



GENERAL  ELECTRIC
Electronic TUBES

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AUTHORIZED
DISTRIBUTOR

GENERAL  ELECTRIC

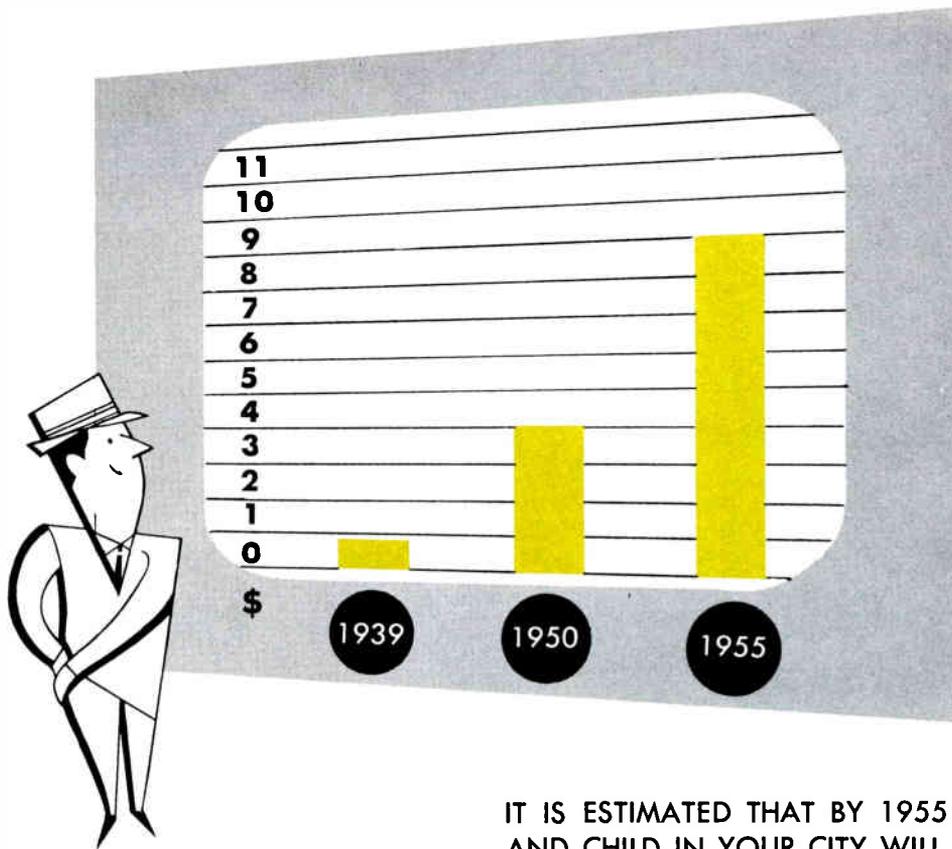
Electronic
TUBES

*are you sure
you're making*

MONEY ?



GENERAL  ELECTRIC
Electronic TUBES



IT IS ESTIMATED THAT BY 1955 EVERY MAN, WOMAN AND CHILD IN YOUR CITY WILL SPEND \$9 A YEAR FOR RADIO-TV SERVICE. WILL YOUR BUSINESS BE GEARED TO GET YOUR SHARE?

A BANK BALANCE IS FINE BUT . . .

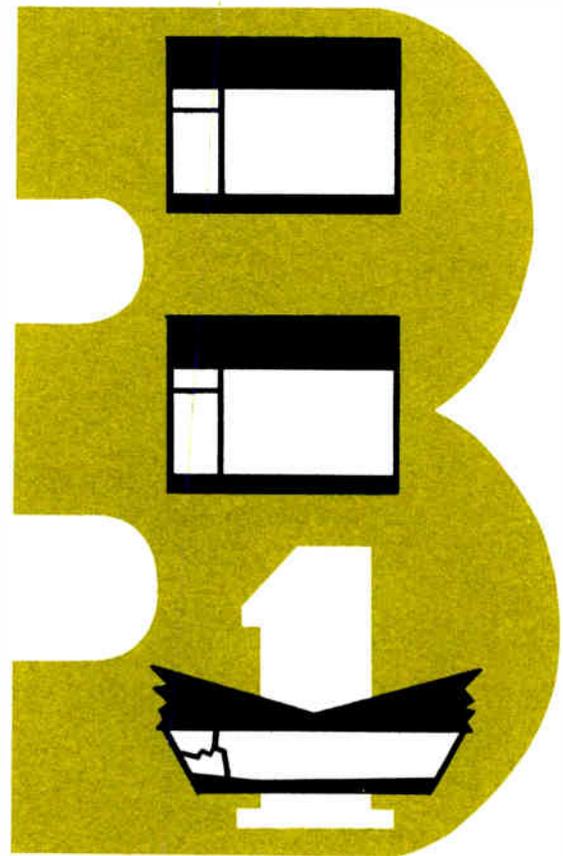
Do you know that a bank balance may not be a particular indication of success? Without basic accounting records you cannot tell how much money you've made, what the future may hold for you, or whether or not you are already well on the road to failure.

Accounting records for your business can be simple. They require little time to keep you well posted on the condition of your business. One reason why so many businesses fail is because they make little or no use of accounting controls. Studies of small business bankrupts show that almost one-third kept no records. Seventy-five per cent of the failures kept inadequate records.

One out of three business firms go out of business within their first year according to the United States Department of Commerce. Inadequate or badly kept records are an important cause. In one check of 30 bankrupt retailers, only two had ever attempted to prepare statements of profit and loss or balance sheets. Three kept no records whatsoever. Others had note books in which they recorded only purchases and sales. Most of those who failed, although on the road to ruin for many months, were not aware of their ultimate failure until it arrived.

Think of it! A man begs, borrows and saves to go into business, works his head off, and then fails because he doesn't appreciate the absolute necessity of good accounting practices. The United States Department of Commerce says that the lack of adequate records is a cause of business failure second only to a lack of sufficient working capital. How about you? Is the success of your business endangered because you haven't "had time" to keep records?

Those of you who are in TV areas don't have to be told you're in on the ground floor of a boom industry. But the question is: Are you set for what's to come? It has been estimated that by 1955 every man, woman, and



ONE OUT OF THREE BUSINESSES FAIL!

you're making money?

child in the country will be spending \$9 a year for radio and TV service. What other industry can match this growth? In 1939, 70 cents a year for radio service; 1950, an annual per capita expenditure of \$4 for radio and TV service; 1955, \$9. No doubt about it, you're in a business that's growing faster than any other in the country. Your job is to get a share of it.

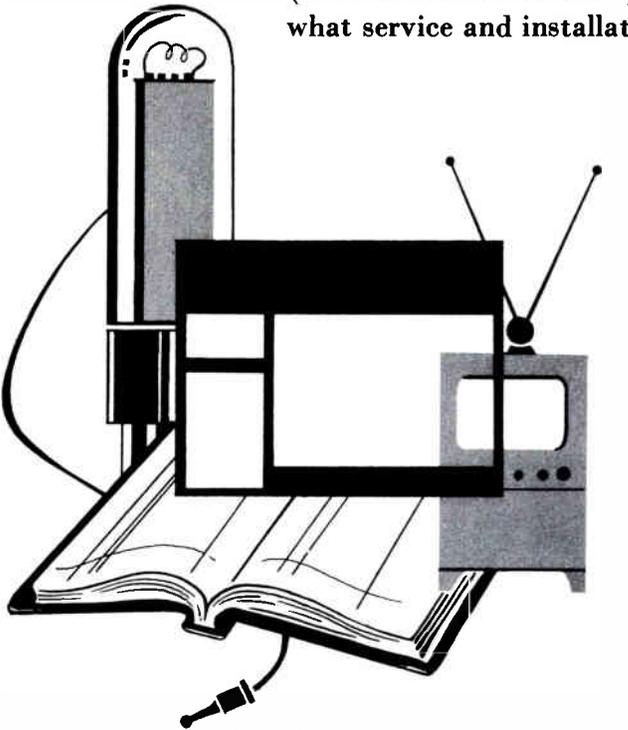
But getting your share is not going to be as easy as it was in the beginning when TV first hit your town. You remember what happened? Aerials sprouted like weeds in a cabbage patch. For weeks you were so rushed you hated to answer the phone because it might be another customer. Busy around the clock, installing and servicing. No question about price. It was as easy to make a dollar as it was to plug in a new set.

KEEP CLOSE TABS ON YOUR MONEY

Many dealers we know were so busy taking in money they had almost no time to keep close tabs on it. Their bank accounts grew along with their business. They bought more test equipment, added a truck, and put on a couple of men to help them carry the load. Maybe they even moved to a better store. Their sales were up every month and what did it particularly matter (or so it seemed to them) whether or not they knew down to the last dollar what service and installation were really costing them.

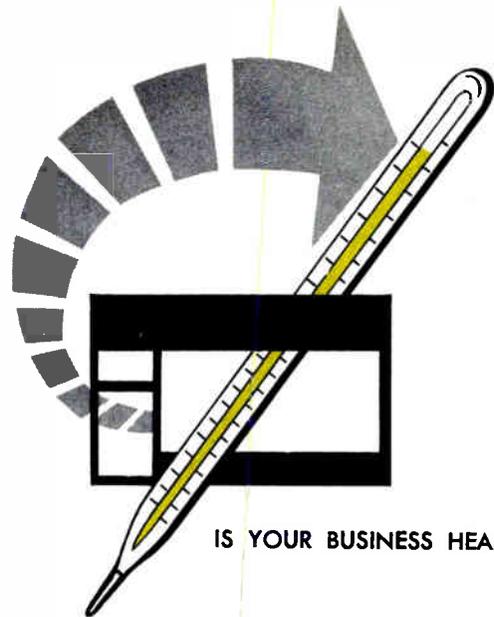
It wasn't that they didn't want to know. They just never could find—or make—time enough to set up their books to keep account of the money as it rolled in. After they had paid the men off at the end of the week there was always enough both for them and the bills. What more does a man have to know about his business, they asked?

The answer to that is *plenty*, Plenty, if he wants to build for himself a solid spot in an industry that has only begun to grow. It was simple enough to jump on the television band wagon. For a while it was like a circus. But in city after city the circus has left town, and in its wake, sharp competition is already beginning to weed out the weak sisters, many of whom fail because they have no records to guide them in running their business. As a business man, you invested money in radio and television servicing for one reason only: to make money. But you are not interested only in earning a legitimate return on your



BUSINESS IS BUILT ON KNOW-HOW

investment. Mostly you want to build something from which you can draw higher wages and greater profits. This you can do if you look after the management of your business with the same diligence and care with which you insist your customers' sets be repaired. One sure way to good management is to get the best accounting tools you can find. They will tell you *what* you need to know about your business *when* you need to know it.



IS YOUR BUSINESS HEALTHY?

GO TO YOUR RECORDS FOR ANSWERS

How about your books? Could you go to them right now and find out:

How much of your business you really own?

What do you owe to suppliers?

How much should be accumulated for taxes?

How much profit you made last month, last year?

Is your business growing, standing still, losing money?

Should you expand at this time, or wait six months?

No man can say he is managing his business properly unless he can turn to his books on any given day of the week and get specific answers to each of these questions. Consider the matter of expansion. Hundreds of businesses large and small go overboard on this one. How do you know whether or not you should branch out if you don't have comparative financial and operating records of your business from month to month and year to year. Could you turn to your books the way Jack S—— did, when the time came for him to make a decision?

Jack was as good a TV technician as ever came down the pike. But right from the start he knew he would need more than just technical know-how to build the kind of business he was aiming at. Even at first when he was so busy with service and installation that he hardly had time to think, he had a pretty good idea the gold rush wouldn't last forever. He knew demand would catch up with supply (as it usually does). And he also knew when that day came he'd have to have some fairly detailed business records to help him find out where he should go.

Jack went to an accountant and had him set up a simple but adequate bookkeeping system that both he and his wife could handle. It didn't take them more than a couple of hours a week to keep the thing right up to snuff. After a few months Jack became so expert at keeping his books he could draw his own monthly profit and loss statement without help. This was a lot of fun, particularly working out the profits down to the last penny.

you're making money?

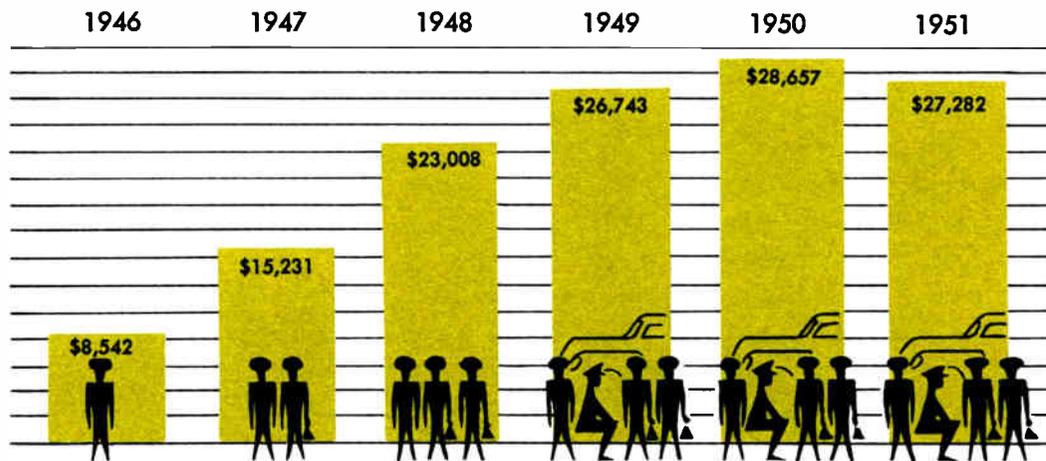
WHAT YOU SHOULD KNOW

Early this year Jack was offered an attractive location next to a supermarket in a sleek, new shopping center. Should he take it? The temptation was strong. The rental was \$375 a month, a cool \$225 over his present rent. It looked like a swell spot for retail sales, a part of the business he had a hankering to get into. He thought it over. Discussed it with his wife. Both of them agreed it would be smart to go back and look over their records to find out how business had been. They got out their yearly profit and loss statements. A comparison of gross sales figures showed this:

1946	\$ 8,542
1947	15,231 (Jack and a helper)
1948	23,008 (Jack and two helpers)
1949	26,743 (Jack, a benchman and two on the truck)
1950	28,675 (Same as '49)
1951	27,282 (No change)

A look at their figures for the first three months of 1952 showed Jack and his wife that business was slipping behind what it was a year ago.

Should they gamble on the new and higher costs? Their records showed Jack and his wife that the gold rush was unmistakably over and that, unless they had a pretty solid plan for substantially increasing sales, the higher costs of the new store would more than eat up their margin of profit. Also, a look at their cost-of-sales figures red-flagged what they already knew: The cost of doing business had been creeping up month after month. At the same time costs were rising, competition was making it increasingly difficult to get a fair price for service. Altogether it looked like a bad gamble to Jack and his wife, just as it would to any business man with adequate records to guide him. Jack said "No" to the temptation, thereby saving himself some



JACK'S BUSINESS



HIS WIFE HELPED HIM WITH THE BOOKS

of the headaches many of his competitors now have.

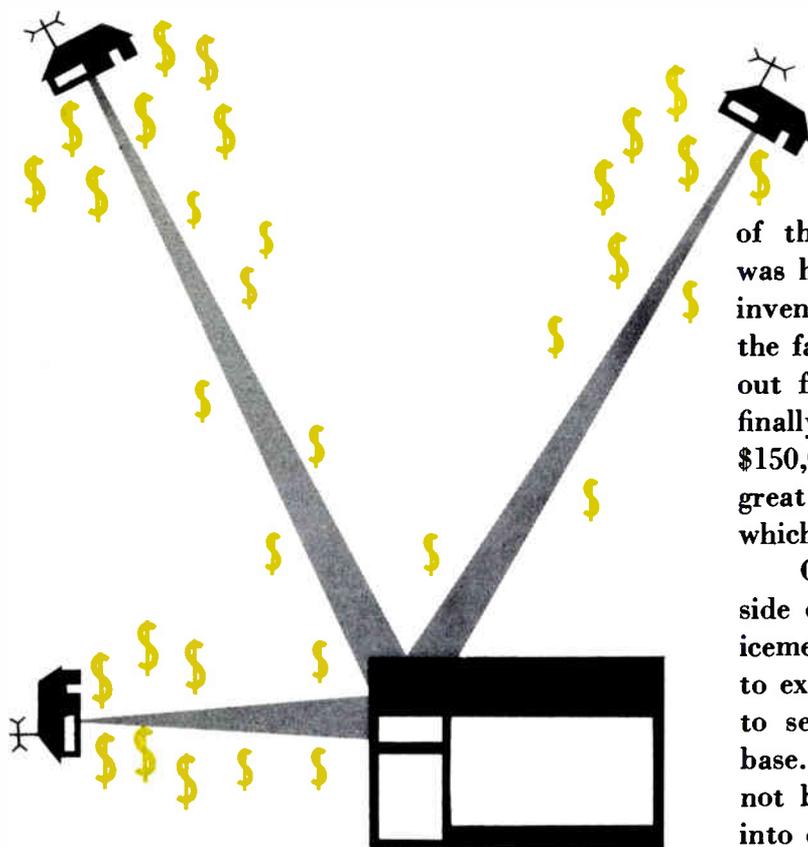
No one has figured out how many over-expansion headaches there are among TV service dealers. But it's a safe bet there are many dealers who wish they hadn't bitten off more than they could chew. Before they made the move a look at their records and a reading of the signs would have saved them losses that are now piling up.

WATCH INCOME FROM CONTRACTS

Other dealers have found it difficult, if not impossible, to complete service contracts because, when they accepted them, they failed to make the proper entries in their books. If they sold a year's service for \$50 and did not put that money in a special fund—pro rating 1/12 of it each month to current income—then more likely than not they found themselves in financial hot water before the contract expired. This is the history of many TV-service failures. Dealers in city after city sold year-long service contracts and then found themselves running out of money while the customers were still quite rightly calling for service. Instead of tightening up their whole operation as they should have, many servicemen, after writing a few hundred contracts, expanded like a government financed industry. This showed admirable enthusiasm. But it could hardly be called a demonstration of sound business judgement based on a careful analysis of their business records.

How about records for the control of your inventory? This is a particularly important problem for the larger dealers employing crews of men to handle their service. Recently, in one of the large metropolitan cities, one

you're making money?



DISTANT SERVICE COSTS MORE

of the really big fellows folded. And what was his trouble? Failure to install a system of inventory control that would have disclosed the fact that his men were stealing parts right out from under his nose. When the loss was finally discovered it was too late. More than \$150,000 was looted from the business, a loss great enough to throw the firm into bankruptcy, which of course it did.

Or take another case on the brighter side of the picture. Johnson, with three servicemen, enlarged his area of coverage in order to expand his business. Naturally it cost more to send these men farther away from home base. These extra costs were absorbed—but not by the customers. The extra service trips into outlying sections of the city looked profitable when sold or billed at the usual rates with the usual margin. A careful analysis of

the figures, however, showed that they were not profitable—they were losing money. Johnson thereupon set up his books so that he could make a proper charge for service to the more distant customers. These charges didn't add much to any single order but, taken all together, they made a lot of difference to Johnson, turning a losing proposition into a profitable one.

DO YOU KNOW YOUR COSTS?

A good set of business records, then, is a pretty handy and valuable thing to have around. In fact it's impossible to over-estimate their importance. Not only will your books tell you what your true costs are, enable you to detect fraud, and help you guard against making disastrous decisions, but they are the continuing source of other vital information without which you cannot properly manage your business.

What about collections? Every call can't be C.O.D. Charges are bound to creep in. Do you have a customer account book that enables you to keep right on top of the charges that drift past their due date? Or are you permitting debts to ride along and then, when you get around to collecting them, you find they are uncollectible? If this is your story, then your sales books are in serious need of an overhaul to prevent such leaks.

How about records showing the operating costs of your truck or trucks? Do you really know what they cost you to operate, say, in cents per mile? If you have such a figure, it should include the idle time of your men while they wait for a truck to be repaired. One contractor, after studying his high costs of truck maintenance, sold his three trucks and found he could save money by paying his men six cents a mile for the use of their cars on the job. His men's cars, he has found, are almost never laid up in the garage for repairs. (They take good care of their own property.) Trucks can eat up your profits. It might be wise to keep careful maintenance records and get rid of your transportation when its cost of operation gets out of hand.

Or take another aspect of your business. Do you have a record of each call you or your men make on a given customer? Does it show name, address, type of set, date of each service call, repairs made and their cost? If you haven't set up such a record for your contract accounts, the chances are you are losing money on some of them. Such records could tell you, for instance, whether or not it is profitable to handle contract service on, say, manufacturer's brand X. Through faulty construction and materials, these sets may require more service to keep them operating than you can afford to provide at your regular contract price. This is something you should know for certain. Losses come out of *your* pocket, not the customer's.

WHAT ABOUT FLOATING A LOAN?

Suppose you hit the slow months without adequate working capital to tide you over. You hate to discharge one or two of your men in order to cut your expenses and stop the drain on your bank account. You'll need these men when business picks up. The thought pops into your head that you'll tap the bank for a loan. But unless you can go to the bank with profit and loss statements that show a history of the company and reflect favorably on your management of it, you might just as well save yourself the trip. It will be the very unusual banker who will even consider your application



LOSSES COME OUT OF YOUR POCKET
NOT THE CUSTOMERS



you're making money?



NO STATEMENT! NO LOAN!

unless you can show him just how your company expects to be in a position to pay him back. Words won't be enough. The banker will want a balance sheet.

GOOD ACCOUNTING LEADS TO SUCCESS

Consider that sore point: Taxes. Are your records set up for good tax management? Have you considered for income tax purposes whether you should incorporate, enter into a partnership with your wife or relative, or operate a sole proprietorship? Under certain circumstances there are tax advantages beneficial to each type of the above ownerships. It might pay you to investigate and make changes in your business accordingly. Again there can be tax economy for you in knowing how and when to report your deductions. Some expenses can be controlled and incurred in the year in which they will give you the greatest deductions. On the other hand, you may find it advantageous to spend money this year for such expenses as repairs, advertising, redecoration, etc. Or perhaps you can delay them until next year, if that will give you greater tax benefit.

But in any event, you'll never know the answers to these and other similar questions unless your records are well kept. Every transaction must be carefully entered in your books and verifiable to any tax agent who may wish to examine your records. If you don't profit from good tax management you have no one to blame but yourself.

In all this discussion of the necessity for keeping detailed records of your business, we have purposely saved the most compelling reason for the last: Uncle Sam, for income tax purposes, demands that you do so. The laws of

the land also say that you shall pay Social Security and other federal, state and city taxes. This you cannot do, without detailed records of your payroll, sales, purchases, expenses, etc.

But even if you were not required by law to keep records, you should be more than eager to do so. As a tool of your business, they are as important as the test equipment in your shop.

These, then, are some of the problems you should be aware of in the management of your business. The necessity for good accounting practices cannot be overemphasized. Good accounting can be the difference between success and failure. Many failures are needless when faults can be so easily corrected by the use of sound bookkeeping procedures.

As a manufacturer of electronic equipment, our success and that of our distributors depends on yours. Thus, it is our hope in the preparation of this manual on management problems that your use of it will help you put your business in the best possible position to take advantage of the expanding market that is ahead for all of us.

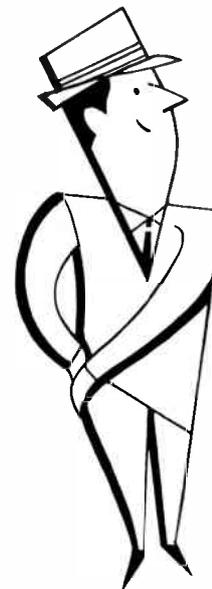
THIS IS ONLY THE BEGINNING

This chapter is only the beginning in a series of discussions about the management problems you face from day to day. Subsequent chapters will be placed in your hands from time to time. They will show you, among other things, the very records you need in order to run your business efficiently.

Bookkeeping forms, designed for radio and television servicing, will be made available to you. It will be a system so simple that either you or your wife can use it, yet complete enough for your basic needs. Still another chapter will tell you how to evaluate and interpret this information enabling you to have at your finger tips the data you require for the proper guidance of your business. Another section will discuss expansion—how and when to expand your service, pointing out what you should know before undertaking any expenditure of capital for growth purposes.

In short, this management service, prepared by the Tube Department of the General Electric Company, will:

- Help you take the guess work out of your business
- Help you make the right decision at the right time
- Help you keep track of your costs
- Help you make money now out of your business.



TUBE DEPARTMENT

GENERAL  **ELECTRIC**

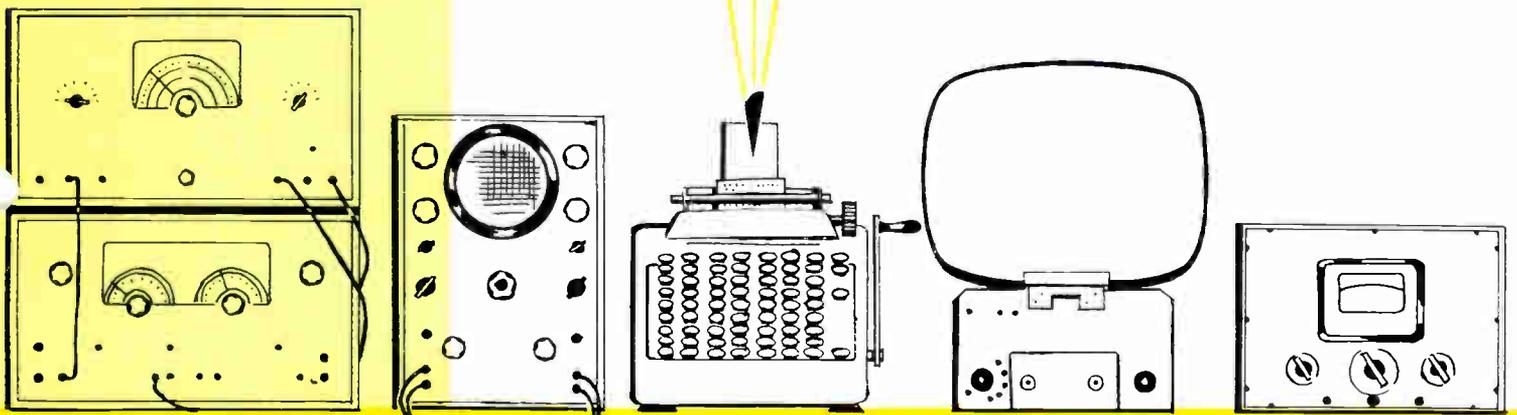
SCHENECTADY 5, N. Y.

BUSINESS
PRACTICES
MANUAL

#2

*Accounting
for the*

TV-RADIO SERVICE DEALER



Part 1



GENERAL  ELECTRIC

Electronic TUBES

*What one dealer learned —
Many now know*



Job Tickets

Accounting Forms

Binders



GENERAL  ELECTRIC
Electronic TUBES

for use with

Part 1 of the G-E Accounting Course for TV-Radio Service Dealers

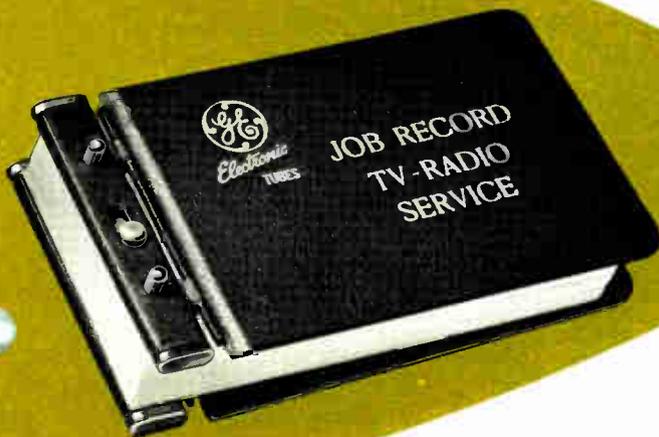
JOB TICKET (ETR-632)

A three-part form consisting of (1) customer's claim check, (2) customer's bill and receipt, and (3) dealer's permanent record printed on heavy paper. Sheets are separated by carbon paper, and perforated. Punched with 2 holes for filing in a special 2-post binder where desirable. Dealer's copy may be separated from the stub and filed permanently in a standard 5" x 8" file box. Overall size of the job ticket is 5" x 8 $\frac{3}{4}$ ", $\frac{3}{4}$ inch of which is the stub.



BINDER FOR JOB TICKETS (ETR-631)

A 5 $\frac{1}{2}$ " x 9 $\frac{1}{2}$ " binder especially designed for filing dealer's copy of the job ticket, where it is desirable to file numerically (by job number) rather than alphabetically. Also useful for holding job tickets given to servicemen at the start of the day. Has stiff covers, metal hinges, and is imprinted as indicated in the illustration. Has 2-inch capacity, which is sufficient space for 100 forms. Expansion posts may be obtained to double this capacity.

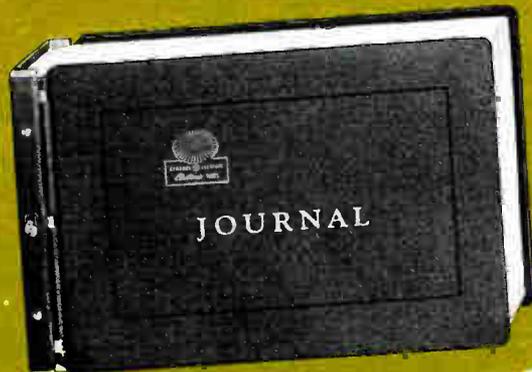
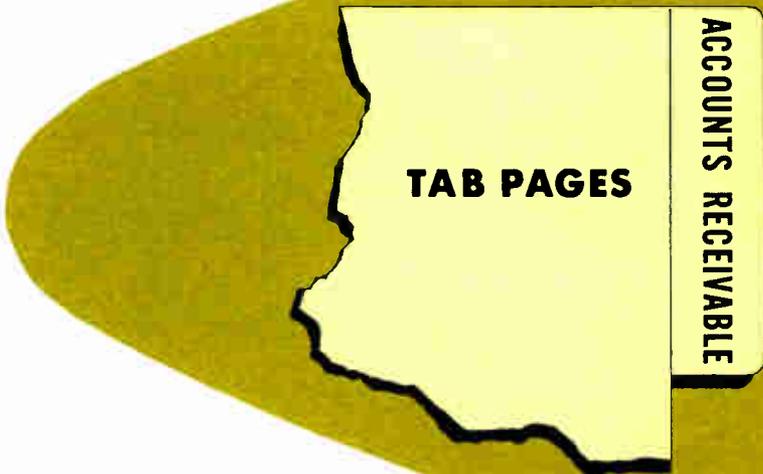


Accounts Receivable Register

DATE	JOB NUMBER	NAME	ADDRESS	BALANCE DUE	PAYMENTS	
					DATE	AMOUNT
6/4/53	101	Joe Helen Smith	125 Spring Lane	9 08	6/4/53	9 08

ACCOUNTING FORMS

Special 11" x 17" forms for recording cash receipts (ETR-647), cash disbursements (ETR-648), and accounts receivable (ETR-649). Tinted to prevent glare, and complete with necessary tab pages to separate the various forms used in the journal. Column headings are printed on all forms. For 25 each of cash disbursements and cash receipt forms, 10 accounts receivable forms, and three tab pages, order ETR-686.



BINDER FOR ACCOUNTING FORMS (ETR-671)

A "lifetime" 2-post binder with stiff covers and metal hinges for holding all the accounting forms in the journal. Imprinted as indicated in the illustration.

Ask your G-E Electronic Tube Distributor how you can obtain these forms and binders at special discounts.

TUBE DEPARTMENT

GENERAL  ELECTRIC

Schenectady 5, N. Y.

"Quickest way I know of to go broke in the radio-television service business is not to keep records," says Morris Sackman, co-partner in money-making, six-year-old Town Television, Flushing, N. Y. And, not intending to go broke, Mr. Sackman keeps just about as complete a set of service records as we have seen. On any given day of the week he can check them for accurate cost information, break down his income into dollars produced from the sale of labor and those earned from the sale of parts, turn to his files for a history of every repair job his men have done, total his sales to find out if he's making or losing money.

But the records at Town Television were not always as well-ordered as they are today. In the beginning, Mr. Sackman had to learn about record-keeping the hard way, by trial and error.

Six years ago, when he and his partner opened shop, there was no one to warn them of the traps they could fall into, of the mistakes they would make. No one told them what to do about the seemingly endless stream of customers who complained that "you fixed my set just last week (more likely, it was last month), charged me \$14.25, and it's still fuzzy."

It took many hundreds of such complaints, and countless wasted man-hours, before Mr. Sackman tumbled to the fact that what he needed was a bill-of-sale designed so that it indicated to the customer when necessary that, even though Town had repaired the set, additional work and other service (such as special parts) might still be required before the customer could expect it to be in A-1 working order. Now, Mr. Sackman is well supplied with such a form and says it has reduced service complaints to a fraction of what they were. (More about this form later.)

A carefully designed bill-of-sale is only one of the many detailed records Mr. Sackman keeps so that he can tell at all times in what direction his business is headed. Without such records, he says, he would find it impossible to operate.

Surveys of radio-television service dealers indicate that the most successful keep the most adequate records. The business is too intricate to trust its progress even to the best of memories. In reality, the small retailer who sells goods over the counter has few record-keeping problems, compared with the owner of a radio-TV repair shop. The latter has service men to keep profitably employed, estimates to make, trucks or cars to be maintained, parts to be sold, sets to be picked up and delivered, and customers to contend with who are about as foggy on the subject of TV circuits and repairs as they are on trigger mechanisms for an atomic bomb.

Keeping track of many of these details requires a set of bookkeeping and accounting forms designed especially for your business. Today, thanks to the record-keeping trials and errors of service people all over the country, the bugs have been worked out of the basic forms and it is now possible to make available to you a bookkeeping system that is simple but which combines the best thought and practices of many dealers. Part of this system will be described to you in this second section of the General Electric Business Practices Manual.

However, it is impossible to overemphasize the fact that no matter how simple a bookkeeping system is,

it will not operate unless you have a sincere desire to *make it work*. It will only prove effective if you complete the various steps required for its successful operation. But, if you do make a reasonable effort, the time you spend on it will reward you not only in dollars saved, but also in the solid satisfaction you will get from knowing that your business is well managed and working efficiently.

The bookkeeping system described here has been designed for the dealer who employs from three to five persons. It assumes that he has been in business for some time, has one or more trucks or cars, derives the lion's share of his income from the sale of parts and service, and has a benchman or else does his own shop repairs.

In this chapter you will be shown:

1. How to estimate the amount of weekly income your business needs in order to make for you a reasonable profit.
2. A set of job tickets that will permit you to keep a complete customer file on each job and cut customer complaints to a minimum.
3. How to record your cash disbursements.
4. How to record your cash receipts.

On the disbursement forms you will be able to record every dollar you spend to maintain your business. They will tell you what expenses are getting out of line, where you'll have to tighten up.

On the cash receipt forms you will record and show income received from labor, the sale of parts and installations. Sales will be divided into cash and charge. These forms will enable you at any time to put your finger on your sources of income and to find out if any weaknesses are showing up.

The cash receipts and cash disbursements forms illustrated in this chapter, are the most important forms you will need. Proper use of them will help you to keep a close check on income and to control your expenditures. Once you have begun to do this, you can really say you have a firm grip on the management of your business. Subsequent chapters will give you the additional forms necessary to complete this accounting system.

But do not think you have to await the completion of the series before you put to work the record-keeping procedures described in this chapter. If your present bookkeeping system is not all it should be—a simple device that can tell you whether you are making or losing money—plan immediately to use this system. You will find it easier to adopt it step-by-step, just as it becomes available, rather than to save all the chapters until the final one is in your hands. Of immediate importance to you is a tight control over your cash receipts and cash disbursements. From what you will learn in this chapter, you can begin to exercise such control immediately.

Think of this system as a continuation of, and (we hope) improvement on, your present record-keeping practices. A word of caution, however, in switching over to the new system. *Do not destroy your old records!* You will need to refer back to them from time to time for necessary information. Also, remember that your records are the only valid source you have for the certification of tax claims.

Estimating your expenses

Perhaps you have been in business for some time and have only a hazy notion of how much money you must take in each week or month in order to pay all your bills, including taxes, to draw from the business the weekly sum you consider necessary for you and your family to live on, and to accumulate capital. For instance, has it occurred to you that unless there is something left over at the end of the year—after you have paid all bills and taken your weekly draw—your business actually may be losing money? You opened up your shop after investing a certain amount of money in fixed assets (test equipment, and trucks or cars). These, as you know, depreciate in value each year and eventually must be replaced. Unless there is sufficient money in the bank to cover the cost of new equipment when the old has worn out, you have not been meeting all your expenses, one of which is depreciation. In reality, in order to meet other expenses, you have been using the money you should have been putting aside for new equipment.

This is an extremely short-sighted policy and can lead to failure. Your fixed assets, plus your technical “know how,” are the most important elements you have in the business. One without the other is worthless. Destroy your assets and you are no longer the owner of a radio-television service business.

The point to remember is that you must plan to take in sufficient income not only to cover expenses but also to cover losses in value caused by depreciation and obsolescence of equipment.

So—if you are not quite sure just how much money you must take in to meet all expenses, or if you find that income does not quite equal outgo, you should estimate your expenses in order to determine how much you *must* gross weekly or monthly. In this way you will learn if you are charging enough for your services.

Now, estimating expenses to determine what charges you must make for service is not a difficult task. Mostly, it is a matter of judgment. In Table I we have worked out for you a sample operating budget based on a survey of a number of dealers in a large metropolitan center. If you are a newcomer to radio-TV service, you may not be able to estimate accurately within several dollars how much your expense in each category

will be. For this reason, at frequent intervals—say, weekly—you should compare actual expenditures with your estimate. Such weekly review will put you on your guard against the loss of considerable sums of money. Neglect this safeguard, and you can run in the red for some time before you actually know where your money is going.

Frequent review of operating expenditures, compared with your budget allowance, will reveal expenses you have either failed to estimate or have underestimated. Such practice will allow you to revise and improve your estimate so that you can ultimately make the correct and profitable charge for your services.

Costs of certain items will vary from section to section of the country, but such differences in costs will not affect the make-up of your budget. For instance you may be able to get a first-rate service man in your area for considerably less than \$90 a week. But, even if you do, this will mean only that you will probably charge less for service than is customary in other areas where wages are higher.

To estimate expenses as we have done in Table I, simply list all the expenses you must meet by the week, month, or year in order to run your business. Some of your expenses (for instance, insurance and taxes) are usually payable by the year. To determine the weekly cost of these items, divide by 52. With some other expenses (rent, heat, telephone, and electricity, the normal billing period is one month. In this case divide the monthly bill by $4\frac{1}{3}$ to obtain weekly costs.

After you have made a list of your costs, check them against the items in Table I to make sure you have included all factors. Allowance for truck depreciation is based on an original cost of \$1000 for a second-hand truck, depreciated over a five-year period at the rate of \$200.00 a year. For tax purposes, the Internal Revenue Department considers the life of certain trucks to be about six to eight years. Test equipment which we assume cost you about \$1000 (you can, if you wish, spend considerably more than this) is depreciable as follows: 16 per cent each year for the first five years; 4 per cent each year for the next five years.

TABLE 1
Estimating Your Expense

Expenses, excluding cost of materials and parts used	Period	Estimated cost for period	Divisor to determine estimated weekly expenditure	Estimated weekly expenditure
Rent and heat	Year	\$1320.00	52	\$ 25.39
Electricity	Month	15.00	4 $\frac{1}{3}$	3.47
Telephone	Month	15.00	4 $\frac{1}{3}$	3.47
Auto and truck expense:				
Gas and oil	Week	5.00	1	5.00
Tires and repairs	Year	100.00	52	1.92
Mileage allowance for employee's cars	Week	10.00	1	10.00
Insurance, autos, and trucks	Year	208.00	52	4.00
Depreciation, autos, and trucks (5 years)	Year	200.00	52	3.85
Other auto and truck expense	Year	100.00	52	1.92
Property and business insurance	Year	100.00	52	1.92
Taxes other than income, payroll, and sales taxes	Year	100.00	52	1.92
Stationery, printing and office supplies	Year	150.00	52	2.88
Depreciation, shop equipment (10 years)	Year	50.00	52	.96
Depreciation Test Equipment	Year	160.00	52	3.08
Depreciation, furniture and fixtures	Year	50.00	52	.96
Advertising	Week	10.00	1	10.00
Other exepenses	Year	200.00	52	3.85
Payroll, serviceman No. 1	Week	70.00	1	70.00
Payroll, serviceman No. 2	Week	90.00	1	90.00
Salaries, clerical	Week	35.00	1	35.00
Wages of owner	Week	150.00	1	150.00
Unemployment Insurance Tax —				
Employer's contribution	Week	5.85	1	5.85
Federal Old Age Benefits Tax —				
Employer's contribution	Week	2.93	1	2.93
Total Expenditures to be recovered in excess of materials and parts				<u>\$438.37</u>

Here is how the schedule of depreciation shown in Table I was computed:

Here is how the contributions to the Unemployment Insurance Tax and the Federal Old Age Benefits Tax shown in Table I were computed:

Item	Original Cost	Estimated Life (years)	Annual Depreciation		Class of Salary	Weekly Salary	Unemployment Tax at 3 per cent	F.O.A.B. tax at 1.5 per cent
			Per Cent	Dollars				
Autos & Trucks	\$1000	5	20	200	Serviceman No. 1	\$70	\$2.10	\$1.05
Shop Equipment (other than test)	500	10	10	50	Serviceman No. 2	90	2.70	1.35
Test Equipment	1000				Clerical	35	1.05	.53
1st 5 yrs.			16	160	Owner	150	none	none
2nd 5 years			4	40				
Furniture and Fixtures	500	10	10	50	Total	<u>\$345</u>	<u>\$5.85</u>	<u>\$2.93</u>

You will note that we have made no provision for F.O.A.B. and Unemployment taxes on the owner's salary. This is because both of these taxes are computed on earnings. While you may draw \$150 a week from the business, your yearly earnings may well be in excess of this depending on your profits. How you will compute your taxes, as owner, is discussed in another section of this chapter under payroll taxes. Because federal taxes are such a knotty problem, and because state tax laws differ widely, it is advised that you consult the Social Security and Unemployment Insurance Boards nearest you for information as to the requirements for your business.

Now add up the figures in your weekly column and total the amount. This figure, then, is the amount of money, including your draw, you must gross weekly to cover all expenses. It is called the break-even point. You will note that the illustrated budget is set up for the salaries of two service men, one office employee, and the owner's weekly drawing account. Chances are you may do your own bench work, in which case the salaries of your service people will be about \$70 a week. Benchmen, being more experienced than the average service man, command a higher wage.

In looking over your expense budget you will see that considerably more than half of its costs is absorbed by payroll. The other expense items, you will note, are pretty much fixed. Even if you

closed for a month, or dismissed all your employees, you would find it exceedingly difficult to reduce these other expenses. Their weekly, monthly, and yearly recurrence, once you are in business, are as inevitable as the change of the seasons. In a slack period, you can get some relief by cutting your work force. But this is shortsighted policy. When things get busy again, you'll need your service men.

Realization of this fact, then, places on you, the owner, the task of devising ways and means of making sufficient income month in and month out to meet your estimated expenses plus a reasonable profit.

We cannot in this section on Business Practices tell you how to do this. The sections on Marketing, Merchandising, and Advertising suggest ways to increase your sales. In any event, if you are to continue in business your average weekly income over a period of a year or more must equal expenses unless you are able to raise additional working capital to meet your losses.

Once you have determined your break-even point, you can begin to figure out how much you must charge for service and parts. Obviously the sky is not the limit. Competition sees to that. The point is that you must work out a charge for service and parts that will permit you not only to cover expenses but also to earn a certain amount of profit, to which you as owner are entitled.



Figuring your income

How much you should charge depends on several factors: competition, wage rates in your area, your fixed expenses, how much you wish to take out of the business weekly, how much yearly in profits. Within the framework of competitive pricing and wage rates established in your city or area, over which you have little or no control, you will have to work out your pricing problem. Now it is obvious that if you decide to draw from the business \$75 a week instead of \$150 you will be able to bill out your men's time at a lower rate. Likewise, if your store rent is \$500 a year instead of \$1,320 the difference becomes an important factor in estimating what you should charge.

If competition prevents you from charging for service the amount you need to cover your costs and to earn a reasonable profit, two courses of action are open to you:

1. Increase your sales volume.
2. Reduce your costs.

In pricing service time, cost factors are so variable that it is impossible to tell you the exact hourly charge you must make for service time.

For instance: in a large metropolitan area, parking presents a serious problem. As a result it has been found that in large cities service men are able to make no more than half the calls per day completed by men of a suburban dealer. As a result, the price per service call in the city must necessarily be higher than it is in the country.

Yet, within a given marketing area, the city and its suburbs, costs from dealer to dealer will vary little if any. Hence the hourly rate which the city dealer determines his men must earn will practically be the same as that of his suburban competitor. Thus: a city dealer may charge \$5 per service call. His men average six calls a day for a gross of \$30 per man. A suburban dealer may charge \$3 per service call, but his men average 10 calls a day, grossing \$30. In each case, however, the dealer is charging \$3.75 an hour per 8-hour day.

We have worked out a pricing procedure based on the experiences of many dealers in a large metropolitan area. This procedure, we think, can easily be fitted to your needs once you have determined your own variables as set forth in the two preceding paragraphs.

Be sure you plan for profits

Once you have determined your break-even point, it is not enough that your income just equal this amount. You must plan your business so that income exceeds bare expenses, including your draw. Almost every business has its slack periods, and radio-TV servicing is no exception. Expenses in off-periods should be met out of profits. Hence you must strive for a weekly rate of income in excess of your break-even point. Unless you do this you will find yourself dipping into capital to tide you over the slack months.

One sound rule to follow in figuring expenses and income is to estimate high on expenses and low on income. The best-laid plans for developing business don't always work out. Hence overshoot the mark on expenses and underestimate your income.

It is more than likely that you will derive almost all your income from the sale of labor and parts. In our estimate of expenditures (Table I) the *cost* of parts sold has been deliberately ex-

cluded as an expense item. Parts will be sold at list price enabling you to recover inventory costs plus a profit. This profit is considered a contribution to the recovery of expenditures listed in Table I.

Mark-up on the sale of parts averages from 40 to 50 per cent of list price. It has been found in one of the large metropolitan areas that profit on the sale of parts can be expected to account for approximately 15 to 20 per cent of your gross income. From this estimate we can develop the following:

1. Weekly labor billings required to recover operating expenses plus owners profit. (Table II.)
2. Minimum hourly billing rate for a given number of service men. What you must charge for their time. (Table III.)
3. Number of calls required when the following facts are known:

- a. Number of service men working.
- b. Standard rate at which service calls can be billed in your community (Table IV.).
- 4. How much in parts you will have to sell so that from their sale you can earn 15 to 20 per cent of your income (Table V.).

HOW MUCH INCOME FROM SERVICE?

The answer to the question of how much income you must derive from labor time alone is arrived at by adding total expenses to expected owner's profit, and deducting from these your estimated profit from the sale of parts. This is illustrated in Table II, below.

Thus it is evident that the owner's time, plus that of his men, must bring into the business at least \$422.62 a week, a sum equal to operating expenses plus owner's profit less estimated profits on the sale of parts. The next problem is to determine what hourly rate your billable labor must earn. In Table I you noted that the owner employed two service men. Naturally you as the owner will employ your time profitably. For our purposes, we will assume that 50 per cent of your time in the shop can be devoted to income-producing activity. We are now ready to find out the rate at which each productive labor hour must be billed.

MINIMUM HOURLY RATES

Here is the way to calculate the minimum hourly

rates you and your men must earn. In the example given below in Table III we have deliberately estimated your time at 40 hours a week, even though you will probably work many hours in excess of that figure. All billable time you are able to write up over the necessary 20 hours will be very profitable. But for illustrative purposes, we have carefully avoided distorting the income account by requiring you to be profitably employed every minute of the 50 to 60 hours a week you are in the shop. We have limited your income-producing time to 20 hours. In some areas, service men work 48 hours a week. If this is the case in your city, adjust your calculations to make allowance for this fact.

Working out the minimum hourly rate you and your men must earn to cover expenses plus profit (\$4.60 per hour in Table III) should be very instructive to you as owner of a radio-TV service shop. When you have computed your hourly rate, you will immediately see that you have no such thing as "free time" to give away. Every hour your men are on the job, less that 10-percent idle-factor about which you must never tell your men, must be accounted for in billable time. If you can reduce this idle-time factor, even by only a few hours a week, it will mean greater profits.

By now it should be evident that you cannot afford to cut prices below whatever figure you

TABLE II

Weekly Labor Billings Needed to Recover Expenses Plus Profit

Total operating expenses (See Table I).....	\$438.37
Add profit desired by owner	50.00
	\$488.37
Deduct estimated profit on sale of parts at the rate of 15 per cent of operating expenditures (0.15 x \$438.37)	65.75
Net Amount of Income.....	\$422.62

TABLE III

Minimum Hourly Rate for Billing Labor

Estimated billable time	(A) Number of employees	(B) Weekly hrs. to be billed	(A) X (B) Billable hrs.
Service men	2	40	80
Owner, 50 per cent of whose time is billable.....	1	20	20
Total billable hours			100
Deduct idle, or nonchargeable, time of service men estimated at rate of 10 per cent.....			8
Net billable hours			92
Labor billing needed to recover expenses plus owner's profit (Table II).....			\$422.62
Minimum billing rate per hour (\$422.62 divided by 92).....			4.60

need to recover the *necessary*, minimum hourly rate; nor can you afford to make a practice of doing favors for your customers, like calling back this week at no charge to adjust a set you repaired last week. Every hour you and your men are on the job is valuable time which must be profitably employed. If you don't look at labor time in as cold a light as this, the chances are you will run into trouble before very long, just as many of the price cutters do.

In each TV city in the country, when things get tough competitively, some dealers get the notion they're going to set the town on fire with, say, a \$3 service call. They figure they're smarter than their competitors and will have no trouble at all getting the lion's share of the \$5 business. Now maybe they could do this—if they were all geniuses. But, the occurrence of genius is about like a \$3 bill—very rare indeed. No one has determined yet how you can sell a \$5 commodity for \$3 and do it for very long; unless, of course, your rich great aunt is financing the deal. And there's always a chance that even she will run out of money.

The only thing the \$3 geniuses usually set on fire is their own working capital, which they proceed to burn up in short order. It is well to remember that customers, normally, are suspicious of some one who sells a product or service for less than the accepted rate. They suspect the deal is not quite on the up-and-up. And because of their hesitancy in patronizing the suspected ones, the latter have as much trouble in selling service for \$3 as their competitors do for \$5. As a result, the \$3 boys fail to increase their business materially. And, unless they can just about double their nor-

mal 8 to 12 service calls a day, they will lose money pretty rapidly. Then one of two things usually happens: either they go broke, or wake up to the facts of business life just in time to keep themselves from bankruptcy.

Moral: Figure out what it costs you to do business and stick to it.

HOW MANY SERVICE CALLS PER DAY?

Once you have determined the minimum hourly rate you and your men must earn to cover expenses plus profit, it is then necessary to find out how many service calls, billed at the competitive rate for your city, will be necessary for your men to make each week. Number of service calls is arrived at as follows in table IV below:

In order to recover a \$4.60 minimum hourly billing rate, it is necessary for each of the two service men to average eight \$5 calls per day. Quite obviously if you are located in a congested city area where parking is a problem, it will not be possible for your men to make 8 calls a day. In this event, and, if you are faced with a competitive \$5 service rate, you will have to take at least one of the three following steps or a combination of all three to make up for the fewer number of service calls.

1. Decrease amount of nonchargeable time.
2. Add another service man.
3. Cut operating expenses.

If you take Step 2 you will have to recalculate your minimum hourly rate and at the same time develop a sufficient amount of additional business to keep the third man profitably employed.

TABLE IV

Labor billing required to recover operating operating expenditures and owner's profit. (Table II) . . .	\$422.62
<i>Deduct:</i> Estimated billings for time of owner-benchman	
Owner's time on service (Table III)	20 HOURS
Minimum hourly rate for billing labor (Table III)	\$4.60
Minimum billing for owner's time as benchman (20 hrs. X \$4.53)	92.00
Labor billing required from service calls	330.62
Standard rate per service call	5.00
Number of service calls required to bill \$321.05 weekly (330.62 divided by \$5)	66*
Weekly number of calls for each service man (66 divided by 2)	33
Number of service calls required from each service man per day, assuming a five-day week, less allowance of nonchargeable time (10 per cent of 5 days equals ½ day, netting 4½ days each week for billable time) is computed by dividing 33 (number of weekly service calls required) by 4½	8*

*Rounded Off

What gross income from the sale of parts?

You will recall that, as pointed out earlier in this section, in one of the large metropolitan areas many dealers calculate that their profit from the sale of parts is equal to approximately 15 per cent of their operating expenditures. Using this figure, you can determine how many dollars worth of parts you must sell each week in order to earn the necessary parts income needed to help defray 15 per cent of your operating expenditures. This you do as shown in Table V.

TABLE V

**Dollar value of Parts required to Contribute
15 Per Cent of Operating Expenditures**

Estimated profit contribution from sale of parts (Table II)	\$65.75
Minimum gross profit rate from sale of parts	40 per cent
Gross dollar value of parts per week required to contribute \$65.75 where minimum profit is 40 per cent of selling price. (Profit contribution, \$65.75 divided by gross profit margin on sale of parts, 40 per cent)	\$164.37

PROOF

Sale of parts required	\$164.37
Gross profit margin on sale of parts	40 per cent
Profit (0.40 X \$164.37)	\$65.75

Many dealers have found that they can quite legitimately increase parts sales by having their men spend a little more time on each job, particularly in the home. In such cases, the serviceman inspects each set rather carefully, and in so doing, more likely than not, discovers parts which are still working but are in ragged condition. A bit of explanation about the rather predictable rate at which some TV parts wear out will frequently induce the customer to replace them. The selling pitch here is that replacement now will be less costly than later on, and will, of course, result in considerably better reception. Using such techniques, many dealers are able to lift their income contribution from the sale of parts considerably above the 15 per cent mark.



The job ticket

Part of the base of the pyramid for this accounting system is firmly anchored in your sales forms or job tickets. When you sell service time and parts, you want your job tickets handy for a permanent record of the transaction.

A job ticket is many things to many dealers. Some have elaborate forms they have developed themselves. Others buy equally elaborate forms. Still others use simplified job tickets. The point is that there is no single job ticket adaptable to the requirements of each and every radio-TV service dealer across the country. The best of them, however, are designed to record the following information and to perform the following functions:

1. Provide the customer with a claim check for work to be repaired in the shop.
2. Provide the customer with a record of work accomplished in the form of an unpaid or receipted bill.
3. Provide dealer with a detailed, permanent record of each job: pertinent customer information (name, address, date, make and model of set, customer complaint, etc.) and a record of work done (divided into the sale of parts and labor time).
4. Provide dealer with space for indicating to the customer, when necessary, that even though he has repaired the set, it is still in need of addi-

tional work. Some dealers have found this to be one of the most important features of a job ticket. In effect, it lets the customer know that the dealer feels there is still more work to be done on the set before it is in A-1 working condition, thus forestalling a great percentage of customer complaints against the quality of the repair work. This feature has saved dealers many dollars normally wasted in needless callbacks.

In Fig. 1 on page 10, you will find a three-part carbon job ticket that meets these primary requirements. The first page of the form is the customer's claim check; the second, customer's receipt; the third, dealer's permanent record printed on a light Bristol board. The over-all size of the form is 5 x 8 $\frac{3}{4}$ inches, $\frac{3}{4}$ of an inch of which is the pasting stub. When a transaction is completed, the dealer copy is filed alphabetically in a standard 5 x 8 card file.

When a service call comes in, pertinent information is secured from the customer and filled in at the top of the form and the job is assigned a number. The three-part form can then be placed in a rack containing six sections, one for each day of the week. Dealers in a large city will want to make a further ticket grouping according to geographic areas. Naturally it is time-consuming to have service men chasing from one end of the city to the other. If possible, start your men out each morning to work a specific area of the city.

Each morning the service men are given a set of job tickets, after the dealer has logged into a special notebook customer name, job number and the initials of the service man. Such a precaution is worth the time it takes. If the repair can be made in the home, the customer claim check is destroyed, the work completed, the set then checked for general performance and the Additional-Repairs-Required section of the form filled out. If the set is in good working order, it will be so stated on the form. However, if certain small defects mar perfect reception, the service man will indicate this fact in the space allowed and will also point it out to the customer. The customer is thereby informed that he can expect further trouble from his set, unless certain faulty parts are replaced or further adjustments are made. This check will take an experienced service man no more than a few minutes to make, and should result in additional business.

When the job is completed the proper charges are made on the customer receipt form, and the customer's signature obtained. If payment is made, the bill is marked paid and given to the customer. If payment is not made, the same procedure is followed, but the bill, of course, is not marked paid.

If the set is brought into the shop, the claim check is given to the customer. For purposes of shop identification the job number can be written in chalk on the inside of the set. When the job is finished, the set is delivered, connected, its over-all performance is checked and the job tickets are filled out as before. If the bill is unpaid, it is filed back in the shop in an accounts receivable file for follow up. When it is paid, it is filed alphabetically after certain information has been posted from it to the cash receipts journal. How you post to your cash receipts journal will be described later in this chapter.



The checkbook

DEPOSITS		NUMBER	DATE	CHECKS
1000 00 Balance 6/3/53		8386	6/6 1953	
✓ 178 24	ORDER OF <i>Business #1</i>			
✓ 178 24	FOR <i>Wages \$6000</i>			
	<i>Gen: 35 Feb 90</i>			
	<i>U.H.C. 9 60 10 50</i>			
49 50	DETAIL DEPOSIT			49 50
✓ 128 74				
AMOUNT DEPOSIT		NUMBER	DATE	
		8387	19	
ORDER OF				
FOR				
DETAIL DEPOSIT				
AMOUNT DEPOSIT		NUMBER	DATE	
		8388	19	
ORDER OF				
FOR				
TOTAL DEPOSITS		TOTAL CHECKS		

NO RECEIPT REQUIRED RETURN IF NOT CORRECT THIS CHECK PAYS IN FULL THE FOLLOWING ITEMS				YOUR NAME ADDRESS		N ^o
DATE	AMOUNT	CREDITS & DEDUCTIONS	NET			8386
						19
						\$
						Dollars
TO				YOUR BANK NAME		
				ADDRESS		
FE						PRESIDENT

NO RECEIPT REQUIRED RETURN IF NOT CORRECT THIS CHECK PAYS IN FULL THE FOLLOWING ITEMS				YOUR NAME ADDRESS		N ^o
DATE	AMOUNT	CREDITS & DEDUCTIONS	NET			8387
						19
						\$
						Dollars
TO				YOUR BANK NAME		
				ADDRESS		
FE						PRESIDENT

NO RECEIPT REQUIRED RETURN IF NOT CORRECT THIS CHECK PAYS IN FULL THE FOLLOWING ITEMS				YOUR NAME ADDRESS		N ^o
DATE	AMOUNT	CREDITS & DEDUCTIONS	NET			8388
						19
						\$
						Dollars
TO				YOUR BANK NAME		
				ADDRESS		
FE						PRESIDENT

Fig. II

Another of your most important basic records is your checkbook. How you keep it has a direct bearing on the success of your business. If you cannot keep it with absolute accuracy, it's doubtful that you should be in business for yourself.

If you haven't already done so, it would be wise to secure from your bank a checkbook with your firm name printed on it, like that shown in Fig. II. The small charge for it is more than compensated for by the prestige and appearance of permanence offered by checks with an imprinted name.

Every stub in your checkbook should show the date, name of the individual, or firm to whom the check is issued, the purpose and the amount. Never fail to record these facts. You will need them when the time comes to post these transactions in your cash disbursements ledger. Bring

your cash balance forward on the stub as you write each check, show the deduction and add in any deposit, indicating the date of the deposit next to the amount. Then for each page add the deposits and deduct the total amount of the checks. The balance of your account should be shown in the margin provided.

Be sure to number each check, and never use one unless it is from your checkbook and the stub is properly filled out. If it is necessary to transact business away from your shop, take a check or two from the book and fill out the stub the minute you return. If these checks become soiled or otherwise unusable, destroy them and mark the stubs void. Never write a post-dated check and never write a check if your balance cannot cover it. It will take you a long time to overcome the shadow cast by one bad check.

The Cash Receipts and Sales Journal

The cash receipts and sales journal, and the cash disbursements journal, along with the job ticket and the checkbook, are the forms which complete the base of our accounting pyramid. Proper use of all four will launch your business on the road to sound management through the use of good accounting practices.

Let's assume it is the end of your business day, June 4, 1953. This is the day you have decided to begin to use these accounting forms.

First thing to do is to get out your checkbook and enter on the next unused stub the date and your correct cash balance as of the current day. Next when your two service men have returned to the shop and have given you the cash they have collected and their job tickets, you immediately proceed to total the job tickets after first checking the calls made against the record of them which you logged in the morning. The money is then counted and checked against the job tickets. If it balances against paid job-ticket totals, all's well. If not, the discrepancy must be found. For your own and your servicemen's protection, you can, if you wish, give them a receipt for the money turned in.

In analyzing the invoices Serviceman No. 1 turned in you find the following:

Total business per job tickets . . .	\$65.60
Less account receivable from	
Mrs. Helen Smith	9.08
Cash collected	\$56.52
Serviceman No. 2's invoices showed:	
Total business per job tickets . . .	\$67.81
(all cash)	

You further analyze Serviceman No. 1's invoices, breaking his sales down into labor and parts. You find that parts plus the three percent sales tax charged account for \$20.60 of his total; labor from service, \$45. Sales slips from No. 2 show \$27 for materials and parts, \$.81 sales tax, \$15 for labor charges, installation, and \$25 labor charges from service.

Today you sold \$4.25 worth of tubes over the counter upon which 13 cents sales tax was collected. Your men collected and turned over to you, in addition to money earned from their service calls, \$40.45 from customers whose sets had been repaired in the shop and delivered on this day. In effect, you, as benchman or owner took in \$40.45: \$15 is the price of materials and parts used in repairs, 45 cents sales tax and \$25 was for billable time earned by repairing sets.

With your days receipts broken down in this way, you are now ready to make the first entries in your *Cash Receipts and Sales Journal*. This journal is made up of several identical pages, one of which you will find in Fig. III. These forms are bound in a single loose-leaf binder containing all the other forms used in the journal.

When you have secured the necessary forms, open to the sales journal and let's proceed to enter the day's sales transactions. You will note that under the columns *Received From*, each day's transactions are entered according to the name of the serviceman. For illustrative purposes we will use Serviceman No. 1, Serviceman No. 2, and owner, and *Over The Counter* . . .

Serviceman No. 1 did \$65.60 worth of business,

The Cash Receipts and

DATE	RECEIVED FROM	DEBITS			MISCELLANEOUS DETAILS
		TOTAL CASH & RECEIVABLES	CASH	ACCOUNTS RECEIVABLE	
1	June 4 Serviceman # 1	\$ 65 60	\$ 56 52	\$ 9 08	
2	" # 2	67 81	67 81		
3	Owner	40 45	40 45		
4	Over the Counter	4 38	4 38		
5		178 24	169 16	9 08	
6	June 5 Over the Counter	21 44	21 44		at Receivable - Mrs Helen Smith - Job #101
7	" " " James Jones	282 50	282 50		See 1 Prod T.V. Set
8					

Fig. III

\$9.08 of which was uncollected. On the left hand side of the page is the total column *Total Cash & Receivables*. Enter there the total of his day's business, \$65.60. In the next two columns enter the appropriate amounts: \$56.52 under *Cash*; \$9.08 under *Accounts Receivable*. The purpose of these entries is to give you a quick summary of each man's sales day by day.

Now let's shift to the right-hand columns of the sales journal. There you will see at the top of the page the broad heading *Analyses of Cash Receipts and Sales*, and under that several self-explanatory column headings. In the *Total Receipts* column under the analyses section, again enter the total sales of Serviceman No. 1. His parts sales, you recall, accounted for \$20 with 3 per cent sales tax added. Enter these in the appropriate column. The \$45 received from labor charges will also be entered. Total Receipts for Serviceman No. 1 should now equal *Total Cash and Receivables*.

When you have completed making all entries to account for the sales of Serviceman No. 1, follow the same routine for Serviceman No. 2, and for yourself, as Owner. The figure, of course, will be taken from your analysis of each man's sales. After you have made all entries, total each column, as has been done in the sample form, Fig. III. Thus, day by day, you have an accurate account and analysis of each day's business. You will also want to total or "foot" each separate

column when you have completed the day's entries as has been done in Fig. III. You should also add the totals across to make certain that they balance with the *Total Cash and Receivable* and the *Total Receipts* columns. You then have a running account of each day's sales according to their several categories.

At the end of the month, total all daily figures. These figures will eventually build up into a month-by-month record of your sales. After you have completed 12 months of such entries you will find it very helpful and revealing to go back each month and check the current month's sales against comparable figures a year ago. These figures are a valuable indicator of the growth or failure of your business.

On June 5, the day after you made the above entries, Mrs. Helen Smith stopped into your store and paid her \$9.08 charge. On this day you also sold \$12 worth of parts over the counter to which the 3 percent sales tax was added. These entries you will make as shown in Fig. III. The accounts receivable payment is entered under *Miscellaneous Details* column where you note the customer's name and job number. These you get from Mrs. Helen Smith's sales invoice which was turned in by Serviceman No. 1 on the preceding day and which you put away in your accounts receivable file. (The *Miscellaneous Details* column is used to record those entries for which no columnar provision has been made in the *Analyses of Cash*

Sales Journal

CREDITS - ANALYSES OF CASH RECEIPTS AND SALES

T. NO.	AMOUNT	SALES MATLS. & PARTS	LABOR CHARGES			SALES TAX COLLECTED	TOTAL RECEIPTS
			INSTALLATIONS	SERVICE CALLS	OTHER		
		20 00		45 00		60	65 60
		27 00	15 00	25 00		81	67 81
		15 00			25 00	45	40 45
		4 25				13	4 38
		66 25	15 00	70 00	25 00	199	178 24
	9 08	12 00				36	21 44
	225 00	25 00	25 00			7 50	282 50

Accounts Receivable Register

	DATE	JOB NUMBER	NAME	ADDRESS	BALANCE DUE	PAYMENTS	
						DATE	AMOUNT
1	6/4/53	101	Mr. James Jones	125 Spring Lane	9 08	6/5/53	9 08
2							
3							
4							
5							

Fig. IV

Receipts and Sales, Fig. III. At the end of each month, account numbers, as determined from a chart of accounts, which will be given you in the next chapter, will be used for the purpose of summarizing and posting the specific accounts to the General Ledger.)

At the time you filed the unpaid invoice, you also made a record of it in your Accounts Receivable Register (Fig. IV), entering the unpaid invoice in the manner shown there. This *Accounts Receivable Register* is maintained only for the purpose of giving you a double check on unpaid invoices. They may become lost or get mislaid. But when you have a separate record of them in your register you are safe from probable loss through inability on your part to present a bill.

When an account receivable is paid, in this case the \$9.08, you make the entry as shown in Fig. IV under *Payments*.

When your men turn in unpaid job tickets, file them in a standard 5 x 8 inch file with dividers for each day of the month. Such a file will enable you to maintain a close check on your accounts receivable.

When a payment is received, the customer card is removed from the accounts receivable file and the date, the amount collected, and the unpaid balance, if any, is marked on the back of the ticket. If the account is fully paid, it is filed alpha-

betically in your permanent customer file. If only partial payment has been made, it is returned to the accounts receivable file. The purpose of keeping a permanent customer file is, of course, to give you ready access to a blow-by-blow description of each repair job.

While the bulk of your income is derived from the sale of service and parts, from time to time it is very likely that a customer will ask you to recommend a TV set to replace his old model. The customer, James Jones, is pleased with your recommendation and asks you to get and install the set for him. Servicemen No. 1 and No. 2 are sent out to make the installation. When they have completed the installation, you bill the customer in the usual way on one of your job tickets. On June 5 he pays you in full with a check for \$282.50.

As you can see by checking the sample entry for June 5, Fig. III, there is no particular trick to recording this transaction in your journal. The analysis of this sale shows that, of its \$282.50 total, \$25 was accounted for in parts, \$25 as installation charges, and \$225 as the billing price of the set to the customer. The sales tax on the set and parts must be added to the selling price and is entered in the *Sales Tax* column. If your community does not collect a sales tax, you will, of course, not be troubled by such an entry.

The Cash Disbursements

DATE	CHECK NUMBER	AMOUNT OF CHECK	CREDITS			TOTAL CREDITS	GROSS PAYROLLS	AUTO TRUCK EXP
			DEDUCTIONS FROM PAYROLL					
			SOCIAL SECURITY	INCOME TAX	OTHER			
1 June 6	101	\$ 49 50	\$ 90	\$ 9 60	\$ 60 00	\$ 60 00		
2	102	74 05	1 35	14 60	90 00	90 00		
3	103	124 33	3 37	22 30	150 00	150 00		
4	104	6 27			6 27			
5	105	2 00			2 00			
6	106	38 00			38 00			
7	107	90 00			90 00			
8	108	22 00			22 00			
9	109	14 25			14 25			
10	110	25 00			25 00			

In the meantime, continue daily postings to your cash receipts and sales journal, following the routine outlined above. And, at the end of each month total the columns. In time, your diligence in carrying out this task will be more than amply rewarded with a set of sales figures that will be an accurate and revealing history of your business. In a subsequent chapter you will be shown how to post these monthly sales totals to your general ledger.

Our explanation of this and related transactions involving the sale of a piece of major equipment is, perhaps, over-simplified. However, in a subsequent chapter in this series the problem will be fully explored. There you will be shown accounting procedures concerning the sale of major items of equipment when they are drawn from inventory and when a trade-in must be accepted with the sale.

Keeping the cash disbursements journal is no more complicated a chore than posting to the sales journal. The cash disbursements journal (Fig. V), you will note, is divided between debits and credits. The point to remember is that total credits must equal total debits. On the right-hand side of the page you will see, under debits, a *Miscellaneous* column. In that you will post all expense items, such as rent, insurance, and telephone, that normally do not recur weekly. You will note that no allowance has been made for a specific listing in the cash disbursements journal of company or personal names in whose favor you draw a check. Such a listing is not necessary because posting is done from checkbook stubs where you had previously recorded this information.

Except for withdrawals from petty cash for minor expenses, it would be wise to make it a rule never to make any payment from your business except by check.

Let's assume that June 6 is pay day in your shop. Serviceman No. 1 draws a gross pay of \$60 a week. The usual deductions are as follows: 1½ percent, or \$.90, withheld for Social Security Tax; and \$9.60 for federal income taxes. These amounts you have determined from Government Withholding Tables. The total deducted, then, from Serviceman No. 1's check is \$10.50, making a net payment of \$49.50. In his favor you draw check No. 101. In the cash disbursements journal you record this transaction as follows:

The date and check number are entered in the extreme left-hand columns of the journal. Then under *Credits* you record the amount of the check and, under *Deductions From Payroll*, the Social Security and Federal Income Tax deductions. Add this column across and post the amount to *Total Credits*. On the debit side of the journal post \$60 to *Gross Payroll* and the same amount to *Total Debits* in the extreme right-hand column. The procedure you will follow in entering Serviceman No. 2's check (No. 102) and also your weekly draw (No. 103) will be the same as you followed for Serviceman No. 1. You, of course, will have to determine the amount of the withholding taxes in each case. If you are familiar with the routine of computing these taxes, skip the next several paragraphs and pick up the story on page 18 with the paragraph that begins: "On the same day," etc.

DEBITS													
NO	ADVERTISING EXPENSE	PARTS AND MATERIALS				MISCELLANEOUS				TOTAL DEBITS			
		EXPENSE		INVENTORY		DETAILS		ACCOUNT NUMBER	AMOUNT				
												60 00	1
												90 00	2
												150 00	3
27												627	4
	2 00											200	5
		16 00		22 00								38 00	6
								Rent for June		90 00		90 00	7
								Fire Insurance Premium		22 00		22 00	8
								Telephone - May		1425		1425	9
								Petty Cash		2500		2500	10

Fig. V

Payroll Taxes

As an employer, you are required by law to withhold certain amounts from the wages of your employees to cover Federal taxes on their earnings. As owner of your own business your profits are subject to similar taxes but not to the withholding provisions of the laws. These taxes, as you probably know by now, are the Federal Income Tax and The Federal Insurance Contributions Tax. The latter is popularly known as the Social Security or Old Age Insurance Tax.

If you have been in business for some time you have undoubtedly secured the necessary tax forms and instructions for filing from the Collector of Internal Revenue. But if you have not done so, you will certainly want to get a supply of the following forms:

Form No.	Form Title
W4	Employee's Withholding Exemption Certificate
W2	Withholding Statement
941	Employers' Quarterly Federal Tax Returns
W3	Reconciliation of Quarterly Returns
Circular E	Employer's Tax Guide containing Wage Bracket Withholding Tables and instructions for filing the above forms.

The Employee's Withholding Exemption Certificate is used whenever you hire a new employee. On this form are recorded the employee's full name, address, social security number, and the number of exemptions claimed by the employee for Federal income tax withholdings.

The Wage Bracket Withholding Tables are used each pay day to tell you how much you must withhold for income taxes to cover your earnings and employee wages. The amount withheld is based upon the number of exemptions claimed, the employee's total earnings, and the length of the pay period. The tables and instructions for their use are included in the booklet Employer's Tax Guide which may be obtained from the Collector of Internal Revenue for your district.

Until the end of 1953 you will be required to withhold 1½ per cent of each paycheck to cover the Federal Insurance Contributions Tax (Social Security). You as an employer must contribute an additional 1½ per cent of your employees' earnings. (See Table I.) Beginning with 1954 schedule of payments will be gradually increased as follows:

1954 to 1959 inclusive.....	2 per cent
1960 to 1964 inclusive.....	2½ per cent
1965 to 1969 inclusive.....	3 per cent
1970 and after.....	3½ per cent

Computing this tax is simple. Merely withhold $1\frac{1}{2}$ per cent of the employee's pay. Thus, if he earns \$60 a week, the tax will amount to 90 cents. The Federal Insurance Contributions Tax is withheld on only the first \$3600 paid to an employee in any one calendar year.

The government requires that you file Form 941, Employer's Quarterly Federal Tax Return and that you pay the withholding taxes quarterly, unless the amounts you withhold for your Income and Social Security taxes in any one month exceed \$100. In the event that they do they should be deposited in a commercial bank authorized to receive such deposits for the Federal Reserve Bank in your district within 15 days after the close of the month in which they were collected. Your own banker can advise you what banks in your community are authorized depositories.

As an owner of your own business you will compute your Social Security Taxes in a slightly different way from the procedure followed with your employees. You will not file Social Security Taxes unless your net earnings total at least \$400 in your taxable year, and you will not be required to pay these taxes on any earnings in excess of \$3600 a year. Suppose you draw only \$40 a week from your business in wages, but at the end of the year find that your earnings from the business are in excess of this figure. You will then be required to pay an additional tax on these earnings. The amount of these taxable earnings is simply

the difference between the total of your yearly wages, say, \$2,080 and \$3,600, or \$1,520. You then will be expected to pay additional Social Security Taxes on \$1,520.

The rate at which you will compute this tax for yourself as a self-employed person is as follows:

1951 to 1953 inclusive	$2\frac{1}{4}$ per cent
1954 to 1959 inclusive	3 per cent
1960 to 1964 inclusive	$3\frac{3}{4}$ per cent
1965 to 1969 inclusive	$4\frac{1}{2}$ per cent
1970 and after	$4\frac{7}{8}$ per cent

Until your business shows a profit, your drawings as owner are not subject to withholding taxes for either Social Security or Federal Income Taxes. For tax purposes it is assumed that your drawings are made out of capital invested in the business in anticipation of profits. However, when your business does make a profit for the year you must pay the taxes when due. Naturally you expect to make a profit and for that reason it is wise to withhold taxes from your own earnings in the same manner followed with your employees. We have assumed that check #103 (Fig. V) represents your drawings. You will note that amounts have been withheld for both Social Security and Income Taxes. The Social Security tax has been computed at $2\frac{1}{4}$ per cent of gross earnings instead of at $1\frac{1}{2}$ per cent as it was for your employees. Taxes withheld on your drawings will not be included in your Employer's Quarterly Tax Return.

Other Expenses

On the same day, June 6, you also pay your weekly garage bill of \$6.27, and issue in payment of it check No. 104. The bill is for gas, oil, and changing a tire. Under *Credits*, record the check number, its amount in the next column, and again, the amount in the *Total Credits* column. On the debit side of the page, enter the check in the *Auto and Truck Expense* column, and again under *Total Debits*.

You also wrote a \$2 check in payment of a classified ad you had taken in your local paper.

This is your check No. 105. Follow the same procedure outlined for recording the garage bill entry, but on the credit side of the page you post the amount to *Advertising Expense*.

Check No. 106 is payment of your account with City Electronics, your distributor. Normally, you will buy from your distributor many small parts that you will not carry in inventory and which, for accounting purposes, are considered a business expense. In determining the parts and materials you should treat as expense items and those

which should be carried as inventory, you might adopt some arbitrary figure of, say, \$2.50. All parts costing less than this amount you will consider as expense items, all costing more will be charged to inventory.

If you follow this simple rule in recording the payment of check No. 106 for \$38 you will, after completing the credit side of the page, post \$16 to *Parts & Materials, Expense*, and the balance, or \$22, to *Parts & Materials, Inventory*. The *Inventory* column, then, becomes a continuing record of your purchases in that account.

Check numbers 107 through 110 are for expenses that normally do not recur every week. As a result, separate columns in the cash disbursements journal are not set aside for them. Instead, while their entry on the credit side of the journal is just the same as for every other entry, on the

debit side they are recorded under *Miscellaneous*. There in the columns left open for *Details*, you write in the kind of expense. Thus for illustrative purposes we have rent, insurance, telephone, and petty cash. In making each entry, record the total amount in the *Amounts* column under *Miscellaneous*, and again in the *Total Debits* column.

As in the case of keeping the cash receipts and sales journal, you will continue to post all cash disbursements as they occur, and total the columns at the end of the month. In the next chapter we will tell you how to post these monthly totals to your general ledger.

Before you pay a bill you should make certain you have received the merchandise or service for which you are making payment. Immediately upon paying the bill, mark the check number on the paid bill and file it numerically.

Summing it up

Do not worry if the monthly totals of your cash receipts and cash disbursements journals don't get posted to the general ledger for some time. These totals won't spoil for want of posting. In fact, you could manage your business very nicely for quite a few months with no more accounting procedure than we have covered in this section. Your management problems are more than half licked when you know: (1) your weekly expenses, and hence how much income you'll need to break even; (2) the sources of your income; and (3) how your income is being spent, particularly in relation to a carefully worked out operating budget.

With the accounting tools we have given you up to now you can't determine down to the last penny how much money you're making or losing. At the moment, however, that is not too important. Frequent analyses of your cash receipts and

sales journal, and your cash disbursements journal in comparison with your expense estimate, will pretty soon let you know whether or not you are on the right track. And that's the important thing.

In the next chapter of this Business Practices Manual, prepared by the Tube Department of the General Electric Company, you will be shown:

What the general ledger is and how to use it.

How to summarize sales and cash receipts and post them to the general ledger.

How to summarize cash disbursements and post them to the general ledger.

Methods for controlling inventory.

Records for controlling furniture and equipment depreciation.

A system for managing your petty cash.



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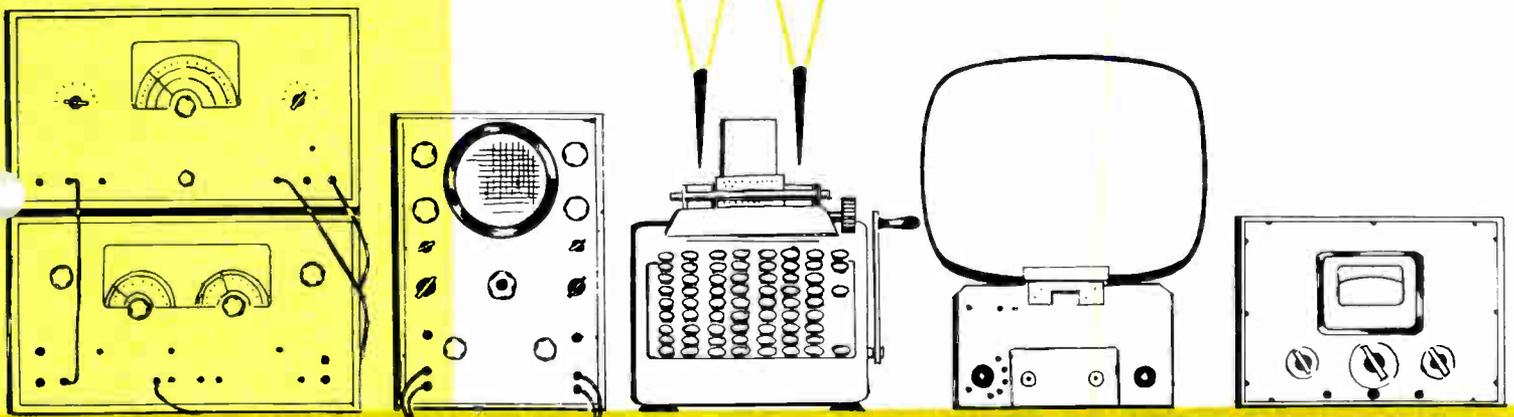
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*Accounting
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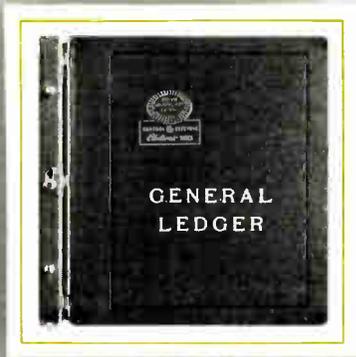
General Ledger Binder Ledger Sheets



GENERAL ELECTRIC
Electronic TUBES

for use with

Part II of the G-E Accounting Course for TV-Radio Service Dealers



GENERAL LEDGER BINDER — ETR-688

A leather-covered binder to match the Journal binder offered in Part I of this accounting system. Has stiff covers and metal hinges, and is imprinted as shown in the illustration. Holds more than a year's supply of ledger sheets.

LEDGER SHEETS AND TAB PAGES — ETR-689

11" x 11" sheets for recording all entries in the General Ledger. Tinted to prevent glare, and complete with tab pages labeled *assets, liabilities, income, and expenses*. Available in packages of 50 sheets, approximately a year's supply.



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How much profit did you make last month?

How much profit did you earn last year?

Are your earnings enough to keep you in business?

These are critical questions. No one can claim he is managing his business properly unless he can turn to his books at any time and come up with the right answers.

A good set of business records gives you the answers to these vital questions. Your books should tell you how much you made from your TV-radio service operations, how much it cost you to make that income, and what the difference—the profit—is. Properly used, your books suggest ways of stepping up receipts, of cutting expenses, or of locating and plugging up an unsuspected leakage of your funds. They help you provide against emergencies requiring an outlay that, without some planning, would amount to a raid upon the cash you have on hand.

Part I of this G-E accounting system discussed such daily, primary business records as the cash receipts and sales journal, the cash disbursements journal, and the accounts receivable register. Along with these, we considered such auxiliary records as job tickets and checkbook stubs.

All these you will find useful in the operation of your TV-radio service business. The two jour-

nals keep track of the money coming in as sales receipts and the money going out as business expenses. Your accounts receivable register records what is owed you. Your job tickets give you the operating details helpful in your relationships with your customers. Your checkbook stubs keep tabs on what has been happening to your bank account.

Yet all these records tell you only bits and pieces of the story of your business operations. The whole story has yet to be set down in such a way that all these details fall into their proper places where you can see them in significant focus. Keeping watch over daily details is like seeing the forest from the inside, where all you see is the trees. We need a different perspective to view the forest as a whole.

The useful, consecutive history of your business operations, including all the relationships between income and outlay, between the money you have sunk into the business and the profits you are earning from day to day, requires still another accounting form.

FIG. II

The Cash Receipts and Sales Journal

DATE	RECEIVED FROM	DEBITS			CREDITS - ANALYSES OF CASH RECEIPTS AND SALES								TOTAL RECEIPTS	
		TOTAL CASH RECEIVABLES	CASH	ACCOUNTS RECEIVABLE	MISCELLANEOUS		SALES MATERIALS & PARTS		LABOR CHARGES			SALES TAX COLLECTED		
					DETAILS	ACCT. NO.	AMOUNT	INSTALLATIONS	SERVICE CALLS	OTHER				
1	June 4 Serviceman #1	6560	5652	908			2000		4500			60	6560	
2	" " #2	6781	6781				2700	1500	2500			81	6781	
3	Owner	4045	4045				1500				2500	45	4045	
4	Owner de Carter	438	438				425					13	438	
5		17124	16716	408			6625	1500	7000	2500	199		17124	
6	June 5 Owner de Carter	2144	2144			103	908	1200				16	2144	
7	" " " " " "	27250	27250			220	22500	2500	2500			750	27250	
8		30394	30394				23408	3700	2500			796	30394	
9	June 6 Serviceman #1													
10														
28														
29	Totals June	245633	244725	908			23408	73621	16500	122395	7500	2209	245633	
30			46101	46103				472	201	276	203	47	210	164
31														
32														

Fig. II shows your cash receipts and sales also analyzed and totaled. But this time you are on the receiving end, and the items set down tell you how much cash and how much credit business you transacted on each day of the month and finally during the month as a whole. Your cash receipts and sales journal tells you what part of your earnings came over the counter in your shop and what sums your serviceman earned for you off the shop's premises. The amounts recorded are separated into receipts for materials and parts, and payments for labor, either installations or service repair calls.

The cash receipts and sales journal also shows you what amounts of accounts receivable you collected. But to learn who owes you how much you

must turn either to your unpaid job tickets or to your accounts receivable register. This latter business record is maintained only as a safeguard or hedge, in the event that an unpaid job ticket becomes lost, strayed or stolen.

The important fact this chapter seeks to drive home at this point is that all the records we have been dealing with contain only daily transactions. Each day's recordings are added to the other days', and accumulated totals are thus obtained. This process continues until the end of the accounting month. At that time, the totals for the month are determined—and then transcribed in another important record called the General Ledger.



The general ledger

Now, the vital record, the General Ledger—the subject of this chapter—is the basic bookkeeping record. It is the general depository of all the important facts about your business. The journals chronicle day-to-day transactions. They provide information about voluminous daily transactions, the results of which must be summarized or totaled in order to be measured. The General Ledger records only monthly totals taken from the journals.

Monthly totals are accumulated in the General Ledger until the end of the accounting year. At the year's end, income and expense accounts are summarized, and the profit or loss for the year is determined. When there is a profit for the year, it is added to the owner's capital. A loss is deducted from the owner's capital.

Once a profit or, as the case may be, a loss, has been related to the owner's capital, a new accounting year commences. The whole process starts over again—the daily entries in the cash receipts and sales journal, the cash disbursements journal, and the accounts receivable register; the determination of monthly totals; the transcribing — always called *posting* — of the monthly totals to the General Ledger, and finally,

at the end of a second accounting year, the computation of profit or loss with its addition to or subtraction from owner's capital.

The summarized monthly entries and the annual pulling together of all this information in a profit or loss statement have this important result: You are able to analyze the earning capacity of your TV-radio service operation. Once a profit or loss has been determined, the General Ledger is the place to go to find out what your business owns, to whom it owes money, and what equity or share you have as operator-proprietor in what your business owns. The General Ledger's simple arithmetic shows:

1. What assets your business owns
2. What you owe to others
3. The difference between what you have and what you owe.

Of course, when you owe more money than you have in cash and the value of other assets, you are in trouble.

The general ledger is usually a loose-leaf book made up of pages designed like the one shown in Fig. III. It is a necessary accounting device whenever day-by-day business is or tends to become the least bit complex. A business such as yours

Chart of ledger accounts

A list of the accounts in the General Ledger and a system of numbering such accounts makes up what is called a chart of ledger accounts.

General Ledger accounts fall into the categories previously mentioned—assets, liabilities, income, and expenses. (A fifth category, Net Worth, is the difference between assets and liabilities and will be taken up later). Subdivisions under the first four of these categories vary considerably in number for each type of business

and even among businesses of the same general type.

Before preparing your General Ledger, you must decide what types of accounts can best record the financial operations of your TV-radio service business. The accounts should provide the information that will guide you in making decisions about the management of your own shop. Our survey of TV-radio service operations leads us to believe the following list of accounts can do the job:

BASIC CHART OF ACCOUNTS

100-110 Current Assets	160 Sales Taxes Collected
101 Cash in Bank	171-180 Net Worth
102 Petty Cash	171 Owner's Capital
103 Accounts Receivable—Customers	1180 Owner's Drawings Against Current Year's Income
104 Other Receivables	201-220 Income Accounts
107 Inventory—Parts and Materials	201 Sales of Materials and Parts
108 Deposits	202 Labor Charges—Installations
111-120 Fixed Assets	203 Labor Charges—Service Calls
111 Automotive Equipment	210 Labor Charges—Other
112 Accumulated Depreciation—Automotive Equipment	220 Other Income
113 Shop Equipment	221-300 Expenses
114 Accumulated Depreciation—Shop Equipment	221 Gross Payrolls
115 Test Equipment	222 Rent and Heat
116 Accumulated Depreciation—Test Equipment	223 Electricity
117 Furniture and Fixtures	224 Telephone
118 Accumulated Depreciation—Furniture and Fixtures	225 Depreciation—Automotive Equipment
121-150 Other Assets	226 Insurance—Automotive Equipment
121 Prepaid Insurance	227 Other Auto and Truck Expenses
122 Deposits	228 F.O.A.B. Tax—Employer's Contribution
151-170 Liabilities	229 Unemployment Insurance Tax—Employer's Contribution
151 Notes Payable—Banks	230 Other Taxes—Employer's Contribution
152 Notes Payable—Others	231 Advertising
153 Accounts Payable	232 Property and Business Insurance
154 Accrued Payroll	233 Non-Inventoried Parts and Materials
155 Federal Insurance Contributions Tax Payable (Social Security)	234 Stationery, Printing and Office Supplies
156 Unemployment Tax Payable—State	235 Depreciation—Shop Equipment
157 Unemployment Tax Payable—Federal	236 Depreciation—Test Equipment
158 Federal Income Taxes Withheld from Employees	237 Depreciation—Furniture and Fixtures
	300 Other Expenses
	400 Cost of Goods Sold

You will note that each account in this list has been assigned a number. The number may be used in the journals as a substitute for the account title wherever space is not sufficient to accommodate the account name in full. These numbers have been assigned more or less arbitrarily within the groups. Within the groups, some numbers have been left open, so that accounts can be added to fit the needs of any individual service organization.

In setting up a system of business records for your TV-radio service business, you should give careful study to the kinds of information within the four general categories which, in your opinion or rather in accordance with your own business experience, would constitute accounts active enough to affect any of these categories.

A chart of accounts for a particular service operation usually is based on what the proprietor knows about his own area, the people who patronize him, the amount of capital he owns or borrows, his requirements in employees and motor equipment, the number and kinds of taxes particular to his location, and the volume of business conducted in his own shop.

While most service shops extend credit to cus-

tomers, it is conceivable that a particular shop would have little or no use for such an asset account as "Other Receivables." An expense account might be included to cover expenditures for either regular or occasional advertising. Yet a business that doesn't advertise frequently might find it more convenient to charge an occasional ad to the account, "Other Expenses" rather than set up a permanent but little-used ledger account. There should be an account for each continuously recurring income and expense item. Unusual, seldom-recurring items of income and expense will normally be recorded through "Miscellaneous Income" and "Other Expenses" accounts.

Your chart of accounts should be available for ready reference until you or your bookkeeper has memorized the account titles and numbers.

It is obvious that the number of accounts helps determine the size of your General Ledger. What is more important is that the chart serves as an index to your ledger accounts. In addition, index tabs on the right margin of the proper pages direct you promptly to those parts of the ledger to which you have reason to refer. Frequently in the course of business, a quick reference to a particular ledger account is desirable or necessary.

Debits and Credits

You're not in training to become a bookkeeper so there's little purpose to be served in wrestling with so complicated a subject as debits and credits, with their whys and wherefores. That subject has thrown many a would-be bookkeeper. In this chapter, we will merely point out to you what to do and how to do it.

Looking back at Fig. III, you will see that every ledger account is divided into a debit, or charges, and a credit column. In the general ledger, the debit column is always on the left and the credit column on the right. You have seen this arrangement previously in the cash receipts and sales journal.

By this time you have grasped the important accountancy fact that every bookkeeping transaction involves one or more debit entries and one or more credit entries. The total of the debit entries must equal the total of the credit entries.

Accountants and bookkeepers talk a professional jargon when they speak of debiting and crediting an account. What they mean is placing an entry to an account, respectively, in the left or right column of the ledger leaf. The simplest

way to remember when to debit or credit is to analyze the effect of an entry on a business's cash. What happens to cash may be summarized in this way:

When cash is received, the cash account is debited, that is to say, *increased*, and the amount received goes into the debt column of the ledger leaf;

When cash is spent, the cash account is credited, that is to say, *reduced*, and the amount spent goes into the credit column of the ledger leaf.

Since debits must equal credits, and the cash account is debited for a receipt we must *credit* the account indicating where the cash came from.

Correspondingly, any account showing what *cash was spent* for must be debited, and the cash account credited.

In your cash receipts and sales journal, increases to cash were placed in the column with the heading "Debits." In your cash disbursements journal, the amount of a check drawn, that is, a reduction of cash, was entered as a credit.

Posting to the general ledger

Except for the entries in the "Miscellaneous" column of your cash receipts and sales journal, the column captions in your daily records are clear indications of which accounts in the General Ledger are to be debited or credited. To debit or credit entries in the ledger which have their origin in the miscellaneous column, you refer to your chart of accounts. To illustrate how this is done, let's look at a specific transaction recorded in Fig. II.

On June 5, you sold a television set to James Jones for \$225 and added to his bill certain additional charges for installation and parts. To record your receipts, you debited the cash column of your cash receipts and sales journal for the amount of \$282.50. Since debit and credit entries for each transaction must be equal, you credited the following columns in the journal:

Labor Charges—Installations. . .	\$25.00
Sales—Material and Parts.	25.00
Miscellaneous	225.00
Sales Tax Collected (3 per cent of the billing price of the TV set and of the materials and parts)	7.50
	<hr/>
	\$282.50

In recording the sales price of the TV set, you entered the \$225 in the miscellaneous column because no column is set aside for such sales in the journal. For the same reason, you entered the \$9.08 collection from Mrs. Helen Smith in the miscellaneous column. At the end of the accounting month, you faced the problem of determining in just which ledger accounts these miscellaneous entries belong.

There is no account for the sale of TV sets within the income category of your chart of accounts. Such an account was not included on the assumption that your business is primarily a service operation and that you do not ordinarily stock such merchandise. Your occasional sales of TV sets are then only a miscellaneous source of income, and the ledger leaf to be credited with \$225 is that labeled "Other Income."

Such an entry, however, requires identification, and so the notation "Sale 1 Mod. TV set" has been set down in the details column of the cash receipts and sales journal. The account number of "Other Income," 220, is written beside the item in the place provided. The \$9.08 collected from Mrs. Smith is identified by the account number 103 for "Accounts Receivable—Customers"

and requires no further notation.

The above procedure applies to every entry in the miscellaneous column of the cash receipts and sales journal. When account numbers and, where required, short descriptions of the transaction have been supplied, you are ready to continue posting to the General Ledger.

Fig. IV, on pages 9 and 10, shows you the correct way to post the information previously recorded in your cash receipts and cash disbursements journals, using the ledger leaf which you can obtain from the G-E tube distributor who made this course available to you. Because it provides a special column for the account balance, this is called the balance-form ledger leaf. This leaf has one date column serving for all entries. When you begin to post on a previously unused leaf, you write the year date in the column heading. When the year date changes, you indicate the new year on the same line but above the month and day of the first entry for the new year.

The form of the ledger leaf allows you to write the month name only once for all the entries in a single month. This month date is written at the time of the first entry during the month. You may abbreviate the month or employ the numeral system of designating month and day separated by a slant-bar as has been done in Fig. IV. The day of the month employed in the ledger is always the day on which the entry was posted.

Special notations covering either debit or credit entries may be made in the single description space. You will find, however, that except for explanations of extraordinary transactions, the description space is seldom used. When details concerning entries are required, you can refer to notations in the book of original entry.

The sources of items in General Ledger accounts are indicated in the column with the heading "Post. Ref." In Fig. IV you see such posting references as "CD" for cash disbursements journal and "CR" for cash receipts and sales journal. The number suffixed to these initials is that of the page in these journals. General Ledgers usually show another type of notation. When balances are carried over from one leaf to a fresh one, "Balance" is written in the description column on a line with this entry. Such an entry is dated with the date it was carried over. When you carry over a balance from an earlier leaf, the posting reference column is left blank.

In writing the balance of an account in the column provided for that purpose, you must

label the balance as a debit or credit. The abbreviations "Dr" and "Cr." have a narrow column provided for their insertion.

You will find that a definite, uniform posting routine, employed from the very beginning, tends to eliminate errors. Post each complete entry from the daily records before proceeding to the next entry. Enter the debit amount of the entry first and then the credit amount. As each item is posted to the ledger, place a check mark under the total in the book of original entry and write the account number either below the total or on

a line with it when a column has been provided.

To compute new balances for debit balance accounts at the end of each month, you add all the new debit amounts to any previous debit balance and subtract the sum of all new credit amounts. To obtain a balance of all credit balance accounts, you find the sum of all new credit amounts, add it to the previous credit balance and subtract the sum of all new debit amounts.

The total of the debit balances in the ledger should equal the total of the credit balances. The test of this equality is made by what is called a trial balance.

ASSETS

GENERAL LEDGER											
ACCOUNT NO 101		ACCOUNT		Cash in Bank						SHEET NO 1	
DATE	POSTING REF.	CHARGES	CREDITS	BALANCE							
4/30 X	CR1	2,447.25		Dr	2,447.25						
4/30 X	CD1			Dr	123.96						

GENERAL LEDGER											
ACCOUNT NO 121		ACCOUNT		Prepaid Insurance						SHEET NO 1	
DATE	POSTING REF.	CHARGES	CREDITS	BALANCE							
4/30 X	CD1	22.00		Dr	22.00						
4/30 X	CD1	59.07		Dr	81.07						

GENERAL LEDGER											
ACCOUNT NO 102		ACCOUNT		Petty Cash						SHEET NO 1	
DATE	POSTING REF.	CHARGES	CREDITS	BALANCE							
4/30 X	CD1	25.00		Dr	25.00						

LIABILITIES

GENERAL LEDGER											
ACCOUNT NO 155		ACCOUNT		Federal Insurance Contributions Tax Payable						SHEET NO 1	
DATE	POSTING REF.	CHARGES	CREDITS	BALANCE							
4/30 X	CD1		22.48	Cr.	22.48						

GENERAL LEDGER											
ACCOUNT NO 103		ACCOUNT		Accounts Receivable						SHEET NO 1	
DATE	POSTING REF.	CHARGES	CREDITS	BALANCE							
4/30 X	CR1	9.08		Dr	9.08						
4/30 X	CR1		9.08								

GENERAL LEDGER											
ACCOUNT NO 158		ACCOUNT		Federal Income Taxes Withheld from Employees						SHEET NO 1	
DATE	POSTING REF.	CHARGES	CREDITS	BALANCE							
4/30	CD1		186.00	Cr.	186.00						

GENERAL LEDGER											
ACCOUNT NO 107		ACCOUNT		Inventory - Parts and Materials						SHEET NO 1	
DATE	POSTING REF.	CHARGES	CREDITS	BALANCE							
4/30	CD1	977.64		Dr	977.64						

GENERAL LEDGER											
ACCOUNT NO 160		ACCOUNT		Sales Taxes Collected						SHEET NO 1	
DATE	POSTING REF.	CHARGES	CREDITS	BALANCE							
4/30	CR1		22.09	Cr.	22.09						

FIG. IV

INCOME

GENERAL LEDGER
ACCOUNT NO. 201 ACCOUNT *Sales - Materials and Parts* SHEET NO. 1

DATE	DESCRIPTION	POSTING REF.	CHARGES	CREDITS	DEBIT OR CREDIT	BALANCE
6/30 X		CR1		776.21	Cr	776.21

GENERAL LEDGER
ACCOUNT NO. 202 ACCOUNT *Labor Charges - Installations* SHEET NO. 1

DATE	DESCRIPTION	POSTING REF.	CHARGES	CREDITS	DEBIT OR CREDIT	BALANCE
6/30 X		CR1		165.00	Cr	165.00

GENERAL LEDGER
ACCOUNT NO. 203 ACCOUNT *Labor Charge - Service Calls* SHEET NO. 1

DATE	DESCRIPTION	POSTING REF.	CHARGES	CREDITS	DEBIT OR CREDIT	BALANCE
6/30 X		CR1		75.00	Cr	75.00

GENERAL LEDGER
ACCOUNT NO. ACCOUNT *Labor Charges - Other* SHEET NO. 1

DATE	DESCRIPTION	POSTING REF.	CHARGES	CREDITS	DEBIT OR CREDIT	BALANCE
6/30 X		CR1		75.00	Cr	75.00

GENERAL LEDGER
ACCOUNT NO. 220 ACCOUNT *Other Income* SHEET NO. 1

DATE	DESCRIPTION	POSTING REF.	CHARGES	CREDITS	DEBIT OR CREDIT	BALANCE
6/30 X		CR1		285.00	Cr	285.00

EXPENSES

GENERAL LEDGER
ACCOUNT NO. 221 ACCOUNT *Gross Payroll* SHEET NO. 1

DATE	DESCRIPTION	POSTING REF.	CHARGES	CREDITS	DEBIT OR CREDIT	BALANCE
6/30 X		CD1	1,200.00		Dr	1,200.00

GENERAL LEDGER
ACCOUNT NO. 222 ACCOUNT *Rent and Heat* SHEET NO. 1

DATE	DESCRIPTION	POSTING REF.	CHARGES	CREDITS	DEBIT OR CREDIT	BALANCE
6/30 X		CD1	90.00		Dr	90.00

GENERAL LEDGER
ACCOUNT NO. 224 ACCOUNT *Telephone* SHEET NO. 1

DATE	DESCRIPTION	POSTING REF.	CHARGES	CREDITS	DEBIT OR CREDIT	BALANCE
6/30 X		CD1	19.25		Dr	19.25

GENERAL LEDGER
ACCOUNT NO. 227 ACCOUNT *Auto and Truck Expenses - Gas and Oil* SHEET NO. 1

DATE	DESCRIPTION	POSTING REF.	CHARGES	CREDITS	DEBIT OR CREDIT	BALANCE
6/30 X		CD1	26.00		Dr	26.00
6/30 X						

GENERAL LEDGER
ACCOUNT NO. 231 ACCOUNT *Advertising* SHEET NO. 1

DATE	DESCRIPTION	POSTING REF.	CHARGES	CREDITS	DEBIT OR CREDIT	BALANCE
6/30 X		CD1	19.00		Dr	19.00

GENERAL LEDGER
ACCOUNT NO. 233 ACCOUNT *Parts and Materials - Expense* SHEET NO. 1

DATE	DESCRIPTION	POSTING REF.	CHARGES	CREDITS	DEBIT OR CREDIT	BALANCE
6/30 X		CD1	127.50		Dr	127.50

FIG. IV (cont'd)

The trial balance

A trial balance is merely a list of the accounts in the ledger which have balances. Fig. IV shows that account number 103, Accounts Receivable, has no balance since the item in the charges column cancels out the item in the credit column. Such an account is not employed in striking a trial balance. You will notice that all the other accounts posted have balances. These must be listed in your trial balance.

A trial balance is drawn up on a form containing two identification columns and two money columns. The money columns have the usual debit and credit headings. The first column on the left contains the account numbers. Next to it is a column for the names of the accounts. Trial

balances are prepared once a month, after the current month transactions have been posted to the general ledger.

Since trial balances may be drawn up at any time, they need not be retained as part of a business's records. They are prepared primarily for the convenience of the person keeping the ledger accounts—you or your bookkeeper, as the case may be. When a trial balance is drawn up properly, it proves that the debit and credit sides of each account and all the accounts collectively have been correctly posted and balanced in the ledger.

A trial balance, based on the data in Fig. IV, would appear as follows:

TRIAL BALANCE

Acct. No.	Account Name	Debits	Credits
100	Cash in Bank	123 86	
102	Petty Cash	25 00	
107	Inventory—Parts and Materials	937 64	
121	Prepaid Insurance	81 07	
155	Social Security		22 48
158	Income Taxes		186 00
160	Sales Taxes Collected		22 09
201	Sales—Materials and Parts		736 21
202	Labor Charges—Installations		165 00
203	Labor Charges—Service		1223 95
210	Labor Charges—Other		75 00
220	Other Income		225 00
221	Gross Payrolls	1200 00	
222	Rent and Heat	90 00	
224	Telephone	14 25	
227	Other Auto and Truck Expenses	26 80	
231	Advertising	19 60	
233	Non-Inventoried Parts and Materials—Expense	137 51	
		2655 73	2655 73

Thus far we have been concerned with keeping the necessary records of your TV-radio business transactions. Up to this point, this chapter has discussed only cash transactions and employed the trial balance to prove that entries in your ledger from your cash journals balanced. Looking at the trial balance, it might appear to you that everything is rosy when everything cancels out.

Before profit or loss can be ascertained, the following information must be reflected in your trial balance:

Depreciation on automobiles and trucks, shop equipment, test equipment, and furniture and fixtures;

The amount of insurance prepaid that has expired during the month;

The cost of materials and parts used during the month;

Expenses incurred but not paid for during the month;

The cost of parts and materials charged to expense when they are purchased but not yet used up.

Without registering such information in the trial balance, profit and loss cannot be determined. In later chapters, we will discuss these problems in detail.

At this point, however, you are in a position to make some inferences as to how your business is going. Such inferences in the early stages of your business operations may be almost as valuable as a complete profit and loss statement, especially as such inferences answer such important questions as:

Am I doing the volume of business necessary for me to break even?

Is my cash balance holding up so that I can meet my obligations during the period required to make my business profitable?

In Part I of this accounting system, we estimated the volume of business necessary to break even. Since our estimate still appears reasonable, we can compare our first month's sales volume for each income category and obtain a fairly good idea of how you are doing.

Comparing amounts spent, as reflected in the cash disbursements journal, with our estimates of expenses in Table I, Part I, there is nothing to indicate a serious underestimate of your expenses. In fact, some items of expense appear to have been budgeted too high. With this knowledge, we must next compare actual sales volume with the estimate in the table. The following comparisons may be made:

IN RESPECT TO LABOR

Labor Billings for the Month		
Installations		\$ 165.00
Service		1223.95
Other		75.00
Total		\$1463.95
Labor Billings Needed to Recover Expenses plus Profit		
Each Week—From Table II, Part I	\$422.62	
Each month (4½ times \$422.62)		1831.35
Labor Billing Too Low		367.40

IN RESPECT TO MATERIALS AND PARTS

Gross Dollar Value of Parts Sales Required		
Each Week—From Table V, Part I	\$164.37	
Each Month (4½ times \$164.37)		\$ 712.27
Billings for Materials and Parts		736.21
Billings for Materials and Parts Over Budget		13.94

Thus, since your sales of labor are the primary source of your income, you can readily see that you are not selling enough time. You must extend your sales effort in that direction. If you can bring up your labor billings to your original estimate, the increase should be reflected in greater profits.

You have been selling somewhat more materials and parts than you originally anticipated.

In the early stages of your business, watch your cash balance. More businesses fail in the beginning from a lack of cash than for any other single reason. Whether cash is coming in faster than it is going out may be determined by changes in your cash balance from day to day, or by comparing your cash receipts with the "Checks Issued" column in the cash journals. In making

this comparison, however, you should always reduce cash balances by the amount of unpaid bills on hand.

Had we multiplied our sample transactions and extended them over a whole year, this chapter could conclude with an exposition of closing the ledger accounts. But to close the ledger accounts, you would have to know something about another accountancy instrument called the journal which could be confused with the daily journals referred to in this chapter and in Part I. We wish to avoid this confusion. The journal, non-cash accounts, the cost of goods sold, inventory records, depreciation, prepaid insurance, the work sheet, more about the trial balance, the profit and loss statement and the balance sheet will make up the subject matter of the next chapter.



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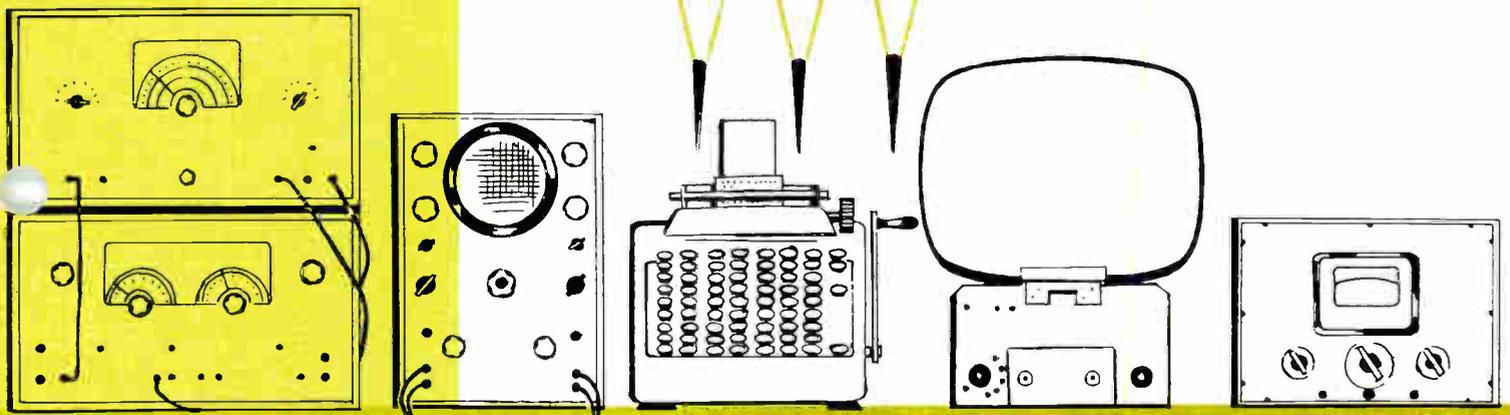
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*Accounting
for the*

TV-RADIO SERVICE DEALER



Part 3



GENERAL  ELECTRIC
Electronic TUBES



Index

	Page
Non-Cash Costs	1
The General Journal	2
Journal Debit Entries	4
Original Assets	4
Depreciation	5
Equipment and Depreciation Record	5
Computing Depreciation	6
Making Entries in Record	7
Supporting Journal Entry	7
Prepaid Insurance	8
Original Premium Entry	9
Monthly Summary	10
Cost of Goods Sold	11
Stock Record	11
Storeroom Requisitions	12
Unrecorded Liabilities	13
Booking Unrecorded Liabilities	14
Reversing Entry for Unrecorded Liabilities	17
Posting Journal Entries	17
Profit & Loss Accounts	20
Closing Accounts	21
Petty Cash	22
General	23

*“What better proof is there
that I’m operating at a profit?”
asks the owner of a small business.
“My books show more cash
coming in than going out.”*

Yet, at the year’s end this businessman may be sitting on the edge of his seat, pawing gloomily through his records, for a true picture of profit or loss, not knowing exactly what to look for. If his records are limited to cash books, his search is fruitless. He cannot expect to get a true picture of profit and loss from his cash books if his business uses many fixed assets and requires a substantial inventory.

As proprietor of a TV-radio service business, you could face this paradox. You, too, can run into financial trouble by operating your establishment on the assumption that all your expenses have been met by the cash outlays noted in your cash disbursements journal. But all that you need to know about the expenses of your business cannot be found in that record, important though it is.

You cannot compute your financial condition unless your arithmetic includes a dollar-and-cents measurement of the depreciation on the properties you use in the course of servicing your customers. During a business month, for instance, your delivery truck became a month older and

was a month longer in use. Disregarding actual breakdown or accidental damage, that truck has been subject to a month’s wear and tear, shortening its period of usefulness. Such wear and tear costs your business money. To measure accurately the success of your business, this cost must be reflected in your bookkeeping system.

Non-Cash Costs

Depreciation is one type of expense described in this chapter of your G-E Business Practices Manual. In addition, other important areas of cost, such as insurance and the cost of goods sold, are discussed, and several new bookkeeping forms are introduced. Finally, you will be shown how to develop financial statements from which you can tell what your business has accomplished and how it stands financially.

Keeping business records is not a simple matter of keeping tabs on cash operations. Partial records often fail to reveal all the pitfalls inherent in business operations. While an excess of recorded cash receipts over disbursements may

indicate profitable operations, it does not do so always. Likewise, more disbursements than receipts do not invariably signify a loss.

It is not necessarily a fact that you are teetering on the brink of bankruptcy when your cash outlays exceed your cash received. It is even possible that you are operating at a profit. You may have spent substantial sums for parts and materials which are still included in your inventories. You may have prepaid insurance or taxes for a year in advance. The value of such expenditures does not fade away as soon as you issue your check. This value must be considered when you compute your profit. It must be recorded and brought into your calculations by accounting methods.

Factors you must consider to obtain an accurate picture of your operations include:

1. The amount your furniture, fixtures, automotive and other equipment has depreciated during the month.
2. The amount of expense you have incurred but not paid during the month.
3. Any amounts that have been paid, but for which the goods and services have not been entirely consumed, and therefore still retain part of their value.
4. The cost of material and parts used during the month.

Once the foregoing amounts have been determined, your records are adjusted for such amounts, and financial statements can be prepared. The financial statements of primary interest to you are:

1. The balance sheet, which shows the financial condition of a business at a given time, such as at the close of business on December 31, 1953.
2. The profit and loss statement, which shows what profit or loss has been realized between two dates, say June 1 and June 30, 1953.

You will find such statements important in managing your business. You will require them in preparing your income tax returns. But as a wise businessman you will not wait for the approach of the Ides of March to prod you into composing them. You will prepare them frequently and regularly. The end of each business month is the time to check on what is happening to your investment. Without effective controls, much money can dribble away in a longer period, and in a year your whole investment could be lost.

We cannot too strongly emphasize that staying abreast of what is going on in your TV-radio service business allows you to take timely corrective action in accordance with sound business management principles.

The General Journal

In earlier chapters you were shown how to record, classify, and summarize cash transactions. Cash transactions were given preference for a definite reason. We considered the keeping of tight control over cash transactions immediately important to the businessman setting up or changing over to the accounting system described in this manual.

Now, you must combine recording your cash transactions with non-cash entries in order to obtain a true analysis of your profit or loss. The cash receipts and sales journal and the cash disbursements journal enable you to record every cash

transaction of your business, such activities constituting probably 95 per cent of your operations. The remaining 5 per cent requires the use of another journal called the General Journal.

The format of the General Journal may be seen in Fig. I, and the use of the General Journal is discussed throughout this chapter. As it appears in the illustration, the General Journal provides columns for the date an entry is made, for a description of the entry, and for the account numbers and the amounts to be debited or credited. The "Detail" column permits a breakdown of several amounts charged to the

DAY	DESCRIPTION	ACCT. NO.	DETAIL	CHARGES	CREDITS
	(1)				
6/30	Cash in Bank	101		1000 00	
	Deposits	121		200 00	
	2 Months Prepaid Rent		180 00		
	Security - Public Utility		20 00		
	Furniture and Fixtures	117		5000 00	
	Automotive Equipment	111		1000 00	
	Shop Equipment	113		5000 00	
	Test Equipment	115		1000 00	
	Materials and Part Inventory	107		1000 00	
	Owner's Capital	171			5200 00
	To record owner's investment at June 4, 1953 at which date doors were opened to public				
	(2)				
6/30	Depreciation - Automotive Equipment	225		16 67	
	" Shop Equipment	235		4 17	
	" Test Equipment	236		13 33	
	" Furniture and Fixtures	237		4 17	
	Accumulated Depreciation - Automotive Eq.	112			16 67
	" " - Shop Equip.	114			4 17
	" " - Test Equip.	116			13 33
	" " - Furn. & Fix.	117			4 17
	To record Depreciation for the month of June, 1953 (See Equipment and Depreciation Record)				
	(3)				
6/30	Insurance - Automotive Equipment	226		4 84	
	Property and Business Insurance	232		1 83	
	Prepaid Insurance	121			6 67
	To record Insurance expenses and adjust Prepaid Insurance for premium expired during June 1953 (See Insurance Record)				
	(4)				

FIG. 1

same account number when such itemizing is desirable. In general, the form provides a means for explaining non-cash transactions and recording them in a chronological and orderly fashion.

Fig. 1 shows a general journal leaf on which have been entered assets assumed to have been on hand on June 4, 1953, the day your TV-radio

service business opened its doors to the public and commenced using the new bookkeeping system. Usually, assets comprising the original investment of a business are recorded by general journal entry, whereas cash journals reflect cash transactions from the time the business launches operations. Besides the assets on hand on the first

day of business, the General Journal records all subsequent non-cash transactions. Each entry is referenced to a general ledger account by a number from the charts of accounts. (The General Ledger and the Chart of Accounts were described in Part II of this accounting system.)

Journal Debit Entries

The costs of various items of equipment, such as furniture and fixtures, shop equipment, test equipment, and automotive equipment, have been itemized in the debit column with the caption "Charges." The values of other assets—deposits, for instance—also appear as debits. Such entries were made in accordance with the now familiar rule: When an increase to an asset account is to be recorded, the amount is placed in the debit column.

When such entries are made on the day the shop begins operations, the required information usually is readily available. Bank books and statements, deposit receipts and suppliers' invoices provide the necessary information. When, however, you have been in business for some time, the development of this information may be more difficult. A check book, the depreciation schedules and inventory lists supporting last year's income tax returns, and some sort of listing of the sums owed you by customers and others would be sufficient data for establishing these required facts:

1. The amount of cash in the bank on the day you switched over to the new bookkeeping system.
2. The amounts owed you by customers and others at that time.
3. The costs of your furniture and fixtures, test equipment and other physical assets.

If you had been in business so long that your equipment invoice slips were long ago discarded, the cost figures in your previous year's income tax returns could serve. As a last resort, you might have to estimate costs of your equipment from current market prices.

Original Assets

Returning to the supposition that you opened your business on June 4, 1953, then we may fur-

ther assume that on that date you were able to develop the following list of assets:

Description of Asset	
Cash in the Bank.....	\$1000
Deposits:	
2 months' prepaid rent.....	180
Security deposit with public utility.....	20
Fixed Assets:	
Furniture and fixtures.....	500
Automotive equipment.....	1000
Shop equipment.....	500
Test equipment.....	1000
Parts and Materials.....	1000
	\$5200

The purchase of physical assets is not reflected in your cash disbursements journal, as only transactions on or after June 4 are entered there. The amounts listed, representing your investment, are the assets with which you went into business and, as such, are the basis of general journal entry (1).

RECORD OF JOURNAL ENTRIES						MONTH OF <i>June</i>		19 <i>53</i> NO. <i>1</i>	
DAY	DESCRIPTION	ACCT. NO.	DETAIL	✓	CHARGES	✓	CREDITS		
	(1)								
4/30	Cash in Bank	101			1000 00				
	Deposits	121			200 00				
	2 months Prepaid Rent				180 00				
	Security - Public Utility				20 00				
	Furniture & Fixtures	117			500 00				
	Automotive Equipment	111			1000 00				
	Shop Equipment	113			500 00				
	Test Equipment	115			1000 00				
	Parts & Material Inventory	107			1000 00				
	Owner's Capital	191					5200 00		
	To record owner's investment as June 4, 1953 at which date business was opened to public								

GENERAL JOURNAL ENTRY NO. 1

Note that in the general journal entry, asset accounts are debited while owner's capital (investment) is credited. This, too, is in compliance with the rule: To increase asset accounts, debit the accounts; to increase owner's capital accounts, credit the accounts. General journal entries are subsequently posted to the general ledger, just as entries in the cash journals are posted in that general depository of the facts of a business. Notice in the general journal entry the explanation—a most significant part of every such entry.

Depreciation

Financial statements are incomplete without computations for depreciation on business properties. As we proceed you will note that depreciation affects only your assets, your liabilities being of less perishable stuff. For instance, when you owe a man a fiver, it remains a fixed amount unless interest is involved. Age and use attack only the value of what you own.

To put it another way, we might say that all of your fixed assets, such as furniture and fixtures, shop equipment, test equipment, and autos and trucks, are ultimately destined for the scrap heap. With the exception of the land, the properties that constitute your operating establishment gradually diminish in money value, due to use, obsolescence, or the passage of time. The amount of the decrease, translated into dollars and cents, is treated in accounting as a continuous expense of the business.

Even in our discussion of cash transactions, we underscored the necessity of bringing all business expenses under surveillance.

Anyone who has owned a car has had experience with the measurement of depreciation in dollars and cents over a period of time. He knows that the auto bought in February has a lower market value in May, in June, at the end of the

year and after several years. Second-hand dealers have schedules that assign progressively sinking values to the products of each car manufacturer from the date of purchase until the car goes to the junk heap.

In keeping accounts of your TV-radio service business you should set up a similar schedule. It is called the Equipment and Depreciation Record, a sample of which is shown as Fig. II.

In Part I of this G-E accounting system, a preliminary budget furnished estimates for the depreciation of the physical assets of your TV-radio service business. Depreciation is important not only as a deduction from your income tax liability, but also and especially as an expense affecting your profits and investment until your assets are disposed of by sale or junking. Your bookkeeping must show in detail the original cost and the progressively declining values of every physical property.

Equipment and Depreciation Record

Large companies control depreciation through equipment ledgers which record purchase prices,

YEAR 1953		EQUIPMENT AND DEPRECIATION RECORD				<i>Automotive Equipment</i>		
DESCRIPTION	P U R C H A S E D			DEPRECIATION PRIOR YEARS		RATE	AMOUNT	
	DATE MO. DAY YR.	FROM	COST					
<i>Half-Ton Chevrolet Panel Body Truck</i> <i>Year 1949, Serial No 14F5134495</i> <i>Engine No. FAB 46561</i>	<i>5 24 1949</i>	<i>Legal Motors</i>	<i>\$ 1000.00</i>			<i>20%</i>		

FIG. II

maintenance history, and depreciation for each piece of equipment they use. A service operation such as yours does not require an elaborate equipment ledger. What it does need is a simple record providing an inventory of your equipment and a chronicle of the depreciation changes in your equipment.

Fig. II shows one type of equipment and depreciation record which you will find useful in your TV-radio operations. Such a record provides space for listing each piece of equipment which you acquire and the month-to-month depreciation on it.

Entries in the Equipment and Depreciation Record are classified. A glance at Fig. II reveals that a single leaf or a single group of leaves, whichever is required to accommodate similar entries, is devoted to recording the facts about each type of equipment, such as automotive equipment, shop equipment, test equipment, furniture and fixtures. Our sample leaf lists automotive equipment only.

The "Description" column in Fig. II identifies an item by type, serial number, age, and other details. Spaces allow entering the date of purchase, the supplier's name, and the cost, as well as the following:

1. The rate of depreciation, a percentage figure such as the 20 percent in the budget tables on P. 3 of Part I for the depreciation of autos and trucks.
2. Dollars of depreciation which have been taken in previous years.

3. Total depreciation to be taken during the current business year (This is the monthly depreciation—computed later—multiplied by the number of months the asset is used during the year).
4. The amount of depreciation to be taken each month the equipment is in use (Depreciation should be entered starting with the month after the equipment is acquired).
5. Total amount of depreciation accumulated through the end of the current year (After the first year, this should equal the total of "Depreciation Prior Years" plus "Depreciation to be Taken This Year").
6. The remaining asset value, which is the cost of the asset less the "New Depreciation Reserve."

Computing Depreciation

The importance of depreciation is not lessened by the fact that all methods of computing it arrive at an estimated figure. It is an estimated figure because the amount of depreciation is a product of three factors: cost, residual or scrap value, and length of life. Of these, only cost is an exact amount. It is not possible to determine precisely how long any asset will retain its usefulness, or just what it will be worth as scrap. But it is not in the realm of guesswork that equipment has some scrap value. To this value a reasonable figure may be given, and the life of an item may be estimated in a similar way.

For the entry in Fig. II, showing the progres-

EQUIPMENT AND DEPRECIATION RECORD <i>Automotive Equipment</i> YEAR <i>1953</i>															
DEPRECIATION TO BE TAKEN THIS YEAR	MONTHLY (OR PERIODIC) DEPRECIATION												NEW DEPRECIATION RESERVE	REMAINING ASSET VALUE	
	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>June</i>	<i>July</i>	<i>Aug</i>	<i>Sept</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>			
<i>116.69</i>						<i>16.67</i>									

FIG. II

sive depreciation taken on the second-hand, half-ton Chevrolet panel truck, your computations would consist of the following steps:

1. The amount of depreciation to be accumulated over the life of the asset is determined thus:

Cost of asset.....	\$1000
Less estimated scrap value to be recovered when the asset is disposed of (This value is assumed as zero here in the interest of simplifying computation)	0
Depreciation to be accumulated...	\$1000
2. The amount of depreciation to be taken each year is determined thus:

Total depreciation to be accumulated	\$1000
Estimated life of equipment.....	5 years
Depreciation to be taken each year (\$1000 ÷ 5)	\$ 200
3. Rate of depreciation is determined thus:

\$200 ÷ 1000.....	20%
-------------------	-----
4. The amount of depreciation to be taken each month is determined thus:

\$200 ÷ 12.....	\$16.666
-----------------	----------

In Fig. II, \$16.67 has been written in for the month of June, the month the truck was put into use. The column with the heading "Depreciation to be Taken This Year" contains the figure \$116.69, which is the sum of amounts that will be recorded month by month under the appropriate column heads during the rest of the year. Total depreciation for all pieces of equipment in each class are totaled each month and ultimately find their way through the general journal to the general ledger. In this way, the accumulated depreciation for each class of asset is brought up to date at the end of each month.

Making Entries in Record

Generally, you have more than one piece of equipment recorded on an equipment and depreciation record leaf. Because the mechanics of recording each item are the same, Fig. II shows only one entry. In preparing the equipment and depreciation record, bear in mind the following points:

1. Details of every piece of furniture and equipment recorded in your cash disbursements journal must be recorded in the equipment and depreciation record. Thus, amounts entered in the cost column of the equipment and depreciation record for each class of equipment for each month should total the same as the total debits for that class in the cash disbursements journal.
2. One sheet, or set of sheets, is devoted to each class of equipment. (Fig. II, for instance, records only automotive equipment.)
3. A sufficient number of blank lines should divide each entry from the next so that each year's depreciation may be recorded over the life of the item. (It is good practice to leave three more blank lines than the number of years over which the asset is to be depreciated.)
4. The depreciation to be recorded for a class of equipment in any month is the sum of the entries for each piece of equipment in that month's column.
5. Follow a consistent policy in taking the first month's depreciation. For example, begin entering depreciation on a piece of equipment in the month following its acquisition.

You should remember that when you add down the cost columns of a sheet pertaining to one class of equipment, the total should equal the debit balance for the class of asset as it is recorded in the general ledger account. Likewise, at the end of each year, when the new depreciation reserve column of a sheet for a single class of equipment is added down, the total should equal the credit balance in the accumulated depreciation account for the class of asset.

Supporting Journal Entry

Monthly depreciation totals for furniture and fixtures and every other class of equipment are entered in your records by use of the general journal. Amounts entered and totaled in the equipment and depreciation record are the de-

tails supporting the journal entry. Thus, if depreciation columns for June 1953 totaled as follows:

CLASS OF EQUIPMENT	TOTAL DEPRECIATION
Automotive equipment	\$16.67
Shop equipment	4.17
Test equipment	13.33
Furniture and fixtures.....	4.17

the journal entry (2) in Fig. 1 would be prepared.

Those items labeled "Depreciation—Automotive Equipment," "Depreciation—Shop Equipment," etc. in journal entry (2) are, as you can check by reference to the chart of accounts, expense accounts. As such, increases to them are debits. Offsetting credit entries are made to accumulated depreciation, which in effect reduce the value at which assets are recorded. We do not credit the asset accounts themselves for accumulated depreciation because we want the cost values of equipment items in a form constantly available for insurance and tax evaluation. Cost values could be obscured in the simpler procedure of deducting depreciation directly from the equipment accounts.

RECORD OF JOURNAL ENTRIES MONTH OF June 19 53 - NO. 1

DAY	DESCRIPTION	ACCT. NO.	DETAIL	CHARGE	CREDIT
	(2)				
6/30	Depreciation—Automotive Equipment	225		16.67	
	Shop Equipment	235		4.17	
	Test Equipment	236		13.33	
	Furniture & Fixtures	237		4.17	
	Accumulated Depreciation—Automotive Equip.	112			16.67
	" Shop Equip.	114			4.17
	" Test Equip.	116			13.33
	" Furniture & Fix.	117			4.17
	To record Depreciation for the Month of June, 1953 (See Depreciation Record)				

GENERAL JOURNAL ENTRY NO. 2

Because it is an important point, we want to restate that depreciation as an expense of your business must be charged to expense accounts. As depreciation reduces the value of assets, the accumulated depreciation could be credited to asset accounts. So that asset accounts will always show a debit balance, we credit accounts entitled "Accumulated Depreciation," which are in effect reductions of the asset value. Posting of the journal entry to the general ledger is explained further on in this chapter.

Prepaid Insurance

The apportioning of cost, which we described in connection with accountancy procedure for the depreciation of assets, applies also to keeping insurance accounts. A business establishment having several kinds of insurance usually keeps an Insurance Record, in which the cost of insurance premiums is allotted over the months of a year in a format similar to that of the equipment and depreciation record. Just as the latter record is the basis of monthly entries in the general

journal, the insurance record contains details which are periodically summarized and posted in the general journal.

As there are many forms of business insurance, an insurance broker should be consulted as to what types a TV-radio service operation requires. Whatever the types, the accounting for premium costs remains the same.

Usually, insurance premiums are prepaid. When you pay a fire or automobile insurance

NO. 1 INSURANCE RECORD FOR YEAR ENDED December 31 19 53													
POLICY NUMBER	COMPANY	AGENT	COVERAGE		DURATION				PREMIUM		PRORATE THIS YEAR		
			TYPE	AMOUNT	DATE EFFECTIVE		DATE EXPIRES		RATE	AMOUNT			
AMOUNTS FORWARDED													
EC907	ABC Fire Ins. Co.	Dagwood	Fire & Exp. Cov.	\$5000	6	1	53	6	1	54	4.40	22.00	12.81
DC 303	ABC Mutual Insur. Co.	do.	Liability	10000	6	1	53	6	1	54	}	59.07	34.42
			Accident-Driver	10000	6	1	53	6	1	54			
			Collision	10000	6	1	53	6	1	54			

FIG. III

premium, you put down your money in advance for a one-, two-, three-, or five-year policy. Were the premiums for such a policy charged to expenses in the month in which they were paid, your insurance expenses for that month would be overstated. The customary procedure is to charge a general ledger account called "Prepaid Insurance." In the chart of accounts, such an account has been assigned the number 121, which is in the category of Other Assets.

Just as depreciation is charged to automotive equipment each month, prepaid insurance is reduced each month for the expired portion of the premium. The Insurance Record, a sample leaf of which appears as Fig. III, gives the details of the gradual expiration of premiums. Note the similarity between Fig. II and Fig. III.

The Insurance Record provides space for recording pertinent details of your insurance policies, including premiums paid and charged to prepaid insurance in the general ledger.

Original Premium Entry

Since the purchase of insurance is a cash transaction, accountancy procedure for recording insurance begins with the debiting of the amount of the premium in the cash disbursements journal, this initial entry showing the amount of your

check. The cost of the premium, and every subsequent debit to prepaid insurance in the cash disbursements journal, must have corresponding entries in the insurance record, where the details of each policy appear as in the sample leaf. These details are developed from the insurance invoices and include the following:

1. Policy number
2. Company issuing the policy
3. Agent
4. Amount of coverage
5. Duration or term of coverage
6. Premium

From the above data are computed the amounts appearing in the columns captioned "Prorate This Year" and "Monthly Charges to Expense." In the "Prorate This Year" column, you record the amount of the premium that will expire during the whole or the remaining part of the current year. In the "Monthly Charges to Expense" columns, you record the portion of premium cost that expires each month.

For the first policy recorded, Fig. III shows the yearly premium cost to be \$22. But only seven months—July through December—of the policy's duration fall in the current year, so that 7/12 of the premium cost, or \$12.81, is chargeable to this

ACCOUNTS TO BE CHARGED	MONTHLY CHARGES TO EXPENSE												TOTAL	UNEXPIRED END OF YEAR			
	1 J	2 F	3 M	4 A	5 M	6 J	7 J	8 A	9 S	10 O	11 N	12 D		AMOUNT	NO. OF MOS.		
232						183											
226						484											

FIG. III

year's expenses. "Monthly Charges" are developed by dividing the premium cost by the number of months the policy will run. When the "Monthly Charges" amount is multiplied by the number of months the policy will run in the current year, the product should agree with the "Prorate This Year" amount—give or take a few cents. The premium rate, for which a column has also been provided, is the yearly cost per \$1000 of insurance coverage.

Monthly Summary

Details of the second policy are worked out in the same way.

The amount of premiums expired each month is summarized for each account to be charged, such as account numbers 226, Insurance—Automotive Equipment; or 232, Property and Business Insurance. The totals are the basis for entry (3) in the general journal debiting account numbers 226 and 232. You will note that account number 121, Prepaid Insurance, has been credited with an amount equal to the sum of the amounts debited to accounts 226 and 232.

At the year's end, when the insurance record column captioned "Unexpired End of Year" is totaled, the sum should agree with the balance in the prepaid insurance account in the general ledger. The amount entered for each policy in the

"Unexpired End of Year" column is as follows:

At the end of the year in which the policy was purchased.

The difference between the premium and the total amounts charged off to insurance expense accounts.

At the end of the second and subsequent years.

The difference between the unexpired premiums at the end of the previous year and the amounts charged off to insurance expense in the second or subsequent year.

We will see further on in the present chapter how insurance as well as depreciation and original investment postings are made to the general ledger.

RECORD OF JOURNAL ENTRIES												MONTH OF		19 53		NO. 1	
DAY	DESCRIPTION	ACCT. NO.	DETAIL	✓	CHARGES	✓	CREDITS	✓									
6/30	(3) Insurance—Automotive Equipment Property and Business Insurance Prepaid Insurance To record insurance expenses expired. Prepaid insurance premium expired during June 1953. See Insurance Record	226 232 121					484 183										667

GENERAL JOURNAL ENTRY NO. 3

1. Adding machine tapes or lists are assembled.
2. Total cost is determined for each day and the total cost for the month.
3. A general journal entry of the monthly cost total is prepared to reduce "Materials and Parts—Inventory" for the month.

Assuming the monthly total cost is \$375, the entry in the general journal would appear like journal entry (4).

RECORD OF JOURNAL ENTRIES		MONTH OF <i>June</i>		19 <i>53</i>		NO. <i>1</i>	
DAY	DESCRIPTION	ACCT. NO.	DETAIL	✓	CHARGES	✓	CREDITS
	(4)						
6/30	Cost of finished goods	400			375.00		
	Materials and Parts Inventory	107					375.00
	to charge cost of goods finished by Parts Inventory during June 1953 (See Work Papers on file)						

GENERAL JOURNAL ENTRY NO. 4

Unrecorded Liabilities

When parts and materials have been delivered to your TV-radio service shop near the end of the month and the supplier's invoice has not been presented, your bookkeeping system has another problem to deal with, one which has been only passingly referred to in our previous chapters.

At the time you balanced your books, you had incurred an expense for these parts and materials. It is an expense, however, not recorded either as a liability from the supplier's invoice, nor has it been entered in the cash disbursements journal when a check was issued. With respect to your bookkeeping at the time you balanced your accounts, no record was made to reflect the delivery or the liability. What you owe the supplier is an unrecorded liability.

You could incur expenses in a similar way if the end of the month fell in the middle of your payroll period, or if numerous small bills for electricity, telephone, and other services received arrived after the month's end. In the first instance, you would have an unrecorded liability to your employees for a half week's salary; in the other, the bills would not ordinarily be charged to expense until you had issued your checks in payment. Both types of liability were incurred at or near the end of the month for which you are balancing your accounts. To the extent that your records fail to reflect such expenses or liabilities, your accounts are incorrect.



Schedules of Unrecorded Accounts Payable at June 30, 1953

Supplier	For	Period in Which Goods and Services Received	Charges	
			Account Number	Amount
A Company	Materials & Parts	June	107	\$ 65.00
B Company	"	June	107	10.00
C Company	"	June	107	5.00
D Company	"	June	107	13.00
Auto Window Tinting	Window Tinting	June	300	25.00
Brown Auto Service	Truck Storage & Gas	June	227	11.00
			153	129.00

Journal Entry Distribution			
		Debits	Credits
Dr	107	Materials & Parts Inventory	\$ 93.00
Dr	227	Other Auto & Truck Expenses	11.00
Dr	300	Other Expenses	25.00
Cr	153	Accounts Payable	\$ 129.00

FIG. VI

Booking Unrecorded Liabilities

To correct your books, you must make a general journal entry charging the expense accounts and crediting accounts payable. This procedure is what an accountant calls "booking unrecorded liabilities." The procedure is not complicated; in fact, it is somewhat similar to that for paying bills through the cash disbursements journal, but with the notable difference that you credit accounts payable instead of cash, i.e., checks issued.

To determine the amount of unrecorded liabilities, you should review all invoices, both those you have paid since the end of the month and those on hand but unpaid. Invoices for goods and services received before the previous month's end should be listed on a columnar work sheet like that shown as Fig. VI. Accounts to which the invoices were charged when they were paid after the end of the month, or to which they will be charged when paid, should be indicated so that the total amount chargeable to each account can be determined. When such amounts have been determined, they are recorded by a general journal entry.

A general journal entry like entry (5) should record the invoices in a summarized form. This journal entry, of course, will later be posted in the general ledger. For purposes of illustration, however, it is shown in this chapter as it has been posted to the work sheet, Fig. VII, (Pages 15 & 16), which will be discussed later.

RECORD OF JOURNAL ENTRIES				MONTH OF	19	NO.
				June	53	1
DAY	DESCRIPTION	ACCT. NO.	DETAIL	CHARGES	CREDITS	
6/30	(5)					
	Materials and Parts - Inventory	107		93.00		
	Other Auto and Truck Expenses	227		11.00		
	Other Expenses	300		25.00		
	Accounts Payable	153			129.00	
	To record unrecorded accounts payable at June 30, 1953 (See schedule on file)					

GENERAL JOURNAL ENTRY NO. 5

Trial Balance Month Ended

Account		Trial Balance before adjustments		Adjustments	
No.	Account Name	Debit	Credit	Debit	Credit
101	Cash in Bank	12386		①	100000
102	Petty Cash	25 00		⑤	9300
107	Inventory - Parts & Materials	937 64		①	100000 ①
121	Prepaid Insurance	81 07			② 667
155	F.I.C.T Payable		2248		
158	F.I.Tax Withheld		186 00		
160	Sales Taxes Collected		22 09		
201	Sales Materials & Parts		736 21		
202	Labor Charges - Installations		165 00		
203	" " - Services		1223 95		
210	" " - Other		75 00		
220	Other Income		225 00		
221	Gross Payrolls	120000			
222	Rent & Heat	9000			
224	Telephone	1425			
227	Other Autos & Truck Expenses	2680		⑤	11 00
231	Advertising	1960			
233	Trans Inventory Parts & Materials	13751			
122	Deposits			①	20000
111	Automotive Equipment			①	100000
113	Shop Equipment			①	50000
115	Test Equipment			①	100000
117	Furniture & Fixtures			①	50000
171	Owner's Capital				① 520000
225	Deprec - Auto Equipment			①	1667
235	" - Shop "			①	417
236	" - Test "			①	1333
237	" - Furn & Fixtures			①	417
112	Accum. Deprec - Auto Equipment				② 1667
114	" " - Shop "				② 417
116	" " - Test "				② 1333
117	" " - Furn & Fixtures				② 417
226	Insurance - Auto Equipment			③	484
232	Property & Business Insurance			③	183
400	Cost of Goods Sold			④	37500
300	Other Expenses			④	2500
153	Accounts Payable				⑤ 12900
		265573	265573	5749.01	5749.01
	Net Profit to be transferred to Capital				

Work Sheet
June 30, 1953

Trial Balance After adjustments		Balance Sheet		Profit and Loss			
Debit	Credit	Debit	Credit	Debit	Credit		
112386		112386					
2500		2500					
165564		165564					
7440		7440					
	2248		2248				
	18600		18600				
	2209		2209				
	73621				73621		
	16500				16500		
	122395				122395		
	7500				7500		
	22500				22500		
120000				120000			
9000				9000			
1425				1425			
3780				3780			
1960				1960			
13751				13751			
0000		20000					
100000		100000					
50000		50000					
100000		100000					
30000		50000					
	520000		520000				
1667				1667			
417				417			
1333				1333			
417				417			
	1667		1667				
	417		417				
	1333		1333				
	417		417				
484				484			
183				183			
32500				32500			
2500				2500			
	12900		12900				
<u>802307</u>	<u>802307</u>	<u>607890</u>	<u>559791</u>	<u>190417</u>	<u>242516</u>		
			48099	48099			
		<u>607890</u>	<u>607890</u>	<u>242516</u>	<u>242516</u>		

FIG. VII

Reversing Entry for Unrecorded Liabilities

All invoices, as they are paid, are charged to accounts through the cash disbursements journal. Every invoice listed on the work sheet (Fig. VII) will have been paid since the end of the month or will be paid ultimately through the cash disbursements journal. Thus, all invoices will have been entered twice—first as an entry in the general journal and again in the cash disbursements journal as checks are issued. This double entry imposes on you the necessity of making an entry every month which will reverse the previous month's entry for unrecorded liabilities.

In general journal entry (5) asset and expense accounts are debited and accounts payable accounts are credited. The procedure for reversing is as simple as this. Next month, just before setting up your unrecorded liabilities, turn that

RECORD OF JOURNAL ENTRIES		MONTH OF <i>June</i>		19 <i>53</i> NO. <i>1</i>	
DESCRIPTION	ACCT. NO.	DETAIL	CHARGES	CREDITS	
(6)					
<i>Accounts Payable</i>	<i>153</i>		<i>129.00</i>		
<i>Materials and Parts—Inventory</i>	<i>107</i>			<i>93.00</i>	
<i>Other Auto and Truck Expenses</i>	<i>227</i>			<i>111.00</i>	
<i>Other Expenses</i>	<i>330</i>			<i>25.00</i>	
<i>To reverse entry for unrecorded accounts payable at June 30, 1953.</i>					

GENERAL JOURNAL ENTRY NO. 6

journal entry round by crediting asset and expense accounts and debiting accounts payable, just as they appear in general journal entry (6). This is an exact reversal, the effect of which is to remove the duplication of entry just mentioned.

Posting Journal Entries

All the general journal entries we have made must be entered in the general ledger. Dates, a brief description of the purpose of the entry, reference to the general journal page number, and the dollar amount debited or credited are entered to the general ledger as explained in Part II of this G-E accounting system.

So that you may have an overall picture of your accounts, you should prepare a trial balance work sheet each month similar to the one shown as Fig. VII. Enter in this sheet's "Trial Balance Before Adjustments" column your general ledger balances after posting entries from your cash receipts and sales and cash disbursements journals. In Fig. VII, the balances recorded are those that appeared in the trial balance on page 11 of Part II.

In the "Adjustments" columns, debits and

credits are posted from the general journal entries we have made in this chapter. These having been made, debit and credit adjustment columns are added down. Total debits must equal total credits. When this isn't so, an error has been made which must be located.

When debit amounts added together are greater than the sum of credit amounts, as is the case with account 107, "Materials and Parts—Inventory," a net debit results. When credit totals exceed debit totals, a net credit results.

Amounts entered in the debit and credit sections of the two columns, "Trial Balance Before Adjustments" and "Adjustments," must be combined by cross adding. A net debit or credit for each account is then entered in the "Trial Balance After Adjustments" columns.

Profit and Loss Accounts

Debit and credit columns under "Trial Balance After Adjustments" must be added and balanced. When this has been done, you are prepared to determine your profit or loss by carrying balances over to the columns of the balance sheet and the profit and loss statement.

Your chart of accounts in Part II is your guide as to which accounts are to be entered in the profit and loss statement's columns. Account numbers greater than 200 are either income, expense, or cost of goods sold—that is, profit and loss accounts. Debit and credit values for such accounts are entered in the profit and loss statement. On the other hand, debit and credit amounts for accounts numbered 199, or a lesser number, are entered in the balance sheet columns.

When all balances in the "Trial Balance After Adjustments" column have been entered in the columns of the financial statements, debit and credit balances are added down. It will be found then that the debit column in the balance sheet does not equal the credit column, nor is there an equality of debit and credit totals in the profit and loss statement. The differences between these columns represent your profit—or your loss.

Have you experienced a profit or a loss?

With reference to your profit and loss statement, when credits exceed debits, you have a profit. You have a loss when debits exceed credits.

Since debits must equal credits in the profit and loss statement column, the amount by which credits exceed debits, or vice-versa, must be added to the column with the smaller total. This procedure is then extended to the balance sheet. If profit and loss statement and balance sheet columns are accurate:

1. The amount by which profit and loss debits exceed credits equals the amount by which balance sheet credits exceed debits, or
2. The amount by which profit and loss credits exceed debits equals the amount by which balance sheet debits exceed credits.

When your work sheet is completed, you can prepare formal statements in any manner that you feel gives you the information you require to manage your business, such as the balance sheet and the profit and loss statement shown, respectively, as Fig. VIII and Fig. IX.

Balance Sheet
At the Close of Business June 30, 1953

Assets

Current Assets:

Cash in Bank	\$ 11,238.66
Auto. Cash	25.00
Inventory - Parts & Materials	16,556.40
<u>Total Current Assets</u>	<u>\$ 27,820.06</u>

Fixed Assets:

	<u>Book Value</u>	<u>Accumulated Depreciation</u>	<u>Depreciated Value</u>	
Automotive Equipment	\$ 10,000.00	\$ 1,667.00	\$ 8,333.00	
Shop Equipment	5,000.00	417.00	4,583.00	
Auto. Equipment	10,000.00	1,333.00	8,667.00	
Furniture & Fixtures	5,000.00	417.00	4,583.00	
	<u>\$ 30,000.00</u>	<u>3,824.00</u>	<u>\$ 26,176.00</u>	26,176.00

Other Assets:

Prepaid Insurance	\$ 74.40
Deposits	200.00
	<u>274.40</u>
	<u>60,400.56</u>

Liabilities & Capital

Liabilities

Accounts Payable	\$ 129.00
Federal Income Tax Withheld from Employees	186.00
Federal Insurance Contributions Tax Payable	22.48
Sales Tax Collected	22.09
	<u>\$ 359.57</u>

Capital

Owner's Capital - June 1, 1953	\$ 5,200.00
Add: Profit for June, 1953	4,809.99
	<u>\$ 6,040.56</u>

FIG. VIII

Profit & Loss Statement
June 1953

<u>Income from Labor Charges:</u>			
Installation Charges			\$ 165.00
Service			1233.95
Other			75.00
<u>Total Income from Labor Charges</u>			\$ 1463.95
<u>Less - Operating Expenses:</u>			
Payroll		\$ 1200.00	
Rent & Heat		90.00	
Telephone		14.25	
Auto & Trucks:			
Depreciation	\$ 166.7		
Insurance	48.4		
Other	378.0	593.1	
Advertising		19.60	
Depreciation - Other than Automotive Equipment:			
Shop Equipment	\$ 4.17		
Test Equipment	133.3		
Furniture & Fixture	4.17	21.67	
Property & Business Insurance		1.83	
Other Expenses		25.00	1431.66
<u>Net Profit including profit from sales of materials</u>			\$ 32.29
<u>Profit from Sales of Material & Parts:</u>			
Other Income		\$ 225.00	
Sales of Material & Parts		736.21	
		961.21	
<u>Less:</u>			
Non-mentioned Material & Parts	\$ 137.51		
Cost of Goods Sold	325.00	512.51	448.70
<u>Net Profit for June, 1953</u>			\$ 480.99

FIG. IX

Closing Accounts

The procedures described for recording depreciation, insurance expense, unrecorded liabilities, etc., are repeated each month during the year. Thus income, cost, and expense accounts accumulate and would become cumbersome were this process allowed to continue throughout the life of the business. Consequently, once a year these accounts are closed out and profit or loss is transferred to the owner's capital account. To accomplish this, proceed as follows:

1. At the end of the year, prepare a balance sheet and a profit and loss statement, using the trial balance work sheet as previously explained
2. Prepare a journal entry closing out profit and loss statement accounts by the following steps:
 - a. Debit profit and loss accounts having credit balances
 - h. Credit accounts having debit balances
 - c. Total debit and credit columns of the journal entry.

When the credit total exceeds the debit total, debit owner's capital account with the amount

required to effect a balance, as below:

	<i>Debit</i>	<i>Credit</i>
Income Accounts	\$500	
Expense Accounts		\$400
Owner's Capital		100
To close income and expense accounts for the year ended 12/31/53		

If the debit total exceeds the credit total, credit owner's capital account with the amount required to effect a balance as below:

	<i>Debit</i>	<i>Credit</i>
Income Accounts	\$400	
Owner's Capital	100	
Expense Accounts		\$500
To close income and expense accounts for the year ended 12/31/53		

When the owner's capital account is credited, you are entering a profit. When you debit owner's capital, you enter a loss. The amount of profit or loss may be compared with the profit or loss developed in the trial balance work sheet. It should agree.

Petty Cash

The cash disbursements journal, as illustrated in both Parts I and II of this system, reflects a check for \$25 drawn for a petty cash fund such as you would find useful in the day-by-day operation of your TV-radio service business.

Unexpended petty cash is an asset, and all checks for petty cash are charged to Petty Cash, account 102. As cash is expended, the date, purpose and amount, as well as the signature of the person receiving it, should be recorded on a list which should be kept in the petty cash drawer. When the fund gets low, it should be replenished by drawing another check.

At the end of each month, your petty cash list should be analyzed, and the expense accounts affected by the amounts listed should be marked beside the amount. The amounts should be summarized, and the list should be used as a work sheet for supporting a general journal entry crediting (reducing) the petty cash account and debiting individual expense accounts. When the entry has been made in the journal and then posted to the general ledger, the balance in the general ledger should agree with the amount of cash in the petty cash drawer.



General

The principles developed in this manual apply to many accountancy problems not illustrated in our text. On the basis of what you have read here, you know that it would not be practical bookkeeping to charge taxes paid for a half or an entire year ahead direct to expenses. You would charge such taxes to prepaid expenses, determine at the end of each month how much remains prepaid, and charge the difference to an expense account.

The extent to which you analyze and adjust income and expense accounts to reflect your operating conditions determines the accuracy of your financial statements.

To whatever degree you have profited from

your reading of this manual, ordinary business wisdom dictates the employment of a certified public accountant to review the financial operations of your TV-radio service business at least once a year. He will iron out the rough spots in your bookkeeping and, as your business increases, his services should more and more replace your personal efforts to keep business records.

As your business prospers, you will find that your time is better spent analyzing your statements, planning for future profitable operations, promoting sales, increasing your services and whatever else will broaden and strengthen your business.



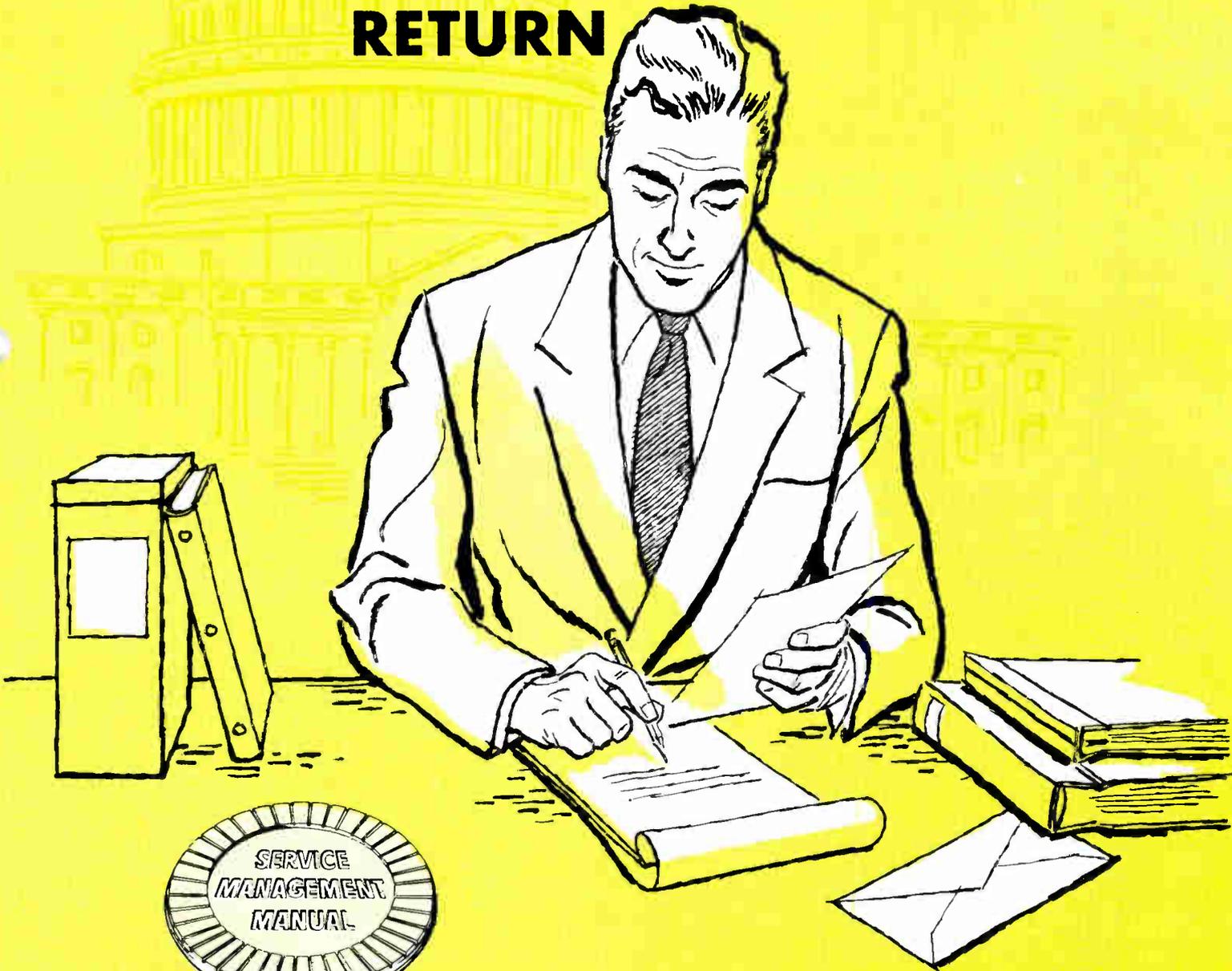
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TUBE DEPARTMENT
GENERAL  **ELECTRIC**
Schenectady 5, N. Y.

**BUSINESS
PRACTICES
MANUAL**

#5

Preparing
**YOUR FEDERAL INCOME TAX
RETURN**



GENERAL  ELECTRIC
Electronic **TUBES**

**WRITTEN ESPECIALLY FOR THE
TV-RADIO SERVICE DEALER**

Names and addresses used in this publication are fictional. Any resemblance to persons living or dead is purely coincidental.

Figures and tables referred to in the text are located in the rear of this booklet.

Index

	Page
Business or Personal.....	5
Importance of Records.....	6
Understanding Tax Terms.....	7
Planning for Income Taxes.....	9
Filling Out the Income Tax Report Form	10
Computing Gross Income.....	10
How to Calculate Business Profit	12
Use of Home, Phone and Auto.....	12
Establishing the Facts of Use.....	14
Combining Deductions With Profit & Loss.....	16
Net Operating Loss Deduction	16
Itemized Deductions From Adjusted Gross Income.....	18
Income Splitting	19
Declaration of Estimated Income Tax.....	20
Sending in Returns.....	21
Recording Your Income Tax Payment.....	21
Figure I	22
Figure II	23
Figure III	24
Figure IV	25
Figure V	26
Figure VI	26-27
Figure VII	28
Figure VIII	29
Figure IX	30
Figure X	31
Figure XI	32
Figure XII	33
Table I	34-35
Table II	34-35



It is not the purpose of this Manual to attempt to teach you how to cheat the government out of taxes you are obliged to pay. What it *will* do is help you determine the amount of tax you *really* owe so that you pay no more of your hard-earned dollars than is necessary.

If you are using the accounting system described in previous chapters of this *Service Man-*

agement Manual you will find your task relatively easy. This accounting system was developed to help you run your business more successfully. One of the ways it does this is to provide you with dollar-saving information for tax purposes. Most of the information you need can be taken from just two of your records—your ledger, and your trial balances.



Business or Personal

Before we get ourselves involved with the details of Income Tax reporting, let's recognize one thing which makes you, as a TV-radio service man, different from your neighbor, Tom Gardner, who works for a department store and whose only income is his regular weekly paycheck.

This difference lies in the fact that Tom goes to work in the morning and comes home at night, leaving his work in the office. You can seldom do that. Your books come home with you so you can catch up on your paper work. Your phone rings several times a week with calls from your customers wanting advice or service. And two or three times a week you have to leave your evening paper, jump into the family car, and drive out to see a customer or repair a radio or TV set. A customer is important, particularly when you're starting a new business.

All of this adds up to a fact important to you taxwise. Tom's home is only his home. Your

home is to some extent a second office. Your home phone becomes a business phone whenever a customer calls you or you call a customer over it. When you make a business trip in the family automobile it becomes, for the time involved, a business car.

To the extent that you use your car, your telephone and your home in your business dealings, you are entitled to deduct their cost in computing your tax. It is probable that you use them to a much greater extent than you realize. But to get credit for using them, and thereby cut down the amount of your Income Tax, you must *establish the fact of their use and the amount of their use* in such a way that a tax examiner will be satisfied. To do this does not require you to do anything which is either illegal or in any way dishonest. It does require that you keep good and sufficient business and personal records. Details will be given further on in the chapter.

Importance of Records

One further thought before we get down to business on your Income Tax return. How good are your records? If you have kept good records—personal records of expenses as well as your business records—the job of filling out your return will be easier and the amount you will need to pay will almost surely be less than if you have relied on memory. What's more, if the government questions a detail in your return, a tax examiner usually goes over every item, asking you to produce records or evidence to support your figures. Your memory won't satisfy him. Deductions not backed by records are likely to be disallowed, and your tax may consequently be increased.

If you haven't kept careful records during 1953, you'll have to struggle through as best you can with this year's Income Tax report. But start now to keep the records you will want next year, and every year thereafter.

If you are using the accounting system recommended in previous chapters of this series, your business records can be considered well taken care of. Certain of your personal transactions should be as carefully recorded.

Draw checks whenever practicable, particularly when making contributions to charities or paying doctors, dentists, pharmacists, and hospitals. Canceled checks are valuable evidence of payment when receipted bills are lacking.

Keep receipts for telephone, fuel oil, gas, coal, electricity, etc. File receipts by years (to be safe you'll need to keep them at least five years) and keep all receipts of a similar kind together, i.e., telephone bills, gas and electric bills.

Keep a record of all expenditures, being particularly careful to note all donations to churches and charities, and all payments for upkeep of your house, auto and other property or equipment which is used in any way for business purposes.

Be sure your records show what part of any payments on mortgages or other loans is inter-

est and what part is taxes (where taxes are included in mortgage payments). If you don't know, at the end of the year get an analysis of your mortgage payments and what they were for, from your bank or mortgage holder.

Keep a record of purchases of gasoline and oil for your car and record the mileage at each year's end. If you use the car for business (not just driving back and forth from home to office, but for calling on prospects, picking up and delivering sets, chasing into the city for parts, etc.) keep a record of the miles you drive on business errands.

Also keep a score pad by the telephone. Rule two columns—one for business and one for personal calls. Every time you make a local call, put a mark in the proper column. Record both the calls you and your family *make* and those you *receive*. Record the date and number called of all toll calls made for business purposes.

Keeping records may be a bother, but it pays off from a tax standpoint. Records of personal expenditures are much more important to you, a businessman, than they are to your salaried neighbor.

Your business records will be in order whether you use the special, convenient system described in earlier chapters or some other adequate system. You must keep them in good order because, from time to time, you may be visited by representatives of the federal, state or municipal tax departments who will examine your journals and general ledger, your cancelled checks, vendors' invoices, job tickets, stores requisitions, and all other documents and worksheets explaining or supporting these records.

Your personal records must, like your business records, be kept several years. If you have filed a return, to the best of your knowledge, that is "true, correct, and complete," after three years you can be reasonably sure that Uncle Sam is satisfied with it. But there are many clauses in the regulations. We advise consulting your attorney before you dispose of any records.

Understanding Tax Terms

Before you start entering figures on Form 1040 (U. S. Individual Income Tax Return) or Form 1040 ES (Declaration of Estimated Income Tax), the two Federal Income Tax report forms that you will most likely use, you should be sure of the meanings of the various terms used in the form. Certain terms have important implications for you, particularly the "Deductions for Adjusted Gross Income" and the "Deductions from Adjusted Gross Income". Let's take the various terms in the order in which we need them. In essence, your Income Tax report reduces itself to this:

Gross Income	\$XXXX
Less—Deductions for Adjusted Gross Income	XXXX
Adjusted Gross Income.....	\$XXXX
Less—Deductions from Adjusted Gross Income (or if you so elect, the Standard Deduction)	XXXX
Net Income	\$XXXX
Less Exemptions	XXXX
Balance Subject to Tax (i.e., Surtax Net Income)	\$XXXX
Tax (Computed by reference to Fig. IV or Table II).....	XXXX

Making out honestly your Income Tax return is somewhat like a game. The object is to come up with the smallest possible Balance Subject to Tax. The definitions of terms which follow will bear careful study. They show how facts can be used to advantage in arriving at that smallest possible Balance Subject to Tax.

Gross Income. This covers almost every penny received from any source whatsoever, even the money that wasn't received because it was withheld for taxes. Gross Income includes:

1. Salaries, wages, bonuses and taxes withheld.
2. Business profits (or losses).
3. Prizes won in contests (including gambling winnings).
4. Interest on savings deposits, and interest and dividends from investments.
5. Rents and royalties.
6. Interest on tax refunds.
7. Gains from sales of real and personal property.

Not considered a part of Gross Income, and therefore not reported, are bequests and monies received as beneficiary of life insurance policies



because of the death of the insured.

Deductions for Adjusted Gross Income. These, which are mostly business expenses, include the following items:

1. Ordinary and necessary expenses of carrying on one's trade or business. (This is an item of primary importance and will be explained further along in this chapter.)
2. Expenses of travel, meals, and lodging paid by an employee while traveling for his employer.

3. Expenses other than travel, meals, and lodging incurred by an employee while traveling for an employer, for which his employer has agreed to reimburse him.
4. Losses resulting from sales or exchanges of property.
5. Expenses of properties held for the purpose of obtaining rents or royalties.

Adjusted Gross Income. This is what remains after Deductions for Adjusted Gross Income have been subtracted from Gross Income.

Deductions from Adjusted Gross Income. These are the normally personal or non-business deductions. They include:

1. Interest on mortgages, auto loans, delinquent taxes, and other *personal* indebtedness, including life insurance loans.
2. Real and personal property taxes, state and local income taxes, use taxes, retail sales taxes, poll taxes, automobile license fees, and state gasoline taxes (in most states).
3. Contributions to religious, educational, charitable, scientific or literary organizations. (Your total deduction for contributions may not exceed 20% of your Adjusted Gross Income.)
4. Losses from fire, theft, storm damage and other forms of casualty (when such losses are not recovered through insurance).
5. Medical and dental expenses. (No deduction is allowable except in instances where these expenses exceed 5% of your Adjusted Gross Income, and the deduction allowed is that amount by which these expenses exceed that 5% figure.) Limitations are also placed on amounts which can be deducted. These limitations are discussed later in the chapter.

Because many people fail to keep adequate records to support their claims for Deductions from Adjusted Gross Income, the government offers each taxpayer the choice of a Standard Deduction requiring no explanation or supporting data.

The Standard Deduction for a single person or for a married couple filing a Joint Return is 10% of Adjusted Gross Income up to a maximum of \$1000.

If a husband and wife file separate returns, each may take a Standard Deduction of 10% of his (or her) Adjusted Gross Income, but not more than a \$500 deduction is allowed to each individual. If husband and wife file separate returns and one elects to itemize deductions, the other must itemize deductions also.

When Adjusted Gross Income is less than \$5000, the amount of tax is computed by use of a table on the back of the return form. (See Fig. I and Fig. IV) By using this table, the taxpayer receives the benefit of a Standard Deduction approximating 10% of his Adjusted Gross Income.

You should, of course, figure out your Deductions from Adjusted Gross Income on an actual basis and then discard this method of reporting if you find the Standard Deduction more advantageous.

Net Income. This is the remainder after Gross Income has been reduced by Deductions for and Deductions from Adjusted Gross Income.

Exemptions. Portions of your income are exempted from income tax by statute. Unless you (or your wife) are blind or are 65 years old or older, your exemptions will be \$600 for yourself, \$600 for your wife (assuming that you are not separated) and \$600 for each child or other close relative you have supported during the tax year. The rules that apply to exemptions are so clearly stated in the instructions supplied with your Income Tax Report that there is little point in discussing them here.

Balance Subject to Tax. This is what remains when you have deducted the total of your allowed exemptions from your Net Income. It is the final amount which becomes the basis for computing your tax.

Tax. Using the tables and applying the percentages of tax given in the instructions for completing the Income Tax Report form (see Table II), you finally arrive at the amount you must pay. This is the *Tax*.

Planning for Income Taxes

Unless your personal and business affairs are quite complex, the preparation of your Income Tax Report is a simple matter when you have planned ahead for it. The better your preparation, the less time and effort you will use in completing the form, and the less likelihood there is that you will pay more tax than required.

Planning for taxes is an important phase of good business management for the following reasons:

1. Since your income as a businessman is not subject to withholding, which at least partially prepays the tax, you must estimate your Net Income quarterly and make quarterly tax payments based on your estimates. To make these payments you must have the necessary cash (or bank balance) at the proper time.

2. Certain of your business decisions will affect the amount of your tax. By planning ahead and by knowing how and when to take steps that will place you in a favorable tax position, you can save yourself many dollars, perhaps even hundreds of dollars, in a single year.

Let's talk cases. Suppose you go merrily on your way without thinking of Income Taxes.

You're busy with your repair and service work. The money comes in satisfactorily, and your bank balance looks nice. Your wife gets a peek at the figures on your last check stub and decides that now is the time to talk you into buying the dishwasher she has had her eye on. The outlay won't disturb your healthy cash position too much, so you call up a dealer and tell him to bring the dishwasher around and set it up. A week or so later, you find your inventory of tubes and parts (without which you can't fix anything) is getting low. So you order enough stock to hold you for the next few months.

Then comes trouble.

You have forgotten about that quarterly Income Tax Report due tomorrow, the 15th. You take your books home and figure far into the night, only to find that you must pay Uncle Sam more money than you have left uncommitted.

You realize that a little planning would have spared you this embarrassment. You should have kept in mind the fact that a tax payment was due, and you should have estimated the amount needed to meet this obligation. Had you exercised such foresight, you could have explained to your wife that the dishwasher must wait or you could have bought only essential inventory. You would then have been in a good position to meet your tax obligation.

The accuracy of your estimate at each quarterly reporting period is of considerable importance. If you underestimate your Net Income and pay too little tax, you may be liable for a penalty. If you overestimate your Net Income, you will pay too much and lose the benefits of adequate working capital.

By knowing your tax position, you may find that a new car or truck should be bought this year rather than next year. Such a purchase might increase your expenses so as to offset a good profit and reduce your Balance Subject to Tax. Next year may not be as profitable, and expenditures to reduce your Balance Subject to Tax might not be needed to keep you out of the



higher tax rate bracket.

Such instances are merely examples of the thinking and planning you can do to avoid paying a higher tax than necessary. Any attempt to catalog the ways to lessen, legitimately, the

amount of your tax would make a very long list. Once you understand the principles, you can train yourself to consider the effect on your Income Tax whenever you consider expanding or improving.

Filling Out the Income Tax Report Form

Thus far you have been told that there are ways to avoid paying more tax than you owe, and have been given one or two important points to keep in mind in planning for tax savings. These are: 1) recognizing that your business intrudes into your home and involves the use of your house, your phone, your automobile, and other normally personal possessions or services; and 2) that you must keep records to enable you to realize the tax savings to which such use of your house and other possessions for business purposes entitles you.

Now, before you start the actual arithmetic

necessary for filling out Form 1040, take a tip. Read the entire form, and especially the instructions supplied with it. Read it all through. Then, and only then, should you start building up figures and filling out the lines.

In the instructions which follow, and in the examples shown, the 1952 Income Tax Form 1040 has been used because 1953 forms were not available. Differences, if any, between the 1952 and 1953 forms are expected to be slight. When you get your 1953 form, check it against the 1952 form as reproduced here to make sure you are aware of any differences between the two.

Computing Gross Income

You are an individual businessman. If you have a partner, or if your business is incorporated, the instructions that follow will not be entirely applicable, and you should seek help in preparing your return. If your net income is likely to be more than \$25,000 for the year, you will be wise to have your return prepared by a tax specialist.

With your two copies of U. S. Treasury Department Form 1040, U. S. Individual Income Tax Return, you probably will have received a copy of the instruction sheets. If you did not receive

them, contact the nearest Director of Internal Revenue, U. S. Treasury Department. You will find him listed in your phone book.

The more you know about Income Taxes, the more money you can save. So write for a copy of "Your Federal Income Tax for Individuals," published by the Bureau of Internal Revenue, Treasury Department, and obtainable from the Superintendent of Documents, Government Printing Office, Washington, price 25 cents.

Still another book worth its purchase price sev-

eral times over is J. K. Lasser's "Your Income Tax," published by Simon and Schuster, and available through stationery stores and book shops in almost every city, town and village in the country.

We have avoided wasting your time with detailed instructions on points clearly and fully explained in Form 1040. You should not, for example, find any difficulty with item 1 (Fig. 1) which deals with your "exemptions." Still there are a couple of points worth mentioning which may fit your case.

If your wife worked for wages or salary during 1952 and you are filing a joint return, enter her Social Security number as well as your own.

Notice that line 1(c) emphasizes children with "gross incomes of less than \$600 in 1952 who received more than one-half of their support from you in 1952." This means that if one of your children caddied, mowed lawns, worked as an errand or delivery boy or otherwise earned \$600 or more during the year, you may not claim him as an exemption. If he earned only \$599, you are entitled to the exemption. Thus, if your own income puts you in the 25% tax bracket, that one extra dollar of your son's income will cost you \$150 in taxes.

whether they worked for you or for someone else, income taxes were probably withheld from their wages. Unless their earnings were \$600 or more each for the year, the amount withheld can be recovered by filing a tax return claiming a refund for the amount of the tax withheld. The person who earned the money files the return. Such a claim does not change your right to take the \$600 exemption for each child, always providing that the child earned less than that magic \$600 and he or she received more than one-half of his support from you.

Line 2 (Fig. I) concerns your wages or salary from employment before you became a businessman. We have assumed that you worked for the Dogwood Corporation before you started your own TV-radio service business and that you earned \$2290 there. We have assumed also that your wife worked part of the year and earned \$1780. Both Dogwood and your wife's employer reported to the Treasury Department the amounts paid you as well as the amounts withheld for Income Tax. Each of you should have received, or can request from your employer, a record of these payments on U. S. Treasury Form W2. You *must* have this record because you *must* send it with your return.



There is, however, the possibility that you can use the \$600 gross income limitation to your advantage. If your children are old enough to work in your store at tasks for which you would ordinarily hire someone, you are justified in paying them a reasonable salary such as you might otherwise have paid an outsider. And as long as you do not let them earn *as much as* \$600 each, you can still claim them as exemptions while deducting their salaries from your Gross Income as a necessary expense of your business.

If your children were employed, regardless of

Now we come to line 3, where your business profit (or loss) enters the report. Also reported here are dividends from stocks, bonds, interest on bank deposits, Series E Government Bonds, money you have out on loan, etc. Turn to Page 2 of Form 1040 (Fig. II) and fill in the information called for in Schedules A, B, C, D, E, F and G. For an example of the proper way to fill in these schedules, see the entries in Schedules B and C (Fig. II). The total of the amounts entered in those schedules is later entered at line 3 on Page 1.

Since we are primarily concerned with helping you report your business gains (or losses) we shall cover only Schedule C, assuming that the others do not apply in your case or, at least, will cause you no difficulty.

Schedule C is the most important part of your report. To calculate (or “develop,” as account-

ants call it) the figures for this schedule, you go to your business records—your “books.” From them you will prepare a series of worksheets like those shown in Figs. VI, VII, VIII, and in Table I. The final figure to be entered on line 1 of Schedule C will be found at the bottom of Fig. VIII.

How to Calculate Business Profit

The figures in the worksheets (Figs. VI, VII and VIII) are based on certain assumptions about your business. Your own figures will not, of course, be the same. We merely demonstrate the method. You follow it, using your own facts and figures.

Assume that, at December 31, 1953, you prepared your profit and loss statement in the manner described in Manual IV and came up with the amounts appearing in the “Before Adjustment” columns in Fig. VI. For Income Tax purposes that statement does not reflect the true

profit you have made from your TV-radio service business. Your true profit is your book profit plus the salary you have drawn. Therefore the net profit must be increased by the amount of your salary that is included in payroll expense. This is done by deducting \$4550.00 from payroll expenses. The method of doing this is shown in

Fig. VI. See the column headed “Adjustment” and the explanatory note at the bottom. Observe also that the revised figures are entered in the “After Adjustment” column, and that they are added down and proved in the same manner as the “Before Adjustment” entries.

Use of Home, Phone and Auto

Thus far we have completed a record of your business income and expenses as taken from your normal business records. But you have taken no account of those business expenses arising from your use of your home, your home telephone, your family or personal automobile and, perhaps, other possessions and equipment not usually considered business property.

Earlier in this chapter we mentioned that, to

take advantage of tax savings available to you, you would need to establish both the *fact of your use* of home, phone and/or automobile, and the *amount* of that use for business purposes. In the tabulation which follows, you will see the types of expenses we are discussing and what can be done with them in your Income Tax Return. The tabulation shows how this information can be translated into dollar savings in your tax report:

TYPE OF EXPENSE**IF AUTOMOBILE AND RESIDENCE USED****PART FOR BUSINESS****NONE FOR BUSINESS**

Rent of home.

Part deductible *for* Adjusted Gross Income; balance not deductible at all.

No part deductible.

Depreciation on home and maintenance, also repairs if home owned.

Part deductible *for* Adjusted Gross Income; balance not deductible at all.

No part deductible.

Interest on mortgage if home owned.

Part deductible *for* Adjusted Gross Income; balance deductible *from* Adjusted Gross Income.All deductible *from* Adjusted Gross Income.

Taxes on home if home owned.

Part deductible *for* Adjusted Gross Income; balance deductible *from* Adjusted Gross Income;All deductible *from* Adjusted Gross Income.

Fire Insurance, Light, Heat and Telephone expenses.

Part deductible *for* Adjusted Gross Income; balance not deductible at all.

No part deductible.

Auto expenses including maintenance, repairs, registration fees, garage rent, depreciation and other costs.

Part deductible *for* Adjusted Gross Income; balance not deductible at all.

No part deductible.

Gasoline and Oil.

Part deductible *for* Adjusted Gross Income; state and local taxes included in non-business portion usually deductible *from* Adjusted Gross Income.State and local taxes usually deductible *from* Adjusted Gross Income.

In the "Total Cost" column of Table I are listed costs connected with maintaining your home and automobile. Some of these costs, as indicated in the tabulation, would not be deductible at all if you did not use these assets partly for business purposes. Those costs are apportioned between the "Deductions for Adjusted Gross Income" and "Not Deductible" columns. Other costs, such as interest on mortgages, taxes, and contributions, are deductible from Adjusted Gross Income by statute. In Table I, they are treated in two ways:

1. In the "Deductions If Automobile and Residence Used—Partly for Business" section of the table, costs have been apportioned between the Deductions for Adjusted Gross Income and Deductions from Adjusted Gross Income;

2. In the "Deductions If Automobile and Residence Used—None for Business" section of the table, costs have been listed in the "None for Business" columns. These costs would be Deductible from Adjusted Gross Income if you were not using your automobile and residence for business purposes at all. They are deductible by statute.

As Table I indicates, use of your automobile and home for business contributes quite a tax saving. When they are used "None for Business," Deductions from Adjusted Gross Income total \$1127. When they are used "Partly for Business," total deductions amount to \$1546.25.

Deductions for Adjusted Gross Income	\$592.50
Deductions from Adjusted Gross Income	953.75
	<u>\$1,546.25</u>

This increase in deductions, amounting to \$419.25, is explained as follows:

Deductions which were obtained only because residence and auto were used for business purposes:

Depreciation on Residence	\$ 50.00
Repairs on Residence	100.00
Light and Heat	40.00
Telephone	48.00
Automobile Depreciation	100.00
Automobile Gas, Oil and Repairs (Excluding taxes)	81.25
	<u>\$419.25</u>

Establishing the Fact of Use

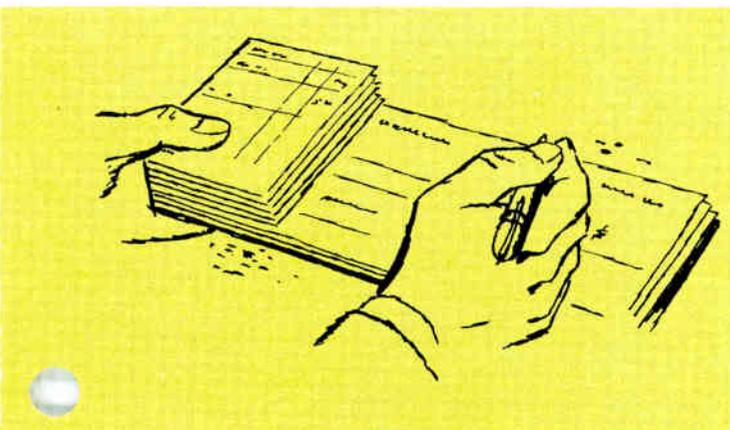
Naturally, Uncle Sam is not going to hand you the benefits of a tax advantage such as has just been discussed. You have to be able to justify it. Not only must you be able to prove the amounts you have spent for these deductible items, but you must also be able to satisfy tax authorities that your apportionment of the expenses between business and personal is reasonable.

The best way to prove the amounts you spend is to produce canceled checks indicating that payments were actually made. Since this cannot be done in case of "out-of-pocket" payments, it is wise to keep a diary or log showing amounts you paid out in cash, to whom paid, the reason

for the payment, and the date of the payment. This log can also support apportionments between personal and business expenditures. It will be to your advantage to keep a record of time worked at home on matters pertaining to your business. If you entertain for business reasons, keep a record of the persons entertained, the dates, the amount spent, etc. Record mileage on your automobile speedometer at the beginning of the year and at the end of the year. During the year, keep figures on the mileage for the use of the car for business reasons and indicate where you went, whom you saw, and the dates of such trips. At the year's end, deduct mileage at the

year's beginning from the present reading, total up your business mileage, and relate this latter figure to the total mileage. This relationship may be used as a guide in apportioning your auto costs between business and personal expense. When your log is kept as a formal record to save you money and is neat and clean, tax authorities are inclined to accept it as reliable.

Another way to justify deducting part of the costs of your home is to set aside a room or part of a room as an office. When you or your wife keep the books for your business, the bookkeeping should be done at home, where you should allow space for a file or two and for your books of account and other records.



It is also a wise measure to have your home telephone listed in the yellow section of the telephone directory, on your business cards and in advertisements, or to have your number listed in the regular sections of the telephone directory as a number to be called during certain hours of the day. In other words, publish it as widely as possible that you use your home as a means of increasing the earnings of your TV-radio service business.

From the records you have kept which establish both the *facts of your use* of these possessions and the *amount of your use* of them, you should prepare a statement or worksheet like that shown as Table I. No figure in this table can be used directly by you. Do not assume, for example, that your house will be completely depreciated in 40 years unless you consider that reasonable in your particular case. The depreciation rates should be based on your best estimate of the life of the assets. The following would probably be considered reasonable for your residence, automobile, and furniture if used partly for business.

Type of Asset	Estimated Life (Years)	Depreciation Rate (Annual)
Residence:		
Brick	50	2%
Frame	25-40	2½-4%
Office Furniture	10	10%
Automobile	4-5	20-25%

Thus, if your house cost \$10,000 and was used 20% for business, depreciation for tax purposes would be:

Total Cost	\$10,000
Annual Depreciation at 2½%	\$ 250
Depreciation for Tax	
(20% x \$250)	\$ 50

The Treasury Department will probably consider five years a reasonable total life for an automobile. However, in a period of rapidly rising prices, your house or car may be worth more today than it was when you bought it. This does not alter the depreciation picture. Depreciation is based on cost, not on present value.

Do not estimate the use of your house at 20% just because that figure is used here. Determine the true percentage from the facts. The same is true for the use of telephone and automobile. Don't guess at the percentage or just pick a figure out of the air. Base the percentage on the records you keep and avoid a red face, occasioned by Uncle Sam inquiring about "where you got that figure."

The right-hand column in Table I, headed "Not Used for Business," is given only to show what deductions would be allowed if you did not use home and/or automobile partly for business. You do not need to use such a column in calculating your own deductions unless you are interested in learning how much you save. Do not, however, send a worksheet that has this column with your Income Tax Return. It is irrelevant.



Combining Deductions With Profit and Loss

In Table I or, rather, in the table you have prepared in the same manner, there is a column "Deductions for Adjusted Gross Income." The figures in this column are now combined with those you developed in your own version of Fig. VI, the Profit and Loss Statement. This you do on a separate worksheet as indicated in Fig. VII, using notes at the bottom to explain each item fully.

The final Profit and Loss Statement (Fig. VIII) is much simpler than that you would normally prepare for your own management purposes. It is really a summary sheet which incorporates the information developed in Fig. VI with the adjustments worked out in Fig. VII. This final Profit and Loss Statement must be attached to your tax returns unless you prefer to use the Treasury Department form illustrated in Fig. IX. We do not recommend using the Treasury form because it fits poorly the nature of your business.

In preparing the Profit and Loss Statement (Fig. VIII) you will find that the first entry, Income from Labor Charges, has been taken directly from Fig. VI. The Operating Expenses, however, are taken partly from Fig. VI (when no adjustment is involved) and partly from Fig. VII. The payroll situation has not been changed

on any worksheet since we removed your salary (Fig. VI). Therefore that figure comes directly from the "After Adjustment" column in Fig. VI. The Rent, Heat, and Electricity item in Fig. VIII is taken from Fig. VII, where we combined the "home" items from Table I with the similar "business" items from Fig. VI.

The figures we have used are merely by way of example. Your own figures will be different. The important thing is to understand the reasoning. Try checking yourself to see how well you understand. Look at each item in Fig. VIII and see whether you can tell, without referring back, where the entry came from—whether directly from Fig. VI or from Table I as combined in Fig. VII.

After you have prepared your version of Fig. VIII you should prove the profit (or loss) figure in somewhat the following manner:

Net Profit (Fig. VI).....	\$5231.84
less—Deductions for Adjusted	
Gross Income (Table I).....	592.50
Net Profit (Fig. VIII).....	<u>\$4639.34</u>

The \$4639.34 is then entered on line 1, Schedule C, Page 2 of Form 1040 (See Fig. II). The amounts you have entered in schedules A through G are now added down and their total entered as indicated on Page 2.

Net Operating Loss Deduction

Line 5, Schedule C (Fig. II), provides space for entering Net Operating Loss Deduction. The Net Operating Loss Deduction results from business losses or losses from casualty or theft in-

curred in other years—not losses of the current year. If your business lost money in the current year, the loss would be entered at Schedule C, line 1.

If your business operates at a loss, that loss can be offset against other income such as salaries, dividends, interest, etc. However, if the loss is more than your other income, the excess or "net operating loss" can be carried back to offset income of the next preceding year. If income of the previous year is insufficient to offset the "net operating loss" carried back, the remaining excess loss can be carried forward in sequence against income of the next five succeeding years. For example, assume your profit picture for the years 1952-1958 looked like this:

Year	Profit or (Loss)
1952	\$1000
1953	(3250)
1954	500
1955	750
1956	310
1957	400
1958	100

the 1953 Net Operating Loss of \$3,250 would be applied as follows:

Income for the year	Net Operating Loss Applied	Net Operating Loss Remaining
1952	\$1000	\$2250
1954	500	1750
1955	750	1000
1956	310	690
1957	400	290
1958	100	190

The carryback of \$1,000 Net Operating Loss to 1952 would make it necessary to file an amended

return and claim a tax refund. The Net Operating Loss carryovers to years 1954, 1955, 1956, 1957 and 1958 would simply be offset against business profits and would eliminate tax otherwise payable.

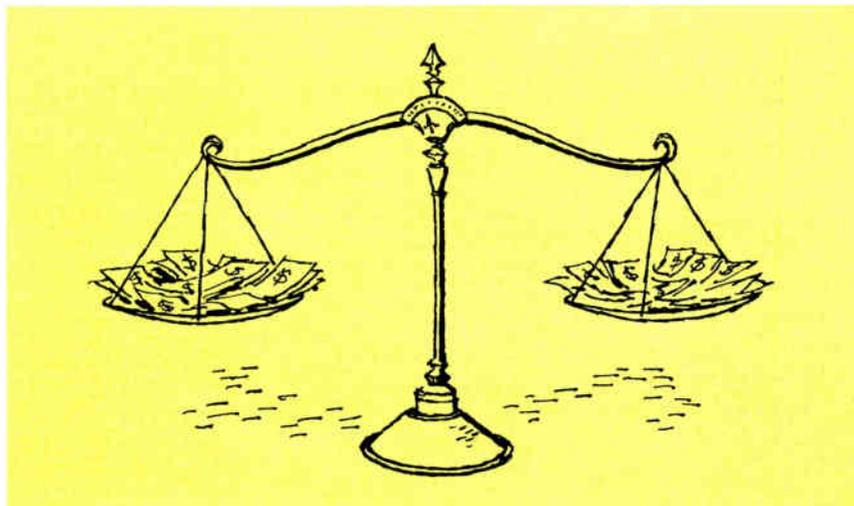
The above was a simple example. Where there are profits and losses in several intervening years, computation of Net Operating Loss carrybacks, carryforwards and deductions becomes very complicated. If you face this problem, be wise: consult a certified public accountant.

You should, however, fix in your mind the principle that losses in one year may entitle you to a refund of taxes paid in a preceding year, and that the losses can be used to reduce taxes of following years.

So much for losses. Let's get back to the business of filling out your return.

The \$4,709.14 Total Income shown on Fig. II will be transferred to line 3 Fig. I. Lines 2 and 3 on Fig. I will then be added and the total entered at line 4. This is your Adjusted Gross Income. As it is not less than \$5000, it must be entered at Fig. III, line 1, in the Tax Computation Schedule.

Before doing this, make certain that you read the section of Fig. I entitled HOW TO FIGURE THE TAX. It tells very clearly when to use the tax table at Fig. IV, and when it is advantageous to itemize deductions, etc. Also, if you are widowed, unmarried, or legally separated and have children, don't overlook the tax benefit you may be entitled to as Head of Household. Answer the questions at Schedule 5 Fig. II to determine whether you qualify.



Itemized Deductions from Adjusted Gross Income

At this point you must make an important decision — whether you should *itemize* your Deductions *for* Adjusted Gross Income or use the Standard Deduction discussed previously. If your Deductions *from* Adjusted Gross Income are more than 10% of Adjusted Gross Income (see Fig. I , line 4), it is generally advantageous to itemize them in spaces provided in the upper half of Fig. III . If Deductions *from* Adjusted Gross Income are less than 10%, it is usually advantageous to use the Standard Deduction.

Looking at Table I , where Deductions *from* Adjusted Gross Income are itemized, you find the total is \$935.75. As this is greater than 10% of Adjusted Gross Income, the deductions will be listed in the upper half of Fig. III . The total of amounts listed will be entered at the point indicated on Fig. III .

The fact that no deductions are entered for medical expenses, casualty losses, etc., does not mean that you cannot take such deductions. In our example, we have assumed that you had no such deductions. The following are a few of the deductions to which you may be entitled:

1. Losses from destruction of property by fires, storms, automobile accidents, etc. to the extent that such losses were not reimbursed by insurance.
2. Losses due to theft.
3. Medical and dental expenses such as:
 - a. Payments to doctors, dentists, nurses and hospitals.
 - b. Premiums for hospitalization, accident and health insurance which

provides for payment of medical care.

- c. Travel expenses, where necessary to obtain proper medical attention.
- d. Drugs, dental and medical supplies.
- e. Ambulance hire and in special cases, cost of travel “for the prevention or alleviation of a physical or mental defect or illness when such travel is not in any sense for vacation purposes.”

Of course, medical and dental expenses can only be deducted to the extent that they exceed 5% of Adjusted Gross Income, and even then only up to the following limits:

1. On a separate return when one exemption is claimed—\$1250.
2. On a separate return when more than one exemption is claimed—\$2500.
3. On a joint return when two exemptions are claimed—\$2500.
4. On a joint return when three exemptions are claimed—\$3750.
5. On a joint return when four or more exemptions are claimed—\$5000

Balance subject to tax (also known as Surtax Net Income) is computed by deducting line 2 from line 1 and line 4 from line 3. It is the figure to which tax rates are applied.

Income Splitting

Notice that line 6 Fig. III, is used only when the Balance Subject to Tax is \$2000 or less. There is a reason for this.

The first \$2000 of the Balance Subject to Tax is in the lowest tax rate bracket—22.2%. From \$2000 on, rates jump within brackets until they reach a tax of 92% on amounts over \$200,000.

If the Balance Subject to Tax is over \$2000, taxes are computed at line 7 or 8, depending on whether one files a separate return, as head of the household, as a single person, or a joint return. For a married couple, it is usually advantageous to file a join return when:

1. Either spouse has exemptions exceeding his or her gross income.
2. Either spouse has a Balance Subject to Tax greater than \$2000.

In the first case, one spouse gets the benefit of the other spouse's excess exemption by filing a joint return. In the second case, the advantage is caused by an income-splitting provision which allows the spouses to split their combined incomes in half, compute the tax on the half, and report twice the tax computed in this manner as their tax liability. The benefit thus obtained is illustrated below:

When Both File Separate Returns			
	Albert Cee	Beatrice Cee	Combined for Joint Returns
Adjusted Gross Income	\$6999.14	\$1780.00	\$8779.14
Less—Deductions from Adjusted Gross Income	953.75		953.75
	\$6045.39	\$1780.00	\$7825.39
Less Exemptions	1800.00	600.00	2400.00
Balance Subject to Tax	<u>\$4245.39</u>	<u>\$1180.00</u>	<u>\$5425.39</u>
Tax Computation:—(1)			
1st \$2000 @ 22.2%	\$ 444.00		\$ 444.00
1st \$1180 @ 22.2%		261.96	
2nd 2000 @ 24.6%	492.00		
712.69 @ 24.6%			175.32
245.39 @ 29%	71.16		
	<u> </u>	<u> </u>	<u>\$ 619.32</u>
Total Tax	\$1007.16	\$ 261.96	\$1238.64 —(2)

(1)—Rates taken from 1952 Tax Rate Schedule, for all taxpayers except head of household. (see Table II)

(2)—See computation of tax in Fig. III, lines 8 (a), 8 (b) and 8 (c).

If separate returns are filed, the combined tax liability is \$1269.12 instead of the \$1238.64 for a joint return.

Lines 9, 10, 11, and 12 will not apply to many taxpayers, so entries affecting them will not be discussed. For our purposes \$1238.64 on line 8 (c) is also entered on line 13 and is transferred to Fig. I, line 5 (a).

On line 5 (b), Fig. 1, enter your Self Employment Tax as computed at Fig. X. Add the

amounts at lines 5 (a) and 5 (b) to obtain the total income and Self Employment Tax liability.

On line 6 (a), enter amounts withheld from your wages and your wife's.

On line 6 (b), you will enter any payments made when you estimated your tax liability earlier in the year. If this is your first year in business, you probably have not made either estimates or payments.

Declaration of Estimated Income Tax

As you know, you are required to withhold income taxes from your employees' wages and pay them over to the government monthly or quarterly. But, as owner of your business, you don't withhold taxes from your own wages.

Because the government will not wait until you file your annual Income Tax Return to collect your tax, you are required to estimate your tax on Form 1040ES and pay installments on your estimated tax. (See Fig. XI) You will want to obtain a few of these forms from the Collector of Internal Revenue in your district and study the instructions for preparing them. Now that you have studied how to prepare your Income Tax Return, you should not find this form difficult.

The instructions tell quite clearly who must file a Declaration of Estimated Income Tax. If you expect your business to make a profit of more than \$600, you are required to file.

We cannot tell you how to estimate your income. If you have the same sources of income in 1954 as you had in 1953, you would be wise to base your 1954 estimate on your 1953 Adjusted Gross Income. Your first estimate must be made by March 15, 1954, but you can revise the estimate upward or downward on June 15, September 15, or January 15 (the 15th day of the last month of the first, second, and third quarters of your fiscal year and the 15th day of the first month of your next fiscal year, if you are filing on a fiscal year basis).

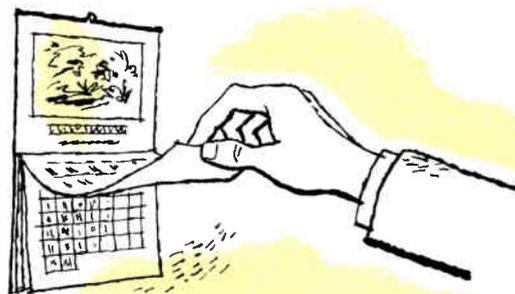
You can pay your entire estimated tax for the year on March 15, when you make your first dec-

laration, although such procedure is unusual. Instead, it is recommended that you prepare Forms 1040ES on March 15, June 15, September 15 and January 15, and that you make payments in the following manner:

On Declaration Prepared	Pay
March 15	25% of amount entered on line 7, on Fig. XI .
June 15	33% of amount entered on line 7 Fig. XI .
September 15	50% of amount entered on line 7 Fig. I .
January 15	Entire amount entered on line 7 Fig. I .

In this manner, you will make payments based on a revised estimate of your tax liability, reduced by what you have already paid.

In Figs. XI and XII, we have illustrated a sample Form 1040ES as it might be filled in by you.



Sending in Returns

It is recommended that you have your return and supporting schedules typed in preparation for mailing them to the Collector of Internal Revenue. Once these have been typed, compare the typed matter with your pencil originals, giving special attention to all mathematical computations. When mailing your return, the following should be firmly attached to Form 1040:

Form W2 Withholding Statement
(original).

Schedule C Profit (or Loss) From Business or Profession, with your Profit and Loss Statement (Fig. VIII) attached.

For your own protection, your pencil copies of the above, along with all your worksheets, should be attached together and filed with your copy of your tax return in a safe but accessible place in your office or home.

Recording Your Income Tax Payments

In Business Practices Manual #2, under Payroll Taxes, both Social Security and Income Taxes were withheld from your personal drawings even though this was not required by law. Such a procedure would be considered highly unorthodox by accountants, but it has its conveniences. For one thing, it cuts down your cash withdrawals from your business; for another, it helped to remind you that eventually you would have to pay those taxes on your drawings. When you constantly compare your cash balances with your liabilities, you can prepare for paying your taxes by having on hand a good part of the cash required. It amounts to setting up a reserve with which to meet your tax obligations.

Now that you are about to pay your taxes, you should wipe out the liabilities that you have set up for your own taxes in your own books. How much you have withheld, as it shows up in your payroll accounts, will be the total of the amounts you "withheld" each pay day. Whenever you pay your taxes, whether on the basis of Form 1040 or

Form 1040ES, you should wipe out the liability you have set up for income taxes withheld from your drawings. Cancel out the amounts you have "withheld" from your drawings for Social Security taxes when you pay your Self Employment Tax. Your general journal entries will be as follows:

Account No.		Debit	Credit
155	F.I.C. Tax Payable....	\$ xxx	
158	Federal Income Taxes Withheld from Employees	xxx	
1180	Owner's Drawings		\$ xxx

When you pay your taxes, it is recommended that you charge the amount of the tax check to Account 1180, Owner's Drawings. If you are presented later with a tax refund, the amount of the refund check should be credited to the same account.

U. S. INDIVIDUAL INCOME TAX RETURN
FOR CALENDAR YEAR 1952

1952

or taxable year beginning _____, 1952, and ending _____, 1952.

Do not write in these spaces

Name **Albert and Beatrice Cee**
(PLEASE PRINT. If this is a joint return of husband and wife, use first names of both)
HOME ADDRESS **135 Springtime Lane West**
(PLEASE PRINT. Street and number or rural route)
Levittown **N.Y.**
(City, town, or post office) (Postal zone number) (State)
Social Security No. **000-00-0000** Occupation **TV-Radio Service**

Serial No.

(Cashier's Stamp)

Your exemptions

1. List your name. If your wife (or husband) had no income, or if this is a joint return, list also her (or his) name.

A **Albert Cee**
B **Beatrice Cee**
(Your wife's name—do not list if exemption is claimed on another return)

C. List names of your children (including stepchildren and legally adopted children) with 1952 gross incomes of less than \$600 who received more than one-half of their support from you in 1952. See Instructions.

D. Enter number of exemptions claimed for close relatives listed in Schedule I on page 2

E. Enter total number of exemptions claimed in A to D above

2. Enter your total wages, salaries, bonuses, commissions, and other compensation received in 1952, before payroll deductions. Persons claiming traveling or reimbursed expenses, see Instructions.

Print Employer's Name	Where Employed (City and State)	Total Wages	Income Tax Withheld
Dogwood Corporation	Hempstead, NY	\$ 2290 00	\$ 204 00
Agnar Cleaners	Levittown, NY	1780 00	340 00
Enter total →		\$ 4070 00	\$ 544 00

3. If you received dividends, interest, or any other income, give details on page 2 and enter the total here

4. Add income shown in items 2 and 3, and enter the total here

\$ 4709 14	\$ 8779 14
------------	------------

(Before figuring your tax, see Schedule J for "Head of Household." If you claim such status, check here .)
IF YOUR INCOME WAS LESS THAN \$5,000.—Use the tax table on page 4 unless you itemize deductions. The table allows about 10 percent of your income for charitable contributions, interest, taxes, medical expenses, etc. If your deductions exceed 10 percent, it will usually be to your advantage to itemize them and compute your tax on page 3.
IF YOUR INCOME WAS \$5,000 OR MORE.—Compute tax on page 3. Use standard deduction or itemize deductions, whichever is to your advantage.

How to figure the tax

5. (A) Enter your tax from table on page 4, or from line 13, page 3.
(B) Enter your self-employment tax from line 35, separate Schedule C.

\$ 1238 64	\$ 29 47	Enter total here →	\$ 1268 04
------------	----------	--------------------	------------

6. How much have you paid on your 1952 income tax?
(A) By tax withheld (in item 2, above). Attach Original Forms W-2.
(B) By payments on 1952 Declaration of Estimated Tax (include any overpayment on your 1951 tax not claimed as a refund).

\$ 544 00	-	Enter total here →	\$ 544 00
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7. If your tax (item 5) is larger than payments (item 6), enter balance of tax due here. This balance must be paid in full with return

\$ 724 04

8. If your payments (item 6) are larger than your tax (item 5), enter the overpayment here

\$ -

Enter amount of item 8 you want \$ _____ (Refunded) \$ _____ (Credited on 1953 estimated tax)

Do you owe any prior year Federal tax for which you have been billed? (Yes or No) **No**. Is your wife (or husband) making a separate return for 1952? (Yes or No) **No**. If "yes," write her (or his) name _____
If you have filed a return for a prior year, state latest year **1952** Where filed? **Brooklyn, N.Y.**
To which director's (formerly collector's) office did you pay amount claimed in item 6 (B), above? **1 --**

I declare under the penalties of perjury that this return (including any accompanying schedules and statements) has been examined by me and to the best of my knowledge and belief is a true, correct, and complete return.

(Signature of person, other than taxpayer, preparing this return) **Albert Cee** (Date) **3/10/54**
(Signature of taxpayer) **Beatrice Cee** (Date) **3/10/54**
(Name of firm or employer, if any) _____ (Signature of taxpayer's wife or husband if this is a joint return) _____ (Date) _____

◆ To assure split-income benefits, husband and wife must include all their income and even though only one has income, BOTH MUST SIGN. 16-65304-2

Fig. 1

Schedule A.—INCOME FROM DIVIDENDS

Name of corporation declaring dividend	Amount	Name of corporation declaring dividend	Amount
	\$		\$
			Enter total here → \$

Schedule B.—INCOME FROM INTEREST

Name of payor	Amount	Name of payor	Amount
First Savings Bank	\$ 44 80		\$
ABC Corporation	25 00		
			Enter total here → 69 80

Schedule C Summary.—PROFIT (OR LOSS) FROM BUSINESS OR PROFESSION, FARMING, AND PARTNERSHIP

1. Business profit (or loss) from separate Schedule C, line 23	\$ 4639	34
2. Farm profit (or loss) from separate schedule, Form 1040F	-	
3. Partnership, etc., profit (or loss) from Form 1065, Schedule K, Column 3	-	
4. Total of lines 1, 2, 3	\$ 4639	34
5. Less: Net operating loss deduction (attach statement)	-	
6. Net profit (or loss) (line 4 less line 5)	4639	34

Schedule D.—NET GAIN OR LOSS FROM SALES OR EXCHANGES OF CAPITAL ASSETS, ETC.

1. From sale or exchange of capital assets (from separate Schedule D)	-
2. From sale or exchange of property other than capital assets (from separate Schedule D)	-

Schedule E.—INCOME FROM ANNUITIES OR PENSIONS

1. Cost of annuity (amount you paid)	\$	4. Amount received this year	\$
2. Cost received tax-free in past years		5. Excess of line 4 over line 3	
3. Remainder of cost (line 1 less line 2)	\$	6. Enter line 5, or 3 percent of line 1, whichever is greater (but not more than line 4)	

Schedule F.—INCOME FROM RENTS AND ROYALTIES

1. Kind and location of property	2. Amount of rent or royalty	3. Depreciation or depletion (explain in Schedule H)	4. Repairs (attach statement)	5. Other expenses (attach statement)
	\$	\$	\$	\$
1. Totals	\$	\$	\$	\$
2. Net profit (or loss) (column 2 less sum of columns 3, 4, and 5)				

Schedule G.—INCOME FROM ESTATES AND TRUSTS AND OTHER SOURCES

1. Estate or trust	(Name)	(Address)	4709	14
2. Other sources (state nature)				
Total income (or loss) from above sources (Enter here and as item 3, page 1)			\$	

Schedule H.—EXPLANATION OF DEDUCTION FOR DEPRECIATION CLAIMED IN SCHEDULE F

1. Kind of property (If buildings, state material of which constructed). Exclude land and other nondepreciable property	2. Date acquired	3. Cost or other basis	4. Depreciation allowed (or allowable) in prior years	5. Remaining cost or other basis to be recovered	6. Life used in accumulating depreciation	7. Estimated life from beginning of year	8. Depreciation allowable this year
		\$	\$	\$			\$

Schedule I.—EXEMPTIONS FOR CLOSE RELATIVES—(See Instructions)

1. Name of dependent relative. Also give address if different from yours	2. Relationship	3. Did dependent during 1952—			4. If answer to either 3(b) or 3(c) is "No" enter amount spent for dependent's support in 1952 by—	
		(a) Have gross income of \$600 or more?	(b) Reside in your home?	(c) Receive entire support from you?	You (and your wife if this is a joint return)	Others, and by dependent from own funds
					\$	\$

Enter here and as item 1D, page 1, the number of close relatives claimed above

Schedule J.—HEAD OF HOUSEHOLD (See Instructions)

- (Not applicable where wife or husband died during taxable year)
- Were you unmarried (or legally separated) at the close of your taxable year? (Yes or No)
 - Did any person for whom you are entitled to an exemption, or your unmarried child, grandchild, or stepchild, even though not a dependent, share during your entire taxable year your home which was your principal residence? (Yes or No)
List name(s) and relationship to you
 - Did you furnish more than one half of the cost of maintaining the household during the taxable year? (Yes or No)
If you did not furnish the entire cost, state total amount furnished by you \$; by all others (including those sharing your home) \$
 - If all of the above questions are answered "Yes," you may determine your tax as Head of a Household.

Fig. II

ITEMIZED DEDUCTIONS—FOR PERSONS NOT USING TAX TABLE ON PAGE 4 OR STANDARD DEDUCTION ON LINE 2 BELOW—
 If Husband and Wife (Not Legally Separated) File Separate Returns and One Itemizes Deductions, the Other Must Also Itemize

Describe Deductions and state to whom paid. If more space is needed, attach additional sheets.			
Contributions	Salvation Army - Cash, clothing, furniture	135	00
	Red Cross	25	00
	First Presbyterian Church	104	00
Allowable Contributions (not in excess of 20 percent of item 4, page 1)			\$ 264 00
Interest	Mortgage on Residence	360	00
	Total Interest		360 00
Taxes	Real Estate	320	00
	State Gasoline Taxes	6	00
	Driver's License	3	75
Total Taxes			329 75
Losses from fire, storm, or other casualty, or theft			
Total Allowable Losses (not compensated by insurance or otherwise)			
Medical and dental expenses (if over 65 see Instructions)			
Net Expenses (not compensated by insurance or otherwise)			
Enter 5 percent of item 4, page 1, and subtract from Net Expenses			
Allowable Medical and Dental Expenses. See Instructions for limitation			
Miscellaneous (See Instructions)			
Total Miscellaneous Deductions			
Total Deductions			\$ 953 75

TAX COMPUTATION—FOR PERSONS NOT USING TAX TABLE ON PAGE 4

1. Enter amount shown in item 4, page 1. This is your Adjusted Gross Income	\$	8779	14
2. If deductions are itemized above, enter total of such deductions. If deductions are not itemized and line 1, above, is \$5,000 or more: (a) married persons filing separately enter \$500, (b) all others enter 10 percent of line 1, but not more than \$1,000		953	75
3. Subtract line 2 from line 1. Enter the difference here. This is your Net Income	\$	7825	39
4. Multiply \$600 by total number of exemptions claimed in item 1E, page 1. Enter total here		2400	00
5. Subtract line 4 from line 3. Enter difference here. (If line 1 includes partially tax-exempt interest, see Instructions)	\$	5425	39
If line 5 is not more than \$2,000 —			
6. Enter 22.2 percent of amount shown on line 5 and disregard lines 7, 8, and 9	\$		
If line 5 is more than \$2,000 —			
7. And you are a single person, a married person filing separately, or a head of household — Single persons and married persons filing separately use Tax Rate Schedule I on page 12 of Instructions to figure tax on amount on line 5; heads of household use Tax Rate Schedule II	\$		
8. And you are filing a joint return —			
(a) Enter one-half of amount on line 5	\$	2712	69
(b) Use Tax Rate Schedule I on page 12 of Instructions to figure tax on amount on line 8 (a)		619	32
(c) Multiply amount on line 8 (b) by 2	\$	1238	64
9. If alternative tax computation is made, enter here tax from separate Schedule D	\$		
Disregard lines 10, 11, and 12, and copy on line 13 the same figure you entered on line 6, 7, 8 (c), or 9, unless you used itemized deductions			
10. Enter here any income tax payments to a foreign country or U. S. possession (attach Form 1116)	\$	-	
11. Enter here any income tax paid at source on tax-free covenant bond interest	\$	-	
12. Add the figures on lines 10 and 11 and enter the total here	\$		
13. Subtract line 12 from line 6, 7, 8 (c), or 9. Enter difference here and as item 5 (A), page 1	\$	1238	64

If you use this table, tear off this page and file only pages 1 and 2

TAX TABLE FOR CALENDAR YEAR 1952

FOR PERSONS WITH INCOMES UNDER \$5,000 NOT COMPUTING TAX ON PAGE 3

Read down the shaded columns below until you find the line covering the total income you entered in item 4, page 1. Then read across to the appropriate column headed by the number corresponding to the number of exemptions claimed in item 1E, page 1. Enter the tax you find there in item 5(A), Page 1.

If total income in item 4, page 1, is—		And the number of exemptions claimed in item 1E, page 1, is—				If total income in item 4, page 1, is—		And the number of exemptions claimed in item 1E, page 1, is—												
At least	But less than	1	2	3	4 or more	At least	But less than	1		2			3			4	5	6	7	8 or more
								Single or a married person filing separately	A head of a household	Single or a married person filing separately	A head of a household	A married couple filing jointly	Single or a married person filing separately	A head of a household	A married couple filing jointly					
		Your tax is—						Your tax is—												
\$0	\$675	\$0	\$0	\$0	\$0	\$2,325	\$2,350	\$334	\$334	\$201	\$201	\$201	\$67	\$67	\$67	\$0	\$0	\$0	\$0	\$0
675	700	4	0	0	0	2,350	2,375	339	339	206	206	206	72	72	72	0	0	0	0	0
700	725	9	0	0	0	2,375	2,400	344	344	211	211	211	77	77	77	0	0	0	0	0
725	750	14	0	0	0	2,400	2,425	349	349	216	216	216	82	82	82	0	0	0	0	0
750	775	19	0	0	0	2,425	2,450	354	354	221	221	221	87	87	87	0	0	0	0	0
775	800	24	0	0	0	2,450	2,475	359	359	226	226	226	92	92	92	0	0	0	0	0
800	825	29	0	0	0	2,475	2,500	364	364	231	231	231	97	97	97	0	0	0	0	0
825	850	34	0	0	0	2,500	2,525	369	369	236	236	236	102	102	102	0	0	0	0	0
850	875	39	0	0	0	2,525	2,550	374	374	241	241	241	107	107	107	0	0	0	0	0
875	900	44	0	0	0	2,550	2,575	379	379	246	246	246	112	112	112	0	0	0	0	0
900	925	49	0	0	0	2,575	2,600	384	384	251	251	251	117	117	117	0	0	0	0	0
925	950	54	0	0	0	2,600	2,625	389	389	256	256	256	122	122	122	0	0	0	0	0
950	975	59	0	0	0	2,625	2,650	394	394	261	261	261	127	127	127	0	0	0	0	0
975	1,000	64	0	0	0	2,650	2,675	399	399	266	266	266	132	132	132	0	0	0	0	0
1,000	1,025	69	0	0	0	2,675	2,700	404	404	271	271	271	137	137	137	4	0	0	0	0
1,025	1,050	74	0	0	0	2,700	2,725	409	409	276	276	276	142	142	142	9	0	0	0	0
1,050	1,075	79	0	0	0	2,725	2,750	414	414	281	281	281	147	147	147	14	0	0	0	0
1,075	1,100	84	0	0	0	2,750	2,775	419	419	286	286	286	152	152	152	19	0	0	0	0
1,100	1,125	89	0	0	0	2,775	2,800	424	424	291	291	291	157	157	157	24	0	0	0	0
1,125	1,150	94	0	0	0	2,800	2,825	429	429	296	296	296	162	162	162	29	0	0	0	0
1,150	1,175	99	0	0	0	2,825	2,850	434	434	301	301	301	167	167	167	34	0	0	0	0
1,175	1,200	104	0	0	0	2,850	2,875	439	439	306	306	306	172	172	172	39	0	0	0	0
1,200	1,225	109	0	0	0	2,875	2,900	444	444	311	311	311	177	177	177	44	0	0	0	0
1,225	1,250	114	0	0	0	2,900	2,925	449	449	316	316	316	182	182	182	49	0	0	0	0
1,250	1,275	119	0	0	0	2,925	2,950	455	455	321	321	321	187	187	187	54	0	0	0	0
1,275	1,300	124	0	0	0	2,950	2,975	460	460	326	326	326	192	192	192	59	0	0	0	0
1,300	1,325	129	0	0	0	2,975	3,000	466	466	331	331	331	197	197	197	64	0	0	0	0
1,325	1,350	134	1	0	0	3,000	3,050	474	473	338	338	338	205	205	205	72	0	0	0	0
1,350	1,375	139	6	0	0	3,050	3,100	485	483	348	348	348	215	215	215	82	0	0	0	0
1,375	1,400	144	11	0	0	3,100	3,150	496	494	358	358	358	225	225	225	92	0	0	0	0
1,400	1,425	149	16	0	0	3,150	3,200	507	504	368	368	368	235	235	235	102	0	0	0	0
1,425	1,450	154	21	0	0	3,200	3,250	518	515	378	378	378	245	245	245	112	0	0	0	0
1,450	1,475	159	26	0	0	3,250	3,300	529	525	388	388	388	255	255	255	122	0	0	0	0
1,475	1,500	164	31	0	0	3,300	3,350	541	536	398	398	398	265	265	265	132	0	0	0	0
1,500	1,525	169	36	0	0	3,350	3,400	552	546	408	408	408	275	275	275	142	8	0	0	0
1,525	1,550	174	41	0	0	3,400	3,450	563	557	418	418	418	285	285	285	152	18	0	0	0
1,550	1,575	179	46	0	0	3,450	3,500	574	567	428	428	428	295	295	295	162	28	0	0	0
1,575	1,600	184	51	0	0	3,500	3,550	585	578	438	438	438	305	305	305	171	38	0	0	0
1,600	1,625	189	56	0	0	3,550	3,600	596	588	448	448	448	315	315	315	181	48	0	0	0
1,625	1,650	194	61	0	0	3,600	3,650	607	599	459	459	458	325	325	325	191	58	0	0	0
1,650	1,675	199	66	0	0	3,650	3,700	618	610	470	469	468	335	335	335	201	68	0	0	0
1,675	1,700	204	71	0	0	3,700	3,750	629	620	482	480	478	345	345	345	211	78	0	0	0
1,700	1,725	209	76	0	0	3,750	3,800	640	631	493	490	488	355	355	355	221	88	0	0	0
1,725	1,750	214	81	0	0	3,800	3,850	651	641	504	501	498	365	365	365	231	98	0	0	0
1,750	1,775	219	86	0	0	3,850	3,900	662	652	515	511	508	375	375	375	241	108	0	0	0
1,775	1,800	224	91	0	0	3,900	3,950	673	662	526	522	518	385	385	385	251	118	0	0	0
1,800	1,825	229	96	0	0	3,950	4,000	684	673	537	532	528	395	395	395	261	128	0	0	0
1,825	1,850	234	101	0	0	4,000	4,050	696	683	548	543	538	405	405	405	271	138	5	0	0
1,850	1,875	239	106	0	0	4,050	4,100	707	694	559	553	548	415	415	415	281	148	15	0	0
1,875	1,900	244	111	0	0	4,100	4,150	718	704	570	564	558	425	425	425	291	158	25	0	0
1,900	1,925	249	116	0	0	4,150	4,200	729	715	581	574	568	435	435	435	301	168	35	0	0
1,925	1,950	254	121	0	0	4,200	4,250	740	725	592	585	578	445	445	445	311	178	45	0	0
1,950	1,975	259	126	0	0	4,250	4,300	751	736	603	596	588	456	456	456	321	188	55	0	0
1,975	2,000	264	131	0	0	4,300	4,350	762	746	614	606	598	467	466	465	331	198	65	0	0
2,000	2,025	269	136	2	0	4,350	4,400	773	757	625	617	608	478	476	475	341	208	75	0	0
2,025	2,050	274	141	7	0	4,400	4,450	784	768	636	627	618	489	487	485	351	218	85	0	0
2,050	2,075	279	146	12	0	4,450	4,500	795	778	648	638	628	500	497	495	361	228	95	0	0
2,075	2,100	284	151	17	0	4,500	4,550	806	789	659	648	638	511	508	504	371	238	105	0	0
2,100	2,125	289	156	22	0	4,550	4,600	817	799	670	659	648	522	518	514	381	248	115	0	0
2,125	2,150	294	161	27	0	4,600	4,650	828	810	681	669	658	533	529	524	391	258	125	0	0
2,150	2,175	299	166	32	0	4,650	4,700	839	820	692	680	668	544	539	534	401	268	135	2	0
2,175	2,200	304</																		

EMPLOYEE TO WHOM PAID (Print name, full address, and Social Security account number)

Albert Cee
135 Springtime Lane West
Levittown, New York

000-00-000

FEDERAL INSURANCE CONTRIBUTIONS ACT	
Total F.I.C.A. wages (before payroll deductions) paid in 1952*	F.I.C.A. employee tax withheld, if any
\$ 2290.00	\$ 34.35

INFORMATION FOR INCOME TAX RETURN	
Total wages (before payroll deductions) paid in 1952	Federal income tax withheld, if any
\$ 2290.00	\$ 204.00

EMPLOYER BY WHOM PAID (Name, address, and identification number)

Dogwood Corporation
Hempstead, New York

NOTICE TO EMPLOYEE: This statement is important. It must be attached to your U. S. income tax return for 1952. **SEE OTHER SIDE.**

*If your wages were subject to F.I.C.A. taxes, but are not shown, your F.I.C.A. wages are the same as wages shown under "INFORMATION FOR INCOME TAX RETURN," but not more than \$3,600.

☆ GPO 16-65242-1

Fig. V

Work Sheet - Profit and Loss for Income Tax Return 1040

Before Adjustments

<u>Income from Labor Charges:</u>			
Installation Charges			\$ 1168.71
Service			8722.00
Other			297.84
Total Income from Labor Charges			<u>\$10188.55</u>
<u>Less - Operating Expenses:</u>			
Payrolls		\$9861.75	
Rent and Heat		630.00	
Telephone		131.20	
Electricity		101.18	
Auto and Trucks:			
Depreciation	\$ 116.69		
Insurance	33.88		
Other	<u>312.19</u>	462.76	
Advertising		147.79	
Depreciation - Other than Automotive Equip.			
Shop Equipment	29.19		
Test Equipment	93.31		
Furniture & Fixtures	<u>29.19</u>	151.69	
Property & Business Insurance		63.60	
F.O.A.B. Taxes - Employer's Contribution		86.75	
Other Expenses		<u>78.91</u>	<u>11715.63</u>
<u>Net Profit excluding profit from Sales of materials and parts</u>			<u>(\$ 1527.08)</u>
<u>Profit from Sales of Materials and Parts:</u>			
Sales of Materials and Parts		\$5080.92	
Other Income - Sales of TV's, radios etc.		822.00	
		<u>\$5902.92</u>	
Less - Cost of Goods Sold		3694.00	2208.00
<u>Net Profit for Seven Months ended December 31, 1953</u>			<u>\$ 681.84</u>

() Denotes Loss

Worksheet for Combining Deductions Arising from Use of
 Automobile and Residence for Business Purposes
 with Expense Accounts on Profit and Loss Statement

Rent, Heat & Electricity	Telephone	Depreciation	Insurance	Autos & Trucks Gas, Oil, Maint.
\$630.00-1)	\$131.20-4)	\$116.69-6)	\$33.88-10)	\$312.19-12)
101.18-2)	<u>48.00-5)</u>	151.69-7)	<u>63.60-11)</u>	81.25-13)
<u>40.00-3)</u>	\$179.20	50.00-8)	<u>\$97.48</u>	2.00-14)
<u>\$771.18</u>		<u>100.00-9)</u>		<u>1.25-15)</u>
		<u>\$418.38</u>		<u>\$396.69</u>

- (1- Rent and Heat - (Figure VI)
- (2- Electricity - (Figure VI)
- (3- Light and Heat - (Table I)
- (4- Telephone - (Figure VI)
- (5- Telephone - (Table I)
- (6- Depreciation - Autos and Trucks - (Figure VI)
- (7- Depreciation - Other than Automotive Equipment - (Figure VI)
- (8- Depreciation on House - (Table I)
- (9- Automobile Depreciation - (Table I)
- (10- Insurance - Auto and Trucks - (Figure VI)
- (11- Property and Business Insurance - (Figure VI)
- (12- Gas, Oil, Registration, Maintenance and Other Costs of Autos and Trucks - (Figure VI)
- (13- Gas, Oil, Registration, Maintenance and Other Costs of Automobile - (Table I)
- (14- State Gasoline Taxes - (Table I)
- (15- Driver's License - (Table I)

Albert Cee - TV, Radio Service Station
 Profit and Loss Statement
 Year ended December 31, 1953

Income from Labor Charges		\$10,188.55
Operating Expenses:		
Payrolls	\$5,311.75	
Rent, Heat, and Electricity	771.18	
Telephone	179.20	
Depreciation	418.38	
Advertising	147.79	
Insurance	97.48	
Autos and Trucks - Gas, Oil, Maintenance	396.69	
Payroll Taxes	86.75	
Repairs to Residence	100.00 *	
Interest on Mortgage	90.00 *	
Real Estate Taxes	80.00 *	
Miscellaneous	78.91	7,758.13
Net Profit excluding Profit from Sales of Materials and Parts		2,430.42
Profit from Sales of Materials and Parts:		
Sales	\$5,902.92	
Less - Cost of Goods Sold	3,694.00	2,208.92
Net Profit		<u><u>\$4,639.34</u></u>

* The taxpayer does a considerable portion of his office work and some repair work in his home. During 1953 it is estimated that his home was used 20 per cent for business purposes.

PROFIT (OR LOSS) FROM BUSINESS OR PROFESSION

1952

(For Computation of Self-Employment Tax, see Page 3)

For Calendar Year 1952 or taxable year beginning _____, 1952, and ending _____, 195

Name and Address (from Form 1040) Albert and Beatrice Cee, Levittown, N.Y.

(Partnerships and joint ventures should file on Form 1065)

(I) Principal business activity (see instructions) TV-Radio Service
(Retail trade, wholesale trade, lawyer, etc.) (Principal product or service)

(II) Business name Albert Cee - Radio & TV (III) FICA employer identification number, if any (see instructions)

(IV) Business address (see instructions) _____
(Street and number or rural route) (City, town, post office) (County) (State)

(V) Were you the sole proprietor of this business in 1951? Yes No . If "No," check whether this business in 1952 became a successor to a corporation , a partnership , another sole proprietorship , or started as an entirely new business . Where applicable, give name of such predecessor 431 Hempstead Turnpike, Levittown, N.Y.

Do NOT include cost of goods withdrawn for personal use or deductions not connected with your business or profession

1. Total receipts from business or profession	\$	
COST OF GOODS SOLD		
2. Inventory at beginning of year	\$	
3. Merchandise bought for manufacture or sale		
4. Cost of labor		
5. Material and supplies		
6. Other costs (explain in Schedule C-2)		
7. Total of lines 2 to 6	\$	
8. Less inventory at end of year		
9. Net cost of goods sold (line 7 less line 8)		
10. Gross profit (line 1 less line 9)	\$	
OTHER BUSINESS DEDUCTIONS		
11. Salaries and wages not included in line 4	\$	
12. Rent on business property		
13. Interest on business indebtedness		
14. Taxes on business and business property		
15. Losses of business property (attach statement)		
16. Bad debts arising from sales or services		
17. Depreciation and obsolescence (explain in Schedule C-1)		
18. Repairs (explain in Schedule C-2)		
19. Depletion of mines, oil and gas wells, timber, etc. (submit schedule)		
20. Amortization of emergency facilities (attach statement)		
21. Other business expenses (explain in Schedule C-2)		
22. Total of lines 11 to 21		
23. Enter net profit (or loss) (line 10 less line 22). Also enter on line 24, page 3, and on line 1, Schedule C Summary, Form 1040 See attached Statement of Profit and Loss	\$	4639 34

Schedule C-1. EXPLANATION OF DEDUCTION FOR DEPRECIATION CLAIMED ON LINE 17

1. Kind of property (if buildings, state material of which constructed). Exclude land and other nondepreciable property	2. Date acquired	3. Cost or other basis	4. Depreciation allowed (or allowable) in prior years	5. Remaining cost or other basis to be recovered	6. Life used in accumulating depreciation	7. Estimated life from beginning of year	8. Depreciation allowable this year
Shop Equipment		\$ 500 -	\$ -	\$ 500 -	10	10	\$ 29 19
Test Equipment		1000 -	-	1000 -	10	10	93 31
Furniture and Fixtures		500 -	-	500 -	10	10	29 19
Autos and Trucks		1000 -	-	1000 -	5	5	116 69
Auto (25% Business)	1/1/53	2000 -	-	2000 -	5	5	100 00
Residence (20% Business)	1/1/53	10000 -	-	10000 -	40	40	50 00

Schedule C-2. EXPLANATION OF LINES 6, 18, AND 21

Line or Column No.	Explanation	Amount	Line or Column No.	Explanation	Amount
		\$			\$

COMPUTATION OF SELF-EMPLOYMENT TAX
(For old-age and survivors insurance)

Name of self-employed person Albert Cee

State nature of business, if any, subject to self-employment tax TV Radio Service

24. Net profit (or loss) shown on line 23, page 1	\$ 4639	34	
25. Losses of business property shown on line 15, page 1	-		
26. Total of lines 24 and 25	\$ 4639	34	
27. Less: Net income (or loss) from excluded services or sources included in line 26. Specify excluded services or sources	-		
28. Net earnings from self-employment (line 26 less line 27)	\$ 4639	34	
29. Net earnings (or loss) from self-employment from partnerships, joint ventures, etc. (from column 10, Schedule K, Form 1065)	-		
30. Total net earnings (or loss) from self-employment (line 28 plus line 29). (If total of net earnings is under \$400, do not make any entries below)	\$ 4639	34	
31. Maximum amount subject to self-employment tax	\$ 3,600	00	
32. Less: Wages paid to you during the taxable year which were subject to withholding for old-age and survivors insurance. (If such wages exceed \$3,600, enter \$3,600)	2290	00	
33. Maximum amount subject to self-employment tax after adjustment for wages	\$ 1310	00	
34. Self-employment income subject to tax—Line 30 or 33, whichever is smaller	\$ 1310	00	
35. Self-employment tax—2½ percent of amount on line 34. Enter here and as item 5 (B), page 1, Form 1040	\$ 29	47	

OPB 16-02553-2

FILL IN ITEMS BELOW BUT DO NOT DETACH

Schedule C-a (Form 1040)
U. S. TREASURY DEPARTMENT
INTERNAL REVENUE SERVICE

U. S. REPORT OF SELF-EMPLOYMENT INCOME
(For Federal Old-Age and Survivors Insurance)

1952

For calendar year 1952 or fiscal year beginning _____, 1952, and ending _____, 195

State nature of business subject to self-employment tax TV Radio Service

ENTER HERE THE SOCIAL SECURITY ACCOUNT NUMBER OF THE PERSON NAMED BELOW



000	00	0000
000	00	000

Enter total net earnings from self-employment shown on line 30 above \$ 4639.34

ENTER BELOW, NAME OF SELF-EMPLOYED PERSON AND BUSINESS ADDRESS

<u>Albert Cee</u>	(Name)
<u>431 Hempstead Turnpike</u>	ADDRESS (Street and number, or rural route)
<u>Levittown, New York</u>	(City or town, postal zone number) (State)

Enter wages shown on line 32 above \$ 2290.00

Enter self-employment income shown on line 34 above \$ 1310.00

Fig. X

amended declaration may be filed jointly by husband and wife even though separate declarations have been filed.

Even though a joint declaration is filed, separate income tax returns may be filed for the taxable year 1953 if desired, in which case the payments of estimated tax may be treated as payments by either the husband or the wife or may be divided between them in any proportion.

6. Changes in Income or Exemptions.—Even though your situation on March 15 is such that you are not required to file a declaration at that time, your expected income or exemptions may change so that you will be required to file a declaration later. In such case the time for filing is as

principal residence and which, except for temporary absences, you share during the entire taxable year with—

- (a) Any person for whom you are entitled to an exemption, or
- (b) Your unmarried child, grandchild, or stepchild, even though such child is not a dependent.

If you are married to a nonresident alien at any time during your taxable year but otherwise meet the tests above, you are considered a "Head of a Household" since you are not permitted to file a joint return.

If your wife or husband (not a nonresident alien) dies during the taxable year, you do not qualify as a "Head of a Household" since in such case you are generally entitled to file a joint return.

YOUR COPY OF DECLARATION OF ESTIMATED TAX (Form 1040-ES)

1953

NAME

If this declaration is not for calendar year 1953, show here ending date of your fiscal year 1954

1. Your 1952 Income Tax \$.....	ESTIMATED Income Tax for 1953	\$ 1650	60	COPY THESE FIGURES ON THE DECLARATION WHICH YOU WILL FILE WITH THE DIRECTOR. KEEP THIS COPY FOR USE IN MAKING YOUR ANNUAL RETURN.
2. Estimated Income Tax withheld and to be withheld during entire year 1953				
3. ESTIMATED Tax after deducting estimated tax withheld (item 1 less item 2)		\$ 1650	60	
4. Less: Credit for 1952 overpayment if credit was elected in item 8, page 1, Form 1040, for 1952	\$ -			
5. If this is an amended declaration, enter payments made on account of prior declarations for this year	-			
6. Unpaid balance of ESTIMATED Tax (item 3 less the sum of items 4 and 5)		\$ 1650	60	
7. Amount paid with this declaration. (Read carefully Instruction 4 above)		\$ 412	50	

DETACH AT THIS LINE ↓ AND FILE FORM BELOW WITH THE DIRECTOR

FORM 1040-ES
U. S. Treasury Department
Internal Revenue Service

DECLARATION OF ESTIMATED TAX

NAME Social Security No., if any **1953**

ADDRESS (Please print) (Street and number or rural route) (City, town, or post office) (Postal zone number) (State)

If this declaration is not for calendar year 1953, show here ending date of your fiscal year 1954

1. Your 1952 Income Tax \$.....	ESTIMATED Income Tax for 1953	\$ 1650	60	(Cashier's Stamp)
2. Estimated Income Tax withheld and to be withheld during entire year 1953				
3. ESTIMATED Tax after deducting estimated tax withheld (item 1 less item 2)		\$ 1650	60	
4. Less: Credit for 1952 overpayment if credit was elected in item 8, page 1, Form 1040, for 1952	\$ -			
5. If this is an amended declaration, enter payments made on account of prior declarations for this year	-			
6. Unpaid balance of ESTIMATED Tax (item 3 less the sum of items 4 and 5)		\$ 1650	60	
7. Amount paid with this declaration. (Read carefully Instruction 4)		\$ 412	50	

I declare under the penalties of perjury that this declaration has been examined by me and to the best of my knowledge and belief is a true, correct, and complete declaration.

.....
(Signature of taxpayer or agent)

Dated 19..... (If this is a joint declaration (not made by agent), it must be signed by both husband and wife)

10-07278-1

Fig. XI

2,000	2,025	134	7	0	4,350	773	768	0	636	818	487	351	208	0	0	0	0	0	0
2,025	2,050	274	141	7	0	4,400	784	776	648	828	497	486	361	218	85	0	0	0	0
2,050	2,075	270	146	12	0	4,450	795	778	648	838	508	504	373	228	95	0	0	0	0
2,075	2,100	264	151	17	0	4,500	806	789	659	848	522	518	381	238	105	0	0	0	0
2,100	2,125	289	156	22	0	4,550	817	799	670	859	533	529	391	248	115	0	0	0	0
2,125	2,150	294	161	27	0	4,600	828	810	681	869	544	539	391	258	125	0	0	0	0
2,150	2,175	299	166	32	0	4,650	839	820	692	880	555	550	401	268	135	2	0	0	0
2,175	2,200	304	171	37	0	4,700	851	831	703	890	566	560	411	278	145	12	0	0	0
2,200	2,225	309	176	42	0	4,750	862	841	714	901	577	571	421	288	155	22	0	0	0
2,225	2,250	314	181	47	0	4,800	873	852	725	911	588	584	431	298	165	32	0	0	0
2,250	2,275	319	186	52	0	4,850	884	862	736	922	599	594	441	308	175	42	0	0	0
2,275	2,300	324	191	57	0	4,900	895	873	747	932	610	600	451	318	185	52	0	0	0
2,300	2,325	329	196	62	0	4,950	906	883	758	943	621	603	461	328	195	62	0	0	0

TAX COMPUTATION SCHEDULE—FOR TAXPAYERS NOT USING TAX TABLE

1. Enter amount of Adjusted Gross Income *expected in 1953* (item 4, page 1, Form 1040)..... \$ 10500 00

2. If deductions are itemized, enter total of such deductions. If deductions are not itemized *and line 1, above, is \$5,000 or more:*
 (a) married persons filing separately enter \$500, (b) all others enter 10 percent of line 1, but not more than \$1,000..... 1000 00

3. Subtract line 2 from line 1. Enter the difference here. This is your Net Income..... \$ 9500 00

4. Enter your exemptions (\$600 for each exemption; including additional exemptions for age and blindness)..... 2400 00

5. Subtract line 4 from line 3. Enter difference here..... \$ 7100 00

If line 5 is not more than \$2,000.....

6. Enter here and as item 1 on other side 22.2 percent of amount shown on line 5 and disregard lines 7 and 8..... \$.....

If line 5 is more than \$2,000.....

7. And you are a single person, a married person filing separately, or a head of a household—
 Single persons and married persons filing separately use Tax Rate Schedule I below to figure tax on amount on line 5;
 heads of household use Tax Rate Schedule II below. Enter tax here and as item 1 on other side..... \$.....

8. And you are filing a joint return.....

(a) Enter here one-half of the amount of line 5..... \$ 3550 00

(b) Use Tax Rate Schedule I below to figure tax on amount on line 8(a)..... \$ 825 30

(c) Multiply amount on line 8(b) by 2. Enter tax here and as item 1 on other side..... \$ 1650 60

1953 TAX RATE SCHEDULE

I. FOR ALL TAXPAYERS EXCEPT HEAD OF HOUSEHOLD		II. FOR HEAD OF HOUSEHOLD ONLY	
If the amount in line 5 or 8 (a) is:	Enter in line 7 or 8 (b):	If the amount in line 5 is:	Enter in line 7:
Not over \$2,000	22.2% of the amount on line 5 or 8 (a).	Not over \$2,000	22.2% of the amount on line 5.
Over \$2,000 but not over \$4,000	\$444, plus 24.6% of excess over \$2,000.	Over \$2,000 but not over \$4,000	\$444, plus 23.4% of excess over \$2,000.
Over \$4,000 but not over \$6,000	\$938, plus 29% of excess over \$4,000.	Over \$4,000 but not over \$6,000	\$912, plus 27% of excess over \$4,000.
Over \$6,000 but not over \$8,000	\$1,516, plus 34% of excess over \$6,000.	Over \$6,000 but not over \$8,000	\$1,452, plus 29% of excess over \$6,000.
Over \$8,000 but not over \$10,000	\$2,196, plus 38% of excess over \$8,000.	Over \$8,000 but not over \$10,000	\$2,032, plus 34% of excess over \$8,000.
Over \$10,000 but not over \$12,000	\$2,956, plus 42% of excess over \$10,000.	Over \$10,000 but not over \$12,000	\$2,712, plus 35% of excess over \$10,000.
Over \$12,000 but not over \$14,000	\$3,796, plus 46% of excess over \$12,000.	Over \$12,000 but not over \$14,000	\$3,412, plus 41% of excess over \$12,000.
Over \$14,000 but not over \$16,000	\$4,756, plus 53% of excess over \$14,000.	Over \$14,000 but not over \$16,000	\$4,232, plus 44% of excess over \$14,000.
Over \$16,000 but not over \$18,000	\$5,816, plus 56% of excess over \$16,000.	Over \$16,000 but not over \$18,000	\$5,112, plus 47% of excess over \$16,000.
Over \$18,000 but not over \$20,000	\$6,836, plus 59% of excess over \$18,000.	Over \$18,000 but not over \$20,000	\$6,052, plus 48% of excess over \$18,000.
Over \$20,000 but not over \$22,000	\$8,116, plus 62% of excess over \$20,000.	Over \$20,000 but not over \$22,000	\$7,012, plus 52% of excess over \$20,000.
Over \$22,000 but not over \$24,000	\$9,556, plus 66% of excess over \$22,000.	Over \$22,000 but not over \$24,000	\$8,032, plus 54% of excess over \$22,000.
Over \$24,000 but not over \$26,000	\$11,096, plus 67% of excess over \$24,000.	Over \$24,000 but not over \$26,000	\$9,132, plus 57% of excess over \$24,000.
Over \$26,000 but not over \$28,000	\$12,816, plus 68% of excess over \$26,000.	Over \$26,000 but not over \$28,000	\$10,312, plus 60% of excess over \$26,000.
Over \$28,000 but not over \$30,000	\$14,616, plus 72% of excess over \$28,000.	Over \$28,000 but not over \$30,000	\$11,612, plus 63% of excess over \$28,000.
Over \$30,000 but not over \$32,000	\$16,416, plus 73% of excess over \$30,000.	Over \$32,000 but not over \$34,000	\$13,092, plus 64% of excess over \$32,000.
Over \$32,000 but not over \$34,000	\$18,216, plus 75% of excess over \$32,000.	Over \$34,000 but not over \$36,000	\$14,652, plus 64% of excess over \$34,000.
Over \$34,000 but not over \$36,000	\$20,016, plus 77% of excess over \$34,000.	Over \$36,000 but not over \$38,000	\$16,292, plus 71% of excess over \$36,000.
Over \$36,000 but not over \$38,000	\$21,816, plus 80% of excess over \$36,000.	Over \$38,000 but not over \$40,000	\$18,012, plus 72% of excess over \$38,000.
Over \$38,000 but not over \$40,000	\$23,616, plus 83% of excess over \$38,000.	Over \$40,000 but not over \$42,000	\$19,812, plus 73% of excess over \$40,000.
Over \$40,000 but not over \$42,000	\$25,416, plus 85% of excess over \$40,000.	Over \$42,000 but not over \$44,000	\$21,612, plus 77% of excess over \$42,000.
Over \$42,000 but not over \$44,000	\$27,216, plus 88% of excess over \$42,000.	Over \$44,000 but not over \$46,000	\$23,512, plus 79% of excess over \$44,000.
Over \$44,000 but not over \$46,000	\$29,016, plus 90% of excess over \$44,000.	Over \$46,000 but not over \$48,000	\$25,512, plus 81% of excess over \$46,000.
Over \$46,000 but not over \$48,000	\$30,816, plus 91% of excess over \$46,000.	Over \$48,000 but not over \$50,000	\$27,612, plus 85% of excess over \$48,000.
Over \$48,000 but not over \$50,000	\$32,616, plus 92% of excess over \$48,000.	Over \$50,000 but not over \$52,000	\$29,812, plus 88% of excess over \$50,000.
Over \$50,000 but not over \$52,000	\$34,416, plus 92% of excess over \$50,000.	Over \$52,000 but not over \$54,000	\$32,112, plus 91% of excess over \$52,000.
Over \$52,000 but not over \$54,000	\$36,216, plus 92% of excess over \$52,000.	Over \$54,000 but not over \$56,000	\$34,512, plus 92% of excess over \$54,000.
Over \$54,000 but not over \$56,000	\$38,016, plus 92% of excess over \$54,000.	Over \$56,000 but not over \$58,000	\$37,012, plus 92% of excess over \$56,000.
Over \$56,000 but not over \$58,000	\$39,816, plus 92% of excess over \$56,000.	Over \$58,000 but not over \$60,000	\$39,612, plus 92% of excess over \$58,000.
Over \$58,000 but not over \$60,000	\$41,616, plus 92% of excess over \$58,000.	Over \$60,000 but not over \$62,000	\$42,312, plus 92% of excess over \$60,000.
Over \$60,000 but not over \$62,000	\$43,416, plus 92% of excess over \$60,000.	Over \$62,000 but not over \$64,000	\$45,112, plus 92% of excess over \$62,000.
Over \$62,000 but not over \$64,000	\$45,216, plus 92% of excess over \$62,000.	Over \$64,000 but not over \$66,000	\$48,012, plus 92% of excess over \$64,000.
Over \$64,000 but not over \$66,000	\$47,016, plus 92% of excess over \$64,000.	Over \$66,000 but not over \$68,000	\$51,012, plus 92% of excess over \$66,000.
Over \$66,000 but not over \$68,000	\$48,816, plus 92% of excess over \$66,000.	Over \$68,000 but not over \$70,000	\$54,112, plus 92% of excess over \$68,000.
Over \$68,000 but not over \$70,000	\$50,616, plus 92% of excess over \$68,000.	Over \$70,000 but not over \$72,000	\$57,312, plus 92% of excess over \$70,000.
Over \$70,000 but not over \$72,000	\$52,416, plus 92% of excess over \$70,000.	Over \$72,000 but not over \$74,000	\$60,612, plus 92% of excess over \$72,000.
Over \$72,000 but not over \$74,000	\$54,216, plus 92% of excess over \$72,000.	Over \$74,000 but not over \$76,000	\$64,112, plus 92% of excess over \$74,000.
Over \$74,000 but not over \$76,000	\$56,016, plus 92% of excess over \$74,000.	Over \$76,000 but not over \$78,000	\$67,712, plus 92% of excess over \$76,000.
Over \$76,000 but not over \$78,000	\$57,816, plus 92% of excess over \$76,000.	Over \$78,000 but not over \$80,000	\$71,412, plus 92% of excess over \$78,000.
Over \$78,000 but not over \$80,000	\$59,616, plus 92% of excess over \$78,000.	Over \$80,000 but not over \$82,000	\$75,212, plus 92% of excess over \$80,000.
Over \$80,000 but not over \$82,000	\$61,416, plus 92% of excess over \$80,000.	Over \$82,000 but not over \$84,000	\$79,112, plus 92% of excess over \$82,000.
Over \$82,000 but not over \$84,000	\$63,216, plus 92% of excess over \$82,000.	Over \$84,000 but not over \$86,000	\$83,112, plus 92% of excess over \$84,000.
Over \$84,000 but not over \$86,000	\$65,016, plus 92% of excess over \$84,000.	Over \$86,000 but not over \$88,000	\$87,212, plus 92% of excess over \$86,000.
Over \$86,000 but not over \$88,000	\$66,816, plus 92% of excess over \$86,000.	Over \$88,000 but not over \$90,000	\$91,412, plus 92% of excess over \$88,000.
Over \$88,000 but not over \$90,000	\$68,616, plus 92% of excess over \$88,000.	Over \$90,000 but not over \$92,000	\$95,712, plus 92% of excess over \$90,000.
Over \$90,000 but not over \$92,000	\$70,416, plus 92% of excess over \$90,000.	Over \$92,000 but not over \$94,000	\$100,112, plus 92% of excess over \$92,000.
Over \$92,000 but not over \$94,000	\$72,216, plus 92% of excess over \$92,000.	Over \$94,000 but not over \$96,000	\$104,612, plus 92% of excess over \$94,000.
Over \$94,000 but not over \$96,000	\$74,016, plus 92% of excess over \$94,000.	Over \$96,000 but not over \$98,000	\$109,212, plus 92% of excess over \$96,000.
Over \$96,000 but not over \$98,000	\$75,816, plus 92% of excess over \$96,000.	Over \$98,000 but not over \$100,000	\$113,912, plus 92% of excess over \$98,000.
Over \$98,000 but not over \$100,000	\$77,616, plus 92% of excess over \$98,000.	Over \$100,000 but not over \$102,000	\$118,712, plus 92% of excess over \$100,000.
Over \$100,000 but not over \$102,000	\$79,416, plus 92% of excess over \$100,000.	Over \$102,000 but not over \$104,000	\$123,612, plus 92% of excess over \$102,000.
Over \$102,000 but not over \$104,000	\$81,216, plus 92% of excess over \$102,000.	Over \$104,000 but not over \$106,000	\$128,612, plus 92% of excess over \$104,000.
Over \$104,000 but not over \$106,000	\$83,016, plus 92% of excess over \$104,000.	Over \$106,000 but not over \$108,000	\$133,712, plus 92% of excess over \$106,000.
Over \$106,000 but not over \$108,000	\$84,816, plus 92% of excess over \$106,000.	Over \$108,000 but not over \$110,000	\$138,912, plus 92% of excess over \$108,000.
Over \$108,000 but not over \$110,000	\$86,616, plus 92% of excess over \$108,000.	Over \$110,000 but not over \$112,000	\$144,212, plus 92% of excess over \$110,000.
Over \$110,000 but not over \$112,000	\$88,416, plus 92% of excess over \$110,000.	Over \$112,000 but not over \$114,000	\$149,612, plus 92% of excess over \$112,000.
Over \$112,000 but not over \$114,000	\$90,216, plus 92% of excess over \$112,000.	Over \$114,000 but not over \$116,000	\$155,112, plus 92% of excess over \$114,000.
Over \$114,000 but not over \$116,000	\$92,016, plus 92% of excess over \$114,000.	Over \$116,000 but not over \$118,000	\$160,712, plus 92% of excess over \$116,000.
Over \$116,000 but not over \$118,000	\$93,816, plus 92% of excess over \$116,000.	Over \$118,000 but not over \$120,000	\$166,412, plus 92% of excess over \$118,000.
Over \$118,000 but not over \$120,000	\$95,616, plus 92% of excess over \$118,000.	Over \$120,000 but not over \$122,000	\$172,212, plus 92% of excess over \$120,000.
Over \$120,000 but not over \$122,000	\$97,416, plus 92% of excess over \$120,000.	Over \$122,000 but not over \$124,000	\$178,112, plus 92% of excess over \$122,000.
Over \$122,000 but not over \$124,000	\$99,216, plus 92% of excess over \$122,000.	Over \$124,000 but not over \$126,000	\$184,112, plus 92% of excess over \$124,000.
Over \$124,000 but not over \$126,000	\$101,016, plus 92% of excess over \$124,000.	Over \$126,000 but not over \$128,000	\$190,212, plus 92% of excess over \$126,000.
Over \$126,000 but not over \$128,000	\$102,816, plus 92% of excess over \$126,000.	Over \$128,000 but not over \$130,000	\$196,412, plus 92% of excess over \$128,000.
Over \$128,000 but not over \$130,000	\$104,616, plus 92% of excess over \$128,000.	Over \$130,000 but not over \$132,000	\$202,712, plus 92% of excess over \$130,000.
Over \$130,000 but not over \$132,000	\$106,416, plus 92% of excess over \$130,000.	Over \$132,000 but not over \$134,000	\$209,112, plus 92% of excess over \$132,000.
Over \$132,000 but not over \$134,000	\$108,216, plus 92% of excess over \$132,000.	Over \$134,000 but not over \$136,000	\$215,612, plus 92% of excess over \$134,000.
Over \$134,000 but not over \$136,000	\$110,016, plus 92% of excess over \$134,000.	Over \$136,000 but not over \$138,000	\$222,212, plus 92% of excess over \$136,000.
Over \$136,000 but not over \$138,000	\$111,816, plus 92% of excess over \$136,000.	Over \$138,000 but not over \$140,000	\$228,912, plus 92% of excess over \$138,000.
Over \$138,000 but not over \$140,000	\$113,616, plus 92% of excess over \$138,000.	Over \$140,000 but not over \$142,000	\$235,712, plus 92% of excess over \$140,000.
Over \$140,000 but not over \$142,000	\$115,416, plus 92% of excess over \$140,000.	Over \$142,000 but not over \$144,000	\$242,612, plus 92% of excess over \$142,000.
Over \$142,000 but not over \$144,000	\$117,216, plus 92% of excess over \$142,000.	Over \$144,000 but not over \$146,000	\$249,612, plus 92% of excess over \$144,000.
Over \$144,000 but not over \$146,000	\$119,016, plus 92% of excess over \$144,000.	Over \$146,000 but not over \$148,000	\$256,712, plus 92% of excess over \$146,000.
Over \$146,000 but not over \$148,000	\$120,816, plus 92% of excess over \$146,000.	Over \$148,000 but not over \$150,000	\$263,912, plus 92% of excess over \$148,000.
Over \$148,000 but not over \$150,000	\$122,616, plus 92% of excess over \$148,000.	Over \$150,000 but not over \$152,000	\$271,212, plus 92% of excess over \$150,000.
Over \$150,000 but not over \$152,000	\$124,416, plus 92% of excess over \$150,000.	Over \$152,000 but not over \$154,000	\$278,612, plus 92% of excess over \$152,000.
Over \$152,000 but not over \$154,000	\$126,216, plus 92% of excess over \$152,000.	Over \$154,000 but not over \$156,000	\$286,112, plus 92% of excess over \$154,000.
Over \$154,000 but not over \$156,000	\$128,016, plus 92% of excess over \$154,000.	Over \$156,000 but not over \$158,000	\$293,712, plus 92% of excess over \$156,000.
Over \$156,000 but not over \$158,000	\$129,816, plus 92% of excess over \$156,000.	Over \$158,000 but not over \$160,000	\$301,412, plus 92% of excess over \$158,000.
Over \$158,000 but not over \$160,000	\$131,616, plus 92% of excess over \$158,000.	Over \$160,000 but not over \$162,000	\$309,212, plus 92% of excess over \$160,000.
Over \$160,000 but not over \$162,000	\$133,416, plus 92% of excess over \$160,000.	Over \$162,000 but not over \$164,000	\$317,112, plus 92% of excess over \$162,000.
Over \$162,000 but not over \$164,000	\$135,216, plus 92% of excess over \$162,000.	Over \$164,000 but not over \$166,000	\$325,112, plus 92% of excess over \$164,000.
Over \$164,000 but not over \$166,000	\$137,016, plus 92% of excess over \$164,000.	Over \$166,000 but not over \$168,000	\$333,212, plus 92% of excess over \$166,000.
Over \$166,000 but not over \$168,000	\$138,816, plus 92% of excess over \$166,000.	Over \$168,000 but not over \$170,000	\$341,412, plus 92% of excess over \$168,000.
Over \$168,000 but not over \$170,000	\$140,616, plus 92% of excess over \$168,000.	Over \$170,000 but not over \$172,000	\$349,712, plus 92% of excess over \$170,000.
Over \$170,000 but not over \$172,000	\$142,416, plus 92% of excess over \$170,000.	Over \$172,000 but not over \$174,000	\$358,112, plus 92% of excess over \$172,000.
Over \$172,000 but not over \$174,000	\$144,216, plus 92% of excess over \$172,000.	Over \$174,000 but not over \$176,000	\$366,612, plus 92% of excess over \$174,000.
Over \$1			

	<u>Total Cost</u>
Depreciation on House	\$ 250.00
Repairs to House	500.00
Interest on Mortgage	450.00
Real Estate Taxes	400.00
Light and Heat	200.00
Telephone	96.00
Automobile - Depreciation (Cost \$2000 ÷ 5 years)	400.00
Automobile - Gas, Oil, Repairs (Excluding Gasoline Taxes)	325.00
State Gasoline Taxes	8.00
Drivers License	5.00
Contributions:	
Paid in Cash:	
Red Cross	25.00
Church	104.00
Salvation Army	10.00
Fair Value of:	
Used Furniture and Clothing Donated to Salvation Army	125.00
	<u>\$2898.00</u>

Table I

- 1) - House estimated to be used 20% for business.
- 2) - Telephone estimated to be used 50% for business.
- 3) - Automobile estimated to be used 25% for business.

**I. FOR ALL TAXPAYERS
EXCEPT HEAD OF HOUSEHOLD**

If the amount in line 5 or 8 (a) is: Enter in line 7 or 8 (b):

Not over \$2,000	22.2% of the amount on line 5 or 8 (a)
Over \$2,000 but not over \$4,000	\$444, plus 24.6% of excess over \$2,000
Over \$4,000 but not over \$6,000	\$936, plus 29% of excess over \$4,000
Over \$6,000 but not over \$8,000	\$1,516, plus 34% of excess over \$6,000
Over \$8,000 but not over \$10,000	\$2,196, plus 38% of excess over \$8,000
Over \$10,000 but not over \$12,000	\$2,956, plus 42% of excess over \$10,000
Over \$12,000 but not over \$14,000	\$3,796, plus 48% of excess over \$12,000
Over \$14,000 but not over \$16,000	\$4,756, plus 53% of excess over \$14,000
Over \$16,000 but not over \$18,000	\$5,816, plus 56% of excess over \$16,000
Over \$18,000 but not over \$20,000	\$6,936, plus 59% of excess over \$18,000
Over \$20,000 but not over \$22,000	\$8,116, plus 62% of excess over \$20,000
Over \$22,000 but not over \$26,000	\$9,356, plus 66% of excess over \$22,000
Over \$26,000 but not over \$32,000	\$11,996, plus 67% of excess over \$26,000
Over \$32,000 but not over \$38,000	\$16,016, plus 68% of excess over \$32,000
Over \$38,000 but not over \$44,000	\$20,096, plus 72% of excess over \$38,000
Over \$44,000 but not over \$50,000	\$24,416, plus 75% of excess over \$44,000
Over \$50,000 but not over \$60,000	\$28,916, plus 77% of excess over \$50,000
Over \$60,000 but not over \$70,000	\$36,616, plus 80% of excess over \$60,000
Over \$70,000 but not over \$80,000	\$44,616, plus 83% of excess over \$70,000
Over \$80,000 but not over \$90,000	\$52,916, plus 85% of excess over \$80,000
Over \$90,000 but not over \$100,000	\$61,416, plus 88% of excess over \$90,000
Over \$100,000 but not over \$150,000	\$70,216, plus 90% of excess over \$100,000
Over \$150,000 but not over \$200,000	\$115,216, plus 91% of excess over \$150,000
Over \$200,000	\$160,716, plus 92% of excess over \$200,000

Table II

TABLE I DEDUCTIONS

IF RESIDENCE AND AUTOMOBILE

Used Partly for Business		Not Deductible	Not used for Business Deduction from Adjusted Gross Income
Deduction for Adjusted Gross Income	Deduction from Adjusted Gross Income		
\$ 50.00 -1)		\$ 200.00	
100.00 -1)		400.00	
90.00 -1)	\$ 360.00		\$ 450.00
80.00 -1)	320.00		400.00
40.00 -1)		160.00	
48.00 -2)		48.00	
100.00 -3)		300.00	
81.25 -3)		243.75	
2.00 -3)	6.00		8.00
1.25 -3)	3.75		5.00
	25.00 -4)		25.00 -4)
	104.00 -4)		104.00 -4)
	10.00 -4)		10.00 -4)
	125.00		125.00
\$ 592.50	\$ 953.75	\$1351.75	\$1127.00

-4) - Contributions never a deduction for adjusted Gross Income; always a Deduction from Adjusted Gross Income.

Table I

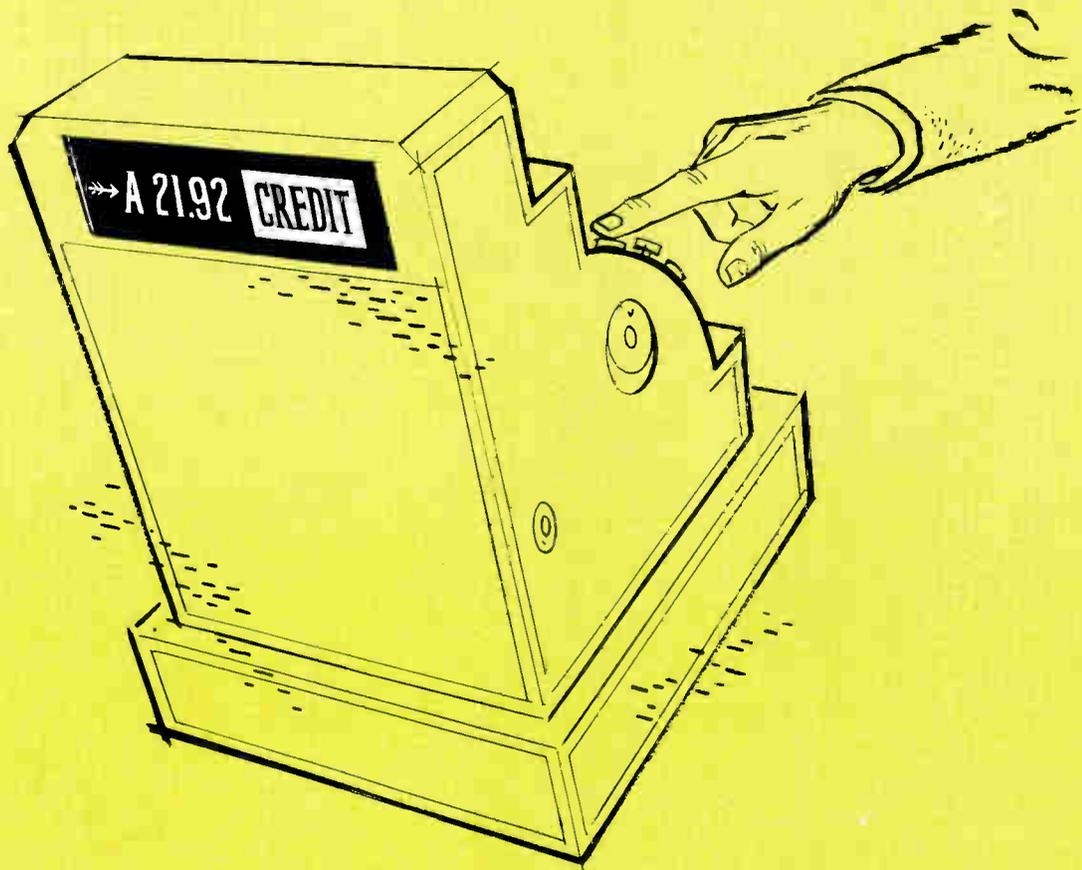
II. FOR HEAD OF HOUSEHOLD ONLY

If the amount in line 5 is:	Enter in line 7:
Not over \$2,000	22.2% of the amount on line 5
Over \$2,000 but not over \$4,000	\$444, plus 23.4% of excess over \$2,000
Over \$4,000 but not over \$6,000	\$912, plus 27% of excess over \$4,000
Over \$6,000 but not over \$8,000	\$1,452, plus 29% of excess over \$6,000
Over \$8,000 but not over \$10,000	\$2,032, plus 34% of excess over \$8,000
Over \$10,000 but not over \$12,000	\$2,712, plus 35% of excess over \$10,000
Over \$12,000 but not over \$14,000	\$3,412, plus 41% of excess over \$12,000
Over \$14,000 but not over \$16,000	\$4,232, plus 44% of excess over \$14,000
Over \$16,000 but not over \$18,000	\$5,112, plus 47% of excess over \$16,000
Over \$18,000 but not over \$20,000	\$6,052, plus 48% of excess over \$18,000
Over \$20,000 but not over \$22,000	\$7,012, plus 52% of excess over \$20,000
Over \$22,000 but not over \$24,000	\$8,052, plus 54% of excess over \$22,000
Over \$24,000 but not over \$28,000	\$9,132, plus 57% of excess over \$24,000
Over \$28,000 but not over \$32,000	\$11,412, plus 60% of excess over \$28,000
Over \$32,000 but not over \$38,000	\$13,812, plus 63% of excess over \$32,000
Over \$38,000 but not over \$44,000	\$17,592, plus 66% of excess over \$38,000
Over \$44,000 but not over \$50,000	\$21,552, plus 71% of excess over \$44,000
Over \$50,000 but not over \$60,000	\$25,812, plus 72% of excess over \$50,000
Over \$60,000 but not over \$70,000	\$33,012, plus 73% of excess over \$60,000
Over \$70,000 but not over \$80,000	\$40,312, plus 77% of excess over \$70,000
Over \$80,000 but not over \$90,000	\$48,012, plus 79% of excess over \$80,000
Over \$90,000 but not over \$100,000	\$55,912, plus 81% of excess over \$90,000
Over \$100,000 but not over \$150,000	\$64,012, plus 85% of excess over \$100,000
Over \$150,000 but not over \$200,000	\$106,512, plus 88% of excess over \$150,000
Over \$200,000 but not over \$300,000	\$150,512, plus 91% of excess over \$200,000
Over \$300,000	\$241,512, plus 92% of excess over \$300,000

Table II

TUBE DEPARTMENT
GENERAL  ELECTRIC
Schenectady 5, N. Y.

CREDIT & COLLECTION PRACTICES for TV-RADIO SERVICE DEALERS



GENERAL  ELECTRIC
Electronic TUBES



CREDIT PRACTICES FOR TV-RADIO SERVICE DEALERS

It is usually when your bills are piling high that Mrs. Jones produces the story she hasn't the cash for her new picture tube and channel selector. That starts you wondering:

"Why did I ever go into the TV-radio service business?"

Without reflection, you might ask that question and grumble that your business is in a deep freeze—you owing people and people owing you.

But this dilemma is not at all formidable when you think about it. Consider a moment the importance of credit to this country and to you personally. Some 28 billion dollars worth of consumer credit is now outstanding. People owning automobiles owe more than ten billion of it. You may have bought your own car on time. So did 70 percent of all recent car buyers. Charge and installment accounts reflect 53 percent of all department store sales.

Like Mrs. Jones, millions of Americans purchase what they want without putting down the cash. This doesn't mean that these people are broke. Most people who buy on credit, are in a financial situation similar to your own when you promise to pay for products you use in your business in the month following their delivery. Most vendors are satisfied that you will have the cash later and that you have an intention of paying.

Without credit, large corporations couldn't hire thousands of employees, and many people without work couldn't buy TV sets or radios or anything else. Imagine the things your family enjoys, which you couldn't have bought, were you required to put the money on the seller's counter.

Perhaps as much as our mass production, buying without cash has raised the country's standard of living

to a level higher than that of any other country in the world. Mass production itself would be stymied without mass markets, access to which is possible only through installment buying. Furthermore, buying on credit acts as an incentive to saving. It is difficult to put aside money unless you have a goal, and meeting payments on a monthly or other periodic basis makes saving purposeful.

Of course, this sort of buying has abuses. Some people live above their incomes when they can obtain much of what they want on credit; many people buy more than they ever pay for. These are not arguments against credit, as such, but they are reasons why businessmen exercise caution in extending credit. It is not the buyer who suffers in such a transaction; the seller must know his way around. This chapter of the G.E. Business Practices Manual was written to help you, as proprietor of a TV-radio service operation, to understand credit and guide you in deciding whose credit is safe to accept and whose isn't.

In earlier chapters of this manual, "Are You Sure You're Making Money," and those on "Accounting for the TV-Radio Service Dealer," you were given reasons for keeping accurate records of your assets, liabilities and expenditures. Those chapters stressed the essentials for successful operation of your business, such as, how to compute your profits, plan for the future, and determine periodically how you stand financially.

Look now at your balance sheet. Just how did you acquire all of your assets listed there? Your answer is the key to your credit reputation. What story does the right-hand side of that balance sheet tell you? Your assets are equal to the amount you owe plus the money

you yourself put into your business through initial investment and retained profits. You know that it costs money to borrow money, either in interest or in higher prices for trade credit. It also ties up your money when you withdraw your savings from the bank or sell your Government bonds to put money into your business. Look now at the item called Accounts Receivable. If your money wasn't tied up in that account, it could be earning interest for you in the bank, or it could pur-

chase the new equipment you need, or it could pay off the bank on loans extended to you.

Uncollected accounts can be either real "live" accounts, or a drain on your business. This choice is yours. You can sell for cash only, and thereby lose customers. Or, you can forget about collecting and have many customers who may or may not pay you, and possibly jeopardize your business. This manual proposes to assist you in making vital credit decisions.

WHEN TO GIVE CREDIT

Let's revert to Mrs. Jones and her bill. Was it a wise decision to return her TV set before she paid you? Practically, credit is the ability to obtain something today, whether a suit of clothes, a radio, a television set, an automobile, or repairs made, simply on the promise to pay for it in the future. How then can you determine whether Mrs. Jones's promise of future payment is reasonably safe grounds for giving her the materials and services she sought?

If Mrs. Jones can't pay in the near future, there isn't any use in keeping her as a customer because you'll never get your money. But supposing that the Jones's income is sufficient to pay you, you must ask yourself another question: Will she pay? There are people with

comfortable incomes who feel no personal compulsion to come forward with money they owe. When you get your money at long last, it has cost you a great deal of effort, some unpleasantness, and perhaps the assistance of a lawyer. Any dealing with such customers entails a great deal of time spent in writing letters and in telephoning, and making a profit requires a skin of inordinate thickness. Again the decision is up to you.

But how do we answer these questions about the ability and willingness of Mrs. Jones to pay? The answers lie in the application of common sense. Those who specialize in credit operations usually break down their investigations of clients into what they call the four "C's" of credit. There are:

- CHARACTER
- CAPACITY
- CAPITAL
- CONDITIONS



These, you too will find useful after a little practice.

Character is rightly considered first. Webster defines it as "the peculiar qualities impressed by nature or habit on a person, which distinguishes him from others." In Europe and South America, character alone is considered a sufficient guide to credit and is zealously safeguarded. In Egypt, the entire family is disgraced for life when one of the family reneges on his debts. Honesty, reliability, fairness, sobriety—these are all attributes desirable in a credit risk. Character, however, is not necessarily a surface quality, so that the credit man's problem resolves into judging on the basis of external behavior the internal personal qualities of his customer.

You can arrive at some estimate of a client's character through your own association with him in church, at community and social events, in clubs, etc. But as it is hardly probable that you will have such associations with everyone seeking to do business with you on a credit basis, you must employ a more usual yardstick. This yardstick is his reputation, that is, what the people who have personal associations with him think of his character. Your reliance upon reputation as a yardstick, however, should not be absolute. You must always weigh just how much of a man's reputation is built on rumor among neighbors who have partial or false views of his behavior.

Capacity, the second of the four "C's" of credit is concerned with the ability of a customer to make good his promise to pay. With the best intentions in the world, Mrs. Jones won't be able to pay when her husband is sick or out of work. A practical businessman generally checks such important facts as a client's age and state of health, and usually he tries to learn something about that person's aggressiveness and outlook on life in general. Not only the chronically sick, but also the tired and the beaten are seldom good credit risks. In this phase of his investigation, the credit man merely couples the physical and financial ability to pay with the general attitude of the customer.

Of all the four "C's," *Capital* is usually the easiest to determine. It is tangible and largely impersonal. The credit man has only to learn how much money his customer has. There are however, instances in which this information is not available in detail. In such cases the credit decision must rely on other factors.

Conditions, last of the four "C's," refers to the economic ambient of the country as a whole and particularly to the industrial and business conditions prevailing in your own community. Are people working? Is unemployment increasing? Is the community undergoing a readjustment or a recession? How long may any of these situations continue?

Mr. J. P. Morgan, testifying at a Congressional investigation some years ago, declared that of all the four "C's" the first is the most important, that the basis of all credit is character. What he said about big business loans is even more true concerning small personal credit loans, such as your loan to Mrs. Jones. Big business has access to a great deal more credit information than the individual TV-radio service dealer could ever possess. Back in 1864, someone said:

"Never deal with a rascal under the delusion you can prevent him from cheating you. The risk is greater

than the profit."

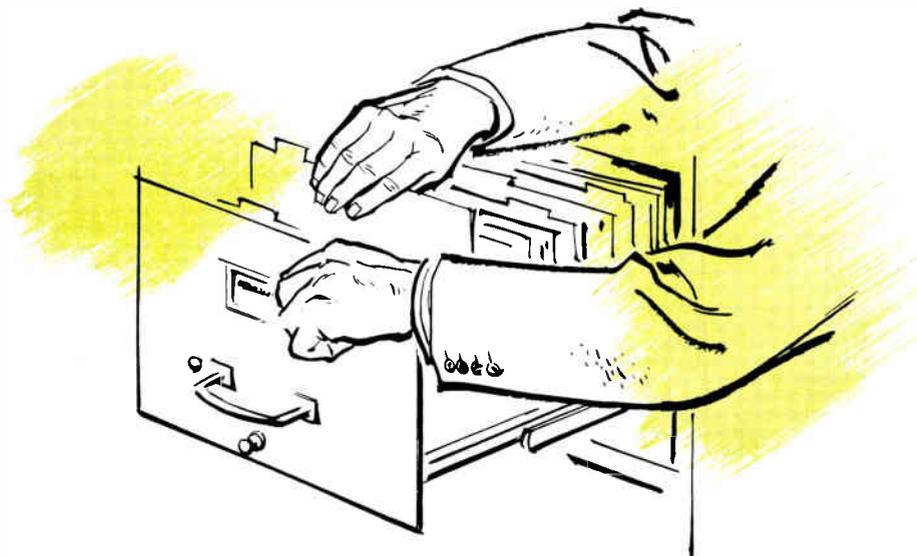
Matching shrewdness with shrewdness may be good sport. You are in business for a profit. While your client's capital and the prevailing economic conditions in which you both live are important to your business, they are less important than they are to big business. Since your bills are relatively small a customer is likely to pay you out of current earnings or out of a bank account adequate for his standard of living. But don't forget about capital and conditions entirely, because your suppliers have them constantly in mind.

MORE RECORD KEEPING

The account you set up in your Accounts Receivable Register for the bill Mrs. Jones owes you is part of her credit record. It shows you what you did, even when it doesn't indicate what you should have done. Once Mrs. Jones becomes a customer, her account in the register records both what you did and how she behaved. Her account is therefore a quick guide to your action from that point on. Once a dealer-customer relationship has been established, your books of account are both a history and a projection of your action.

But how about opening an account for a new customer? And how about collecting bills due?

These problems become easier when you develop a card index system. In such a system, use cards at least 5 by 8 inches so that you have plenty of space for the information needed to come to a decision. Keep a permanent record of a customer's paying habits, his background, and any other matters you feel may be helpful. But don't put information other than credit information on one of these cards. How elaborate a



system you should set up depends upon the number of your credit customers and how frequently you will refer to the cards. A simple system consists of a metal or wooden file box designed for 5 by 8-inch cards; a more elaborate system has the cards filed on a rotary wheel or in a card case with each card fastened so that you can see its contents by opening the case without touching the card. Both kinds are available at any commercial supply store.

How much information you will need on the card is up to you. The customer's full name should be typed so as to be visible for easy reference either at the top or the bottom of the card depending upon the method of inserting or fastening the cards in the file. Be careful, however, that you have the name spelled correctly. Smith, Smythe, Smithe may be all Smith to you, and Polish, Czechoslovak, Russian, Turkish, or Chinese names can be spelled quite differently from the way an American pronounces them. The address must be correct also. When these precautions have been taken, you have eliminated a lot of subsequent crosschecking. In addition to name and address, your card should contain at least some of the following information:

1. CUSTOMER'S AGE Remember that persons under 21 years may rescind contracts in most states unless the contracts are for necessities.

2. MARITAL STATUS A husband is responsible for his wife's necessities. Just what are necessities depends upon the law in your own state. In any event, when the wife is the customer, it is good practice to insure that the husband knows the wife is incurring the bill. When there is no other way of making certain, call him by telephone merely to ask whether the service was satisfactory. Such action not only earns you thanks for your courtesy, but puts him on notice of obligations incurred.

3. EMPLOYMENT STATUS Such information should consist of employer's name, how long the customer has worked for him (steadiness is always a good credit sign, whether it refers to living in the same house or working for the same firm), and how much salary he makes. When both work, the same information should be obtained on husband and wife.

4. BANK It is a good idea to find out whether your customer has a saving or checking account. If it is a checking account, determine whether it is a special or regular one. Inasmuch as a bank requires that a minimum balance be maintained for a regular checking account, that type is considered a better index of credit worth.

5. OTHER CHARGE ACCOUNTS Current charge accounts with other merchants afford valuable information. As a customer pays others, so shall he pay you.

6. REMARKS Sufficient space should be left on the card for your own remarks. These might include personal references the customer has furnished, the names of relatives living nearby to whom you could turn for forwarding addresses should your customer skip town without paying, or any other information you consider helpful.

It might prove time saving to keep on the reverse side of the customer's card a skeletonized copy of the accounts receivable register on that customer. This may be mere jottings of the amount of the bill outstanding and each payment as it is made. Such notations speed up collections by eliminating reference to the accounts receivable register.

When you open an account, spend some thought on how much credit it is safe to extend the new customer. It will save time thereafter, when the customer again requests work on his TV set, if a figure known as the credit limit has been jotted down in the corner of the card opposite the customer's name. This device is quite common, and it is very probable that your suppliers have fixed a credit limit for you.

There are many ways of arriving at this credit limit. Some credit men make it a nominal amount at first which they increase from time to time (say every six months when they go through the cards) as experience with the customer warrants. Frequently the creditor

merely asks other merchants in the community what credit they are giving that customer and fixes on the same amount. This latter method has some disadvantages, since the local haberdasher may establish a \$100 limit, the butcher a \$25 limit, etc., depending on whether each has a strict or liberal policy in extending credit. Thus you are left to make up your own mind. When the customer pays regularly, there is no reason for fixing a limit at all. When he or she falls behind, a limit may be set and watched carefully for as long as the customer remains in arrears, or until he or she has demonstrated reform.

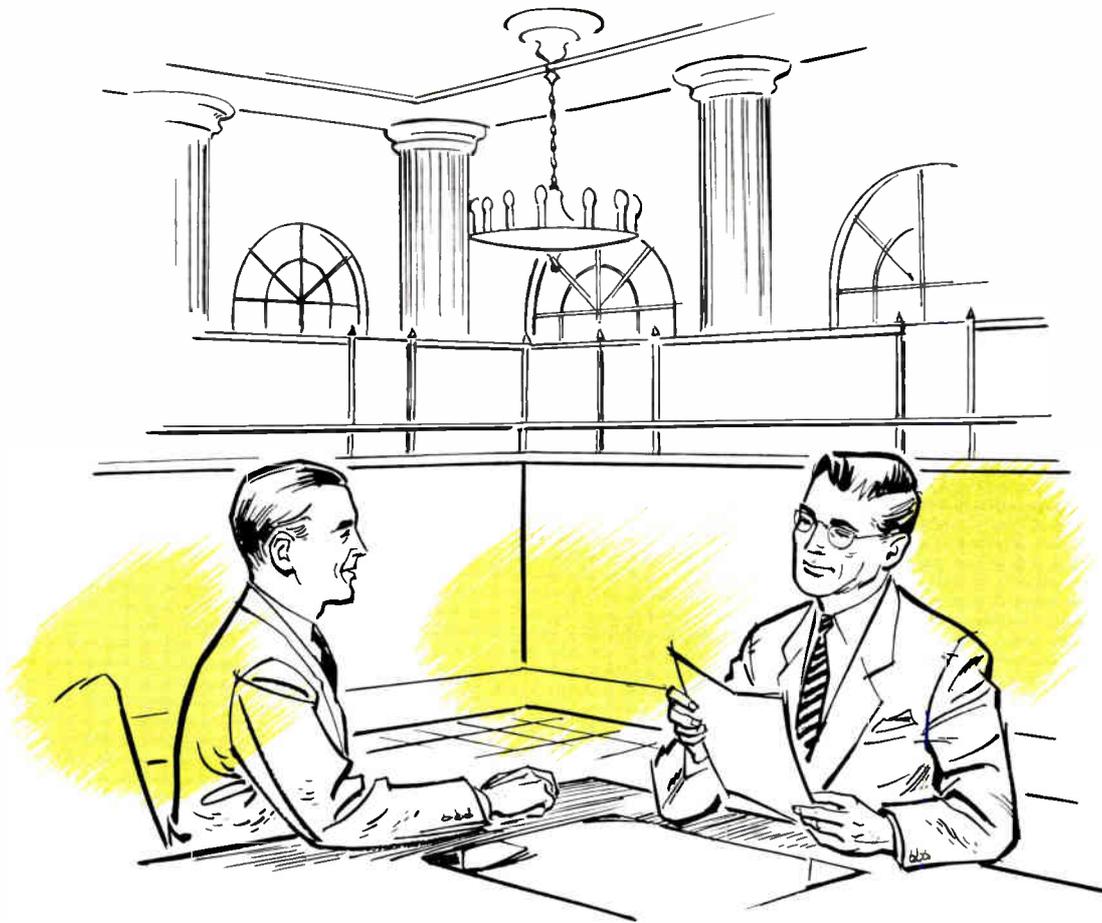
CREDIT INVESTIGATION

When Mrs. Jones called you to fix her television set, did you wonder why she called you particularly? Had another dealer serviced her set before and, if so, why did she change? Was it because the other dealer gave unsatisfactory service? Or, was it because Mrs. Jones wouldn't pay her bills, and the repair shop refused to give her service? If her home is at a distance, perhaps her credit isn't good in her own part of town? Or perhaps, one of your satisfied customers recommended you as giving superior service?

These questions might well occur to you. But how

are you going to find the answers. Your local banker is often a good source of information. But you must remember, that he is in a peculiar position, like that of a doctor or lawyer, and in his position of trust cannot tell all you would like to know about Mrs. Jones. Much of what he knows must be kept in confidence. But when he knows and feels he can trust you, there are facts he may pass on. One important fact is whether Mrs. Jones or her husband has an account at his bank. Another is whether the account is a small, medium or large one, and whether he considers it satisfactory.





Unfortunately, what a banker may mean by a satisfactory account is merely that Mrs. Jones doesn't bother him and doesn't draw too many checks. Occasionally, it refers only very vaguely to the facts you want to know, such as, whether Mrs. Jones ever overdrew her account, or would he lend her money if she asked for it. When a bank manager knows you and is sure his advice will be understood, he may volunteer, "Why don't you see so-and-so who sold her the set—he may have something of interest." Such a suggestion may be based on the fact that he has the notes Mrs. Jones signed when she bought the set.

By gathering facts here and there, you can put together your own picture of Mrs. Jones as a credit risk. Little things you know about her TV set, such as the date it was sold, coupled with your knowledge that she hasn't cleaned up her debt, indicate that she should be regarded as "slow-pay."

In every community in the United States you will find an organization doing this type of investigative work at a low cost. This organization is the Retail Credit Bureau. Such bureaus were started by businessmen seeking to obtain credit information. These businessmen soon realized that money, effort, and time

could be saved by establishing a central office that could make one credit check rather than have all the businessmen of the community each make his own. They found that the job could be done more efficiently when it was given to experts, people skilled in the techniques of investigation and with time to check records for suits and judgments as well as newspaper and trade journal items pertaining to a person's credit worth.

Credit bureaus are owned either by the merchant members themselves or by private individuals. In the latter instance, it is customary to have businessmen in the community sit on the board of directors or at least act in an advisory capacity. Usually, a businessman need not be a member in order to obtain credit reports on his customers, but the cost of a single report is considerably less expensive for a member than for a non-member.

In your own investigation of credit worth, it is frequently a good idea to look into the bureau in your neighborhood, and when the number of your credit accounts is considerable, it pays to join. Of course, a business with relatively few credit customers would require only occasional reports.

Credit bureaus obtain their information for the files they build up from the same sources available to you. Their worth to you lies in the time they save and in the thoroughness they bring to their investigations. Each time a member asks for a report, the bureau checks its files for the name and, if it has it, brings its file up to date by calling all merchants listed as doing business with the customer. In this way, the bureau has an up-to-date file on paying habits. But when a name has not been previously filed, the bureau checks all references furnished by the customer and gathers other data from the customer's neighborhood. Information on bankruptcies, judgments, law suits, unexplained fires, etc., are procured through a constant check of the courts and various publications.

Retail credit bureaus have an assortment of reports to fit the various needs of members. Perhaps, from the following list, one or more may be of assistance to you:

1. Antecedent or consumer's report

This is the most complete report offered, covering the customer's background as well as his paying habits. It may be obtained in narrative form written under descriptive headings, or in question and answer form, whichever you prefer. Both forms contain information

about the customer's age, marital status, number of dependents, living conditions, and whether he owns or rents his living quarters. When the customer owns a house, its value is given; when he rents a house, its rental is furnished. This report, in either form, gives the customer's employment record, including his length of service, position, salary, employer's opinion of him as an employee, and the employer's financial status.

2. Trade Report This report may be issued as part of the antecedent report or as a special report. It is recognized that most of the information about a customer is relatively free from change. A person owning a house, working for a large company or for himself, isn't likely to move about. Some credit men believe it a waste of money to buy reports repeating information which the merchant has already on file. Some credit men only want to know the way in which a customer pays his bills and place no value on information about the number of a customer's children or the place where he works. The trade report is designed to meet this more limited need and performs its purpose by covering the experiences of other merchants and tradesmen in dealing with the customer. Specifically, this report includes:

- (a) *The age of the account carried by each person having the account,*
- (b) *The highest credit extended at any one time by each creditor,*
- (c) *The amount owed to each creditor at the time of the report,*
- (d) *The month for which the current balance is owed, and*
- (e) *The exact paying habits of the customer.*

Credit bureaus offer other reports, although some may be of limited usefulness to you. They are:

1. Residence Check This verifies the age, marital status, number of dependents, living conditions and resident ownership, or rent paid.

2. Employment Check This is a verification of occupation, position, length of service, salary, and employer's opinion.

3. Verification Report This is a combination of numbers 1 and 2 immediately above.

4. Property Report This report gives details of the ownership of real estate, including the owner on record, the assessed valuation, mortgages, payment of taxes, foreclosures, and other information about property.

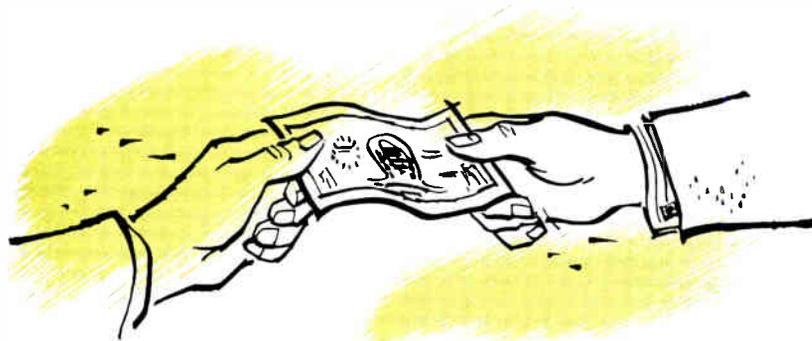
COLLECTIONS

Making collections varies in difficulty, in each type of community. In a large city, making a collection is apt to be a cold-blooded arrangement with very little of the close personal relationship that exists in smaller communities. In the smaller town, the merchant knows his customer, and perhaps his family is on friendly terms with the customer's. In such an environment, collection is an art, having no precise rules, and methods that succeed in one small community won't bring in a cent in another of the same size. There are, however, broad principles which should be observed, and collection, like investigation, takes practice.

Make no mistake: collection is as important to you as getting the business in the first place, and a simple calculation will make this fact clear. Suppose that your

profit on each dollar a customer spends is 10 percent before taxes. If Mrs. Jones owes you for one picture tube for which you have charged her \$40, you must sell \$400 worth to other customers to cover your loss due to Mrs. Jones's failure to pay you. Just consider the time it will take you! If you make only eight instead of 10 cents on the dollar, your sales will have to reach \$500 before your loss is recovered. To calculate the dollars in sales needed to retrieve each dollar of bad debt just divide the bad debt by the percentage of your profit per sale.

Every businessman must deal with the excuses of his customers who delay payment or neglect to pay at all. To succeed in dealing with such customers, a TV-radio service dealer must develop a collection technique, requiring knowledge of the following:



- 1. Which accounts become overdue? Why don't customers pay on time, particularly when they have the money?**
- 2. A method of watching all your accounts to detect an overdue account before it runs too long.**
- 3. A system for recording the steps you have taken toward collection and to remind you when and how to follow up.**
- 4. Collections methods.**

What is the real reason Mrs. Jones isn't paying? When you know the answer, you will find it easier to collect. There are at least seven reasons she may not be paying promptly, and perhaps you can think up others. The seven usual situations are:

- 1.** The customer honestly doesn't understand when you expect her to pay. Neither your serviceman nor you have explained to her clearly. "Pay when you are downtown," "Send the money along," or "Pay me later" are too indefinite. Always take the time to come to an understanding with a customer about the payment of her bill, and a customer who values her good reputation, will be appreciative and will comply. An understanding reached at the beginning prevents loss of good will in a customer who intends to pay but is resentful of dunning letters.
- 2.** Customers sometimes overlook payments through carelessness. If you approach one when he has cash laying around you will have no trouble in collecting. Usually, such a person has good intentions but bad habits, and no effort on your part will make him punctual.
- 3.** Some customers disregard small bills, deferring payment until they have purchased enough to make their bills worth their attention. You must impress upon such people that you have other accounts like theirs, that while their accounts are individually small, their sum represents a tidy amount. These are the accounts that it takes time to collect and, in business, time means money. More clerical work goes into ten of these accounts than into a single large one, so that an hour spent in educating such customers is time and money well spent. They must be made to realize that any increased costs occurring in your business are eventually passed on to your clients, so that it is to their own advantage to keep your costs low. In collection

work always talk to the consumer in terms of the consumer's advantage and avoid reference to your own hard luck.

4. Some customers who usually pay on time, are occasionally slow. This group includes those who pay promptly when you bill them on the first or 15th of the month when they have the cash. In collecting from these, timing is important and it is well to remember when you pay your own bills.

5. Some customers are usually slow, and you have to make up your mind whether to continue dealing with them or dropping them as accounts. Collecting demands follow-up work, and frequently you find yourself forgetting that they owe you money. Such people, expecting to be dunned, conveniently forget their bill unless you keep after them. When you feel squeamish about dunning them, remember everyone else is doing it too.

6. Some customers balk at paying bills, although there is no question of their ability to pay and pay promptly. They would rather keep their money than give it to you. With such, you must take a firm stand even at the risk of losing them as customers.

7. Some customers have a temporary run of bad luck. Sickness, loss of job, fire in the home or business premises make paying bills a tough pull. Since you can't collect promptly anyhow, it is well to deal with these people in such a way as to retain their good will. Drop such a customer a line, telling him not to worry about the bill until he's back on his feet. If fire damaged his television set, why not fix it and just add the amount to the bill. Chances are that you'll make a good customer for life, and word of your good deed will get around the neighborhood.



METHOD OF WATCHING ACCOUNTS

Watching accounts to prevent them from becoming delinquent is largely conditioned by the number of such accounts. When the number is small, you merely look through your credit cards every so often, perhaps once a week, noting the accounts overdue. Some busi-

nessmen put colored tabs on such account cards and remove them when the account is paid. This device signals active accounts and is useful when accounts are numerous.

FOLLOW-UP

Once a customer becomes indebted to you, keep a constant record of your efforts to collect. Without such a record, you will soon find that you don't know who owes you or how old the account is. It is not enough to glance casually through your accounts receivable register. Such a glance will tell you how long the account is overdue, but it won't show you what steps you have taken to follow it through to collection. Neglect of such records could result in the loss of collection and—what is more serious—in the loss of the customer's good will.

It is poor collection technique to do nothing for a month and then to bombard your customer with high-

pressure tactics certain to cause resentment. As a collection method, this procedure lacks continuity and therefore force. What would you think of a supplier who after neglecting your account for two or three months, campaigned vigorously with letters and phone calls to collect from you? That is exactly how your customer will feel about you.

Several simple methods are available for following up an account. When you have cards for each account, make them the basis of your system of collecting. As cards become active, as suggested above, place colored tabs on the top. Start with a blue tab, indicating that

the account is receivable. Then, depending upon your own policy, after two weeks or a month, change the tab for a yellow one. If there is still no collection after two weeks or a month, change the color again, perhaps this time to red as signifying an account nearing the danger point. Each time you change the tab, you might note on the card what steps you have taken, such as "reminder letter 11/30/53" or "phoned 11/30/53, promised to pay in a week."

When such a constant check becomes burdensome because of the number of cards, a refinement of the above procedure may be followed. When the colored tab indicates that the account is more than one or two weeks old, the account card may be removed from the file and placed in a special box or folder. This box or folder should have 31 divisions, one for each day of the month and identified only by number. When Mrs. Jones's account becomes a week old, send her a letter

and slip her account card into a pigeonhole several numbers past the date of the letter. Suppose you wrote her a reminder note on December 3. Then her card should be in the slot marked 10, so that on December 10 you can look at the card in that slot to determine what collection effort is called for on that day. Suppose you phone Mrs. Jones, and she tells you she will pay in a few days. You can then file the card in the 14 slot, thus allowing her a few days leeway.

Be sure that every time you reach some decision with respect to a customer's account, you jot it down on the card. A collection effort repeated loses force. Never let your customer think that you are hazy in your own mind about the status of her account or that your records are disputable.

Another simple method employs a worksheet containing several columns. This sheet would appear as below:

ACCOUNT	Amt. Due	Date	Amt. Pd.	- Days -			REMARKS
				15	30	45	
Jones, H.	\$40	3/4/54	\$2-3/6/54	letter	phone	visit	Won't answer letters

As each account on the sheet is collected, cross it out.

All three methods of collection have advantages and disadvantages. The first method uses a filing system already in operation, but the colored tabs are not much assistance in picking out the cards each week when the tabbed cards become too numerous.

The advantage of the second system lies in its automatic built-in control. There is a constant reminder, a constant compulsion to make a decision. The system works like a secretary who stays at your elbow to remind you to follow up. But leaving a card in its pigeon-

hole is equivalent to deciding to put off collection for a month. The third system presents a complete picture of your accounts receivable on a single sheet resembling your other charts. Significant blanks show up at a glance. For instance, if you neglect Mrs. Jones's account but attend to all the others, a lot of white space will appear on the line with her name. But the system allows a very limited space for a record of your collection activities.

COLLECTION TECHNIQUES

So much for the mechanics of collection, analyzing your customers, watching delinquents and following up your collections. Now to the fourth and last technique, that of collecting, the one that pays off.

Collecting does not mean simply going after money owed you; a collection agency can do that. Collection, as we use it here, means collecting money fast while retaining the good-will of the customer. To accomplish collection properly, you should proceed in three stages.

FIRST, *remind* your customer of the overdue bill;

SECOND, *follow up* the account, becoming more insistent with each contact with the customer, and

THIRD, taking *drastic* measures when it can be pretty well conceded that the customer is a goner as far as you are concerned. Certainly you don't want him as a customer any longer. In this stage, a lawsuit may be called for.

Collection effort begins with a letter, a phone call, or a personal visit. Which of these will accomplish your purpose without offending the customer, you will have to decide from your own knowledge of him. Since most customers merely overlooked the payment or deferred it until the beginning of next month, the least offensive yet most effective tactic is probably a second copy of the bill, perhaps with a sticker calling attention to the fact that payment is overdue. An assortment of these stickers can be purchased at most commercial stationery stores. Stickers are of many kinds, some with

merely "Please Remit," others cute or comical or employing cartoons. Usually, it is advisable to use the more conventional types, reading "Please Favor" or "Kindly Send Us A Check."

When the duplicate bill technique fails to bring in a payment, most credit men resort to the letter. For his collection letter to have "pull," the writer must be careful with both its appearance and language. In writing your letter, keep in mind how you would react to it yourself. It should command attention and make the customer *want* to pay. Never lose your temper no matter how long you have been pleading with the customer to pay. Consider what sort of appeal he is most likely to react to. Your letter can appeal to his:



Pride

Self-interest

Sense of fairness

Good will toward others

Fear.

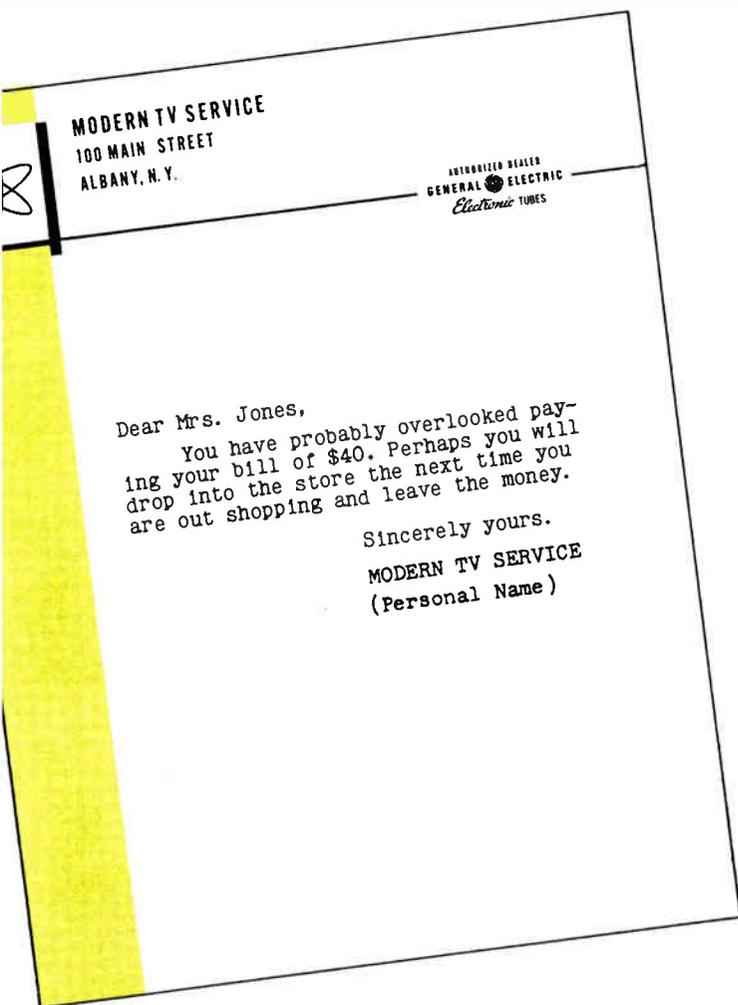
It is not always a simple problem to know which to use, but it is a good idea to keep a record of the letter which gets results and make use of its slant in most of your correspondence. Probably you will want to write several letters to a customer before taking more drastic steps, and in these you can try two or even three different approaches.

Here are some "don'ts" to be observed in the preparation of collection letters. Never be offensive. Never injure a customer's pride. These only stir up resentment and ill-will toward you, and instead of paying, the customer will become stubborn and—what is worse—may start rumors about you in the community. Don't try to scare a customer unless you are ready to back up your threat, and when you have threatened to turn a bill over to a lawyer unless it is paid, do it. Remember the boy who cried "Wolf" too often. Don't put anything on the outside of an envelope that would suggest that a customer is a dead-beat, and never call him a dead-beat—that's slander. Post cards should never be used as a means of collection.

When you confine your collection message to the

debtor, you can be almost as insistent as you wish. You should avoid expressing opinions, such as "I don't think you ever had an intention of paying the bill," or, "You never pay any bills." Whatever the aggravation, refrain from calling anyone a thief or a swindler, terms that never helped to collect payments and in most places constitute libel. Never threaten criminal action.

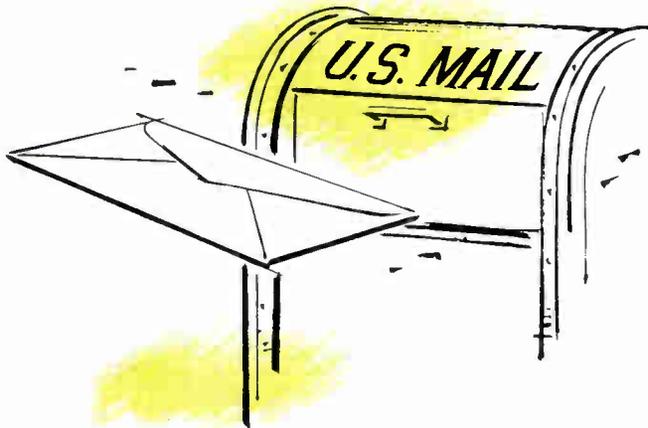
Copying someone else's letters is a common enough practice, even though copied letters lack the "you," the distinguishing personality that is so often the effective ingredient. Following are some sample letters you can personalize by changing the wording to include the kind of language your customers have heard you use.



1. *Simple Reminder.* This type of letter probably would follow the submission of a duplicate bill, with or without a sticker, when the debt remains outstanding.



When the customer has been delinquent on earlier bills, perhaps a stronger tone is called for:



Collecting bills for small amounts often involves difficulties. Some customers don't like writing checks for such sums, and either fail to pay through carelessness or wait until additional repairs by you bring the bill to a higher amount. Since these people intend to pay, they don't regard their bill as overdue. A letter to these customers must explain the inconvenience caused by their delay.



MODERN TV SERVICE
100 MAIN STREET
ALBANY, N. Y.

AUTHORIZED DEALER
GENERAL ELECTRIC
Electronic TUBES

Dear Mrs. Jones,
May I remind you that your bill of \$40 is overdue.
While I am not in the least worried about it, I must pay my bills too. Would you please send me a check for this amount.

Sincerely yours,
MODERN TV SERVICE
(Personal Name)



MODERN TV SERVICE
100 MAIN STREET
ALBANY, N. Y.

AUTHORIZED DEALER
GENERAL ELECTRIC
Electronic TUBES

Dear Mrs. Jones,
I don't like to ask for money owed me. This is particularly so when the bill is as small as yours and the customer as good as you are. I'm sure that you pay all your bills on time, and it is just that this bill is so small that you have overlooked it.

Will you consider, however, what happens to my business when these small bills are multiplied a hundred times. They constitute considerable cost in clerical work and time lost, and since we are all in business to make a profit, this cost must be passed on to customers in the form of higher prices.

As you know, I try at all times to give the best service at the lowest prices. Won't you help me do this by sending me a check for \$5.50 promptly.

Yours truly,
MODERN TV SERVICE
(Personal Name)

MODERN TV SERVICE
100 MAIN STREET
ALBANY, N. Y.

AUTHORIZED DEALER
GENERAL ELECTRIC
Electronic TUBES

Dear Mrs. Jones,
We still haven't received payment
of your bill.

When we repaired your set, you
appreciated our prompt response to
your call and the speed with which we
had your set working again. Do you
think it is fair to keep us waiting
for our money? Won't you please send
us a check for this amount?

Yours truly,
MODERN TV SERVICE
(Personal Name)



2. *Second Type Letter.* When the simple reminder type of letter fails to collect, you may want to try a second letter, appealing to the customer's sense of fair play, pride, or self-interest:

FAIR PLAY

MODERN TV SERVICE
100 MAIN STREET
ALBANY, N. Y.

AUTHORIZED DEALER
GENERAL ELECTRIC
Electronic TUBES

Dear Mrs. Jones,
When we first did business with
you, we naturally inquired about you
from friends. Without exception, they
told us fine things about you; that
you were fair; that you paid your
bills on time. You can take pride in
the reputation you have in this com-
munity. I know you wouldn't want to
harm this reputation by owing a bill
as small as mine. Won't you send me a
check for this amount?

Yours truly,
MODERN TV SERVICE
(Personal Name)



PRIDE

When the second letter does not get you some cash, you might switch to the telephone. The telephone has some advantages; it saves time and is more definite than a letter inasmuch as you get some response. While a letter may be ignored, the customer will hardly refuse to promise a check or give his reasons for not doing so in a telephone conversation. Furthermore, the telephone permits a variety of appeals not possible in a letter. When you sense that your appeal to self-interest is not working, you can try an appeal to the customer's pride or his sense of fairness. Even threats can be made (of legal action, that is). The telephone can be used repeatedly without being offensive. Of course, you can't clinch the deal over the phone any more than you can by letter. When the customer promises to send a check, you must be content.

SELF INTEREST

At times there is an obvious advantage in visiting your customer. A visit shows that you regard the situation as being sufficiently serious to come yourself rather than send a messenger. A personal visit has all the advantages of a telephone call and, in addition, affords you an opportunity to clinch the deal and come away with the money. Its disadvantage lies in the time it takes. Save this for the climax of your campaign.

3. *Drastic Measures.* When all other measures have failed, your last recourse is another letter before you turn the job of collection over to your attorney. This final letter should be something like the following:



MODERN TV SERVICE
100 MAIN STREET
ALBANY, N. Y.

AUTHORIZED DEALER
GENERAL ELECTRIC
Electronic TUBES

Dear Mrs. Jones,

When a customer asks for credit, one of the ways the merchant comes to a decision is by asking other merchants in the community how that customer pays her bills. After all, it is a pretty good bet that as you treat one you will treat all. I get calls frequently about my customers, and it is always a pleasure to be able to say that the customer is the best, that he or she always pays bills on time. What can I tell them about you? I have asked you twice for payment, and you haven't paid. A good credit reputation is hard to build. Once lost it takes years to regain it. You wouldn't want this to happen to you. Please send me a check for \$40 so that I may report that you are not overdue when I am asked.

Yours truly,

MODERN TV SERVICE
(Personal Name)



MODERN TV SERVICE
100 MAIN STREET
ALBANY, N. Y.

AUTHORIZED DEALER
GENERAL ELECTRIC
Electronic TUBES

Dear Mrs. Jones,

I have reminded you, requested you, and even begged you to pay the bill which you have owed me for the past several months. It is my earnest desire to maintain pleasant relationships with all my customers. I don't want to believe that a single one of my customers is not going to pay a bill. But what alternative do you leave me, in your case?

I am going to give you one last chance to pay me. If I don't receive a check within one week from today, I must place this account in the hands of my attorney, much as I regret doing so.

Sincerely yours,

MODERN TV SERVICE
(Personal Name)

By now you have lost Mrs. Jones as a customer, and having made a threat of legal action, go through with it. If it is rumored about in the community that your

threats are idle, not only will you be letting Mrs. Jones off the hook, but other customers might follow her example.

HOW IS YOUR CREDIT?

Your credit is probably your best business asset. Just stop and think of it. How many times do you order parts and pay cash to the supplier? How often do you order equipment, tools, or even a truck and put the cash on the line? How do your creditors rate you? The principles they employ are the same as those we have been discussing for your own use. They want to know whether you can pay, and whether you will pay. The only difference lies in the technique by which they get their answers to these questions, and it is in your interest to know how they are testing you, so that you can improve your credit.

Just as you inquired about your customer, your creditors want to know your character. Keep on good terms with your banker and fellow merchants, because your creditors will ask them what they think of you and what are your paying habits. Your suppliers will want to know your capacity, i.e., your business ability, your state of mind, your health, your business habits. They won't expect you to be pictured as a Wall Street banker, but they will expect you to be described to

them as a good TV-radio service dealer. They will inquire whether you know your business, whether you keep a modern, up-to-date store, whether your place of business is orderly and clean so as to attract customers and give a good impression to those with whom you do business. They will take into consideration all they can learn about your energy, aggressiveness, shrewdness and ambition.

Unlike your own investigation of customers, mercantile credit men will put a lot of faith in your financial statement. Suppose now for a moment you look at your own picture of your financial condition. Just how liquid are you? What is the percentage of your cash to your total payables? How much cash and accounts receivable have you with which to meet your current liabilities? This last relationship is called the "quick ratio," or the "acid test." Your business is wobbly and your credit poor when your current debts are greater than your cash and receivables combined. Your creditor will look next at your current ratio, i.e., the ratio of your current assets to current liabilities, which



changes from one part of your season to the next.

Your creditor will want to know how good your accounts receivable are. One simple test often applied by creditors consists of dividing the accounts receivable by the sales for the year and multiplying the result by 360. In this way, it is possible to get a fair idea of how old your accounts are. Thus, if you have \$6,000 in accounts receivable outstanding and your sales for the year are \$60,000, your accounts are on the average 36 days old ($\$6,000 \div \$60,000 \times 360 = 36$ days). Of course you have an advantage over the credit man; you can open your accounts receivable register and figure exactly how old the accounts are.

Before they sell you more supplies, your creditors will be interested to know how fast your inventory is moving. A rough test of your inventory turnover can be arrived at by dividing your cost of goods sold by your average inventory. The faster your inventory turns over, the more profit you are likely to make. Curiously enough, however, when your inventory turnover is too fast, your creditor will consider you a bad risk. It means that you are overtrading. To determine how efficiently you are using working capital, i.e., your current assets, he will divide your sales by the total current assets. Here again, the faster it turns over the more money you are making, but again this is true only up to a point. It could be true that you are working with inadequate capital and that trouble lies ahead. What these ratios should be depends on many factors, among them the size of your business, the season, the part of the country where you are doing business, whether your shop is a city or country store and many others. It is a prudent procedure to ask your banker, your trade association, the local credit agency, or your supplier for opinions on these ratios.

Two other ratios helpful to you in determining whether you are making sufficient profit to compensate you for your risk may interest your creditor less than they interest you. He is primarily concerned with your capacity for paying his bills, not with the profit you are making. The net profit on the sales dollar and on the net worth as a position of your total investment are measures of your success.

There are other tests that the creditor will make. He will want to determine how much of your total assets he and his fellow creditors have paid for and how much you have paid for. To do this, he will add all your debt and compare it with your total net worth. The addition of the two, of course, is the sum total of your assets. Thus, when your assets are \$10,000 and your debts of all kinds are \$5,000, compared with \$5,000 of your investment, he knows that the creditors are taking half the risk while you are taking all the profit. When the ratio of debt to net worth is 2 to 5, the creditors have advanced money for \$2 of the \$7 you have invested.

Changes in the net worth of ownership are an important clue to business progress over the years. By comparing the owner's equity each year, all changes in the business can be observed easily as all changes are reflected in that account. Did you leave profits in the business? Did you add money to your investment? Did you write up assets? All these will be mirrored in this account.

Just as you judge your customers by the promptness with which they pay you, so will your creditors judge you. There is a difference, however. Your creditors give you a tremendous incentive to pay. Suppose you went to the bank to ask for a loan and the banker said he would gladly make the loan, but that the interest rate would be 36 percent a year. You would think he





was crazy. Yet that is just what it costs you not to take a discount of 2/10 net 30. When you pay the distributor on the basis of 1/10 prox and you pay the full amount on the 15th day rather than 99 percent on the 10th day, you are paying 72 percent interest for keeping the money the extra five days! Unbelievable? Then figure it out for yourself.

Suppose your bill is \$100. When you pay it in ten days, it will cost you \$99. When you pay it on the 15th day, it will cost you \$100. Therefore, it has cost you \$1 to keep \$100 for five days. There are 72 five-day periods in a year, and since it has cost you one percent for each of them (\$1 to keep \$100), it has cost you interest at the rate of 72 percent for the year. Remember you don't have to keep the money a year to compute the annual rate of interest. And suppose the supplier allows you to take the discount on the 15th,

or even the 20th day. Someday he may change his mind. You will be surprised how it will improve your credit rating when you take discounts.

Just as retail credit men have their credit bureau, so do mercantile men have theirs. Dun and Bradstreet, or several special agencies will give your creditors a fairly complete report on you, your business background, your financial worth and your shop. Credit interchange bureaus will report the experience of all your suppliers with you. If you are slow-pay, rest assured, they will all know about it in short order. Don't forget that once your credit reputation is damaged, it takes a long time to regain it. It is one of your most valuable assets. Take good care of it.

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TUBE DEPARTMENT
GENERAL  **ELECTRIC**
Schenectady 5, N. Y.

**MERCHANDISING
MANUAL**

#5



DIRECT MAIL



GENERAL  ELECTRIC
Electronic TUBES



INDEX

How to Build Your Mailing List	5
How to Record Your Mailing List	6
How to Maintain Your Mailing List	7
Addressing Methods	8
Keying for Quick Location of Names	9
Mechanical Addressing Methods—Letter Shops	9
Direct Mail Copy	10
How to Write Better Letters	13
Letters for the TV-Radio Service Dealer	14
Format and Production Economies	16
Business Reply Cards, Envelopes, Labels	17
Reproduction Methods for Letters	18
Envelope Styles	19
Postal Regulations	20

INTRODUCTION

Direct mail advertising is the least expensive way to get your service message into your customers' homes. There's no mystery about it—you don't have to be a literary expert to prepare effective direct mail pieces. As a matter of fact, manufacturers offer post cards, booklets, and self-mailers to service dealers which only require rubber-stamping with your name, address, and telephone number, addressing, and dropping in the mail.

The important thing is to start a *regular* direct mail program right away, no matter how simple. You'll see results immediately, in the form of increased service volume and profits.

Whether you use ready-made mailers or design your own, the basic direct mail methods outlined in this manual will work for you.



HOW TO BUILD YOUR MAILING LIST

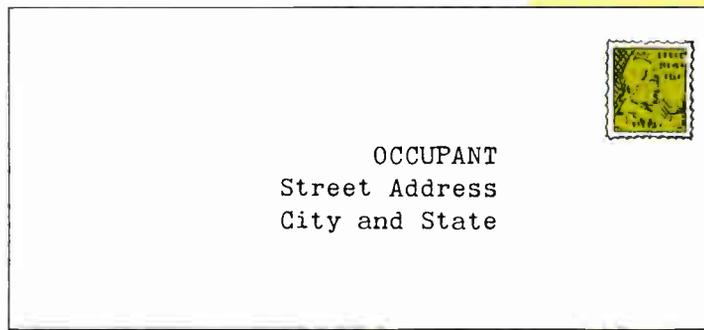
It's been proved that the most important *single* contributing factor to the success of any direct mail advertising program, is the mailing list.

When building your mailing list, remember that your local telephone book is a valuable source of names. Today almost every household has one or more radios. Many also have a television set. Of course, your telephone book doesn't tell you who has which, but you are fairly safe in assuming you'll reach a high percentage of actual prospects.

Select only those names in the territory you can economically cover with your service facilities. You may have to make that selection by telephone exchange, by town, or section of a city. In some of the larger cities you can rent "reverse telephone books" which list by street address rather than name.

There are many other sources of names, of course. Your own customer list is undoubtedly the best. If you sell TV and radio sets in addition to service, use the names of the people who have bought sets from you. If you don't sell sets, try to secure the lists of other retailers in town who do, but who do not maintain service departments.

If addresses are available but names are not, you can address your mailing piece as follows:



If you are making an "occupant" mailing to an apartment house, the apartment number must be added, which will take some prior canvassing on your part.

Pick up additional known prospects by asking your customers for names of friends who have radio or television sets. Make your request by mail—and make it easy for them to give you this information. Among the best formats to encourage answers are the double postal card, and a letter with a separate data sheet to be returned to you in your prepaid business reply envelope.

When you make a mailing to *these* new prospects, indicate on the mailing piece the name of the customer who told you about them. It amounts to a personal recommendation. There is no stronger sales tool.

Lists are also available from city, county and national records. Some of these are automobile registration lists, tax lists, license and permit lists, and automobile license lists.

You can rent lists from mailing list brokers, too (see your Classified Telephone Book). These rented names are usually, but not always, people who have bought from mail-order firms. The broker will give you the history of the list, and some information on use and results.

There are also list compilation firms who make up special lists and sell you names and addresses. These lists would be general, with no indication given of the prospect's interest in television or radio. (Again, see Your Classified Telephone Book.)

Radio and TV antennas signify known prospects. Hire someone to list the addresses of houses with antennas, and then send an "occupant" mailing to this list.

HOW TO RECORD YOUR MAILING LIST

Keep your mailing list in a card file, with each name and address on a separate card. Keep the cards in alphabetical order.

You may use cards of your own design but consider the G-E job ticket which was described in Part I of your G-E Accounting Course. (Fig. I) Your copy of a completed job ticket can easily become part of your card-record of people who

NAME		PHONE NO.		JOB NUMBER	
ADDRESS		CITY			
MAKE	MODEL NO.	TYPE	APR. NO.	SERVICE CONTRACT	FAIR USE TUBES IN WARRANTY
					<input type="checkbox"/> YES <input type="checkbox"/> NO
DEFECTS	PROMISED DEL.	REPAIRS MADE TO	TECHNICIAN NAME	LINE VOLTAGE	
CUSTOMER'S COMPLAINT		PARTS AND TUBES USED		CUSTOMER'S SIGNATURE	
ONAN				REPAIRS MADE	
LABOR CHARGE PER HOUR		MATERIAL CHARGE PER HOUR			
TOTAL CHARGE					
ADDITIONAL REPAIRS REQUIRED					
1. TUNING HEAD	8. DEFINITION	9. CONTROLS			
2. PICTURE TUBE	6. PICTURE SIZE	10. SOUND			
3. HORIZ. SYNC.	7. FOCUS	11. ANTENNA			
4. VERT. SYNC.	5. HUM	12.			

(Fig. I)

have called you for service. It gives you all-important information on the service history of your customer's set. Ask your G-E tube distributor for samples of this convenient, tested form. Names of prospects (people who own sets but have not yet called you for service) should be kept on similar cards, in the same file. Record changes of address, and add new names as they are received. Keeping your list up-to-date means it is always ready for use if you should want to mail a special offer, announcement, etc. Timing is often important.

HOW TO MAINTAIN YOUR MAILING LIST

Americans like to move around. The U.S. Post Office reported about 750,000 removals all over the country in one year. Mailing to the prospect who isn't there is like throwing money out the window. Keeping your mailing list up-to-date, corrected, ready for immediate action, will pay off.

If your list is small you will probably use 1st or 3d-class mail. The Post Office will return undeliverable 1st-class mail if your name and address are shown in the upper left corner of the mailing piece. If your prospect has moved and the Post Office has a record of the new address, all 1st-class mail is forwarded without further postage charges. However, this will not give you a record of the new address.

The only way you can check *undeliverable mail*, returned because the Post Office has no record of the new address, is to check against your local phone book. If this information isn't available, destroy your prospect card. If it is, correct the card immediately and mail a new piece.

There is a correction service offered by the Post Office which may interest you. If you have a valuable list that has not been used or corrected for some time—you can send it to the Postmaster in the community to which you are mailing. Send it to him on 3" x 5" cards. At a cost of one cent for each name he will check the names in his locality against the latest information in his possession. Minimum charge is 25¢ for each Post Office covered.

This same correction service is available to you if you use bulk 3d-class mail and want to "clean" your list in advance of use. And 3d-class mail users have a second correction service—through the use of Postal Form 3547, which reads



"FORM 3547 REQUESTED". This notice should be shown in the lower left corner of the addressing panel, with your name and address appearing in upper left. FORM 3547 reports to you on undeliverable mail at a cost of 2¢ for each notice. The mailing piece is returned to you with the reason for non-delivery noted. Or if the Post Office has a forwarding address, they destroy the mailing piece, and send you a card on which is noted the new address at the same cost of 2¢ for each notice. When this happens, correct your master mailing list immediately. (Incidentally, this service can prove helpful as an inexpensive way to locate unpaid or "skip" accounts.)

SOMETHING FOR NOTHING!

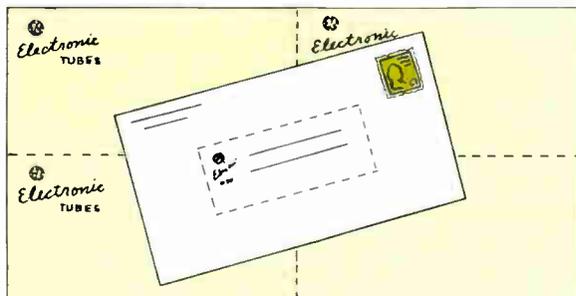
Using postal zones in addressing *does* speed delivery of your mail. The Postmaster in each of the 100-odd cities where the system is in effect will, without charge, check your mailing list on cards and insert correct zone numbers.

Your mailing list is the most important business asset you own. Remember it is really made up of people, not names. Handle it with care, since it is the foundation of your business.

ADDRESSING METHODS

With your mailing list in card form, we must now consider addressing methods which are fast and economical, and which require no special equipment or added investment.

You can, of course, address mailing pieces by hand or typewriter, but a better way is to use sheets of gummed, perforated labels which you can get from the G-E distributor who offered you your Service Management Manual.



(Fig. II)

Each sheet contains 33 labels and there are four sheets to each set, with carbon paper already interleaved (Fig. II). All you have to do is type names and addresses from your card file onto the 33 labels—without ever removing the sheet from the typewriter. When you finish, you will have enough labels for 4 mailings to your complete list. You simply tear the labels apart at the perforations, moisten, and apply to your mailing pieces.

With this method, addressing can be done in advance—during slow periods when your office help can take on this extra work. Pre-plan your mail program. Know what you will use in the coming months, and take advantage of spare time to save money.

"KEYING" LISTS FOR QUICK LOCATION OF NAMES

Here's a way to make it easy to locate addresses to be corrected on your carbon copies as removal notices and undeliverables are received. Number the label sheets consecutively. Each of the 33 labels on a sheet should carry the same number (of course, all 4 copies of your list will carry that number). A good place for it is on the same line with the city and state.

Assume your list consists of 660 names. Since there are 33 addresses on a sheet, you will have 20 sheets. Your key numbers will run from 1 thru 20, and your labels will look like this:

	Personal Name	
	Street Address	
	City and State	20

If a mailer with this notation is returned, key number 20 means you will quickly find the address to be corrected on page 20 of your carbon copies.

MECHANICAL ADDRESSING EQUIPMENT—LETTER SHOPS

If your direct mail advertising program calls for use of a large list ten or more times during the year, you will want to consider buying a mechanical addressing machine, or turning your work over to a professional letter shop.

For small lists, there are hand-operated machines which prepare a "master" roll of addresses. You typewrite on special master paper, and the master can be used to make up to 100 copies of the list. Machines for reproduction are easy to use, and will address tags, cards, labels, envelopes, or self-mailers. No metal plates or stencils are used. The master rolls take up little storage space, and you can reuse as needed. Your local stationer can recommend several types of simple addressing equipment. Prices range from \$11 to \$55 (approx.) plus supplies.

You may want to turn your list over to a letter shop, which will put it on stencils, and handle the entire addressing and mailing procedures. But before making any such decision it would be wise to check the costs of owning your own addressing equipment with your local stationer. Get the story of initial costs,



upkeep, service guarantees—add your own labor and overhead costs. Then talk to local letter shops and compare. Usually, if your list is small or moderate in size you will find the letter shop economical, and you'll have fewer headaches.

There are many office and mailing room aids to make the job of mailing easier. These are usually available at your stationers. Examples of these are stamp and envelope moisteners; and hand-operated stamp affixers which can also be used to apply blank gummed labels to seal mailing pieces. It will cut to size, moisten, and apply in one fast motion.

DIRECT MAIL COPY

Direct mail advertising includes postal cards, mailing cards, over-size cards, letters, folders, circulars, catalogs... in fact, it is any printed matter sent through the mails with the purpose of selling your services to your prospects.

There are simple, proved, successful formulas for writing good direct mail copy. Here are some important ones you will want to remember:

In Merchandising Manual #3, on the subject of advertising, we gave many recommendations about the preparation of good advertising copy. Many of these recommendations also apply to direct mail copy. Refer to "Steps Toward Good Advertising," "Ask the Reader to Do Something," "Tell Him Who You Are," and "Decide How Many People You Want to Reach."

Watch bad "conversation" habits. For example, humorous phrases which sound fine when you are talking to a prospect because you give them "flavor" with the sound of your voice, might well lose all meaning in print.

Try always to use the "you" approach—not the "we". Don't write about yourself unless you can interpret your message into an advantage for your customer. For example, don't say "Our technicians average ten years experience and have serviced all makes, all models, etc." Twist this to read "Your TV will receive the most expert attention from service technicians who average ten years in servicing, etc." Your customer or prospect isn't interested in reading about you—except as you benefit him. Talk about him.

Many a good sales point has been lost in verbiage. Eliminate those extra, useless words. As for using long "five dollar" words, they probably won't be understood, and your prospect will not take the time to try and figure out what you *might* mean.

Write simply, in a friendly manner. Your sentences should average only about a dozen words. Try this rule—you will soon be writing simple, direct copy that is easy to read and understand.

But before you can write good direct mail advertising copy you must know what makes your prospect buy what you have to offer.

Your prospect wants to know . . .

How your service benefits him

What makes your service better

How it will save him money

How much it costs

How he can reach you fast when you're needed



There are basic facts about you and your organization which will be the foundation of your direct mail advertising copy. List them now.

List all the reasons you can think of why your service is better than your competitors'.

How long have you been in business? List the number of years and anything interesting in the history of it.

Are you, or any of your associates generally well-known in the community? Featuring a known personality, or building one, lends a human touch to your advertising.

List the brand names you feature. Ride along on the benefits of the manufacturers' national advertising.

List all facts about your special services—about speed of service—about technical know-how, guarantees, etc.

List seasonal features, special offers.

If you feature a credit policy, list it.

With these basic facts before you, the next step is to

**PLAN AND ORGANIZE
WHAT YOU WANT TO SAY**

Your opening words are probably the most important in your message. They must be thought-provoking. They will either persuade your prospect to read on, or he will lose interest and you will lose your message to his wastebasket.

Since personalization (filling in name, address and salutation) is costly, many users of direct mail feature headlines instead. These can be your opening words, for example:

KEEP THAT PICTURE BRIGHT!
The best entertainment is
right in your television set.
That set must work at it's best
if you and your family
want to enjoy its
million dollar talent!

or

KEEP EYE APPEAL
IN YOUR TV PICTURE!
You'll see television at
its best when we make all
installations, repairs
or adjustments.

Your opening words have earned your prospect's attention. Now get into your sales story, writing copy that is direct, says what it means, means what it says. Appeal to your reader's human reactions, of course. Stir his buying impulses with enthusiastic copy, but steer clear of extravagant or boastful claims.

Your closing copy must move the reader to action! Either he will immediately place your mailing piece where it can be quickly found in case of trouble, or he'll pick up the telephone and call for service. Feature your telephone number, make it easy to call.

Here are other tricks that will spark up your printed copy.

Type talks! On printed matter you have a wide choice of type faces to emphasize important points. Use a succession of brief, snappy phrases. Feature important benefits, or sales points, by position of the sentence or paragraph. Indent, center, or use a postscript. Your words will stand out and get extra attention. Underline important words, but don't overdo emphasis. Use too much of it and the same thing will happen to you that happened to the boy who cried "wolf" too often. After a while no one paid any attention to him.

Repetition is another help. It is one of the most successful forms of advertising. You don't have to sound like a parrot—don't repeat the same words all through your copy—but do repeat the carefully thought-out *theme*. It has been said that one picture is worth ten thousand words. Pictures, if they tie in with copy, add interest, get attention.

Develop a mailing personality. No one likes dull people, yet many letters and mailing pieces give that impression. Colloquialisms properly used will flavor your copy and often supply the right touch of friendliness and appeal.

A good vocabulary helps. But that doesn't mean long words. They don't impress, rather they make your sales message confusing, stiff and stuffy! There are many good books on copy, design, production, etc. Here we have just highlighted some do's and don'ts which add up to organizing and planning your copy and sales approach; keeping your copy friendly and making it easy to read and understand; and setting up the physical layout so your "benefits" stand out to move your prospect to action.



G-E mailing pieces, featured in a catalog available through your G-E distributor, are examples of the friendly, direct approach. Designed to attract the eye, they get attention and put across your sales message quickly and clearly. They follow the basic rules of successful direct mail advertising and give you a pattern to follow.

HOW TO WRITE BETTER LETTERS

Writing good letters is as easy as talking. Your letter is a substitute for a personal call. Use the same short, friendly words that are part of your everyday conversation. Don't sound old-fashioned, flashy or flowery. In conversation you would hardly say "assuring you of prompt attention" or "your request noted"—yet—take a second look at your morning's mail. It is amazing how many people sound as though they were still living in the celluloid collar era.

In the section on Direct Mail Copy we discussed many do's and don'ts for mail advertising copy that certainly apply to letters. Letters are, after all, one of the most popular forms of direct mail advertising.

Here we are principally concerned with daily mail, form letters, etc. There are many good books on letter writing. They can help, but perhaps one of the easiest ways to cure yourself of bad writing habits is to read your own letters aloud.

Listen—if they don't sound natural, you'd better do a rewrite job.

There are many formulas for checking letters to insure your doing your best. One of the most familiar is a four letter word, AIDA . . .

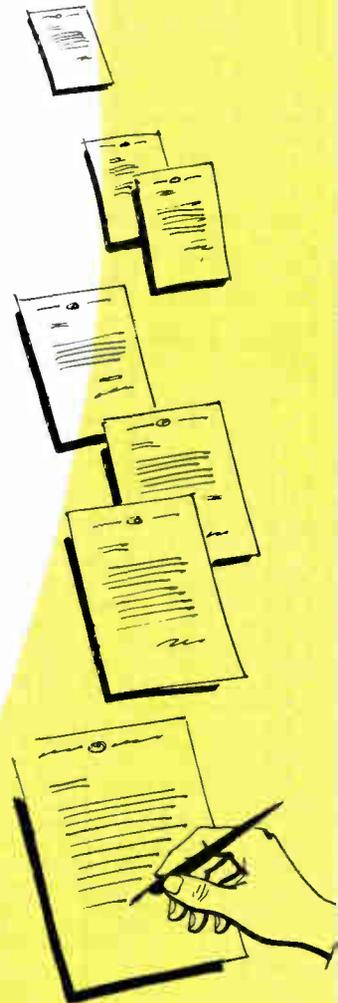
- A**—your letter must attract **ATTENTION**
- I**—your letter must create **INTEREST** in your service or merchandise
- D**—your letter must create **DESIRE** for your service or merchandise
- A**—your letter must demand **ACTION**.

There have been many arguments both pro and con on the subject of the long letter vs the short. Your letter should be long enough to tell your story, but remember that your sales point can be lost if you use a lot of unnecessary words.

Sincerity is important. No matter what you say, how bona fide are your claims, if your letter doesn't have the "ring" of sincerity, it will not sell. Incidentally—the postscript on a letter can put across a most important sales idea or customer benefit. The position of a P.S. is eye-catching and sure of readership.

If the same situation repeats itself constantly in your business—and a letter must be written about it—develop a carefully thought out *form* letter which can be processed and filled in with name and address later. This is a time- and labor-saving idea.

Standard form letters can be developed to handle collections, or reactivate old customers. Form letters are processed letters and they can be designed to do many jobs well.



LETTERS FOR THE TV-RADIO SERVICE DEALER

In addition to sales promotion, there are many uses for good letters in your business. Here are just a few, to stimulate your thinking.

Acknowledging first order

Adjustment Letters

Follow-up, thank-you

letter after job has
been completed

Locating prospects

Need for periodic replacements

Seasonal selling

Special announcements, offers

**Thanks for promptness to a
prompt-paying customer**

Announcing new products or services

Answering complaints

Collection letters

Explaining substitutions

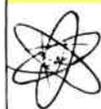
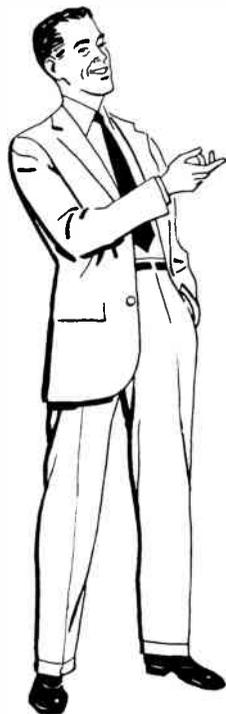
Follow-up to inactive customers

Invitation to open account

**Invitation to come in and see new
product**

New Year's greeting

Christmas greeting



MODERN TV SERVICE

100 MAIN STREET
ALBANY, N. Y.

AUTHORIZED DEALER
GENERAL ELECTRIC
Electronic TUBES

Mr. John Jones
1411 Cherry Lane
Brookline, Mass.

December 1, 1953

THANK YOU, Mr. Jones

for letting us handle your recent call for service. Most of us like to feel there is a spirit of friendliness in every business transaction, and we'd like to have you feel that you now have a friend in the TV service business. We'll do all we can to merit your friendship.

CALL AGAIN

Won't you consider this an invitation to call us in - or come in and visit our shop . . . whenever you have a radio or television problem on which we can help. Your telephone call to PHone 0-0000 will bring one of our trained technicians - promptly.

MODERN TV SERVICE
(Personal Name)

NOTE: This can be a processed letter to be filled in with just date, name, address and salutation or date and salutation only!

 MODERN TV SERVICE
100 MAIN STREET
ALBANY, N. Y.

AUTHORIZED DEALER
GENERAL ELECTRIC
Electronic TUBES

December 1, 1953

Mr. John Jones
1411 Cherry Lane
Brookline, Mass.

Dear Customer:

It was a pleasure to handle your recent complaint and to be able to do it without cost to you.

Any difficulty caused by the failure of a tube or part within the warranty period . . . or mistake made by one of our technicians (it does happen now and then) will be handled quickly, efficiently and cheerfully.

We mean to do everything we can to give you maximum pleasure from your television set. TV, today, is all the more important because it means entertainment for the whole family and is part of our scheme of social living.

Thank you for calling on us for service.

MODERN TV SERVICE
(Personal Name)

 MODERN TV SERVICE
100 MAIN STREET
ALBANY, N. Y.

AUTHORIZED DEALER
GENERAL ELECTRIC
Electronic TUBES

December 1, 1953

Mr. John Jones
1411 Cherry Lane
Brookline, Mass.

CHARGE IT . . . Mr. Jones:

and "recharge" your television set if it's in need of expert repairs. No need to wait - to do without the exciting entertainment of today's up-to-the-minute news, views, shows, stories.

You will find your charge account with us a great convenience. It means that "budget-it-is" (the pain of stand the strain) won't cause you to lose a moment's TV pleasure. You can pay for service, parts, or accessories with one check at the end of the month, instead of making individual payments.

It's an easy way to keep track of where your money goes. We think you are in for a pleasant surprise at the end of the year - when you add up and find how little it costs to use an experienced service dealer.

It's simple. Just fill out this application card, mail today, we'll consider it a privilege to add your name to our list of satisfied charge customers.

MODERN TV SERVICE
(Personal Name)

 MODERN TV SERVICE
100 MAIN STREET
ALBANY, N. Y.

AUTHORIZED DEALER
GENERAL ELECTRIC
Electronic TUBES

December 1, 1953

Mr. John Jones
1411 Cherry Lane
Brookline, Mass.

I'm worried . . .

You can't have just forgotten us and your bill - for service when you needed it!

I know how much pleasure your TV set gives you - each day brings new programs and new heights in entertainment.

Because we recognize this - we spare no effort to make our service the very best. But, if something is wrong, tell me about it.

If everything is all right then won't you send your check today.

MODERN TV SERVICE
(Personal Name)

NOTE: Any situation which repeats constantly and which can be best handled by a letter - can be handled by a carefully written form letter, needing only fill-in.

 MODERN TV SERVICE
100 MAIN STREET
ALBANY, N. Y.

AUTHORIZED DEALER
GENERAL ELECTRIC
Electronic TUBES

December 1, 1953

Mr. John Jones
1411 Cherry Lane
Brookline, Mass.

HAD YOUR SUMMER CHECK-UP?

The time is now, when you'll be outdoors a great deal, when the summer slump in indoor TV entertainment sets in. We believe you'll find it easy NOW to spare your television set for the brief time it will take us to give it a complete summer check-up, to assure fine reception of the wonderful Fall shows

For this month only we are featuring an 8-point check-up which will put your set in good-as-new condition for only \$

It's the best prescription we know of for prolonging the life of your TV set, for uninterrupted pleasure. Call 0-0000 today, and we'll make arrangements to pick up your set when you'll miss it least.

MODERN TV SERVICE
(Personal Name)

FORMAT AND PRODUCTION ECONOMIES

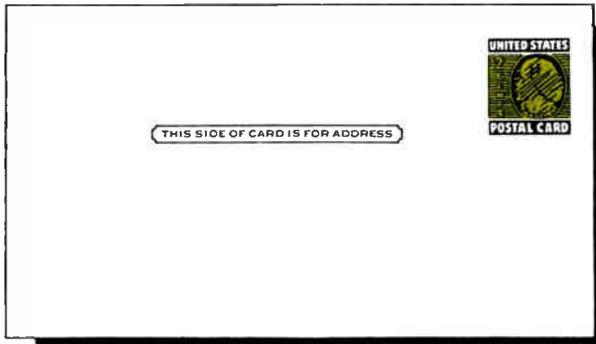
A good salesman makes a good impression at first glance. He is neatly dressed, his clothes fit his personality, he calls you by your right name, and he presents his sales story quickly and completely.

Your mailing piece is your salesman. It must have all the virtues of the personal salesman. Selection of the proper reproduction method is important. So is the quality of production, correct addressing, careful typewriting, the general appearance of your letterhead, card, envelope. All contribute to that mighty important first impression. Work with your stationery and printing suppliers. Discuss your objective with them—they will recommend the best choice to fit your budget.

Design. If you plan to use illustrations, tell the artist, in advance, what the budget is for the job. Get him to make pencil roughs for approval before going into finished art. Be sure he consults with your printer and doesn't use techniques that mean extra printing costs. Use photographs if possible, rather than original art. Stock photos are available (see your Classified Telephone Book) which cover almost every situation, but if you need specially posed photographs, these too can be more economical than original art. Remember that simplicity is effective and economical.

Color. Using a color on letters or folders generally adds interest, attracts attention. Whether or not you use color depends largely upon your budget. Color does give you an opportunity for change of pace, always a profitable idea in direct mail. If your prospect becomes too accustomed to one format, one color combination, he may not give your messages the close attention they deserve. Change of pace, through color, helps overcome this.

Cards. Private mailing cards, postal cards and oversize cards are formats economical to produce and mail and which offer a *plus* advantage—readership. Hardly anyone can resist reading a message on an open card. Here are some types of cards you might want to consider using.



Postal Cards – government printed cards measuring $3\frac{1}{4}$ " x $5\frac{1}{2}$ ". They go 1st-class.

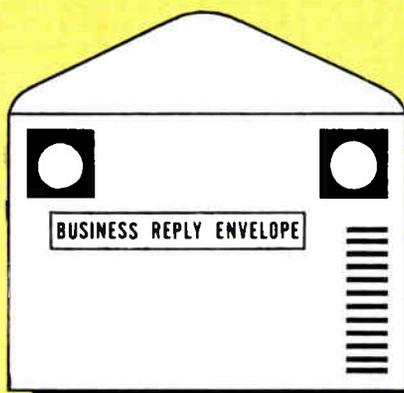
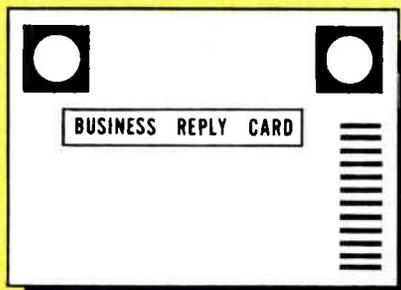
Post Cards—privately-printed cards measuring from $2\frac{3}{4}$ " x 4" to $3\frac{9}{16}$ " x $5\frac{9}{16}$ ", with or without the words Post Card shown. Your printed messages go 1st-class, postage 2¢ each. To mail as 3d-class for $1\frac{1}{2}$ ¢ each, omit the words Post Card. (bulk mail)

Oversize Cards—can be any size from $2\frac{3}{4}$ " x 4" to 9" x 12", mailed 3d-class at minimum of $1\frac{1}{2}$ ¢ each (bulk mail).

Cards are really short letters. They are ideal for teaser ideas, single messages, quick reminders. The oversize card allows plenty of room to sell service. Cards can be reproduced by every printing method . . . mimeographing, multigraphing, lithographing, letterpress. etc. They can be simple typeset or brightened with illustrations.

BUSINESS REPLY CARDS, ENVELOPES, LABELS

Use any one of these three formats to make it easy for your prospects to call you for service; or to give you names of other prospects. This is one of the most popular and successful techniques used to increase answers in direct mail advertising. You pay regular 1st-class postage plus 1 cent. Permits to distribute them may be obtained by presenting an application at the Classification Section of your Post Office, with a proof showing the printing to appear on the front or address side. Ask the Postmaster for a copy of this ruling, and the approved formats.



It has been pointed out before how important it is to check with your local Post Master during the planning stages, when creating special mailing pieces. Get him to approve them in the rough stage, since there are restrictions according to Postal Regulations. Here are *some* of them, affecting format.

“Space shall be left on the address side of all mail and sufficient for a legible address and for all directions permissible thereon, for postage stamps, postmarking, rating and any words necessary for forwarding and return. Not less than 3½” of clear space shall be left for such purposes at the right end of the address side of all envelopes, folders or wrappers of mail matter, except in the case of large envelopes, etc., which have a clear rectangular space of not less than 5” x 3” for this purpose. Postcards mailed 1st class for 2¢ can’t measure more than 3½” x 5½” or less than 2¾” x 4”.

Oversize cards in quantities of over 200 are mailed as 3d-class mail at 14¢ per lb. (minimum 1½¢ each). Sort, zone, etc., as with all types of 3d-class mail.

Know your Postal Regulations—you’ll save time, money, headaches.

For more complete information on postal regulations and rates, see page 20.

One last word on formats. A letter plus business reply card (or envelope or label) and, if necessary, a folder describing your services, is said to be the most successful type of direct mail “package”.



REPRODUCTION METHODS FOR LETTERS

Your letter shop or printer will advise you on the best method of reproduction to be used for your particular job—however, the following information will give you a basic understanding of the different methods.

Individually-Typed. Basically this method is used for sending a letter or message from one businessman to another, but it can also be used to send limited quantities of the same letter to a group. Certainly it should bring in the highest percentage of replies, or get highest interest rating, for this is personal letter-writing, and it gets personal attention. Always hand sign letters yourself. If someone else *must* do it, be sure the signature is done carefully.

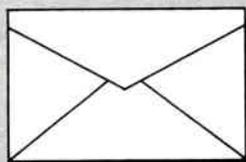
Automatically-Typed. If you must send out 25, 50 or even 100 copies of the same letter and your typist cannot produce them promptly, many letter shops have automatic typewriters and can handle the complete job for you.

These letters too should be hand signed. They look just like individually typewritten letters.

Multigraphed Letters. Your letter is set up from typewriter-face type and printed through an inked ribbon . . . the impression of the type against your letterhead simulates, in appearance, the typewritten letter. Later fill-ins of date, name, address and salutation can be made. Today many people use a one-line fill in of just the personal name or salutation, or on quantity mailings the personalization is often eliminated and headlines substituted. There are many other reproduction methods of course, but these will suffice for most TV-radio service businesses.

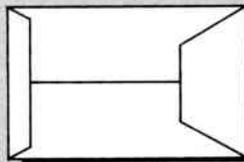
ENVELOPE STYLES

Some styles of envelopes that may be used for mailing printed messages are illustrated in Fig. III.



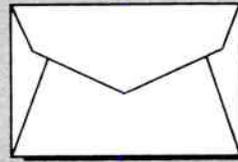
OPEN SIDE ENVELOPE

Flap may be sealed for first class mailing or tucked in for third class mailing.



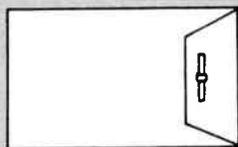
OPEN END ENVELOPE

Flap may be sealed for first class mailing or tucked in for third class mailing.



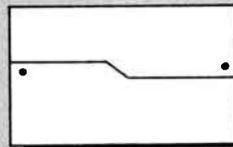
PENNYSAVER

Flap is sealed but one end is unsealed to permit third class mailing.



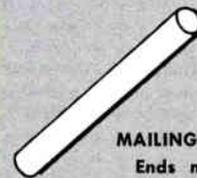
CLASP ENVELOPE

Flap is closed with metal clasp for third class mailing.



MAILING CARTON

Flaps may be fastened or sealed.* If package weighs less than 8 ounces it may be mailed third class. If it weighs over 8 ounces it must mail fourth class.



MAILING TUBE

Ends may be sealed or unsealed.*

If package weighs less than 8 ounces it may be mailed third class. If it weighs over 8 ounces it must mail fourth class

*If sealed the package must be labeled to indicate that it may be opened for postal inspection—otherwise first class rates will apply.

If addressing is to be done on the envelope—use regular full-face envelope.
If addressing is to be done on an enclosure—use open window envelope.
If enclosing is to be done by machine—use open side seal flap.
If enclosing is to be done by hand—use open side or open end seal flap for 1st-class mail. Use regular postage saver or spot-of-gum postage saver, or tuck-in ungummed flap for 3d-class mail. For combination of 1st and 3d class use two compartment or duplex envelope.

POSTAL REGULATIONS

FIRST CLASS MAIL

First class mail (1st-class) includes letters, postal cards, (private mailing cards), business-reply cards and envelopes, all matter wholly or partly in writing, whether sealed or unsealed. Matter sealed or otherwise closed against inspection is also of 1st-class. Remember that any kind of automatic or electrically typewritten letter, carbon or letterpress copy, even though reproduced in quantity, must be paid for at 1st-class postage rates.

Rates are 3¢ for 1 oz. and any fraction thereof. Only 1st-class mail is returned or forwarded without extra charge when addressee has moved, provided the sender's name and address are shown in the upper left corner.

Multigraphed or mimeographed letters with a fill-in in the body of the letter must go as 1st-class mail. (Under 3d-class regulations it is permitted only to include name, address, salutation and signature.)

Private mailing cards or postcards (not larger than 3-9/16" x 5-9/16" nor smaller than 2 3/4" x 4") go through the mails at 2¢ each.

THIRD CLASS MAIL

This consists of printed circulars, books, catalogs, merchandise, miscellaneous printed matter and all mailable matter (except 1st and 2d class mail) weighing 8 ozs. or less. Bulk mailing of advertising falls into this group, which allows lowest postage rates. Multigraphed, mimeographed or other productions of typewriting can be mailed 3d-class when they bear no writing (hand or typewritten fill-in) other than name, address, salutation and signature—and when 20 or more identical pieces are mailed at the same time.

REGULAR OR STRAIGHT THIRD CLASS MAIL

This is advisable if you have no facilities for zoning, sorting, etc., as required by the Post Office in order to take the lowest possible rate. You prepare straight 3d-class mail for the Post Office as you do 1st-class mail. They handle the details, and the rate for regular or straight 3d-class matter mailed in the U.S. is 2 1/2¢ for the first 2 ozs.—1¢ for each additional oz. or fraction thereof up to and including 8 ozs. There is one exception to this rate. Catalogs and books of 24 pages, of which at least 22 are printed, take a special rate of 2¢ for the 1st 2 ozs. and 1 1/2¢ for each additional 2 oz. or fraction thereof.

Postage may be applied in the following ways: You may use ordinary postage stamps or government stamped envelopes. To use precancelled stamps or metered mail, permits (no charge) are required. See your Postmaster. For a printed indicia there is a fee of \$10 required by the Post Office on regular or straight 3d-class mail.

SEALING OF THIRD CLASS MAIL

Circulars, folders, form letters and other printed matter sent as 3d-class mail must be readily accessible for postal inspection. If enclosed in envelopes, the envelopes must be left unsealed and the back flap tucked inside. However, many stationery stores feature a special form called the "pennysaver envelope". Only one end of the flap is gummed and can be sealed like ordinary envelopes. Since the other end is ungummed the envelope can be easily opened for postal inspection.

ENCLOSURES IN THIRD CLASS MAIL

There are no restrictions (except those applying to books and catalogs at special rates) as to the number of enclosures in 3d-class matter, but the enclosures must not be of a personal nature.

Special Note: We have indicated that straight or regular 3d-class mail has no restrictions upon it regarding zoning, sorting, etc. The exception is when it is sent in large quantities or mailed under permit without stamps affixed or with precancelled stamps. It may then be necessary, at the request of your Postmaster, to separate it by post offices and states only.

BULK 3D CLASS MAIL SEC. 34.66 P. L. & R.

The most commonly used kind of 3d-class mail is called "bulk mailing". Under Sec. 34.66 P. L. & R. such matter can be mailed at a cost of 14¢ per pound, a minimum cost of 1½¢ each piece, provided that not less than 200 separately-addressed, identical pieces, or 20 pounds (each piece weighing not over 8 ozs.) are mailed at the same time.

Books and catalogs of 24 or more pages, of which 22 must be printed, are mailed at a special rate of 10¢ a pound with a minimum of 1½¢ each, when pieces do not exceed 8 ozs. in weight.

To earn the right to this lowest rate of postage the following regulations must be observed:

- A—Permit to mail under Sec. 34.66 P. L. & R. must be secured from the Post Office at which the mailing is to be made—the cost is \$10.
- B—There must be 200 or more identical pieces (or 20 lbs.) mailed at the one time.
- C—Mail must be separated into states and if there are 10 or more pieces for a Post Office, further separation must be made for such Post Offices.
- D—Each group must be tied in bundles and marked with the names of the Post Office or State to which addressed.
- E—When there are less than 10 pieces for a Post Office it is only required that they be tied in State bundles. When less than 10 for a State, several States may be put into one bundle. These must be labelled too.
- F—Each mailing must be accompanied by a statement of mailing—a separate one for precancelled, metered or non-metered mail.



G—Mailings can be made against an advance deposit of postage or precancelled stamps, government stamped envelopes or postage-meter stamps.

Ordinary postage stamps *cannot* be used for bulk 3d-class mailing. Following are the accepted methods of applying postage:

Precancelled Stamps. These may be used for bulk mailings. Apply at the Post Office for permit to use them. There is no charge for *this* permit. The inscription Sec. 34.66 P. L. & R. must appear in the upper right hand corner of your mailing piece. It may be printed or rubber stamped.

Postage Meter Indicia. This is applied by automatic Postage Meter machines, made by private manufacturers and not supplied by the Post Office. These machines are bought but the meters are rented from the manufacturer. This method is largely used by business firms who need the equipment for daily outgoing mail and packages too. Also by volume mailers who feel that the metered mail looks more “personal” than does the printed indicia. The conditions of using postage meter indicia for bulk mailings are the same as for precancelled stamps except that the notation Sec. 34.66 P. L. & R. can appear right in the metered design. It does not have to be printed separately.

Printed Indicia. For getting maximum advantage of the pound rate in bulk mailings use printed indicia. It bears no denomination but must include Sec. 34.66 P. L. & R. and a permit number. The permit (and design) for a printed indicia may be obtained from the Post Office. There is a fee of \$10 for the issuance of such a permit . . . this is in addition to the \$10 bulk mailing fee. You pay this fee **only once**. A printed indicia may be used on mailings for which the minimum charge of 1½¢ per piece applies and on which postage is paid by the pound.

Ask your local Postmaster for copies of the rulings that apply to 3d-class bulk mailings. It is suggested you submit any specially-designed mailing pieces of your own to the Post Office (Classification Division) for approval, while they are still in the planning stage.

The Post Office requires that pieces or packages of 3d-class mail matter sent at the regular or bulk 3d-class rate, when of such size or form as to prevent ready facing and tying in bundles and requiring individual distribution throughout, are subject to a minimum charge of 3¢ each. This minimum charge applies to mail exceeding 9” in width or 12” in length or less than 2¾” in width and 4” in length. Also to round, cylindrical or other irregularly shaped pieces or packages, and those whose contents form a hump to prevent stacking or tying in packages, and to articles in bags or which are addressed by tags.

FOURTH CLASS MAIL

or parcel post, covers all matter exceeding 8 ozs. in weight. Merchandise, books, printed matter and all otherailable matter not suitable for 1st, 2d, or 3d-class mail. Largely these regulations will apply to packages, as far as service dealers are concerned . . . they will be needed infrequently. But ask your local Postmaster for copies of these rulings too.

KNOW YOUR POSTAL REGULATIONS. YOU’LL SAVE TIME, MONEY, HEADACHES!



TUBE DEPARTMENT

GENERAL  **ELECTRIC**

Schenectady 5, N. Y.

WHY ADVERTISE WHY PROMOTE



GENERAL  ELECTRIC
Electronic TUBES

T

here are a few basic reasons why you, as the operator of a radio-television service business, should promote that business. Generally speaking they fall under the following headings:

1. Identification of yourself and the type of business you operate.
2. Development of new customers for increased business.
3. Stimulation of business during slack periods.
4. Introduction of new products and/or new services.

Too often promotion and advertising are considered a luxury and consequently are the first elements of expense to be reduced or canceled in the event of tight budget situations. This should never be the case. In many instances the greatest expenditure should be during periods when business is slow.

TO ADVERTISE OR NOT TO ADVERTISE

To decide whether or not you should enter into an advertising and sales promotion plan and what type it should be is almost as basic as deciding whether or not you should take on additional help or expand your service facilities. You must first make up your mind what you wish to accomplish with a promotional program and then select the most inexpensive, yet most effective means of doing it.

All of us associated with retail business—whether it be merchandising or servicing—have seen the statistics on the number of failures per year of small businesses. This is a staggering figure and one which serves to caution those already in the business to maintain sound business practices as well as to forewarn those who want to “get into business for themselves.” Alarming as these figures may be, you can certainly take one consolation from them—that you represent the *successful* small businessmen.

THE "PROMOTED" BUSINESS IS THE SUCCESSFUL BUSINESS

In the advertising and promotional areas there are surprising statistics available also—figures which report on those businesses which did not aggressively promote their operations. A surprising number of them have been forced to reduce their staffs and services and in many cases have been obliged to close their doors completely. The statistics apply to large national operations as well as to small local businessmen. The Gold Dust Twins are a famous example of a product that "died" when the manufacturer ceased his advertising program, and for every example of this sort there are hundreds of others—of products which never got started because an adequate promotional program was never authorized.

Perhaps the most convincing argument in favor of promotion and advertising is to examine the businesses in your own town or locality. In almost every instance, the company that is doing the largest amount of business is the one who has consistently followed an aggressive sales program and has included in its budget a consistent and well planned advertising and promotional program.

BUT SERVICE BUSINESS IS DIFFERENT

Yes, service business is different—at least to this extent. You can't promote service calls where sets are in perfect working condition. Unlike the merchandising business, you men in the service business are obliged to wait until something goes wrong before you can develop a customer. However, you can get a *greater* share of the service business in your locality. You can make radio and television set owners conscious of the quality of their reception. You can remind them of the inconvenience of being without the use of their radio and television sets. You can build good will for yourself and your operation on a long-range basis so that when service is required, your name is the first one to come to mind.



YOUR BUSINESS IS GROWING—BUT DON'T LET IT FOOL YOU

Compared with other service industries of its size, local radio and television servicing operations have done little to promote their growth. This is not surprising since the industry as a whole has grown so fast that, in many instances, it has been impossible to keep up with the demand for service.

You, as an individual business man, have found that your operations have expanded, your business has increased, and the demands upon your time and service have been following an ascending curve for the past several years. This situation might easily lead you to believe that it is unnecessary to promote or advertise your business. You're gaining position—why spend money to get more.

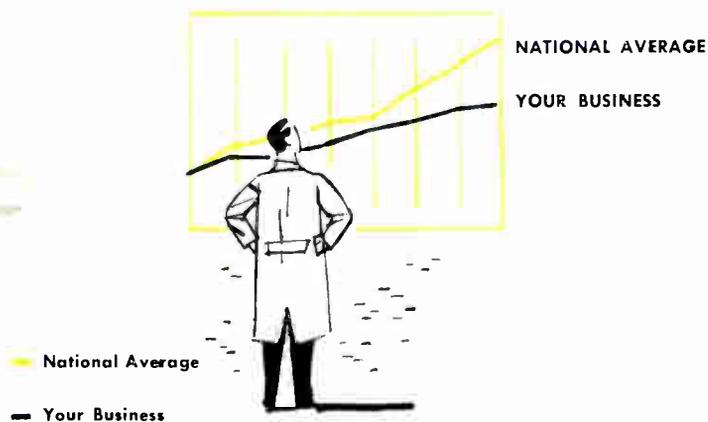
Don't let this increase in business fool you. Because the industry as a whole has expanded and because there have been more demands for service than can be filled by the number of technicians available, your business could not help but increase. However, this does not necessarily mean that you are retaining your share of the business in your own locality. Nor does it mean that when the supply of technicians and the demand for service approaches a balance point, you will necessarily get your share of the business. If you are to be the leading service dealer in your area, you are not going to be satisfied with merely retaining the same *share* of service business—with continuing to get the same percentage of the available service business in your locality.

Consequently to increase your position, you must do more than your competitors and you must do it first. To get an idea of what the competitive situation in the radio-TV service industry may be within the next five to ten years, look at the other established businesses in your town; hardware stores, barber shop, plumbers and electricians, milkmen, laundry routes, service stations. In these established lines—the relationship between one hardware store and another—usually depends on how aggressively the owner has promoted his business over the past few years. The radio and television service business will follow a similar pattern.

THE TIME TO DECIDE ON PROMOTION OF YOUR BUSINESS IS NOW

Review for yourself the principal reasons why you should advertise and promote. Ask yourself the questions that follow and then decide whether or not you should promote your own business.

Remember, that although you may be satisfied with your own operation at the present time, it may not provide the same income five years from now unless you retain a leadership position in your locality.



IDENTIFICATION OF YOURSELF AND THE TYPE OF BUSINESS YOU OPERATE

Do the people in your locality fully understand the type of business you run?

Do they know they can have their present set modified or improved by you?

Do they know that you can help them plan and install built-in equipment?

Is your name and your business the first one that comes to mind when service is needed?

Do they know *how* and *where* to get in touch with you?

Are you available for emergency calls in off-hours and do your customers know this?

DEVELOPMENT OF NEW CUSTOMERS FOR INCREASED BUSINESS

Are you consistently trying to reach new people or are you depending upon old customers to supply your business?

Are you doing anything to develop customers in other areas—high-fidelity music hobbyists, industrial electronic equipment customers, two-way radio operators, taxicabs, farmers, police and fire systems, transmitter operators, etc.?

Are you opening the door to service operations in neighboring localities?

STIMULATION OF BUSINESS DURING SLACK PERIODS

Are you doing anything to level your business load?

Are you looking for companion services or production that will fill in the slack periods and help you to maintain permanency of employment for your people?

Are you suggesting to set owners in your locality that service is more prompt and more thorough during slack periods—that it would pay them to arrange for set checkups during the summer months?

INTRODUCTION OF NEW PRODUCTS AND/OR NEW SERVICES

Are you telling your locality about new equipment devices and accessories which can improve reception?

Are you acquainting your customers with new personnel?

Are you advising potential customers of the specialized talents of your present personnel?

Are you advertising new facilities, test equipment, and other engineering devices which improve the quality of your work?

Are you announcing expansion of the type of service that you are prepared to handle?



TUBE DEPARTMENT,

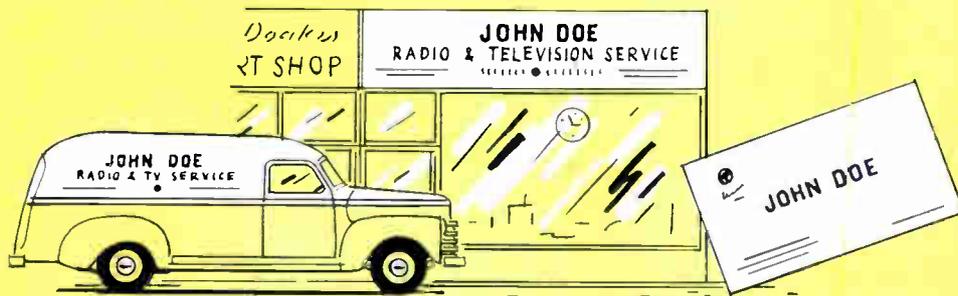
GENERAL  **ELECTRIC**

SCHENECTADY 5, N. Y.

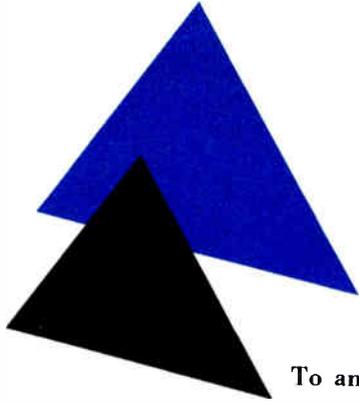
MERCHANDISING
MANUAL

#2

IDENTIFICATION



GENERAL  ELECTRIC
Electronic TUBES



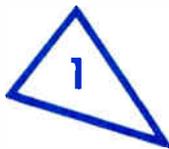
IDENTIFICATION

To any merchant the question of identifying himself with the product or service the customer wants or needs is of primary importance.

Where a service operation is combined with radio and television set sales, it has the advantage of being identified, to the purchasers of these sets, as a primary source of service on the make or makes sold. However, the independent service technician must rely on "prestige" identification, which means he must:

1. Identify himself, in the mind of the prospective customer, with the impression of technical competence and efficiency. Creation of this impression should be considered in every aspect of his business—store appearance, personal appearance, advertising, equipment, etc.

2. Identify himself, as an Authorized Dealer, with one or more of the nationally-advertised brands of tubes or components. As the old saw says, "A man is known by the company he keeps" and by associating himself with brands whose products have a national reputation for reliability, the serviceman helps establish himself, in the minds of his prospective customers, as a reliable, trustworthy operator.



IDENTIFICATION MEDIA

THE STORE—

The people in your immediate neighborhood, *your primary market*, will probably receive their first impression of you from your store or shop. It is, therefore, particularly important that your storefront not only help to create the impression of competence and efficiency but strongly state that this is a place—the place—to come for radio and television service.

Remember that, aside from special check-up offers, your service is something that can't be sold unless your customer *needs* it. Your problem then, is to keep your name, service message, and location constantly before them so that they will think of you first when the need arises.

Creating a storefront which will meet these requirements is by no means as difficult or as expensive as you might believe. Aside from soap and water and a little paint almost everything you need is available to you through your parts distributor, usually at a very modest cost. There are certain definite advantages to securing identification materials in this way:

A. They are designed by the advertising experts of national-brand manufacturers—designed to give maximum impact to your service message and to identify you with national advertising.

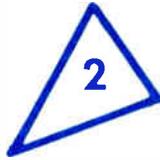
B. You benefit from the price advantage which the manufacturer gains by ordering in quantity.

Some of the items made available in this way are:

- | | |
|------------------------|---------------------------------|
| Outdoor Electric Signs | Outdoor Metal Off-set Signs |
| Electric Window Signs | Electric Clocks |
| Decalcomanias | Metal & Decal Letters for Signs |

A model storefront created from standard materials.

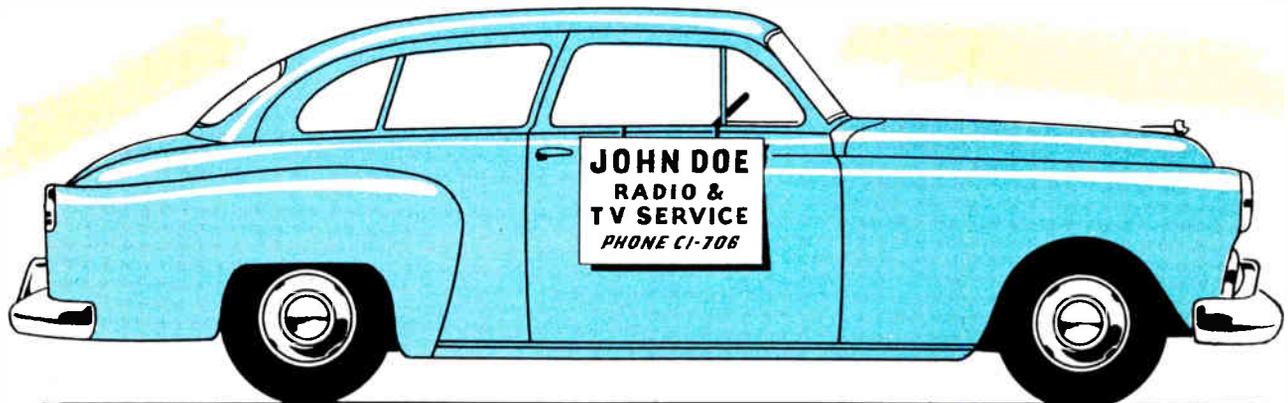
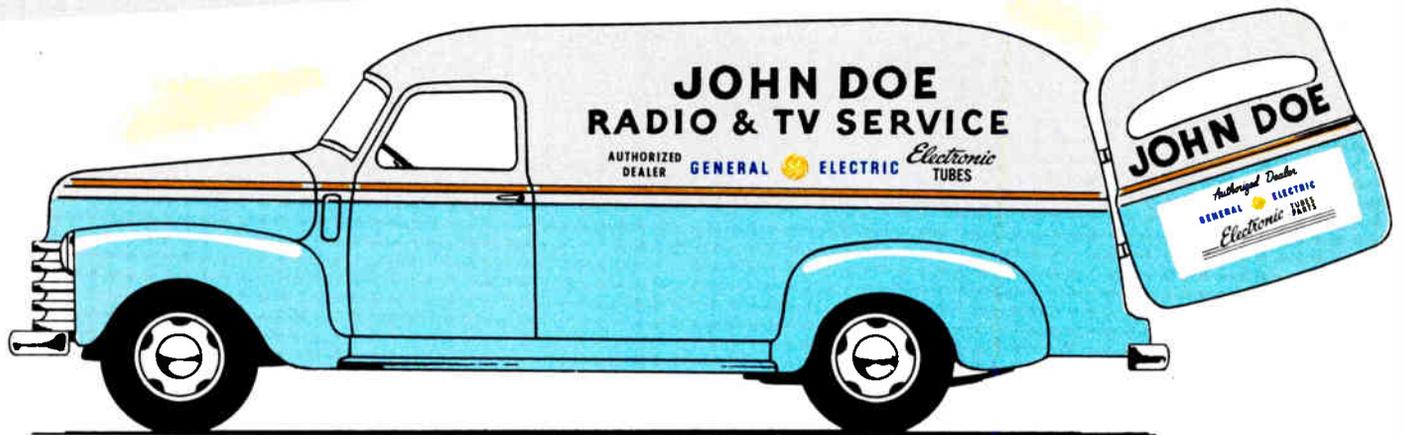




PANEL TRUCK OR SERVICE CAR

Good identification on your service truck or car is almost as important as good store identification. Whether standing near your store or in front of a customer's house, your truck provides a double-faced sign board which can keep your service message constantly before the eyes of your prospective customers. Your distributor may be of assistance to you in this too, for the metal and decal letters previously mentioned are just the thing for this kind of identification. An example of good truck identification is shown below.

Even if a standard sedan is used as a service car, some identification benefit can be obtained through the use of smaller signs hooked on the doors. An example of this type of sign is also shown below.



BUSINESS AIDS

This term includes many stationery items which are, in themselves, minor but still of great importance in impressing the customer with your competence and efficiency. Here again, your parts distributor can be a real help to you for nearly everything of this type that you will require is available through him.

A. Letterheads, billheads and envelopes—Well-designed stationery of good quality, imprinted with your name, address, etc., is provided by many national-brand manufacturers at a price less than you would normally pay for the paper alone.

B. Business Cards—Never be without these. Obtained through your parts distributor, a year's supply will probably cost you only \$3.00 to \$4.00.

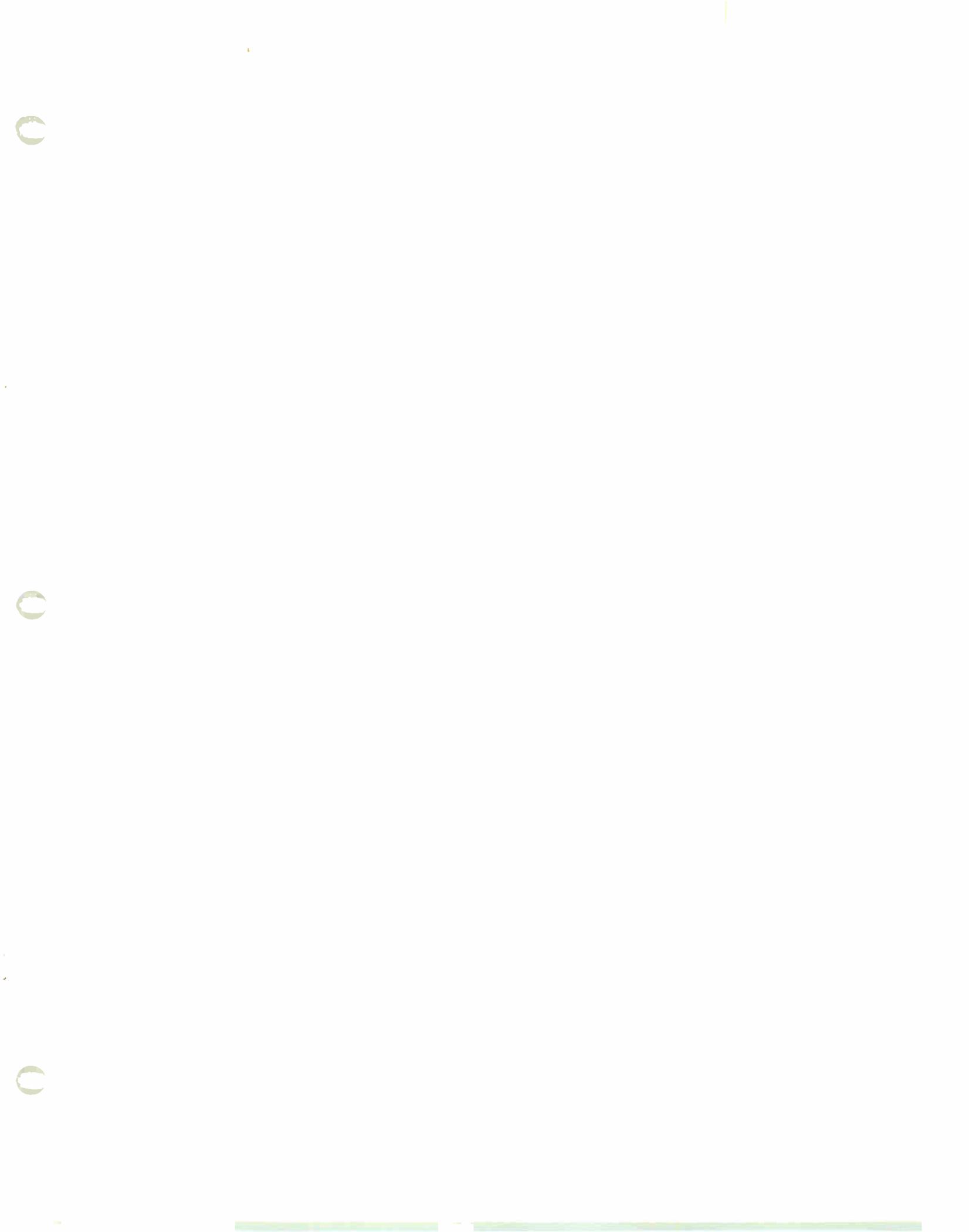
C. Tube Test Stickers—These too, come with your imprint. On repeat calls, show when the tube was last tested. And if it's one of those customers that pulls tubes and brings them in to be tested, he'll see your name on every tube.

D. Repair Stickers—Come imprinted with your name, phone number, etc. Put one on every set you repair and make sure your customer knows who to call next time.

E. Job Tickets—There are many good forms available, most of which provide a customer claim check, some type of bill form, and a job record card. Use one on every job, not only for the effect on the customer but because they give you a reference record on future calls and are your best possible source of names for your mailing list.

Remember, you can only sell service when the customer needs it. Make sure that when he does, he thinks of you.



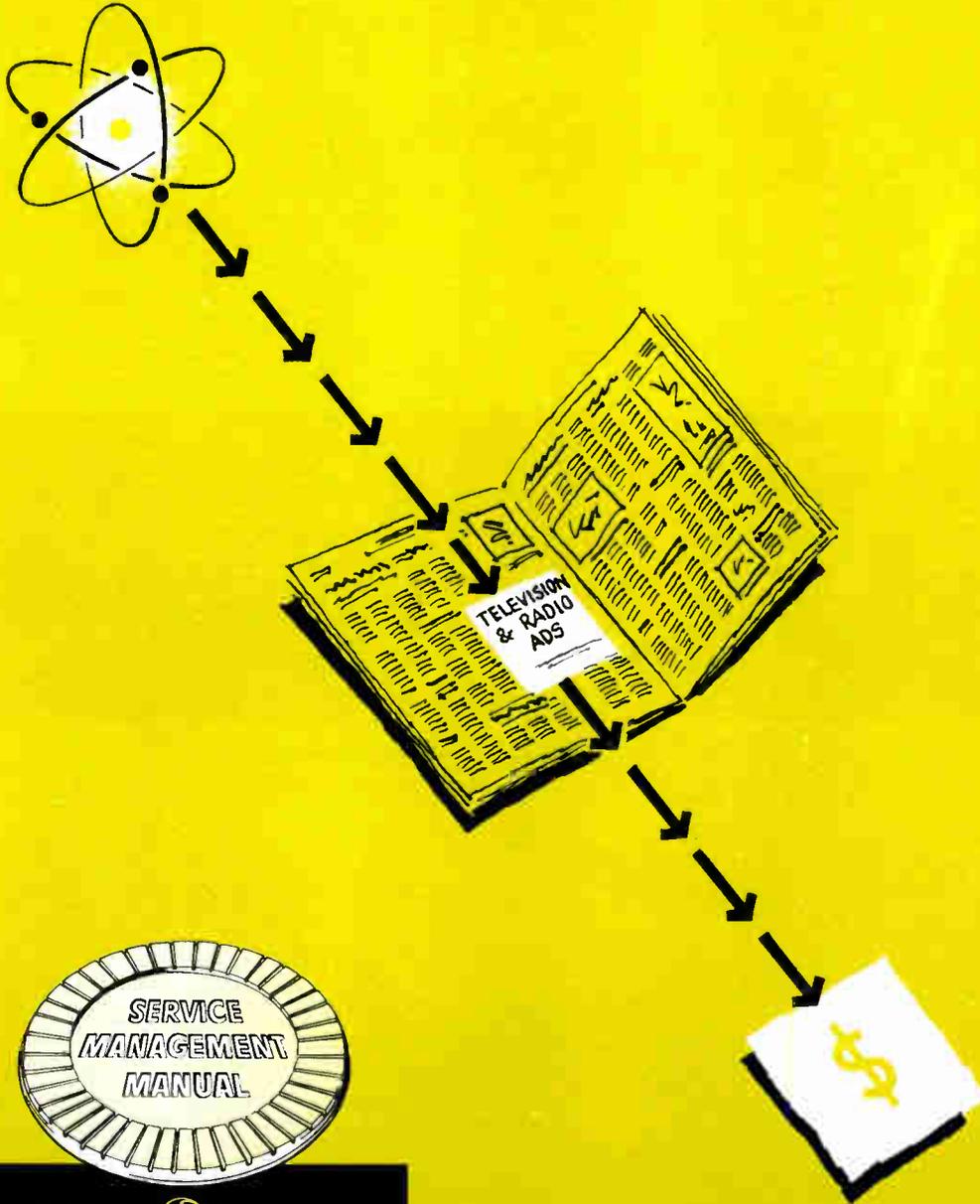


TUBE DEPARTMENT

GENERAL  **ELECTRIC**

SCHENECTADY 5, N. Y.

ADVERTISING



GENERAL  ELECTRIC
Electronic TUBES

ADVERTISE FOR A REASON

A common mistake of many local business people is that they frequently enter into an advertising program simply because their competitor advertises. If the competitor is successful this may be a good reason, but in most instances it is the wrong approach to the problem.

Like other aspects of your business, you should advertise only after you have decided what you want to accomplish with advertising. For instance, if your purpose is to identify yourself and your business, then your promotional plan will follow one trend and your advertising program will follow a particular schedule. If, on the other hand, you want to promote services or sales over a particular period, your advertising schedule will be entirely different.

All of which means that you should think through your reasons for advertising before you do another single thing towards putting a program into operation.

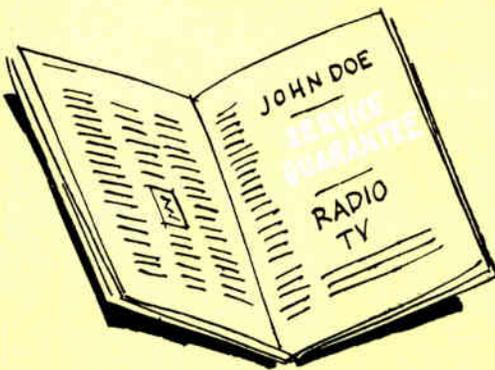
STEPS TOWARD GOOD ADVERTISING

Some basic principles can be followed—axioms which have been developed over a long period of years by all types of advertisers. Here are some to keep in mind:

YOUR ADS SHOULD "OFFER SOMETHING"

Put yourself in the readers position. Why should he read your ad—and if he does, why should he do something about it. If you will bear in mind that the most effective way to get people to read your advertising and to patronize your business is to give them a good reason for doing so, your ads should always be effective. That's why we say you should offer the reader something—make him feel it's worth his while to read your ad. That does not mean that you must offer a discount or a premium or a set of dishes, but it does mean that you should indicate that you can provide better service, that you can provide more prompt service, that your customer gets better value by dealing with you.

To offer any of these things seems difficult in the service business but some of the approaches you may take are these:



BETTER SERVICE

Where you suggest better service, you can advertise:

- that you guarantee the service.
- that you repair only what is necessary.
- that while repairing, you will check other elements of the set and recommend services that may be needed sometime in the future.

MORE PROMPT SERVICE

Under the heading of more prompt service, you can point out:

- that you will be at the customer's house within three hours, six hours, or 24 hours, or whatever is necessary, to beat your competitor's standard practice.
- that you will return radios in a specified minimum time.



BETTER VALUE

As to better value, you might make your advertising message indicate:

- that you have a low minimum charge per hour.
- that your personnel is more experienced and consequently customers get more professional treatment.
- that you use only premium parts and supplies.
- that you are able to handle most service right in the home, thus eliminating the expense of pickup and delivery.
- that under certain circumstances you will provide an estimate of repairs required.
- that you can extend credit for delayed payment.

ASK THE READER TO DO SOMETHING

In terms of the advertising trade, the sign-off is usually called a "bid for action". It means simply that advertising is wasted unless you ask the reader to do something. In most cases, it will probably be simply to "call us for prompt service"—or something similar. However, your bid for action can be to request the reader to fill in the coupon so that you can put his account on a six-months follow-up system.

- Or it may be to, "leave your radio at our shop, we will deliver within 24 hours".
- Another suggestion, "mail in a card now, we will schedule a checkup when we are in your area".
- Or still another, "clip this coupon and stick it to the back of your set so that you will have the number handy when you need it". No matter what your "pitch", be sure that there is one in the ad.

TELL THEM WHO YOU ARE

Be sure that your name at the bottom of the ad is large enough to be easily read.

Be sure also that your address and telephone number are part of the ad. It is a complete waste of money to run a good, effective ad and not have the reader register the message in connection with *your* name and *your* business. Needless to say, it is also wasteful to have many recognize your name and not know how to get in touch with you. If you will follow a philosophy of making it just as easy as possible for the customer to get in touch with you, you can never go wrong in this respect.

DECIDE HOW MANY PEOPLE YOU WANT TO REACH

Another common error in local advertising is that local trades people frequently use media (magazines, newspapers, radio) whose coverage is much more extensive than their business. If there is a choice of two newspapers and one of them covers the local area which you wish to serve, then use it in preference to larger, more popular newspapers whose increased circulation rate is probably based on coverage of surrounding towns and counties. This principle will apply to local magazines, spot radio, television commercials, bus and car cards, and whatever. You can readily see the inadvisability of advertising your business to set owners 15 and 20 miles from your location, if you do not have sufficient customers at that distance to justify the travel expense involved.

Generally speaking, it will be more profitable for you to concentrate heavily on your immediate area than to extend your coverage to a point where time and travel expense are wasted.

TIME YOUR ADVERTISING CAREFULLY



Timing the appearance of your advertising is extremely important. You will find that newspapers, for instance, are read more heavily on general shopping days than they are during the rest of the week. Service business, as such, has an important timing cycle in that little attention will probably be paid to simple identification ads during the summer season when people are not too much interested in radio and television anyway.

Timing is also important from the "number of appearances" aspect. For instance, if you are running a special of some sort, then it probably will be worthwhile to take a large space and shoot your entire budget on one or two appearances. If, on the other hand, you are trying to build general prestige for your business on a long range schedule, smaller ads for a longer period will be more effective. Above all, don't cut your schedule short. Advertisers of all size make the common

mistake of believing that their message has been absorbed by readers long before the impression has been fully registered. Along this same line, don't hesitate to repeat ads. Surveys have shown that second and third runnings of the same ad frequently get as much readership as the initial one.

If you are in a community where another local business is running a big "splash" campaign, it is to your advantage to avoid competing with it unless you are able to top it. Wait until his program is out of the way and then launch your own. This of course does not apply if the campaign is competitive with your business and if the market for the item or service will be exhausted by the time your competitor's campaign is completed.

NOW SELECT YOUR MEDIA

After you have decided—what you want to accomplish, what you are going to ask readers to do, whom you want to reach and when you want to reach them, you can then pick the media (magazines, newspapers, radio, etc.) best suited to your plan.

In your type of business, newspapers are one of the most effective methods, because they reach the people in whom you are interested at a relatively low cost. In many papers you can select location of your ads and this too is important. If possible, have them appear near other service advertising, near the radio or entertainment pages or, if your space size is small, under the correct heading of the classified advertising section. Relative to this classified advertising in newspapers, many dealers have found it effective to run several spots on a two or three times-a-week basis. For this type of thing, be sure you pick the *paper* whose classified section is most extensive—normally it is the paper which has the biggest classified advertising section.

Newspaper advertising presents another possibility. If you happen to have someone in your employ who has a real talent for editorial writing, you may wish to experiment with a series of "gossip" ads. This has to be well done but there is a local business man in Baltimore who has multiplied

his business many times through developing a character for himself and his business by means of a chatty column which he buys as advertising.

Spot radio is another excellent way to reach local people in your area. Again be careful of the coverage and make sure that you are hitting areas which *you can serve*. Generally speaking, it is the man of the family who selects the television service man. That being the case, you should try to time your radio announcements when the man of the family can hear them. If you are in a commuter area, then you can effectively select early morning or rush hour periods and your message can be heard on car radios, as the family has breakfast, etc.

Sponsorship of television commercials is also a good way to promote your business, but is more expensive and, because of the limited number of transmitters available, problematical



as far as getting the right time is concerned. In most cases, you will find that you have to contract for at least 13-week periods on television under the present transmitter situation and you will probably have to compromise on the time of day when your commercial will run. It is still the most effective advertising medium. If you have a choice of time, select one near a program that will appeal to men—sports, news or variety.

Local magazines also are worthwhile, if the audience is not too extensive geographically, in this case be careful of consistency. Don't spend everything on a single ad.

Under this category also we can consider the local shows, dinners, charities, etc., who regularly solicit you for advertising in their particular paper or program. Evaluate this from the standpoint of benefit derived from the organization doing the soliciting. If the group is a good potential customer and you can create good will by supporting their effort, then it probably would be worthwhile to spend money in this manner. However, from an advertising standpoint, these special issues have very limited value. Avoid them rather than substitute them for the standard media of newspapers, direct mailings, etc.

Local telephone and business directories are always good. The classified section of the telephone directory is almost a must. When you consider that over 50 percent of the families with telephones refer to this section for merchandise or service at least once a week, you can see that it is unparalleled in its importance as a reference place for your business listing.

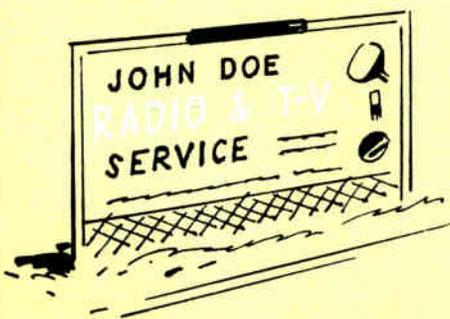
Other business directories in your locality depend upon the local usage of them. It varies, but you should be able to get a reasonably accurate estimate of how many people, and what kind of people use the directory in your area.

OUTDOOR ADVERTISING

Outdoor advertising is worthwhile considering at all times. You may be surprised to find how inexpensive this medium is—particularly if you are in a low population area. This medium is attractive largely from an identification standpoint and has excellent reminder value for you people in the service business. The principal precept to keep in mind with the use of outdoor advertising is that you should limit your message just as much as possible. If you will note the national advertising carried on outdoor signs, you will find that in very few instances does the message consist of more than five to ten words. The reason is obvious. People riding by just don't have time to read any more than that. Look into this one and see if something is available near your place of business.

These are the most accepted and most proved advertising media. There are others; car cards, novelty advertising (match books, give-aways, blotters, etc.) all of which have their particular areas of effectiveness. For a consistent program however, you would be best advised to concentrate on one of the previous suggestions.

Whatever you use, make it a part of an over-all plan. Think it out carefully and see that there is a consistent follow-through.



TUBE DEPARTMENT,

GENERAL  **ELECTRIC**

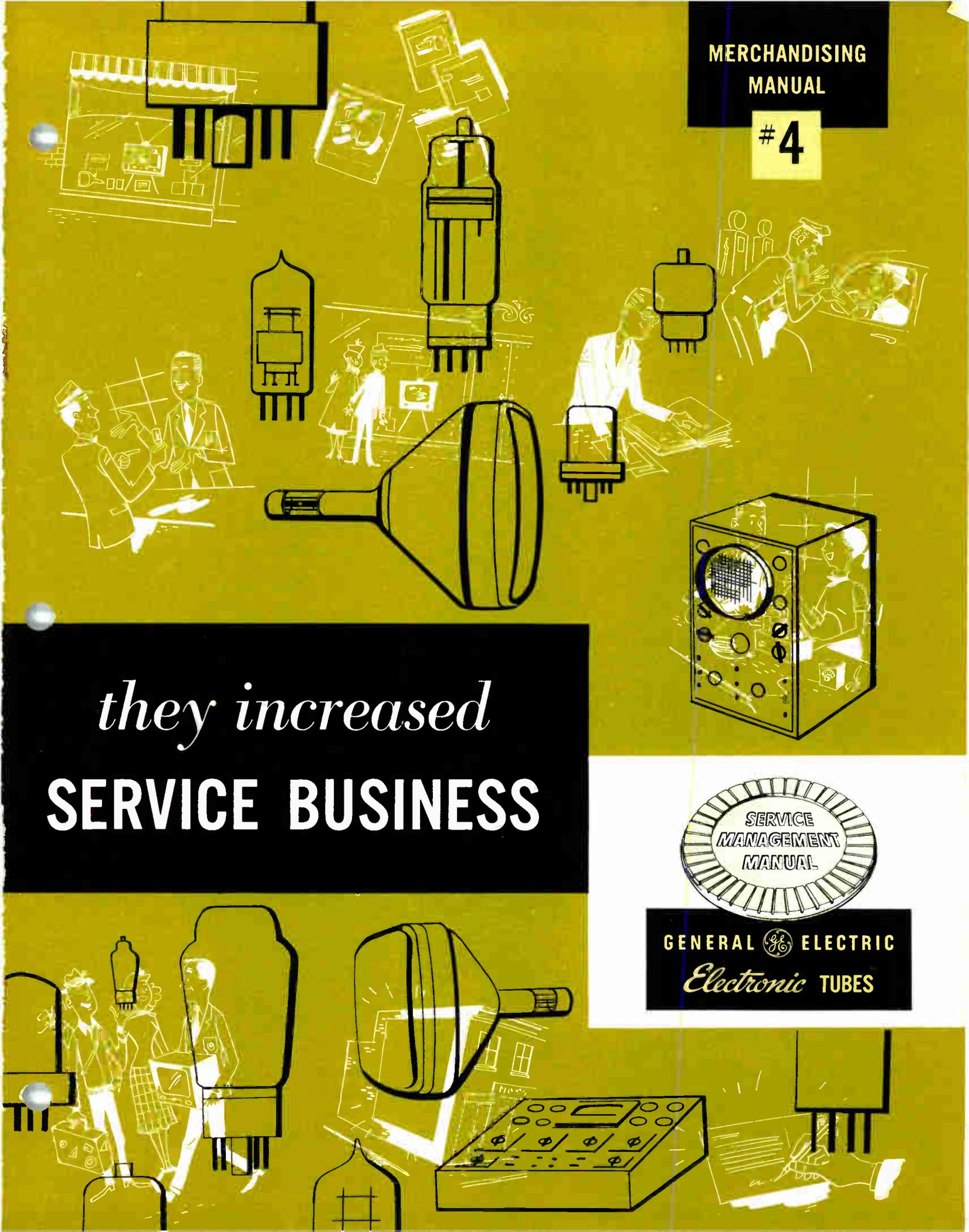
SCHENECTADY 5, N. Y.

they increased
SERVICE BUSINESS



GENERAL  ELECTRIC

Electronic TUBES





a report
on 25
successful
ideas used
by
service dealers

In the pages that follow, you'll find some outstanding merchandising ideas. Far better than average as ideas go, these are devices and techniques that have been "thought up" by TV-radio service dealers. They are simple and easy to perform. In almost every case, they proved highly successful for the dealers who used them.

As is usually the case with service functions, it's sometimes difficult to know how to promote extra TV-radio service business. There isn't any magical answer—no established formula. The method will vary in every town—with every service organization.

But one thing is certain—you *can* build service business—because it's been done—and without a great deal of effort.

Remember this too—that no matter what kind of promotional effort you adopt, you're bound to get *some* benefit—even if it's only a greater recognition for your name. The important thing is to try *something*. Give your program some thought, make it fit you, your budget and your customers, and then get it started.

The ideas that follow were reported in a contest sponsored by General Electric during the summer of 1952 called the "Bigger Summer Business Contest". They are not represented as being the best ideas in the industry—but they worked for their owners. They may work for you—or they may give you an idea for your own business. Take time to read them now and then decide what your program will be.



MORRISTOWN, N. J.

A general concentrated mailing program can be very successful as one service dealer proved.

"I prepared a form letter describing all the service facilities that our organization could render. This was mailed to all the names in the phone directory. To each new customer brought in by this mailing, we mailed a follow-up letter thanking the customer and explaining our 'customer satisfaction' policies. This was followed up with a one-page ad on small set conversion, which we mailed to all our customers having a 12" screen or smaller. This resulted in an average of 15 conversions per month as well as a substantial increase in our regular service business."

EAU CLAIRE, WIS.

"Better customer relations increased our business 24%. A little research on articles in trade magazines concerning customer relations was used as the foundation. Each customer was given a complete report on his set condition, estimate of repairs, and the why and wherefore of preventive maintenance. 75% of our new steady customers came as a result of this customer relations program or on recommendations from satisfied customers."



LOWELL, MASS.

"A complete stock of all tube types has given us the reputation of having any tube that is currently available or obsolete. We do not make service calls but offer free tube testing service for customers bringing them in. With the aid of small newspaper ads we average 1300 tube sales a week."



COLLINGDALE, PA.

"I gave 'gratis' public address system advertising for Cerebral Palsy, Red Cross, local fire company activities and other hometown charities. My station wagon was wired up with two large speakers along with a large 4-sided sign mounted on the roof advertising my service business. This I supplemented with local newspaper advertising, holiday printed programs, and blotters, which we used as give-aways or envelope stuffers. Business has increased considerably with this concentrated effort."

SAN FRANCISCO, CALIFORNIA

"Two evenings a week we conducted classes for interested TV set owners. We explained all the intricacies of wiring, parts, and tubes that make a set operate. A TV chassis was used to illustrate our points.

"At first we held classes only for our customers, but response was so good that we advertised in local papers and ended up scheduling classes. We stressed such points as (1) don't tamper with your set, (2) personal hazards in making home repairs, (3) dangers that could result from improper handling of a picture tube, (4) service dealer equipment costs over \$3000, and (5) how to avoid unnecessary service calls. At the conclusion of each class we held a discussion period and served refreshments.

"Customer confidence rose steadily and we acquired many new customers."



CHICAGO, ILL.

"Portable and car radio service is a lucrative field often overlooked. We made capital in this field by recording all portable radio sales. In May we mailed a reminder card to each owner telling of the special which consisted of a complete check on the set, all tubes tested, tuning condenser cleaned, volume control cleaned, speaker checked and the set re-aligned—all this for \$1.00 plus parts. Later a mailing of this same card was made to all our customers. Doorknob hangers were placed on all door knobs within a 2-mile radius of the store. In September a reminder post card was mailed to portable set owners suggesting they remove the battery from their set and telling them of our TV service facilities for the coming cold season. The auto radio repair was handled with handbills making possible the same offer for \$2.75 plus parts. Our business increased briskly and customer confidence rose swiftly."





PONTIAC, MICH.

"We offered a package deal, consisting of one G-E picture tube with a one-year General Electric warranty, check-up of all small tubes and one free service call when needed any time after the picture tube was installed. The price of this package was list price of one picture tube plus \$10.00. The results were terrific and our customer satisfaction reached an all time high."

NEWPORT, KY.

"We used curb service for TV repairs with great success. The idea was to leave your set in the morning and pick it up after work. The cost was \$1.50 for locating the trouble, plus parts. This idea was advertised in all the local papers. As a result of the many new customers which this idea uncovered, a bonus system was installed for our four repairmen. Weekly service meetings also helped create more loyalty and incentive among the repairmen. Because of the 61.2% increase in business another repairman was added and our place of business was kept open until 9 p.m. three nights a week."



HAGERSTOWN, MD.

"On all service calls, I installed G-E electronic tubes and soon I had a large quantity of empty cartons. I prepared a huge window display of empty G-E tube cartons and displayed a sign stating, 'These cartons speak for themselves'. Business increased."



CHICAGO, ILL.

"We prepared a concentrated newspaper advertising program and followed it with a post card mailer program. As a follow-up we mailed a 2-way post card to service customers after each service call. This card to the customer asked that he return the self-addressed half with comments or suggestions that might help increase our efficiency. This sincere interest in our customer thinking made many new loyal customers. They in turn recommended their friends and relatives."

SAN PEDRO, CALIF.

40 part-time salesmen was the idea of another service dealer.

"We had cards printed with a detachable stub, which we handed out to gas station attendants and others in similar business establishments. For each customer sent in, these part-time salesmen received 10% of the total service charge. The stubs were turned in at the end of each month and matched with the stub which the customer turned in. Our customer good-will is at an all time high and service business has had a marked increase especially in the car radio field."

MANCHESTER, N. H.

"Business increased 100% when we painted a large outdoor illuminated sign on the side of our building offering for \$1.50, plus parts, repair of any table model radio. A budget plan for more expensive repairs and TV picture tube replacements was also explained. This was supplemented with periodic changes of window displays and spot radio advertising."



NEW YORK CITY, N. Y.

Window displays carry more impact than most service dealers realize.

“We doubled our business by changing the window display every three weeks. We had brightly painted banners made up with such slogans as, ‘Enjoy the Baseball Games and Fights,’ ‘Let Us Check Your Tubes Free,’ ‘Be Sure and See the Political Conventions,’ and ‘We Repair All Makes and Models of TV.’ These banners were appropriately displayed with picture tubes, tube cartons and a TV chassis with all the internal wiring and parts exposed.”



WEST MANCHESTER, N. H.

“We participated in a baby contest sponsored by various stores through the local newspaper. Every business sponsored a baby. Coupons were printed in the daily newspaper for several weeks. These coupons counted for so many votes. Relatives and friends of the babies put heart and soul in gathering these coupons. Almost a million votes were cast for our entry. Our ad was noticed approximately a million times. Business and popularity of our name increased.”



CANASTOTA, N. Y.

If your location is off the beaten path you might try this one.

“We solicited the use of a bank window on the main street. Our display consisted of service alignment equipment, a 10” set that had been converted to a 16” set, several different tube types including two picture tubes, also a TV chassis with all wires and parts exposed. Each piece of equipment had an appropriate card explaining its function. This type of display built much prestige and confidence in our ability as a service dealer.”



CAMBRIDGE, MASS.

"300% increase in business is a better than average return for any promotional campaign. We accomplished it during July and August with transit advertising in buses, street cars, and subways. The same ad used in our transit promotion was also placed on both sides of our service vehicles. This resulted in a large number of additional calls as a result of this ad's being seen by neighbors, pedestrians, and motorists. A simple self-mailer offering a 10-point TV check-up was also mailed to all current customers and all customers who held expired service contracts. It stressed the replacement of weak tubes and a complete check-up for \$4.95 plus parts."



CORAL GABLES, FLA.

"We kept a card file on every service call made during the busy season listing information on possible improvements, redesigning, picture tube replacement, complete condenser change, dampness chasers for humid weather, etc., which gave us plenty of ammunition to use during slack periods. When the slack period arrived a letter or phone call to the following effect did wonders to increase business.

"Mr. Brown, last January when I made an emergency repair on your TV set I noticed you had a regular phosphor face picture tube which now has been in use 24 months. (Customer is asked date set was purchased at time of emergency repair.) The average life for a tube that size is 30 months. A new *G-E Aluminized Picture Tube* now will:

1. Increase picture brightness up to 100%
2. Give clearer picture
3. Produce sharper contrast
4. Make easier day-time viewing
5. Give less eyestrain

You receive a one-year factory warranty with this tube and can expect uninterrupted service for months to come. We will also check all the other tubes in your set free of charge. G.E. has been advertising this new aluminized tube in *LIFE* and *COLLIER'S*. Perhaps you have seen their ads. Let us drop over and explain all the advantages and price—no obligation.

or

"Mr. Jones, last December I made an emergency repair to the horizontal circuit in your television. At that time I inspected the paper condensers in your set and noted that the insulation was beginning to deteriorate. I would like to replace them all with a new plastic molded type which will give very little trouble in this climate. As this is our slack period I can give you a better job at some saving to you. May I pick up your set and do this job now so that you will have uninterrupted service next winter?"



DETROIT, MICH.

Would you like to hire extra help during a normally slump period? This service dealer did by taking advantage of obvious situations that surround us every day.

“First, we surveyed a 3-sq.-mile area surrounding our location and obtained every house number. This gave us a mailing list of 7,000 addresses which we broke up into sections of 400 each. Consecutive mailings were made consisting of post cards advertising service facilities, complete stock of tubes, parts, products and business policies, also our membership in local TV Service Association. We also advertised in local church publications and took part in civic association celebrations. For a window display we rented a rear projection screen movie and ran continuous films showing children of the neighborhood in a dance recital, our service shop in action, test equipment necessary for proper service, also other films of general local interest. At the beginning and end of each reel we spliced titles advertising our place of business and facilities. Word of mouth advertising which resulted from these projects gave us an enviable relation with our customers.”



YORK, PA.

“I specialize in auto radios and found the following plan very successful. I used one-minute spot radio announcements and a direct mail campaign to a car owner’s list, procured from registration lists supplied by local auto dealers. We also had a certificate printed which was given to new car radio buyers by dealers, offering free push-button setting and antenna adjustment.”



HOBOKEN, N. J.

Attacking the problem after a complete analysis of the situation will result in merchandising ideas that pay off.

“We set aside a portion of our shop with meters, test equipment, tools, and schematics. This area is used to demonstrate repairs necessary on customer sets. For taverns and other similar establishments where TV is a drawing factor, a free replacement was loaned while repairs were being made. Small cards offering auto repairs at a nominal charge were placed under the windshield wiper of every parked car having an aerial. We experienced no summer slump.”



RICHMOND, IND.

“Vacation time mailings suggesting an 8-point TV check-up with no lost viewing time and one-day service to those staying home increased our business 37%. This 8-point program consisted of (1) pick-up and delivery, (2) check all tubes, (3) clean picture tube, (4) clean cabinet and chassis, (5) check tuner for proper video-audio tracking, (6) check chassis for overheated parts, (7) adjust all controls, and (8) check picture and sound for distortion, hum or weakness.

“Mailings were made to (1) all our regular customers, (2) new potential customers whose names were obtained from non-servicing dealers, (3) addresses obtained by surveying the city and taking addresses of all homes having a TV antenna.”





MIAMI, FLA.

“Direct mail paid off to the tune of 67% increase in our business over the same period of the previous year. Our campaign ran for the two-month period of July and August.

“The first mailer was a two-cent post card sent to customers we had not serviced for six months or longer. This card stated that we hoped the set was in good working condition, if not, or if the customer had any other receiver that needed service to call us at his convenience.

“Since we are located in Florida, just before the hurricane season we mailed a reminder to all our customers that a portable radio was the only way to keep up on progress of a storm since the power company shuts off all power at such a time.

“We later made a mailing to TV owners on the advantages of an outside antenna. If they were using an outside antenna, the suggestion was made that it be checked if it had been up a year or longer, as salt air in this area would cause corrosion and handicap reception.

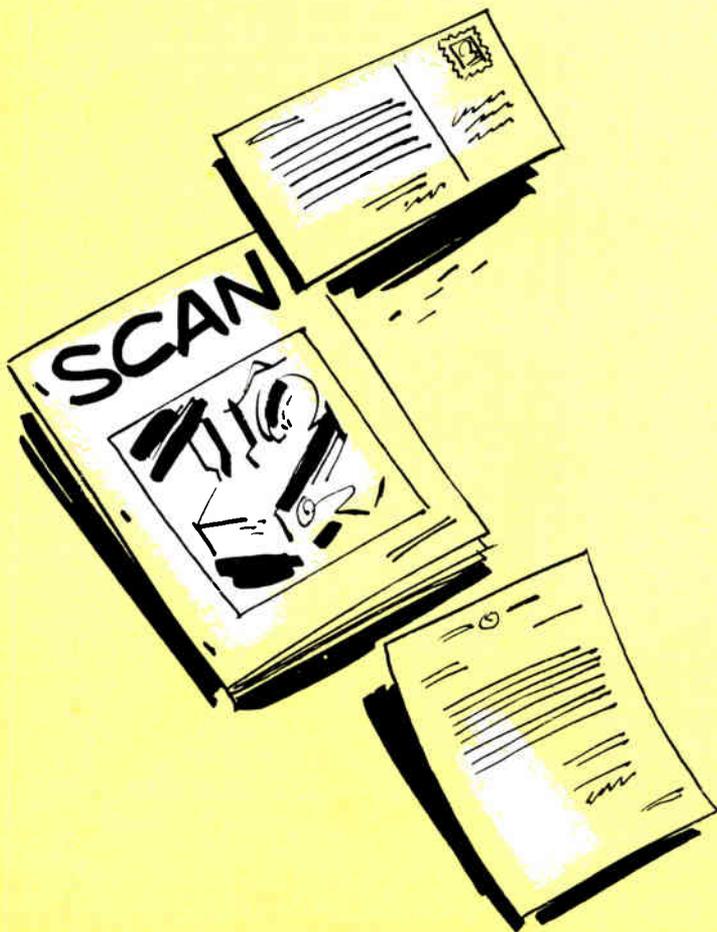
“Our response was so good from all three mailings that two additional servicemen were added.”

WEST PALM BEACH, FLA.

“Giving my customers something to help them understand what was going on in the industry was my plan. I secured the TV magazine ‘Scan’, and made a package of one self-addressed return post card, a letter explaining my service facilities and a copy of ‘Scan’.”

Five hundred copies were delivered in person to TV owners and about 30% of the cards were signed and returned.

“While making this first delivery I got the name, number, and street address if owner was home. In the second mailing a card was enclosed with ‘Scan’ to all the owners who failed to return their signed cards. This mailing had a 50% return. This I repeated for six months until practically every set owner had returned his card asking for ‘Scan’, free for six months. Much interest was generated and people were calling at my store for copies of the magazine on news from friends. The plan increased business and gave me an opportunity to make a mailing each month with ‘Scan’.”





MANCHESTER, N. H.

“We installed a large illuminated outdoor sign which was kept on every evening. This and other G-E identification aids in the window increased G-E tube sales 50%. Many of our customers are specifying G-E replacement tubes and parts.”

Merchandising ideas that pay off are practically limitless. All that is required is a complete analysis of situations and problems. After this, apply the ideas that best fit your situation. It pays off.

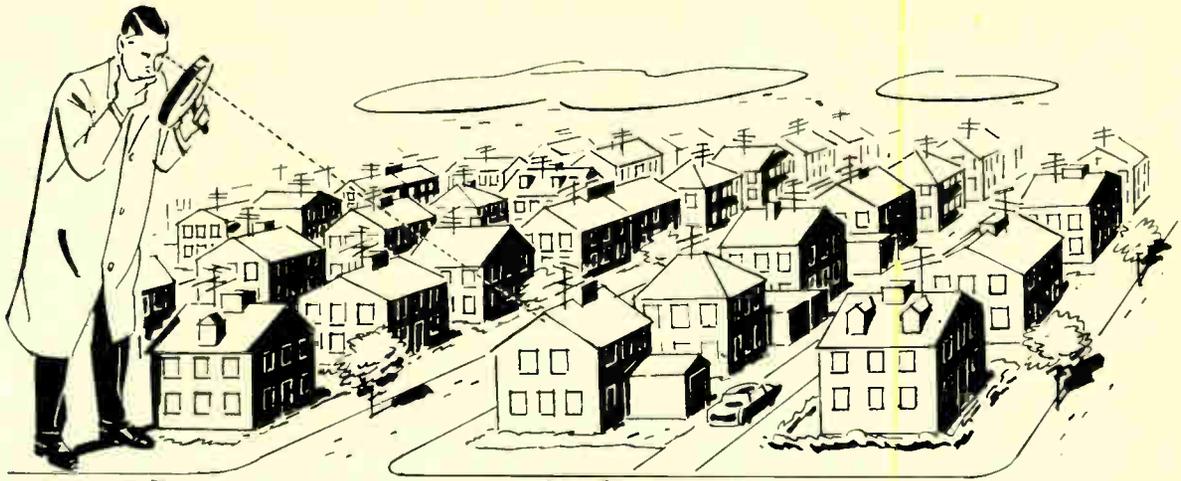


TUBE DEPARTMENT
GENERAL  **ELECTRIC**
Schenectady 5, N. Y.

SERVICE
MARKET
DATA

#1

KNOW YOUR MARKET!



GENERAL  ELECTRIC
Electronic TUBES





GENERAL MARKETING BULLETIN FOR SERVICE DEALERS



Marketing analysis has been widely used for a number of years by manufacturers, to guide them in their sales and product planning. Distributors are also using marketing analysis on an increasing scale to help them in sales and inventory control.

As you know, statistics is another word for facts and figures which, when added together, give a picture of a particular phase of your business. Statistics are the basis for analyzing your sales records for such things as sales trends, turnover ratios, and for inventory control. Statistics also let you determine whether or not you are getting your share of the available business. They can further be used in forecasting what will happen in the foreseeable future.

Marketing analysis, on a more limited scale, can be very useful at the retail level to service dealers, like yourself. It can be used to help you in your planning and in preparing for the months ahead by studying market conditions which affect you and by watching trends in production and the constantly shifting tide of customers' preferences and desires.



The objective of the G-E Tube Department "Monthly Marketing Bulletin" will be to provide service organizations such as yours with brief but specific market information which will be useful to you in customer selling. It will help you to plan your service operations, and to compare your sales and service performance with the radio and TV service industry as a whole.

Service dealers probably know many of their customers personally—where they work and live—and while there is no substitute for this valuable sales tool, you should also get to know your customers "statistically". In other words, you should know something about the average income of the families in your service area and changes in the average income in your locality. Still more important, you should know the total number of operating radios and television sets in your general service area, whether it be a city, a town, or one or more counties. Once you know this, you can determine the total number of receiving and picture tube sockets in these radios and television sets.

The total of these sets in use and the sockets in them represent your potential service and parts market. Multiplying these sockets by a replacement factor gives the total potential tube sales in your service area which you and your competitors will share in 1952. You can then decide what percent of the available replacement business you should obtain. By watching estimated total replacement tubes sales in your area and comparing it with your own sales, you will know whether or not you are keeping pace with the market. You may be increasing your position—or possibly your percentage of the available business has been decreasing without your knowledge.

We hope to supply you with this analysis for service volume as well as for receiving and picture tubes.

One of the objectives then of the "Monthly Marketing Bulletin" will be to tell you exactly how you can determine the market for tubes and service in your area and your share of that business. Once you have done this, you can readily watch your competitive position and keep abreast or ahead of the growth of service business in your region. This is the type of marketing information we will give you each month. One topic will be covered in each issue.

In addition to this data, the bi-monthly "Marketing Bulletin" will analyze in capsule form, brief information on the general business situation and the outlook for replacement tubes and sets. This will cover, from time to time, set and tube production, material availability, production limitations, and the outlook for consumer demand. It will also include information on inventories and price trends.

Here is a list of some of the marketing topics to be covered which, we believe, can be of use to you in sales planning:

1. Local statistics, such as number of radio and TV sets in your area, number of households, income, etc., and how to get them.
2. Trends in replacement picture tube sales by size and shape of tube.
3. How you can use your sales records to estimate the increase or decrease to expect in your monthly sales and service work.
4. A simple method by which you, as a service dealer, can set up your own sales potential by measuring the amount of available business in your area.

SALES RECORDS
% ANALYSIS
% STATISTICS



5. The trend in replacement receiving tube sales by glass, metal, miniature, and by type.
6. A timetable for installation of new TV stations by location (UHF or VHF). (If you are in a non-TV area you can then determine what your tube and servicing requirements will be for the first six months or year.)
7. Forecasts of how many replacement receiving tubes and picture tubes will be sold in 1952 compared with 1950 and 1951 and the estimated volume of service dealers in 1952 compared with past years.
8. Operations of typical service dealers will be analyzed for your information, based on a survey which we recently completed.

You will be able to compare your operation with other service concerns of comparable size and surroundings. We will provide you with a cross sectional picture of thousands of service dealer activities—their space requirements, who does the bookkeeping, number of service employees, jobs handled per week, percent done in homes, average billing per call, anticipated change in business, methods used to obtain new business, and other information pertinent to your type of business.

These are some of the types of information you can expect to receive in your Monthly Marketing Bulletin. If, as you read them, figures and trends occur to you which seem helpful, we may be able to supply them. In any case, do yourself a favor and make a habit of reading the Marketing Bulletin and do us a favor by mentally promising to give us any comments you may have.



TUBE DEPARTMENT,
GENERAL  **ELECTRIC**
SCHENECTADY 5, N. Y.



GENERAL  ELECTRIC
Electronic TUBES

MARKET DATA BULLETIN

Bulletin #1

August 25, 1952

G-E FORECAST SHOWS TREMENDOUS GROWTH OF TV SET OWNERSHIP BY 1960

Television is now entering a period of tremendous growth for much of the country. Certain states now having little or no TV reception will experience a sharp increase during the next eight years.

For example, for every set now in use in Mississippi there will be 46 sets by 1960. For the United States as a whole, the total number of sets in use eight years from now is estimated at 55 million compared with 17.7 million as of August, 1952.

In order to visualize the great potential expansion which is ahead for TV and for the service dealer in the area in which he operates, we have tabulated on page 2 the estimated number of TV sets which will be in use in 1955 and 1960 in each state.

Three factors important to the future growth of TV have been considered:

1. At least 2,000 TV stations will be in operation in 1960 giving complete broadcast coverage throughout the U. S.
2. The number of families in the United States will increase by about 1,000,000 a year for the next eight years.
3. There will be a continued population shift to the west coast, and to a lesser extent to the mountain states and the south Atlantic states.

So population growth and shift, in terms of families, is the important basis for this forecast. Using U. S. Bureau of Census estimates of population by state in 1955 and 1960, we can arrive at the approximate number of families which will be in residence in each state in these years.

On the next page is the TV set ownership forecast for half the states. The remainder will be published in the next issue.

TV SET FORECAST BY STATE, 1955-1960

	<u>TV Sets in Use Aug. 1952</u>	<u>% Of Families With Sets Aug. 1952</u>	<u>1955 Estimated TV Sets in Use</u>	<u>For Every Set Now in Use There Will Be This Many in 1955</u>	<u>1960 Estimated TV Sets in Use</u>	<u>For Every Set Now in Use There Will Be This Many in 1960</u>
Ala.	96,540	11.5%	621,000	6 1/2	1,089,000	11 1/2
Ariz.	26,910	11.5	166,000	6	316,000	11 1/2
Ark.	21,770	4.0	377,000	17 1/2	641,000	29 1/2
Calif.	1,688,570	47.0	2,719,000	1 1/2	4,552,000	2 1/2
Colo.	5,030	1.2	275,000	55	493,000	98
Conn.	353,040	59.0	542,000	1 1/2	737,000	2
Del.	76,180	80.5	87,000	1 1/4	120,000	1 1/2
D. C.	186,470	79.0	206,000	1 1/4	282,000	1 1/2
Fla.	141,190	16.0	621,000	4 1/2	1,197,000	8 1/2
Ga.	211,840	22.5	692,000	3 1/2	1,208,000	5 1/2
Ia.	--	--	94,000	--	219,000	--
Ill.	1,367,480	50.5	2,037,000	1 1/2	3,102,000	2 1/2
Ind.	444,130	36.5	936,000	2	1,441,000	3
Iowa	176,700	21.5	522,000	3	895,000	5
Kan.	60,670	10.0	378,000	6	651,000	11
Ky.	178,120	22.0	586,000	3 1/2	1,015,000	5 1/2
La.	99,910	13.0	550,000	5 1/2	976,000	10
Me.	12,830	4.8	185,000	14 1/2	322,000	25
Md.	415,430	61.5	641,000	1 1/2	893,000	2
Mass.	972,140	71.5	1,230,000	1 1/2	1,635,000	1 1/2
Mich.	908,920	48.0	1,541,000	1 1/2	2,412,000	2 1/2
Minn.	270,100	30.5	695,000	2 1/2	1,047,000	4
Miss.	16,150	2.5	431,000	26 1/2	743,000	46
Mo.	481,500	38.5	911,000	2	1,360,000	3
Mont.	--	--	92,000	--	202,000	--

NOTE: To obtain the estimated total number of TV sets in use in each state in these two years, we made the following assumptions:

1. Sets in use in 1955. Based on the present percent of families with sets in a state, the number of families having sets in 1955 has been calculated in this manner:

<u>If This Is the % of TV Families in a State Now</u>	<u>This Will Be the % of TV Families in 1955</u>
None	50%
1-25%	65%
26-50%	75%
Over 50%	85%

(Colorado and Oregon were considered as having 1-25%, although there are only a few sets in each state, because of rapid TV expansion expected there.)

2. Sets in use in 1960. It is assumed that by 1960 TV set ownership will be relatively equal throughout the country. It is also assumed that 90% of the families in the U. S. will be within TV broadcast range and that 90% of these families will own one or more sets. Approximately one out of four TV homes will have a second set.

SURVEY OF RADIO AND TV SERVICE DEALERS ILLUSTRATES CHARACTERISTICS
OF "TYPICAL DEALER"

A recent G-E survey of full-time radio and television service dealers located in all parts of the country makes available for the first time reliable information on the manner in which a large number of service dealers conduct their businesses. Using the information in this bulletin, you can compare your operations with those of 2175 other full-time service dealers, more than two-thirds of whom reported they had been in business for more than six years.

The returns from the survey have been broken down into three broad classifications in this report. If a dealer indicated that 75% or more of his service business is TV, we have called him a "TV Service Dealer." Those who reported TV service as 25% to 74% of their business are classified as "General Service," while "Radio Dealers" are those doing less than 25% of their total service on TV.

By taking the average of the returns falling into each of these classifications, we get a good picture of the operations of a typical service dealer in each case.

<u>TYPICAL DEALER</u>	<u>Radio</u>	<u>Gen'l Serv.</u>	<u>TV</u>
Average No. of Service Technicians Employed	1.4	2.7	5.3
% of Service Calls Handled in the Home	10%	60%	80%
Sq Ft of Floor Space	700	900	1,000
Sq Ft of Service Space per Technician	250	174	92
Who Handles Bookkeeping and Accounting	Owner	Owner	Acctnt
Jobs Per Week - Each Technician	32	35	37
Average Billing per Service Call	<u>\$5.50</u>	<u>\$7.50</u>	<u>\$8.00</u>
Volume of Service Business --- 1950	\$7,500	\$12,500	\$15,500
1951	9,000	15,500	21,000
Change in Business (1950 vs 1951)	+20%	+24%	+35%
(1951 vs 1952)	+13%	+23%	+27%

These figures light up some facts which will be useful to a Radio Dealer or General Dealer who is planning to expand his operations to include more TV servicing. For example, they show that the number of technicians required will increase as more TV service work is taken on. In fact, all companies reporting 25 or more employees on the survey were primarily TV dealers.

Contrary to this, however, TV service is reported to require a smaller amount of total floor space than radio service, for the same amount of business. So an expansion into TV work does not necessarily require an immediate increase in floor space. This is the result of more TV service work being done in customers' homes.

The figures also show that as the proportion of TV work builds up, business volume jumps ahead sharply -- to the point where the services of an accountant will probably be required eventually by a full-fledged TV dealer. Until this point is reached, the dealer will profit tremendously from the material in the Business Practices portion of the G-E Service Management Manual.

Several topics in the survey are so vital to service dealers that a more detailed analysis is necessary.

JOBS HANDLED BY WEEK PER TECHNICIAN -- ALL DEALERS

The survey shows a wide divergence of operations in this item.

Extremes

Under 15 jobs per week -- 132 or 6%
Over 65 jobs per week -- 118 or 5%

Most Reported

30-34 jobs per week -- 311 or 14%
40-44 jobs per week -- 239 or 11%
20-24 jobs per week -- 231 or 11%

Others

50-54 jobs per week -- 224 or 10%
25-29 jobs per week -- 191 or 9%
35-39 jobs per week -- 150 or 7%
60-64 jobs per week -- 123 or 6%
15-19 jobs per week -- 101 or 5%
45-49 jobs per week -- 64 or 3%
55-59 jobs per week -- 14 or 1%
No Reply 277 or 12%
Totals 2175 = 100%

Dealers whose operations fall into one of the extreme categories may want to take a closer look at the handling of their businesses. Is the dealer handling less than 15 calls per week per technician forced to charge excessively in order to make a profit? Is an inadequate service job being done by the dealer who handles more than 65 calls per week per technician?

AVERAGE BILLING PER SERVICE CALL -- ALL DEALERS

The replies to this item, too, had an extremely wide spread on the return, and varied regionally and by size of city and town. In general, operators in big cities and in TV areas seem to charge more.

Extremes

\$3 per call -- 104 or 9%
\$14 per call -- 146 or 13%

Most Reported

\$5 per call -- 331 or 29%
\$8 per call -- 325 or 29%
\$10 per call -- 231 or 20%

Others

\$6 per call -- 218 or 10%
\$7 per call -- 191 or 9%
\$4 per call -- 165 or 7%
\$9 per call -- 145 or 7%
\$11 & \$12 per call -- 108 or 5%
\$13 per call -- 58 or 3%
No Reply 118 or 5%
Totals 2175 = 100%

Another question asked on the survey concerned methods of soliciting new service business. The answers to this showed considerable uniformity. The typical service dealer uses two media to solicit new business -- local newspaper advertising and mail solicitation. This indicates a healthy realization of the value of advertising in building business. Future issues of the Merchandising Manual will be of real help to all dealers in increasing the effectiveness of their advertising programs.

Incidentally, service contracts seem to be on the wane. Fewer than four percent of the calls made by 1066 dealers responding to a question on this subject were covered by service contracts.

In the next issue of the Market Data Bulletin we will break down the dealer replies to the survey according to numbers of employees. This will give you an opportunity to pinpoint your business as it compares with others in the same size grouping.

ROUNDUP OF NEW CONSTRUCTION PERMITS GRANTED SINCE LIFTING OF TV FREEZE ON JULY 1, 1952

Since the freeze on construction of new TV stations was lifted on July 1, the FCC had granted 28 construction permits up to August 9. Eight of these are for VHF commercial stations (two of which are in U. S. Possessions); 16 are for UHF commercial stations; and four are Educational Grants.

As of August 9, there were 710 other applications pending. Only 20 applications were filed the week ending on that date, the smallest amount for any week since June 1-7 when the freeze was still on.

Following is a summary of new CP's granted up to August 9.

New Station	Call Letters or or Grantee	UHF or VHF	New Station	Call Letters or or Grantee	UHF or VHF
Denver, Colo.	KFEL-TV*	VHF	Flint, Mich.	Trans-	UHF
	KVOD	VHF		American	
	Empire Coil Co.	UHF		TV Corp.	
Spokane, Wash.	KXLY	VHF	New Bedford, Mass.	E. Anthony &	UHF
	KHQ	VHF		Sons	
Austin, Tex.	KTBC	VHF	York, Pa.	WNOW	UHF
	Capital City	UHF		WSBA	UHF
	TV Co.				
Youngstown, Ohio	Vindicator Printing Co.	UHF	Mobile, Ala.	WKAB	UHF
	WKBN	UHF			
Portland, Ore.	Empire Coil Co.	UHF	Honolulu	KGMB	VHF
Bridgeport, Conn.	So. Pacific &	UHF	El Paso, Texas	KROD	VHF
	Long Island TV Co.				
New Britain, Conn.	WKNB	UHF	Ft. Lauderdale, Fla.	WFTL	UHF
				WBRD	UHF
Springfield, Mass.	WSPR	UHF	San Juan, P. R.	WKAQ	VHF
Holyoke, Mass.	Hampden-Hampshire	UHF			
	Corp.				

* On the air





GENERAL  ELECTRIC
Electronic TUBES

MARKET DATA BULLETIN

Bulletin #1

August 25, 1952

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Colo.	5,030	1.2	275,000	55	493,000	98
Conn.	353,040	59.0	542,000	1 1/2	737,000	2
Del.	76,180	80.5	87,000	1 1/4	120,000	1 1/2
D. C.	186,470	79.0	206,000	1 1/4	282,000	1 1/2
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Ill.	1,367,480	50.5	2,037,000	1 1/2	3,102,000	2 1/2
Ind.	444,130	36.5	936,000	2	1,441,000	3
Iowa	176,700	21.5	522,000	3	895,000	5
Kan.	60,670	10.0	378,000	6	651,000	11
Ky.	178,120	22.0	586,000	3 1/2	1,015,000	5 1/2
La.	99,910	13.0	550,000	5 1/2	976,000	10
Me.	12,830	4.8	185,000	14 1/2	322,000	25
Md.	415,430	61.5	641,000	1 1/2	893,000	2
Mass.	972,140	71.5	1,230,000	1 1/2	1,635,000	1 1/2
Mich.	908,920	48.0	1,541,000	1 1/2	2,412,000	2 1/2
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<u>TYPICAL DEALER</u>	<u>Radio</u>	<u>Gen'l Serv.</u>	<u>TV</u>
Average No. of Service Technicians Employed	1.4	2.7	5.3
% of Service Calls Handled in the Home	10%	60%	80%
Sq Ft of Floor Space	700	900	1,000
Sq Ft of Service Space per Technician	250	174	92
Who Handles Bookkeeping and Accounting	Owner	Owner	Acctnt
Jobs Per Week - Each Technician	32	35	37
Average Billing per Service Call	<u>\$5.50</u>	<u>\$7.50</u>	<u>\$8.00</u>
Volume of Service Business --- 1950	\$7,500	\$12,500	\$15,500
1951	9,000	15,500	21,000
Change in Business (1950 vs 1951)	+20%	+24%	+35%
(1951 vs 1952)	+13%	+23%	+27%

These figures light up some facts which will be useful to a Radio Dealer or General Dealer who is planning to expand his operations to include more TV servicing. For example, they show that the number of technicians required will increase as more TV service work is taken on. In fact, all companies reporting 25 or more employees on the survey were primarily TV dealers.

Contrary to this, however, TV service is reported to require a smaller amount of total floor space than radio service, for the same amount of business. So an expansion into TV work does not necessarily require an immediate increase in floor space. This is the result of more TV service work being done in customers' homes.

The figures also show that as the proportion of TV work builds up, business volume jumps ahead sharply -- to the point where the services of an accountant will probably be required eventually by a full-fledged TV dealer. Until this point is reached, the dealer will profit tremendously from the material in the Business Practices portion of the G-E Service Management Manual.

Several topics in the survey are so vital to service dealers that a more detailed analysis is necessary.

JOBS HANDLED BY WEEK PER TECHNICIAN -- ALL DEALERS

The survey shows a wide divergence of operations in this item.

Extremes

Under 15 jobs per week -- 132 or 6%
Over 65 jobs per week -- 118 or 5%

Most Reported

30-34 jobs per week -- 311 or 14%
40-44 jobs per week -- 239 or 11%
20-24 jobs per week -- 231 or 11%

Others

50-54 jobs per week -- 224 or 10%
25-29 jobs per week -- 191 or 9%
35-39 jobs per week -- 150 or 7%
60-64 jobs per week -- 123 or 6%
15-19 jobs per week -- 101 or 5%
45-49 jobs per week -- 64 or 3%
55-59 jobs per week -- 14 or 1%
No Reply 277 or 12%
Totals 2175 = 100%

Dealers whose operations fall into one of the extreme categories may want to take a closer look at the handling of their businesses. Is the dealer handling less than 15 calls per week per technician forced to charge excessively in order to make a profit? Is an inadequate service job being done by the dealer who handles more than 65 calls per week per technician?

AVERAGE BILLING PER SERVICE CALL -- ALL DEALERS

The replies to this item, too, had an extremely wide spread on the return, and varied regionally and by size of city and town. In general, operators in big cities and in TV areas seem to charge more.

Extremes

\$3 per call -- 104 or 9%
\$14 per call -- 146 or 13%

Most Reported

\$5 per call -- 331 or 29%
\$8 per call -- 325 or 29%
\$10 per call -- 231 or 20%

Others

\$6 per call -- 218 or 10%
\$7 per call -- 191 or 9%
\$4 per call -- 165 or 7%
\$9 per call -- 145 or 7%
\$11 & \$12 per call -- 108 or 5%
\$13 per call -- 58 or 3%
No Reply 118 or 5%
Totals 2175 = 100%

Another question asked on the survey concerned methods of soliciting new service business. The answers to this showed considerable uniformity. The typical service dealer uses two media to solicit new business -- local newspaper advertising and mail solicitation. This indicates a healthy realization of the value of advertising in building business. Future issues of the Merchandising Manual will be of real help to all dealers in increasing the effectiveness of their advertising programs.

Incidentally, service contracts seem to be on the wane. Fewer than four percent of the calls made by 1066 dealers responding to a question on this subject were covered by service contracts.

In the next issue of the Market Data Bulletin we will break down the dealer replies to the survey according to numbers of employees. This will give you an opportunity to pinpoint your business as it compares with others in the same size grouping.

ROUNDUP OF NEW CONSTRUCTION PERMITS GRANTED SINCE LIFTING OF TV FREEZE ON JULY 1, 1952

Since the freeze on construction of new TV stations was lifted on July 1, the FCC had granted 28 construction permits up to August 9. Eight of these are for VHF commercial stations (two of which are in U. S. Possessions); 16 are for UHF commercial stations; and four are Educational Grants.

As of August 9, there were 710 other applications pending. Only 20 applications were filed the week ending on that date, the smallest amount for any week since June 1-7 when the freeze was still on.

Following is a summary of new CP's granted up to August 9.

New Station	Call Letters or or Grantee	UHF or VHF	New Station	Call Letters or or Grantee	UHF or VHF
Denver, Colo.	KFEL-TV* KVOD Empire Coil Co.	VHF VHF UHF	Flint, Mich.	Trans- American TV Corp.	UHF
Spokane, Wash.	KXLY KHQ	VHF VHF	New Bedford, Mass.	E. Anthony & Sons	UHF
Austin, Tex.	KTBC Capital City TV Co.	VHF UHF	York, Pa.	WNOW WSBA	UHF UHF
Youngstown, Ohio	Vindicator Printing Co. WKBN	UHF UHF	Mobile, Ala.	WKAB	UHF
Portland, Ore.	Empire Coil Co.	UHF	Honolulu	KGMB	VHF
Bridgeport, Conn.	So. Pacific & Long Island TV Co.	UHF	El Paso, Texas	KROD	VHF
New Britain, Conn.	WKNB	UHF	Ft. Lauderdale, Fla.	WFTL WBRD	UHF UHF
Springfield, Mass.	WSPR	UHF	San Juan, P. R.	WKAQ	VHF
Holyoke, Mass.	Hampden-Hampshire Corp.	UHF			

* On the air





GENERAL ELECTRIC
Electronic TUBES

MARKET DATA BULLETIN

Bulletin #2

October 17, 1952

TV SET FORECAST BY STATE, 1955-1960

The TV set forecast presented in Market Data Bulletin #1 covered half the states in America, showing the tremendous growth of TV coverage expected over the next eight years. The figures for the remainder of the states are published below, along with the totals for the entire country.

	TV Sets in Use Aug. 1952	% Of Families With Sets Aug. 1952	1955 Estimated TV Sets in Use	For Every Set Now in Use There Will Be This Many in 1955	1960 Estimated TV Sets in Use	For Every Set Now in Use There Will Be This Many in 1960
Neb.	107,340	26.0	260,000	2 1/2	441,000	4
Nev.	--	--	27,000	--	66,000	--
N. H.	45,110	28.0	108,000	2 1/2	188,000	4
N. J.	1,076,210	75.0	1,295,000	1 1/4	1,755,000	1 1/2
N. Mex.	13,720	7.2	145,000	10 1/2	267,000	19 1/2
N. Y.	3,163,980	70.0	3,942,000	1 1/4	5,289,000	1 1/2
N. C.	182,100	17.5	831,000	4 1/2	1,475,000	8
N. Dak.	--	--	93,000	--	204,000	--
Ohio	1,563,410	64.5	2,134,000	1 1/2	2,894,000	2
Okla.	140,320	20.5	435,000	3	737,000	5 1/2
Ore.	--	--	333,000	--	623,000	--
Pa.	1,748,920	57.5	2,760,000	1 1/2	3,659,000	2
R. I.	130,100	55.5	204,000	1 1/2	272,000	2
S. C.	37,680	7.0	429,000	11 1/2	754,000	20
S. Dak.	1,290	0.7	99,000	77	218,000	169
Tenn.	143,680	15.5	673,000	4 1/2	1,191,000	8 1/2
Texas	352,120	15.0	1,582,000	4 1/2	2,835,000	8
Utah	65,600	33.0	169,000	2 1/2	267,000	4
Vt.	7,950	7.3	75,000	9 1/2	129,000	16
Va.	210,290	23.5	677,000	3	1,221,000	6
Wash.	136,940	17.5	499,000	3 1/2	922,000	6 1/2
W. Va.	75,970	14.0	407,000	5 1/2	710,000	9 1/2
Wisc.	308,060	30.5	808,000	2 1/2	1,230,000	4
Wyo.	--	--	45,000	--	105,000	--
Total	17,722,410	39.5	35,165,000	2	55,000,000	3
U. S. A.						

SERVICE DEALER SURVEY REVEALS DETAILED OPERATING INFORMATION
BY NUMBER OF SERVICE TECHNICIANS EMPLOYED

In Market Data Bulletin #1 we reported the replies to a recent G-E survey of 2175 full-time service dealers in terms of the "typical" Radio, General Service, and TV Dealer. Here we report the replies as they were given by dealers in various size groupings. This gives you an opportunity to compare your operation with that of the typical service dealer in your size range, based on the number of service technicians you employ.

SERVICE DEALER SIZE

No. of Technicians	ALL DEALERS (2175)		TV DEALERS (817 of the 2175)	
	% of Total Replies	Average No. Per Dealer	% of Total Replies	Average No. Per Dealer
0-2	70%	1	53%	1
3-5	19	3	25	3
6-9	5	7	10	7
10-24	4	14	7	14
25-39	1	31	2	31
40-up	1	--	3	--

* * * * *

FLOOR SPACE

The total amount of floor space occupied by service dealers of various sizes is as follows for ALL DEALERS. Floor space for TV DEALERS is very similar, and therefore not shown separately.

ALL DEALERS (2175)

Square Feet Floor Space	No. of Technicians =	% of Total Replies			
		0-2	3-5	6-9	10-24
0-500		46%	19%	21%	19%
500-1000		21	19	4	4
1000-2000		21	32	24	15
2000-3500		8	19	29	29
3500-over		4	11	22	33

The typical dealer's floor space is:

No. of Technicians =	0-2	3-5	6-9	10-24
Average Sq Ft of Floor Space	600	1250	2000	2750

Note: Insufficient answers were received from concerns in the 2 larger size groupings.

SERVICE SPACE

This table shows the amount of floor space devoted only to service. Replies from TV DEALERS were again very similar, and therefore are not reported. While TV DEALERS are larger, more of their service work is done in the home.

ALL DEALERS (2175)

% of Total Replies

<u>Square Feet Service Space</u>	<u>No. of Technicians =</u>	<u>0-2</u>	<u>3-5</u>	<u>6-9</u>	<u>10-24</u>
0-200		26%	8%	8%	--
200-400		32	18	14	11%
400-600		22	23	6	7
600-800		8	14	13	5
800-1000		4	9	5	5
1000-1500		5	16	23	14
7500-2000		2	6	13	14
<u>Over 2000</u>		1	6	--	--
2000-3500		--	--	12	24
<u>3500 & Over</u>		--	--	6	20

(Although not shown above, about half of the concerns with 25 to 39 technicians have 3000 or more sq ft of service space, and about 70% of the concerns with 40 or more technicians have in excess of 5000 sq ft.)

The service space of the typical dealer is as follows:

<u>No. of Technicians =</u>	<u>0-3</u>	<u>3-5</u>	<u>6-9</u>	<u>10-24</u>
Average Sq Ft of Service Space	300	600	1250	1750
Sq Ft of Service Space per Technician	237	170	166	120

* * * * *

BOOKKEEPING

The following table indicates who in the service dealer's operation handles the book-keeping and accounting.

<u>ALL DEALERS</u>	<u>No. of Technicians =</u>	<u>Percent of Total Replies</u>					
		<u>0-2</u>	<u>3-5</u>	<u>6-9</u>	<u>10-24</u>	<u>25-39</u>	<u>40 & Up</u>
Accountant		26%	53%	58%	55%	67%	70%
Owner		55	26	11	10	0	0
Girl		15	17	29	30	20	18
Other		4	4	2	5	13	12

BOOKKEEPING (CONT'D)

Percent of Total Replies

<u>TV DEALERS</u>	<u>No. of Technicians =</u>	<u>0-2</u>	<u>3-5</u>	<u>6-9</u>	<u>10-24</u>	<u>25-39</u>	<u>40 & Up</u>
Accountant		40%	60%	57%	59%	67%	71%
Owner		36	22	13	7	0	0
Girl		19	14	29	29	20	17
Other		4	4	1	5	13	12

* * * * *

JOBS HANDLED PER TECHNICIAN PER WEEK

Percent of Total Replies

	<u>JOBS HANDLED</u>	<u>No. of Technicians =</u>	<u>0-2</u>	<u>3-5</u>	<u>6-9</u>	<u>10-24</u>	<u>25-39</u>	<u>40 & Up</u>
All Dealers	0-14		8%	6%	6%	3%	--	--
	15-29		32	23	14	7	--	--
	30-44		37	38	32	38	31%	35%
	45-59		13	18	19	33	54	45
	60 & over		10	15	29	19	15	20
TV Dealers	0-14		7%	8%	7%	3%	--	--
	15-29		35	18	11	4	--	--
	30-44		35	36	33	38	31%	35%
	45-59		13	20	16	36	54	45
	60 & over		10	18	33	19	15	20

Jobs handled per week per technician by the typical service business is as follows:

<u>No. of Technicians =</u>	<u>0-2</u>	<u>3-5</u>	<u>6-9</u>	<u>10-24</u>	<u>25-39</u>	<u>40 & Up</u>
ALL DEALERS	32	37	42	46	52	47
TV DEALERS	32	40	44	48	52	47

* * * * *

SERVICE JOBS COMPLETED IN THE HOME

Percent of Total Replies

<u>No. of Technicians =</u>	<u>0-2</u>	<u>3-5</u>	<u>6-9</u>	<u>10-24</u>	<u>25-39</u>	<u>40 & Up</u>
ALL DEALERS	35%	73%	75%	80%	80%	86%
TV DEALERS	78	79	80	80	80	86

* * * * *

AVERAGE BILLING PER SERVICE CALL

	<u>\$ PER CALL</u>	<u>No. of Technicians =</u>	<u>Percent of Total Replies</u>					
			<u>0-2</u>	<u>3-5</u>	<u>6-9</u>	<u>10-24</u>	<u>25-39</u>	<u>40 & Up</u>
All Dealers	Under \$3		9%	2%	0%	0%	0%	0%
	\$4-6		39	26	31	28	31	28
	\$7-9		29	40	36	35	39	22
	\$10-12		15	18	21	29	15	22
	\$13 & over		8	14	12	8	15	28
TV Dealers	Under \$3		2%	1%	0%	0%	0%	0%
	\$4-6		31	21	29	32	31	28
	\$7-9		36	41	41	34	39	22
	\$10-12		19	22	18	24	15	22
	\$13 & over		11	15	12	10	15	28

Average billing per call for the typical service concern is as follows:

	<u>No. of Technicians =</u>	<u>0-2</u>	<u>3-5</u>	<u>6-9</u>	<u>10-24</u>	<u>25-39</u>	<u>40 & Up</u>
ALL DEALERS		\$7	\$7	\$8	\$8	\$8	\$8
TV DEALERS		8	8	8	8	8	8

PERCENT OF CALLS ON SERVICE CONTRACT – Typical Dealer

	<u>No. of Technicians =</u>	<u>Percent of Total Replies</u>					
		<u>0-2</u>	<u>3-5</u>	<u>6-9</u>	<u>10-24</u>	<u>25-39</u>	<u>40 & Up</u>
ALL DEALERS		2%	7%	28%	50%	64%	76%
TV DEALERS		9	10	33	57	64	76

METHODS OF SOLICITING NEW SERVICE BUSINESS

The percent using specific methods is shown below. Replies from TV service dealers did not vary significantly.

<u>METHOD</u>	<u>No. of Technicians =</u>	<u>Percent of Total Replies</u>					
		<u>0-2</u>	<u>3-5</u>	<u>6-9</u>	<u>10-24</u>	<u>25-39</u>	<u>40 & Up</u>
Local Advertising		72%	76%	85%	63%	71%	61%
Radio		16	19	23	29	14	29
TV		6	3	9	17	14	22
Mail		38	48	59	57	14	48
Telephone		10	14	15	22	0	40
Other		21	32	22	27	28	70

(The average service dealer uses about 2 methods. "Other" included "good work," "reputation," etc.)

* * * * *

VOLUME OF SERVICE BUSINESS IN 1950 & 1951

DOLLAR VOLUME IN 1950 & 1951 (Average)

		No. of Technicians =	0-2	3-5	6-9	10-24	25-39	40 & Up
1950	ALL DEALERS		\$8,000	\$22,000	\$50,000	\$88,000	\$175,000*	Over \$200,000*
	TV DEALERS		8,500	23,000	55,000	90,000	175,000*	Over 200,000*
1951	ALL DEALERS		8,000	27,000	59,000	120,000	188,000*	Over 200,000*
	TV DEALERS		11,000	30,000	62,000	125,000	188,000*	Over 200,000*

VOLUME PER TECHNICIAN

1951	ALL DEALERS	\$6,150	\$7,500	\$7,870	\$8,200	--	--
	TV DEALERS	7,330	8,100	8,270	8,500	--	--

* Insufficient replies to obtain a valid figure.

* * * * *

APPEARANCE OF UHF TO INCREASE SERVICE MARKET --
WILL CREATE PROBLEMS, TOO

The appearance of UHF television in a VHF area will create a sizeable increase in available service business.

The vast majority of TV sets now in use have no provision for UHF conversion, and will require the installation of separate converters. Later Model VHF TV sets will at least need the addition of special tuning strips for reception of UHF. Some time in 1953, however, sets will probably be produced which will need little or no adjustment for UHF reception.

Converters will have a wide variation in price, depending upon quality and appearance. So it may be necessary for the service dealer to carry several lines. In the main, converters will consist of (1) a germanium or silicone diode which is used for a mixer, (2) a local oscillator tube, probably a 6AF4, and (3) a Cascode IF amplifier using a 6BK7A or a 6BQ7.

As with anything new, UHF will create new technical problems. Special antennas will be required for UHF reception, and these must be carefully adjusted for height as well as for direction. In addition, lead-in wire approaching the quality of coaxial cable must be used to hold losses to a minimum, particularly where there is a long distance between antenna and set. Considerable attention must be given to the mounting of the antenna, since even minimum antenna sway will cause picture flutter.

Range of UHF transmitters will not be as great as VHF, at least in initial installations, because of the relatively high noise factor of the receiver. VHF receivers with converters

to receive UHF will have about the same noise factor as VHF receivers had 3 years ago. However, in a reasonably strong signal area, UHF reception should be even better than VHF, since it is virtually unaffected by man-made disturbances. Work is now being done on set design to reduce the noise factor, and thus increase the range of reception. Increased transmitter power accomplishes the same result. Service dealers will want to keep this limited range in mind when making conversions to UHF, to avoid customer dissatisfaction. That is, it may be better to tell a customer that he will get unsatisfactory UHF reception even though he gets good VHR reception, than to proceed with a disappointing conversion.

As far as test equipment is concerned, the only additional investment required will be for a UHF signal generator. In some cases even this will not be necessary as several makes of test equipment now in use can be used with UHF with no alterations or additions.





GENERAL  ELECTRIC
Electronic TUBES

MARKET DATA BULLETIN

Bulletin #3

January 15, 1953

MARKET ANALYSIS FOR PLANNED MANAGEMENT

Where Do You Stand?

What is your share of the available service business in your area? Is it increasing, about the same, or decreasing? Undoubtedly, you know your total dollar volume for any given period, but aren't there times when you feel that it should be increasing faster – or perhaps that it doesn't measure up to your expectations? You should know realistically where you stand, and then, based on your experience and the figures in your books, make accurate forecasts of where you want to be a year from now. The beginning of a new year is a good time for a pause and a critical analysis of your business.

Service Volume

The foundation of your planning is knowing your service volume. In this issue, we give you four simple steps for figuring volume in your area. Volume represents the income from which you must pay wages and salaries, rent, heat, taxes, and for tubes and components sold – and have something left over for profit. It takes good sales management to create sales volume, and an important part of sales management is determining available service business.

\$ Service Potential in Your Town or City

Since income from TV servicing greatly outweighs income from radio servicing across the nation, we are going to emphasize measuring service volume for TV sets. In order to quickly figure out how many dollars were spent last year (1952) in your area and how much will be spent next year (1953) for TV servicing and installation, a little figuring is necessary. But the answers can quickly be compared with your own volume for 1952 and your expected share of the business next year. This will show you where you stand, and repeated each year will give you a measure of your potential and your competitive position. Here are the steps that are necessary to figure this.

Step 1. How many TV sets are in use in your area? At the end of this issue, we show a listing of TV sets in use by area. In the event that your area is not represented here, there are numerous other sources of this information. The best is your local TV station (or stations), the Chamber of Commerce, local newspapers, or the monthly sets-in-use figures for each TV area in the country published by NBC and reproduced here. It is best to know the number in use at about midyear or to average the number in use at the beginning and end of 1952.

If you are in a very large city and your service area is pretty much confined to a certain part of the city or suburbs, we suggest you find out how many households

are in this area. Then multiply it by the percent of households having a TV set as of mid-1952 to get the average number of sets in use in 1952. The number of households and the percent having TV sets can be obtained from the same sources we recommended for your sets-in-use figure, from your City Hall or the World Almanac. A letter or phone call should do it. If this fails, write us. Be sure to define your trading area (area in which you do servicing). As an example, suppose you are located in Detroit, Michigan, and you confine your servicing to three of the many parts of the city. These are Royal Oak, Ferndale, and Birmingham. Together these three suburbs have 28,400 families. According to reliable estimates, 70% of the homes in Detroit had a TV set in mid-1952. Therefore:

$70\% \times 28,400 \text{ households} = 20,000 \text{ TV households in Royal Oak, Ferndale, and Birmingham.}$

Use this figure for TV households in your service area and follow through steps 2 - 4.

Step 2. Multiply the number of TV sets in use in your area by the average number of service calls made on each set per year. (The average set is serviced about five times a year.) This gives total service calls for the year which you and your competitors handled during 1952. What percent of these servicing jobs did you handle?

Example:

71,000 TV sets in use in Utica, N. Y., at midyear, $\times 5$ service jobs each = 355,000 service jobs in Utica in 1952.

The records of Acme TV Service Co. in Utica, a make-believe company, show that they did 22,000 service jobs in 1952.

$\frac{22,000}{355,000} = 5.6\%$ of total service calls.

Step 3. Multiply these total service calls for your area by the average charge (including parts), which for the country as a whole was approximately \$8 in 1952. This gives the total service and parts billing in your service area for last year. Compare them with your dollar billing; what percent did you account for?

Example:

Total service jobs in 1952 in Utica, 355,000. At \$8 per job, this amounts to \$2,840,000 total service and parts billing in the area.

Acme TV Service Co. records show their total service income in 1952 was \$177,000. This is 6.3% of total service volume in the Utica area in 1952. Average billing per job was about \$8.

Step 4. How many more sets will there be in your service area in 1953? If you are in one of those fortunate areas about to have its first TV reception, we can't help you except to say make the most of it. Between 30% to 50% of the people will have a set in the first year. For the rest of the country in established TV areas, our crystal ball says that the number of sets in use will increase approximately 25 percent - from 21 million to 26 million sets in actual use. This gives an average increase of about 12 percent for the year. You might use 10 percent as a conservative figure. Your service volume should increase this amount if you merely maintain your present competitive position.

Example:

There were approximately 76,500 TV sets in use in Utica at the end of 1952. A 10% increase means that the average number of sets in use in 1953 will be 84,200.

At 5 service jobs per set there will be 421,000 service jobs in 1953 in this area.

At an average of \$8 per job this amounts to \$3,368,000 billing in 1953 for Acme and their competitors.

We saw that Acme TV Service Co. accounted for 5.6% of service jobs in his area in 1952. They expect to up this to 6.5% in 1953 by adding more men and enlarging their shop facilities.

6.5% x 421,000 service jobs = 27,400 service jobs for ACME in 1953. To find dollars, multiply 6.5% x \$3,368,000 = \$218,000 service volume in 1953 for ACME as a sales budget or goal for them to aim at in 1953.

The following list may help you figure the potential business in your area:

TELEVISION SETS-IN-USE

(All Counties Receiving Standard TV Signal from 64 Stations Affiliated with NBC)

<u>Area</u>	<u>TV Sets-in-use (June 1, 1952)</u>	<u>Area</u>	<u>TV Sets-in-use (June 1, 1952)</u>
Albuquerque	14,400	Lancaster	150,000
Ames, Iowa (Des Moines)	86,300	Lansing	100,000
Atlanta	172,000	Los Angeles	1,200,000
Baltimore	391,000	Louisville	141,000
Binghamton	74,000	Memphis	133,000
Birmingham	107,000	Miami	87,000
Bloomington	165,000	Milwaukee	336,000
Boston	904,000	Minneapolis - St. Paul	318,000
Brownsville, Texas - Matamoros, Mexico	10,800	Nashville	68,500
Buffalo	271,000	New Haven	286,000
Charlotte	145,000	New Orleans	97,900
Chicago	1,160,000	New York	3,005,000
Cincinnati	326,000	Norfolk	116,000
Cleveland	624,000	Oklahoma City	92,300
Columbus	213,000	Omaha	130,000
Dallas	(See Ft. Worth -	Philadelphia	1,052,000
Fort Worth	Dallas)	Phoenix	39,500
Davenport -		Pittsburgh	448,000
Rock Island	118,000	Providence	218,000
Dayton	190,000	Richmond	127,000
Detroit	686,000	Rochester	149,000
Erie	82,700	Salt Lake City	74,000
Fort Worth	172,000	San Antonio	80,400
Dallas		San Diego	118,000
Grand Rapids	136,000	San Francisco	395,000
Greensboro	87,000	Schenectady	213,000
Houston	150,000	Seattle	149,000
Huntington	83,000	St. Louis	402,000
Indianapolis	235,000	Syracuse	166,000
Jacksonville	58,000	Toledo	186,000
Johnstown	154,000	Tulsa	77,500
Kalamazoo	144,000	Utica	71,000
Kansas City	210,000	Washington	370,000
		Wilmington	106,000
		TOTAL	17,627,300

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GENERAL  ELECTRIC

Electronic TUBES

MARKET DATA BULLETIN

Bulletin #4

April 15, 1953

WHAT DO SET-OWNERS REALLY THINK OF THE TV AND RADIO SERVICE DEALER?

Television service technicians undertook a large responsibility in the short period from 1947 to 1952, when they installed and serviced over 20 million TV sets. This monumental task was accomplished with haphazard training programs, inadequate equipment and the problem of parts shortages in the early days.

The fact that 20 million TV sets, in addition to more than 100 million radios, were kept in operation by the service industry is a tribute to all concerned. It resulted in a business amounting to over a half billion dollars in 1952.

Considerable adverse consumer opinion of TV servicing was voiced during this period, largely reflecting the work of a few unethical service concerns and the consumer's own misunderstanding of his TV set's complicated structure. In addition, to understand the problem which faces the service and components industry, it is important to realize that expenditures for service do not tend to increase the living standard or day-to-day pleasure of the set owner. In servicing any appliance, television receiver, or radio set, something is restored to the consumer which he considers already his. As a result, it is natural for a set owner to feel irritated when he has to spend more hard-earned cash to restore something he already had.

The service industry is overcoming this adverse consumer opinion by "selling" service and by educating customers. Ask the man on the street his opinion of TV service in general and he may criticize it, but ask him his opinion of the service technician who last serviced his own set and his opinion will more than likely be favorable.

Our curiosity on this point let us to conduct a survey which was completed April 1st. Here we have actual opinion based on a sample taken from 2000 consumers who actually had their sets serviced during the last six months. The service industry has every reason to be proud of the results.

Quality of Service

The first question we asked had to do with quality of service. We wanted to know what Mr. and Mrs. Consumer thought of the dealer who last serviced their set. Their opinions were taken from three categories: set owners in cities of less than 100,000, set owners in cities of 100,000 to 500,000, and set owners in cities with populations of over 500,000. These replies came from all portions of the country - Miami, Amarillo, Boston, Los Angeles, Madison, Wisconsin, Altoona - from almost every state in the union. With regard to quality of service, only 10 percent thought that the service was poor. A total of 70 percent thought that the service was either good or excellent.

Parts and Labor

Next we asked what they thought about the charges for parts and labor. Seventy-eight percent, or 8 out of 10, thought that the charges for parts and labor were reasonable. Only 22 percent of all consumers polled thought that charges were too high. In other words, our problem rests with only 2 out of every 10 people with whom we do business. It is obvious that the service dealer can now start to shoot with a rifle instead of a shotgun. Efforts to convince this small portion of customers makes the "service selling" job look a lot simpler.

Speed of Service

What did we find about speed of service? Only 13 percent thought that service was slow - 43 percent thought it was average, and 44 percent thought the service was fast.

Work Done by a Professional?

We also asked two more questions: First, was the work done either by an independent service dealer or the service department of an appliance store? 90 percent said yes, and 10 percent said no. In other words, it seems that there are comparatively few tinkerers attempting to do servicing.

Service Contract?

Another significant question was this one: Do you have a service contract? Only 9 percent said yes. This is a marked change from the years immediately following World War II. It reflects the growing confidence of the consumer in the service dealer's fairness and efficiency. It also indicates the growing belief that the service dealer is a permanent part of our electronics industry and, as such, will not be considered a transient in the community.

TABULATION OF RESULTS

	<u>Cities with Population under 100,000</u>	<u>Cities with Population of 100,000 - 500,000</u>	<u>Cities with Population of over 500,000</u>	<u>Total all Cities</u>
<u>Quality of Service</u>				
Excellent	31%	27%	34%	32%
Good	38	31	38	37
Fair	23	24	18	20
Poor	8	18	10	11
<u>Parts and Labor Charges</u>				
Reasonable	84	75	78	77
High	16	25	22	23
<u>Speed of Service</u>				
Fast	40	47	40	43
Average	48	40	48	45
Slow	12	13	12	12
<u>Type of Service Facility</u>				
Independent Service Concern or Service Dept. of an Appliance Store	96	89	84	91
Other (friend, self, etc.)	4	11	16	9
<u>Percent Having a Service Contract</u>	9	10	9	9

IS COLOR TV A REALITY?

The compatible color TV set is definitely practical and will be available by mid 1954, according to numerous leaders in the TV industry. Recent estimates show that the National Television Systems Committee (N.T.S.C.) is expected to complete testing color television in 4 to 6 months. It is expected that the F.C.C. will act on these recommendations in another 6 months. Allowing time for the industry to tool-up, the first sets should be available for sale to consumers some time around mid 1954.

Many believe that color television will be a localized attraction when it hits the market. This is not true. It is claimed by the experts that any one station on a network can pick up and transmit color telecasts with only a few minor changes in station equipment.

The stations from which color programs originate will require much new and expensive equipment, of course. These will probably be located at first in our large entertainment centers such as New York, Chicago, and Los Angeles. Since these are the points where most network programs originate, when color television breaks it will be available across the country simultaneously. It should be remembered that programs transmitted in color can be received on a black and white screen with improvement in picture definition, using the N.T.S.C. system.

Current estimates indicate that 35,000 color sets will be produced in 1954. This figure will increase rapidly until 1960 when over half of the television sets manufactured will be color receivers. As with all such new items, prices of the first sets are expected to be about 3 times the price of today's black and white sets, or approximately \$1100 for sets with a 20-inch to 21-inch screen size. This price will decrease as production increases, so that by 1956 the price should be down to approximately \$500, and in 1960 down to the price level present-day black and white TV sets.

Many servicemen are asking, "What will color TV do to my service business?". Present consensus is that business should increase considerably. The first factor to be considered is that color television sets will require between 35 and 40 receiving tubes. The second factor is that circuitry is much more complicated and involves many more parts.

These features add up to the fact that the servicemen will require more study and training because of the many adjustments and replacements which color TV will demand. Large tube and set manufacturers such as General Electric will be on hand with technical data and diagrams to help the service dealer with his color TV service problems.

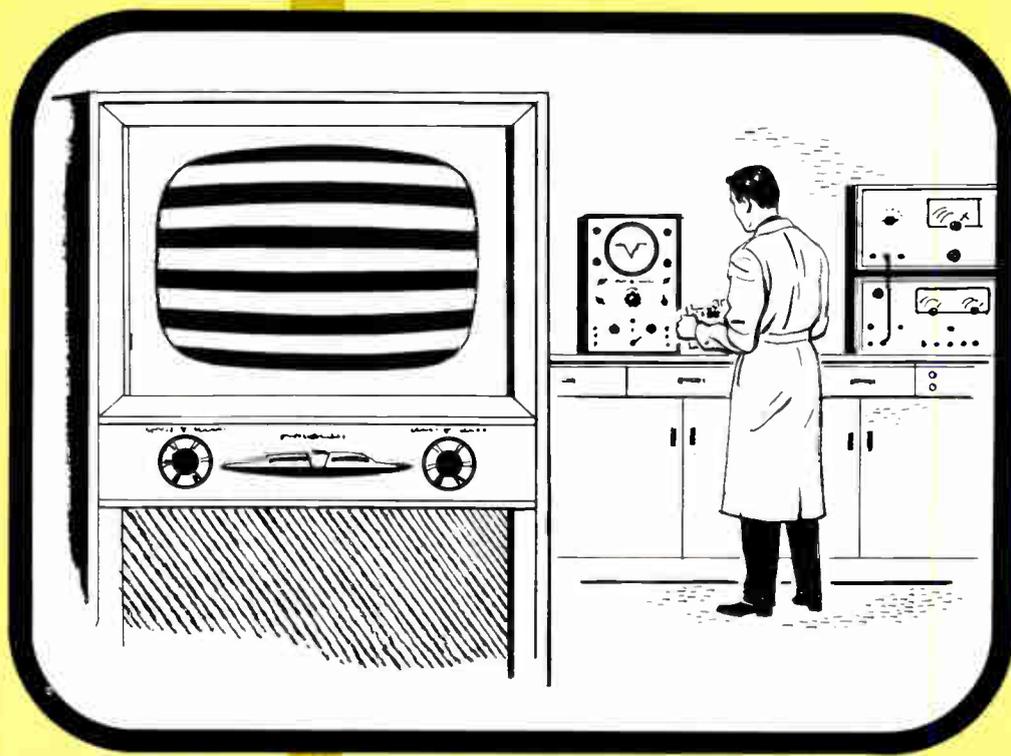
With more and more homes containing more tube sockets than light bulbs, it is expected that the TV and radio service dealer can expect ever increasing business in the future.



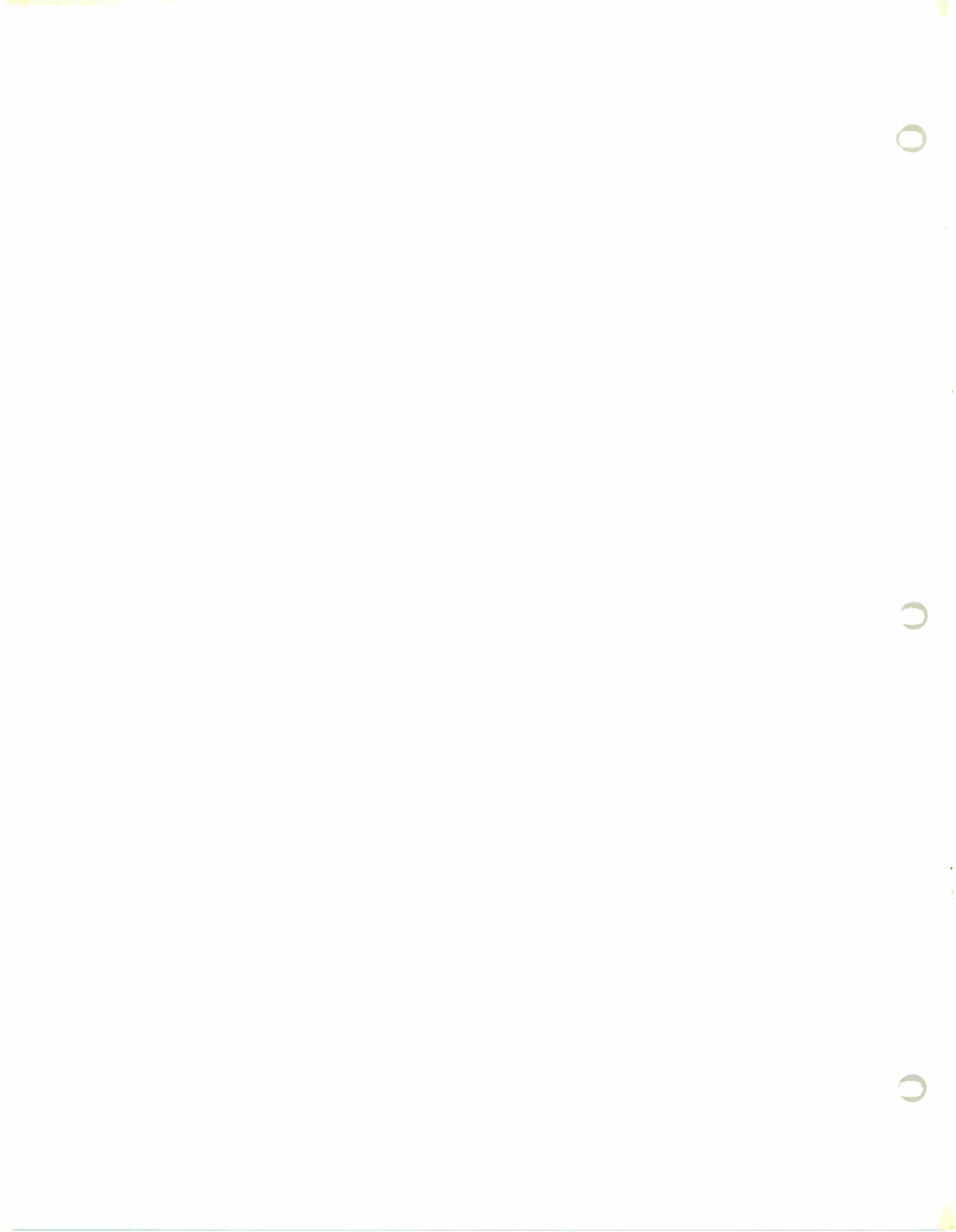
TECHNICAL
MANUAL

#4

UHF SERVICING AND ALIGNMENT TECHNIQUES



GENERAL  ELECTRIC
Electronic TUBES



UHF SERVICING AND ALIGNMENT TECHNIQUES

The number of operating TV stations in the USA is rapidly increasing due principally to the allocation of 70 new (UHF) channels by the Federal Communications Commission. The following is a complete list of

all TV channels as assigned by the FCC. The frequency of both the picture carrier and the sound carrier is given for future reference.

TABLE I
Complete List of TV Channel Frequencies

CHANNEL NO.	FREQUENCY RANGE MC	PICTURE CARRIER MC	SOUND CARRIER MC	CHANNEL NO.	FREQUENCY RANGE MC	PICTURE CARRIER MC	SOUND CARRIER MC
2	54-60	55.25	59.75	43	644-650	645.25	649.75
3	60-66	61.25	65.75	44	650-656	651.25	655.75
4	66-72	67.25	71.75	45	656-662	657.25	661.75
5	76-82	77.25	81.75	46	662-668	663.25	667.75
6	82-88	83.25	87.75	47	668-674	669.25	673.75
7	174-180	175.25	179.75	48	674-680	675.25	679.75
8	180-186	181.25	185.75	49	680-686	681.25	685.75
9	186-192	187.25	191.75	50	686-692	687.25	691.75
10	192-198	193.25	197.75	51	692-698	693.25	697.75
11	198-204	199.25	203.75	52	698-704	699.25	703.75
12	204-210	205.25	209.75	53	704-710	705.25	709.75
13	210-216	211.25	215.75	54	710-716	711.25	715.75
14	470-476	471.25	475.75	55	716-722	717.25	721.75
15	476-482	477.25	481.75	56	722-728	723.25	727.75
16	482-488	483.25	487.75	57	728-734	729.25	733.75
17	488-494	489.25	493.75	58	734-740	735.25	739.75
18	494-500	495.25	499.75	59	740-746	741.25	745.75
19	500-506	501.25	505.75	60	746-752	747.25	751.75
20	506-512	507.25	511.75	61	752-758	753.25	757.75
21	512-518	513.25	517.75	62	758-764	759.25	763.75
22	518-524	519.25	523.75	63	764-770	765.25	769.75
23	524-530	525.25	529.75	64	770-776	771.25	775.75
24	530-536	531.25	535.75	65	776-782	777.25	781.75
25	536-542	537.25	541.75	66	782-788	783.25	787.75
26	542-548	543.25	547.75	67	788-794	789.25	793.75
27	548-554	549.25	553.75	68	794-800	795.25	799.75
28	554-560	555.25	559.75	69	800-806	801.25	805.75
29	560-566	561.25	565.75	70	806-812	807.25	811.75
30	566-572	567.25	571.75	71	812-818	813.25	817.75
31	572-578	573.25	577.75	72	818-824	819.25	823.75
32	578-584	579.25	583.75	73	824-830	825.25	829.75
33	584-590	585.25	589.75	74	830-836	831.25	835.75
34	590-596	591.25	595.75	75	836-842	837.25	841.75
35	596-602	597.25	601.75	76	842-848	843.25	847.75
36	602-608	603.25	607.75	77	848-854	849.25	853.75
37	608-614	609.25	613.75	78	854-860	855.25	859.75
38	614-620	615.25	619.75	79	860-866	861.25	865.75
39	620-626	621.25	625.75	80	866-872	867.25	871.75
40	626-632	627.25	631.75	81	872-878	873.25	877.75
41	632-638	633.25	637.75	82	878-884	879.25	883.75
42	638-644	639.25	643.75	83	884-890	885.25	889.75

FREQUENCY DESIGNATIONS

The frequencies used for channels 2 through 13 range from 55.25 mc to 215.75 mc. These frequencies are known as very high frequencies or vhf. The frequencies used for channels 14 through 83 range from 471.25 mc

to 889.75 mc. These frequencies fall in the band of frequencies known as ultra-high frequencies or uhf. Table 2 is a list of the different radio frequency bands as assigned by FCC.

**TABLE 2
RADIO-FREQUENCY BANDS**

Frequency in mc	Frequency designation	Wavelength in meters	Wavelength in ft. (approx.)
0.01-0.03	Very low (vlf)	30,000 - 10,000	98,400 - 32,800
0.03-0.3	Low (lf)	10,000 - 1,000	32,800 - 3,300
0.3 - 3	Medium (mf)	1,000 - 100	3,300 - 330
3 - 30	High (hf)	100 - 10	330 - 33
30 - 300	Very-high (vhf)	10 - 1	33 - 3
300 - 3,000	Ultra-high (uhf)	1 - 0.1	3 - 0.33
3,000-30,000	Super-high (shf)	0.1 - 0.01	0.33 - 0.03

In some areas the only TV reception will be from UHF stations, whereas in other areas reception from both UHF and VHF stations will be available. It is expected that in the future practically all TV areas will have one or more UHF stations in operation. In view of this, most TV service technicians will have to become familiar with UHF servicing.

The only difference between a VHF receiver and an UHF-VHF receiver is in that portion of the receiver

between the antenna and the 1st i-f amplifier. In those areas where VHF reception was previously available, UHF servicing will include UHF-VHF receivers as well as separate UHF converters. In those areas where only UHF reception is available very few separate converters will have been sold. Servicing will therefore be principally on complete UHF-VHF receivers. In a few years it is expected that all TV receivers will be manufactured with complete UHF-VHF coverage.

UHF-CONVERTERS AND TUNERS

It might be well to point out the principal differences between the terms UHF converter and UHF tuner. A unit which has its own cabinet is generally called a converter, whereas a unit which is mounted inside a TV receiver is called a UHF tuner.

All UHF converters use what is known as double-

conversion. This means that the UHF channel frequency is first converted to the frequency of a VHF channel and the VHF channel frequency is then converted to the i-f frequency of the receiver. A block diagram illustrating double-conversion is shown in Fig. 1.

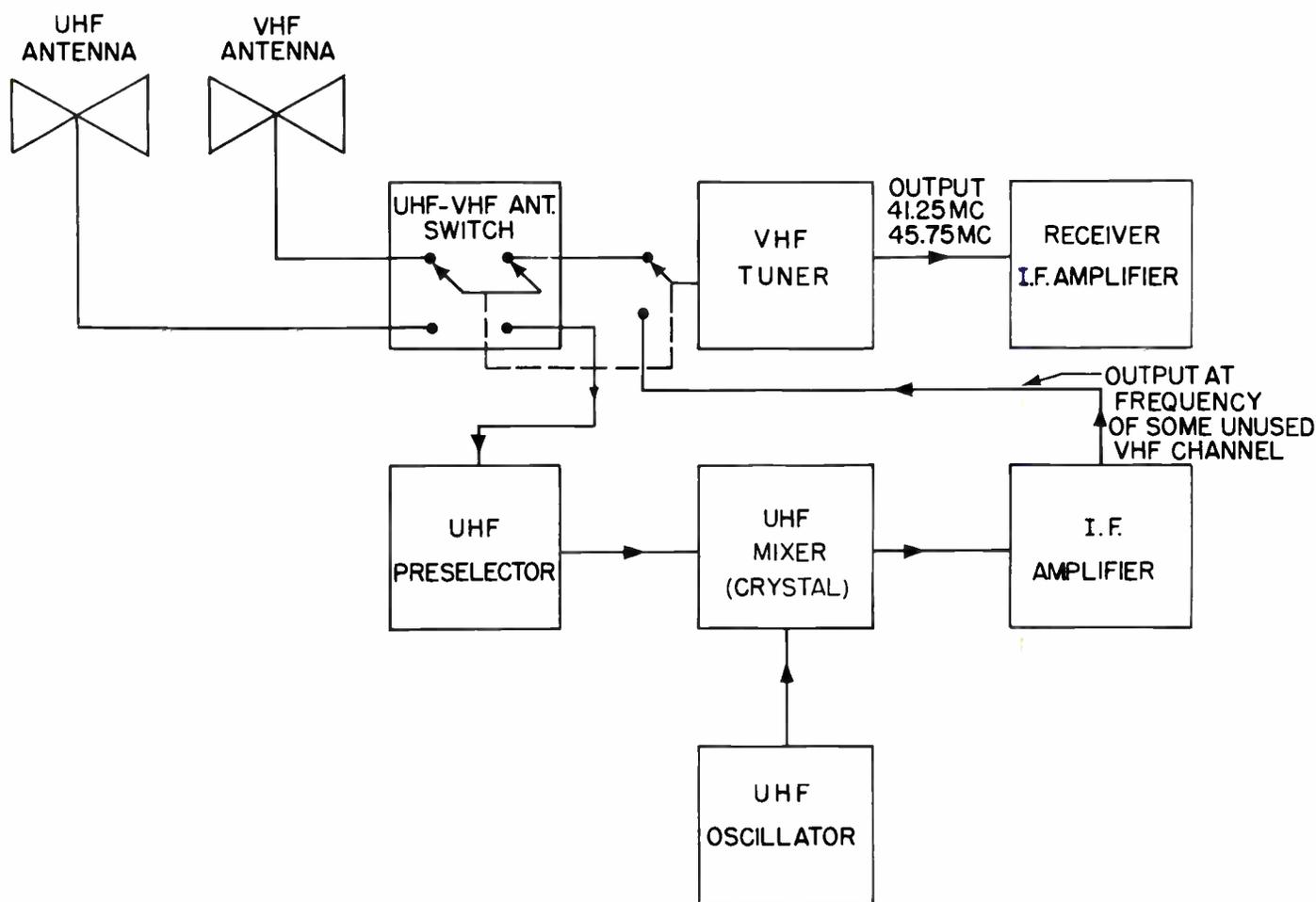


FIG. 1 Block diagram illustrating the double conversion of a UHF channel frequency.

UHF tuners *may* use the same system of double-conversion as is used in converters. The only difference is in physical design and the power supply. Since a UHF tuner is usually mounted on the TV receiver chassis, it is ordinarily designed to fit in a specific location. In many instances the power supply in the receiver is used in place of the self-contained power unit found in UHF converters. Units designed for use *either* as a converter

or as a tuner usually use a self-contained power supply.

Some tuners use a system of single conversion. A single conversion unit would be expected to appear similar to the block diagram shown in Fig. 2. Since this type unit does not have a stage of r-f preceding the mixer, it probably would only operate satisfactorily in very high signal areas. It is expected, however, that UHF tuners will soon be manufactured with a stage of

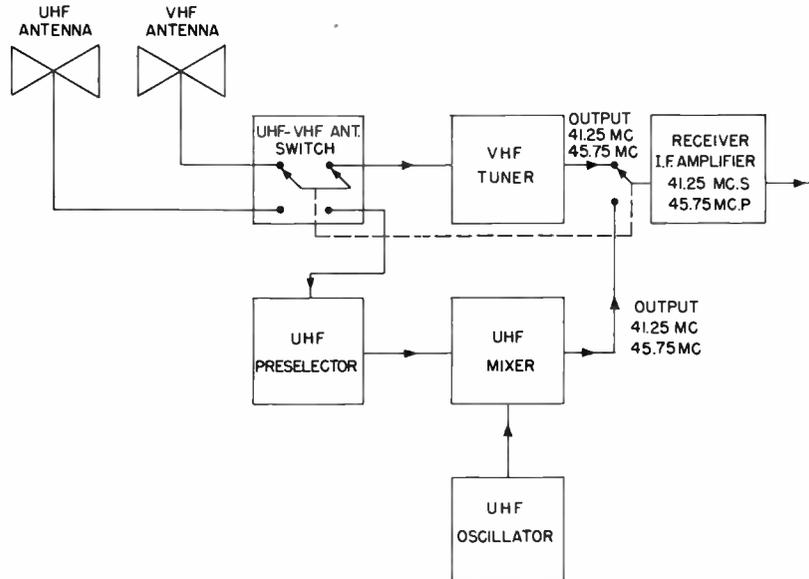


FIG. 2 Block diagram illustrating the single conversion of a UHF channel frequency.

r-f amplification. The units found in current receivers require additional amplification in order to obtain a signal of sufficient level at the first i-f stage. One such unit uses a thirteen position UHF-VHF tuner. Twelve positions are for the VHF channels and the thirteenth position is used for UHF. In the UHF position, a continuous tuner (470-890 mc.) is switched in and in addition circuit elements in the tuner change the r-f amplifier

and mixer stages to operate as 41 mc i-f amplifiers. These stages amplify the UHF signal which has been converted to 41 mc by the UHF tuner. This type of unit is illustrated in the Fig. 3 block diagram. Since the UHF channel frequency has been converted only once this system is known as single conversion. A further description of this type tuner is given in the section on oscillator frequencies.

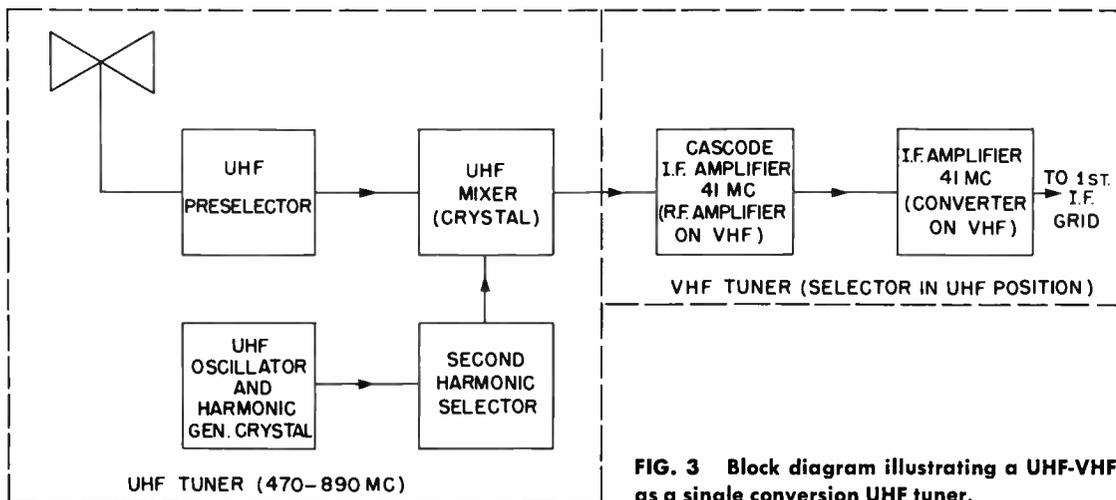


FIG. 3 Block diagram illustrating a UHF-VHF tuner operating as a single conversion UHF tuner.

UHF CHANNEL STRIPS

Channel strips may also be used in receivers designed for them. In older receivers a UHF channel strip may be substituted for an unused VHF channel strip. More recent model receivers use a tuner which has provision for several UHF channel strips in addition to the twelve VHF channels.

Channel strips which are used in tuners originally designed for VHF must use the system of double conversion. Channel strips used in later type UHF-VHF tuners may use either single or double conversion. This will be discussed in the following section on oscillator frequencies.

OSCILLATOR FREQUENCIES

The oscillator frequencies used in UHF converters, tuners and channel strips are considerably different. As an example, let us assume that a typical double-conversion type tuner or converter unit is tuned to channel 45 and the output is at the channel 5 frequency. The

oscillator must operate at a lower frequency than the UHF channel frequency or the picture and sound carriers will be reversed at the VHF tuner input. An illustration may help to clarify this statement.

CHANNEL 45 FREQUENCIES

Picture carrier	657.25 mc
Sound carrier	661.75 mc

CHANNEL 5 FREQUENCIES

Picture carrier	77.25 mc
Sound carrier	81.75 mc

If the UHF oscillator operated on the high side of the UHF channel frequency it would have to be at 739 MC. This frequency would mix with both the picture

and sound carriers for channel 45 and produce a difference frequency which would reverse the carriers as shown below.

Oscillator frequency	739.00 mc
Minus channel 45 picture carrier frequency.....	<u>657.25</u>
Difference is channel 5 sound carrier frequency..	81.75 mc
Oscillator frequency	739.00 mc
Minus channel 45 sound carrier frequency.....	<u>661.75</u>
Difference is channel 5 picture carrier frequency..	77.25 mc

These carriers would be reversed with the sound carrier on the low frequency side of the curve instead of the high frequency side. Since the VHF tuner and i-f circuits were designed for the sound carrier on the high-frequency side of the curve, the output of the UHF

converter must have the sound carrier on that side. This is accomplished by operating the UHF converter oscillator below the UHF channel frequency. When the oscillator is operated at this frequency the output of the converter would be:

Channel 45 Picture Carrier	657.25 mc
Minus oscillator frequency	<u>580.00 mc</u>
Difference is channel 5 picture carrier frequency..	77.25 mc
Channel 45 sound carrier frequency	661.75 mc
Minus oscillator frequency	<u>580.00 mc</u>
Difference is channel 5 sound carrier frequency..	81.75 mc

The VHF tuner accepts this output since it has the same carrier frequencies as a channel 5 station.

In receivers which use a single conversion UHF tuner such as that shown in Fig. 3, the oscillator frequency is different than would normally be expected. Since this type tuner converts the UHF signal directly to i-f frequencies the oscillator should operate on the high side. This is necessary because the standard i-f system has been designed to have the sound carrier on the low frequency side of the alignment curve. The i-f system could be re-designed for high side operation but then the oscillator circuit for each VHF channel would also have to be re-designed. Since the oscillator may be more unstable and the circuit design and components more critical at higher frequencies many manufacturers use an oscillator frequency which is one-half of the frequency normally expected.

In order to produce a typical 41.25 mc sound i-f and a 45.75 mc video i-f, the local oscillator signal would normally have to be tunable from 517 mc to 931 mc. Since the oscillator operates at half the frequency, it tunes from 258.5 mc to 465.5 mc. The output of the oscillator is applied to a crystal which is known as a harmonic generator. This crystal distorts the oscillator signal making it rich in harmonics. The signal is then fed to a harmonic-selector circuit which is tuned to the second harmonic of the oscillator frequency. Since this circuit attenuates all other frequencies the output is suitable for application to the crystal mixer. The output of the mixer is at the i-f frequencies and could be applied directly to the 1st i-f grid. Due to the low signal level additional amplification is required. Therefore the signal is amplified by the VHF tuner which operates as a two stage i-f amplifier. This was illustrated in the

Fig. 3 block diagram.

Some channel strips designed for use in older model VHF tuners use a different oscillator frequency than those previously discussed. Since a UHF strip must utilize the original oscillator tube and some of the circuit components originally designed to operate in the VHF range, it was not practical to use the fundamental oscillator frequency at the UHF mixer.

The oscillator frequency was selected so that it would perform two functions. Since a system of double conversion was used and only one oscillator was available, the oscillator frequency had to be suitable for use at both the UHF mixer and the VHF mixer. In a typical channel strip, a portion of the oscillator signal is applied to a crystal which operates as a harmonic generator. The crystal distorts this signal making it rich in harmonics. This signal is fed to a harmonic selector circuit

which is tuned to a harmonic, usually the third, of the fundamental oscillator frequency. The output of this circuit is mixed with a UHF channel frequency to produce a frequency in the VHF range. This VHF signal may not be the frequency of any particular channel since it merely represents one-third of the frequency required for UHF mixing. This VHF signal is amplified by the r-f amplifier and then mixed with the fundamental oscillator frequency to produce the i-f frequency of the receiver. A block diagram of this type of channel strip is shown in Fig. 4.

It has been shown that the oscillator frequencies necessary for UHF mixing may be obtained by several different methods. A general knowledge of the frequencies present and the methods used to generate these frequencies will be helpful for the technician servicing UHF units.

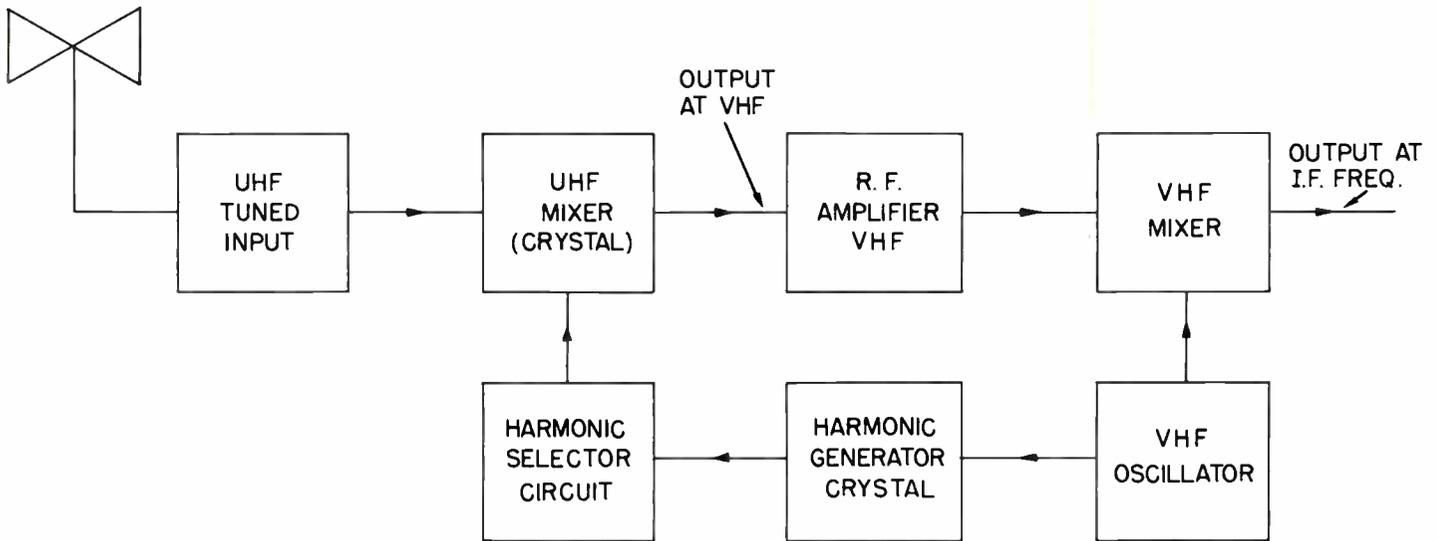


FIG. 4 Block diagram illustrating the operation of a UHF channel strip.

SERVICING UHF UNITS

It has been found that generally very little service has been required on UHF tuners or converters. This is not surprising since the circuit is relatively simple with comparatively few parts. A typical UHF tuner is

the General Electric UHF-90 shown in Fig. 5. This unit was designed to obtain power from the receiver whereas a converter has its own power supply.

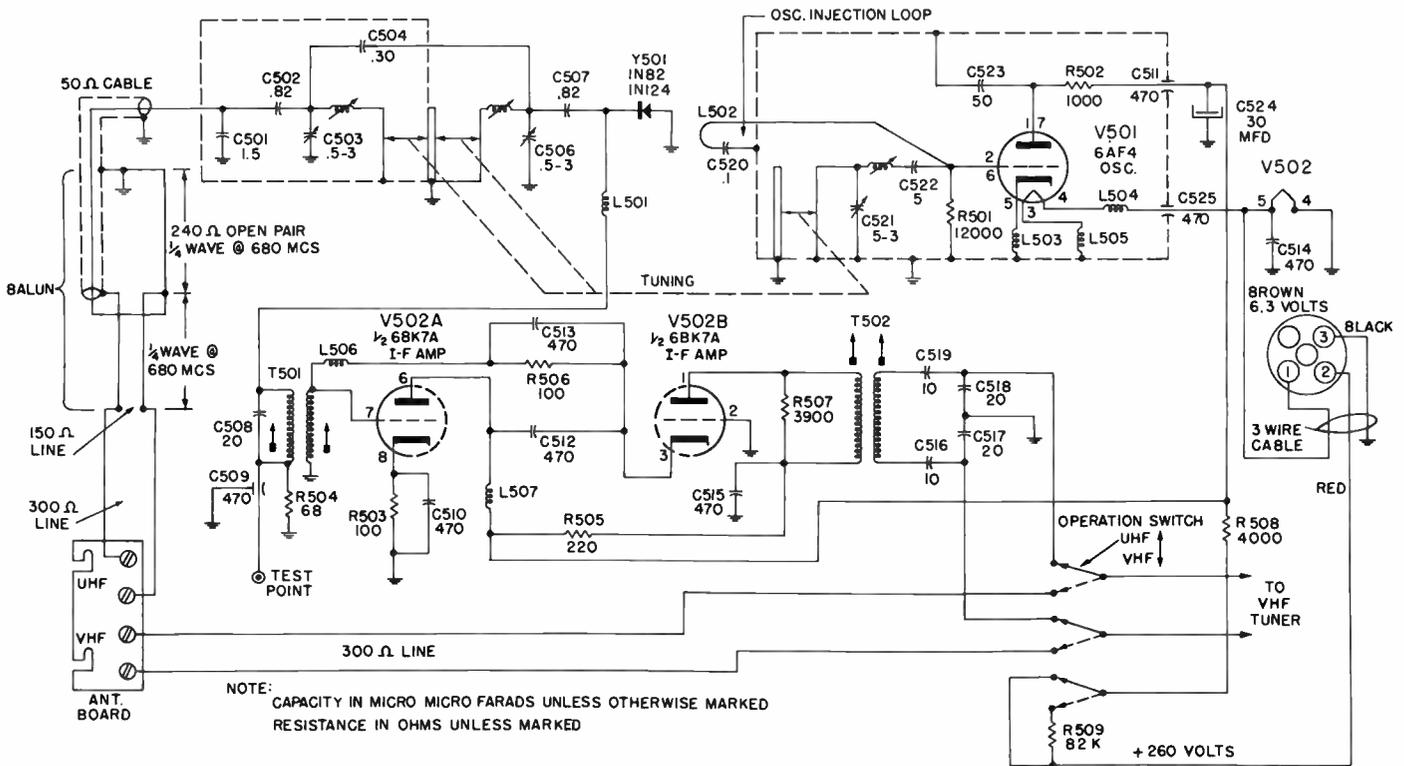


FIG. 5 Schematic diagram of the General Electric Model UHF-90 tuner.

When trouble-shooting UHF tuners or converters practically the same procedure is followed as would be followed in any other section of a TV receiver but only up to a certain point. A typical procedure followed on

UHF units is (1) check tubes (oscillator tube by substitution) (2) check crystal (usually by substitution) (3) check socket voltages (4) make further tests to isolate defect.

TUBE REPLACEMENT

The i-f amplifier tube may be tested either in a tube tester or by substitution. The oscillator tube, due to the frequencies at which it operates, may be inoperative because of some characteristic which will not be evident in a commercial tube tester. Therefore, if the oscillator tube is suspected, it would be advisable to try substitution rather than testing.

Whenever a tube is replaced be sure the original type is used, otherwise the alignment may be affected. When the oscillator tube is replaced it is possible that the dial calibration may be incorrect due to a slight change in the oscillator frequency. Some dial scales only indicate a few channels over the complete UHF range, whereas others have a dial where any channel may be rather accurately located. If the replacement of an oscillator tube shifts the frequency so that the dial indications are "way off", it may be necessary to make a slight adjustment to the oscillator trimmer.

Some converters have a readily accessible oscillator adjustment whereas others do not. Always refer to the manufacturers' service notes if the adjustments cannot

be located or identified. Oscillator adjustments should not be made unless the dial markings are considerably off frequency. If the oscillator is adjusted be sure to check both the high and low ends of the dial for proper tracking. This will be discussed at a later point. The technician will have to decide whether the difference in dial calibration is sufficient to warrant realignment of the oscillator circuit.

Make sure the oscillator tube is seated properly to prevent unstable operation. Also, be sure that the original shielding is replaced and makes good contact. Since the shield affects the oscillator frequency a poor or intermittent contact could cause variations in signal level. An oscillator tube shield not replaced or making loose contact could also produce radiation interference.

If the i-f amplifier tube is replaced, it should not ordinarily be necessary to make any circuit adjustments. If the UHF signal is weak however, it may be advisable to touch up the i-f frequency adjustment for maximum sound and picture. This is the adjustment normally used to shift the output to an alternate channel frequency.

CRYSTAL REPLACEMENT

If tube substitution does not correct the trouble the crystal mixer may be defective. Substitution is the easiest method particularly in those units where the crystal is readily accessible. A new crystal should be tried in every case when a loss of sensitivity is indicated. Most tuner or converter units have the crystal mounted so it is held in place by clip contacts. These facilitate the insertion and removal of the crystal. Since a spring contact is used make sure that the crystal makes a good contact. If there is not sufficient tension at the contact points even a new crystal may make poor contact after a short time.

When a crystal is replaced always use the original type crystal or a type which is directly interchangeable. It is also important to observe polarity. In some circuits the operation is practically the same regardless of crystal polarity, but in other circuits, the unit will be inoperative if the polarity is reversed. If the correct polarity is not known refer to the manufacturers' instructions.

A measurement of the crystal current will indicate that the oscillator is operating. This measurement is

made by inserting a microammeter at one side of the crystal. The current should vary as the dial setting is changed. This measurement should not be used as an indication of mixer efficiency since the current varies in different types of converters and tuners. If the average level of a particular make or model is known, a defective unit may be compared with this average current level. If the current is much lower in the defective unit than other units of the same type, the trouble will probably be found in the oscillator or crystal. Since it is always good practice to change each of these before making any other tests, the diode current measurement has little importance other than to indicate that the oscillator is operating.

It has been found that the oscillator injection voltage has little importance as long as it is between two voltage levels. If it is either above or below these voltage levels the noise generated within the crystal increases considerably. This is principally a design problem since the circuit and tube should operate within these injection voltage levels.

VOLTAGE CHECKS

If tube and crystal substitution does not correct the trouble the next check should be the operating voltages. It is ordinarily quite easy to check the voltages on the pins of the i-f amplifier tube. It may be somewhat more difficult to check operating voltages on the oscillator tube due to the shielding. One method is to use a piece of insulated wire with the bare end formed to fit around one of the tube pins. Voltage measurements can then be made by connecting a VOM between the other end of this wire and chassis or B-. A negative voltage on the grid which varies as the dial setting is changed indicates that the oscillator is operating.

Intermittent operation of a UHF unit may be caused

by line voltage variations. Most units operate over a considerable range of line voltages, however an oscillator tube may become voltage sensitive and not oscillate with reduced filament or plate voltages. It has also been found that the gain of most units varies with changes in line voltage. This fact should be kept in mind whenever the complaint is one of unfavorable operation only at certain times of the day.

Line voltage variations also affect the frequency of the oscillator. In most units this shift is of little importance. A reduction in line voltage, particularly at certain hours, could cause units with fixed frequency settings to operate unsatisfactorily during these periods.

I-F AMPLIFIER TESTS

The i-f amplifier in a tuner or converter is a broad band stage similar in operation to any r-f or i-f amplifier. The reason this tube is called an i-f amplifier rather than an r-f is due to the fact that the UHF signal has been changed or converted to an intermediate frequency. If the UHF oscillator or mixer crystal were removed and a VHF station signal connected to the input, the i-f amplifier would then become an r-f am-

plifier.

The operation of the i-f amplifier can be checked by using an AM signal generator for signal tracing. The generator frequency should be within the frequency range of the i-f amplifier. The amplitude modulation will produce horizontal black bars on the picture tube screen similar to Fig. 6. If the signal is getting through the i-f stage the trouble must be in the preceding stages.

FIG. 6 Bar pattern appearing on picture tube screen when AM signal is applied to the i-f grid.



PRESELECTOR, OSCILLATOR AND MIXER TESTS

The preselector, oscillator and mixer stages in a UHF tuner or converter are somewhat different than similar stages used for VHF. If trouble is suspected or located in these sections certain precautions must be taken. Some of the checks previously mentioned will determine whether or not the oscillator and mixer stages are functioning. Voltage and resistance checks will ordinarily disclose an open or short in some connection or component. When making these checks *do not disturb the lead dress*. This is important because at these frequencies lead dress is extremely critical.

If a component is found to be defective be sure to observe the following precautions:

(1) Use a part which has the same electrical, physi-

cal and temperature characteristics as the original. (If possible this part should be obtained from the manufacturer.)

(2) The lead length should be as close as possible to that used on the original.

(3) Try not to disturb the lead dress of any other components, and duplicate as closely as possible the position and lead dress of the original part.

If a "cold joint" solder connection is suspected, use a small soldering iron with a tip which will not disturb lead dress. Do not heat any connections on or near the crystal mounting board without first removing the crystal. This is important because a crystal can be destroyed if overheated.

DYNAMIC TESTING

If you happen to have a VHF channel operating on one of the converter output channels, the VHF signal can be readily converted to UHF for test purposes. Most UHF converters use either channel 5 or 6, however there are some converters which use other channels for their output frequency. It is only necessary to couple the VHF antenna signal to the UHF crystal mixer. This can be accomplished by removing the i-f amplifier tube in the UHF converter, and inserting a piece of wire into the input grid socket opening. The VHF antenna is then connected between this point and the chassis. The output is taken from the input terminals normally marked "UHF antenna".

Since the UHF preselector circuit is usually designed to accept a broad band of frequencies, a useable signal

may be obtained even on channels somewhat removed from the output channel frequencies. Fig. 7 is a block diagram of this test arrangement. Since the output of the converter is at UHF frequencies, the input terminals are used as output terminals.

The operation of this unit is quite simple since it merely reverses the normal operation. It was previously shown that the UHF signal goes through a preselector stage which is a tuned circuit and is then mixed with the oscillator frequency to produce a difference frequency. This difference frequency is usually amplified and is accepted by the VHF tuner as a VHF channel. If we again use channels 45 and 5 for illustration, the following frequencies would be present when the converter is in normal operation.

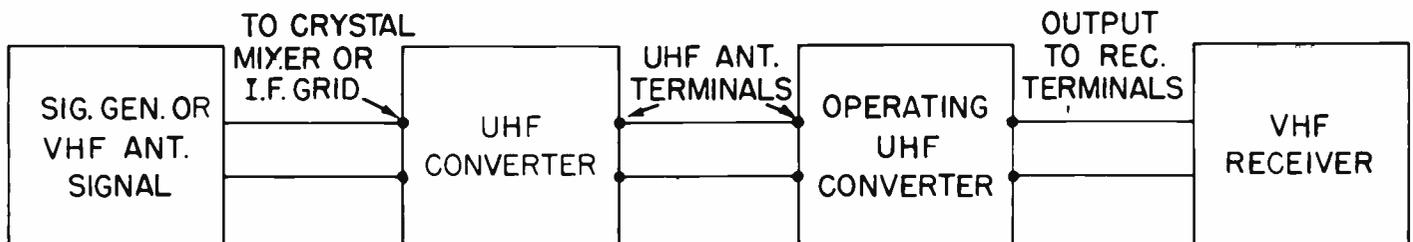


FIG. 7 Block diagram illustrating the conversion of VHF to UHF for test purposes.

Channel 45 picture carrier	657.25 mc
Oscillator frequency of converter	<u>580.00 mc</u>
Difference frequency (channel 5 picture carrier) . . .	77.25 mc

If the i-f tube in the UHF unit is removed and a channel 5 TV signal injected as previously described, the following frequencies would be present:

Channel 5 picture carrier	77.25 mc
Oscillator frequency of converter	<u>580.00 mc</u>
Output frequency at channel 45	657.25 mc

In the first instance the difference frequency is used and in the second the sum frequency. In the mixing of any two frequencies both the sum and difference frequencies plus a number of other frequencies are always present, and tuned circuits eliminate the unwanted frequencies. Since the preselector stage is a circuit which will pass frequencies to which it is tuned in either direction, it selects the channel 45 frequency and attenuates the other frequencies.

If a channel 6 signal were used the output frequency would be 6 mc higher. Since the preselector circuit is

broad, the output level would be about the same but at the slightly higher frequency of channel 46. The use of a VHF channel other than the output channel of the UHF unit will cause the dial calibration to be slightly off. The VHF signal can be converted to any UHF frequency merely by changing the dial setting.

In order to observe the VHF signal which has been converted to a UHF signal, it will be necessary to apply this signal to a UHF converter and receiver as shown in Fig. 7.

Another possible application would be for checking the mixer and preselector stages. If a VHF station signal is available, those converters which have an output frequency at or near the operating VHF channel can be checked for output and preselector efficiency. This may appear to be a somewhat difficult method to test this portion of a converter or tuner. It can save considerable time, however, if there is some question as to whether the preselector, oscillator and mixer stages are operating satisfactorily.

This same procedure may be followed for making

other tests when a UHF signal is required. Obviously the preferred method would be a signal generator which covers the UHF range. Since most of these units are quite expensive few technicians have an instrument of this type available. One example where the set-up shown in Fig. 7 might be useful would be in areas where the UHF station starts transmitting in the late afternoon, whereas a VHF signal is available for a longer period. The UHF section of a converter or receiver could be checked by connecting a signal generator or VHF antenna as shown in Fig. 7.

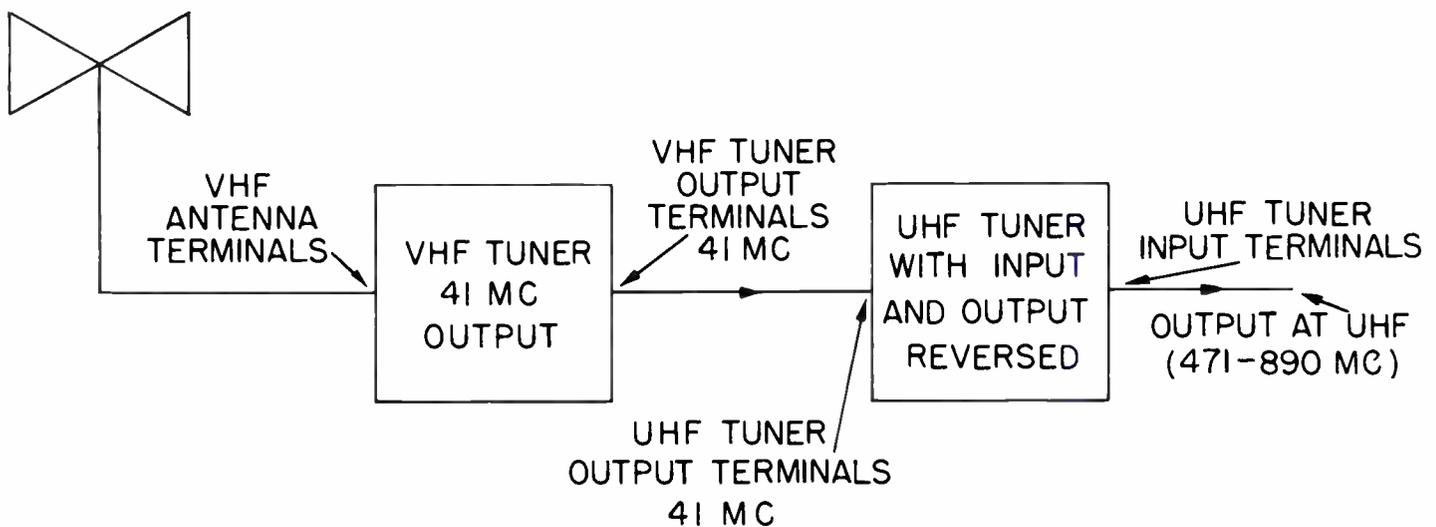


FIG. 8 Block diagram of another method of converting VHF to UHF for test purposes.

Another, though somewhat more elaborate unit could be made which would convert any VHF signal to a UHF signal. This would require (1) A 41 mc VHF tuner with a power supply and (2) A UHF tuner with 41 mc output. These two tuners would be connected as shown

in Fig. 8. In this way any VHF channel could be converted to a 41 mc signal and then fed to the output terminals of the UHF tuner. The converted VHF signal would then be available at any UHF frequency selected by the tuner.

UHF ALIGNMENT

So far the alignment of UHF converters and the UHF portion of UHF-VHF receivers has not been a problem for a number of reasons. Probably the most important reason is the newness of UHF. Numerous difficulties have been experienced in both transmission and reception. Converters and tuners have also been designed with a bandwidth considerably wider than required, therefore the response curve of the converter has not been important since the quality of UHF reception has varied

over such a wide range.

It is expected that after the novelty of UHF wears off, the technician will have to give some consideration to UHF alignment. The General Electric ST-4A Sweep Generator and the ST-5A Marker Generator can be used for the alignment of some UHF units even though the frequencies are considerably higher than those indicated on the dial scales of these instruments.



FIG. 9 The General Electric Model ST-4A sweep generator.

Obviously the only way this can be accomplished is through the use of a harmonic of the fundamental frequency. The use of a harmonic has certain disadvantages which would not be present if the fundamental frequency were available. Very few UHF sweep and marker

generators which use fundamental frequencies are on the market at the present time and these are rather expensive. Since very little additional equipment is required to use the ST-4A and 5A generators for UHF alignment, the advantages outweigh the disadvantages.

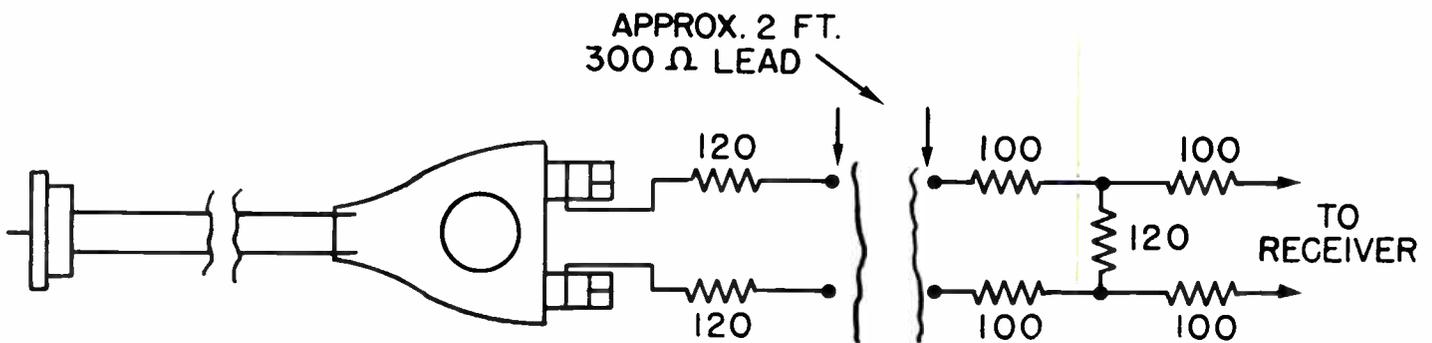


FIG. 10 Recommended termination of the General Electric ST-4A output cable for UHF alignment.

It should be pointed out that because a harmonic of the fundamental frequency is used, the output voltage is considerably reduced. Due to the low output voltage level the ST-4A and ST-5A cannot be effectively used to align UHF units which require a specific bandpass for the preselector circuit. Units of this type must have enough sweep voltage applied to the input terminals to produce a usable curve with the scope connected to the output of the UHF mixer crystal.

When the General Electric ST-4A shown in Fig. 9 is used for UHF alignment the balanced output adapter, type ST-8A which was two red terminal posts should *not*

be used. The sweep output cable should be used instead and terminated as shown in Fig. 10. This cable should be connected to one of the output plugs shown near the bottom of Fig. 9. Since only the direct harmonics of the swept oscillator are used, the "Beat Osc. Bands 2 & 3" switch in Fig. 9 is turned OFF. The fundamental frequency range of the swept oscillator is from 165 to 220 mc, therefore either the 3rd, 4th or 5th harmonic is used for the UHF alignment. The following is a list of Radio Frequency dial settings for different UHF channel frequencies and the harmonics used:

Channel Number	Picture Carrier Frequency	Radio Frequency or Sweep Dial Setting	Harmonic used for UHF
14	471.25	165MC**	3rd
15	477.25	165MC**	3rd
16	483.25	165MC**	3rd
17	489.25	165MC**	3rd
18	495.25	165MC	3rd
19	501.25	167MC	3rd
20	507.25	169MC	3rd
21	513.25	171MC	3rd
22	519.25	173MC	3rd
23	525.25	175MC	3rd
24	531.25	177MC	3rd
25	537.25	179MC	3rd
26	543.25	181MC	3rd
27	549.25	183MC	3rd
28	555.25	185MC	3rd
29	561.25	187MC	3rd
30	567.25	189MC	3rd
31	573.25	191MC	3rd
32	579.25	193MC	3rd
33	585.25	195MC	3rd
34	591.25	197MC	3rd
35	597.25	199MC	3rd
36	603.25	201MC	3rd
37	609.25	203MC	3rd
38	615.25	205MC	3rd
39	621.25	207MC	3rd
40	627.25	209MC	3rd
41	633.25	211MC	3rd
42	639.25	213MC	3rd
43	645.25	215MC	3rd
44	651.25	217MC	3rd
45	657.25	219MC	3rd
46	663.25	165.8MC	4th
47	669.25	167.3MC	4th
48	675.25	168.8MC	4th
49	681.25	170.3MC	4th
50	687.25	171.8MC	4th
51	693.25	173.3MC	4th
52	699.25	174.8MC	4th
53	705.25	176.3MC	4th
54	711.25	177.8MC	4th
55	717.25	179.3MC	4th
56	723.25	180.8MC	4th
57	729.25	182.3MC	4th
58	735.25	183.8MC	4th
59	741.25	185.3MC	4th
60	747.25	186.8MC	4th
61	753.25	188.3MC	4th
62	759.25	189.8MC	4th
63	765.25	191.3MC	4th
64	771.25	192.8MC	4th
65	777.25	194.3MC	4th
66	783.25	195.8MC	4th
67	789.25	197.3MC	4th
68	795.25	198.8MC	4th
69	801.25	200.3MC	4th

Channel Number	Picture Carrier Frequency	Radio Frequency or Sweep Dial Setting	Harmonic used for UHF
70	807.25	201.8MC	4th
71	813.25	203.3MC	4th
72	819.25	204.8MC	4th
73	825.25	206.3MC	4th
74	831.25	208.8MC	4th
75	837.25	209.3MC	4th
76	843.25	210.8MC	4th
77	849.25	212.3MC	4th
78	855.25	213.8MC	4th
79	861.25	215.3MC	4th
80	867.25	216.8MC	4th
81	873.25	218.3MC	4th
82	879.25	219.8MC	4th
83	885.25	221.3MC	4th

**Sweep width at maximum.

The operation of the attenuator at the end of the output cable will be slightly different than when used for VHF alignment. Near the minimum setting the output will increase instead of decrease. It will be necessary when this point is reached to move the adapter to the next lower output socket. In this way adequate control of the output amplitude is available.

Since a harmonic of the swept oscillator is used for UHF the sweep width settings which were used for VHF will have to be multiplied by the harmonic order used. Therefore the sweep width knob at the top left of Fig. 9 will have the following sweep widths at different UHF frequency settings:

Switch position going clockwise	Approximate sweep width on VHF range	Approximate sweep at 495-660mc. (3rd harmonic) UHF Channels 14-45	Approximate sweep width at 660-880mc. (4th harmonic) UHF Channels 46-83
1	0	0	0
2	.5MC	1.5MC	2.0MC
3	2.0MC	6.0MC	8.0MC
4	4.5MC	13.5MC	18.0MC
5	9.0MC	27.0MC	36.0MC
6	14.0MC	42.0MC	56.0MC
7	19.0MC	57.0MC	76.0MC

The ST-5A marker generator shown in Fig. 11 can be used with the ST-4A sweep generator to provide one or more markers on a UHF alignment curve. Since the highest variable frequency range in the ST-5A is 37-

50MC, either the 12th or 15th harmonic of a frequency in this range is recommended. The following is a list of the marker generator frequencies and the harmonic used to obtain a marker at the UHF picture carrier frequency:

Channel Number	Picture Carrier Frequency	Marker Dial Setting	Harmonic Used
14	471.25	39.27	12th
15	477.25	39.77	12th
16	483.25	40.27	12th
17	489.25	40.77	12th
18	495.25	41.27	12th
19	501.25	41.77	12th
20	507.25	42.27	12th
21	513.25	42.77	12th
22	519.25	43.27	12th
23	525.25	43.77	12th
24	531.25	44.27	12th
25	537.25	44.77	12th
26	543.25	45.27	12th
27	549.25	45.77	12th
28	555.25	46.27	12th
29	561.25	46.77	12th
30	567.25	47.27	12th
31	573.25	47.77	12th
32	579.25	48.27	12th
33	585.25	48.77	12th
34	591.25	49.27	12th
35	597.25	49.77	12th
36	603.25	40.2	15th
37	609.25	40.6	15th
38	615.25	41.0	15th
39	621.25	41.4	15th
40	627.25	41.8	15th
41	633.25	42.2	15th
42	639.25	42.6	15th
43	645.25	43.0	15th
44	651.25	43.4	15th
45	657.25	43.8	15th
46	663.25	33.16	20th
47	669.25	33.46	20th
48	675.25	33.76	20th
49	681.25	34.06	20th
50	687.25	34.36	20th
51	693.25	34.66	20th
52	699.25	34.96	20th
53	705.25	35.26	20th
54	711.25	35.56	20th
55	717.25	35.86	20th
56	723.25	36.16	20th
57	729.25	36.46	20th
58	735.25	36.76	20th
59	741.25	37.06	20th
60	747.25	37.36	20th
61	753.25	37.66	20th
62	759.25	37.96	20th
63	765.25	38.26	20th
64	771.25	38.56	20th
65	777.25	38.86	20th
66	783.25	39.16	20th
67	789.25	39.46	20th
68	795.25	39.76	20th
69	801.25	40.06	20th

Channel Number	Picture Carrier Frequency	Marker Dial Setting	Harmonic Used
70	807.25	40.36	20th
71	813.25	40.66	20th
72	819.25	40.96	20th
73	825.25	41.26	20th
74	831.25	41.56	20th
75	837.25	41.86	20th
76	843.25	42.16	20th
77	849.25	42.46	20th
78	855.25	42.76	20th
79	861.25	43.06	20th
80	867.25	43.36	20th
81	873.25	43.66	20th
82	879.25	43.96	20th
83	885.25	44.26	20th

If an exact marker at a UHF picture carrier frequency is desired a separate crystal may be purchased cut for any specific UHF channel. These are precision cut to give the exact picture carrier frequency, and can be plugged into any unused crystal socket. The total number of crystals that can be used is twelve. Since most technicians have only purchased crystals for the channels operating in their area there are ordinarily several unused crystal sockets. When a UHF crystal is used a paper sticker or some other means of identification may be used on the picture carrier selector dial. It should be remembered that sideband markers selected by the

switch at the top right of Fig. 11 will not be 1.5 mc or 4.5 mc away from the picture carrier frequency because a harmonic of the sweep frequency is used. Since either the third or fourth harmonic of the sweep frequency is used, a 1.5 mc marker will be either 4.5 mc (3 x 1.5) or 6.0 mc (4 x 1.5) away from the picture carrier frequency.

This means that the pointer on the right side of Fig. 11 would seldom be in the "Audio carrier 4.5 mc" position since the marker would appear either 13 mc (3 x 4.5) or 18 mc (4 x 4.5) away from the picture carrier depending on the sweep harmonic used.



FIG. 11 The General Electric Model ST-5A marker generator.

An easy way of observing the overall response of the receiver plus the UHF converter would be to connect the oscilloscope across the video detector load or at the point recommended by the receiver manufacturer for VHF alignment. The output of the sweep generator terminated as shown in Fig. 10 should be connected to the UHF antenna terminals and the proper frequencies selected. The alignment curve for the receiver alone should first be observed and, if necessary, adjusted to appear similar to that recommended by the manufacturer. The addition of a UHF converter should not materially change the curve. If the curve is considerably changed it will be necessary to touch up on the alignment of the UHF unit. First make adjustments to the i-f stage and then if necessary to the oscillator and pre-

selector stages.

Another method which can be used to observe the output of a converter is to use a separate VHF tuner wired as shown in Fig. 12. The oscillator section should be disabled and the converter section used as an r-f amplifier. A crystal detector circuit is added as shown. This circuit uses a VHF tuner which was used in a number of earlier model General Electric receivers. The wiring changes are not extensive but a separate power supply is necessary. The filaments must be either rewired or supplied with 19 volts a-c since they are normally wired in series. Any other type of VHF tuner could be used as long as it has a reasonable amount of gain and produces an acceptable alignment curve.

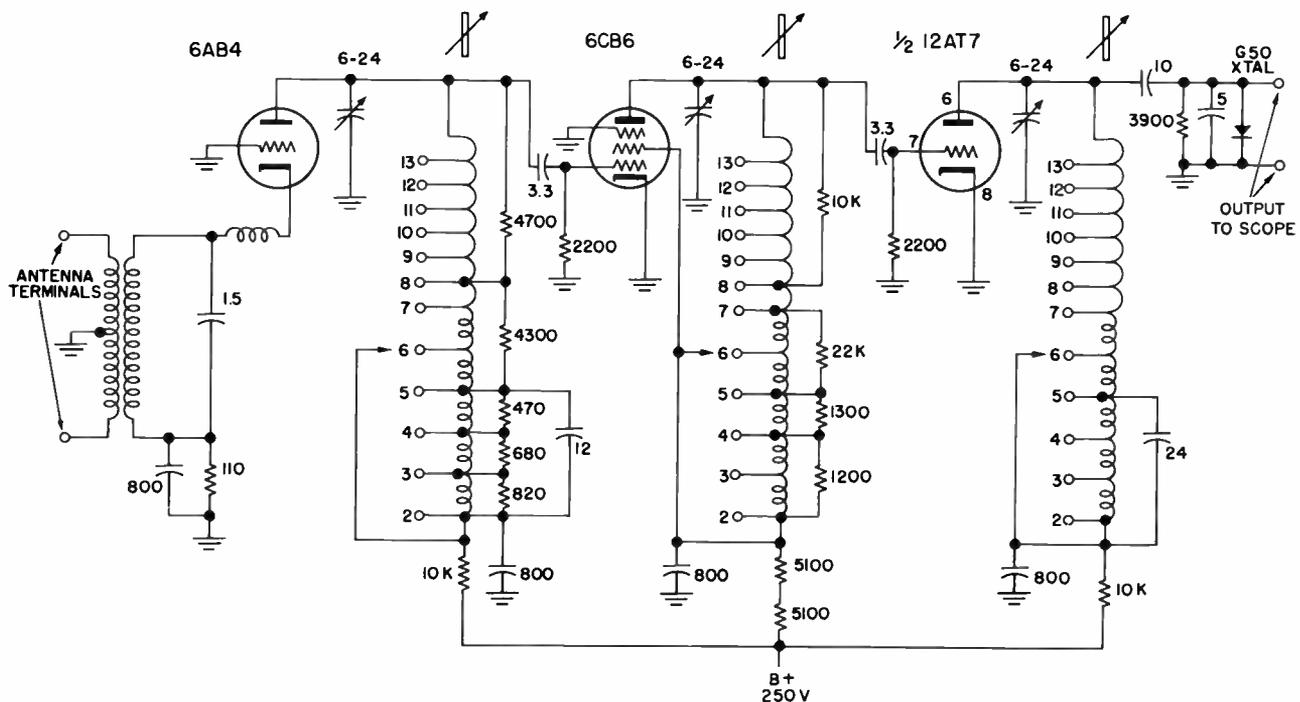


FIG. 12 A General Electric VHF tuner modified for use in UHF alignment.

There are a number of advantages in using a separate VHF tuner for UHF alignment. Since the same unit would always be used the gain would always be the same. This would not be true if a different receiver were used each time. The VHF response curve also would be the same and any variation would have to be due to the converter. A record of the amplitude and waveform can be maintained for each individual channel so that any converter can be aligned and checked for gain regardless of its output frequency.

The alignment procedure for UHF units will vary and the manufacturers' instructions should always be fol-

lowed. Generally the alignment procedure is (1) i-f amplifier, (2) oscillator and (3) preselector. The i-f stage should produce a typical i-f alignment curve but with a somewhat wider pass-band. The oscillator should be adjusted so the pointer tracks with the dial scale. The preselector adjustments are then made to assure proper tracking at both ends of the dial scale. In some cases it may be desirable to peak the preselector stage for maximum output on the operating channels. It should be kept in mind however that the best overall operation will be obtained by following the manufacturers' instructions.

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TUBE DEPARTMENT

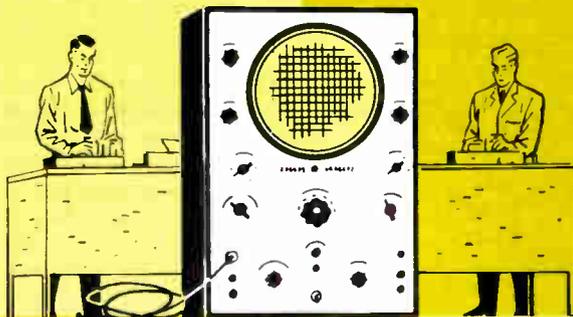
GENERAL  **ELECTRIC**

SCHENECTADY 5, N. Y.

TECHNICAL
MANUAL

#1

TV TROUBLESHOOTING WITH AN
OSCILLOSCOPE



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TV TROUBLESHOOTING with an OSCILLOSCOPE

The service technician's income depends pretty much on the number of receivers, whether radio or TV, which he can repair each day. If one technician averages ten sets per day and another fifteen, the man who repairs fifteen sets per day will have an income considerably greater than the man who can only service ten. The significance of this is apparent when overhead (rent, light, heat, truck expenses, etc.) are taken into consideration, since a certain number of receivers must be serviced each day before any "in the pocket" profit can be realized. It is, therefore, important that as many shortcuts and timesavers as possible be known and used. It is equally important that good test equipment be available and that the technician understands its operation as well as its application.

A number of service shops have invested a considerable amount of money in test equipment which, because of lack of knowledge or poorly written instruction books, is rarely used. This is particularly true of the oscilloscope, which is one of the most versatile and useful instruments available for service work on all types of electronic equipment and especially TV receivers. The only requirements for troubleshooting with an oscilloscope are:

1. A fundamental knowledge of the "how and why" of scope operation,
2. A good general knowledge of television and the function of each stage in a TV receiver.

Since both of the above requirements are necessary for general TV service work, practically everyone engaged in this work should be able to efficiently use the oscilloscope to save time and increase income.

An oscilloscope, when properly used will reduce service time by helping to identify the defective section, and in many cases the defective part such as an open coupling capacitor, which might otherwise be very difficult to locate by resistance or voltage checks. The principal advantage that an oscilloscope has over other types of test equipment is that it literally draws a picture of the signal that is present at any point in the receiver. This is vitally important in efficient TV service work since the proper operation of many circuits depends on

the shape and size of the wave form. This information cannot be obtained from other types of test equipment because they aren't capable of reproducing a wave form. Many service men have spent hours looking for an open or leaky capacitor which caused either horizontal or vertical sync trouble, a type of trouble which can be very difficult to find with other types of test equipment. When an oscilloscope is used, this type of trouble becomes relatively simple and can usually be found in a very few minutes by comparing the waveform and size which appears on the screen with those shown on most schematic diagrams.

It should be pointed out that although an oscilloscope can and will save time when used for TV servicing, it should not be used as a substitute for visual inspection which will indicate a tube with an open filament or a burned out resistor in plain sight. There are also a number of other defects which can be found by tube substitution or a few resistance or voltage measurements. These troubles can be located without using a scope. If the scope is used whenever practical a better knowledge of its use, as well as the ability to judge when and where it should be used, will be gained. The benefits derived from proper and constant use of an oscilloscope are cumulative for such use is bound to result in a more thorough understanding of the operation of the different circuits, due to actually seeing the various waveforms and the changes in them as they pass through these circuits. The knowledge and experience gained will result in more efficient servicing and increased income.

Some of the checks which can be made with an oscilloscope are:

- (a) The video signal can be traced through the r-f section, video i-f amplifier section and video amplifier section.
- (b) The approximate gain of each stage can be measured and in this way the defective circuit, and in many cases the defective component, can be located.
- (c) The section or stage which causes the synchronizing pulses to be clipped can be identified.
- (d) The cause of improper synchronization due to some defect in the horizontal or vertical oscillator or their control circuits can be readily located by a comparison of waveforms.
- (e) Excessive hum from power supplies can be quickly identified both as to amplitude and frequency.
- (f) Probably the most important use of the oscilloscope is the visual alignment of tuned circuits. This requires the use of a sweep generator and a marker generator.
- (g) Measurement of video amplifier frequency response which also requires a sweep and marker generator.

THE OSCILLOSCOPE

Certain basic requirements are necessary in an oscilloscope in order to properly and efficiently service TV receivers. Probably the most important requirement is that the oscilloscope be capable of reproducing horizontal and vertical sync pulses with a negligible amount of distortion. This is determined by a number of characteristics built into the oscilloscope, such as the frequency response and the input impedance of the vertical amplifier. The loading affect of the probe as well as the design of the attenuator circuit are also important.

The oscilloscope shown in Figure A-1, General Electric's Type ST-2A, is an instrument that has a number of features which make it particularly useful for TV service. It is important to realize the limitations of *your* scope in order to properly analyze certain waveforms. Most scopes can be used for the visual alignment of a TV receiver and for observing sine-waves over a considerable frequency range. The waveforms found in many sections of a TV receiver, however, are not sine-waves but more closely resemble square-waves. The accurate reproduction of these waveforms requires certain specifications which are generally only found in better quality oscilloscopes.

The General Electric Type ST-2A was used for most of the waveform photographs in this publication. Note that the front of the oscilloscope, as well as the waveform appearing on the screen has been shown so that the sweep frequency and other scope control settings can be compared with the scope pattern.

FREQUENCY RESPONSE

The frequency response of the vertical amplifier in the oscilloscope becomes important when observing either horizontal or vertical sync

FIG. A-1. The General Electric Type ST-2A oscilloscope.



pulses which are essentially square-waves. Figure A-2 shows a vertical sync pulse on the General Electric Type ST-2A scope. Figure A-3 shows another scope with a much lower frequency response connected to the same point on the same receiver using the same probe. Obviously the scope has changed the shape of the pulse considerably. Figure A-4 shows a horizontal sync pulse on the ST-2A scope and Figure A-5 shows the other scope connected to the same point. The horizontal pulse can hardly be identified due to the distortion in the shape of the sync pulse. Practically any scope has a vertical frequency response equal to the repetition frequency of the horizontal sync pulse which is 15,750 cycles per second. It is necessary that the vertical frequency response be many times this frequency in order to reproduce a 15,750 cycle square-wave. Since a square-wave contains up to the 30th harmonic of the fundamental frequency, it is necessary that the scope amplifier have an essentially true sine-wave response of $30 \times 15,750$ or 472,500 cycles. In some cases the square-wave response of the vertical amplifier will be found in the scope specifications. For

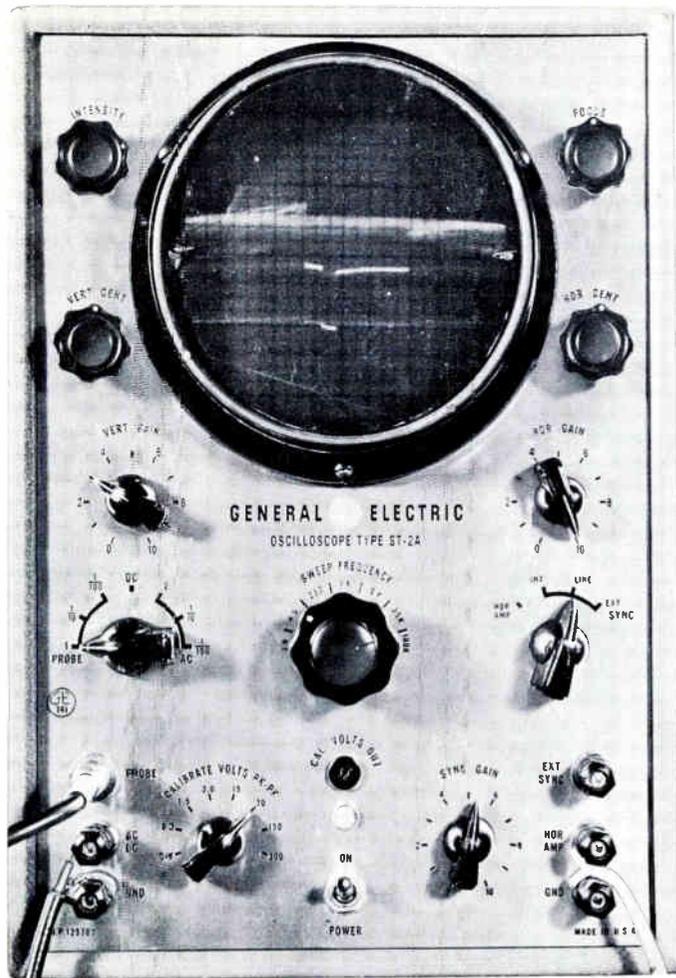


FIG. A-2. A vertical sync pulse as it appears on the General Electric oscilloscope shown in Figure A-1.

instance, General Electric specifications state that the Model ST-2A has a range of from 60 cycles to 40 KC at any gain setting. In any case the square-wave response should cover the complete range of frequencies from 60 cycles to 16 KC in order to faithfully reproduce both the vertical and horizontal sync pulses.

Attenuation is another important consideration. Many scopes are rated in terms of frequency response at full gain and/or minimum attenuation. The frequency response in such cases may fall off as the gain control is decreased, and a square-wave at half gain may appear entirely different than at full gain. A good test before purchasing a scope would be to observe the horizontal sync pulse at different gain settings in a receiver which is in good operating condition.

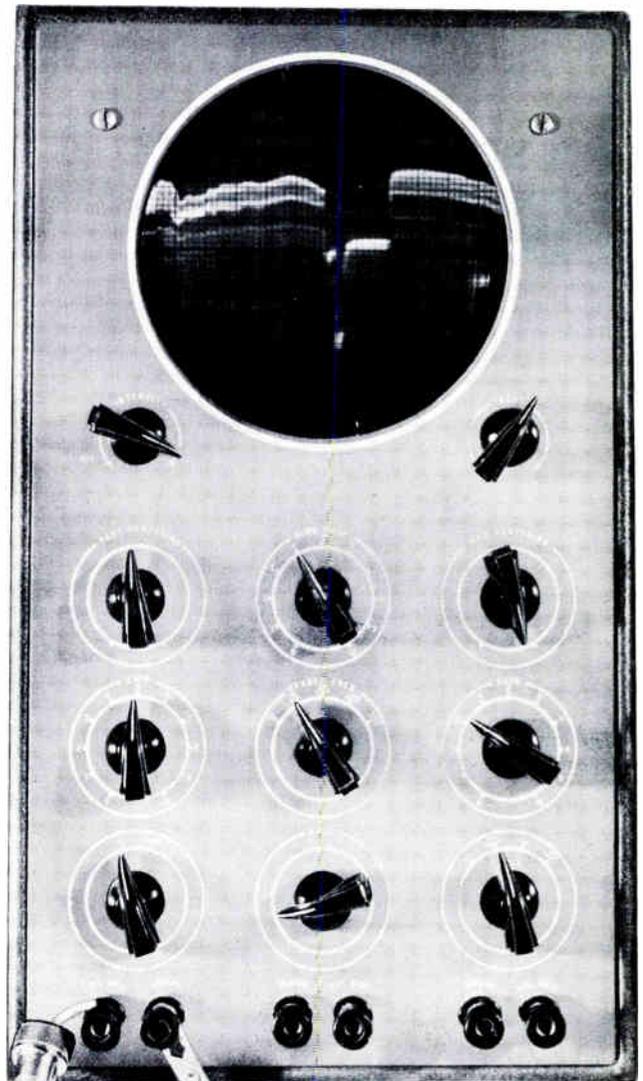


FIG. A-3. A vertical sync pulse as it appears on a less expensive oscilloscope. This illustrates the change in shape which is due to the frequency characteristics of the oscilloscope and not to a defect in the receiver.

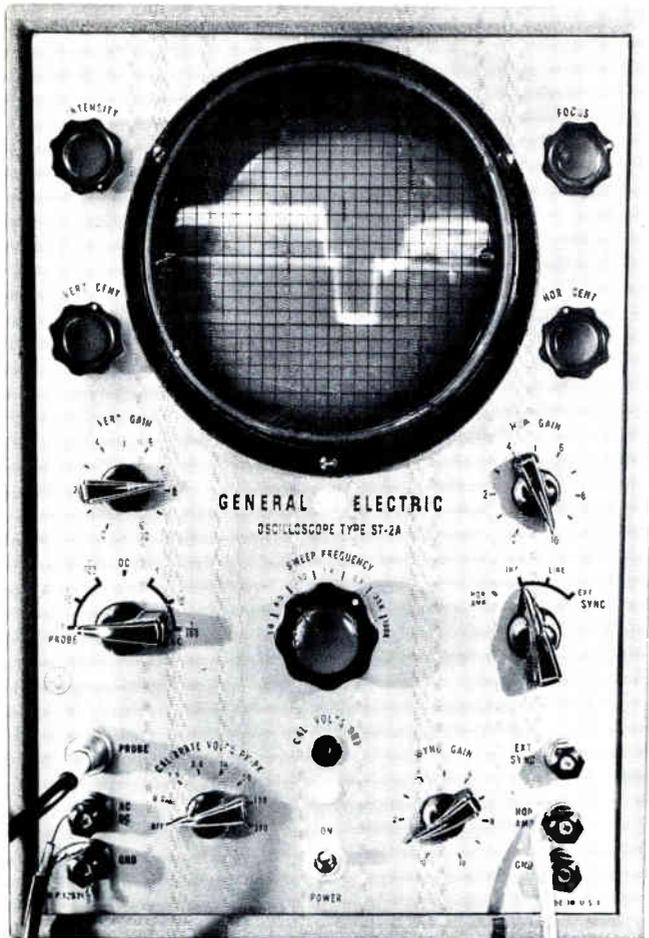


FIG. A-4. A horizontal sync pulse as it appears on the ST-2A oscilloscope.

INPUT IMPEDANCE

The input impedance of the vertical amplifier is also a point for concern in a scope to be used in TV work. This is usually given in the scope characteristics as so many ohms shunted by so many mmfs capacity. Needless to say, the higher the resistance and the lower the capacity the better, due to the loading affect which this may have on the circuit being tested. An analogy in radio servicing would be trying to read the correct plate voltage on a 12SQ7 audio amplifier tube with a 1000 ohm per volt voltmeter. As you know, the reading would be incorrect due to the parallel resistance of the meter. In a similar way, the parallel capacitance and resistance of the input circuit of the scope may also affect the circuit and, therefore, the accuracy of the resulting wave-forms.

Some scopes are not provided with high impedance input probes, but this type of probe is essential for complete and accurate TV servicing. A typical probe used for TV service is supplied with the General Electric ST-2A scope. The circuit used in this probe is shown

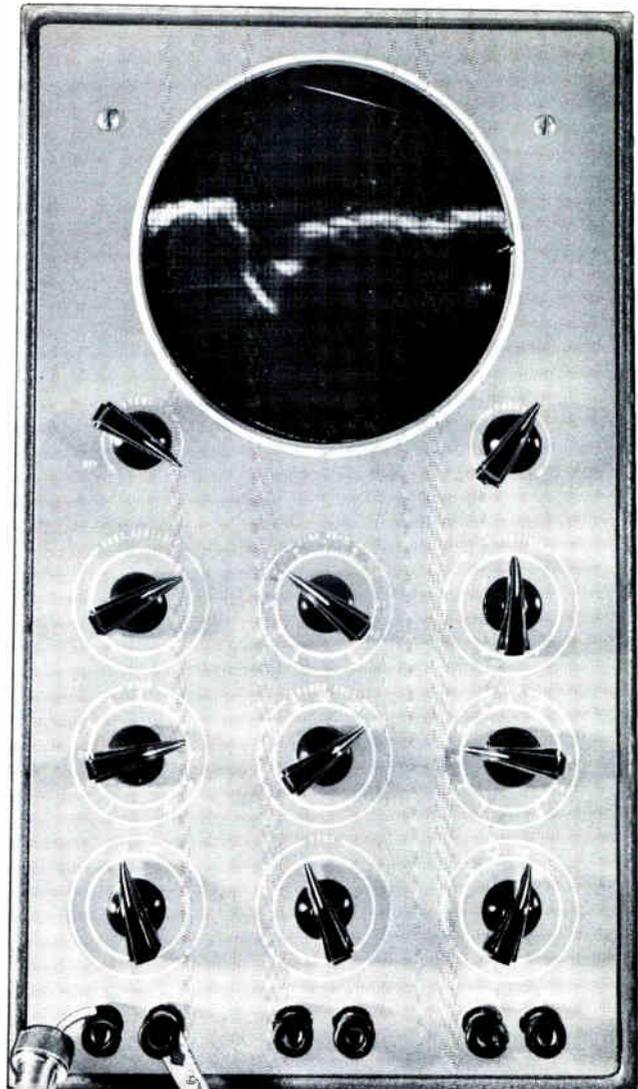


FIG. A-5. A horizontal sync pulse as it appears on the same scope used in Figure A-3.

in Figure A-6. If you do not have this type of probe, it would be advisable to either purchase one, designed for use with the scope you have, or make one using the values recommended by the manufacturer of your scope.

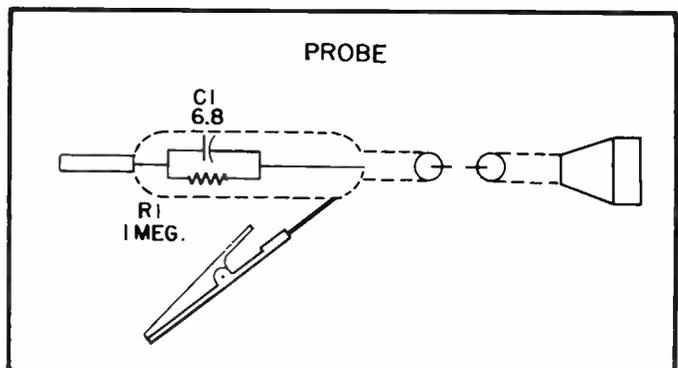


FIG. A-6. Diagram of input probe supplied with General Electric ST-2A oscilloscope.

PEAK-TO-PEAK VOLTAGE CALIBRATOR

Another feature essential in TV service work is a source of peak-to-peak calibrating voltage. This feature is built in the General Electric scope shown in Figure A-1. It operates in the following manner: The end of the input probe is inserted in to the "Calibrate Volts Out" jack located just below the "Sweep Frequency" control. The "Horizontal Gain" control is turned to zero which produces a small spot on the screen. This should be centered both horizontally and vertically. The reference voltage is then selected on the "Calibrate Volts Pk-Pk" scale and the "Vertical Gain" adjusted to indicate a vertical line of so much voltage per square. If, for instance, the voltage to be observed is approximately 10 volts peak-to-peak, the calibrate voltage switch can be set at 15 volts and the vertical gain control adjusted for a line which extends over three large squares, one and one-half above and one and one-half below the center line as shown in Figure A-7. The peak-to-peak voltage of any waveform indicated on the screen of the oscilloscope at this setting would indicate a voltage of one volt per small square. If a waveform should extend beyond the top and bottom of the scope screen when centered vertically, the switch below the vertical gain control can be switched to the 1/10 scale which will change the value of the peak-to-peak voltage to indicate 10 volts per small square. If a waveform is several hundred volts in amplitude, the 1/100 position on the scale would indicate a value of 100 volts per small square. A considerable range of peak-to-peak voltages can, therefore, be measured without recalibrating the vertical gain control. Through the use of this feature any peak-to-peak voltage can be measured merely by establishing a certain reference voltage per square.



FIG. A-7. The General Electric Type ST-2A oscilloscope set up to indicate a peak to peak voltage of 15 volts or 1.0 volt per small square.

A voltage calibrator which can be used with scopes that do not have this feature can be made as a separate unit, using the circuit shown in Figure A-8. It should be remembered, however, that an a-c voltmeter indicates RMS voltage. Peak-to-peak voltage is equal to $\frac{\text{RMS voltage} \times 2}{.707}$. If a 6.3 volt filament transformer is used, the potentiometer can be calibrated for peak-to-peak voltages from zero to about eighteen volts.

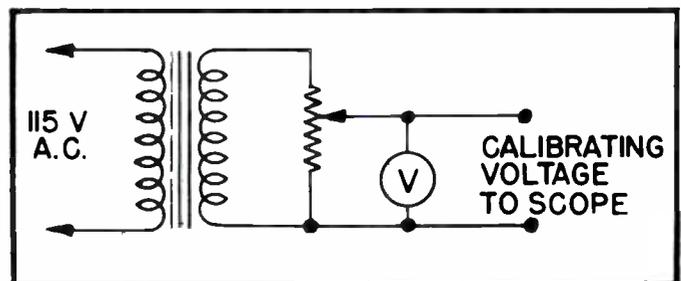


FIG. A-8. Circuit diagram of external voltage calibrator for use with a scope which does not have peak-to-peak voltage source included.

NORMAL WAVEFORMS ON CIRCUIT DIAGRAMS

A number of TV set manufacturers, including General Electric, are showing in their service notes, the waveforms with the peak-to-peak voltages which will normally be found at different test points throughout each receiver. In case this information is not shown on the schematic, considerable time may be saved on future jobs if a pencil sketch of various waveforms with the peak-to-peak voltage is inserted on the schematics. This can be done after the first receiver of a type has been serviced and is operating satisfactorily. Any defect which affects the waveform could also be noted on the drawing. At first thought this might appear as a considerable waste of time. It could, however, save many hours in hunting for a defective component, and the experience obtained in using a scope would be invaluable. A few test points on which such data would be valuable are:

1. Across the diode load resistor with some specific bias voltage either developed by the AGC circuit or obtain from a bias battery.
2. At the plate of each video amplifier stage and at the picture tube input.
3. At the input to sync amplifier and clipper stages.
4. At the input to vertical oscillator and at the grid and plate of the vertical output stage.
5. At the input and output of the different stages in the horizontal control, oscillator and output circuits. (If there is a peak-to-peak or d-c voltage present of more than 500 volts, be sure to use a capacitor with a sufficient voltage rating between the scope and the test point.) If the sync pulse is visible on any waveform be sure to show this as well as its shape.
6. Alignment curves, particularly on receivers which have stagger tuned i-f stages. A number of manufacturers may not show alignment curves with the input at different i-f stages. The scope should be connected across the diode load resistor.
7. If the waveform of the current through either set of coils in the deflection yoke is desired (this should always be a sawtooth) connect a 10 ohm resistor in series with the "hot" lead and connect the scope across this resistor.

SIGNAL TRACING WITH THE OSCILLOSCOPE

Many of you servicemen who service or have serviced radios know that a considerable amount of time is saved by using a signal generator with a "Chanalyst", "Traceometer" or some other similar instrument to supply a visual or audible indication of the signal as it passes through the different stages in a radio receiver. This method has proved invaluable in locating open or intermittent capacitors which could not readily be found by other methods. The scope can be used in a similar manner on a TV receiver, and will become increasingly valuable as TV receivers grow older and capacitors become intermittent.

LOSS OF PICTURE (INTERCARRIER TYPE RECEIVER)

A block diagram of an intercarrier type receiver is shown in Figure B-1. Let us assume that the sound is normal and that a raster is visible on the picture tube with either a faint picture or no picture at all. The normal sound indicates that the receiver is probably

operating satisfactorily up to the sound take-off point (output of DET Y1 in Figure B-1). The defect which causes the loss in video signal will probably be found somewhere between the sound take-off point and the grid of the picture tube.

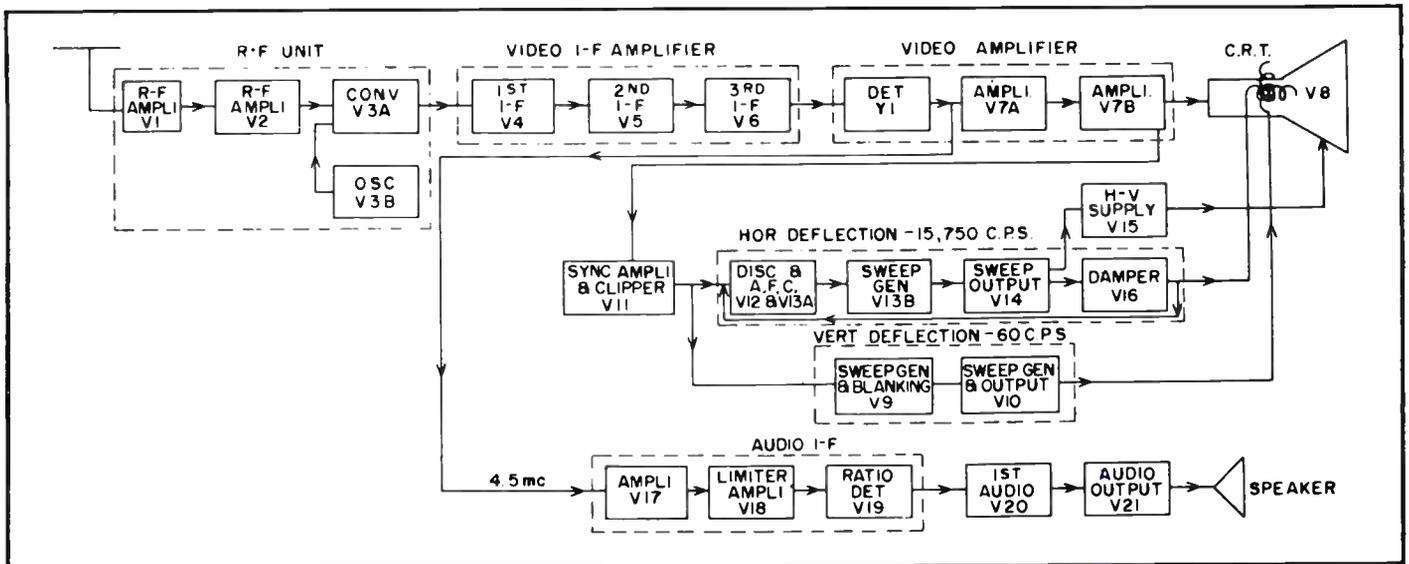


FIG. B-1. Block diagram of an intercarrier type receiver.

A logical point to start checking is across the diode load, point "A" in Figure B-2, since occasionally enough audio will get through to sound almost normal even though the defect exists in the r-f or video i-f sections. The tip of the probe should always be placed at the point indicated by the top arrow, and the ground clip at the point indicated by the bottom arrow. If the signal is normal at this point, the waveform with the scope set at one-half the vertical frequency should be similar to Figure B-3. The peak-to-peak voltage should be at least one volt but will vary with the setting of the

contrast control. The probe can then be moved to the grid, and then to the plate of each video amplifier stage, (points B, C, D, and E) and then to the input to the picture tube, (point F,) or until the point is found where the signal is reduced or disappears. That circuit can then be checked with a voltmeter or ohmmeter for the defective component. If a coupling capacitor is open, no waveform will be present on one side of the capacitor, therefore no further check for signal loss is ordinarily necessary. The polarity of the signal will change as it passes through each tube. The sync pulse will be nega-

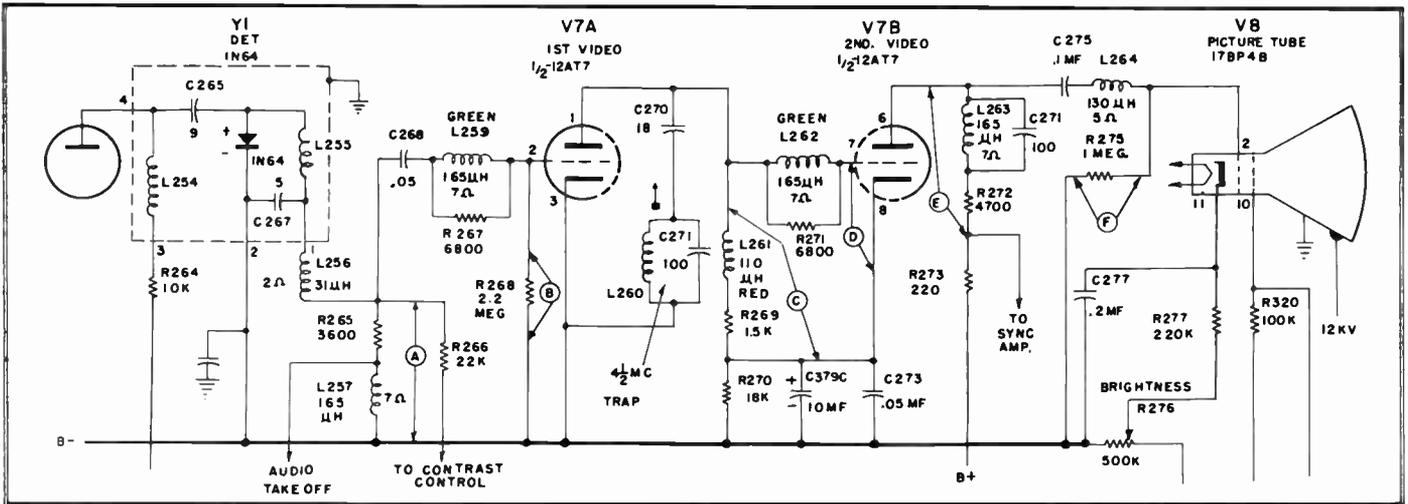


FIG. B-2. Video detector and video amplifier sections of the complete receiver shown on pages 28 and 29.

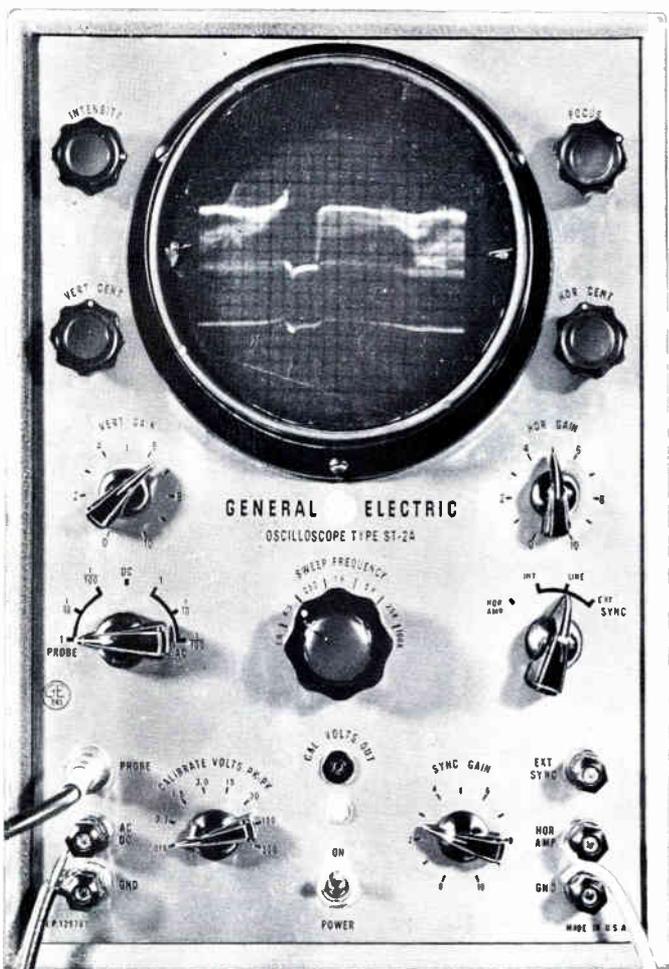


FIG. B-3. Normal scope waveform which should appear at point A, B, E and F in Figure B-2. Scope was set at one-half the vertical frequency.



FIG. B-4. Normal scope waveform which should appear at points C and D in Figure B-2.

tive going (point down) at points A, B, E and F as shown in Figure B-3, and positive going at points C and D as shown in Figure B-4. The use of a scope for this type of troubleshooting will save considerable time over the voltage or resistance measurement procedure, since only two points need be checked in each stage and the results are conclusive.

LOSS OF PICTURE (CONVENTIONAL TYPE RECEIVER)

A block diagram of a conventional type receiver is shown in Figure C-1. If the sound is normal and a raster is visible with either a faint picture or no picture at all, the defect should be between the output of the first i-f where the sound is taken off and the picture tube.

In this type receiver the video detector load resistor is also a good point to start, since the presence of a normal signal at this point will eliminate the preceding stages. The same points should then be checked as

described for the intercarrier type receiver. If a signal is not present here the scope should be left connected across the detector load resistor, and a signal inserted at the grid of each video i-f stage starting at the one nearest the video detector. This signal does not have to be a sweep signal so either a sweep or an ordinary signal generator can be used. The frequency selected should be about the center frequency of the video pass band, although any harmonic of this frequency could

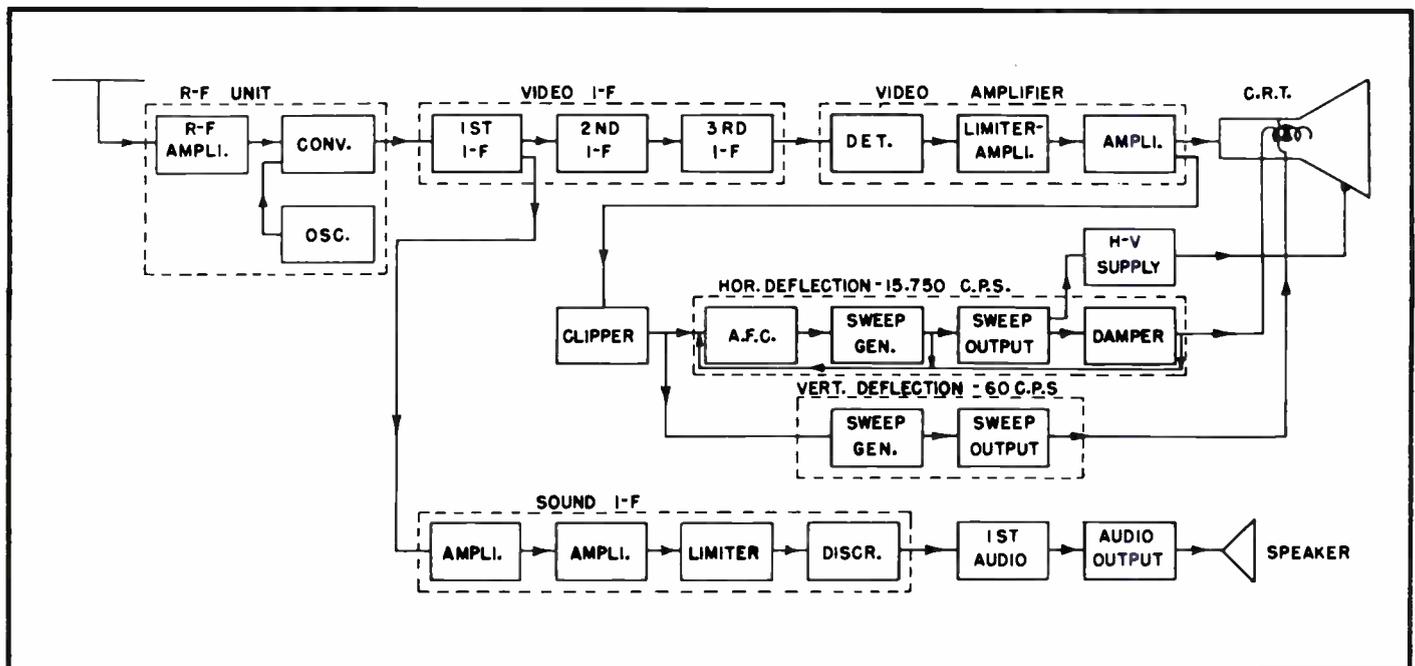


FIG. C-1. Block diagram of a conventional type receiver.

be used. The pattern which will appear on the picture tube is a bar pattern as shown in Figure C-2. The scope will present a sine-wave similar to Figure C-3. In this way the signal can be traced back through the grid of the converter tube. The r-f and oscillator stages can then be checked by changing the signal generator frequency to the center of the TV channel frequency.

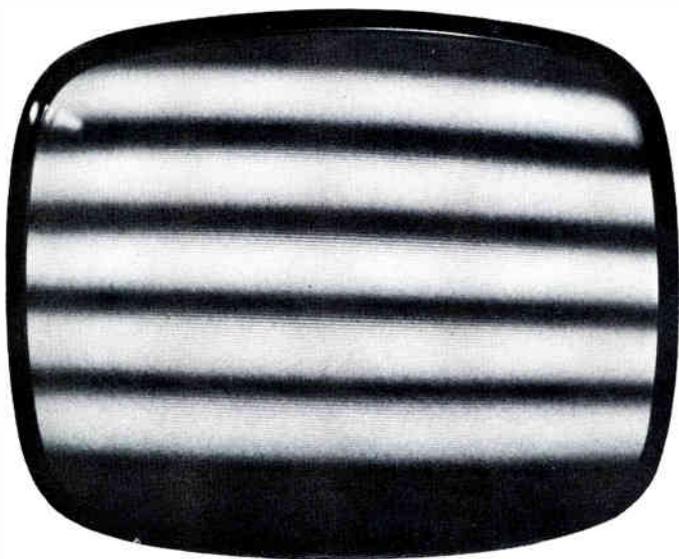


FIG. C-2. Bar pattern which will appear on the picture tube when an ordinary signal generator is used as a signal source.

A travelling detector probe which will be described in the gain measurement section could also be used to check for loss of signal in the video i-f stages. If the r-f or converter stages have to be checked, it will be necessary to use a signal generator as previously mentioned to supply a signal which would be visible on the oscilloscope.



FIG. C-3. Sine-wave pattern which will appear across the diode load resistor when an ordinary signal generator is used as a signal source.

MAKING GAIN MEASUREMENTS IN THE VIDEO I-F, VIDEO DETECTOR AND VIDEO AMPLIFIER STAGES

In some instances there may be a question as to whether or not the gain is normal in the video i-f, video detector and video amplifier stages. The gain of the video i-f stages can be measured approximately by using a travelling detector probe connected to the vertical input terminals. A schematic for this type of probe is shown in Figure D-1. The travelling detector probe tip should be placed first at the grid and then at the plate of each video i-f stage. The normal video signal can be used or one can be supplied by a signal generator, set at the mid-channel frequency and connected to the antenna terminals. The approximate voltage gain can be determined by dividing the peak-to-peak signal voltage at the grid of each tube $\frac{\text{signal voltage at plate}}{\text{signal voltage at grid}} = \text{voltage gain}$. If the amplitude of the transmitted signal is too low to be measured at the grid of the first i-f amplifier, it will probably be necessary to substitute one from a signal generator. This will depend, of course, on the sensitivity of the oscilloscope and the amplitude of the video signal. The peak-to-peak voltage of the waveform obtained from the travelling detector can be measured by first establishing a calibrating voltage at the AC-DC

terminals of the scope. This is obtained in the same way as previously described for the regular scope probe except that one end of the eight inch calibration lead supplied with the scope is inserted into the "Cal Volts Out" pin jack and the other end is inserted into the AC-DC binding post.

An approximate indication of the efficiency of the video detector can be determined by placing the regular scope probe at the output of the video detector and measuring the peak-to-peak voltage at this point. Then connect the travelling detector probe to the plate of the last video i-f stage and measure the peak-to-peak voltage here. The signal will normally be less at the output than at the input and will vary considerably in different circuits. If the same probes are used to make these measurements on several receivers of the same type, a good idea of the normal gain will be obtained.

The gain of the video amplifier stages will be indicated by the ratio of the peak-to-peak voltage at grid and plate of each video amplifier tube. The regular scope probe should be used to obtain these voltage measurements. The grid signal voltage is obtained from across the grid resistor, and the plate signal voltage across the plate load resistor. The gain of these stages will also depend on the circuit as well as the tubes used.

The normal gain which can be expected in different stages and circuits will vary as previously mentioned. Few, if any, manufacturers indicate the normal gain to be expected in their receivers. It will, therefore, be helpful if notes are made on the schematic of different receivers indicating the gain normally found in these circuits.

It should be understood that this type of gain measurement is only approximate due to the capacitive loading effect of the probe. If, however, the same probe is used on the same type of receiver the results should be comparative.

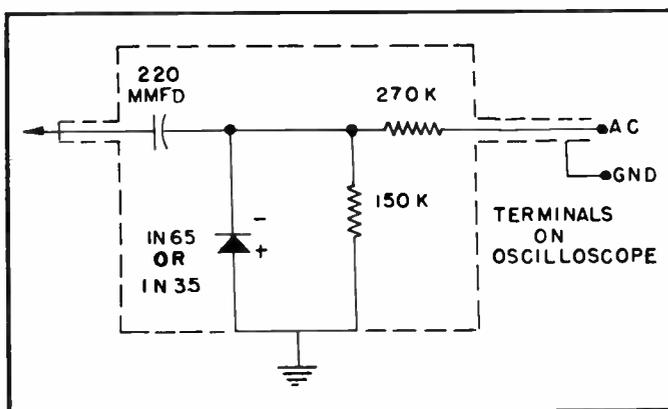


FIG. D-1. Circuit diagram of travelling detector probe.

DISTORTION OF PICTURE DUE TO DEFECTIVE CLIPPING IN R-F OR I-F CIRCUITS

A clipper circuit is designed to eliminate the picture portion of the video signal from the synchronizing pulses without distorting the waveform of these pulses. In this way only the sync pulses are passed on to the horizontal and vertical oscillators. If much video information gets through the clipper stage, or if the sync pulses are reduced in size, the amplitude of the black portions of the picture may be almost as high as the sync pulses. This will of course result in poor or erratic synchronization. There are a number of defects which may occur in various circuits of the receiver which will

result in improper clipping, and a considerable amount of time may be wasted unless a scope is used to localize the trouble. The clipper may be perfect circuit-wise but unable to function properly due to the r-f, video i-f, video amplifier or sync amplifier stages clipping off the top of each sync pulse. This is usually due to one or more stages operating with incorrect bias or plate voltage. If the scope probe is connected across the diode load resistor point A in Figure E-1 several stages can be eliminated as the source of trouble. A normal signal at this point eliminates the r-f, i-f and detector stages,

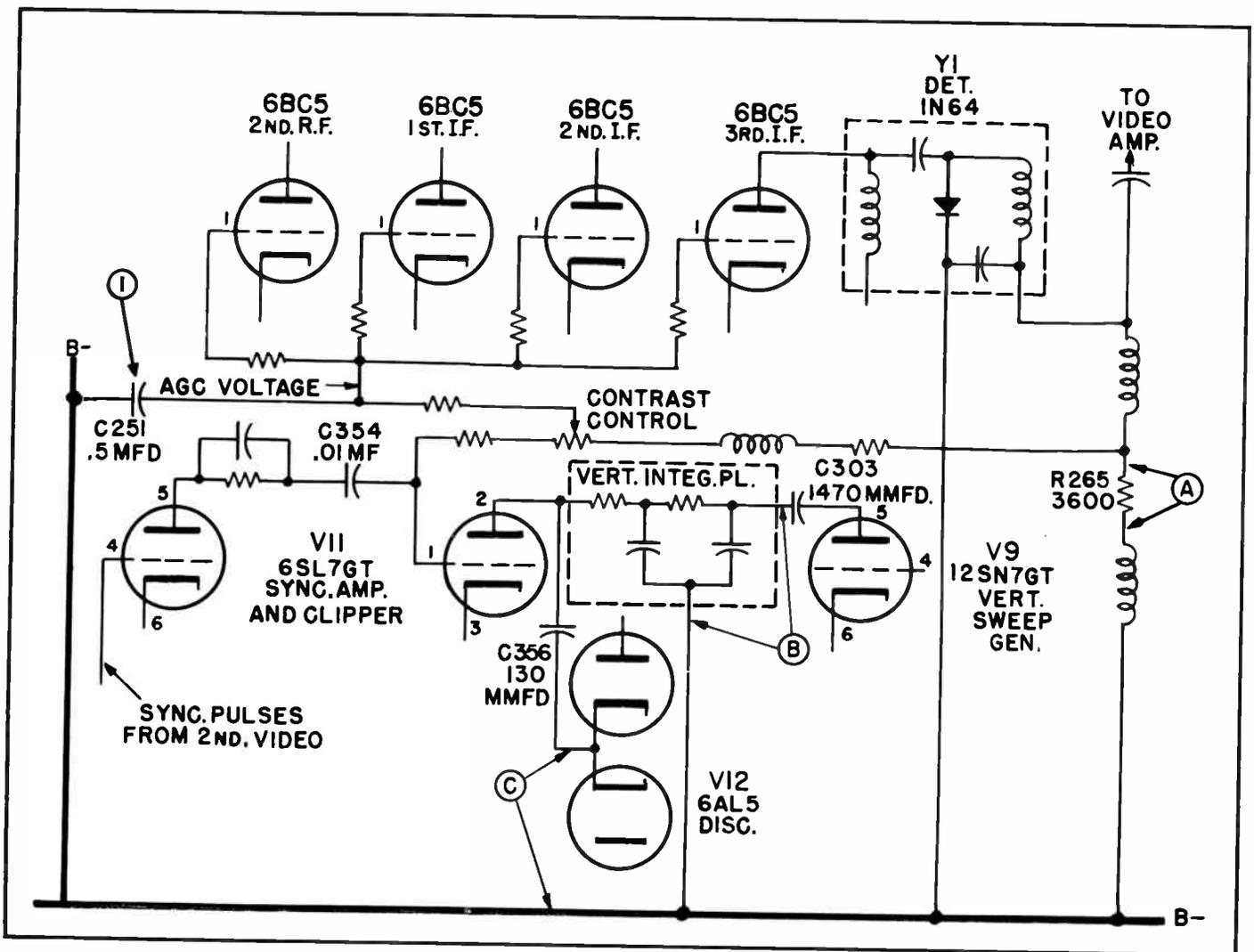


FIG. E-1. Diagram of a section of the complete receiver which appears on pages 28 and 29 showing several test points to check for defective clipping.



FIG. E-2. Test pattern showing the affect of clipping in the r-f or i-f stages.

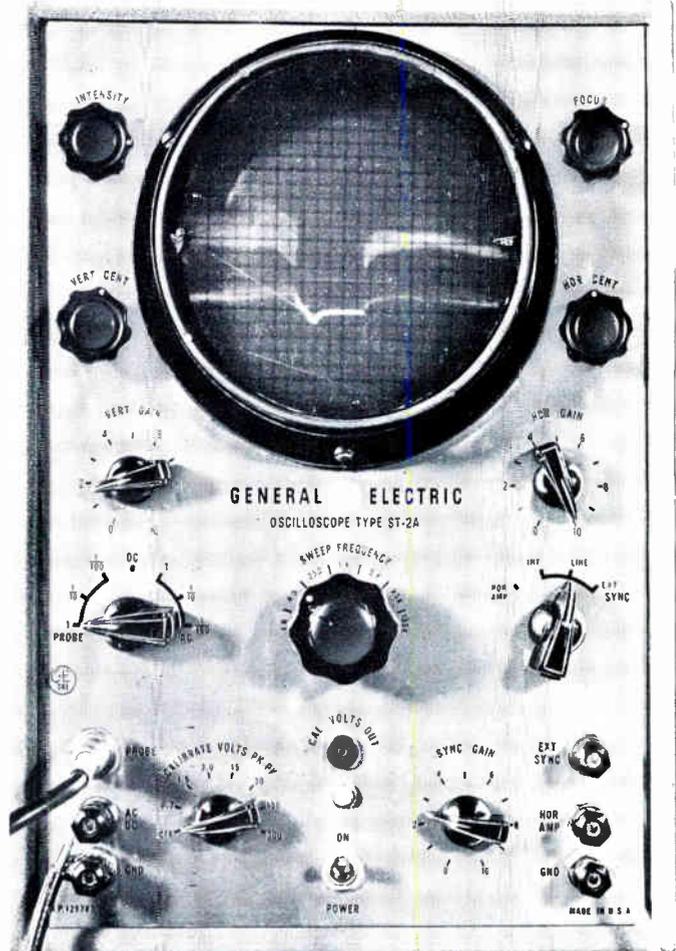


FIG. E-4. Distorted vertical sync pulse across point A due to clipping in the r-f or i-f stages.

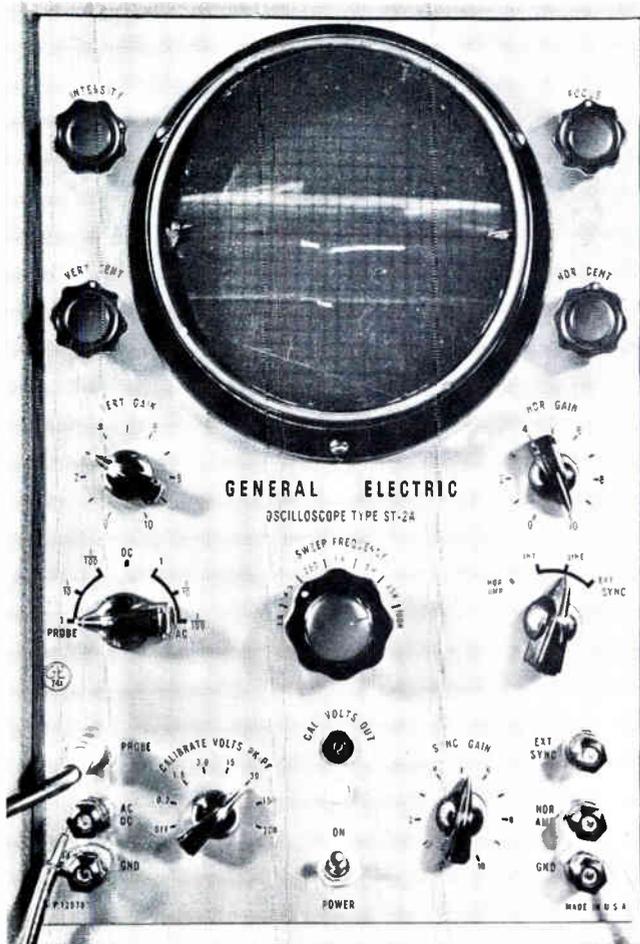


FIG. E-3. Normal vertical sync pulse across point A in Figure E-1.

whereas an abnormal or distorted signal eliminates the video amplifier, sync amplifier and clipper stages.

Any defect which reduces the bias on the tubes controlled by the AGC voltage may cause one or more of these tubes to be overloaded. This will cause the picture to appear distorted with improper shading as shown in Figure E-2. The setting of the contrast control may have very little if any affect on the picture. A normal vertical sync pulse across the detector load resistor R265, point A in Figure E-1 should appear similar to Figure E-3. If capacitor C251, point 1 in Figure E-1, is leaky the AGC voltage is reduced. The pedestal of the vertical sync pulse is practically eliminated and its form distorted as shown in Figure E-4. The peak-to-peak voltage of waveforms obtained at point A in Figure E-1 is not important since it may vary with the setting of the contrast control. The important characteristic in these waveforms is the ratio of the sync pulse to the video signal.

It may be of interest to observe the change which also takes place in the shape of the horizontal sync pulse at point A. A normal horizontal pulse is shown in Figure E-5, and the horizontal pulse which is distorted due to leakage across capacitor C251 is shown in Figure E-6. This explains the pulling and distortion shown in Figure E-2.

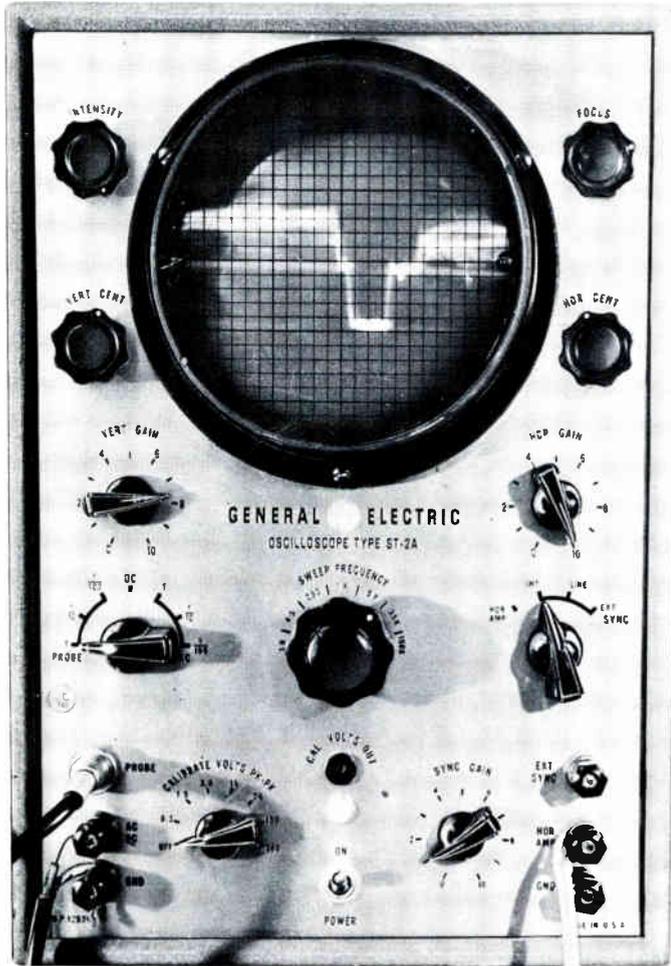


FIG. E-5. Normal horizontal sync pulse across point A in Figure E-1.

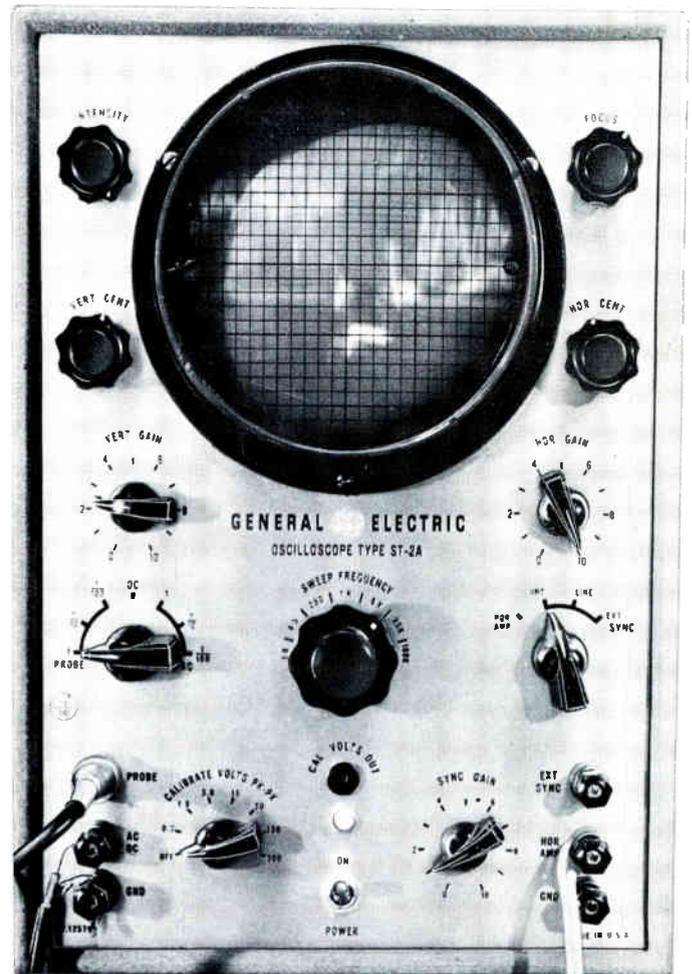


FIG. E-6. Distorted horizontal sync pulse across point A due to clipping in the r-f or i-f stages.



FIG. E-7. Normal waveform at point B in Figure E-1.

Another interesting change to the respective sync pulse takes place at the input to the vertical sweep generator and the horizontal AFC tubes. A normal vertical waveform at point B in Figure E-1 should look like Figure E-7 and have a peak-to-peak voltage of about 25 volts. Leakage across capacitor C251 changes the shape of the waveform as shown in Figure E-8 and allows some video to get through as indicated by the small peaks to the left and right of the sync pulse. The peak-to-peak voltage has increased to about 55 volts. Obviously these changes to the waveform will result in unstable vertical synchronization.

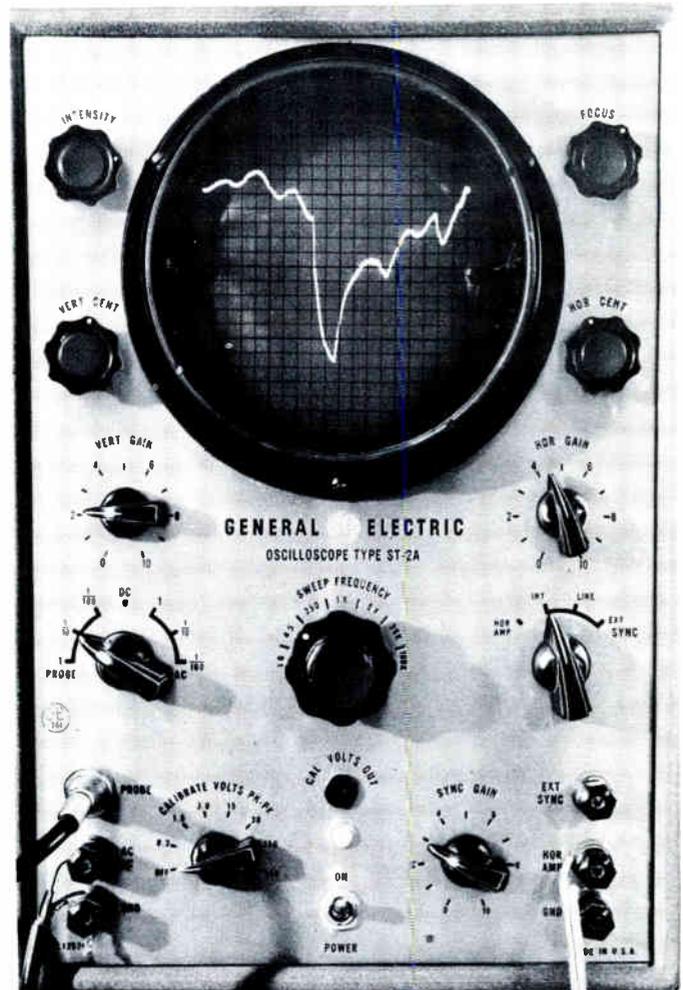


FIG. E-8. Distorted vertical sync pulse at point B due to clipping in the r-f or i-f stages.

The horizontal sync pulse is affected in a similar way at point C in Figure E-1. The normal horizontal pulse should look like Figure E-9 with a peak-to-peak voltage of about 35 volts. If C251 is leaky the pulse is distorted as shown in Figure E-10 with the peak-to-peak voltage increased to about 40 volts.

Normal signals and the affect of one defect on these signals have been shown at three different points in the receiver. The video signal at point A in Figure

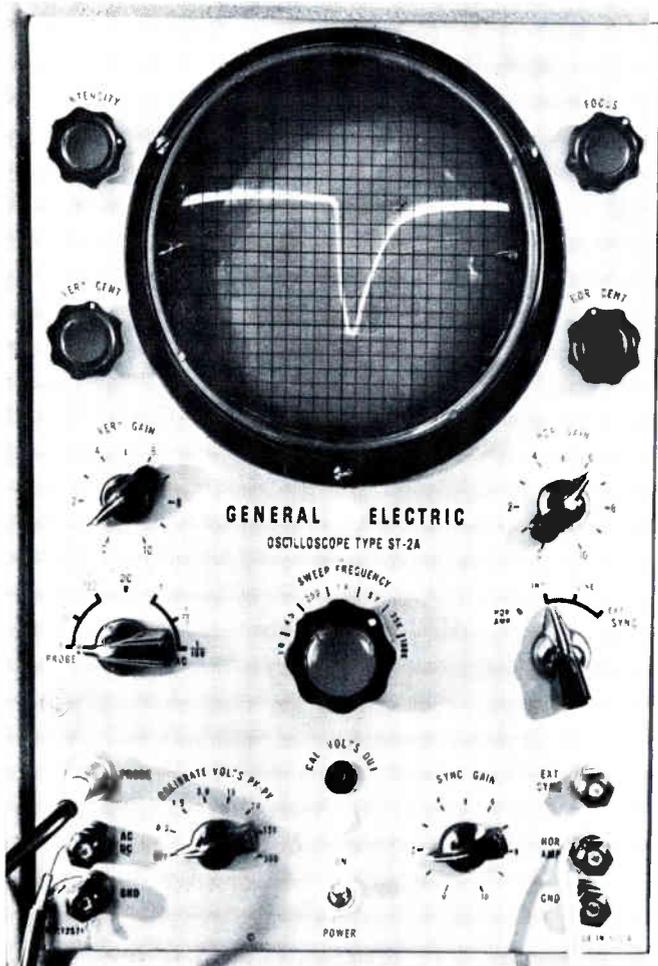


FIG. E-9. Normal horizontal sync pulse at point C in Figure E-1.

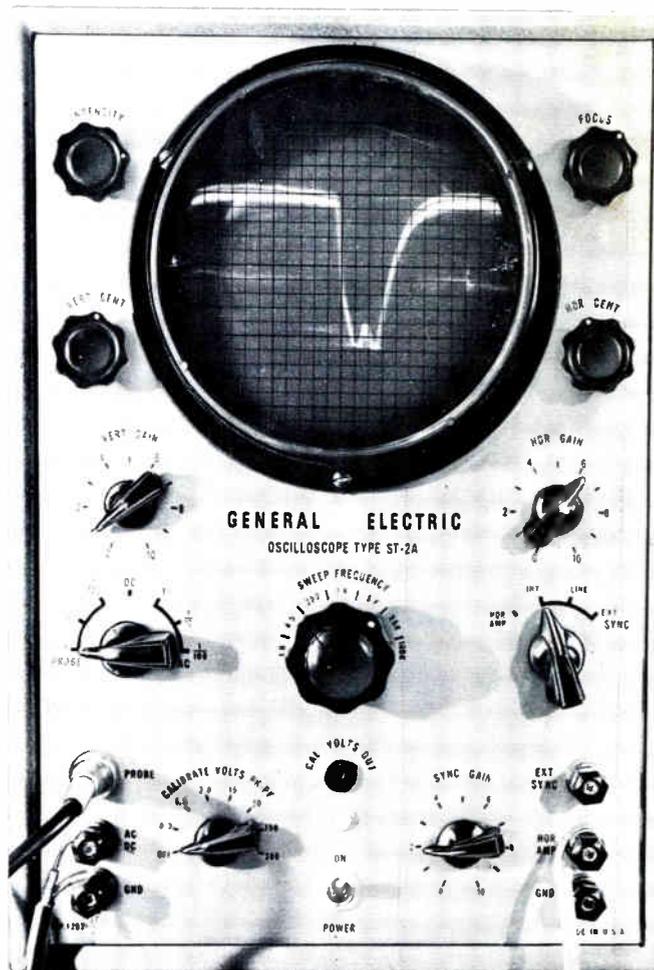


FIG. E-10. Distorted horizontal sync pulse at point C due to clipping in the r-f or i-f stages.

E-1 would be affected in a similar way by several other defects such as a leaky coupling capacitor or a gassy tube in one of the video i-f stages. Another rather common defect is leakage across capacitor C354 in the grid circuit of the clipper tube which results in practically the same distortion to the picture and waveforms as leakage across C251. The significant point is that if the video signal is observed at point A and the sync pulses are not normal in either height or shape, the defect will be due to some stage prior to the video detector.

DISTORTION OF PICTURE DUE TO DEFECTIVE CLIPPING IN THE VIDEO AMPLIFIER STAGES

In the previous section sync clipping which occurred as a result of incorrect bias on the r-f or i-f stages was shown. Sync pulses can also be clipped due to defects in or overloading of the video amplifier stages.

Before discussing circuit defects which may cause the sync pulses to be clipped, it may be of interest to observe the affect on the picture as well as the sync pulse if the picture or contrast control is too far advanced. This condition obviously will only occur when sufficient signal voltage is available to overload one or more of the video amplifier stages. The picture will be distorted with improper shading as shown in Figure F-1. A normal vertical sync pulse across the second video amplifier load resistor, point A in Figure F-2 should appear similar to Figure F-3. If the contrast control is advanced too far the pedestal of the pulse will be considerably reduced in size as shown in Figure F-4. This is due to overloading one or both of the video amplifiers since the waveform at point B will be normal. Here again the peak-to-peak voltage of the waveforms obtained either at point A or point B in Figure F-2 is not important since it may vary with the setting of the contrast control. Only the ratio of the sync pulse to the video signal is important.

If the picture appears similar to Figure F-1 at a normal setting of the contrast control and the waveform across the detector load resistor point B in Figure F-2 is normal, the scope probe should then be connected across the second video amplifier load resistor, point A in Figure F-2. A normal vertical sync pulse at this point should appear similar to Figure F-3. If either C379C or C273 is shorted or R270 is reduced considerably in value the vertical sync pulse at point A will probably look like Figure F-4. If the picture is synced midway between frames the horizontal black bar which normally appears between frames as shown in Figure F-5 indicating the presence of vertical blanking pulses is missing as can be seen in Figure F-6. This is to be

expected since the sync pulse pedestal has practically disappeared as can be seen by comparing Figure F-4 with Figure F-5.

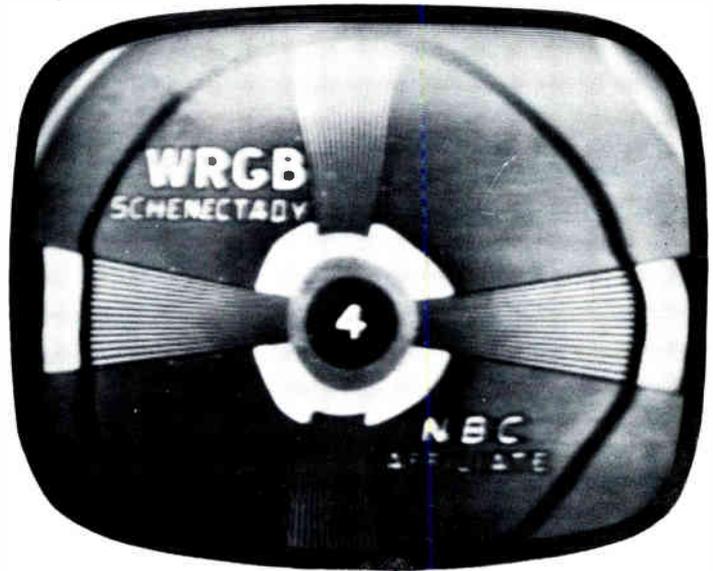


FIG. F-1. Test pattern showing the affect of clipping in the video amplifier stage.

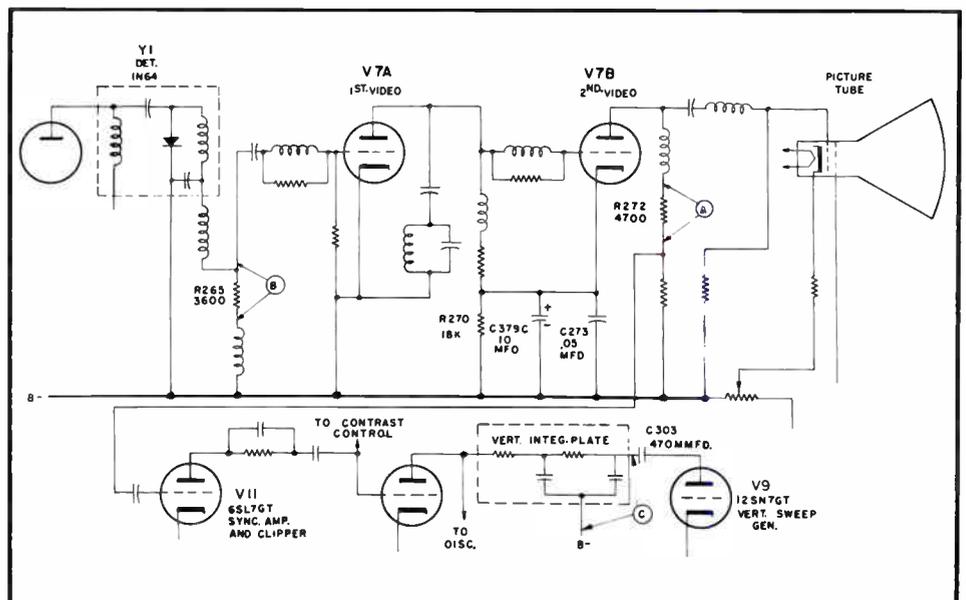


FIG. F-2. Diagram of a section of the complete receiver which appears on pages 28 and 29 showing several test points to check for defective clipping in the video amplifier stages.

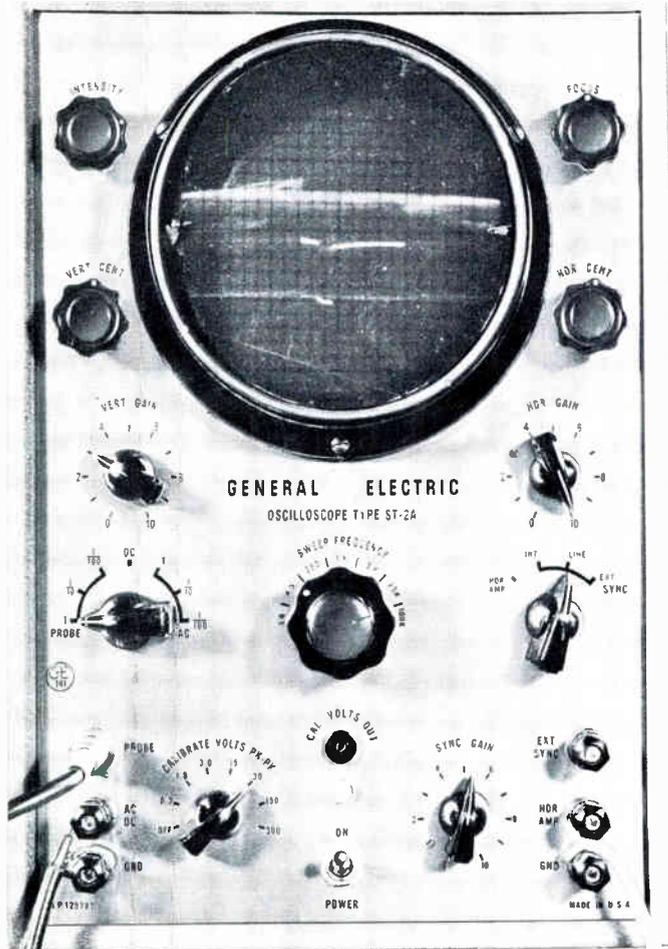


FIG. F-3. Normal vertical sync pulse at point A in Figure F-2.

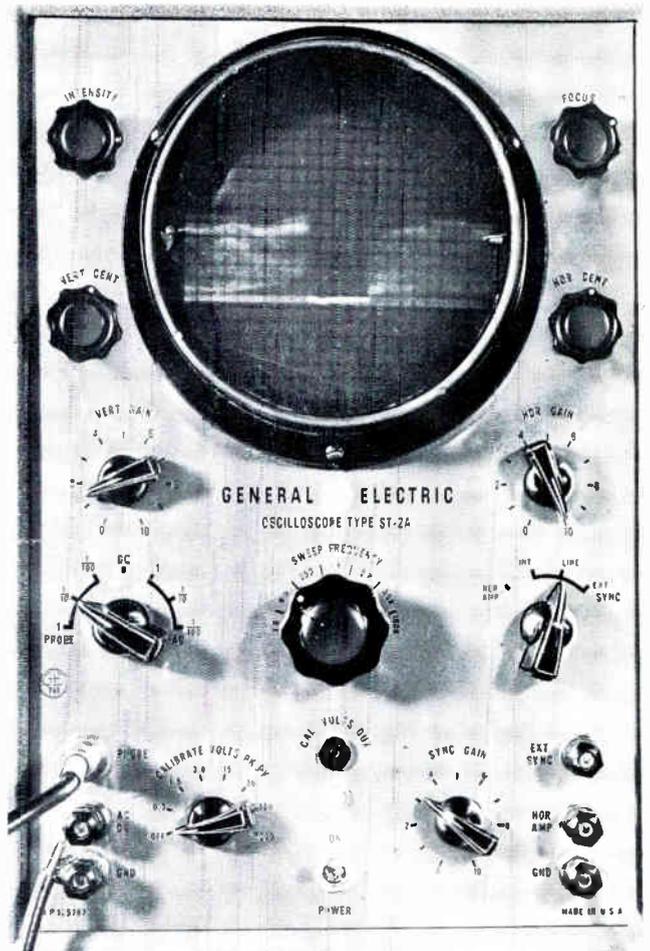


FIG. F-4. Distorted vertical sync pulse at point A due to overloading one or both video amplifiers.

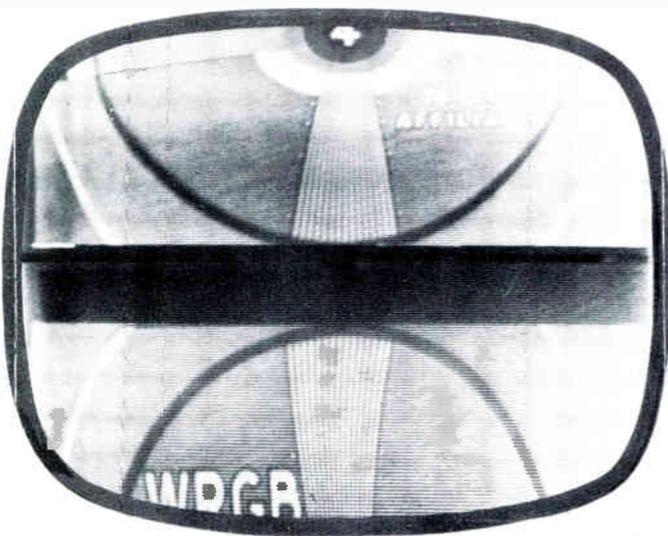


FIG. F-5. Test pattern showing the horizontal black T bar which normally appears between frames.

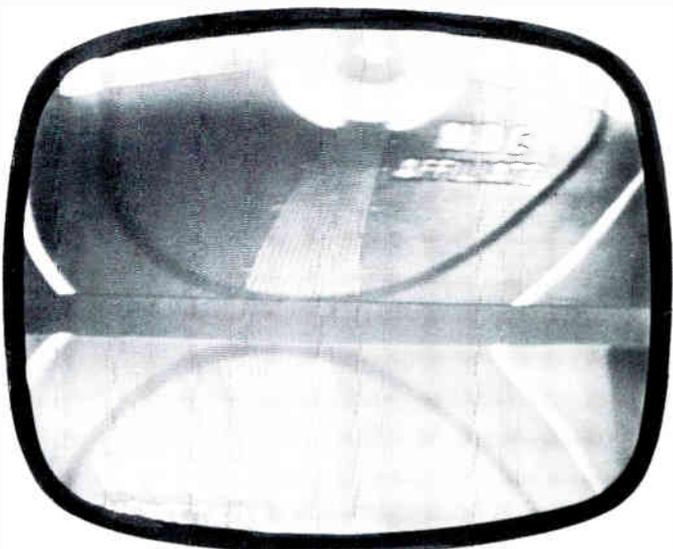


FIG. F-6. Test pattern showing that the vertical blanking and synchronizing pulses are practically missing between frames due to clipping in the video amplifier stages.

If C379C in Figure F-2 is open, the picture will sync slightly above the normal point, as shown in Figure F-7, and vertical synchronization will be unstable. The vertical sync pulse at point A in Figure F-2 will be distorted, as shown in Figure F-8, and at point C in Figure F-2 the vertical pulse will have practically changed polarity as shown in Figure F-9. This defect only affects the very low frequencies and has very little effect on the horizontal sync pulses which will be slightly rounded but not enough to cause horizontal sync trouble.

There are many other defects which may occur in the video amplifier section, some of which may have to be finally determined by voltage or resistance measurements. The important point, however, is that by using the oscilloscope first, the trouble can be localized. This will save trouble-shooting time and automatically increase the number of sets serviced.

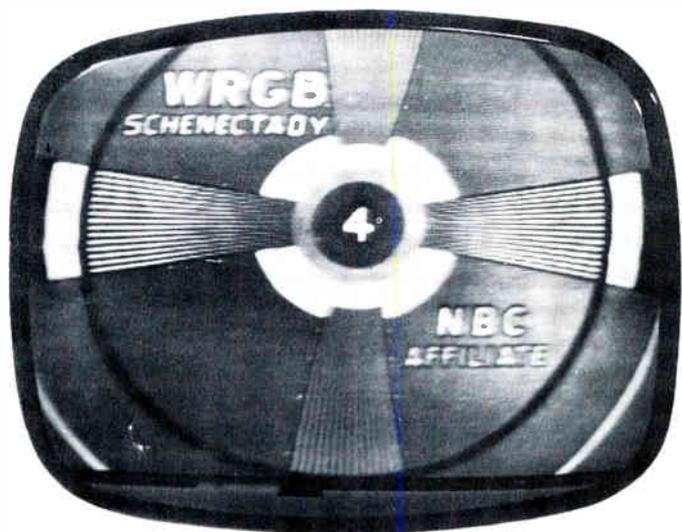


FIG. F-7. Test pattern showing the effect of an open capacitor C379C in Figure F-2.



FIG. F-8. Vertical sync pulse at point A in Figure F-2 with capacitor C379C open.

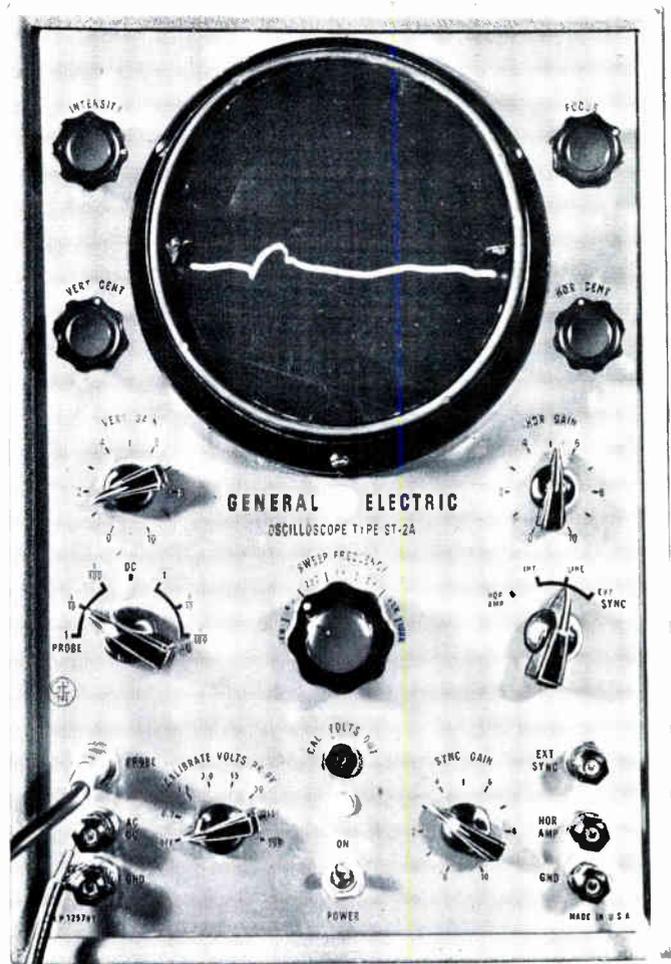


FIG. F-9. Vertical sync pulse at point C in Figure F-2 with capacitor C379C open.

LOSS OF BOTH HORIZONTAL AND VERTICAL SYNCHRONIZATION

As we know both the horizontal and vertical oscillator are kept in step with the transmitter by the sync pulses which are picked off the video amplifier stage and fed to the sync amplifier and clipper stages as previously discussed. If capacitor C351 in Figure G-1 which feeds the complete video signal to the sync amplifier or C354 which feeds the amplified video signal to the clipper is open, both the horizontal and vertical

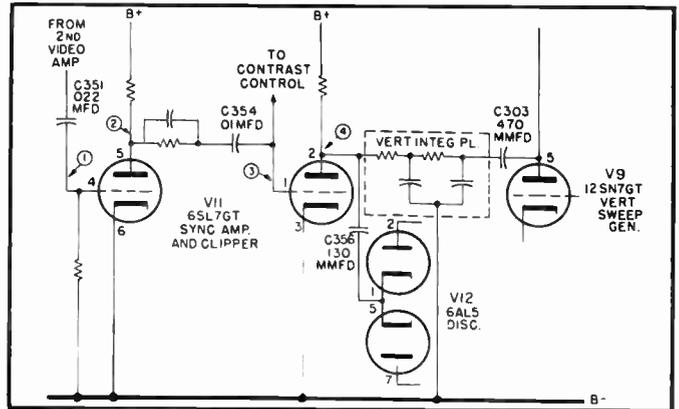


FIG. G-1. Diagram of a section of the complete receiver which appears on pages 28 and 29 showing several test points to check for loss of both horizontal and vertical sync.

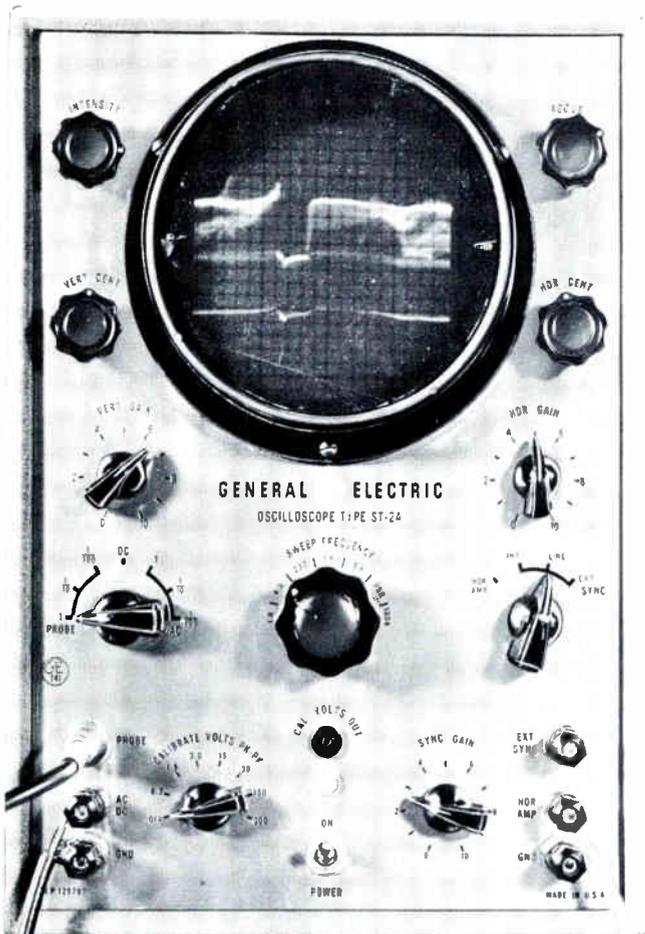


FIG. G-2. Normal vertical sync pulse at point 1 in Figure G-1.

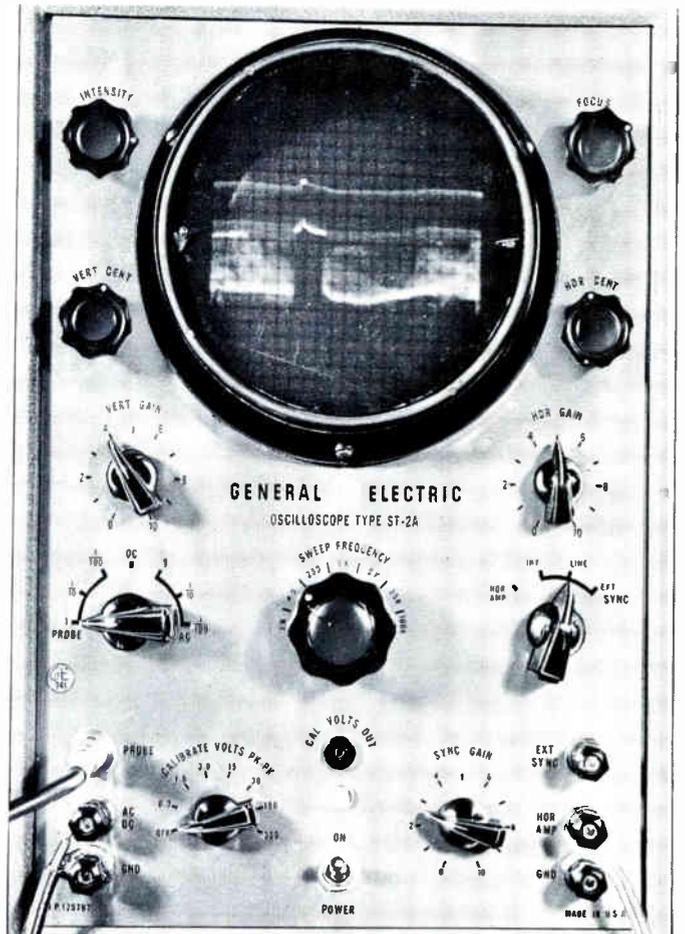


FIG. G-3. Normal vertical sync pulse at points 2 and 3 in Figure G-1.

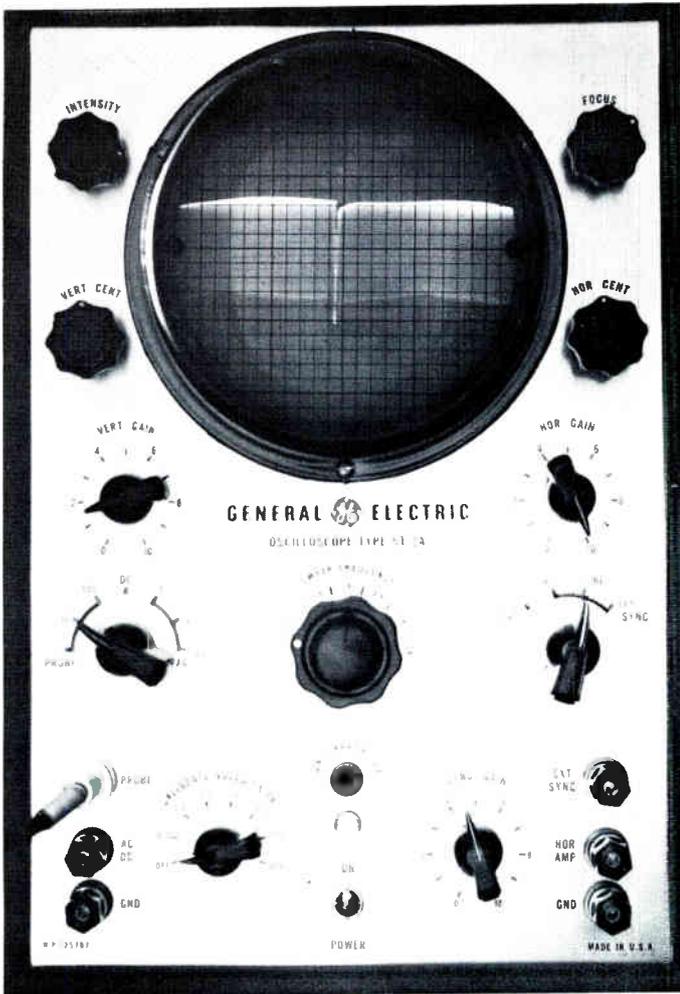


FIG. G-4. Normal vertical sync pulse at point 4 in Figure G-1.

oscillators will either lose sync completely or be very unstable. If either of these two capacitors is suspected of being open they can be quickly checked with a scope by merely placing the probe first on one side and then on the other side of each capacitor. If the signal is normal on one side and is considerably reduced or disappears completely on the other side, the capacitor may be open.

The proper operation of the sync amplifier and clipper tube (V11) can also be quickly checked with a scope by comparing the amplitude as well as the waveform of the video signal at points 1, 2, 3, and 4 in Figure G-1. The sync pulses and video signal with the scope set at one-half the vertical frequency should appear like Figure G-2 at point 1 and like Figure G-3 at points 2 and 3. At point 4 the vertical sync pulse should look like Figure G-4 and the horizontal sync pulse like Figure G-5. It will, of course, be necessary to change the sweep frequency control to one-half the horizontal frequency to view the horizontal sync pulse.

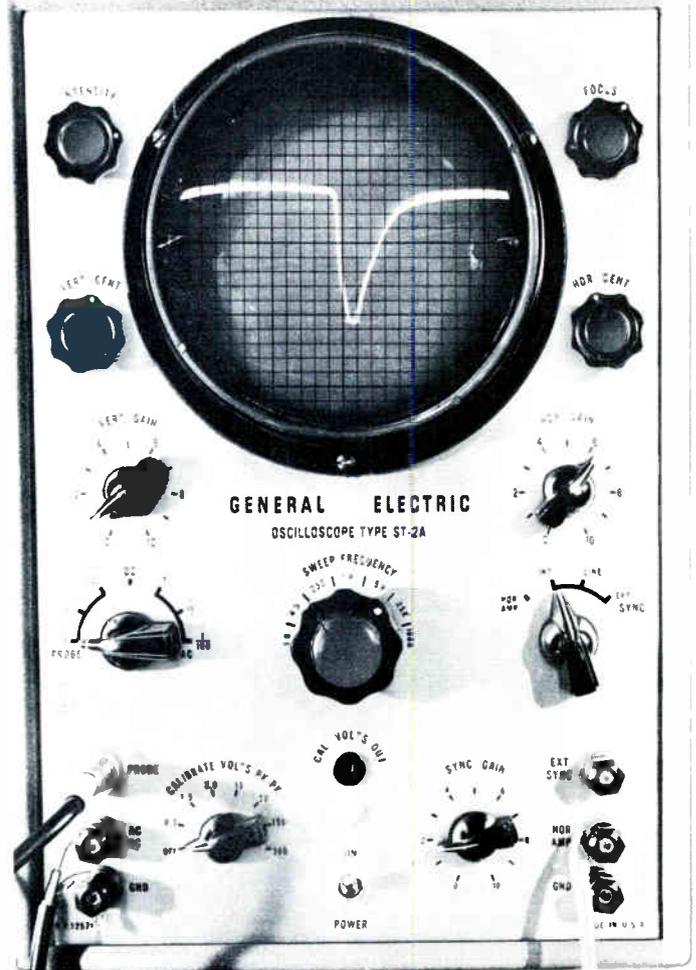


FIG. G-5. Normal horizontal sync pulse at point 4 in Figure G-1.

LOSS OF VERTICAL SYNCHRONIZATION

If a receiver holds sync horizontally but rolls and loses sync vertically the defect may be found in the vertical integrating circuit.

also appear at point 2. When the vertical sweep generator is in sync the integrated sync pulse is superimposed on the pulse fed back from pin 5. If the picture is rolling or synced with the blanking bar near the center both pulses will appear at point 2 as shown in Figure H-4. The larger pulse is the integrated sync pulse which remains stationary and has a peak-to-peak voltage of about 18 volts. The smaller pulse is the vertical sweep generator pulse and this will move either to the left or to the right depending on the direction in which the picture is rolling. This pulse has a peak-to-peak voltage of about 6 volts. The presence of a normal vertical integrated pulse at this point indicates that this pulse is getting through the vertical integrator circuit, and the

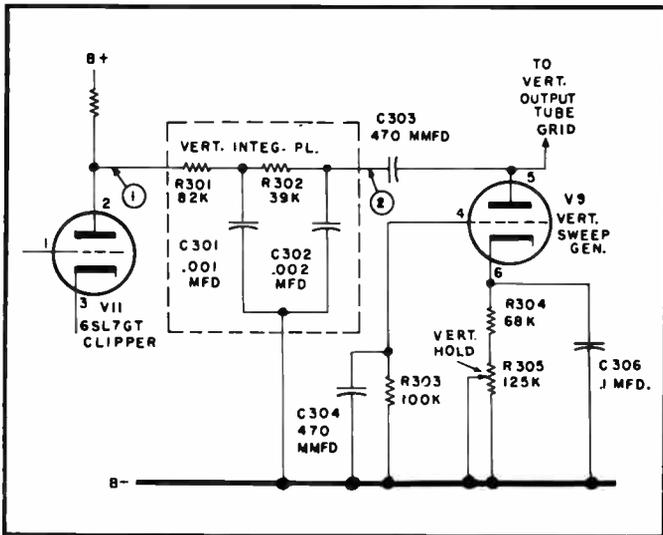


FIG. H-1. Diagram of the vertical integrating circuit showing the test points to check for loss of vertical sync.



FIG. H-2. Normal vertical sync pulse at point 1 in Figure H-1.

The first check to make with the scope probe would be at the input and output of the vertical integrator circuit. The normal vertical sync pulse at point 1, pin 2 of V11 in Figure H-1 should appear similar to Figure H-2 and have a peak-to-peak voltage of about 90 volts. The spike at the center is the vertical pulse and the lighter areas on both sides are due to the horizontal sync pulses. The normal waveform at point 2 should appear like H-3 and have a peak-to-peak voltage of about 30 volts. This waveform is a combination of the wave developed at the plate of V9 and the integrated vertical sync pulse. If one of the resistors R301 or R302 is open or one of the capacitors C301 or C302 (part of vertical integrator plate) is shorted, the integrated vertical sync pulse at point 2 will be absent. The vertical integrated pulse alone can only be observed at point 2 if C303 is open. Since capacitor C303 is connected between the output of the vertical integrator plate and the plate, pin 5, of the vertical sweep generator tube, the pulse developed by the vertical sweep generator will



FIG. H-3. Normal waveform at point 2 in Figure H-1.

presence of the pulse from the plate of the vertical sweep generator indicates that C303 is not open. If either C301 or C302 is leaky the amplitude of the waveform will be slightly reduced and narrower as shown in Figure H-5 which was obtained with 100K leakage across C302. If both of the waveforms are correct at point 2 in shape and amplitude, erratic vertical synchronization may be caused by a change in the value of resistors R304 or R305 or leakage in capacitor C306. In this case the range of the vertical hold control will be inadequate or will have to be rotated to either the maximum clockwise or counter-clockwise position.

A defective vertical sweep generator tube V9 or a change in the resistance of R303 will also cause vertical synchronization to be erratic.

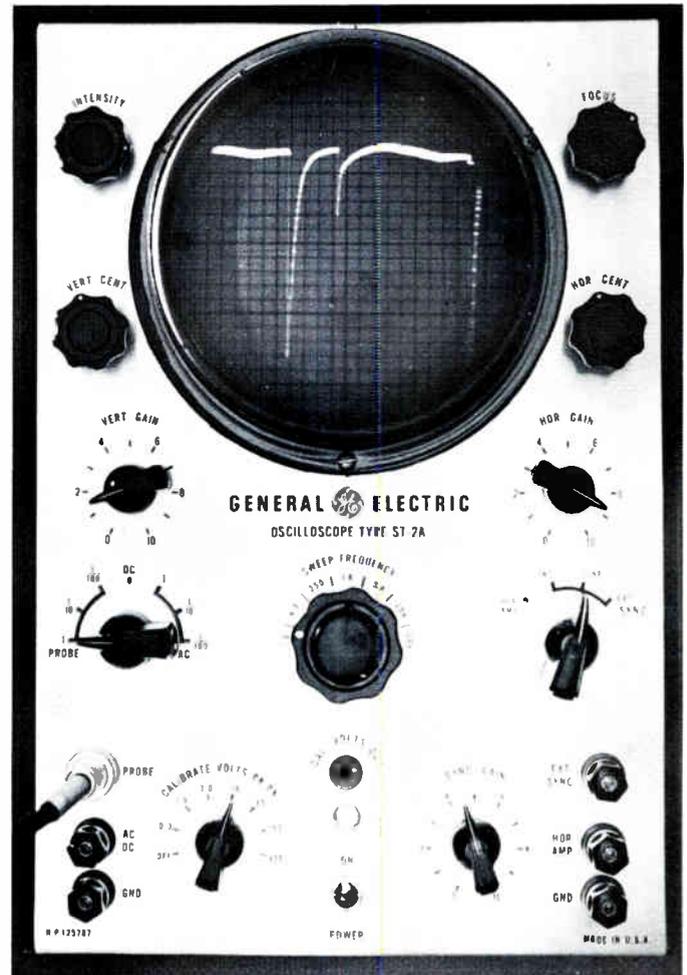


FIG. H-4. Waveform at point 2 in Figure H-1 with picture synced with the blanking bar near the center of the picture tube.

If the ground connection of the vertical integrator plate is open the picture may jitter vertically as can be seen in Figure H-6. The waveform at point 2 will look like Figure H-7 and shows that the horizontal sync pulses are getting through although somewhat reduced in amplitude as can be seen when Figure H-7 is compared with H-2. The important point here is that the horizontal sync pulses are present and have an amplitude of about 20 volts. The vertical sync pulse has also increased in amplitude and has a peak-to-peak voltage of about 80 volts.

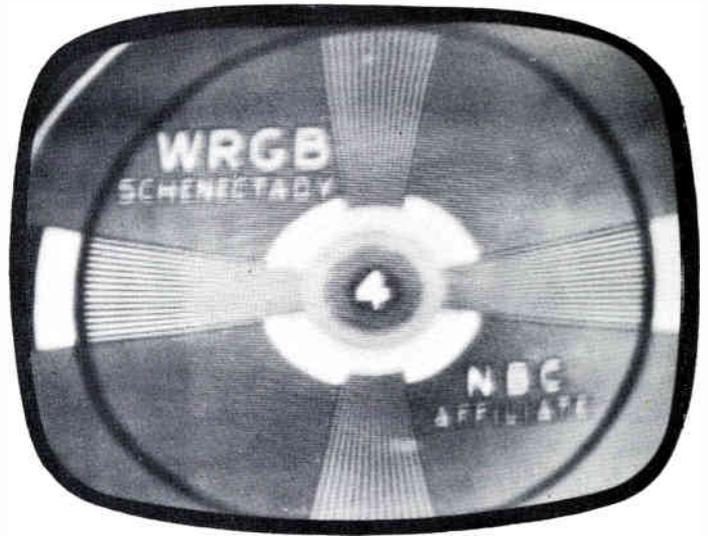


FIG. H-6. Test pattern with vertical jitter due to an open ground connection in the vertical integrator plate.

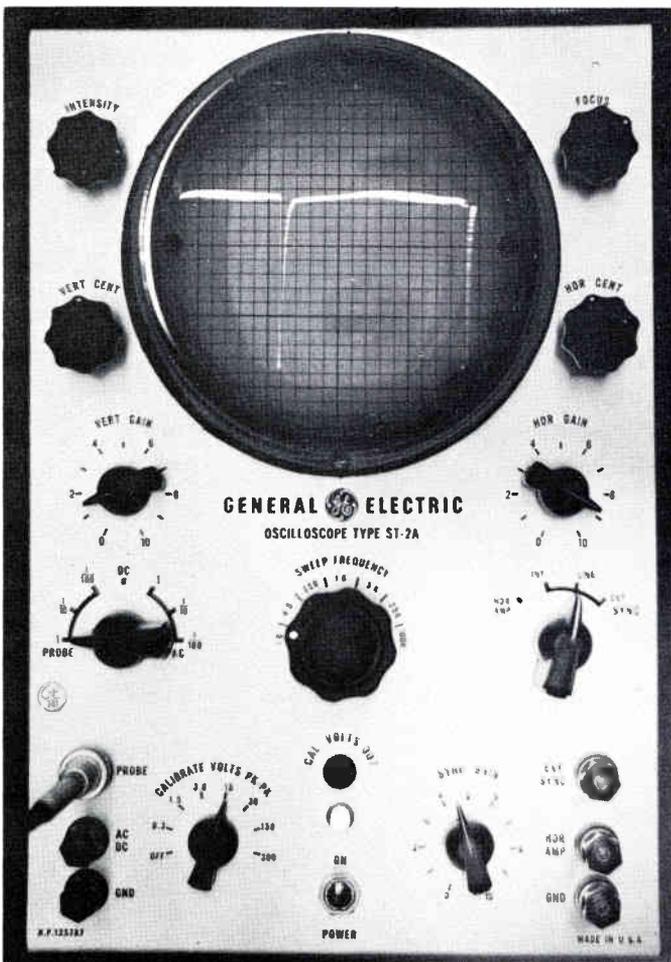


FIG. H-5. Waveform at point 2 in Figure H-1 with 100K leakage across capacitor C302.



FIG. H-7. Waveform at point 2 in Figure H-1 with an open ground connection in the vertical integrator plate.

LOSS OF HORIZONTAL SYNCHRONIZATION

If the vertical holds sync and the horizontal does not, the reason for this is usually in some part of the circuits shown in Figure I-1. There are a considerable number of components in these circuits and the scope can be efficiently used to identify the component or the section of the circuit, which is not operating satisfactorily. The horizontal control circuit is somewhat more complex than most of the other individual circuits, and the defects which can and do occur may not be as easy to identify as those in other sections of a TV receiver. In view of this, a comparably large number of waveforms are shown in this section.

There are a number of different type circuits used by various manufacturers to maintain proper horizontal synchronization. Although these circuits may differ considerably in operation they all depend on the presence

of the horizontal pulse at some point in the control circuit. All horizontal AFC circuits also depend on the presence of one or more waveforms which are fed back from either the horizontal oscillator, horizontal output or the damper tube. The logical places to start checking with the oscilloscope are at the points where the horizontal sync pulse and the fed-back waveforms should appear.

The normal waveform at pins 1 and 5 of V12, point 1 in Figure I-1, looks like Figure I-2 with a peak-to-peak voltage of about 30 volts. If capacitor C356 is open, the horizontal sync pulse will be missing and the waveform at this point will resemble Figure I-3 and have a peak-to-peak voltage of about 30 volts. The waveform obtained with C356 open represents only the integrated pulses from the damping tube plate which are

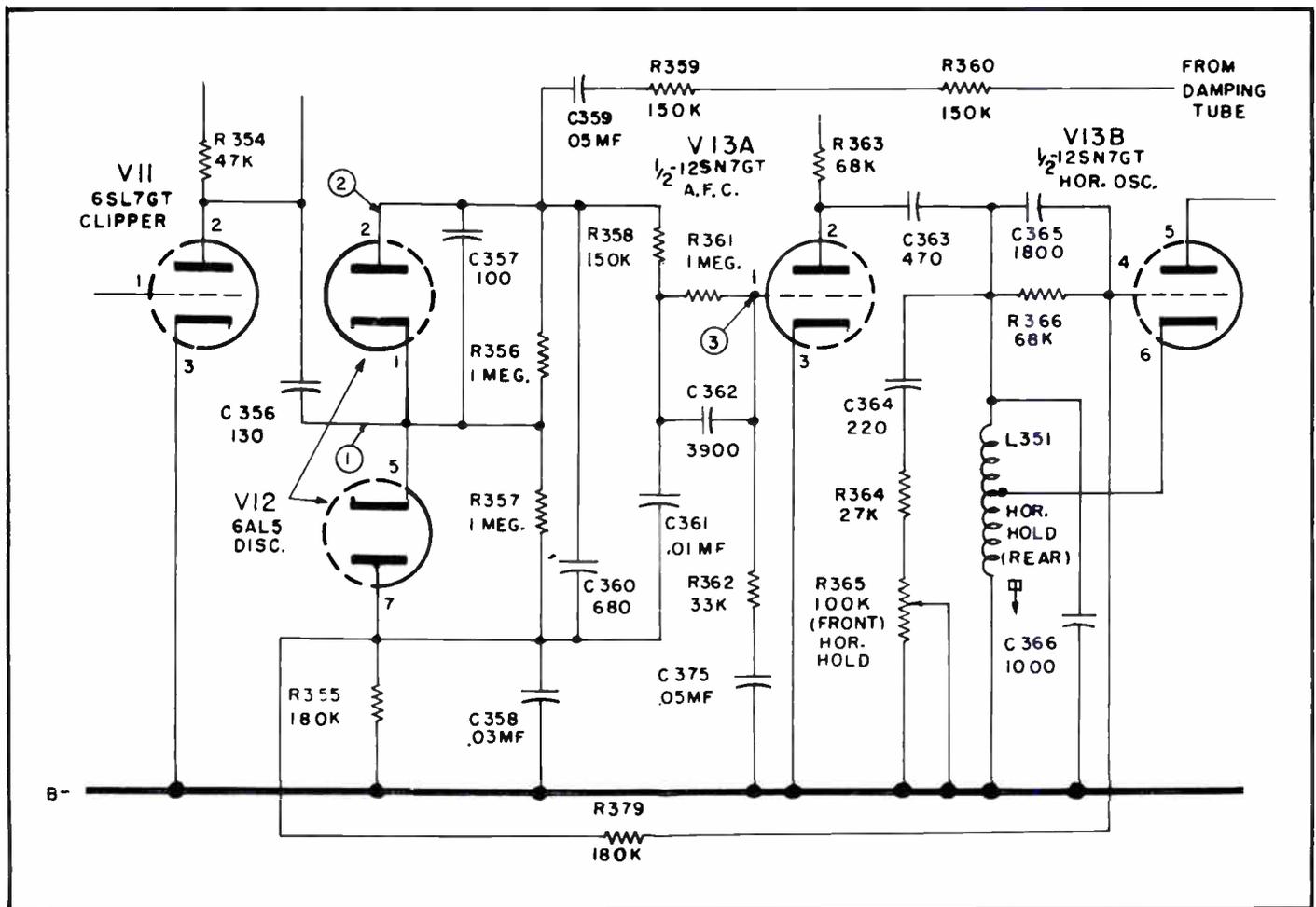


FIG. I-1. Horizontal AFC circuit showing several test points to check for loss of horizontal sync.

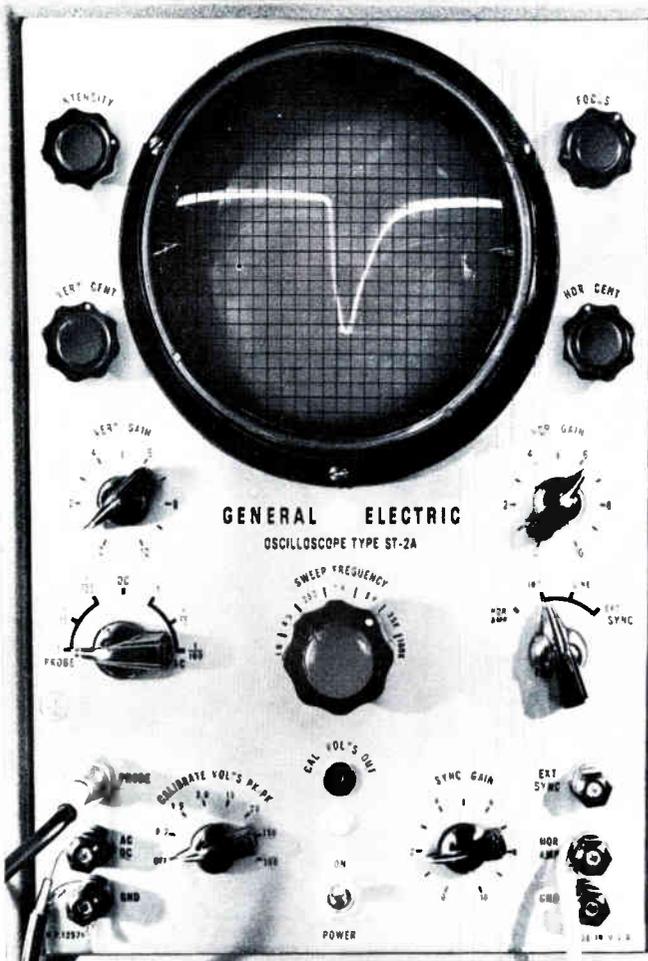


FIG. I-2. Normal horizontal sync pulse at point 1 in Figure I-1. The peak-to-peak voltage is about 30 volts.



FIG. I-3. Waveform which will be present at point of Figure I-1 if capacitor C356 is open. The peak-to-peak voltage is about 30 volts.

applied to pin 2 of V12. The picture is constantly shifting as shown in Figure I-4 which was obtained by adjusting both the front and rear horizontal hold controls for best synchronization.

A normal waveform at pin 2 of V12 point 2 in Figure I-1 will look like Figure I-5 and have a peak-to-peak voltage of about 35 volts. If R359, R360 or C359 is open, the sawtooth will be missing and only the horizontal sync pulse will appear at point 2 as shown in Figure I-6 which has a peak-to-peak voltage of about 6 volts. The picture will tend to weave horizontally and will sync with the horizontal blanking bar either at the left or right as shown in Figure I-7.



FIG. I-4. Test pattern as it appears with capacitor C356 open.



FIG. I-10. Waveform at point 1 due to the same defect as I-9 but with the picture synced so that the blanking bar cannot be seen.

If capacitor C357 is leaky (200K) or R356 is reduced in value, the picture can be synced at the normal point or with the horizontal blanking bar at the left. The pull-in is critical and the horizontal hold must be readjusted frequently to correct shifting. The waveform at point 1 will appear similar to Figure I-9, when the horizontal blanking bar is at the left of the picture. The horizontal sync pulse at the right of Figure I-9 is distorted due to the increased amplitude of the fed back sawtooth which appears at the left. The position of the sawtooth in relation to the sync pulse will change as the horizontal hold control is varied. The peak-to-peak voltage of the horizontal sync pulse is about 30 volts. Figure I-10 shows the waveform with the picture synced normally without the blanking bar showing at either side. This is almost the same as the normal sync pulse shown in Figure I-2 except that the left side is not as

steep as it should be. This defect will also cause the d-c voltage at point 2 to go positive instead of negative. If capacitor C357 is open the pull-in is sluggish and the waveform at point 1 appears like Figure I-11. The peak-to-peak has increased to about 40 volts.

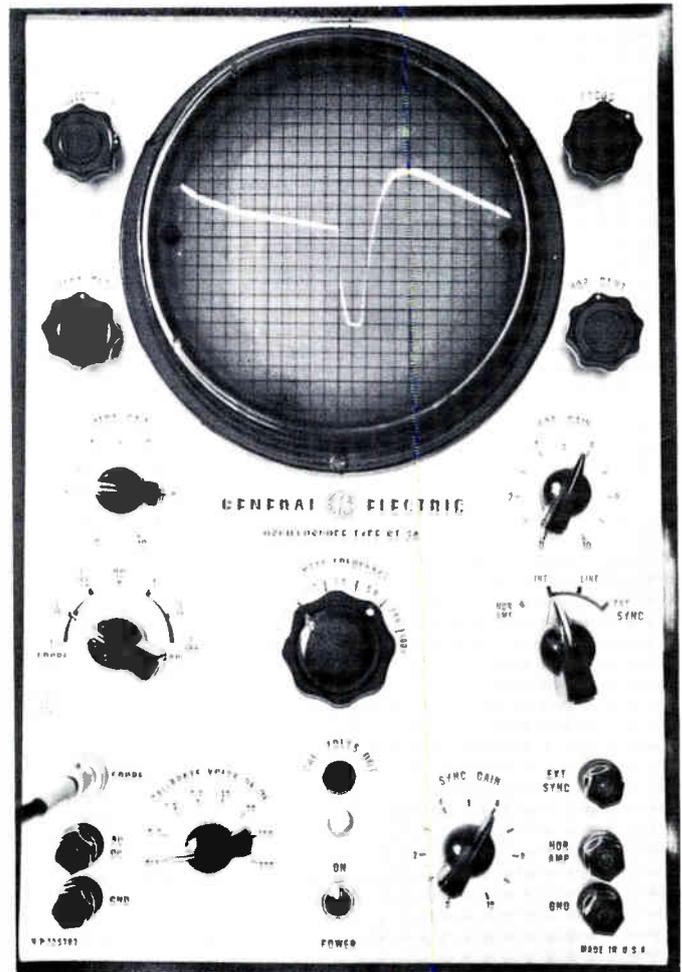


FIG. I-11. Waveform at point 1 if an open develops in capacitor C357. The voltage has increased to about 40 volts peak-to-peak.



FIG. I-12. Waveform at point 1 with R357 open. The peak-to-peak voltage is about 30 volts.

The value of resistors R356 and R357 is quite critical since approximately equal voltages must be developed across each resistor. If R356 is open the control voltage developed across R356 and R357 can not be applied to the grid of V13 and will cause the picture to shift horizontally. Due to the constant movement of both the picture and the waveform, it was not possible to obtain a good photograph of either. If R357 is open horizontal sync will be very unstable. If the hold controls are adjusted, the picture will sync either at the normal point or with the horizontal blanking bar at the left similar to Figure I-7. The waveform at point 1 will look like Figure I-12 with the picture synced at the normal point. The peak-to-peak voltage will be about normal but the waveform is somewhat broader than the

normal sync pulse as shown in Figure I-2.

If capacitor C360 is open, the picture will shift horizontally with the horizontal blanking bar usually at the left. The waveform at point 1 will appear similar to Figure I-13 with a peak-to-peak voltage of about 90 volts. The wider of the two pulses at the left is the sync pulse, and the one at the right is the pulse fed back from the damping tube.

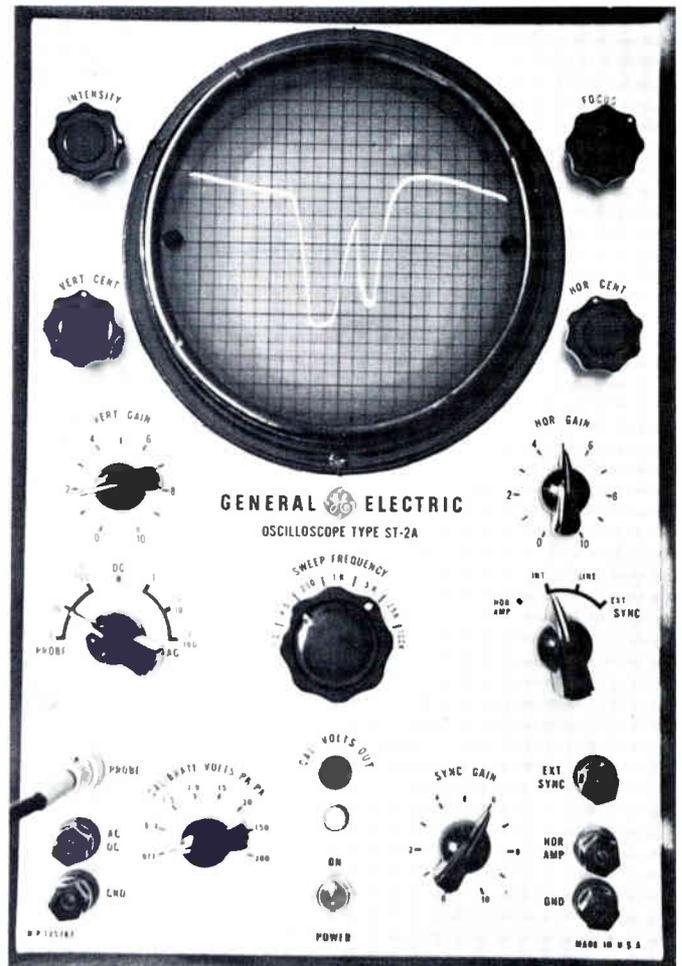


FIG. I-13. If capacitor C360 in Figure I-1 is open the peak-to-peak voltage is increased to about 90 volts and the waveform is distorted as shown.

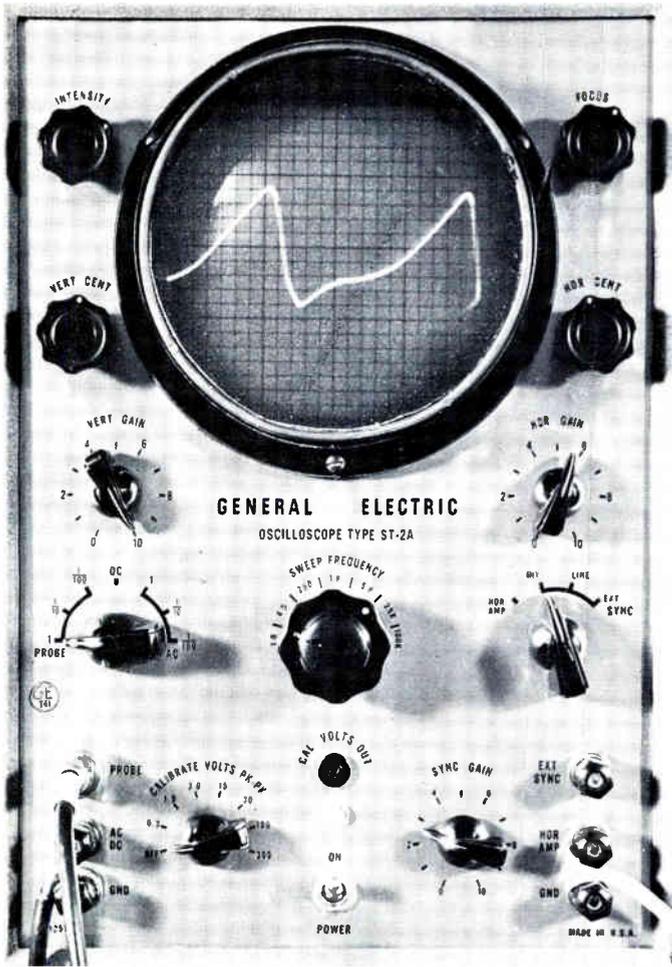


FIG. I-14. Normal waveform at point 3 in Figure I-1 which has a peak-to-peak voltage of about 0.6 volts.

The defects previously mentioned caused a considerable change in the waveform at point 1. These same defects will also effect the waveform at pin 1 of V13A point 3 in Figure I-1 but to a lesser degree. There are several other defects which cause the waveform at point 3 to change considerably. The normal waveform at point 3 should appear like Figure I-14 and have a peak-to-peak voltage of 0.6 volts. If capacitor C361 is open the waveform at point 3 will be similar to Figure I-15. The peak-to-peak voltage is increased to 10 volts.



FIG. I-15. The waveform at point 3 is changed in shape and amplitude due to an open capacitor C361. The peak-to-peak voltage is increased to about 10 volts.



FIG. I-16. If capacitor C361 is open the waveform is changed but the amplitude is normal.



FIG. I-18. The waveform is considerably distorted at point 3 due to an open capacitor C362 and the peak-to-peak voltage is increased to 1.4 volts.

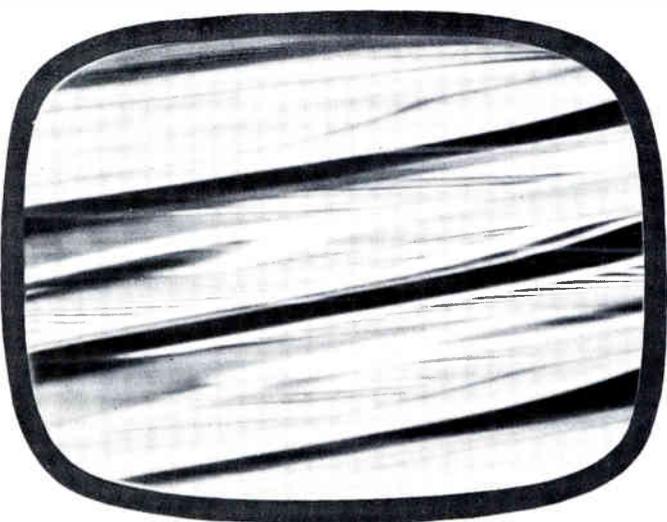


FIG. I-17. Loss of horizontal sync due to an open capacitor C362.

If capacitor C361 is shorted the picture weaves with the blanking bar usually near the left side. The waveform will appear similar to Figure I-16 with a peak-to-peak voltage of only 0.6 volts. The little peak at the bottom is the pulse from the damping tube plate which will shift in position as the picture weaves, or when the horizontal hold is adjusted.

If capacitor C362 is open the horizontal cannot be stabilized, and the picture appears similar to Figure I-17 with the horizontal blanking bars running upward from left to right as shown or downward from right to left. The waveform at point 3 will look like Figure I-18 with a peak-to-peak voltage of about 1.4 volts. If capacitor C362 is shorted, the only noticeable effect is a slight curl near the top of the picture.



FIG. I-19. If capacitor C358 is open the picture weaves horizontally and will only stabilize with the blanking bar at the right side as shown or with a number of horizontal lines tearing the picture as appears in Figure I-20.

lar to Figure I-21. The smaller peaks are the pulses from the damping tube, and the larger peak is the horizontal sync pulse. The peak-to-peak voltage of this waveform has increased tremendously and is now about 60 volts. If C358 is shorted the waveform at point 3 looks like Figure I-22 with a peak-to-peak voltage of about 0.5

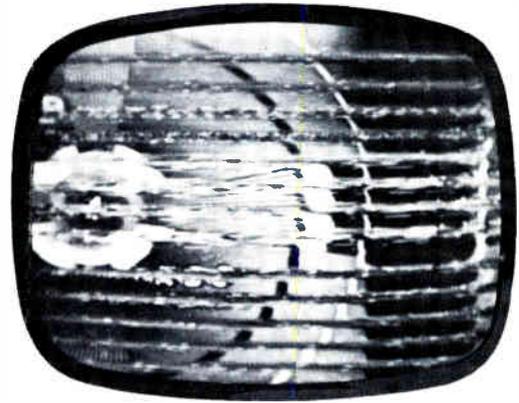


FIG. I-20. This is also due to an open C358 but at a different setting of the horizontal hold control.

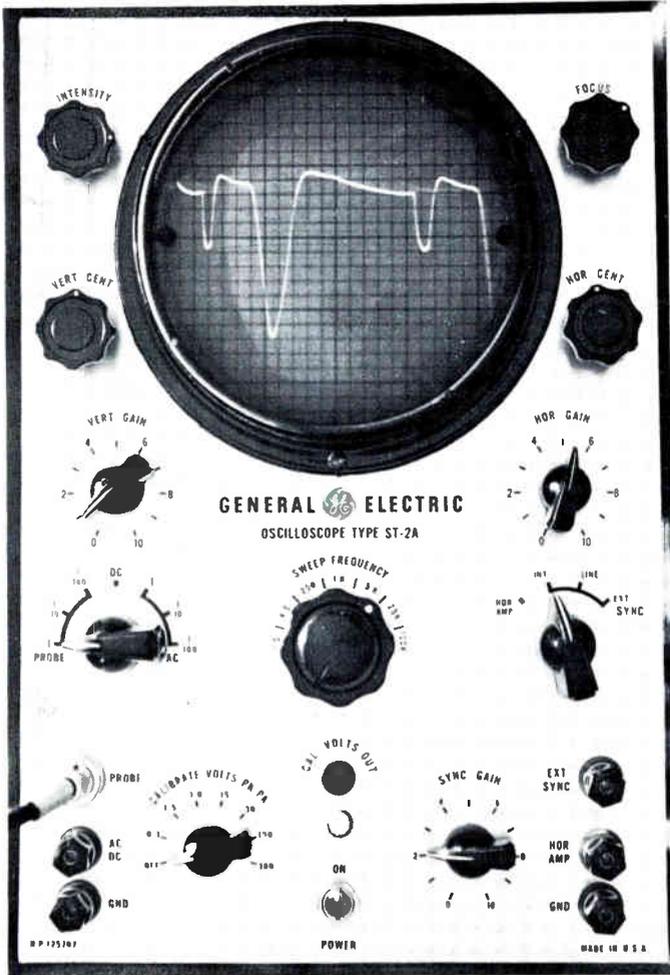


FIG. I-21. The waveform is completely changed due to open C358. The peak-to-peak voltage has increased 100 times to about 60 volts.

An open circuit in capacitor C358 causes the picture to weave horizontally, and can only be stabilized with the horizontal blanking bar at the right, as shown in Figure I-19 or with a number of horizontal lines tearing the picture as shown in Figure I-20. The waveform at point 3 is changed considerably and will appear simi-



FIG. I-22. Waveform at point 3 due to a shorted capacitor C358. The peak-to-peak voltage is only slightly reduced to 0.5 volts.

volts. The picture will sync in the normal position but the pull-in is critical.

If there is only a slight leakage across capacitor C359 (4 megohms), a positive d-c voltage will be found at point 2 and the waveform at point 3 will be changed considerably as shown in Figure I-23. The smaller peak to the right is the damping tube pulse. The peak-to-peak voltage is 0.9 volts. The picture shifts and will sync with the blanking bar at the left.

If an open develops in the anti-hunt circuit R362 or C375, the picture appears similar to Figure I-24. If C375 is shorted the picture weaves and the hold-in range is very limited. If R362 is reduced in value to 2K ohms, the picture is curved near the tops and bottom as shown in Figure I-25. The waveform at point 3 is changed as shown in Figure I-26 with a peak-to-peak voltage of about 0.6 volts.

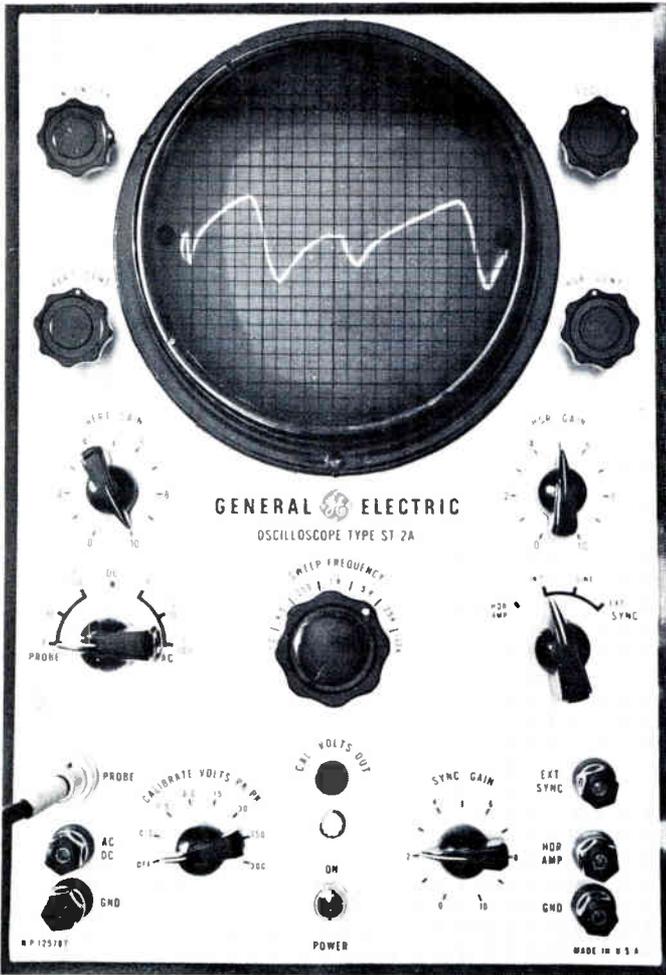


FIG. I-23. Waveform at point 3 due to leakage across capacitor C359. The amplitude has increased to about 0.9 volts.



FIG. I-26. Waveform at point 3 in Figure I-1 with R362 reduced to 2K ohms.



FIG. I-24. Test pattern due to open capacitor C375 in Figure I-1.



FIG. I-25. Test pattern due to a reduction in the value of R362 to 2K ohms.

DEFECTS IN THE VERTICAL SWEEP GENERATOR AND OUTPUT CIRCUIT

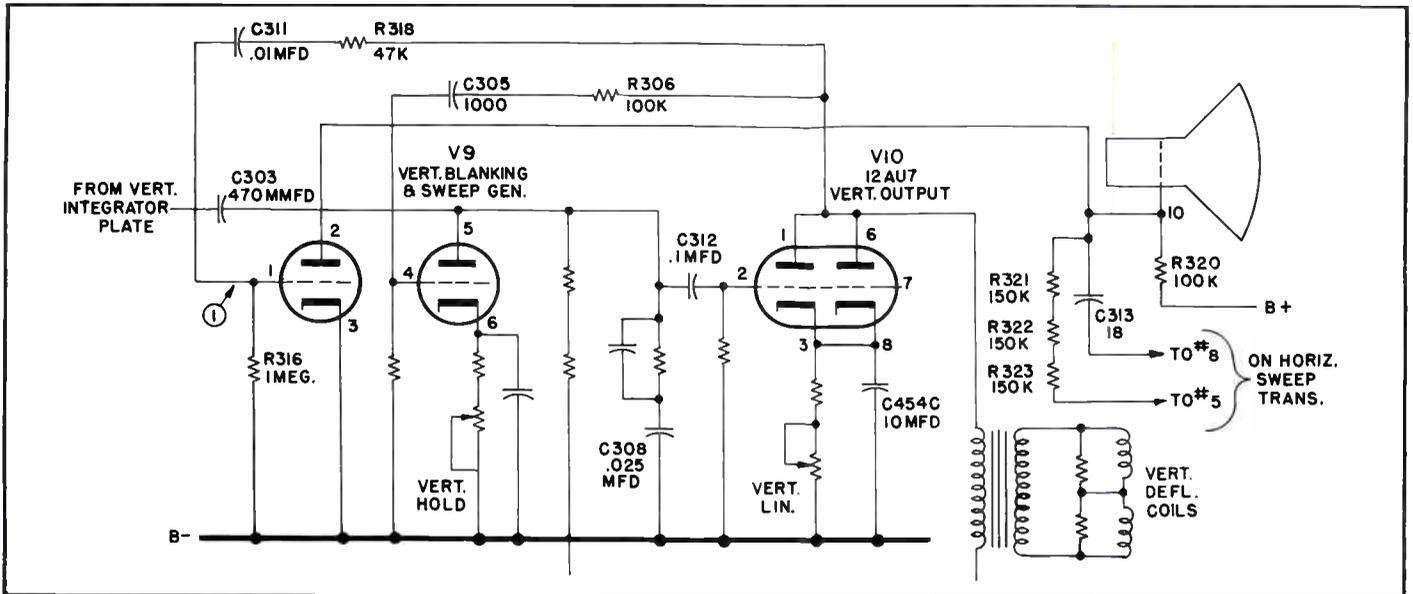


FIG. J-1. Vertical section of complete receiver shown on pages 28 and 29.

The vertical sweep generator and output section develops a waveform which when applied to the vertical deflection coils results in a picture of adequate height with good vertical linearity. Defects in this section usually affect either the height or the vertical linearity.

The circuit shown in Figure J-1 uses one-half of V9 to blank out the picture tube during vertical retrace. This circuit operates in the following manner. The vertical output waveform which is present at pins 1 and 6 of V10 is fed back via R318 and C311 to the grid, pin 1 of V9. This develops a negative bias of about 90 volts at this point and allows the tube to conduct only during vertical retrace. The retrace portion of the waveform is positive as shown in Figure J-2 which is a normal waveform at point 1. The overall peak-to-peak voltage is about 120 volts of which the retrace peak at the top is about 40 volts. Since this section of V9 only conducts on the positive peaks of the waveform, the voltage at pin 10 of the picture tube is normal except during vertical retrace. During retrace V9 conducts and the plate current for pin 2 of V9 must flow through

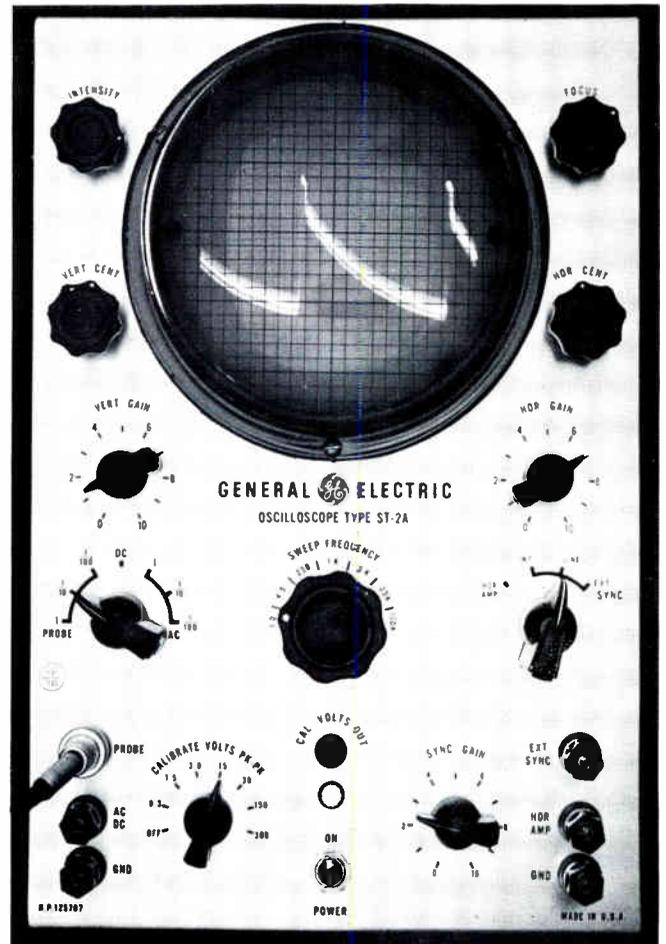


FIG. J-2. Normal vertical waveform at point 1 in Figure J-1 which has a peak-to-peak voltage of about 120 volts.

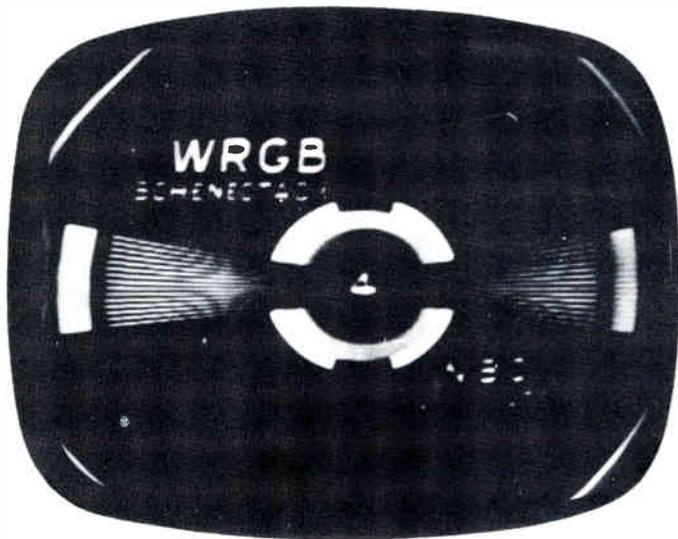


FIG. J-3. Test pattern as it appears with capacitor C311 in Figure J-1 open.

R320. This reduces the voltage sufficiently at pin 10 of the picture tube so as to extinguish the beam during vertical retrace which prevents the vertical retrace lines from appearing on the picture tube.

If C311 is open the vertical waveform at point 1 will be missing, and the picture will appear similar to Figure J-3 which was obtained with the contrast control at a normal setting and the brightness control set at maximum. Since the vertical waveform is absent at point 1 the bias voltage on the grid is reduced to about 2 volts. This greatly reduced bias voltage allows a constant flow of plate current through R320 thus reducing the voltage at pin 10 of the picture tube.

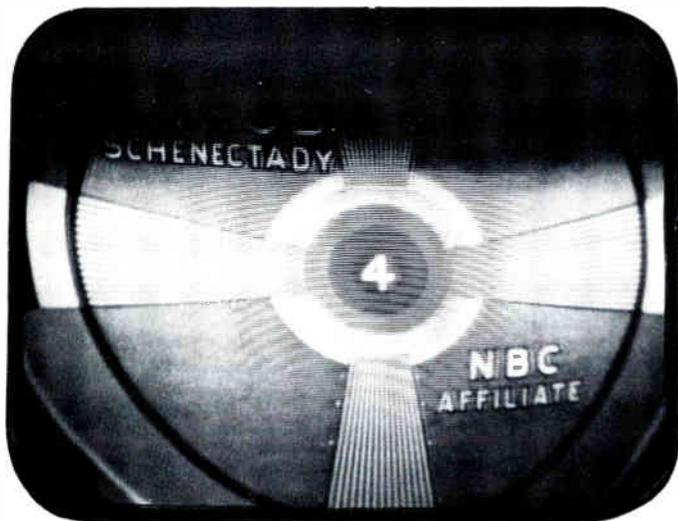


FIG. J-4. Test pattern with 3 megohms leakage across capacitor C311.

If capacitor C311 has 3 megohms leakage across it, the top of the picture will be blanked out as shown in Figure J-4. If the leakage across C311 is 1.5 megohms the dark area extends from the top almost to the bottom of the screen as shown in Figure J-5. If V9 becomes gassy the picture will appear similar to J-3, J-4, or J-5 depending on the amount of gas in the tube.

Capacitor C313 and resistors R321, R322 and R323 are part of the horizontal retrace elimination circuit. If C313 is leaky or shorted, the voltage on pin 10 of the picture tube will be increased since B+ is present on terminal No. 8 of the horizontal sweep transformer. Part of the plate current for pin 2 of V9 will therefore

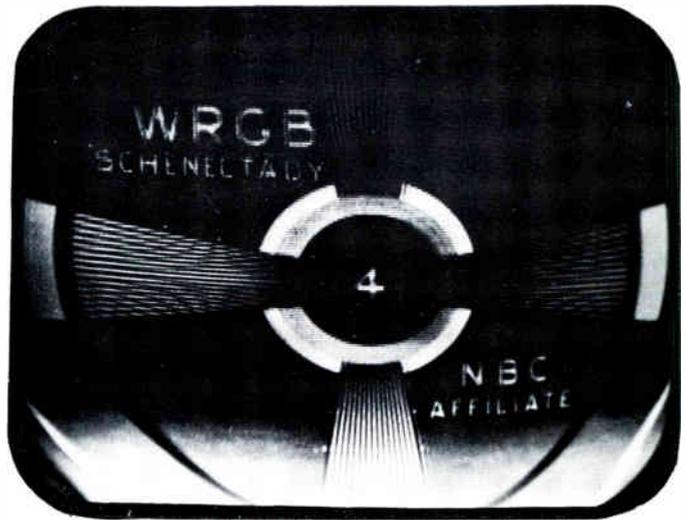


FIG. J-5. Test pattern with 1.5 megohms leakage across capacitor C311.

flow through the leaky or shorted C313, and vertical retrace lines will appear on the picture tube if the brightness control is advanced as shown in Figure J-6.

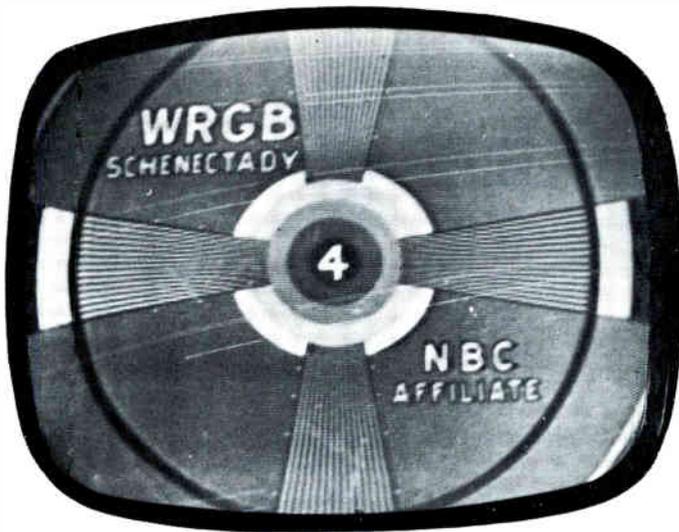


FIG. J-6. Test pattern with visible vertical retrace lines due to a shorted C313 in Figure J-1.

Point 1 in Figure J-1 is a good place to check the operation of the overall vertical circuit since most defects will affect the waveform at this point. If C303 is slightly leaky (5 megohms) the picture will be expanded at the bottom and squeezed at the top as shown in Figure J-7. The waveform at point 1 will be somewhat changed as shown in Figure J-8. If this leakage is increased (200K) the top is expanded and the bottom squeezed as shown in Figure J-9. The waveform will also change as shown in Figure J-10.

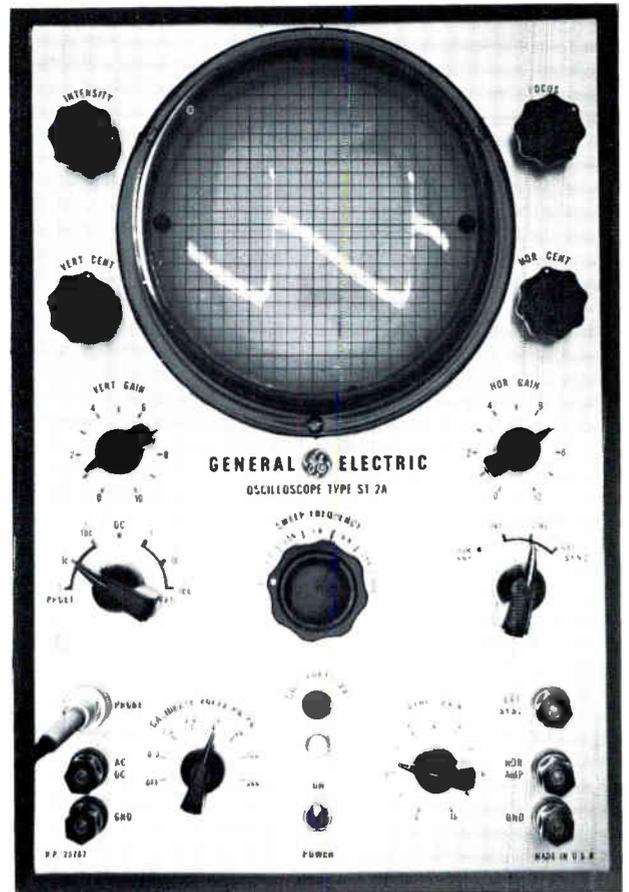


FIG. J-8. Waveform at point 1 due to 5 megohm leakage in capacitor C303.

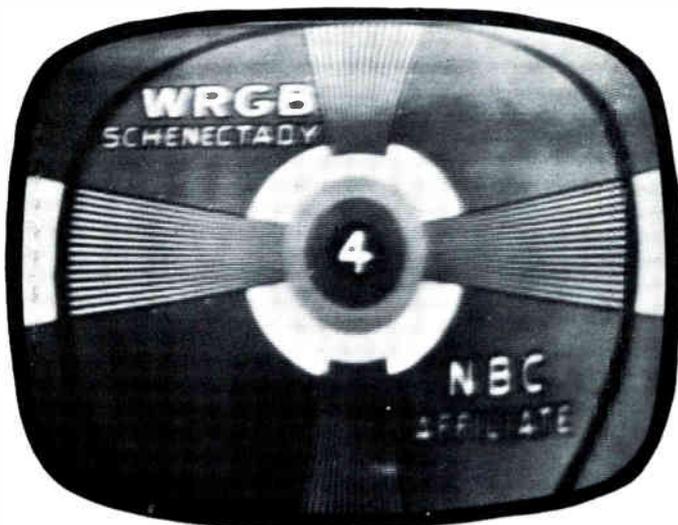


FIG. J-7. Distorted test pattern due to a 5 megohm leakage in capacitor C303.

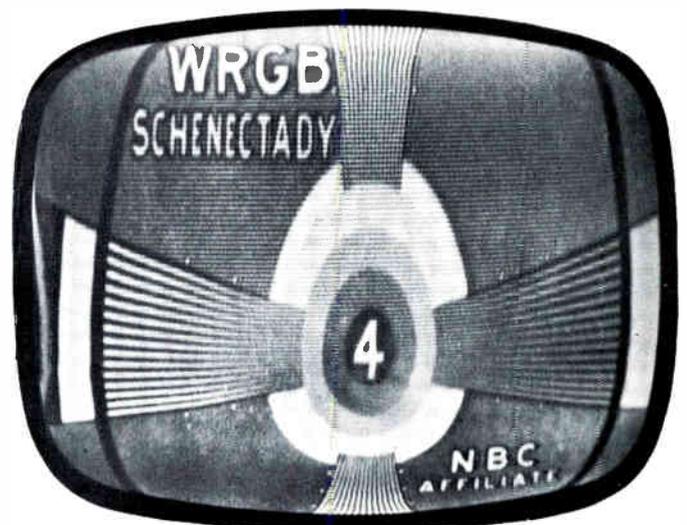


FIG. J-9. Distorted test pattern due to a 200K leakage in capacitor C303.

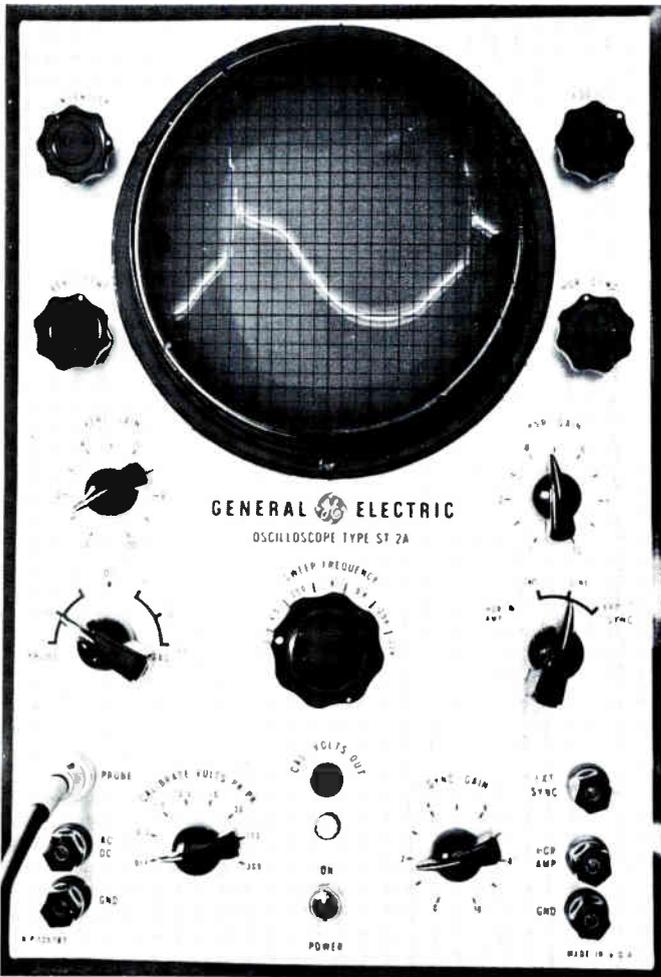


FIG. J-10. Waveform at point 1 due to an open capacitor C303.

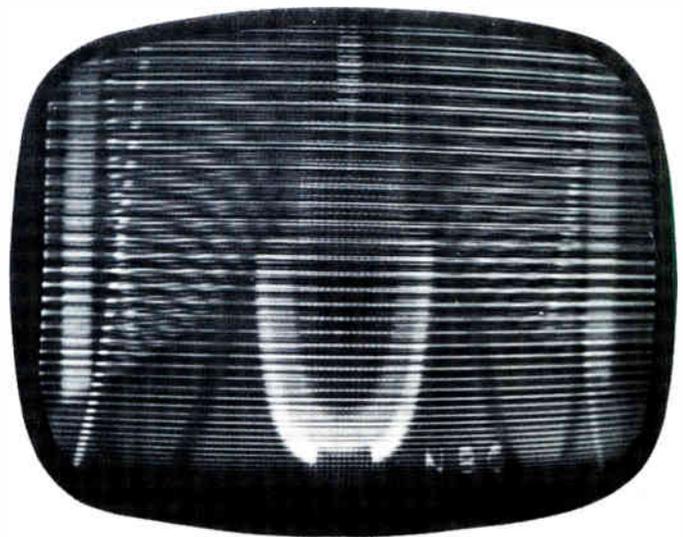


FIG. J-11. Distorted test pattern due to open capacitor C308 in Figure J-1.

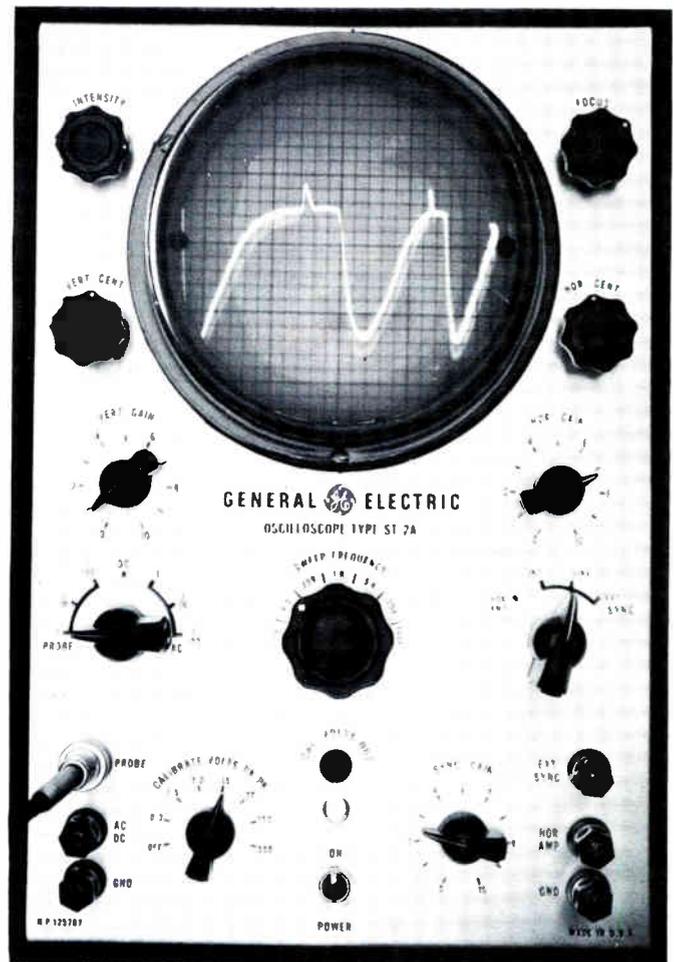


FIG. J-12. Waveform at point 1 due to an open capacitor C308 in Figure J-1. The peak-to-peak voltage is reduced to about 80 volts.

With capacitor C308 open the picture appears like Figure J-11, and the waveform at point 1 is very distorted as shown in Figure J-12. The peak-to-peak voltage is reduced to about 80 volts. If capacitor C305 is leaky (700K) the height of the picture is reduced and appears like Figure J-13 and the waveform at point 1 will look like Figure J-14 with a peak-to-peak voltage of about 65 volts. Both the height of the picture and the amplitude of the waveform will change in proportion to the amount of leakage. If capacitor C454C is open the picture is also reduced in size the same as shown in Figure J-13. The waveform Figure J-15 at point 1 is somewhat different in shape from Figure J-14 and the peak-to-peak voltage is about 5 volts higher or about 70 volts. The interesting point here is that leakage across capacitor C308 or an open in capacitor C454C will produce the same change in the picture, but the waveforms at point 1 are different. The defective component can therefore, be identified by the shape of the waveform.

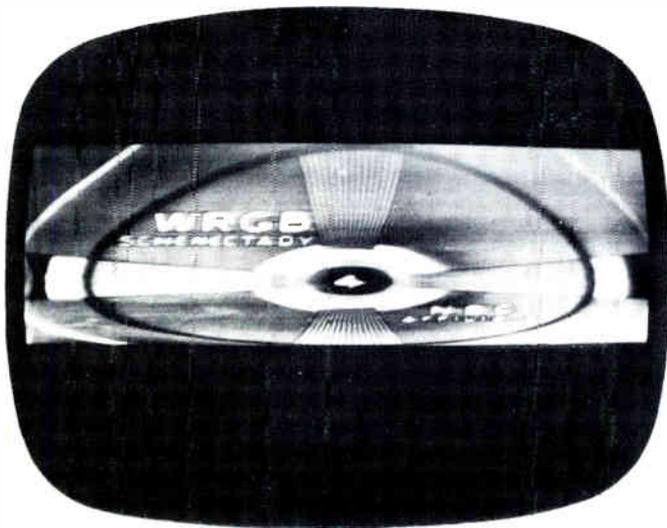


FIG. J-13. Test pattern reduced in size due to leakage in capacitor C305.

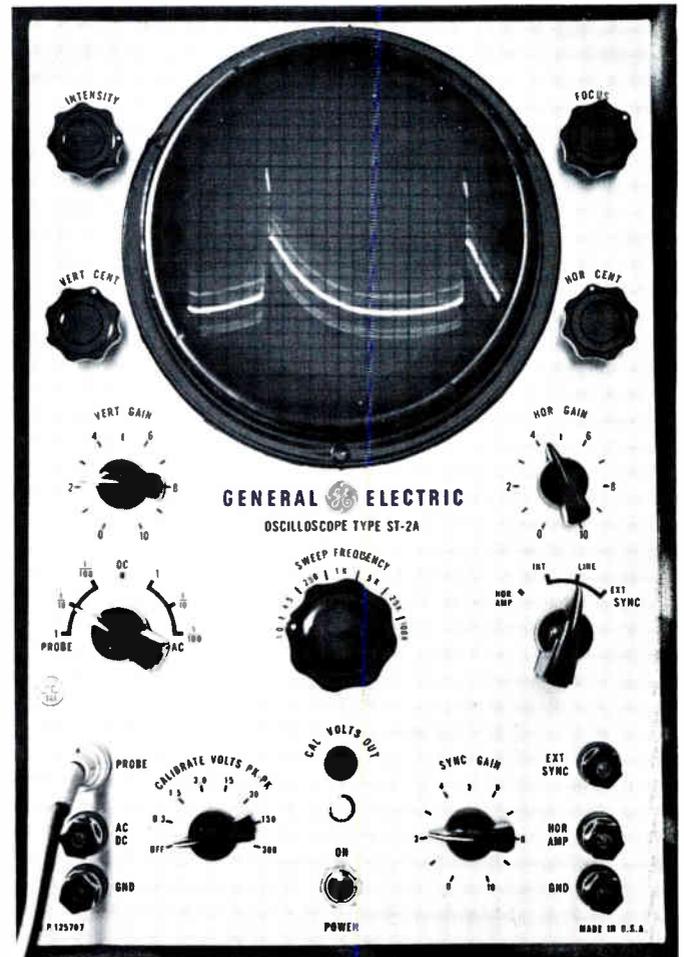


FIG. J-15. Waveform at point 1 due to an open capacitor C454C. The peak-to-peak voltage is slightly increased to about 70 volts.



FIG. J-14. Waveform at point 1 due to leakage in capacitor C305. The amplitude is reduced to about 65 volts.

Leakage (500K) across C312 will cause a foldover at the bottom of the picture as shown in Figure J-16, and the waveform at point 1 is changed considerably to appear like Figure J-17. The peak-to-peak voltage is the same as normal.



FIG. J-16. Foldover at bottom of picture due to leakage in capacitor C312.

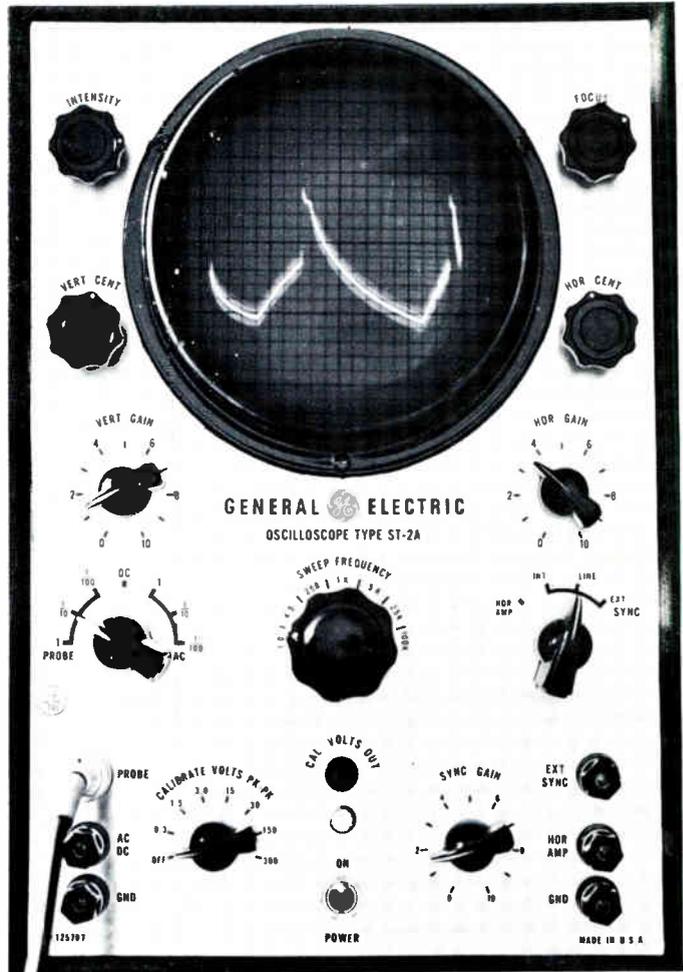


FIG. J-17. Waveform at point 1 due to leakage in capacitor C312. The peak-to-peak voltage is normal.

DEFECTS IN HORIZONTAL OSCILLATOR, SWEEP AND DAMPER CIRCUITS

The horizontal oscillator and output sections must function properly in order to obtain horizontal width with good linearity. Most receivers also obtain as a by-product of the horizontal output section sufficient high-voltage to provide adequate screen illumination. When these circuits are operating properly certain waveforms are present at different points in the circuits. The scope can and will save time when used to compare the waveforms found with those which should be found at these points. Thus the circuit, and in many cases the component, which is defective can be readily located.

The most common defect which occurs in the horizontal section is complete loss of high voltage which results in a blank picture tube. The first step usually taken to remedy this is to replace the following tubes, V13, V14, V15, and V16 in Figure K-1, one at a time, since any one of these tubes if inoperative will result in a loss of high-voltage. This procedure should be followed when servicing in a customer's home. If the receiver is on the bench a quick way to check these same tubes as well as the circuits is to use the scope probe. The

probe should be placed on points 1, 2, and 3 and about one inch away from points 4, 5, and 6 in that order. A normal waveform at each point will indicate that the circuit is operating normally up to this point. A high voltage (20KV) capacitor should always be used between the tip of the scope probe and points 4, 5 and 6 since the voltage rating of the input capacitor in the scope is only 500 volts. In most cases actual contact with points 4 and 5 will not be necessary unless the peak-to-peak voltage is measured. As mentioned previously the scope probe need only be held about one inch from either V14 or V15 or their plate leads in order to produce the waveforms, which are present. If peak-to-peak voltages are to be measured, contact must be made at these points. By observing the waveforms the point where the waveform is not normal in amplitude or is distorted in appearance can be quickly located. This localizes the defect so that only one tube or one particular circuit needs to be checked. Obviously, this method saves valuable time and makes troubleshooting a science rather than a "guessing game".

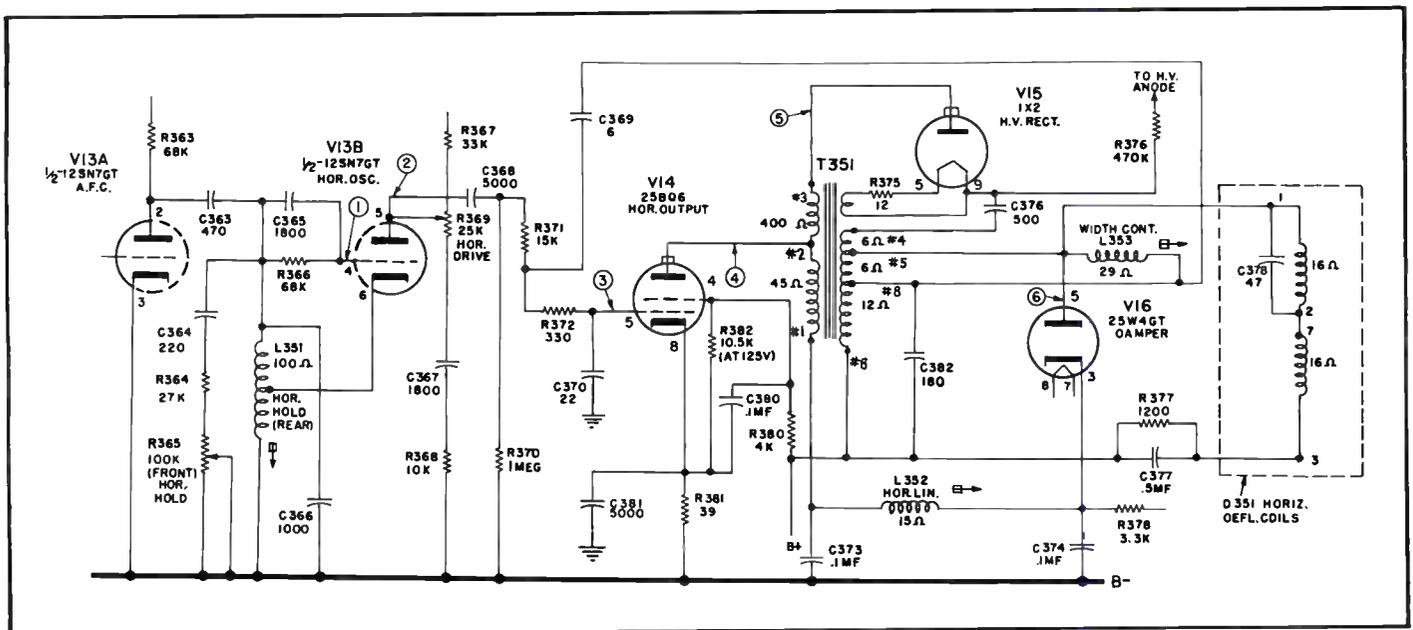


FIG. K-1. Horizontal section of the complete receiver which appears on pages 28 and 29 showing several test points to check for defects in this circuit.

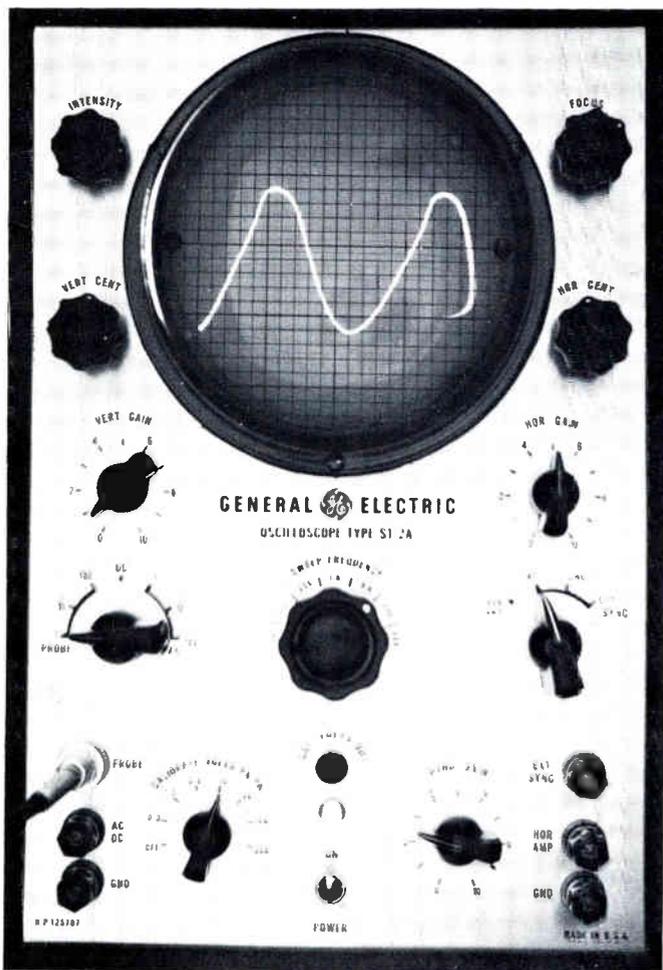


FIG. K-2. Normal waveform at point 1 in K-1. The peak-to-peak voltage is about 120 volts.

A sine-wave type of horizontal oscillator is used in the circuit shown in Figure K-1; therefore the normal waveform at point 1 should appear like Figure K-2 and have a peak-to-peak voltage of 120 volts. If capacitor C365 is leaky (2K) the brightness and width are decreased and several white lines appear near the center as shown in Figure K-3. The waveform at point 1 is changed as shown in Figure K-4 which has a peak-to-peak voltage of about 50 volts.

If C366 is leaky (15K) the picture is also reduced in brightness and has a pulling at the top with a vertical white line as shown in Figure K-5. The white line is at a slightly different point than appeared in K-3, and the waveform at point 1 is somewhat changed from either Figures K-2 or K-4 and appears like Figure K-6. The peak-to-peak voltage is reduced to about 60 volts.

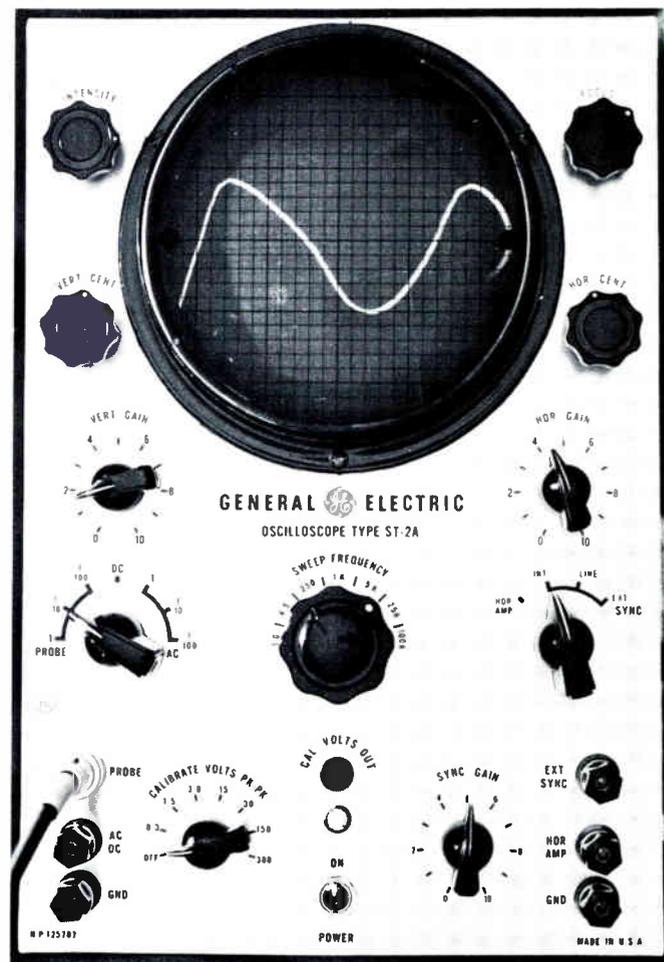


FIG. K-4. Waveform at point 1 in Figure K-1 due to leakage in capacitor C365. The peak-to-peak voltage is reduced to about 50 volts.

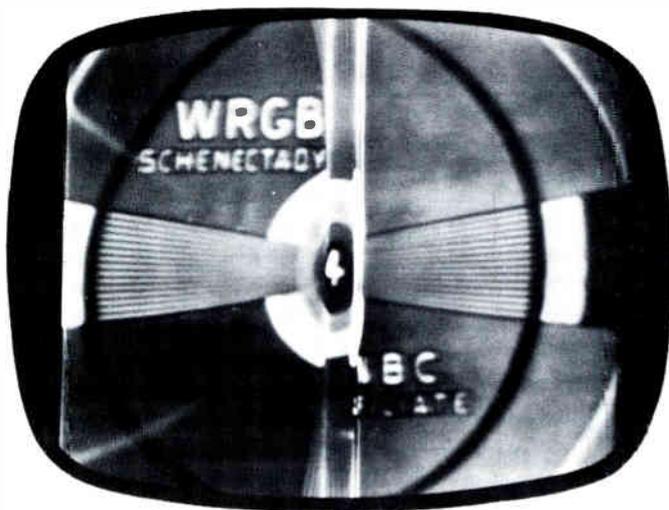
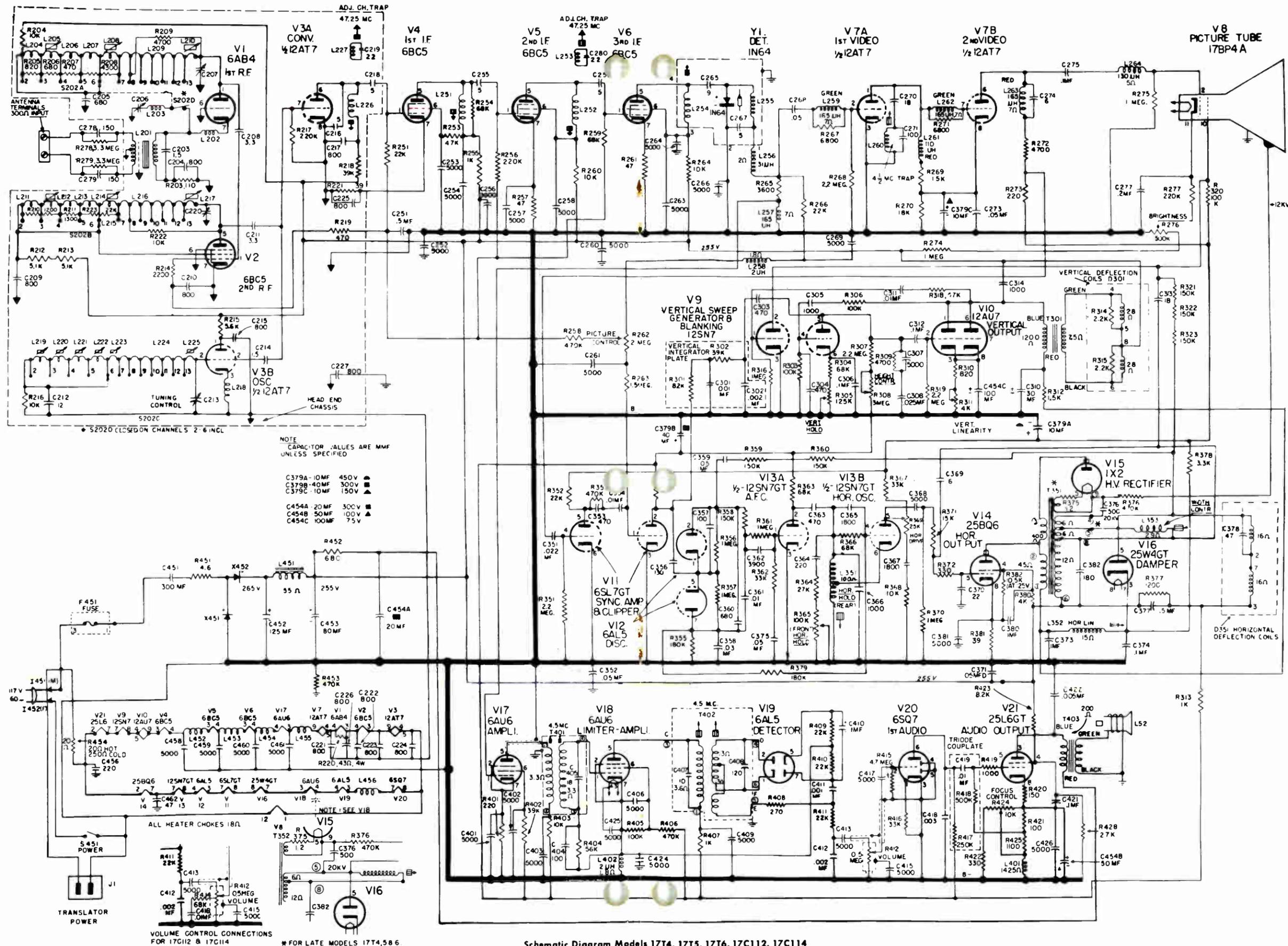


FIG. K-3. Test pattern due to leakage in capacitor C365 in Figure K-1.



Schematic Diagram Models 17T4, 17T5, 17T6, 17C112, 17C114

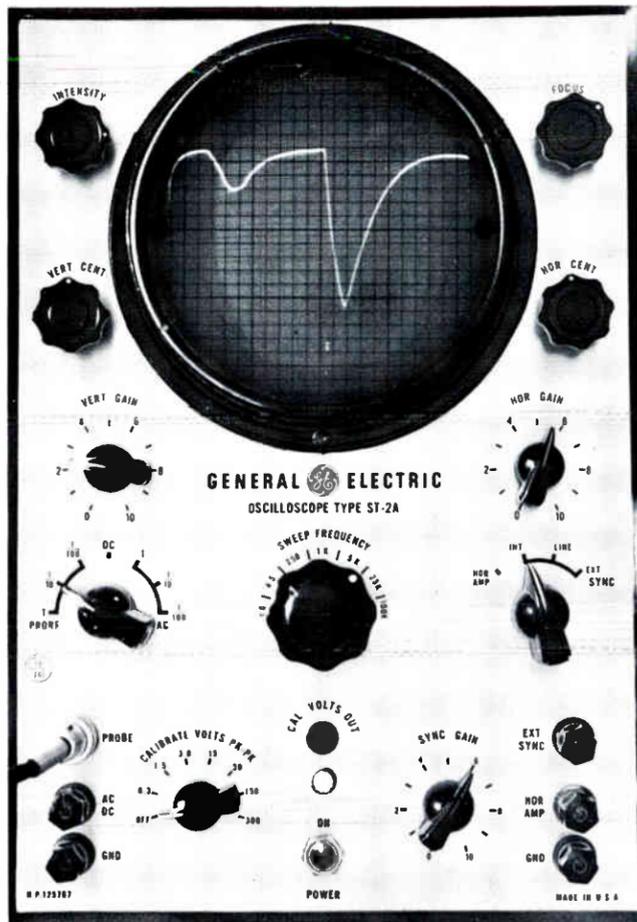


FIG. I-8. Waveform at point 1 if capacitor C356 is leaky. The peak-to-peak voltage is approximately 70 volts.

The waveform at point 1 will look like Figure I-8 which was photographed with the blanking bar near the center of the picture. The large peak is the horizontal sync pulse which remains stationary. The small peak is the pulse which is fed back from the damping tube. This peak will shift as the picture shifts. The voltage at point 1 will, of course, be considerably more positive than the normal 2.5 volts.



FIG. I-9. Waveform at point 1 due to leakage in capacitor C357 in Figure I-1. The picture is synced with the blanking bar at the left of the picture as shown in Figure I-7. The peak-to-peak voltage is about the normal 30 volts.

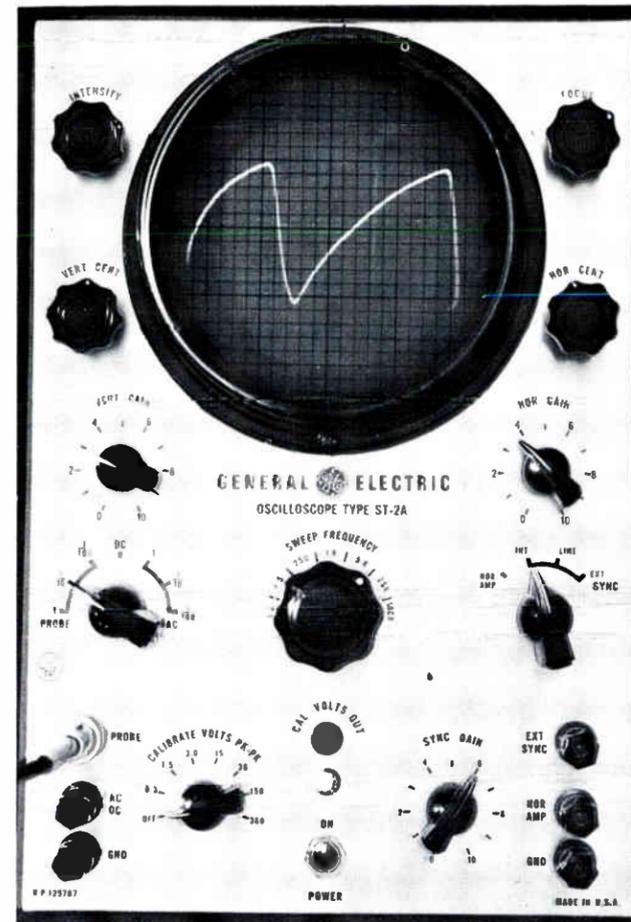


FIG. I-5. Normal waveform at point 2 in Figure I-1. The peak-to-peak voltage is about 35 volts.

The presence of the normal sync pulse at point 1 and the sawtooth waveform at point 2 are necessary in order to develop the proper control voltage at pin 1 of V13A. There are a number of other defects which will also effect this voltage as well as the waveforms at different points in these circuits. If, for instance, C356 is leaky (about 10K) the picture will shift considerably from left to right but will sync with the horizontal blanking bar to the left as shown in Figure I-7.

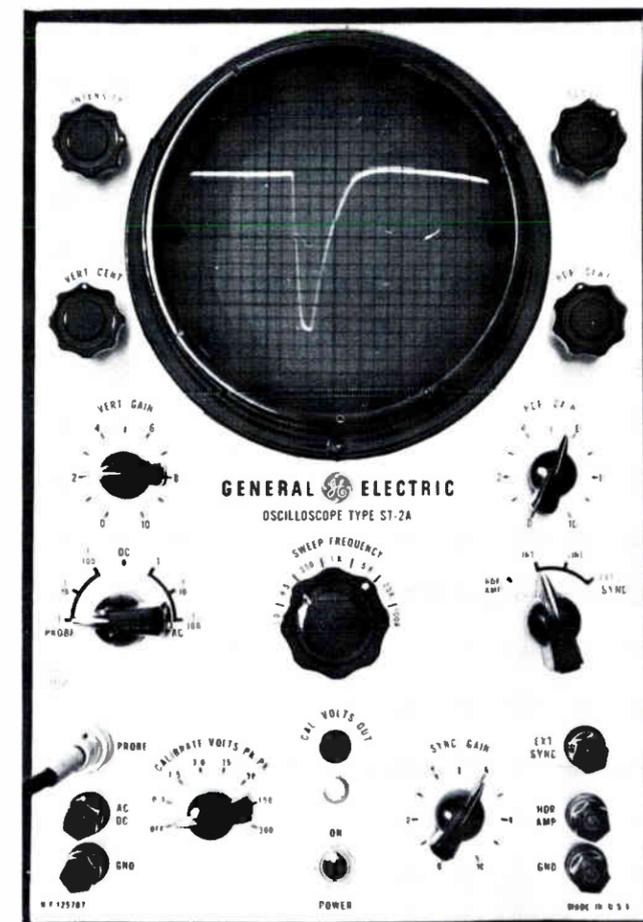


FIG. I-6. Waveform at point 2 in Figure I-1 with capacitor C359 open. The peak-to-peak voltage has dropped to about 6 volts.

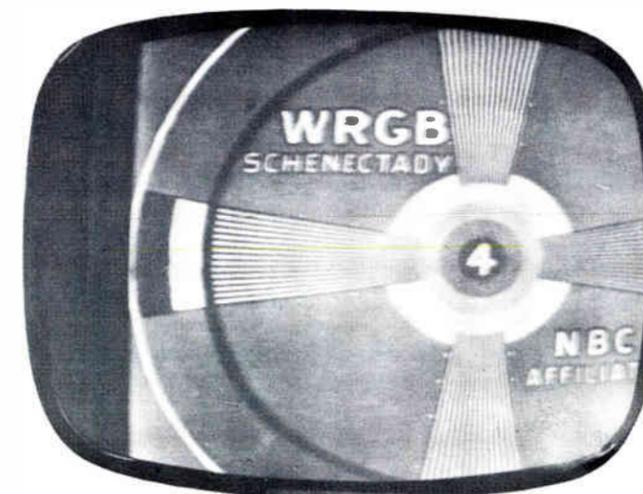


FIG. I-7. Test pattern as it appears if capacitor C356 is leaky.

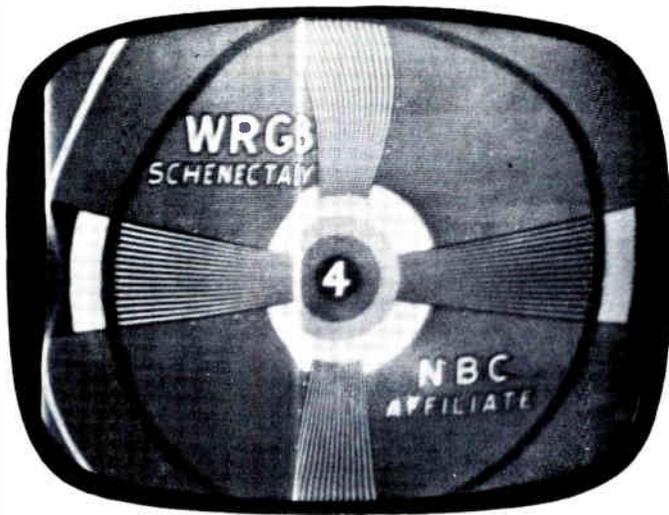


FIG. K-5. Distorted test pattern due to leakage in capacitor C366.

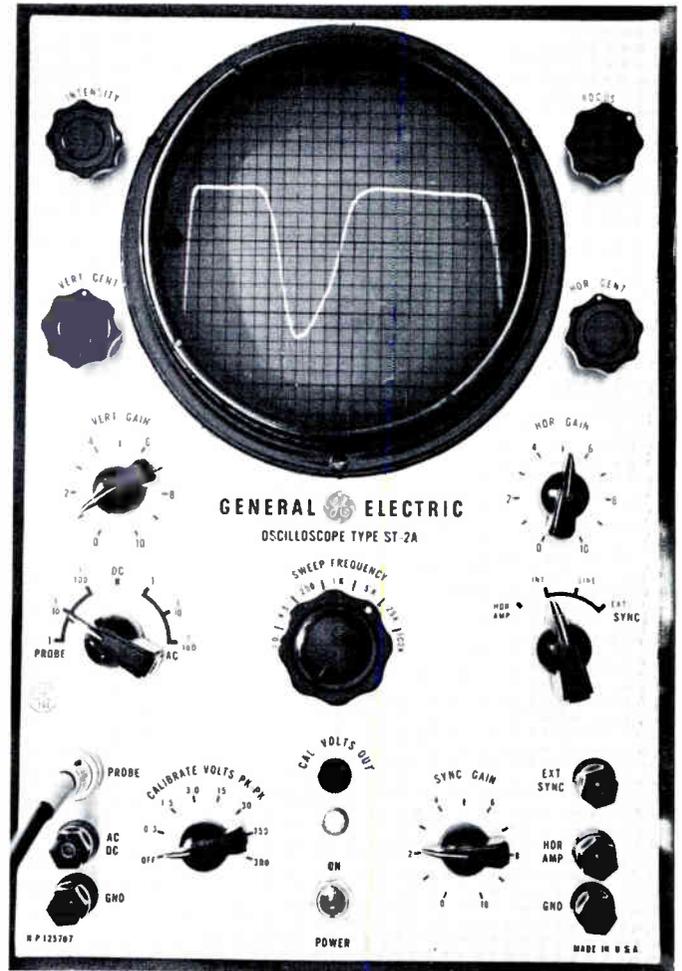


FIG. K-7. Normal waveform at point 2 in Figure K-1 which has a peak-to-peak voltage of about 210 volts.



FIG. K-6. Waveform at point 1 in Figure K-1 with leakage in capacitor C366. The peak-to-peak voltage is reduced to about 60 volts.

If C363 is leaky or shorted the horizontal hold is critical, but the waveform is not noticeably affected. If C364 is shorted or open, or if an open occurs in R364 or R365 the front horizontal hold control will not be effective. It will be necessary to adjust the rear horizontal hold control L351 to obtain proper horizontal sync, otherwise the receiver operates normally and the waveforms are unchanged. Leakage across capacitor C367 reduces the normal plate voltage on V13B and therefore reduces the width and brightness.

The normal waveform at point 2 should appear like Figure K-7 and have a peak-to-peak voltage of about 210 volts. If C365 is open the horizontal oscillator may

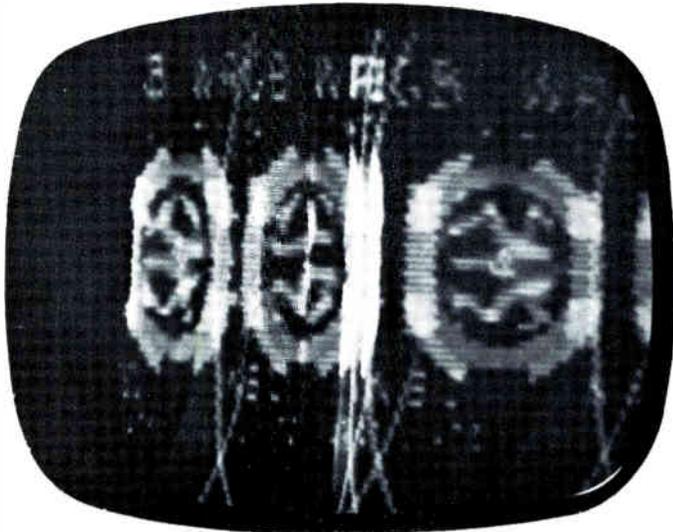


FIG. K-8. Test pattern with capacitor C365 in Figure K-1 open.

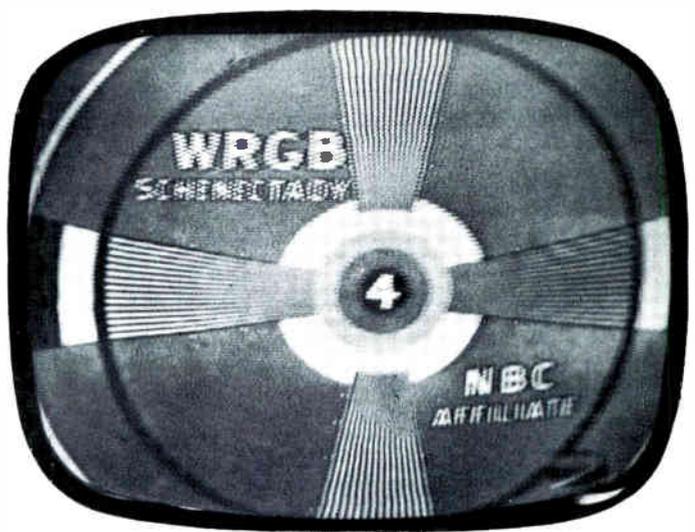


FIG. K-10. Distorted test pattern due to an open resistor R366.



FIG. K-9. Waveform at point 2 in Figure K-1 with C365 open. The peak-to-peak voltage has dropped to about 100 volts.



FIG. K-11. Waveform at point 2 in Figure K-1 with resistor R366 open. The amplitude is reduced to about 180 volts.

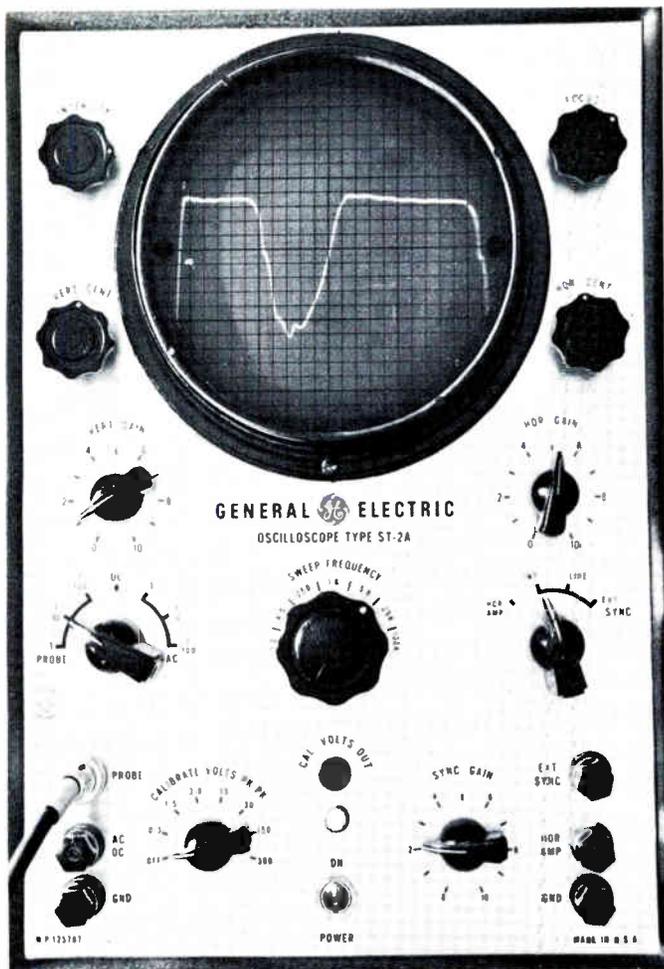


FIG. K-12. Distorted waveform at point 2 due to leakage across capacitor C369. The amplitude of the waveform is normal.

stop oscillating, or if it does oscillate the horizontal hold (rear) will have to be adjusted and the picture will appear similar to Figure K-8. The waveform at point 2 will appear like Figure K-9 with a peak-to-peak voltage of about 100 volts. The waveform will be normal on one side of C365 but practically disappears on the other side. If R366 is open the picture will look like Figure K-10 and the waveform at point 2 will be slightly distorted as shown in Figure K-11 with a peak-to-peak voltage of 180 volts. Leakage (1 megohm) across capacitor C369 will also produce a defect similar to that shown in Figure K-10, but the waveform at point 2 will be distorted more at the bottom as shown in Figure K-12. The peak-to-peak voltage is not affected by this leakage.

The normal waveform at point 3 is practically the same as at point 2 which was shown in Figure K-7. The peak-to-peak voltage is slightly reduced to about 190 volts. If C368 is leaky (100K) the width is reduced and a foldover appears at the left as shown in Figure K-13. The waveform is also changed to look like Figure K-14 which has a peak-to-peak voltage of about 100 volts.

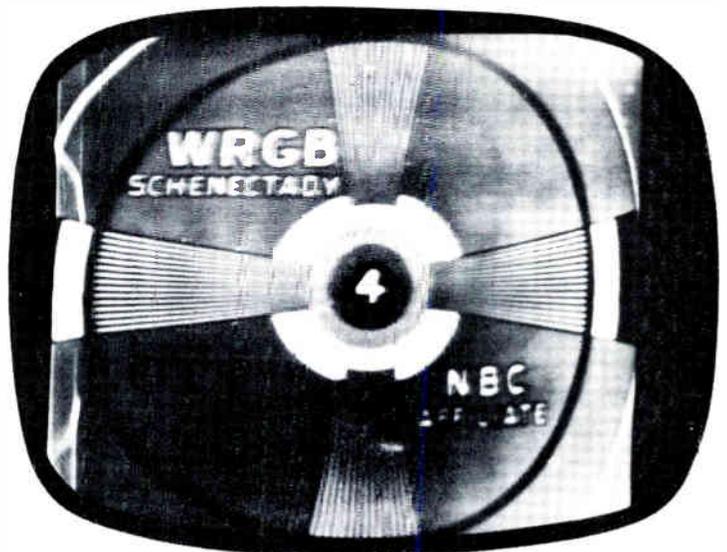


FIG. K-13. Change in test pattern due to leakage in capacitor C368 in Figure K-1.

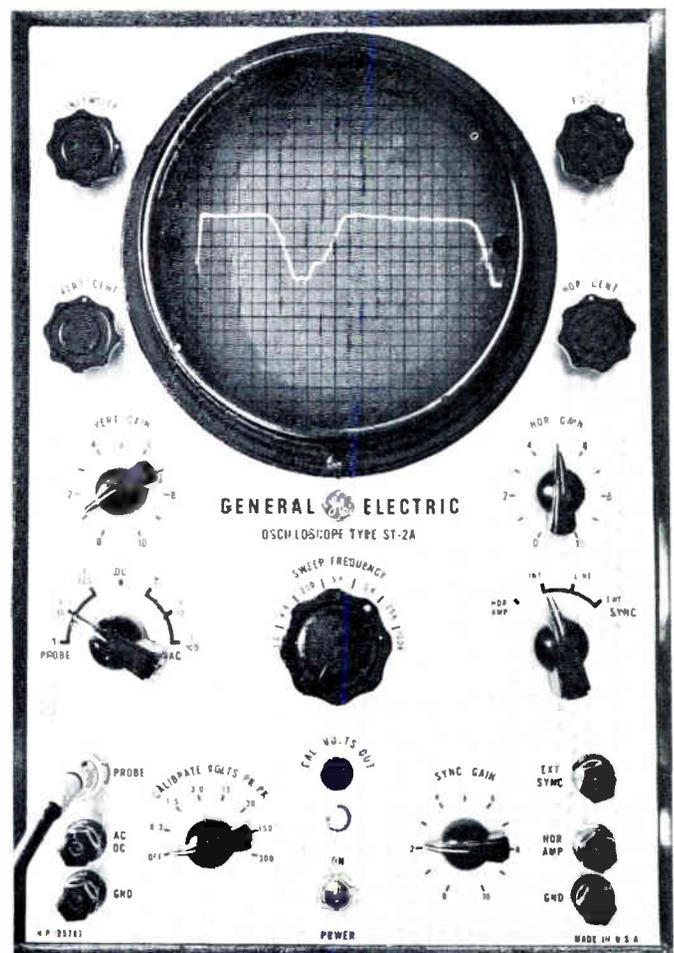


FIG. K-14. Distorted waveform at point 3 in Figure K-1 due to leakage in capacitor C368. The peak-to-peak voltage is reduced to about 100 volts.

The normal pulse at the plate of the damper tube point 6 in Figure K-1 should appear like Figure K-15 and have a peak-to-peak voltage of about 1400 volts. If capacitor C374 is open the picture will be stretched at the left and have a vertical white line as shown in Figure K-16. The waveform at point 6 is changed somewhat as shown in Figure K-17 in that an extra negative going peak appears at the right of the horizontal sweep pulse. The peak-to-peak voltage of the sweep pulse has not changed. If C373 is open there is very little change in either the picture or the waveform. Leakage across either C373 or C374 will reduce the "boost" voltage and therefore the width of the picture and the amplitude of the waveform.

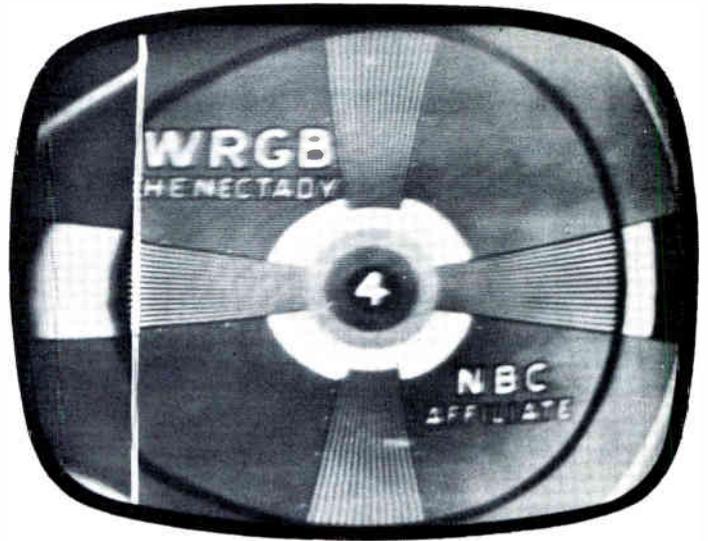


FIG. K-16. Change in left side of test pattern due to an open capacitor C374 in Figure K-1.

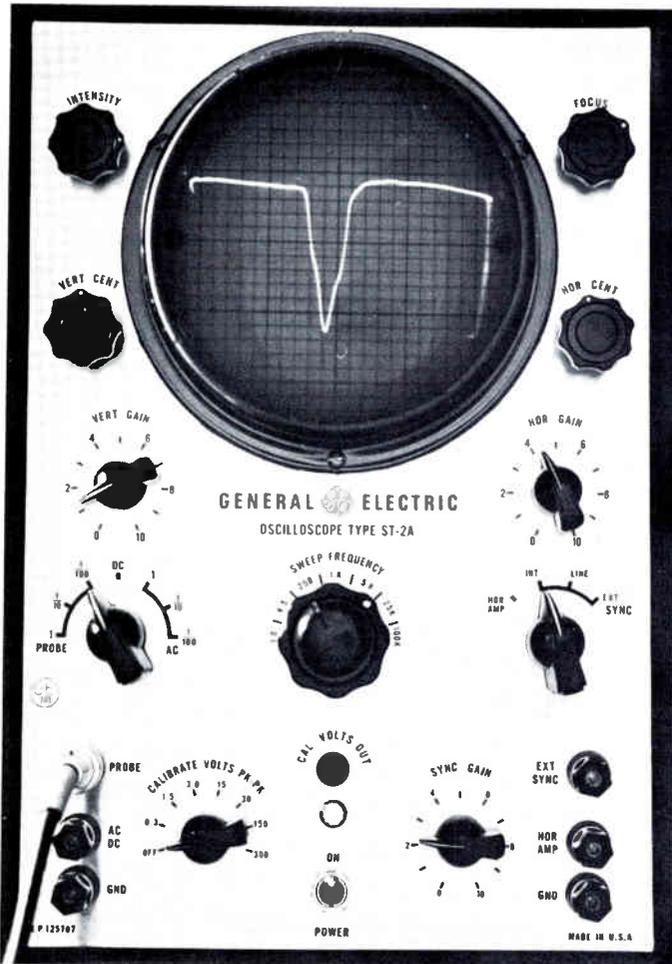


FIG. K-15. Normal waveform at point 6 in Figure K-1. The peak-to-peak voltage is approximately 1400 volts.

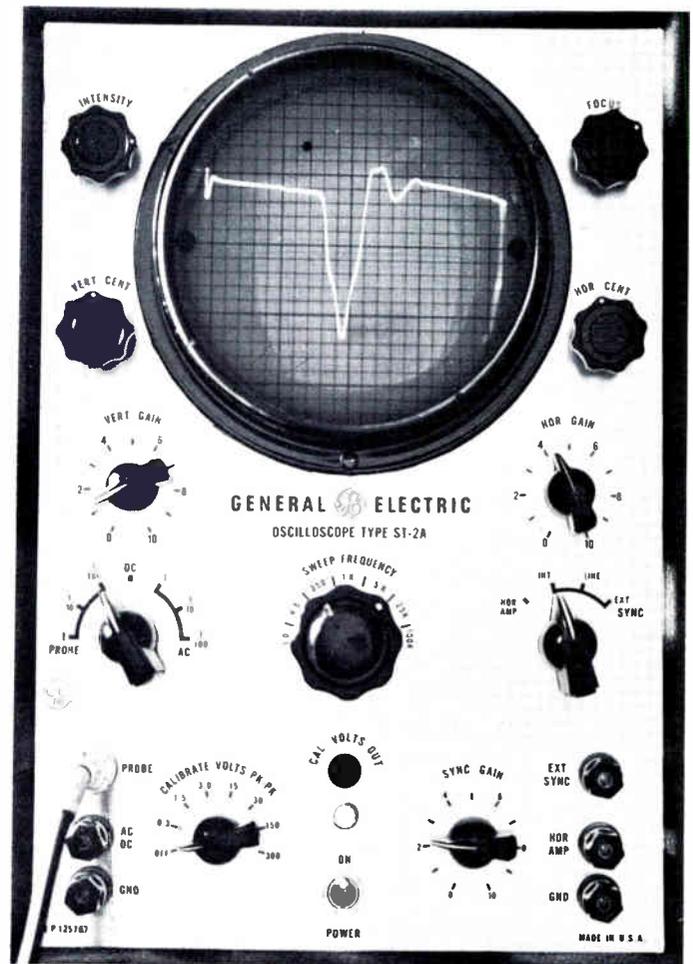


FIG. K-17. Waveform at point 6 in Figure K-1 due to an open capacitor C374. The amplitude of the waveform is unchanged.

HUM IN PICTURE

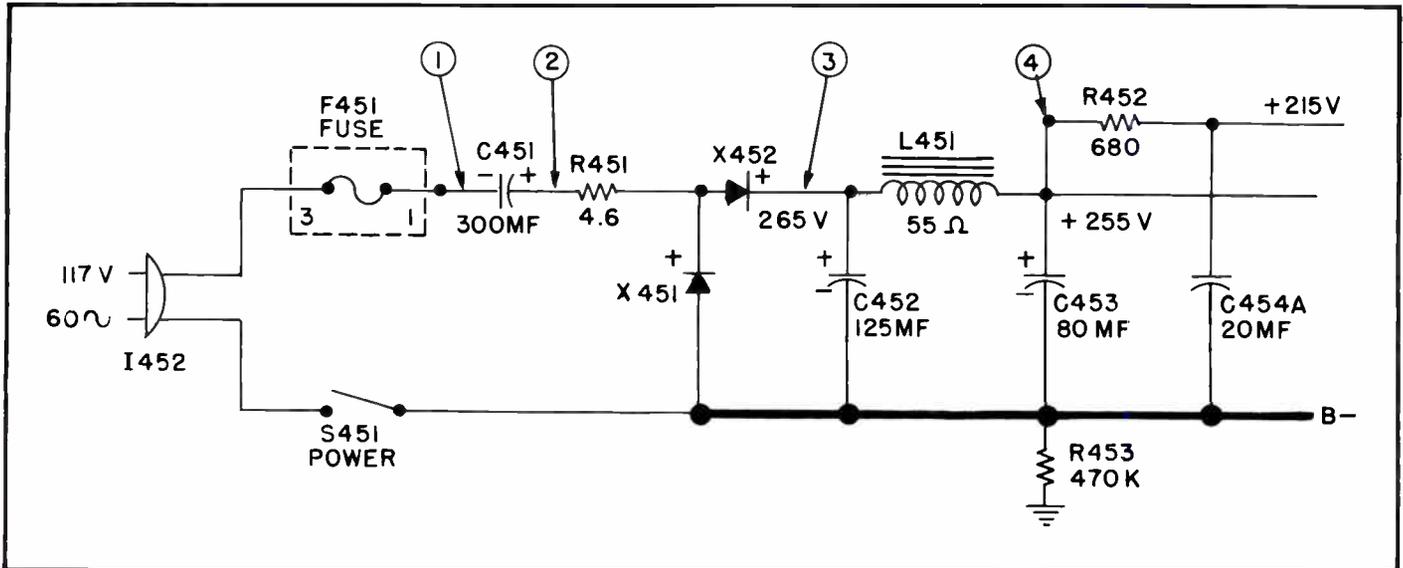


FIG. L-1. Schematic of the power supply section of the complete receiver shown on pages 28 and 29.

The scope can be very effective in locating hum due to either defective filters or heater-cathode leakage in one of the signal amplifier tubes. If hum is present in the picture it will appear similar to either Figure L-2 or Figure L-3 which was due to different amounts

of heater-cathode leakage in one of the video i-f amplifier tubes or Figure L-4 which was due to an open filter capacitor C453 in the power supply circuit shown in Figure L-1. Any of these defects will cause the video signal across the diode load resistor or at the grid of



FIG. L-2. Test pattern with dark band due to heater-cathode leakage in one of the video i-f amplifiers.



FIG. L-3. Test pattern somewhat more distorted due to heater-cathode leakage in one of the video i-f amplifiers. The weave in the picture is due to some of the hum getting into the horizontal circuit.

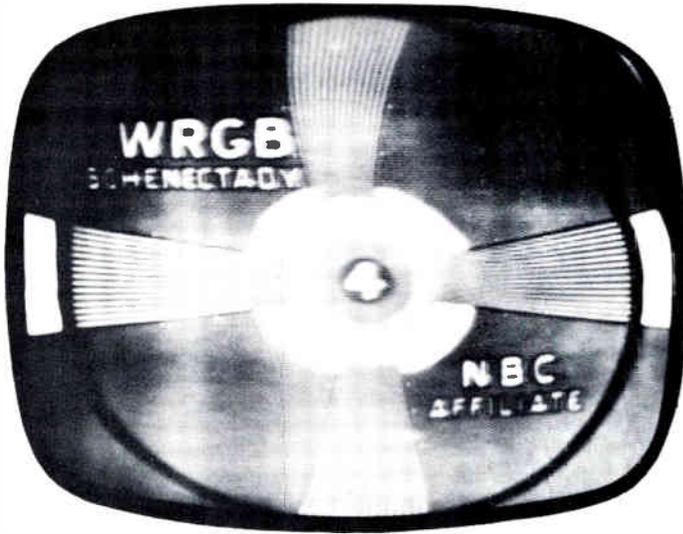


FIG. L-4. The shading of the test pattern is due to an open filter capacitor C453 in Figure L-5 which allows some a-c to modulate the video signal. The wave is due to a-c getting into the horizontal circuit.

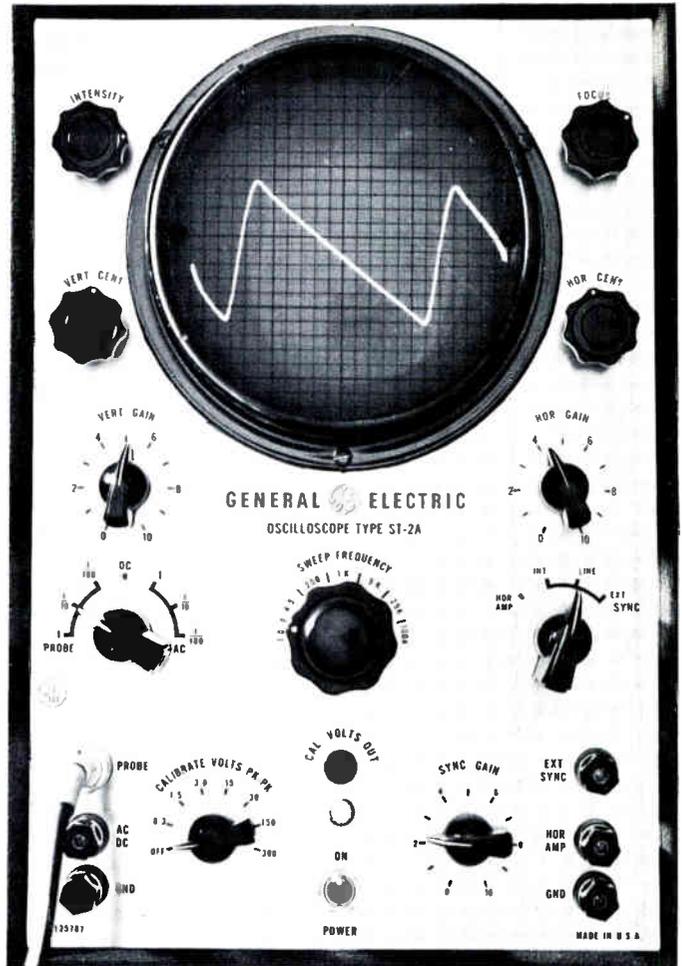


FIG. L-6. Sawtooth waveform which is normally present at point 3 in Figure L-1. The peak-to-peak voltage is about 24 volts.

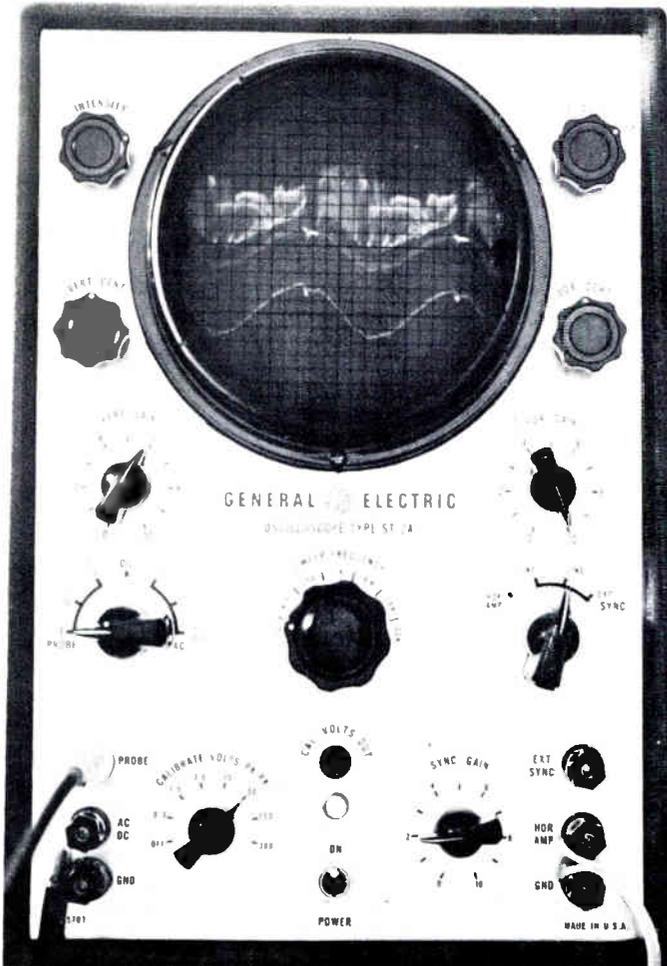


FIG. L-5. Video signal waveform across diode load resistor modulated by a-c due to an open filter capacitor C453 in Figure L-1.

the picture tube to be modulated with 60 cycle a-c voltage as shown in Figure L-5. If a defective filter capacitor is suspected it can be quickly checked by measuring the a-c voltage at each filter capacitor. If the scope probe is placed at either the + or - side of capacitor C451 points 1 and 2 in Figure L-1, the 110 volt a-c sine-wave is present which has a peak-to-peak voltage of about 300 volts. If the probe is moved to point 3 the waveform is changed to a sawtooth as shown in Figure L-6 which has a peak-to-peak voltage of about 24 volts. If the effective capacitance is reduced to 80 mfd instead of 125 mfd, the peak-to-peak voltage of the sawtooth waveform is increased to 60 volts. If this capacitance is reduced still further to 40 mfd the peak-to-peak voltage of the sawtooth waveform is increased 75 volts. If this capacitor is open the waveform is changed in appearance and looks like Figure L-7 with a peak-to-peak voltage of about 300 volts. This results in a distorted picture as shown in Figure L-8.

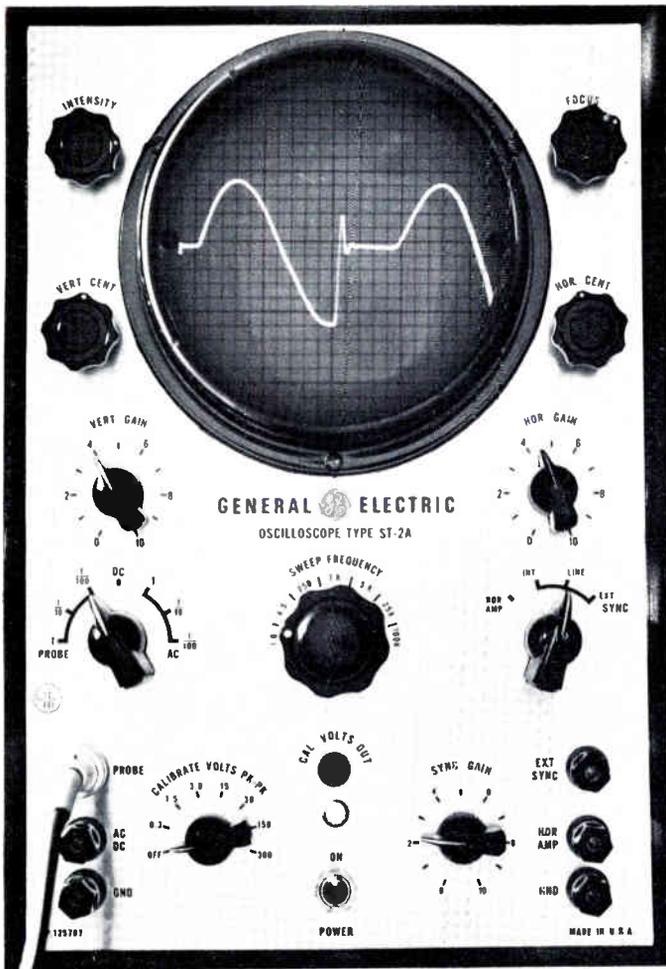


FIG. L-7. Waveform at point 3 in Figure L-1 if capacitor C452 is open. The peak-to-peak voltage is about 300 volts.

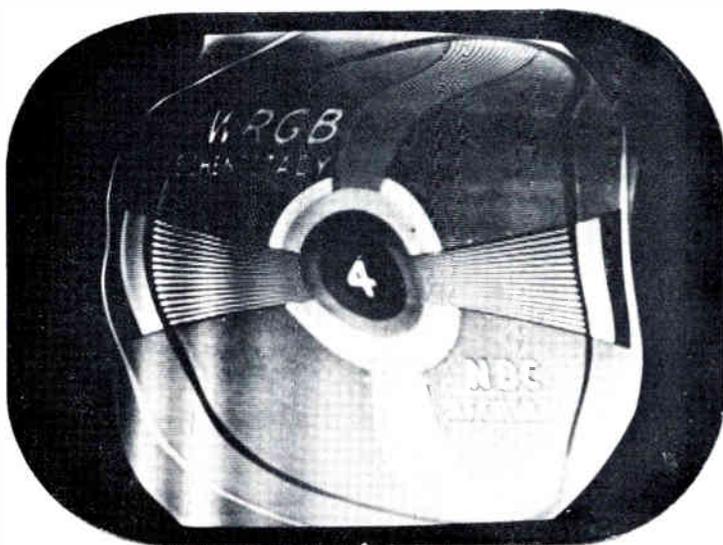


FIG. L-8. Distortion of test pattern due to an open filter capacitor C452.

If the sawtooth voltage is about normal at point 3 the probe should be moved to point 4. Here the sawtooth has been smoothed out by L451 and C453 and is again a sine-wave as shown in Figure L-9 which has a peak-to-peak voltage of about 1.2 volts. If this capacitance is reduced to 40 mfd the sine-wave will look like Figure L-9 but the amplitude will have increased to

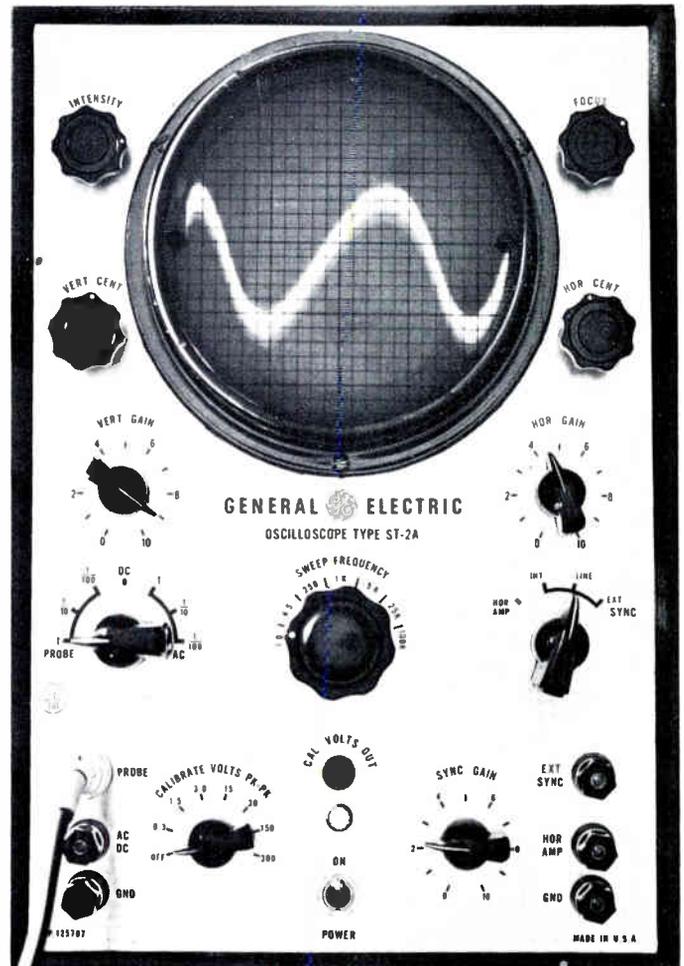


FIG. L-9. Normal waveform at point 4 in Figure L-1. The amplitude of this waveform is about 1.2 volts.



FIG. L-10. Waveform at point 4 in Figure L-1 if capacitor C453 is open. The peak-to-peak voltage has increased to about 42 volts.

about 2.4 volts. If this capacitor is open the sine-wave is changed in appearance and amplitude as shown in Figure L-10. The peak-to-peak voltage has increased to 42 volts. Since this is the supply voltage for V1, 2, 3, 4, 5, and 6, as can be seen by referring to the complete schematic on pages 28 and 29, the video signal will be modulated by this a-c waveform as shown in Figure L-5 and the picture will appear similar to Figure L-4.

If the filter capacitors are doing their job and the a-c voltage at point 4 is normal, a shading of the picture as shown in Figures L-1 and L-2 may be due to heater-cathode leakage in one of the signal amplifier tubes. The first point to check is across the diode load resistor R265 on pages 28 and 29. If the waveform is modulated by a-c and appears like Figure L-11 the leakage is probably in the 6AB4 first r-f amplifier V1. If the waveform is modulated by a-c and appears similar to Figure L-5 the leakage is probably in one of the 6BC5

video i-f amplifiers V4, 5 or 6. The leaky tube can be quickly located by placing the probe on the plate of each one of these tubes. The sine-wave which appears at these points should be about 1.0 volts or less. If one of these tubes has heater-cathode leakage, the sine-wave will have an amplitude many times normal depending on the amount of leakage. This a-c voltage will only appear at the plate of the leaky tube and even though the first i-f tube is leaky, the amplitude of the sine-wave at the plate of the second and third i-f amplifiers will be normal.

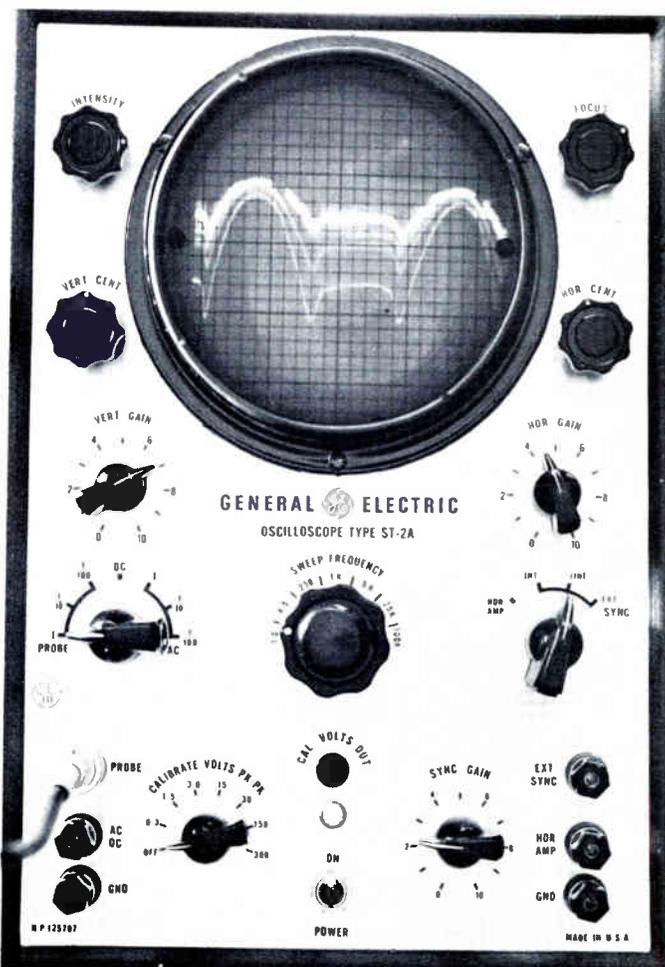


FIG. L-11. Video signal across the video detector load resistor if heater-cathode leakage is present in the 6AB4 1st r-f amplifier tube V-1 in the complete schematic shown on pages 28 and 29.

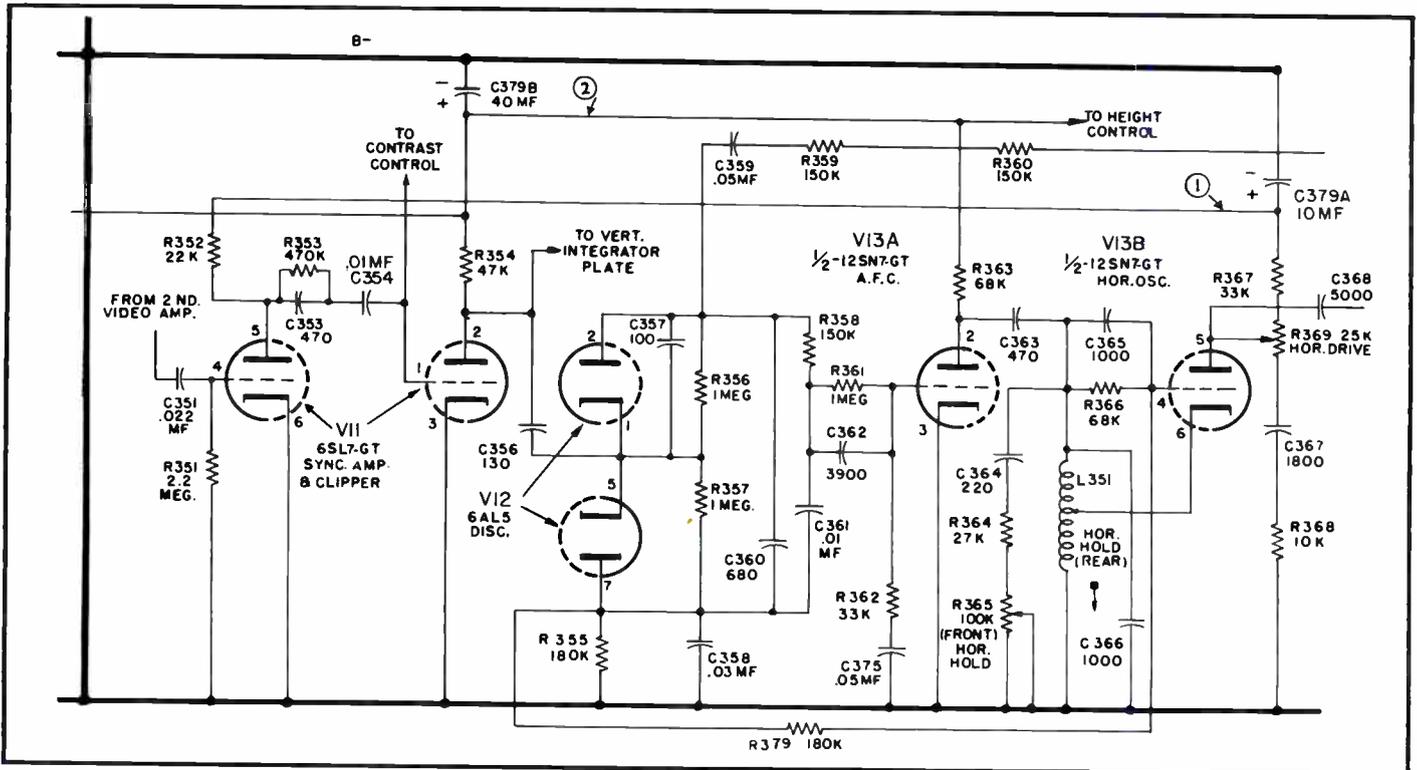


FIG. L-12. Schematic of a section of the complete receiver shown on pages 28 and 29. This section shows the location of filter capacitors C379A and C379B in the circuit.

Heater-cathode leakage in the 12AT7 video amplifier tube V7 will either blank out the picture completely or will act the same as leakage across C379C as described in the section which covered clipping in the video amplifiers.

The efficiency of the other filter capacitors can also be readily checked with the scope, capacitor C379A, for instance, at point 1 in Figure L-12 will normally have a waveform across it similar to Figure L-13 with a peak-to-peak voltage of about 0.3 volts. If this capacitor



FIG. L-13. Normal waveform across capacitor C379A in Figure L-12. The peak-to-peak voltage is about 0.3 volts.

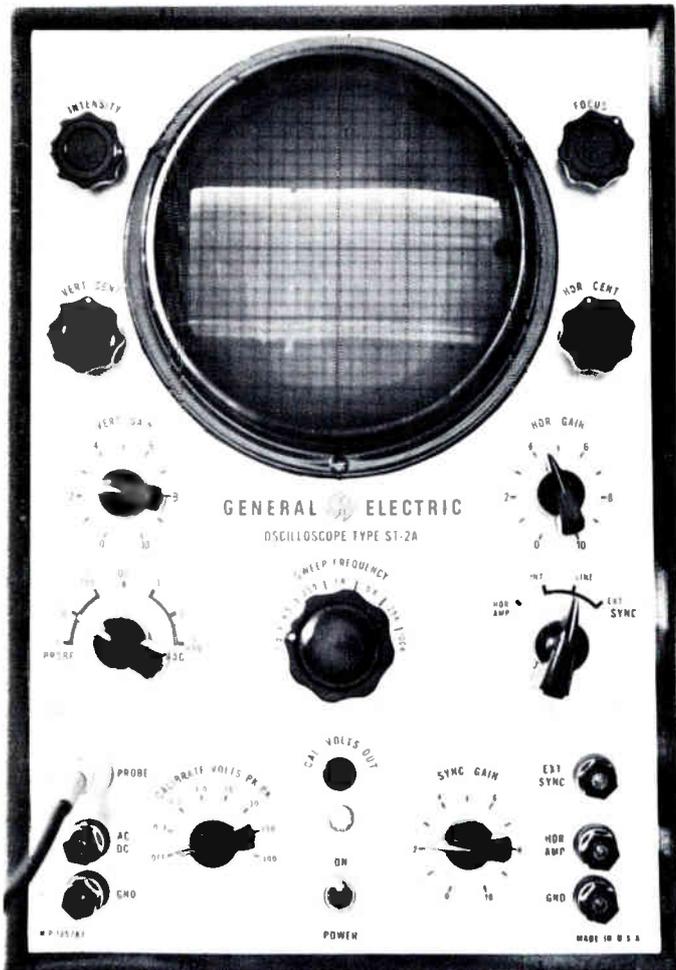


FIG. L-14. Waveform at point 1 in Figure L-12 if capacitor C379A is open. The peak-to-peak voltage has increased to about 50 volts.

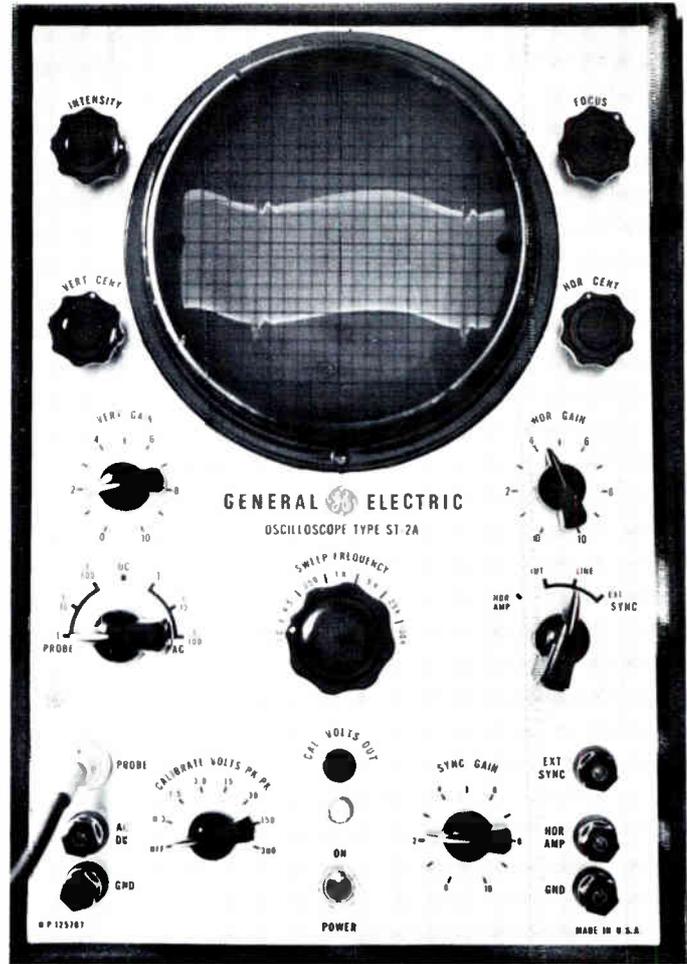


FIG. L-16. Waveform at point 2 in Figure L-12 if capacitor C379B is open. The peak-to-peak voltage is about 7 volts instead of 0.1 volts which is normal.



FIG. L-15. Test pattern with capacitor C379A in Figure L-12 open.

is open the waveform is changed to look like Figure L-14 with a peak-to-peak voltage of about 50 volts. The picture is distorted and will only sync horizontally with the blanking bar at the left or right side. Figure L-15 shows distortion in the picture due to an open capacitor C379A. The adjustment of the contrast control as well as the vertical hold control is very critical.

The normal waveform across capacitor C379B point 2 in Figure L-12 is a sine-wave of only about 0.1 volts in amplitude. If this capacitor is open the waveform at this point looks like Figure L-16 with a peak-to-peak voltage of about 7 volts. The picture appears normal but a noticeable buzz can be heard at any setting of the volume control. This buzz is only heard when a station is received and is due to the vertical sync pulses at pin 2 of V11 modulating the B+ voltage which also feeds V17, 18 and 20. As can be seen by referring to the complete schematic on pages 28 and 29.

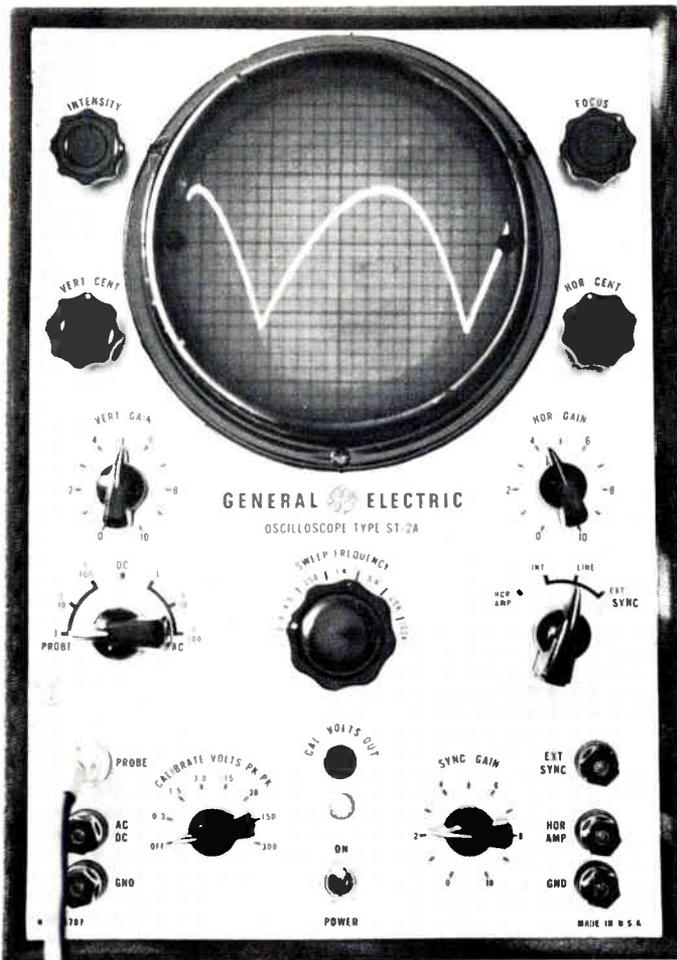


FIG. L-17. Normal waveform across capacitor C310 on the complete schematic shown on pages 28 and 29. Capacitor C310 is connected to the B side of the vertical sweep output transformer. The waveform at this point has a peak-to-peak voltage of about 2.0 volts.

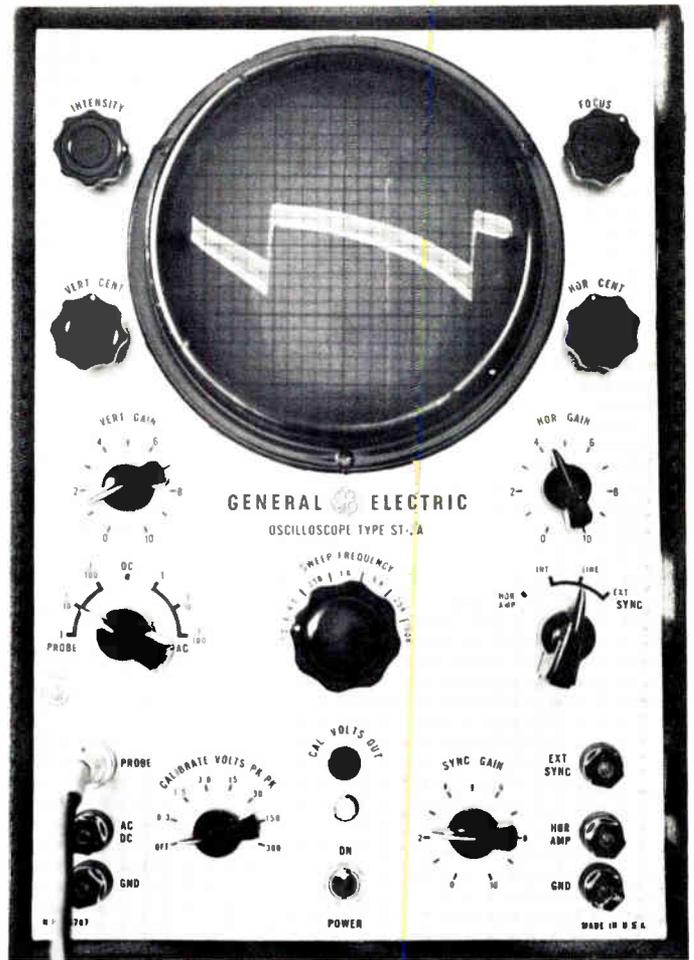


FIG. L-18. Waveform at the plus side of capacitor C310 if this capacitor is open. The peak-to-peak voltage is increased to about 90 volts.

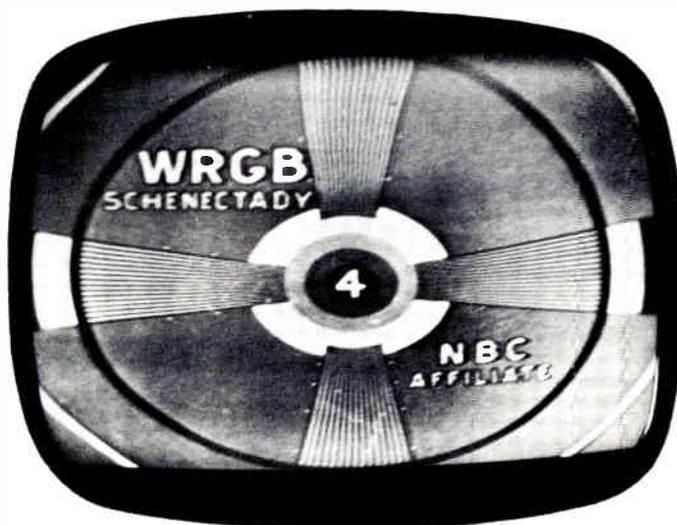


FIG. L-19. Test pattern reduced in height and shaded at the top due to an open capacitor C310.

The normal waveform at the plus side of capacitor C310 is shown in Figure L-17 which has a peak-to-peak voltage of about 2 volts. C310 is the 30 mfd capacitor connected to the B+ side of the vertical output transformer. If this capacitor is open the waveform is changed in both amplitude and shape as shown in Figure L-18. The peak-to-peak voltage has increased to 90 volts. The height of the picture is reduced and the top is shaded as shown in Figure L-19. A wave will also appear in the picture if the contrast is reduced. This is due to the vertical output waveform feeding into the plate of the horizontal output tube.

The peak-to-peak voltage across filter capacitors which were given in this section only apply to the circuit shown on pages 28 and 29. Here again circuit diagrams for other receivers can be made more valuable by writing in the waveforms and the peak-to-peak voltages normally found at these points.

The waveforms shown in this booklet indicate some of the changes caused by certain defective components as seen on a good oscilloscope. Obviously some of these waveform changes will only occur in the type of circuit shown on pages 28 and 29. Other circuits, and defects in those circuits, will produce waveforms which may or may not be similar to those shown. In this case the waveforms and the peak-to-peak voltage of the waveforms should be noted on the schematic for future use.

Some oscilloscopes may not produce a true waveform as shown in the comparison of Figures A-2 and A-4 with Figures A-3 and A-5. If your scope does not produce a true waveform and therefore cannot be used for troubleshooting in *all* TV circuits, use it as much as possible in those circuits where it *does* produce a good waveform. Thus you will come to realize the value of a scope as a timesaver and you probably will not be satisfied until you possess a scope which can be used in all TV circuits.

The consistent use of a good oscilloscope will help you to:

Increase your income by saving time on most bench jobs.

Increase your business by improving your service and efficiency.

Increase customer confidence in your technical ability by use of an instrument which most people find both fascinating and impressive.

Increase your knowledge of Television by actually seeing what happens in each circuit.

C

C

C

TUBE DEPARTMENT

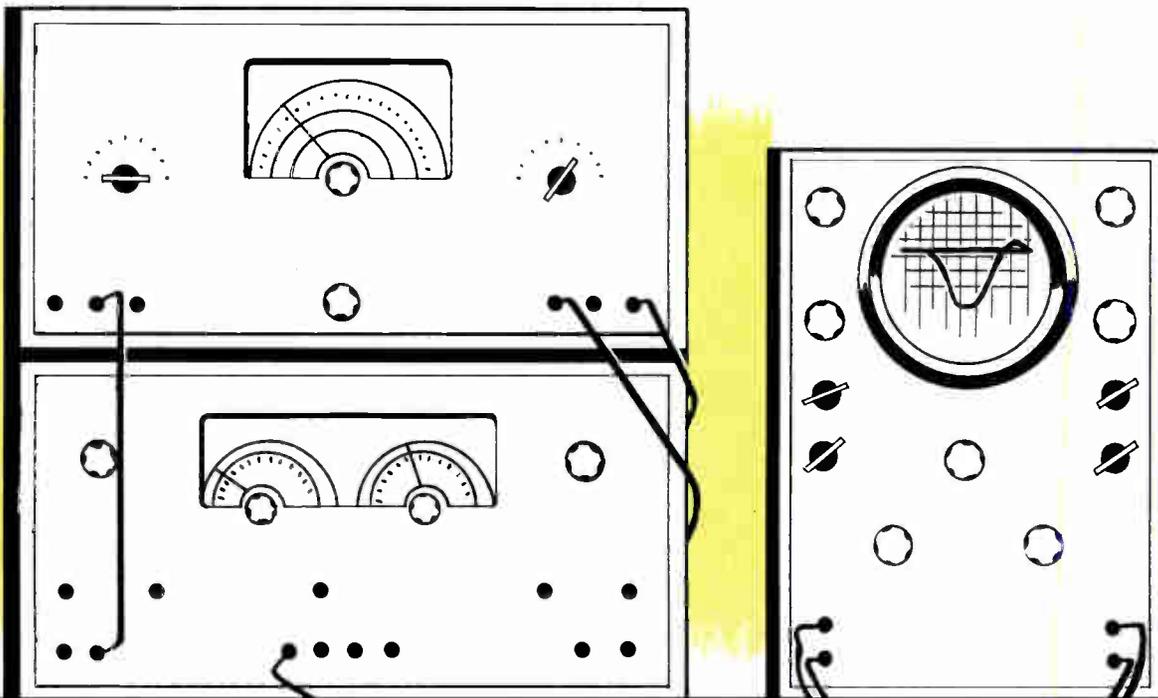
GENERAL  **ELECTRIC**

SCHENECTADY 5, N. Y.

TECHNICAL
MANUAL

#2

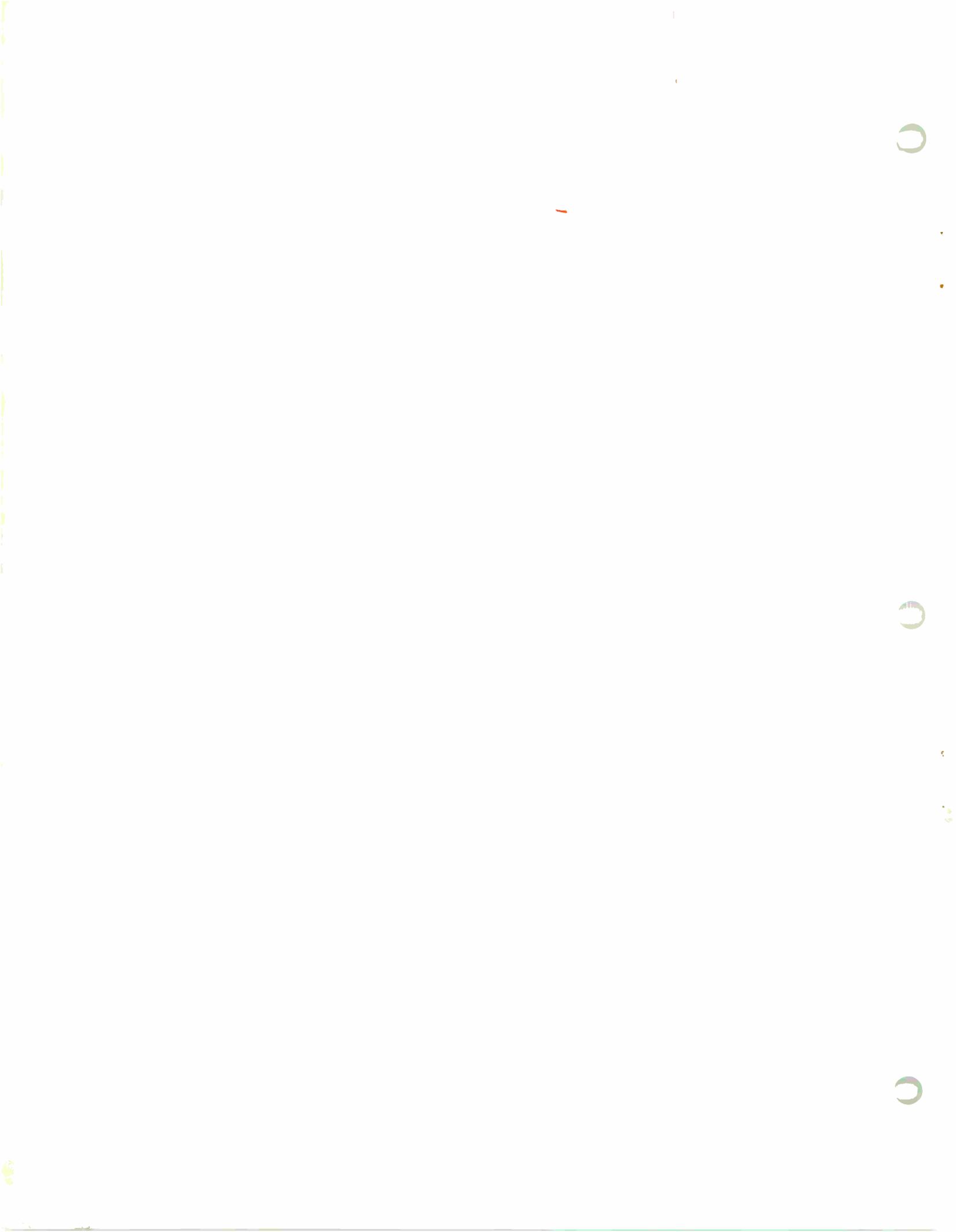
TV ALIGNMENT TECHNIQUES



PART-I



GENERAL  ELECTRIC
Electronic TUBES



TV ALIGNMENT TECHNIQUES PART I

The alignment of a TV receiver is considered a waste of time, effort and money by many technicians. This feeling in many instances is justified because of unsatisfactory experience with alignment equipment and unfamiliarity with general alignment procedures. This was usually due to one or more of the following reasons:

1. Instrument difficult to operate—due to its complexity.
 - (a) Only experienced operator able to properly align a TV receiver.
2. Instrument inaccurate—due to non-linearity of sweep.
 - (a) This does not produce a true alignment curve.
 - (b) Alignment with this type equipment will result in a misaligned receiver and produce a poor quality picture.
3. Instrument improperly shielded
 - (a) This causes leads, equipment and chassis to be “hot.”
 - (b) Considerable time may be wasted trying to obtain stable curve.
 - (c) The alignment curve obtained is in most cases incorrect due to stray “fields.”
4. Instrument has high level undesired spurious outputs.
 - (a) These confuse the operator as to which is the desired signal. Usually this is due to the fact that the generator uses a fixed sweep oscillator and has only beat output on all bands.

Many technicians who invested in the alignment equipment described above have discontinued using it for anything other than “window dressing.” This represents a waste of capital and hard earned money. If you own TV alignment equipment which falls in this category, first make sure that you are operating it correctly, and then if it cannot be used for quick and efficient alignment, dispose of it and purchase equipment which is properly designed.

Keep in mind that *good* TV alignment equipment is expensive since it is impossible to make precision equipment at a low price. However, such an expenditure is justified and necessary for a successful technician. If you compare your charges with those of your doctor or den-

tist, you will find in most cases that they will be reasonably close. Also consider the expenditure which your doctor or dentist has made for equipment. As an example, the dentist’s chair, drill, X-ray machine and other instruments represent a very large investment. This equipment is designed to do a job right and to last for a considerable number of years. So it is with *good* alignment equipment and because of this it is expensive.

TV alignment equipment should be considered essential to every service shop as practically every receiver serviced will require at least a touch-up to produce a good quality picture. This is good business practice and will result in satisfied customers who in many cases will feel that the picture is better than when it was new.

There are quite a few manufacturers of TV alignment equipment, and the service technician in the market for this equipment is confronted with various claims which indicate that the less expensive types will do as much if not more than the most expensive equipment. As previously mentioned, this has resulted in a number of disappointing experiences and a feeling that alignment was “too tough” to be bothered with. In many instances, the equipment purchased just couldn’t be used since the picture was usually worse after alignment than it was before. After several honest attempts and a considerable loss of time, equipment which could not be efficiently used for alignment was usually discarded.

If you are contemplating the purchase of TV alignment equipment, be sure that *you* can use it for quick and accurate TV alignment. This should, of course, be determined *before* purchasing the equipment. A good practice would be to use the equipment on several receivers and to compare the alignment curve produced by the different generators. Since most sweep generators will produce some sort of a curve, the correct curve would be the one produced by laboratory type equipment such as the General Electric Types ST-4A Sweep Generator and the ST-5A Marker Generator. These units are used by a number of receiver manufacturers on their production lines and can, therefore, be considered as accurate. These two instruments have a number of features which are not found in other equipment.

THE ST-4A SWEEP GENERATOR



FIG. A-1. Front view of the General Electric ST-4A Sweep Generator.

The ST-4A sweep generator shown in Fig. A-1 is a precision type instrument which is simple to use yet extremely accurate in operation. This unit is "cold" as far as stray fields or leakage is concerned. A proper alignment curve not affected by body capacitance or other objects can be obtained without the use of a metal top bench or elaborate grounding. This is very important because the curve which appears on the scope then represents a true alignment curve and not one which will change whenever the operator changes his physical position or the position of the leads or equipment.

One of the unusual features found in the ST-4A Sweep Generator is the method of obtaining adequate sweep width. A number of sweep generators use mechanically moving parts such as rotating or vibrating variable

capacitors or a vibrating disk moving near enough to a pancake coil to vary the inductance as the disk vibrates. Sweep generators which use mechanically moving parts are subject to the usual problems of mechanical devices. Sliding surfaces wear and become loose while flexed pieces fatigue and break. This type of unit is also subject to irregularities of motion when shocked or jarred as so often happens under ordinary working conditions in the service shop.

Another method uses a reactance tube in an electronic sweep circuit. This type circuit provided adequate sweep width for FM alignment but it has been found that the linear sweep widths required for TV alignment are extremely difficult to obtain from reactance tube circuits.

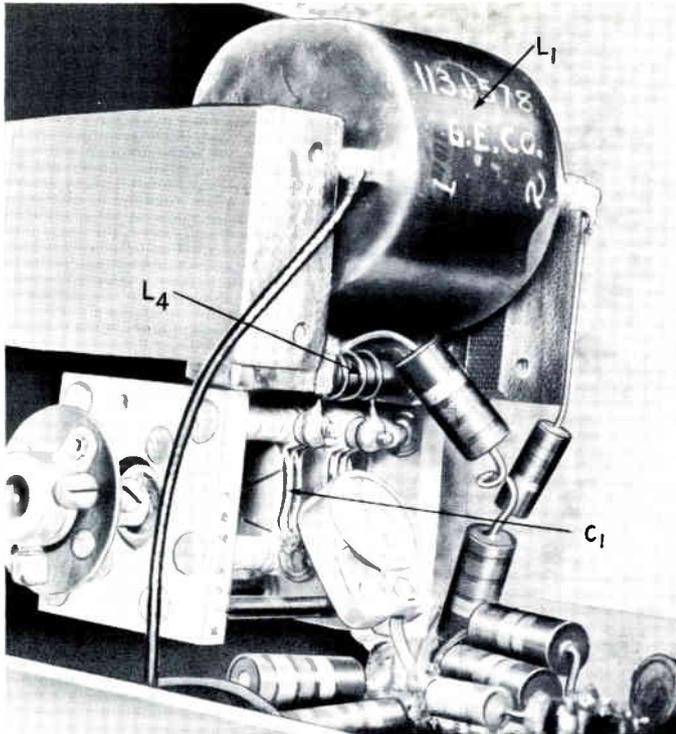


FIG. A-2. Photograph of the variable permeability unit used in the ST-4A Sweep Generator.

VARIABLE PERMEABILITY UNIT

The General Electric Type ST-4A Sweep Generator uses a variable permeability unit to produce an exceptionally wide linear sweep. This linear sweep is produced electronically and, therefore, has no moving parts. The variable permeability unit shown in Fig. A-2 is the heart of the ST-4A sweep generator and operates in the following manner.

It is generally known that the frequency of an oscillator can be varied by changing either capacitance or inductance in the frequency determining network. In the ST-4A generator, the sweep width is obtained by changing the inductance of the oscillator coil. This change in inductance is obtained by making the oscillator coil part of a choke as shown in the Fig. A-3 drawing. We know that an increase in d.c. voltage through a choke will produce a reduction in its inductance. This is true because as the flux in the core is increased, the permeability of the iron is decreased. Therefore, its effectiveness in increasing the inductance over that of an air core is lessened. If this choke is made part of a tuned circuit, the

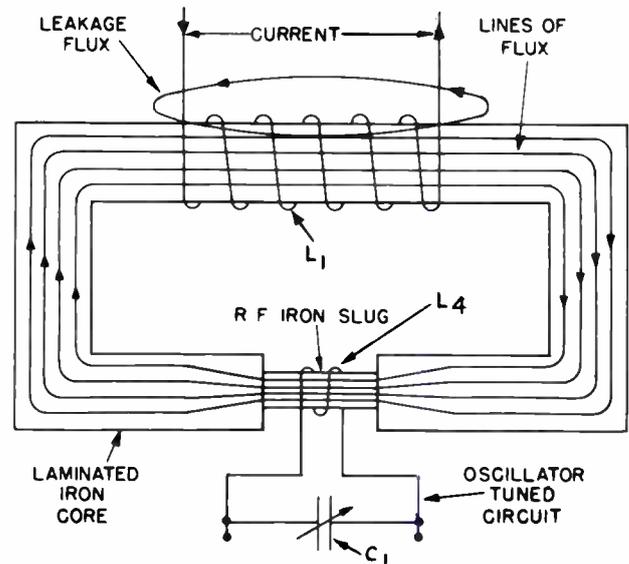


FIG. A-3. Drawing of the variable permeability unit showing how the oscillator coil inductance is varied by saturating the r.f. iron slug.

resonant frequency would increase as the core becomes saturated. If a piece of the core is removed and replaced with a smaller piece of iron as shown in Fig. A-3, this piece of iron will become saturated well in advance of the main part of the core because of its limited cross section. If the oscillator coil is wound on this same small piece of iron, the inductance of the oscillator coil can be varied by running d.c. through the winding of the original choke.

If no d.c. is flowing through the choke coil, the iron core in the tuned circuit lowers the frequency of the oscillator many megacycles over what it would be without the core. If d.c. is applied to the choke, the iron core of the oscillator coil will gradually saturate and become less and less effective in increasing the coil inductance. The oscillator will, therefore, increase in frequency in much the same way as it would if the core were withdrawn from the coil. If a 60 cycle a-c voltage is applied to the choke instead of d-c, the current through the choke will vary at a 60 cycle rate. This will cause the oscillator output to be swept back and forth at the same rate. The sweep width of the ST-4A generator can be varied from 500 kc to about 19 mc by increasing the voltage applied to the choke. The Sweep Width control at the top left of Fig. A-4 is a seven position switch which varies this voltage and, therefore, the sweep width. This briefly is the manner in which the sweep width is obtained in the ST-4A sweep generator.

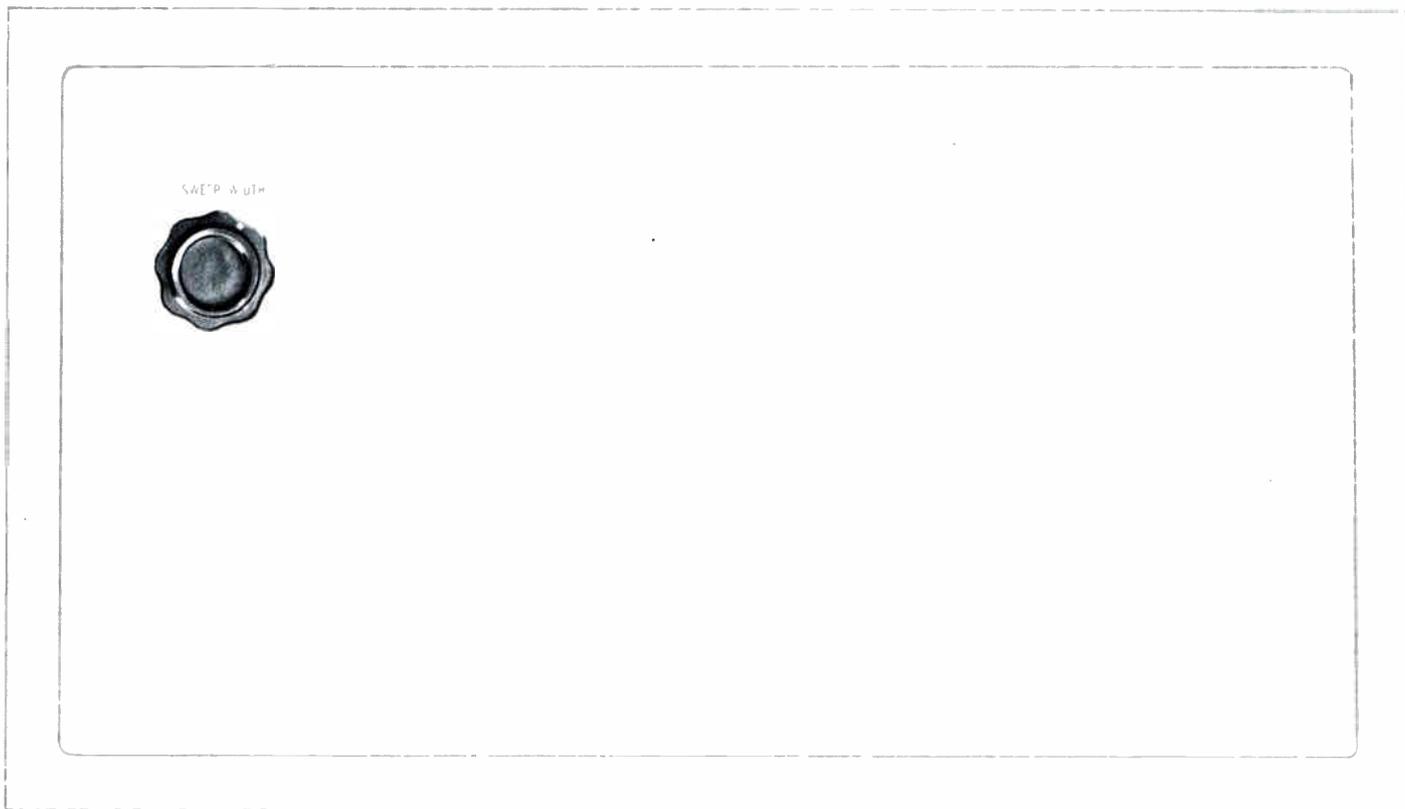


FIG. A-4. Front view of the ST-4A sweep generator with only the sweep width control clearly visible.

SWEEP WIDTH CONTROL

The "Sweep Width" control is a seven position switch which varies the voltage applied to the variable permeability unit. The following is a list of the available sweep widths and Figs. A-5 thru 11 illustrates the changes to a typical alignment curve at the different sweep width control positions.

<i>Sweep Width Control</i>	<i>Approximate Width</i>	<i>Refer to Fig. No.</i>
Position 1*	0	A- 5
2	500 kc	A- 6**
3	2 mc	A- 7**
4	4.5 mc	A- 8
5	9 mc	A- 9
6	14 mc	A-10
7	19 mc	A-11

*Maximum counterclockwise position.

**No appreciable change from Fig. A-5 at center of the sweep frequency. It was necessary to change the *i-j* dial setting to show one side of the curve slope.

When the "Sweep Width" control is in position 1, the sweep width is zero and two parallel horizontal lines will appear on the oscilloscope as shown in Fig. A-5. This is due to the constant amplitude of the signal during the trace period and the zero amplitude of the signal during the retrace period. If the blanking switch, which will be discussed later, is in the "off" position, only a single horizontal line would appear.

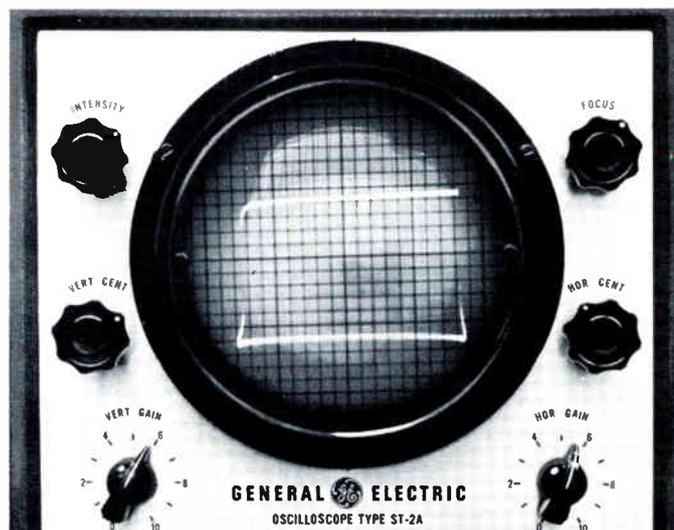


FIG. A-5. Normal alignment curve with the sweep width control in position #1.



FIG. A-6. Normal alignment curve with the sweep width control in position #2.



FIG. A-7. Normal alignment curve with the sweep width control in position #3.

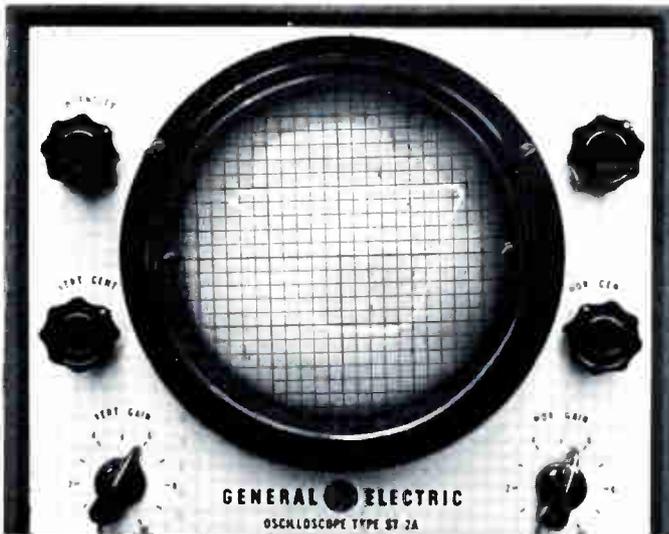


FIG. A-8. Normal alignment curve with the sweep width control in position #4.



FIG. A-9. Normal alignment curve with the sweep width control in position #5.

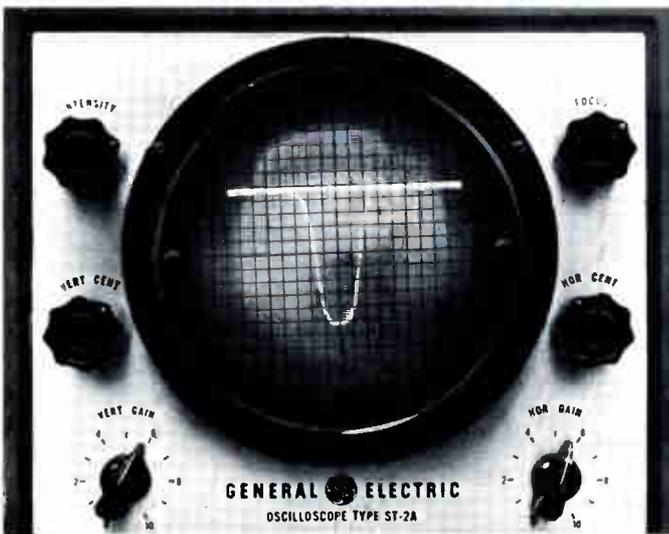


FIG. A-10. Normal alignment curve with the sweep width control in position #6.



FIG. A-11. Normal alignment curve with the sweep width control in position #7.

FREQUENCY DIALS

So far we have only discussed the method by which the sweep is developed and varied. A block diagram of the ST-4A sweep generator is shown in Fig. A-12 and schematic diagram is shown in Fig. A-13. The frequency of the swept oscillator is varied by the large knob on the left as shown in Fig. A-14. This is a vernier control which

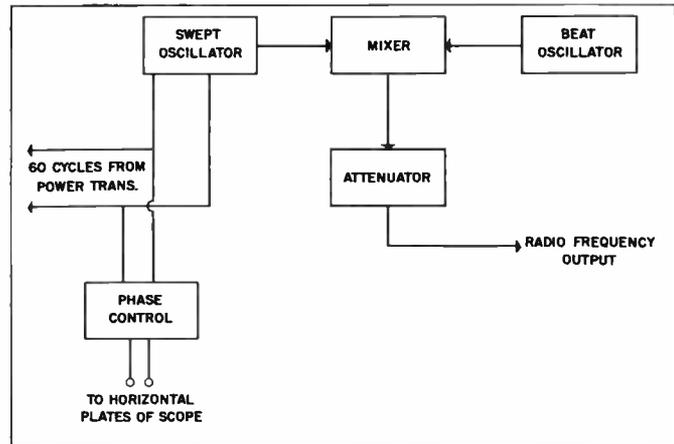


FIG. A-12. Block diagram of the ST-4A Sweep Generator showing the method of combining the two oscillator frequencies.

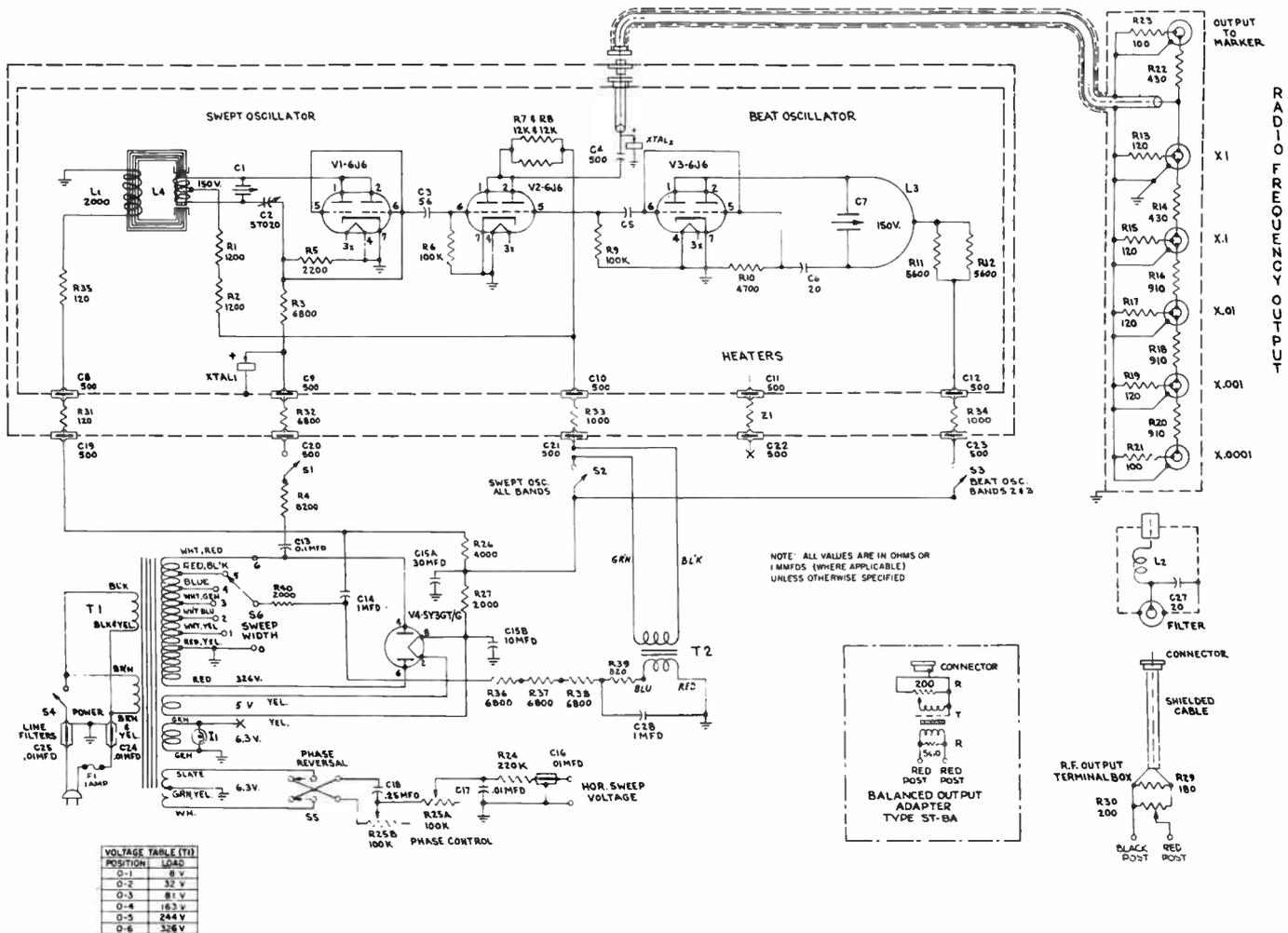


FIG. A-13. Schematic diagram of the ST-4A Sweep Generator.

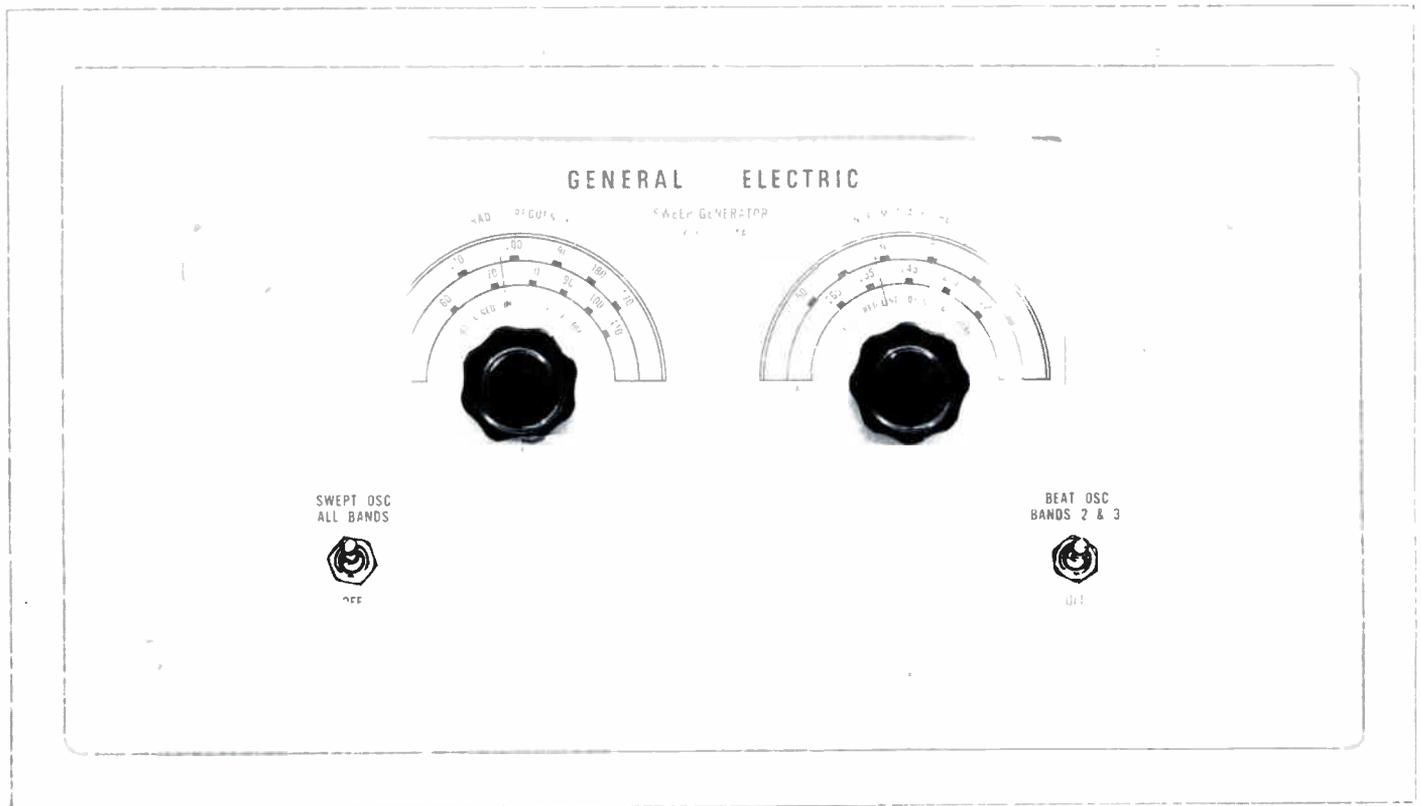


FIG. A-14. Front view of ST-4A sweep generator showing the oscillator control dials and switches.

varies the frequency as indicated by the position of the pointer on the scale marked "Radio Frequency." This oscillator can be turned off by switching the toggle switch marked "Swept Osc All Bands" to the off position. The frequency of the beat oscillator is varied by the large knob on the right in Fig. A-14. This is also a vernier control and the frequency of the beat oscillator is indicated on the scale marked "Intermediate Frequency." The beat oscillator can be turned off by switching the toggle switch

marked "Beat Osc Bands 2 & 3" to the off position.

The swept oscillator controlled by the left knob covers a fundamental frequency range from 165 to 220 mc. The beat oscillator controlled by the right knob covers a fundamental frequency from 220 to 275 mc. Either the fundamental frequency or the difference frequency obtained by mixing the two fundamental frequencies may be used. The four frequency ranges which can be seen on the two dials in Fig. A-14 are obtained as follows:

Frequency Range	Swept Osc All Bands Switch	R-F Dial	I-F Dial	Beat Osc Bands 2 & 3 Switch	Description
0-55 mc	on	220	varied	on	The swept oscillator (r-f band) is set at 220 mc and the beat oscillator is varied from 220 to 275 mc. The difference is 0-55 mc which appears on the top scale of the i-f dial over the fundamental frequency scale. This band is used for video and audio i-f alignment.
55-110 mc	on	varied	275	on	The beat oscillator (i-f band) is set at 275 mc and the swept oscillator is varied from 165 to 220 mc. The difference is 55 to 110 mc which appears on the bottom scale of the r-f dial below the fundamental frequency scale. This band is used for r.f. and overall alignment since it covers TV channels 2 through 6 and the FM band.
165-220 mc	on	varied	not used	off	The fundamental frequency of the swept oscillator (r-f band) is used and the beat oscillator is turned off. This band is used for r.f. and over-all alignment of TV channels 7 through 13.
220-275 mc	off	not used	varied	on	The fundamental frequency of the beat oscillator (i-f band) is used and the swept oscillator is turned off. Since the swept oscillator is turned off the output is unmodulated.

The output of the sweep generator is available at the step attenuator which has five output connections as can be seen in Fig. A-15. This type of output termination has several important advantages one of which is negligible inductive and capacitive coupling between connections. Another advantage is more effective shielding due to the close fitting channel shaped shield shown in Fig. A-16. This shield when assembled completely covers the back of each output jack and the step attenuator resist-

ors. A rotary switch would be considerably cheaper and easier to use. However, it has been found that it is next to impossible to eliminate capacity coupling and unwanted tuned circuits in a rotary switch at these frequencies. A finer degree of attenuation is provided by a variable control at the end of the output cable. A variable attenuator is also built into the balanced output adaptor which is used whenever the signal is fed into the antenna terminals of the receiver.

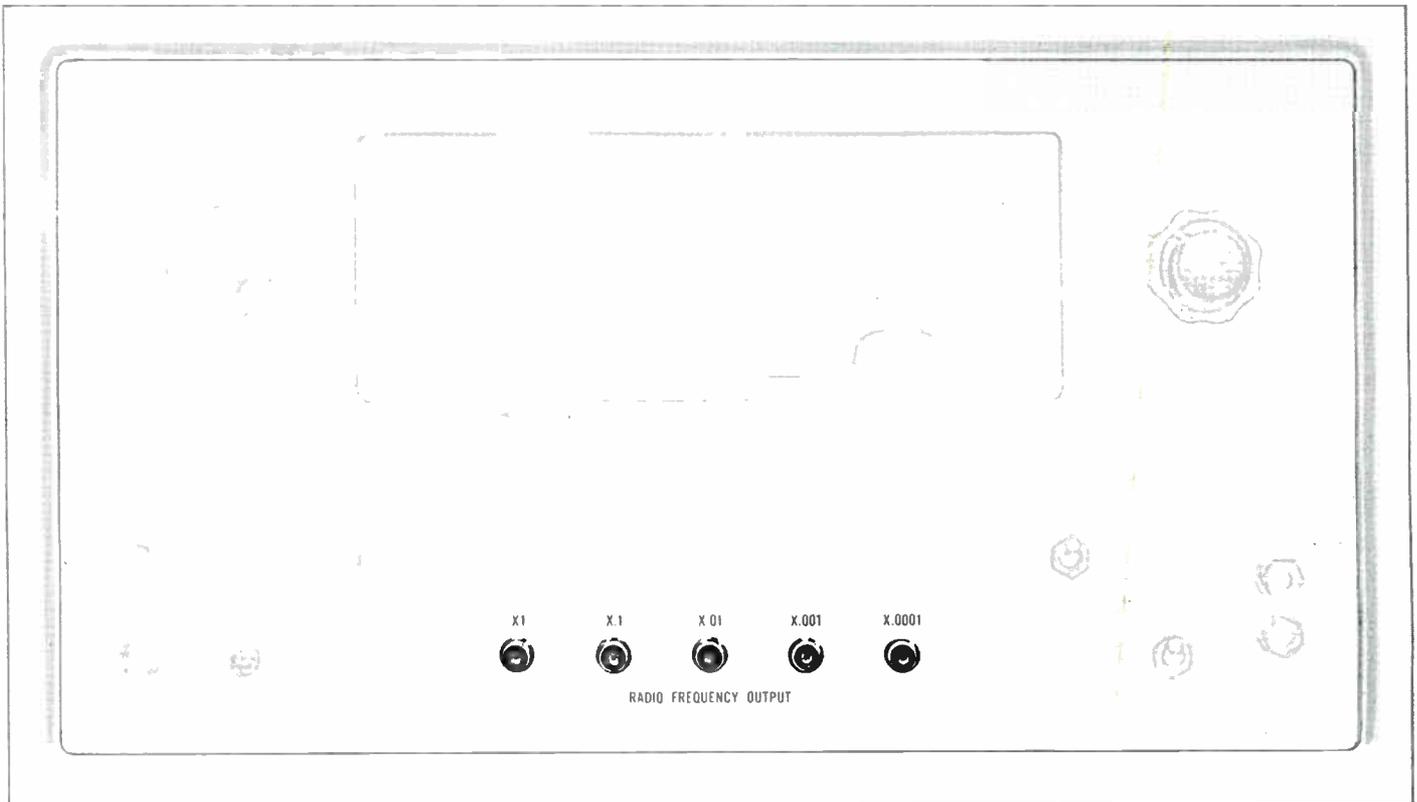


FIG. A-15. Front view of ST-4A sweep generator showing the radio frequency output jacks.

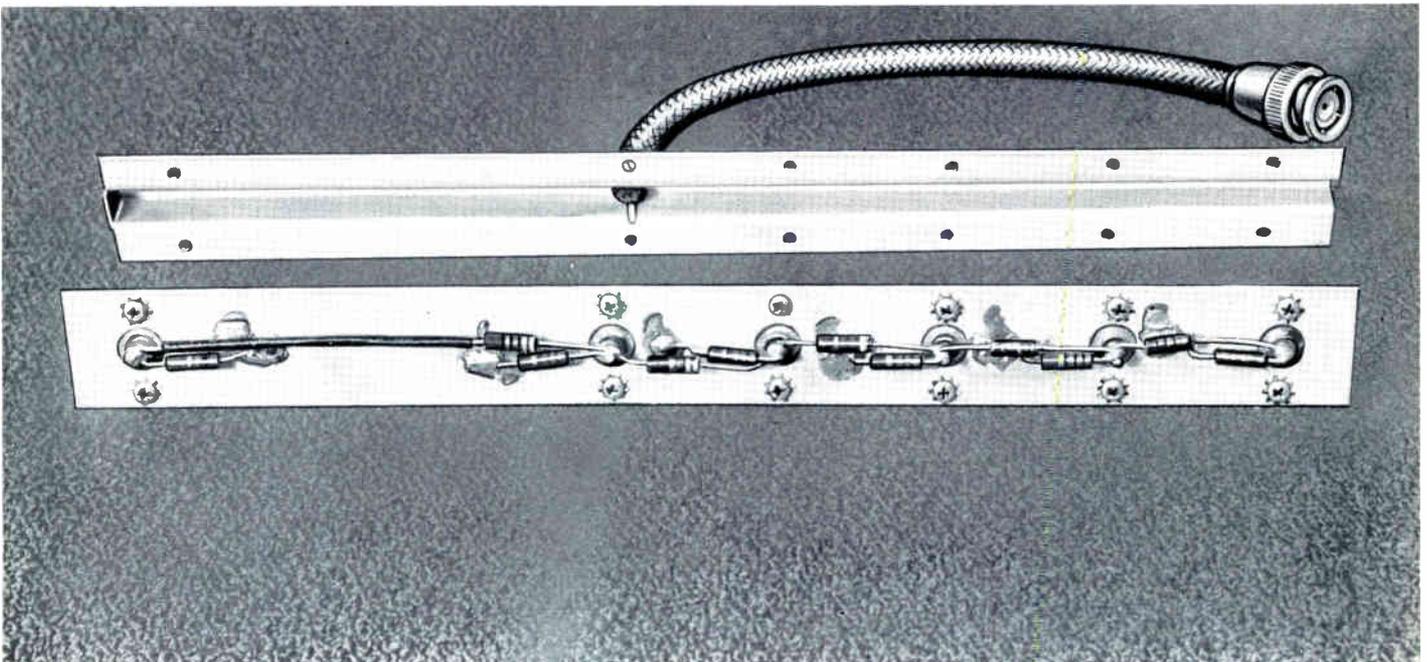


FIG. A-16. Rear view of the radio frequency output jacks shown in Fig. A-15. The channel shaped shield has been removed to show the step attenuator resistors.

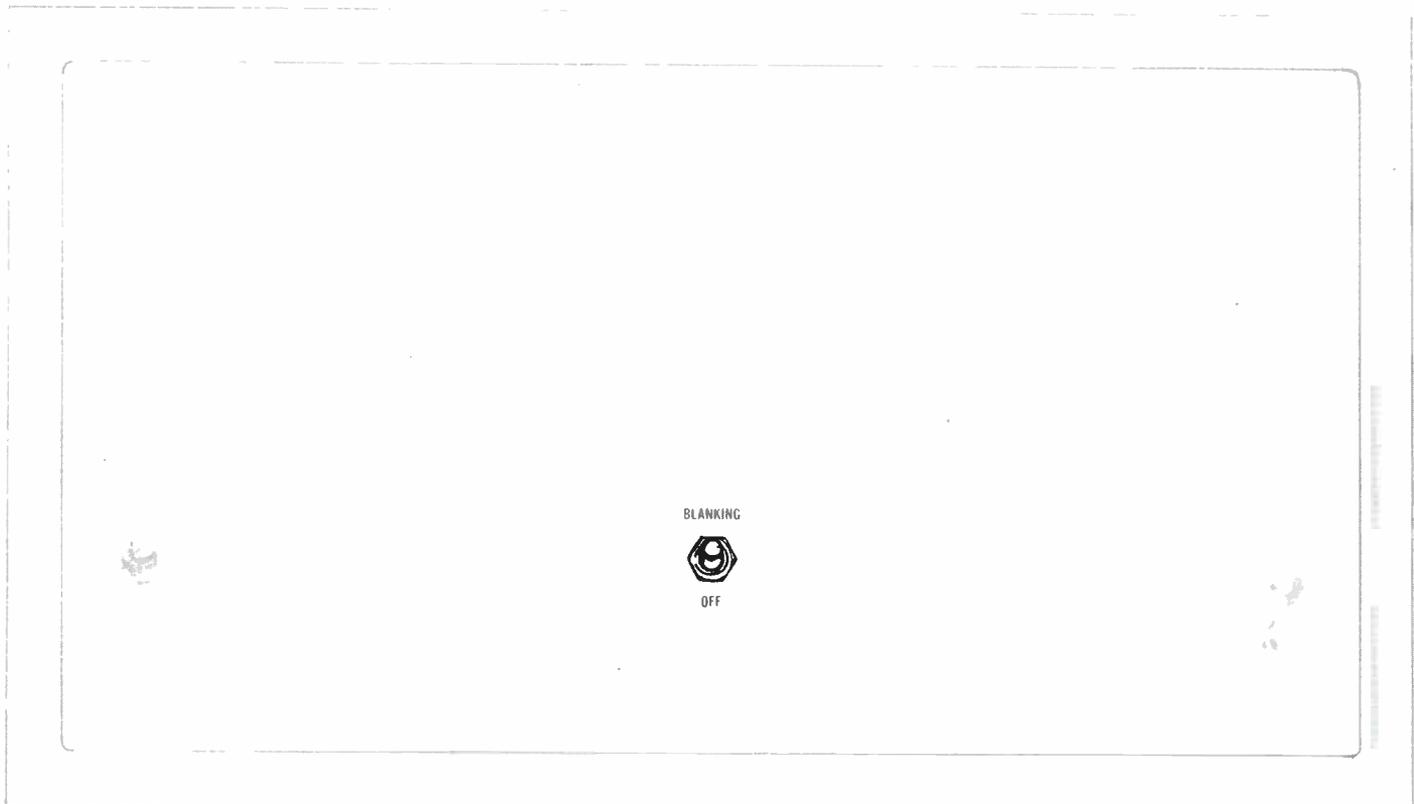


FIG. A-17. Front view of ST-4A Sweep Generator showing the blanking switch.

BLANKING

Since a sweep generator sweeps back and forth over a chosen band of frequencies, the oscilloscope will reproduce both the forward and the return trace. Some provision is ordinarily incorporated in either the sweep generator or the oscilloscope to blank out the return trace

(retrace). The ST-4A sweep generator has a blanking switch near the center of the front panel as shown in Fig. A-17. When this is in the "off" position both the trace and retrace are visible as shown in Fig. A-18. If the switch is turned "on" the sweep oscillator is biased to cut-off during one-half of each cycle which produces a base line during retrace as shown in Fig. A-19. This retrace line also represents a zero base line. The importance of this line is apparent when making trap adjustments since it indicates the effectiveness of the trap circuit.

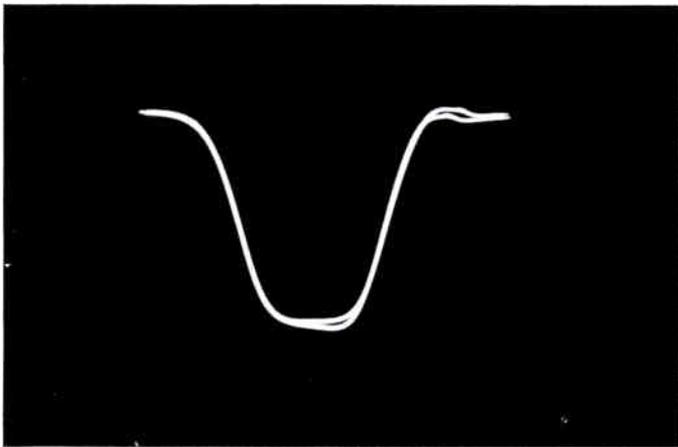


FIG. A-18. This is a double trace of a normal alignment curve as it would appear without blanking but with both trace and retrace properly phased.

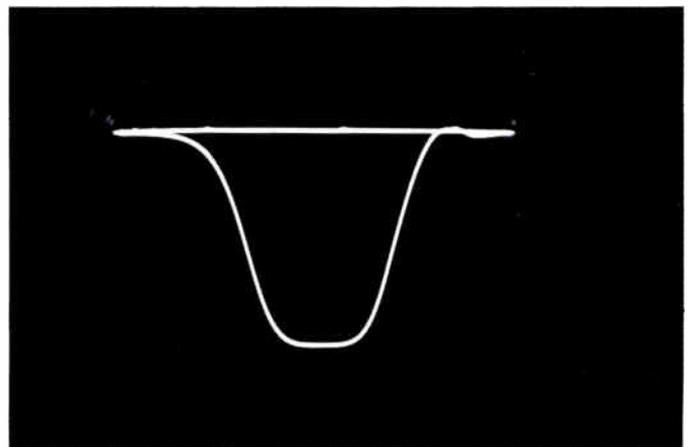


FIG. A-19. The same alignment curve shown in Fig. A-18 but with the retrace blanked out.

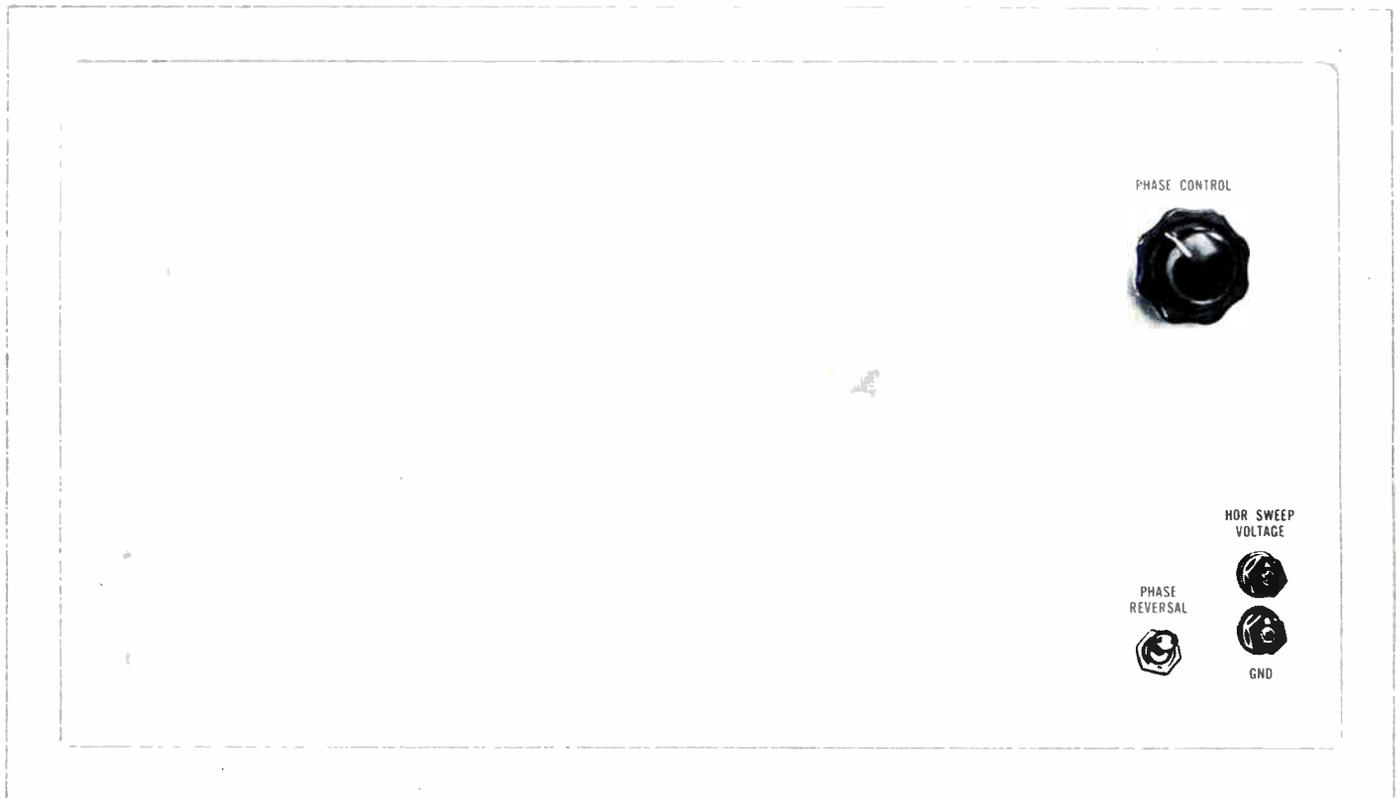


FIG. A-20. Front view of ST-4A sweep generator showing the horizontal sweep voltage output terminals, the dual phase control knobs and the phase reversal switch.

HORIZONTAL SWEEP AND PHASING

The two terminals in the lower right hand corner of Fig. A-20 supplies a horizontal sweep voltage which is applied to the horizontal amplifier terminals on the oscilloscope. The phase of this voltage can be shifted over a range of more than 360 degrees. The phase control is the dual knob located at the top of Fig. A-20. The outer knob covers about 170 degrees of phase rotation while the inner knob produces the balance of the 180 degree rotation. The other 180 degree shift is obtained from the "Phase Reversal" switch at the bottom of Fig. A-20. Fig. A-21 shows the trace and retrace out of phase. Before the

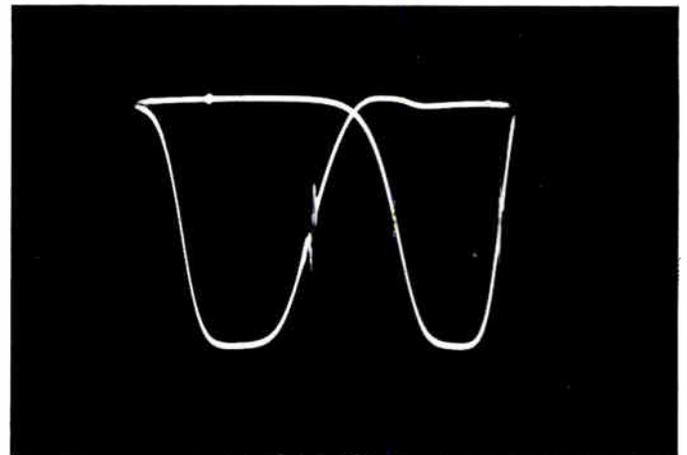


FIG. A-21. A normal alignment curve without blanking and with the two traces out of phase. This illustrates the change in shape when compared with Fig. A-18. A marker has been superimposed so the sides can be identified.

alignment of a receiver is started, the blanking switch should be turned "off" and the phase control adjusted so the two traces overlap as shown in Fig. A-18. If the two traces are not in phase, the alignment curve may be distorted as shown in Figs. A-22 and A-23.

The "Phase Reversal" switch will produce a 180 degree phase shift. This will cause a transposition of the trace which appears on the oscilloscope as shown in Figs. A-24 and A-25. The video marker which is half way down the slope on the right side of Fig. A-24 is on the left side in Fig. A-25. This feature is useful when aligning receivers of different makes since one manufacturer may show the video carrier marker on the left side of the i-f alignment curve whereas another manufacturer may show the same marker on the right side. This switch can be used whenever necessary to make the scope trace appear in phase with the manufacturers alignment curve.

In order to identify the low frequency side of an alignment curve, tune the sweep generator to a higher frequency. At the same time, observe the direction in which the curve moves on the oscilloscope. Since the frequency of the generator is increasing, the curve must move toward the low frequency side of the curve. This is important because it is possible to align a receiver with the video carrier on the low side of the curve instead of the high side. If this happens, either sound or picture will be received but not both.

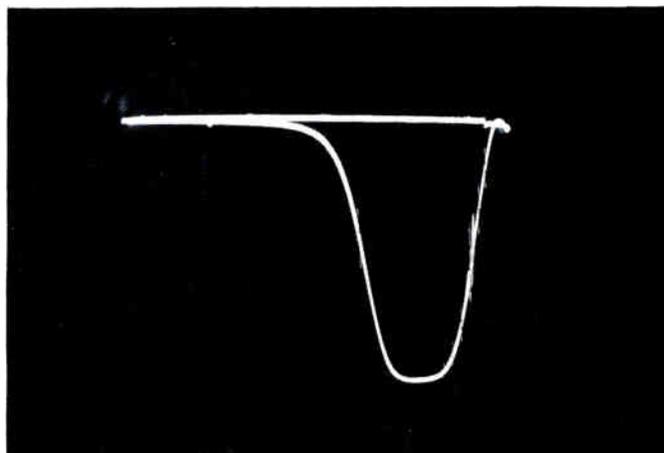


FIG. A-23. The same alignment curve shown in Fig. A-19 but with the horizontal sweep voltage at another out of phase position.

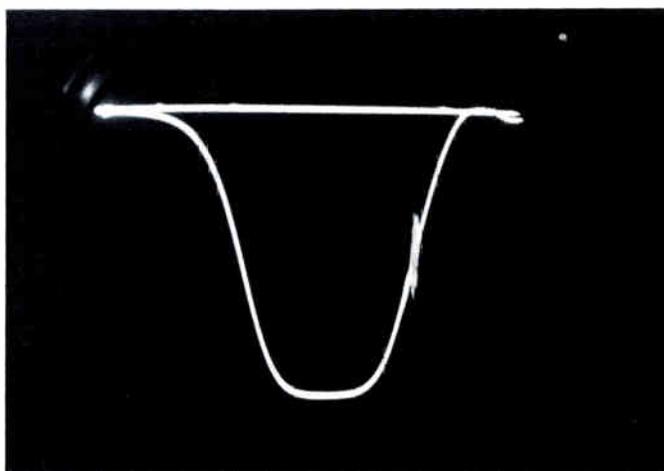


FIG. A-24. A normal alignment curve properly phased with the retrace blanked out and the video carrier marker at the right.

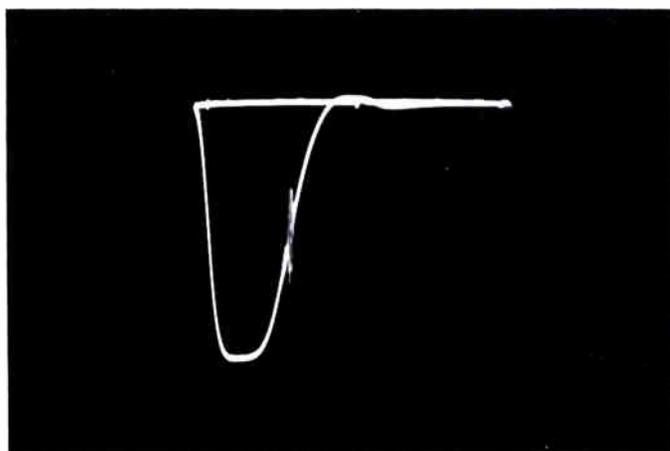


FIG. A-22. The same alignment curve shown in Fig. A-19 but with the horizontal sweep voltage at a different out of phase position. The principal change is in the skirts of the curve and in the width.

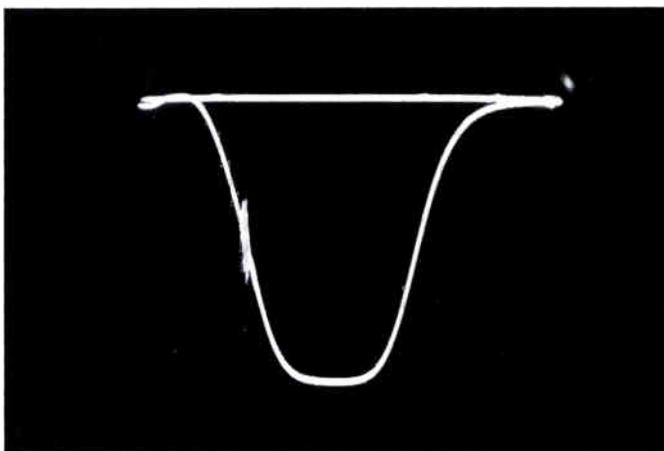


FIG. A-25. The same curve as Fig. A-24 with the phase reversal switch changed to place video carrier on the left slope of the

THE ST-5A MARKER GENERATOR

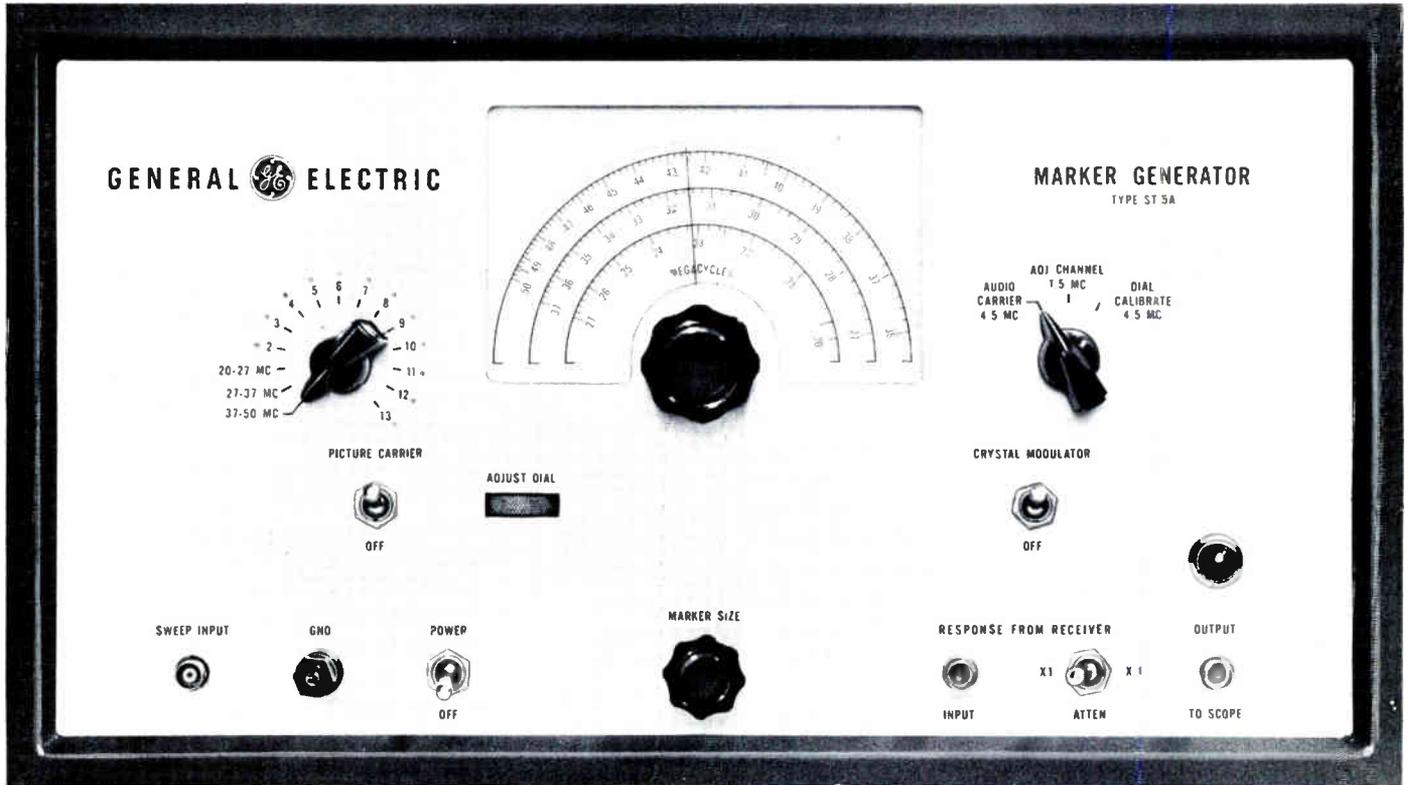


FIG. B-1. Front view of General Electric ST-5A Marker Generator.

The General Electric ST-5A Marker Generator shown in Fig. B-1 was designed as a companion unit of the ST-4A Sweep Generator. The ST-5A employs two oscillators, a modulator, a three stage amplifier and two mixing stages to produce markers necessary for the alignment of FM and TV receivers. This instrument like the ST-4A has features not found in other marker generators which make it particularly easy to use.

MARKER INJECTION

One of the outstanding features is the method by which the output of the marker generator appears on the alignment curve. The block diagram of the ST-5A Marker Generator in Fig. B-2 illustrates graphically the way in which the output of the marker is superimposed on the output of the receiver before it is applied to the oscilloscope. Fig. B-3 is a schematic diagram of the ST-5A generator which shows the different circuits. These will be referred to from time to time. The ST-5A Marker Generator does not produce any significant amount of r-f output because the marker is superimposed on the output

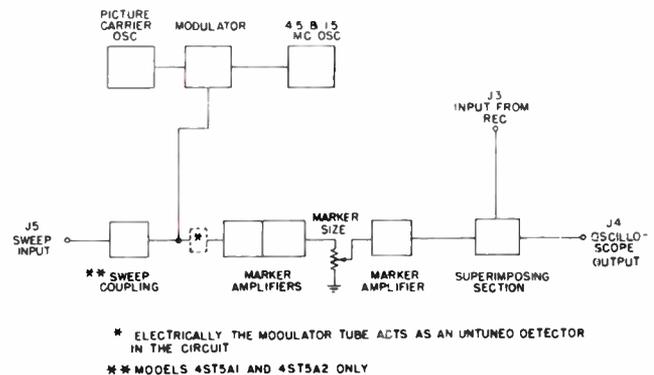


FIG. B-2. Block diagram of the ST-5A Marker Generator.

from the receiver, and not injected into some stage of the receiver or superimposed on the output of the sweep generator as is commonly done. Since there is no r-f output from the ST-5A generator, it cannot, even at the maximum output setting, cause any distortion to the alignment curve. Also by superimposing the marker on the output of the TV receiver, the size of the marker does not change regardless of its position on the curve. In this way, trap circuits can be easily adjusted without losing

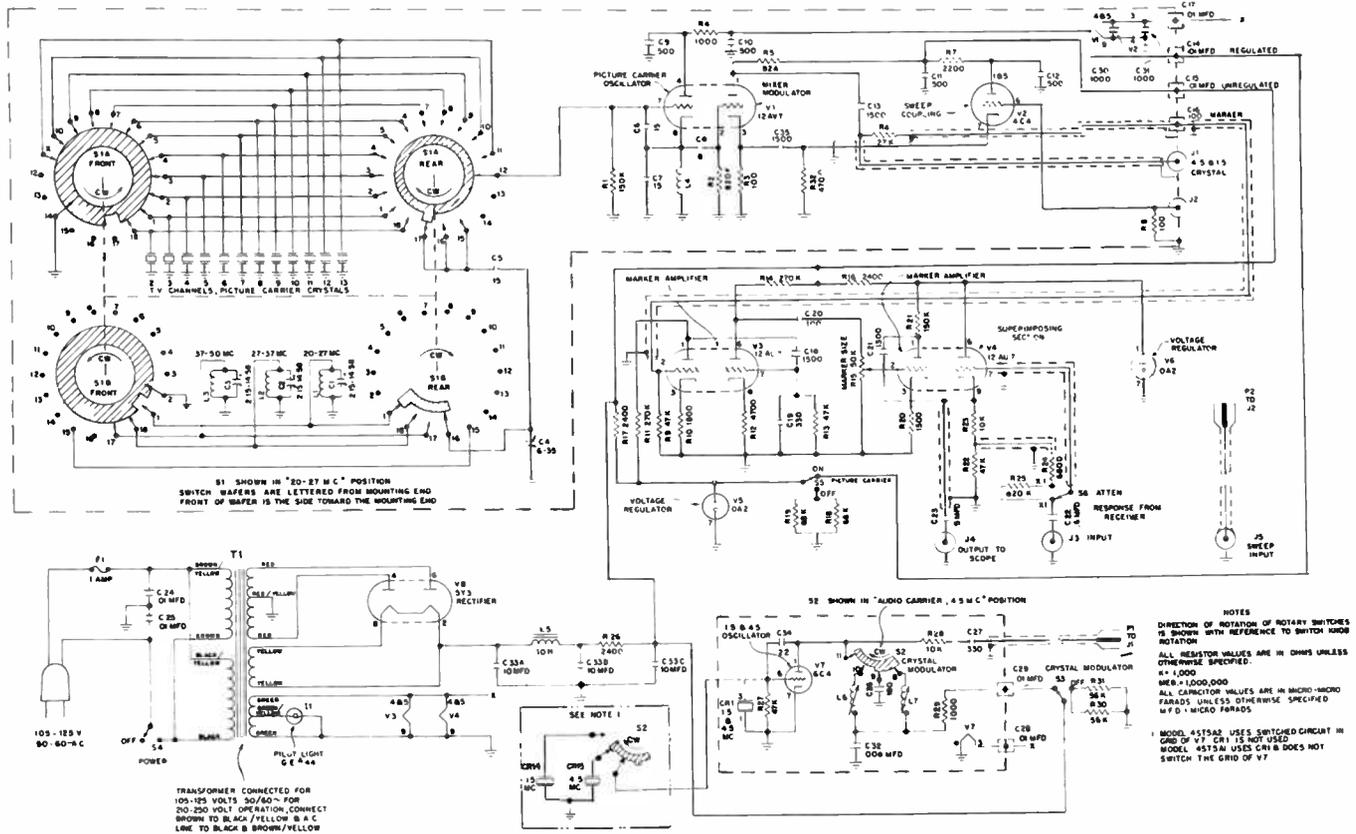


FIG. B-3. Schematic diagram of the ST-5A Marker Generator.

the marker. With r-f type marker generators, the marker is considerably reduced or lost completely because the trap circuit is designed to absorb the frequency to which it is tuned. The disadvantages of using an r-f type marker generator are clearly illustrated in Figs. B-4, 5, 6 and 7.

Fig. B-4 is the normal curve without any marker amplitude. Fig. B-5 shows a very high amplitude r-f type marker (45mc) injected into the mixer tube by connect-

ing the generator output to an ungrounded tube shield. This caused the curve to be reduced in size and distorted. Fig. B-6 shows the effect as the frequency of the marker generator was moved toward the trap frequency. The amplitude of the marker was considerably reduced because it was approaching the base line. In Fig. B-7, the frequency of the r-f marker generator has been changed to the trap frequency of 47.25 mc. Note that the marker cannot be seen since it has *all* been trapped out. Now com-

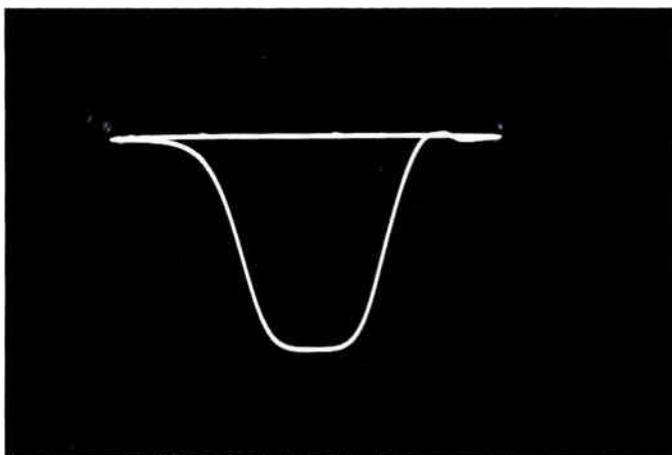


FIG. B-4. Normal alignment curve without any markers.

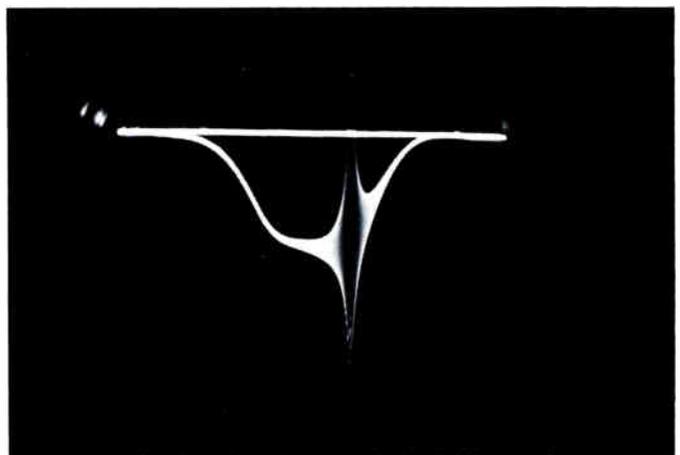


FIG. B-5. The same alignment curve shown in Fig. B4 with high amplitude 45mc RF marker. Note the overall reduction in height due to the marker injection.

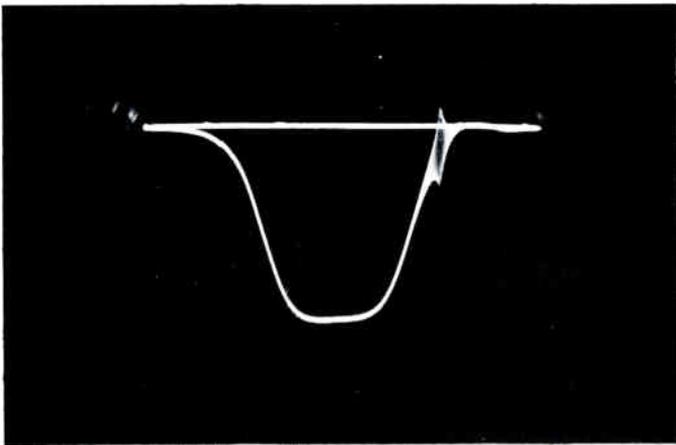


FIG. B-6. The same curve shown in Figs. B4 and B5 with the frequency only of the RF marker changed to 46.4 mc.

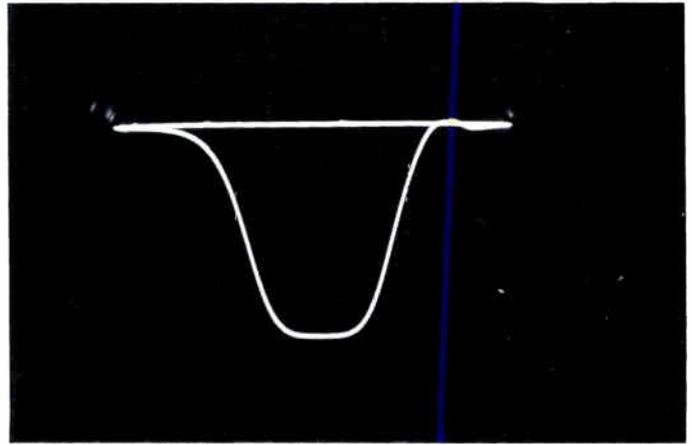


FIG. B-7. The same curve shown in Figs. B4, B5 and B6 with the frequency only of the RF marker changed to the trap frequency of 47.25 mc. Note that the high amplitude marker in Fig. B-5 is reduced to the point where it cannot be seen.

pare Figs. B-4 through B-7 with Figs. B-8 through B-11 which are identical except that the marker in Figs. B-8 through 11 was obtained from the ST-5A generator instead of the r-f type marker generator. The curve has not been distorted and the amplitude of the marker has not changed in size. The amplitude of the marker shown in

Figs. B-8 through B-11 is considerably greater than that normally used. It was purposely made this high to illustrate the difference between the two types of marker generators. Bear in mind that the only change made in any of these photographs was in the frequency of the marker and the type of marker used. No other controls were changed.

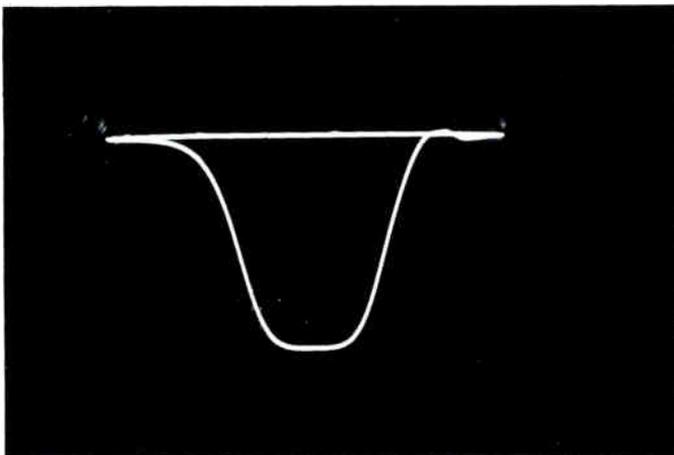


FIG. B-8. Normal alignment curve without any markers.

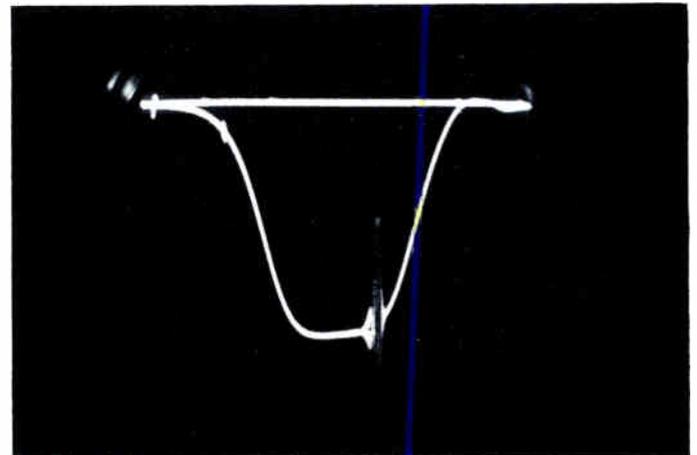


FIG. B-9. The same alignment curve shown in Fig. B8 with a high amplitude 45mc marker from the ST-5A superimposed on the output from the receiver.

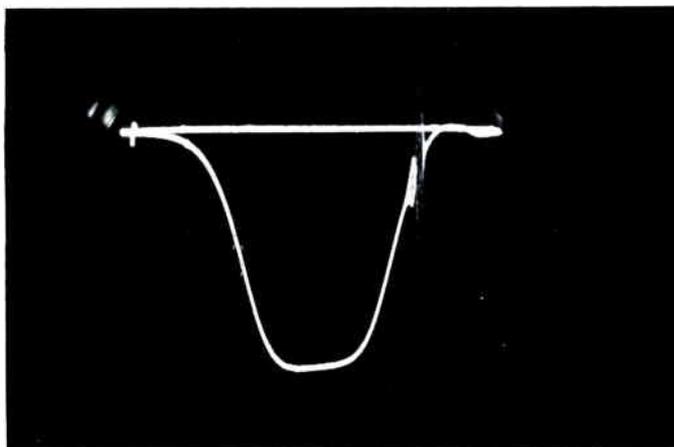


FIG. B-10. The same curve shown in Figs. B8 and B9 with the frequency of the marker from the ST-5A changed to 46.4 mc.

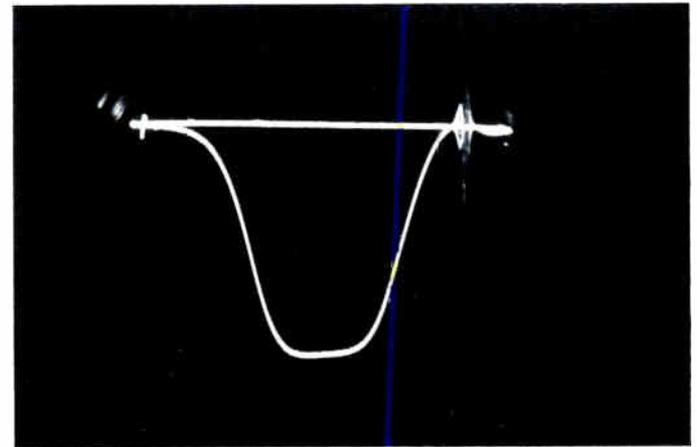


FIG. B-11. The same curve shown in Figs. B8, B9 and B10 with the frequency of the marker from the ST-5A changed to the trap frequency of 47.25mc.

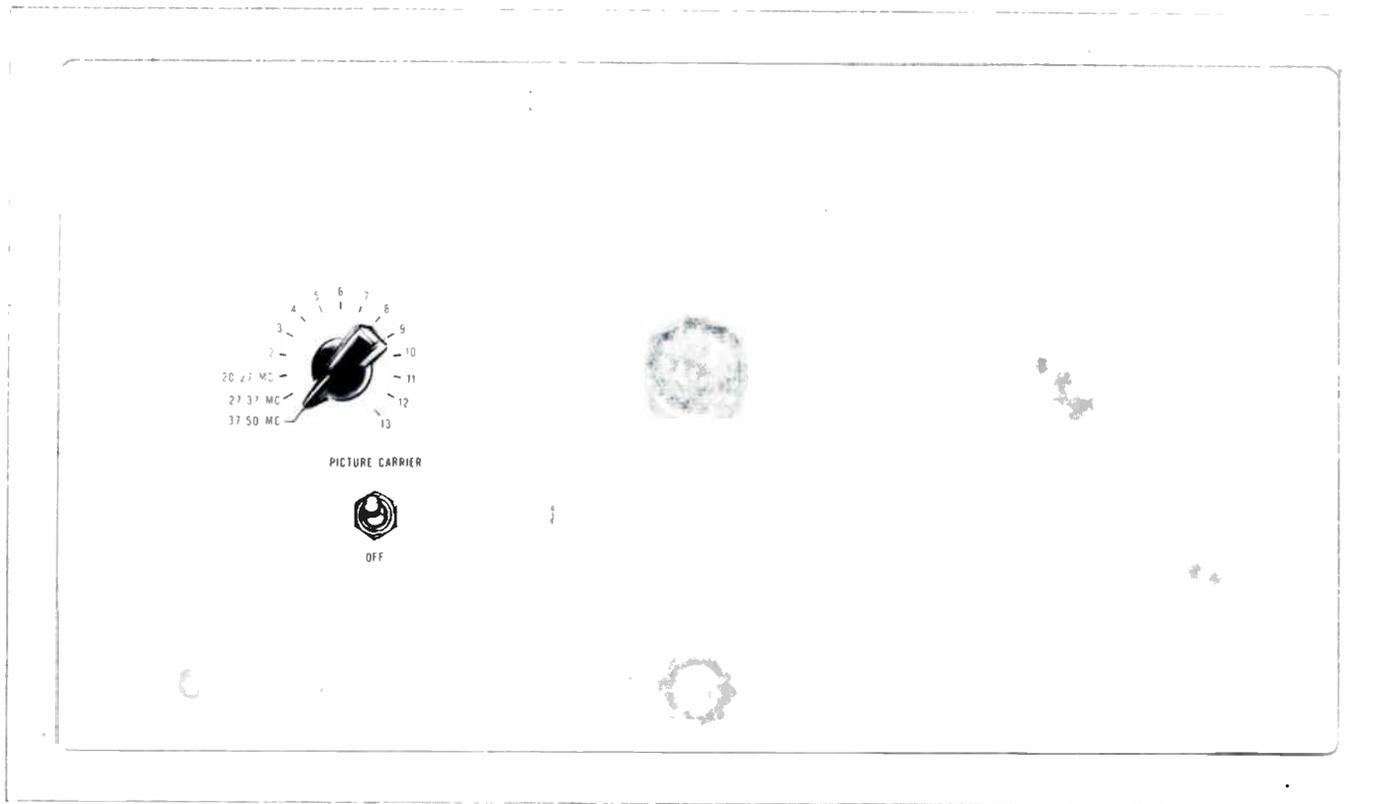


FIG. B-12. The picture carrier selector switch on the ST-5A Marker Generator.

PICTURE CARRIER SELECTOR

The Picture Carrier Selector shown in Fig. B-12 is a 15 position switch which connects any one of three tunable circuits or twelve crystals in the grid circuit of the pic-

ture carrier oscillator. The first three positions going clockwise select one of the three tunable circuits which covers the video i-f frequencies of 20 to 27 mc, 27 to 37 mc and 37 to 50 mc. The next twelve positions select the picture carrier frequency for any one of the VHF channels two through thirteen. Each of these twelve picture carrier positions is controlled by a separate crystal which is precision cut to give the exact carrier frequency. It is pos-

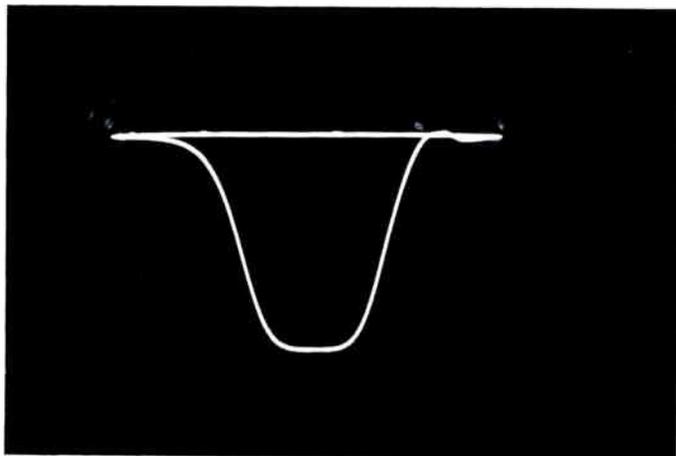


FIG. B-13. Normal alignment curve with the picture carrier switch turned "off."

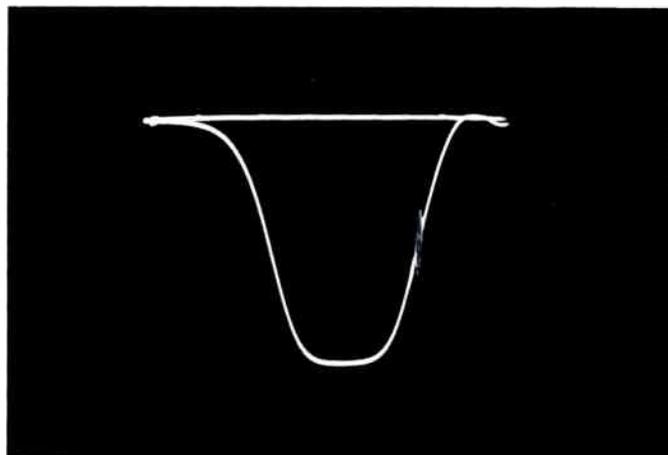


FIG. B-14. Normal alignment curve with the picture carrier switch turned "on" and the marker set at the video carrier frequency.

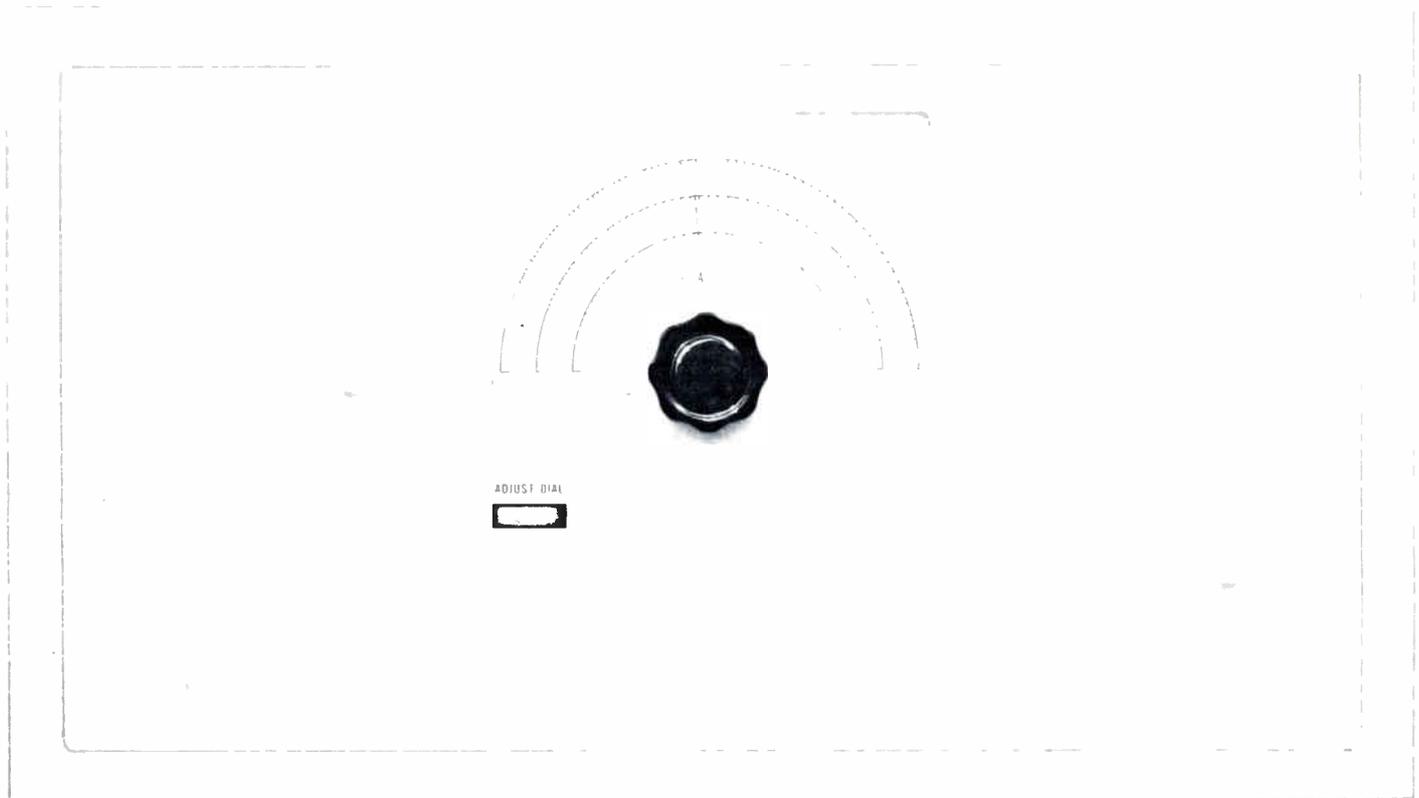


FIG. B-15. The picture carrier tuning control dial on the ST-5A Marker Generator.

sible to observe the extreme accuracy of this crystal by noting the position on the alignment curve of the video carrier from a transmitter, and then superimposing the marker from the generator over it. This will be illustrated in TV Alignment Techniques, Part II.

The Picture Carrier Switch shown just below the Picture Carrier Selector Switch in Fig. B-12 turns the picture carrier oscillator either "on" or "off." When this switch is in the "off" position, it removes the regulated B+ from the plate of the picture carrier oscillator, and substitutes a dummy resistive load to prevent any change in the regulated voltage. Fig. B-13 shows a typical alignment curve with the picture carrier oscillator switch in the "off" position. With the switch in this position, all markers are removed. Fig. B-14 shows this same curve with the picture carrier oscillator "on" and set at the video carrier frequency.

TUNING CONTROL DIAL

The Tuning Control Dial shown in Fig. B-15 is a hand calibrated dial which shows the exact marker frequency within the scale selected by the Picture Carrier Selector

Switch. The knob at the center is a vernier control for capacitor C4 shown in Fig. B-3. Each of the three dial scales are individually hand calibrated on each generator. To insure absolute accuracy each dial has at least two calibration points which are marked on the dial with red dots. These calibration points appear at the following frequencies:

*20.20 mc	36.0 mc
22.50 mc	40.5 mc
27.00 mc	45.0 mc
31.50 mc	49.5 mc

At these points the output of the Picture Carrier oscillator is tuned for zero beat with different harmonics of the 4.5 mc crystal oscillator. The "Adjust Dial" vernier shown in the lower left corner of Fig. B-13 is then adjusted so the dial pointer is moved directly over the calibration point marker. The operation of the 1.5 and 4.5 mc crystal oscillator will be described in the following section.

**The output of the beat frequency is rather weak at this point since the second harmonic of 20.25 mc is beat against the ninth harmonic of the 4.5 mc crystal at 40.5 mc.*

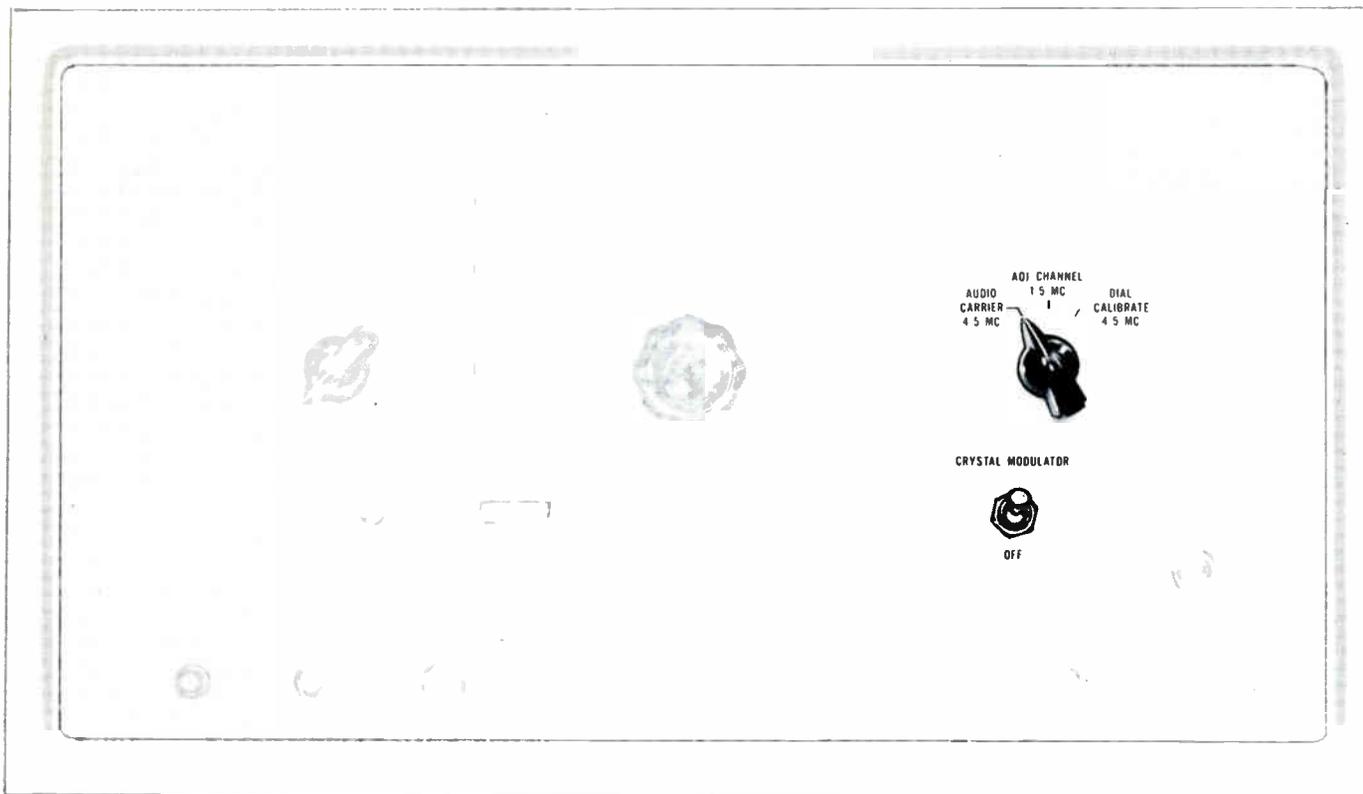


FIG. B-16. The marker selector switch and the crystal modulator "on" "off" switch on the ST-5A Marker Generator.

4.5 AND 1.5 MARKER SELECTOR

The Marker Selector Switch shown in Fig. B-16 inserts suitable inductance and capacitance values to produce outputs of 1.5 and 4.5 mc from the crystal oscillator. If the marker selector switch is set on the "Audio Carrier 4.5 mc" position, a 4.5 mc frequency is generated which is mixed with the output of the picture carrier oscillator. This produces markers every 4.5 mc above and below the frequency produced by the picture carrier oscillator. This can be used in either video i-f, head-end or overall alignment to show the position of the audio carrier which according to FCC regulations must be exactly 4.5 mc above the frequency of the video carrier.

If the marker selector switch is set on the "Adj Channel 1.5 MC" position a 1.5 mc frequency is generated which is mixed with the output of the picture carrier oscillator, and produces markers every 1.5 mc above and below the frequency produced by the picture carrier oscillator. This can be used to check IF bandwidth and to check and adjust the trap circuits without changing the fundamental frequency of the picture carrier oscillator. During video IF alignment, the video carrier is normally established at about the 50% point on the alignment curve. With this point established, the adjacent channel audio and adjacent channel video traps can be adjusted by turning on the 1.5 mc marker. The adjacent channel audio is 1.5 mc above the video carrier and the adjacent channel video is 6.0 mc below the video carrier. Both of these two points will be indicated by the 1.5 mc markers.

If the marker selector switch is turned to the "Dial Calibrate 4.5 MC" position a 4.5 mc frequency rich in harmonics is produced. Since a harmonic of the 4.5 mc crystal is beat against the fundamental output of the picture carrier oscillator, an output rich in harmonics is required to produce a zero beat for dial calibration.

The "Crystal Modulator" switch shown below the Marker Selector Switch in Fig. B-14 turns the marker oscillator "on" or "off." In the "off" position B+ is removed from the plate of the marker oscillator and a dummy resistor load is substituted to prevent any load change on the power supply.

Figs. B-17 thru 19 illustrates the difference in the markers at each of the marker selector switch positions. Fig. B-17 is the same curve shown in Fig. B-14 with the marker oscillator switch turned "on" and the selector switch set to the "Audio Carrier 4.5 MC" position. This shows the audio carrier 4.5 mc away from the video carrier on the other side of the alignment curve. Fig. B-18 shows the same curve with the selector switch turned to the Adj Channel 1.5 MC position, and Fig. B-19 shows the same curve with the selector switch on the "Dial Calibrate 4.5 MC" position. In Fig. B-19 the Picture Carrier Switch was set on the 37-50 MC scale because the receiver used a 40 mc IF system. The Tuning Control Dial was set at 45.0 mc although either the 40.5 mc or the 49.5 mc setting could have been used. Both the Picture Carrier and the Crystal Modulator switches were in the "on" position. As the Tuning Control Dial is slowly moved through the point where the 45.0 mc of the picture carrier beats with the tenth harmonic of the 4.5 mc crystal modulator, the modulation shown in Fig. B-19 will appear, then disappear, and then appear again. The null point is the point where the modulation disappears but will reappear at either side of this point. At this null point the curve will appear similar to B-17 since the effect of the harmonic will be balanced out and only the 4.5 mc markers will be visible. The Adjust Dial Control is then moved until the dial pointer is directly over the 45.0 mc calibration point. The marker generator should always be turned "on" for about 30 min. before the dial is calibrated and the equipment used.

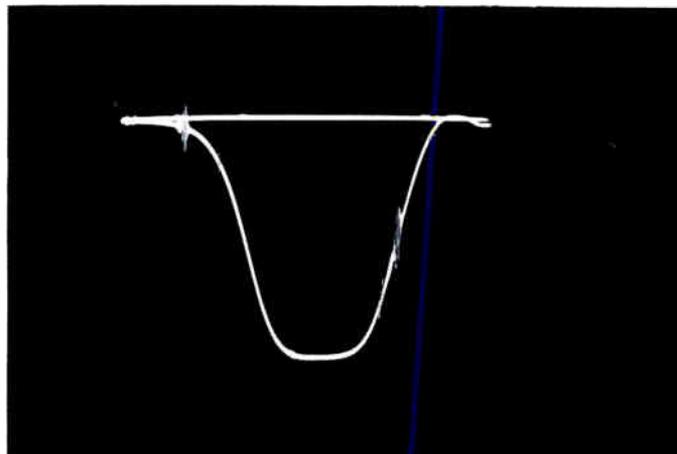


FIG. B-17. Normal alignment curve with the marker selector switch set on the "Audio Carrier 4.5 MC" position.

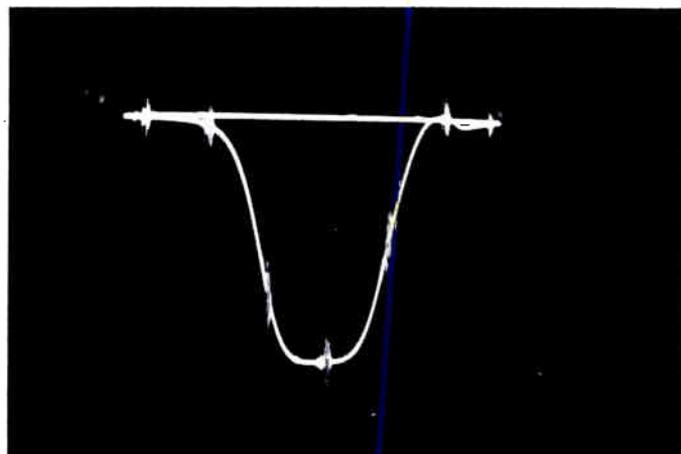


FIG. B-18. Normal alignment curve with the marker selector switch set on the "Adj Channel 1.5 MC" position.

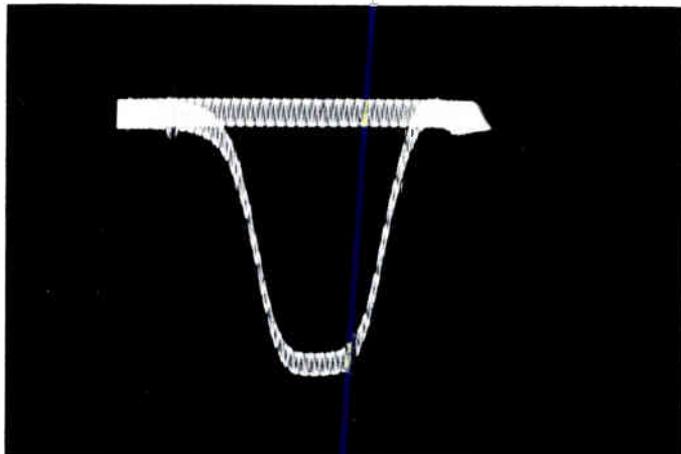


FIG. B-19. Normal alignment curve with the Picture Carrier Tuning Control set at the 45.0 mc calibration point and the marker selector switch set on the "Dial Calibrate 4.5 MC" position.

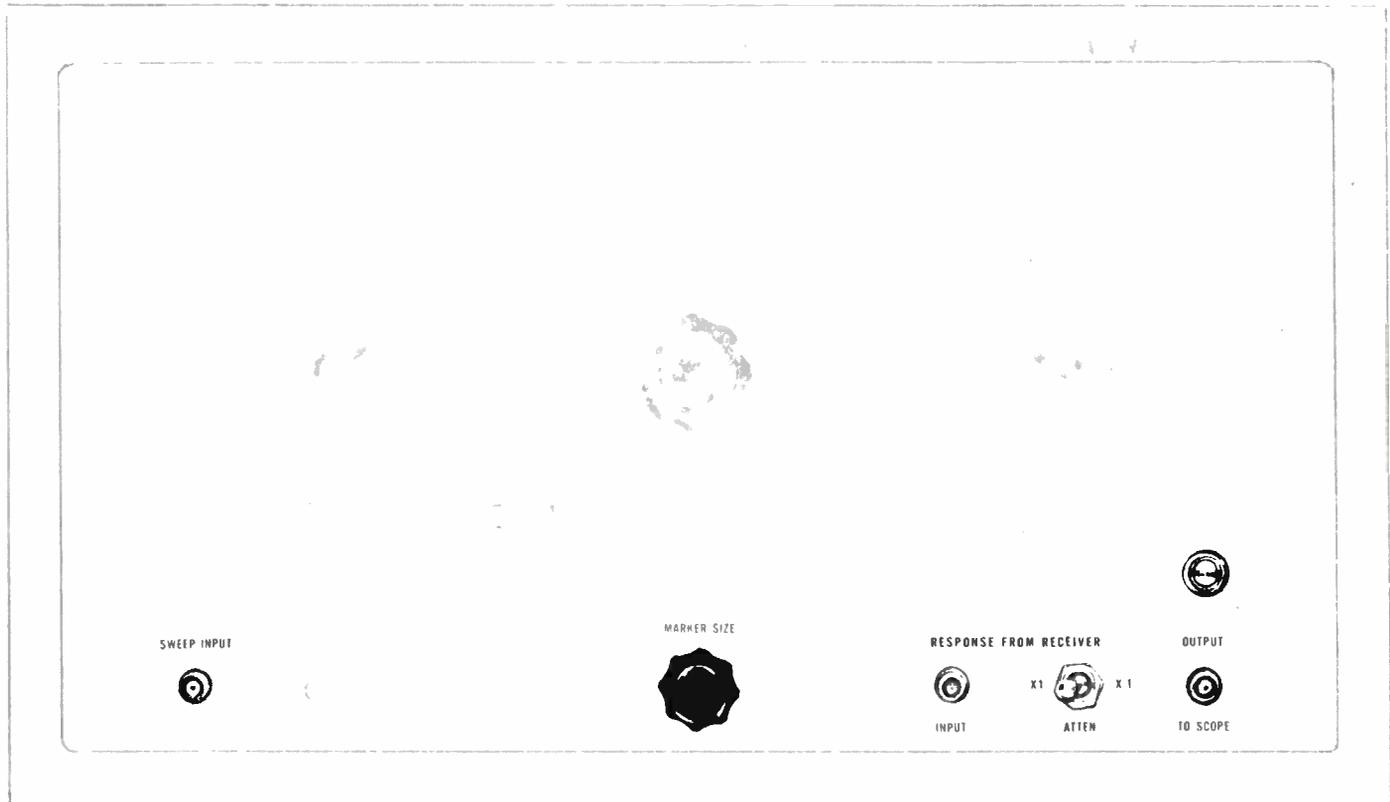


FIG. B-20. The marker size control, receiver output attenuator switch and the cable connections on the ST-5A Marker Generator.

MARKER SIZE CONTROL

The Marker Size Control knob shown in the center of Fig. B-20 is a potentiometer in the grid circuit of the marker amplifier which varies the gain and, therefore, the size of the marker. The ST-5A generator will produce a marker which is more than adequate in size as long as the output of the sweep generator is not set far too high. Since excessive output ordinarily produces distortion to the alignment curve, the output of the sweep generator should be kept within the set manufacturers recommendations. The set manufacturer usually specifies a certain peak-to-peak voltage across the video detector load resistor. If this recommended value is not given, about one volt is a good average value to use.

RESPONSE FROM RECEIVER ATTENUATOR SWITCH

The attenuator switch shown at the right of Fig. B-20 reduces the output from the receiver to one-tenth if switched toward the right. The purpose of this switch is to prevent overloading the super-imposing tube under certain conditions.

The jack on the left side of Fig. B-20 is connected to the sweep generator with a special cable which comes with the marker generator. The other two jacks shown at the right of Fig. B-20 are also connected to the receiver and the oscilloscope with special cables supplied with the generator.

Part II of TV Alignment Techniques will be published at a later date. It will show the importance of alignment and discuss the factors that produce misalignment.

C

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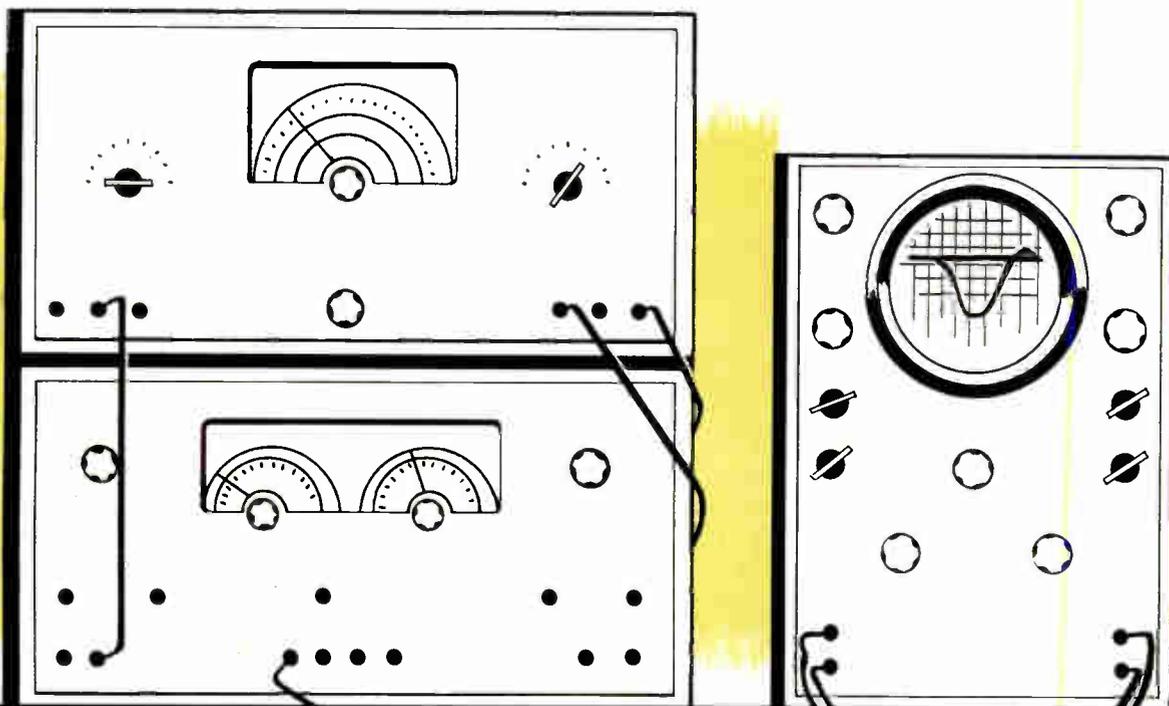
C

TUBE DEPARTMENT

GENERAL  **ELECTRIC**

SCHENECTADY 5, N. Y.

TV ALIGNMENT TECHNIQUES



PART-2



GENERAL  ELECTRIC
Electronic TUBES



INDEX

TELEVISION ALIGNMENT TECHNIQUES – PART II

	PAGE
Vertical Resolution Limitations	2
Horizontal Resolution Limitations	2
Video Carrier Modulation	5
Factors Influencing Alignment	8
Circuit Ageing	8
Tube Replacement	10
Lead Dress	13
Tube Shields	13
Alignment	14
Bias Battery	14
Signal Level During Alignment	14
Shorting Coils	15
Trap Adjustment	16
Head-End Alignment	18

TELEVISION ALIGNMENT TECHNIQUES – PART II

This is part two of a two part series on "Television Alignment Techniques." The first part described the operation of the sweep and marker generators. In this part, the factors which make realignment necessary for the service technician will be discussed.

Before describing the factors which affect the alignment of a TV receiver, it might be well to consider some reasons why proper alignment is necessary for good picture quality. It is a recognized fact that the quality of a photograph depends upon the smallest details which are visible. An illustration of this would be to make a quality comparison of a photograph in a newspaper with one in a good magazine. If these are compared under a magnifying glass, it will be noticed that the dots which appear in the magazine photograph are much smaller than those in the newspaper. Obviously smaller size dots can produce finer detail than larger ones which is the principal reason for the better definition in the magazine photograph. It is also the dot size that governs the quality of the TV picture which appears on the face of the picture tube.

VERTICAL RESOLUTION LIMITATIONS

There are certain limitations in the quality of the reproduced picture which are due entirely to the TV system. In view of these, it is important that the additional limitations imposed by the receiver circuit be kept at a minimum. First let us consider how the system limits vertical resolution. We know that each complete picture produced on the face of the picture tube is made up of 525 horizontal lines scanned 30 times a second. Since interlaced scanning is used, each field made up of 262.5 lines is scanned 60 times a second. Of the 525 horizontal lines in each picture, about 40 are lost due to the blanking interval between each field. Therefore, only about 485 lines are available for picture information. If each of these lines were alternately black and white going from top to bottom as illustrated in Fig. C1, the maximum number of black lines would be one-half of 485 or approximately 240 lines. The other 240 lines would be white.

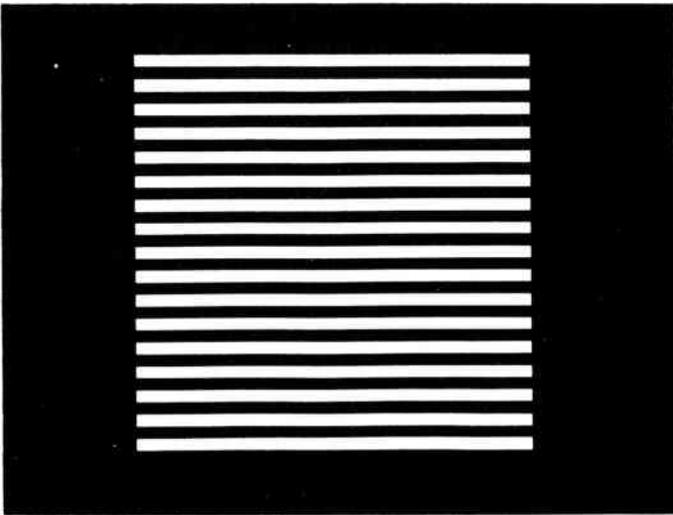


FIG. C-1. An illustration of how an enlarged section of a picture tube screen would appear if each horizontal line were alternately black and white.

Fig. C1 can be considered as a small portion of the screen enlarged to show alternate color changes.

We have assumed so far that the scanning beam on the camera falls entirely on either a black or a white horizontal line. If the scanning beam should fall partly on a black line and partly on a white line, the reproduced value will be some shade of gray. A study has been made regarding the chance relationship between narrow horizontal lines and the camera scanning spot. It was found that a given number of lines will afford a vertical resolution which is only .70 as great. The value of .70 may be called the "vertical resolution factor." Thus in the case

of present standards, where there are about 485 active lines, the vertical resolution will be equal to $485 \times .70$ or 340 lines. This means that the best vertical definition would produce 170 black and 170 white horizontal lines on the picture tube.

If the detail of a scene is smaller than the height of one line, it will be lost. An example of this would be a thin black line drawn in the center of one of the white lines in Fig. C-1. Since each white line represents the height of one scan line, the detail of anything smaller than one line would be lost. The camera would pick this up as a shade of gray rather than black on white. The limiting factors in vertical definition are, therefore, the number of lines, the size of each line and the size and position of the picture elements with respect to the camera scanning pattern. Very little can be done by the technician to improve vertical definition except to adjust for the best focus and good vertical interlace.

It might be well to point out that if the vertical lines do not interlace properly and "pair up" with one field on top of the other, the vertical definition is reduced by fifty per cent.

HORIZONTAL RESOLUTION LIMITATIONS

The TV system imposes somewhat different limitations when horizontal definition is considered. These limitations should be understood by the service technician since receiver adjustments can seriously reduce the best horizontal definition. As mentioned previously, picture quality depends upon the smallest detail which can be clearly reproduced. Since the TV picture is composed of individual horizontal lines, which are broken or dimmed at numerous spots, the picture detail depends upon the smallest size dot or break which can occur in each horizontal line. Therefore, the size of this dot is dependent upon both time and frequency.

The TV system limits both of these factors. Time is limited by the horizontal frequency standard of 15,750 cycles per second. One horizontal line requires $\frac{1}{15750}$ of a second or 63.5 micro-seconds. Of this about 10 micro-seconds is used for horizontal blanking which leaves about $53 \mu s$ available for the visible part of each line. Frequency is limited by the channel bandwidth of 6 MC

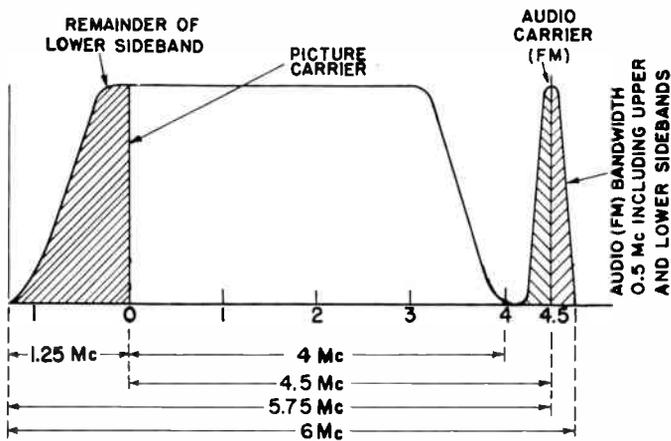


FIG. C-2. A drawing of the way each TV channel utilizes the 6Mc bandwidth.

which contains the audio carrier and the video carrier sideband as shown in Fig. C-2. Of the 6Mc channel bandwidth only 4Mc is available for transmitting picture information.

Since $53 \mu s$ is the time established for each horizontal line and 4Mc is the maximum frequency which is available for picture information, let us see just how small a dot can be transmitted. If the camera scans one line of a scene which is half black and half white, the frequency of the signal generated by the camera for that one line will be one cycle divided by $53 \mu s$ or a frequency of 18,868 c p s. This is illustrated in the A part of Fig. C-3. If the number of black and white areas are increased to six, the frequency will be six cycles divided by $53 \mu s$ or a frequency of 113,208 c p s which is six times the 18,868 c p s

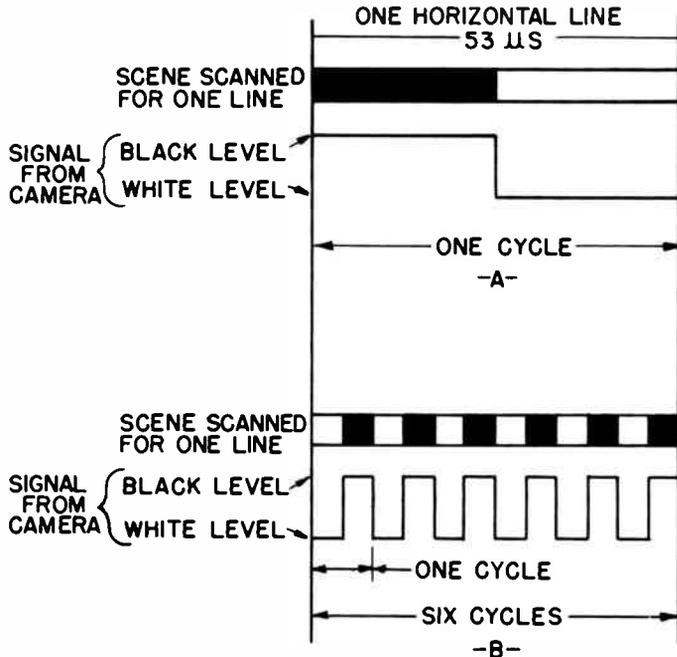


FIG. C-3. Illustration of signal generated by the TV camera as it scans one line half black and half white in "A" and six alternate black and white areas in "B".

frequency generated by a single change from black to white on one line. The change in the frequency of the camera signal is illustrated in the comparison of the A and B parts of Fig. C-3. Note that the frequency of the TV signal increases as the horizontal size or width of the black or white area decreases.

Obviously the frequency is low in the illustration shown in Fig. C-3 since the changes from black to white represents rather large portions of the total screen width. Suppose the width of these black and white areas are reduced so that a 1Mc or 1,000,000 cycles per second signal is produced. Since 1Mc represents one million cycles per second and one μs represents one millionth part of a second, one horizontal line which takes $53 \mu s$ will contain 53 black and 53 white dots and cause the camera to produce 53 square waves per line. A 1Mc camera signal will, therefore, be produced by a black spot or dot $1/106$ of the picture width. (53 black and 53 white dots on one line.) In as much as a 1Mc signal represents one cycle in one micro-second, a 4Mc signal will represent four cycles in one micro-second. Therefore, it would be possible to have 212 black and 212 white dots (4×53) on a single horizontal line. The size dot which would produce a 4Mc signal would be one fourth of $1/106$ or $1/424$ of the picture width. Keep in mind that one cycle represents a change from white to black to white or vice versa. Also keep in mind that one black dot on a white background or vice versa will produce a signal of a certain frequency depending upon its width. If there are a number of the same size black or white dots on the same line, the frequency of the signal generated by each dot will remain the same. The important point is that the frequency produced by the TV camera depends upon the width of the black or white area scanned.

We have so far only considered the highest frequency which the TV camera can produce due to the limitations of the system. In order to reproduce the best picture

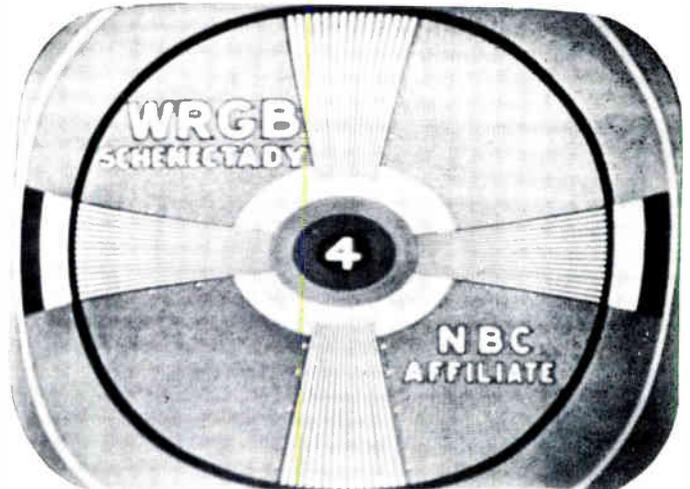


FIG. C-4. Photo of a test pattern on a 4Mc bandwidth receiver. Note that the vertical wedges can be seen right down to the center bulls-eye.

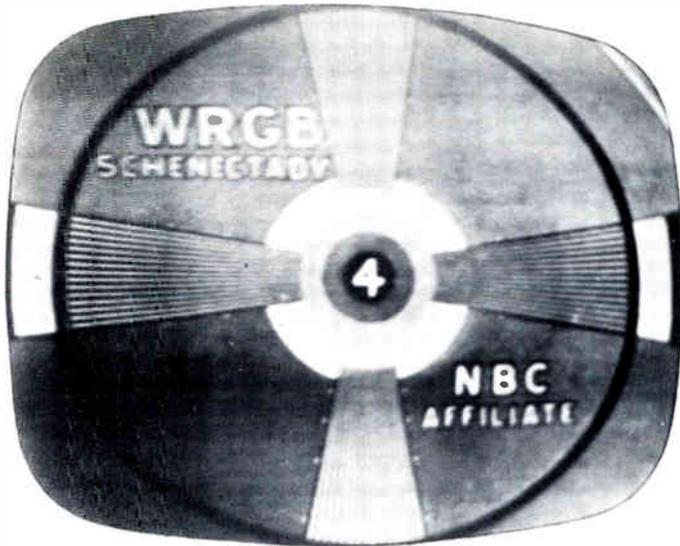


FIG. C-5. Photo of test pattern on a receiver with a 2MC bandwidth. Note the blurred lines in both vertical wedges as they approach the center.

afforded by the present system, the TV receiver must also pass practically all of the frequencies up to 4MC with a minimum amount of distortion. As mentioned previously, a dot $1/424$ of the picture width will produce a four MC camera signal. If the receiver is designed and adjusted to pass up to a 4MC signal, the same size dot ($1/424$ of the picture width) will appear on the picture tube. This means that the vertical wedges on a test pattern will be "clean" down to the center similar to Fig. C-4. In view of the various test pattern designs, it would be advisable to obtain from the station information on the bandwidth at

different points on the vertical wedges. If these points are known, the bandwidth of a receiver can be determined by observing the test pattern. If the receiver limits the bandwidth of the signal, the smaller size black dots will appear gray. This loss of higher frequencies is illustrated in Fig. C-5. Notice that the vertical black and white lines merge into a shade of gray.

The importance of bandwidth and, therefore, alignment will be more apparent if we consider the smallest size dot which will be clearly reproduced at various bandwidths. The table which appears below shows the maximum number of cycles composed of one black and one white dot as shown in Fig. C-3 which could clearly appear on a picture tube screen in a receiver with various bandwidth limitations. Note that the maximum number of cycles per horizontal line is shown on the basis of both a $53 \mu s$ and $40 \mu s$ time duration. The $53 \mu s$ columns 2, 3 and 4 are based on the length of time required to cover the total picture width. The $40 \mu s$ columns 5, 6 and 7 represent the time required to cover three-fourths of the picture width. The area covered in $40 \mu s$ has been accepted as a basis to determine horizontal resolution because it equals the picture height and in this way provides a direct comparison between horizontal and vertical resolution. The figures shown in the column on the extreme right are in many instances used to indicate horizontal resolution on a test pattern instead of the bandwidth in megacycles. Since there is a direct relation between these two time bases, they can be readily converted by referring to the following table.

1 Bandwidth	2 Time required for total width	3 Approximate number of cycles in one horizontal line	4 Approximate number of alternate black and white lines in one horizontal line	5 Time required to cover $3/4$ total width	6 Approximate number of cycles in $3/4$ of one horizontal line	7 Approximate number of alternate black and white lines in $3/4$ total width
4.0MC	$53 \mu s$	212	424	$40 \mu s$	160	320
3.75MC	$53 \mu s$	198	397	$40 \mu s$	150	300
3.5MC	$53 \mu s$	185.5	370	$40 \mu s$	140	280
3.25MC	$53 \mu s$	172	344	$40 \mu s$	130	260
3.0MC	$53 \mu s$	159	318	$40 \mu s$	120	240
2.75MC	$53 \mu s$	145	292	$40 \mu s$	110	220
2.5MC	$53 \mu s$	132.5	265	$40 \mu s$	100	200
2.25MC	$53 \mu s$	119	239	$40 \mu s$	90	180
2.0MC	$53 \mu s$	106	212	$40 \mu s$	80	160
1.75MC	$53 \mu s$	93	186	$40 \mu s$	70	140
1.5MC	$53 \mu s$	79.5	159	$40 \mu s$	60	120
1.25MC	$53 \mu s$	66	133	$40 \mu s$	50	100
1.0MC	$53 \mu s$	53	106	$40 \mu s$	40	80

It can be seen from this table that with a 4MC bandwidth the greatest number of vertical lines which can appear on the full width of the picture tube face is 424. This means that the smallest line that could appear on a twenty-seven inch picture tube such as the 27EP4 (screen area 24" x 18½") would be slightly less than one-sixteenth of an inch. With a bandwidth of 2.75MC, the smallest line would be about one-twelfth of an inch and at 2.0MC just under one-eighth of an inch. Fortunately this does not mean that all small detail is *completely* lost but it does mean that both contrast and definition are reduced considerably as can be seen by comparing Fig. C-4 with Fig. C-5. Obviously with larger size picture tubes, alignment will become increasingly important and any changes which reduce or affect the alignment curve will be noticeable in the picture.

CARRIER VIDEO MODULATION

Since 4MC is the maximum bandwidth available for picture transmission, the television camera has been designed to produce picture signals which range from a few cycles per second up to 4 million. These frequencies modulate the amplitude of the video carrier both above and below the carrier frequency. Thus a 60 cycle signal transmitted on the channel 3 video carrier of 61.25MC would cause the carrier frequency to vary between 61.25MC plus 60 cycles to 61.25MC minus 60 cycles. A 4MC signal would cause the 61.25MC carrier to vary from 65.25MC to 57.25MC. These excursions both above and below the carrier frequency are called the upper and lower sidebands. If both sidebands were allowed to remain, the channel bandwidth of 6MC would be exceeded and the lower sideband of channel 3 would extend into the frequency range of channel 2. These conditions are prevented by suppressing all of the lower sideband beyond 1.25MC as shown in Fig. C-2. This means that the station transmits both sidebands for frequencies up to about 1.25MC and only one sideband for frequencies between 1.25 and 4MC. Since both sidebands are transmitted on signals up to 1.25MC, more power is also transmitted on these frequencies.

We know that for the best picture quality all frequencies should receive the same amount of amplification as they pass through the receiver. In order to compensate for this difference in the power of the transmitted signal, the i-f system in the receiver is so designed that the picture carrier usually falls at the 50% point. This is the point indicated by the marker on the right side of Fig. C-6. In this way both sidebands are received but are amplified differently. Since the carrier is at the 50%

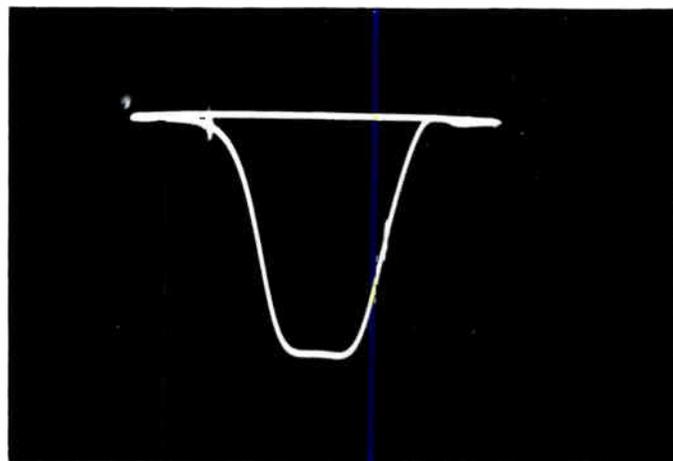


FIG. C-6. Typical alignment curve with picture carrier at the 50% point on the right side.

point, those frequencies which are above this point (closer to the bottom of Fig. C-6) will receive more than 50% amplification and those below this point (closer to the top or base line of Fig. C-6) will receive less. As an illustration, suppose the carrier is modulated by a 500,000 cycle (½MC) signal. The upper sideband of this frequency would then fall approximately 25% from the top and receive about 75% amplification, and the lower sideband of this frequency would fall about 25% from the bottom and receive about 25% amplification. The upper and lower sidebands of this 500,000 cycle frequency would receive a total of 75% plus 25% or 100%. The same total amplification would be received by all frequencies up to 1.25MC and would vary from +50 to +100% for the upper sideband and from +50 to +0% for the lower sideband depending on the point where the frequency falls on the alignment curve slope. In this way all frequencies up to 1.25MC receive a total of 100% amplification. Due to the single side-band system of transmission, all of the frequencies above 1.25MC on the lower side-band are cut-off at the transmitter. Those frequencies above 1.25MC fall somewhere along the top of the curve and also receive 100% amplification.

All of the alignment curves shown in this publication will have the base or zero amplification line at the top of the photograph. This is the way alignment curves are shown for all General Electric receivers as well as for many other makes. When the top of the curve is referred to in the text, it means the peak of the curve which is closest to the bottom of the photograph. When the bottom of the curve is referred to, it means that portion near the base line which appears near the top of each photograph.

It might be well to point out that the bandwidth of a receiver is measured from the midpoint on each skirt of the alignment curve. If the video carrier marker is placed at the 50% point on one slope, the bandwidth can be determined by moving the marker to the midpoint on the

other slope. The difference between the frequency at these two points will be the video i-f bandwidth.

Another item which may be of interest is the variation in alignment curves shown by the manufacturer for different receivers. Generally they are similar to the one shown in Fig. C-6. Occasionally, however, a manufacturer will specify a curve somewhat different in appearance. Always follow the manufacturer's instructions since the best overall response of the *complete* receiver depends upon the i-f curve specified by the manufacturer.

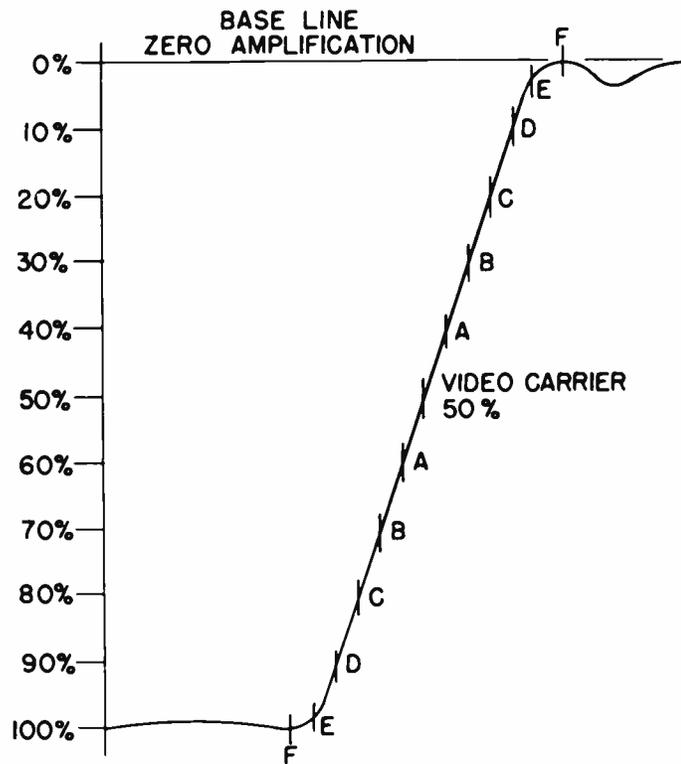


FIG. C-7. Drawing of the video carrier side of a typical alignment curve.

Fig. C-7 is a drawing of the video carrier side of a typical alignment curve. This drawing is marked at each ten per cent point from zero to one hundred. As previously explained, the various frequencies up to 1.25MC will modulate the video carrier both above and below the carrier frequency. If the carrier is modulated by a 200 KC signal, the side-bands will fall at approximately the points marked "A" on the drawing. A 400 KC signal would fall at "B", a 600 KC signal at "C", an 800 KC signal at "D", a 1MC signal at "E" and a 1.25MC signal at "F". It can be seen from this drawing that each of these signals will receive the same amount of amplification due to the symmetrical slope. Note that at point "E", the amplification would be about ninety-seven per cent near the top of the curve. Also note that point "F" which is 1.25MC is at the base line or zero amplification at the

bottom and at the one-hundred per cent point at the top. If the video carrier is moved toward the base line to the forty per cent point, a 200 KC signal would fall at the thirty and fifty per cent points and only receive a total of eighty per cent amplification. If the video carrier were moved in the other direction to the sixty per cent point, the same 200 KC signal would receive fifty plus seventy or one-hundred and twenty per cent amplification. It can be seen from this that the lower frequencies (under 1.25MC) can receive either less than one-hundred per cent amplification or more than one-hundred per cent

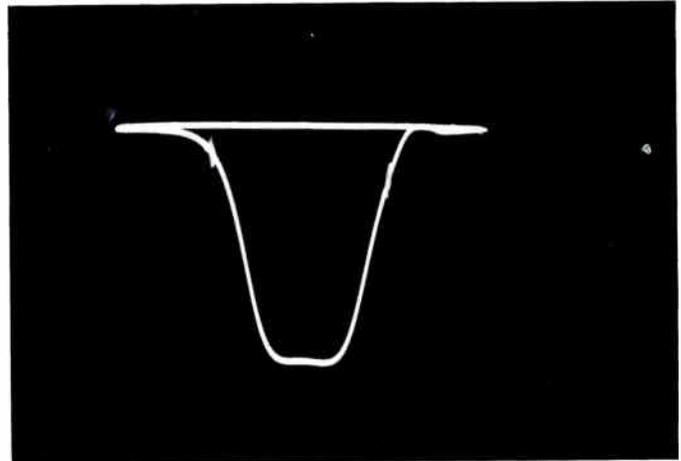


FIG. C-8. A typical alignment curve with the picture carrier at the 25% point on the right side.



FIG. C-9. Test pattern with picture distorted by the sound carrier as shown in Fig. C-8 alignment curve.

amplification depending on the point where the video carrier is placed on the alignment curve. When the video carrier is moved to the twenty-five per cent point on the alignment curve as shown in Fig. C-8, the audio carrier moved up the slope and is considerably above its normal

level. This usually causes the picture to be distorted due to the loss of lower frequencies plus horizontal bands caused by the audio signal modulating the video signal as shown in Fig. C-9.

Another cause of amplification variations would be a curve such as Fig. C-10 which had a non-symmetrical slope and a peak at the top. This type of alignment curve would result in a different amount of amplification for various signal frequencies rather than the normal one-hundred per cent for all frequencies.

If the picture carrier is moved close to the base of the

square wave composite signals, up to the 15th harmonic of the fundamental frequencies must be amplified in order to produce a sync pulse with the proper wave form. An example of this is shown in Figs. C-11 and C-12. Fig. C-11 is the horizontal sync pulse with the video carrier at the 50% point on the alignment curve. In Fig. C-12, the carrier has been moved to the bottom of the alignment curve. This caused some of the lower frequencies to be reduced or lost and produced the distorted horizontal sync pulse.

If the picture carrier is moved to the top of the align-

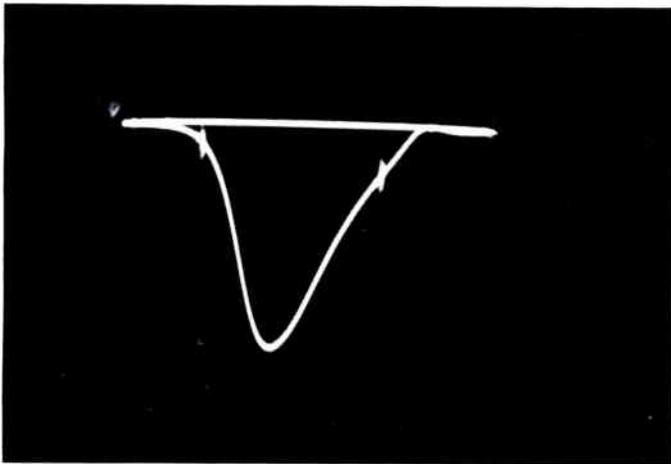


FIG. C-10. A distorted alignment curve with the picture carrier on the right side. Regardless of where the picture carrier is placed on this curve, the amplification of different frequencies will vary over a wide range.

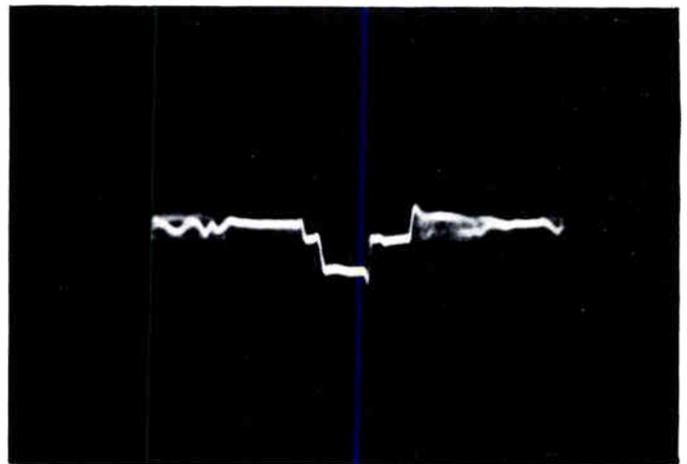


FIG. C-12. The same sync pulse shown in FIG. C-11 when the video carrier is moved to about the 10% point on the alignment curve.

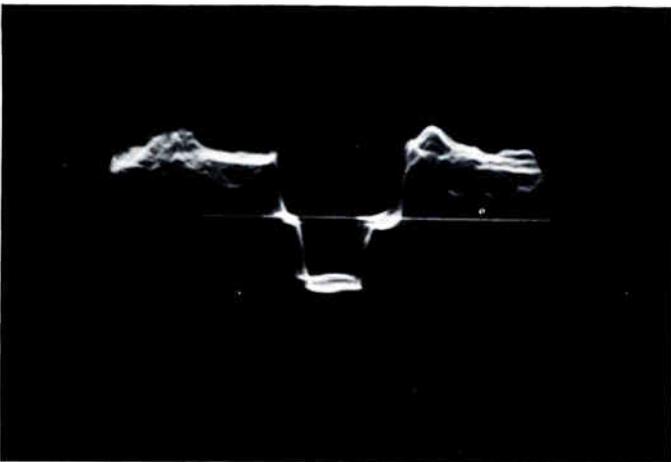


FIG. C-11. A normal horizontal sync pulse as it would appear on an oscilloscope with the video carrier at the 50% point on the alignment curve.

curve, both horizontal and vertical sync may be affected since they are comparatively low frequencies and are, therefore, very close to the video carrier frequency.

Since these sync pulses are 60 cycle and 15750 cycle

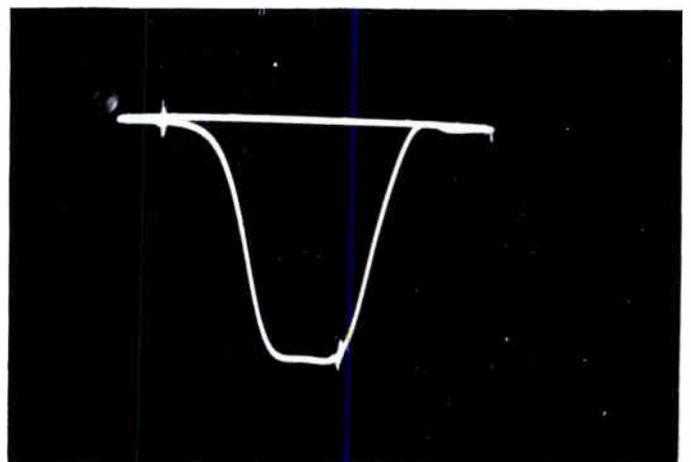


FIG. C-13. Alignment curve with the video carrier near the peak or 100% level.

alignment curve as shown in Fig. C-13, the frequencies below 1.25MC will be amplified more than the higher frequencies. This will usually cause the horizontal wedge on a test pattern to be darker than the vertical wedge due to

a loss of the higher frequencies which have been pushed on down the audio carrier side of the alignment curve.

Any change from the normal position of the video carrier or the general shape of the alignment curve will affect some frequencies. The degree to which these are affected may only be apparent in certain scenes or by comparison with a correctly aligned receiver. Suppose we use as an example three sections of a TV receiver made up of (1) the head-end (2) video i-f amplifiers and (3) the video amplifiers and consider each one of these sections as a window placed in line so light would pass through the first, second and third windows in that order. If each window has a shade which can be raised or lowered, it can be visualized as the bandwidth of that section. When all three windows are in line, with the shades up, all of the light would be visible at the other end. If

one of the shades were lowered, some of the light would be lost. The position of the other shades would then have no affect unless they were lowered below the level of the shade first mentioned. This is also true of a TV receiver; if one section limits the bandwidth to 2MC and all of the other sections pass 4MC, only frequencies up to 2MC will appear at the picture tube. Therefore, a receiver with a poorly designed video amplifier section or an incorrectly aligned i-f amplifier section may act like the window with the shade half down and cut off a good portion of the bandwidth which would ordinarily get through the other sections.

This visualization does not indicate amplitude changes and has only been used to show the result of misalignment in regard to the loss of video frequencies.

FACTORS INFLUENCING ALIGNMENT

If we assume that every receiver is properly aligned when it leaves the manufacturer, and this is generally true, then why should the technician have to worry about

alignment. There are a considerable number of reasons which we shall try to illustrate.

CIRCUIT AGEING

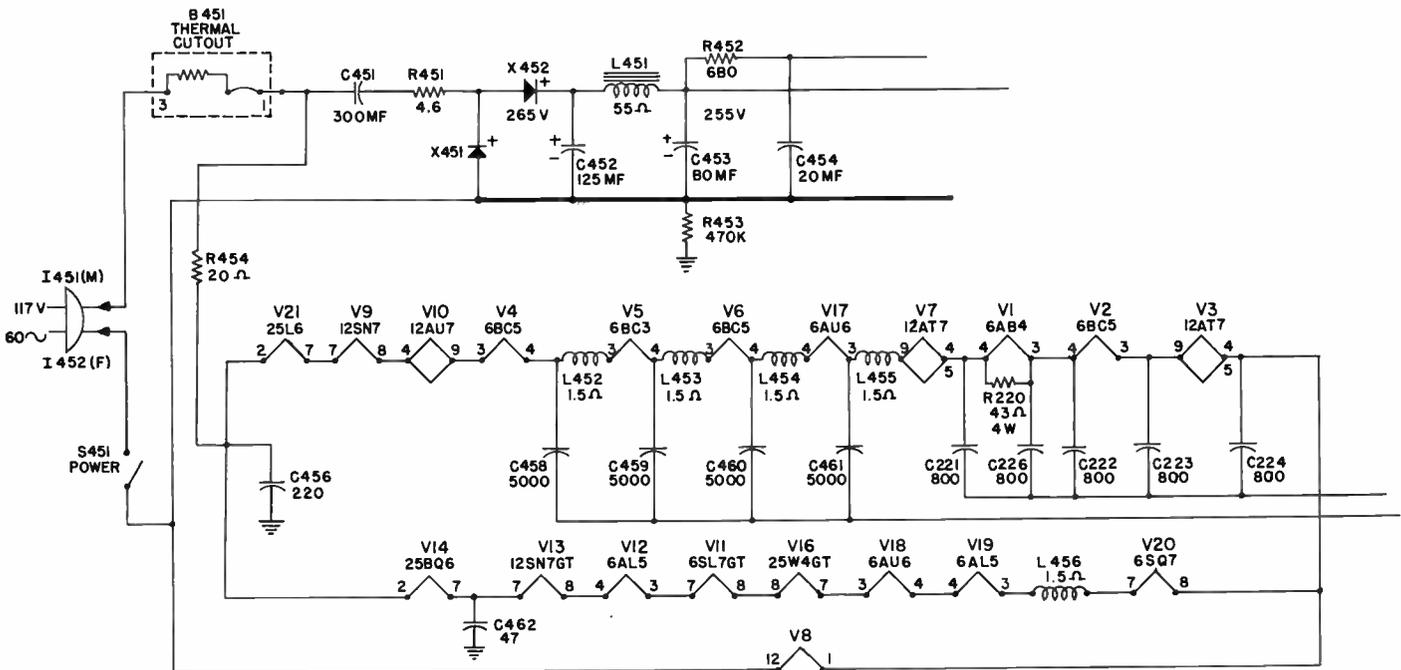


FIG. C-14. Filament circuit used in a number of General Electric receivers including Model 17T4.

It is a generally known fact that resistors may and do change in value after a few hundred hours use. In some instances, the resistance increases and in other cases it decreases. The alignment curve may be affected by these changes. Other parts such as capacitors, coils, etc. develop leakage or change in value which can also affect a normal alignment curve. An example of this would be an open in either capacitor C-459 or C-460 in the filament circuit of Fig. C-14. An open capacitor C-459 caused the curve shown in Fig. C-15 to change to the one shown in Fig. C-16

some receivers. In other receivers the misadjustment of an i-f stage or the replacement of an i-f amplifier tube may cause a similar condition.

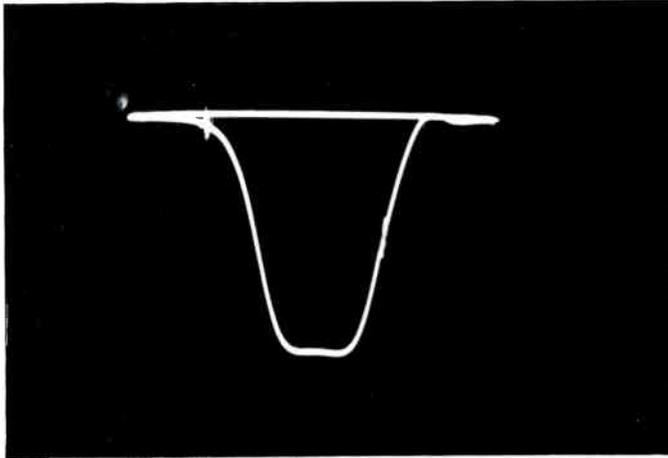


FIG. C-15. A normal alignment curve as it appeared on a General Electric Model 17T4 receiver.

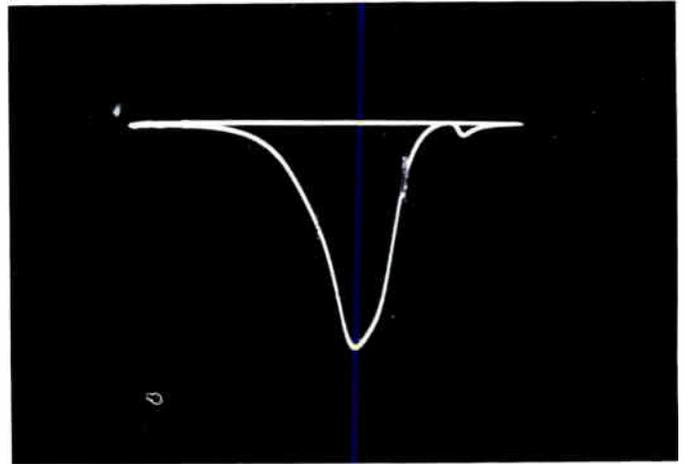


FIG. C-17. Change in alignment curve due to an open capacitor C-460 in FIG. C-14.

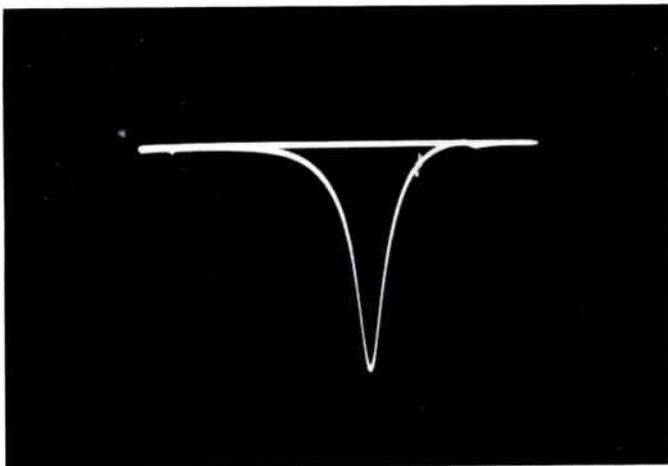


FIG. C-16. Change in alignment curve due to an open capacitor C-459 in FIG. C-14.

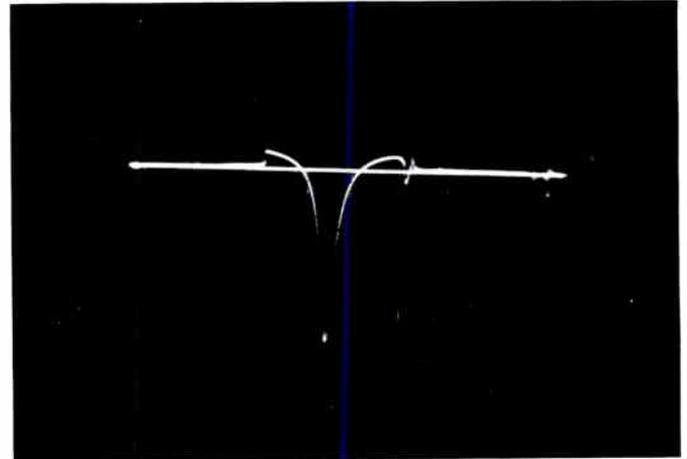


FIG. C-18. Change in alignment curve due to an open in both C-459 and C-460 in FIG. C-14.

and an open capacitor C-460 caused Fig. C-15 to appear like Fig. C-17. If both of these capacitors are open one or both of the i-f stages "takes off." This oscillation causes the curve to look like Fig. C-18 and practically ruins the picture as shown in Fig. C-19. An open screen by-pass capacitor may produce practically the same condition in

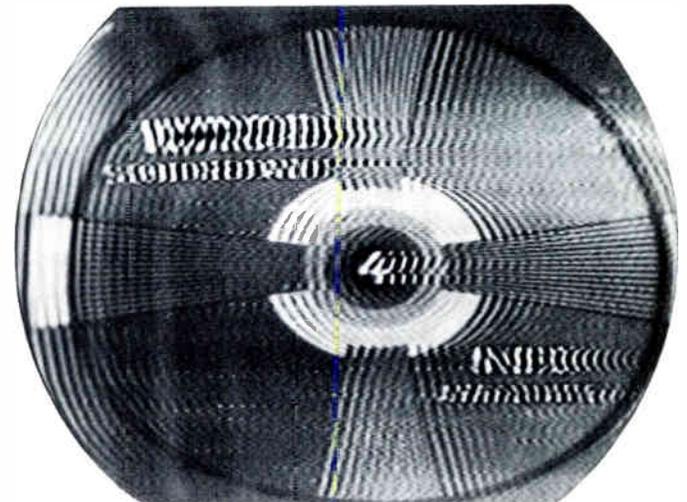


FIG. C-19. A blanked out picture due to oscillation in one or more i-f stages. This was caused by an "open" in capacitors C-459 and C-460.

TUBE REPLACEMENT

One of the easiest ways of causing a change in the alignment curve is to replace one or more of the i-f amplifier tubes. This is particularly true of most present day re-

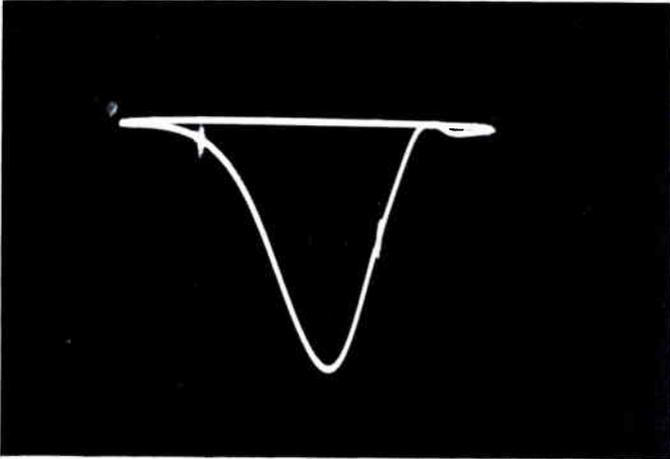


FIG. C-20. A new 6BC5 tube in the first i-f socket caused this change to the FIG. C-15 curve.

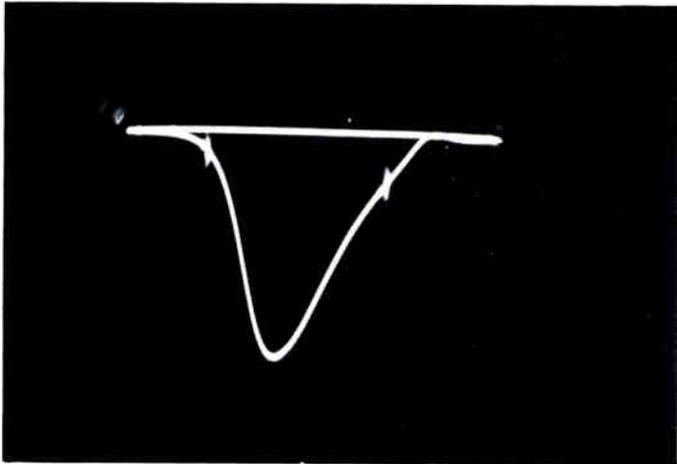


FIG. C-21. The same new 6BC5 tube was placed in the second i-f socket and the original tube was returned to the first i-f socket.

ceivers which use a stagger-tuned type i-f system. This is so because the capacitance of each individual tube is part of the i-f tuned resonant circuit. Since tube capacitances do vary within certain limitations, the frequency of each i-f circuit may be changed considerably. Fig. C-15 is a normal alignment curve with the video carrier on the right side as it appeared before the i-f tubes were changed. Figs. C-20, 21 and 22 are photographs of changes which occurred to the Fig. C-15 alignment curve when a new 6BC5 tube was used to replace the first, second and third i-f

amplifier tubes in a General Electric 17T4 receiver. The original tube was returned to its own socket after each photograph. Bear in mind that the curve was normal before this tube substitution was made and that the picture and sound carriers were at the normal points as shown in Fig. C-15. The amplitude of the input signal was changed whenever necessary to keep the amplitude of the curve at about .75 volt. Notice that the sound carrier on the left slope of Fig. C-22 is considerably higher than the

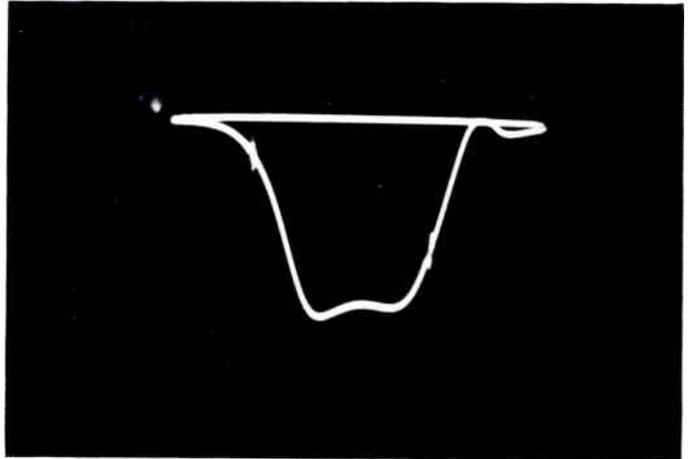


FIG. C-22. The 6BC5 tube used for FIGS. C-20 and C-21 was placed in the third i-f socket and caused this change in the alignment curve.

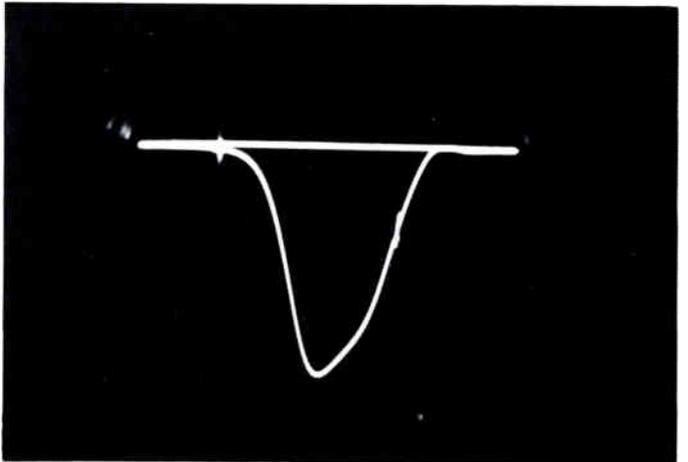


FIG. C-23. A different new 6BC5 tube was placed in the first i-f socket. This caused the normal curve shown in FIG. C-15 to change as shown above.

normal 5 to 10% which could cause audio buzz.

Figs. C-23, 24 and 25 are photographs with a different 6BC5 tube substituted in the 1st, 2nd and 3rd i-f amplifier tube sockets in the same receiver. Note that the general shape of the curve as well as the placement of both markers usually changes. Also note that the change is different when the same tube is placed in a different i-f socket.

Bear in mind that these tubes were selected from a small lot of new tubes (about ten) all of which tested

“good.” Most of the tubes produced only a slight distortion whereas a few produced a considerable change. In view of these illustrations, do not overlook the possibility that tubes may be the reason why the correct curve cannot be obtained during alignment. If you have difficulty getting a curve similar to the one shown by the manufacturer, be sure to try other tubes before condemning the manufacturer.

Fig. C-26 shows the change when the first and second i-f amplifier tubes were interchanged. The curve appeared like Fig. C-15 before these tubes were interchanged. If i-f

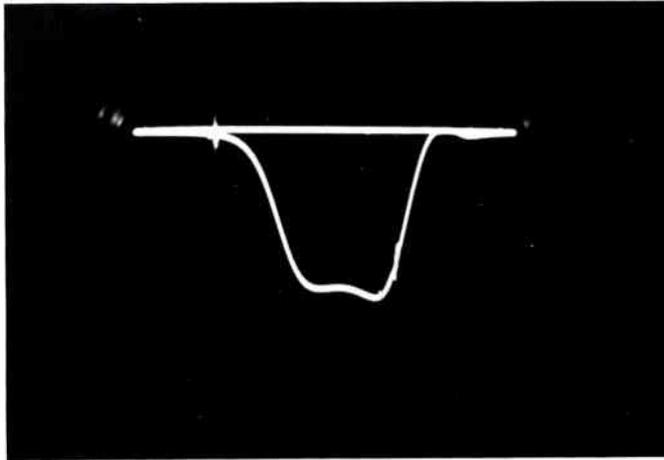


FIG. C-24. The same tube used for the FIG. C-23 photograph produced the above curve when placed in the second i-f socket.

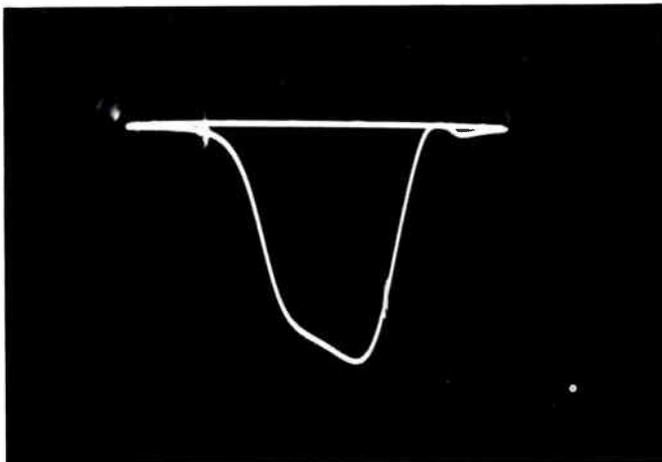


FIG. C-25. The same tube used for FIGS. C-23 and C-24 was placed in the third i-f socket and caused the above change.

tubes are not returned to their respective sockets, a perfectly aligned receiver may become a poorly aligned receiver. Therefore, when servicing or testing tubes be sure that they are returned to their original sockets. This point should be explained to the set owner so that he

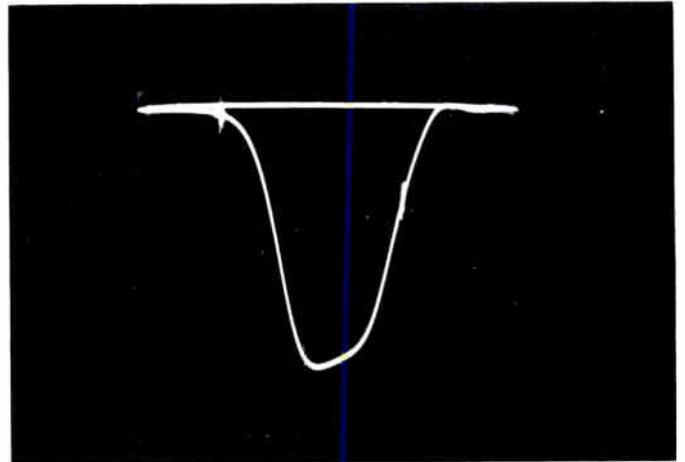


FIG. C-26. This change to the curve shown in FIG. C-15 was caused by interchanging the first and second i-f tubes.

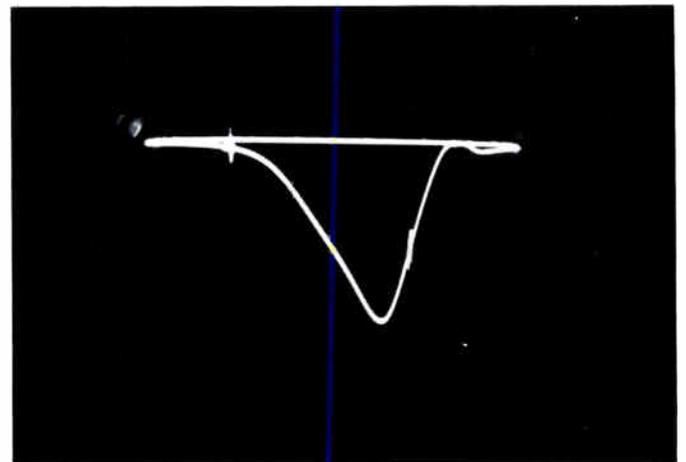


FIG. C-27. A new 6AU6 tube was substituted for the 6BC5 first i-f amplifier tube.

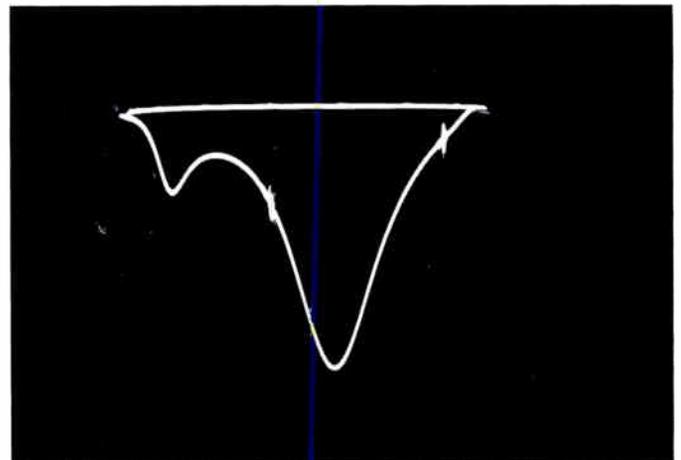


FIG. C-28. The same 6AU6 tube was substituted for the 6BC5 second i-f amplifier tube.

will be discouraged from taking the tubes to the corner store to have them tested.

Another reason for a very distorted curve with poor picture quality may be substitution of a different type tube. Fig. C-27 shows the change when a 6AU6 is substituted for a 6BC5 as the first i-f amplifier in a 17T4 receiver. Figs. C-28 and C-29 show the same substitution, first in the second i-f amplifier and then in the third i-f amplifier socket. Due to the lower amplification, the signal input had to be increased.

Fig. C-30 shows the change when a 6CB6 is substituted for the 6BC5 first i-f amplifier. Figs. C-31 and 32 show the same substitution first in the second i-f amplifier and then in the third i-f amplifier. These photographs show the distortions to an alignment curve which may be produced by changing tube types in the i-f string. There may be a considerable temptation when out on service calls to substitute a 6CB6 in a 6BC5 socket particularly if you have just used the last 6BC5 and the circuit shows that pins 2 & 7 are tied together. Under certain conditions a *temporary* substitution can be made and explained to the set owner, but this type of substitution should only be a stop-gap remedy until the correct tube can be obtained. It should be pointed out again that all 6BC5 tubes *did not* produce significant variations whereas *all* 6AU6 and 6CB6 tubes when substituted for a 6BC5 i-f amplifier *did* produce considerable changes to the alignment curve.

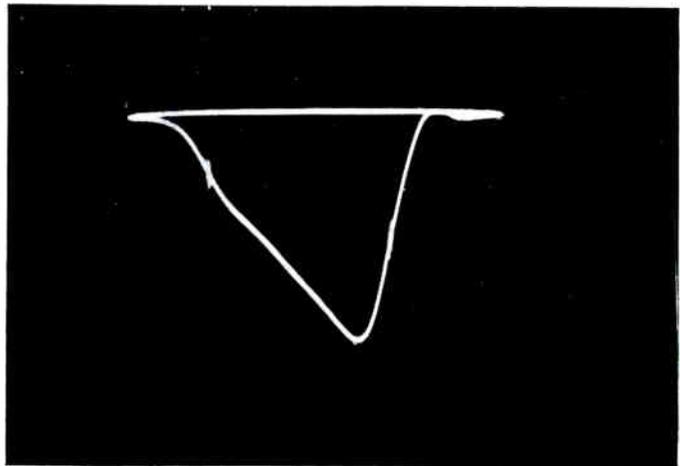


FIG. C-30. A new 6CB6 tube was substituted for the 6BC5 first i-f amplifier tube.

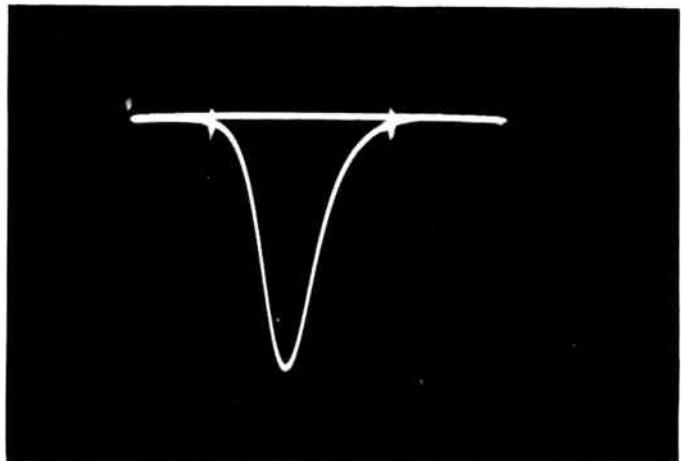


FIG. C-31. The same 6CB6 tube was substituted for the 6BC5 second i-f amplifier tube.

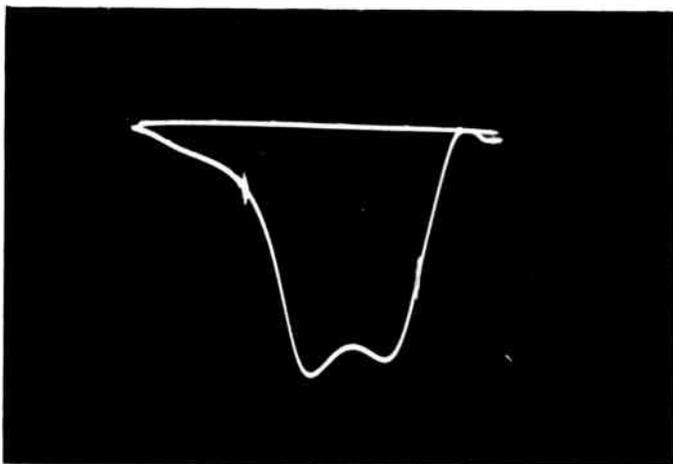


FIG. C-29. The same 6AU6 tube was substituted for the 6BC5 third i-f amplifier tube.

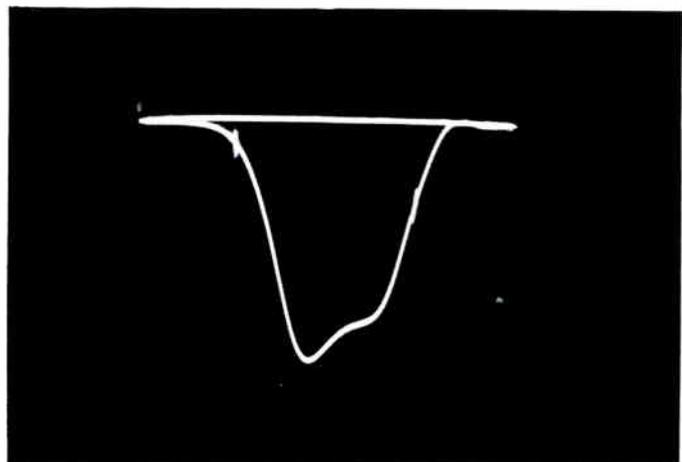


FIG. C-32. The same 6CB6 tube was substituted for the 6BC5 third i-f amplifier tube.

LEAD DRESS

Another factor which can cause considerable change in the alignment curve is lead dress. There are many times when either in locating or making repairs it is necessary to disturb either the grid or plate wiring in one of the amplifier circuits. Unless these wires are returned to their exact original location, the alignment may be affected. Two examples of this are shown in Figs. 33 and 34. In Fig. 33, the coupling capacitor between the plate of the first i-f amplifier tube and the grid of the second i-f amplifier was moved about $\frac{1}{8}$ " closer to the chassis. In Fig. 34 this same capacitor was moved about $\frac{1}{4}$ " away from the chassis. In view of this, it is entirely possible that rough

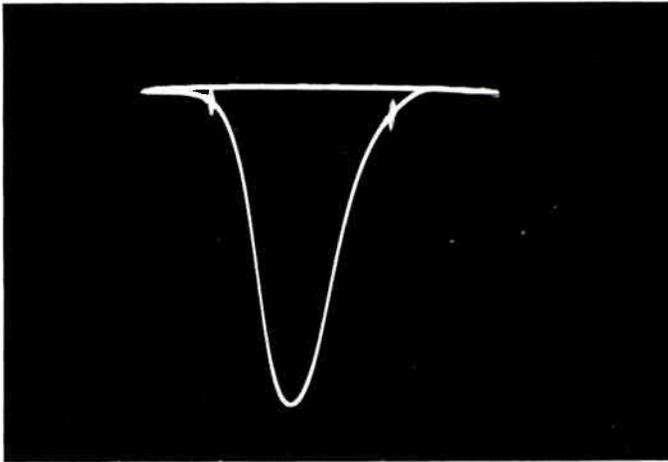


FIG. C-33. The coupling capacitor between the plate of the first i-f amplifier and the grid of the second i-f amplifier was moved $\frac{1}{8}$ " closer to the chassis on a 17T4 receiver.

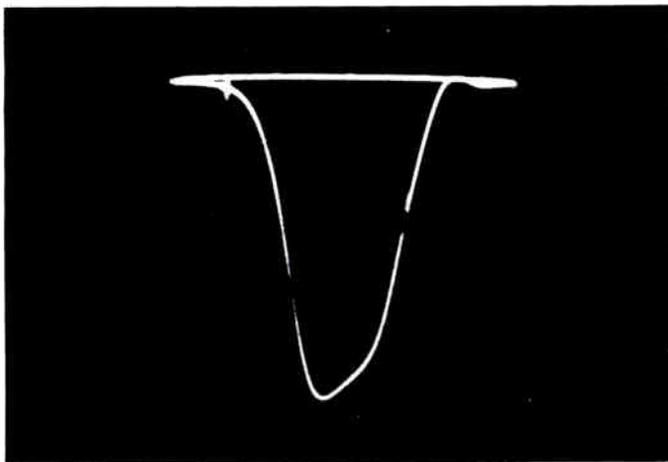


FIG. C-34. The same coupling capacitor was moved $\frac{1}{4}$ " away from the chassis.

handling during shipment could result in a distortion of the alignment curve before the receiver is purchased and used. It is also possible that any receiver serviced a few times will have the lead dress disturbed enough to produce a distorted curve.

TUBE SHIELDS

In some cases a tube shield may be left off when testing or replacing the r-f or i-f amplifier tubes. Since this has a direct effect on the tube capacitance, it is important that each tube shield be replaced on the proper tube. It is also important that the shield be properly grounded since a poor or open contact could produce a similar condition. Fig. C-35 shows the change in a normal alignment curve of a General Electric 17T4 receiver when the third i-f amplifier tube shield is removed.

There are a number of other factors which can cause the alignment curve to be distorted. Among these are attempted alignment with inadequate test equipment or misadjustment by a "screw driver happy" set owner. It is easy to understand, when there are so many factors that affect the alignment of a TV receiver, why practically every receiver repaired on the bench requires at least a touch-up to assure optimum picture quality.

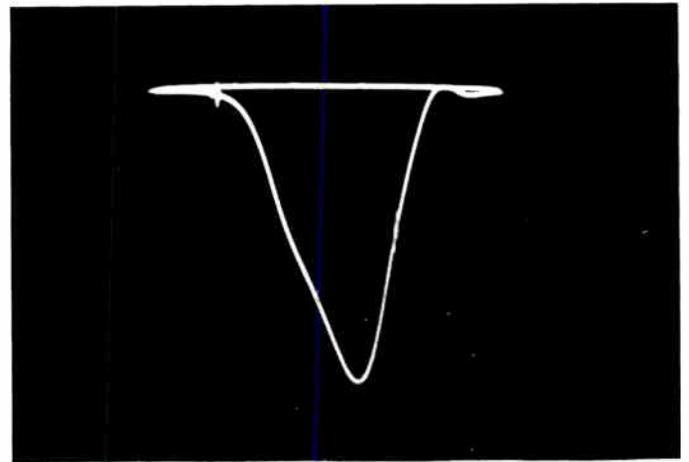


FIG. C-35. The removal of the shield on the third i-f tube caused the alignment curve shown in FIG. C-15 to be changed as shown above.

ALIGNMENT

Before attempting the actual alignment of a TV receiver, there are a few precautions to follow. Probably the most important is to use reliable equipment. If you do not have reliable and accurate equipment, which you can use with confidence, do not attempt to realign a receiver or even to touchup on any alignment adjustments. This is *most* important since experience has shown that receivers are generally *more* out of alignment after this type of an operation than before. It is, therefore, better to know that the picture won't be any *worse* than it was before than to gamble on improvement with the odds against you.

If you do own good reliable equipment that is easy to use, by all means use it on practically every receiver serviced. You will find that the few additional minutes required to touch-up the alignment curve will more than pay for this time by increasing your business through satisfied customers.

One of the most important requirements for good alignment is to follow the manufacturers instructions. This is particularly true of any new make or model. You will soon find that the maze of instructions on each model can be condensed and simplified by making notes on the schematic or attaching condensed instructions in your own words. You will also find that most manufacturers do not change their instructions on every model and that the same general instructions may apply to models produced by different manufacturers. The alignment instructions will have to be checked, however, and notes made of any variations. These changes usually are due to slightly different i-f frequencies as well as trap frequencies. The technician who services only a few makes of receivers will soon find that the alignment procedure can be memorized and accomplished in a very few minutes. Other technicians may have to spend a little more time particularly on the unfamiliar makes and models.

Occasionally very little if any alignment information may be included with the schematic. In these cases the information that is supplied such as the frequency of each i-f transformer can be used and compared with similar circuits where alignment instructions are given. If trap frequencies are not known and the video carrier frequency on the i-f curve can be determined, it is quite easy to find the trap frequencies from experience gained on other receivers of the same type.

Always set the channel selector to the channel recommended by the manufacturer. If a channel is not given in the instructions, select one which will not vary the shape of the alignment curve when the fine tuning control is rotated.

BIAS BATTERY

The bias battery usually recommended by the receiver manufacturer is used in most receivers to offset the AGC voltage and maintain the amplification of each stage at a certain level. This is important because this bias voltage varies the capacitive effect of the tube in the resonant circuit. If a receiver is to be used in a weak signal area, the voltage should be reduced to one-half or one-third of recommended level depending on the amplitude of the signal received.

SIGNAL LEVEL DURING ALIGNMENT

Most manufacturers also establish a signal level at the video detector. The output of the sweep generator is changed as the point of input is changed to maintain this level. One way to do this is to calibrate the scope so the recommended voltage level indicates a trace which covers about two-thirds of the scope face. This was explained in Technical Manual #1. The position of the vertical gain control is left at this one setting and the size is maintained by changing the output attenuator on the generator. If the input signal is too high, one or more stages in the receiver may be overloaded due to driving the grid beyond the cut-off point. This may produce a beautiful flat-top curve which will change to any shape when the input is reduced. A test for this is to reduce the output from the generator. If the scope trace is also reduced in size and maintains the same overall shape, the flat top is not due to overloading.

If the output voltage is kept at approximately the recommended level, there will be very little chance of overloading any stage. Another reason for using this level is to make sure that the curve will be normal when a picture signal is received. The effect of detector loading on the last tuned circuit will cause the alignment curve to change its shape at certain signal levels. In case a voltage level is not specified, use one volt peak-to-peak across the video detector load resistor.

Another reason for establishing a sweep signal voltage level is to prevent the possibility of losing the marker with certain types of marker generators. Since the amplitude of the marker signal is usually considerably lower than the sweep amplitude, it may be too small to be useable or lost entirely if the sweep amplitude is too high.

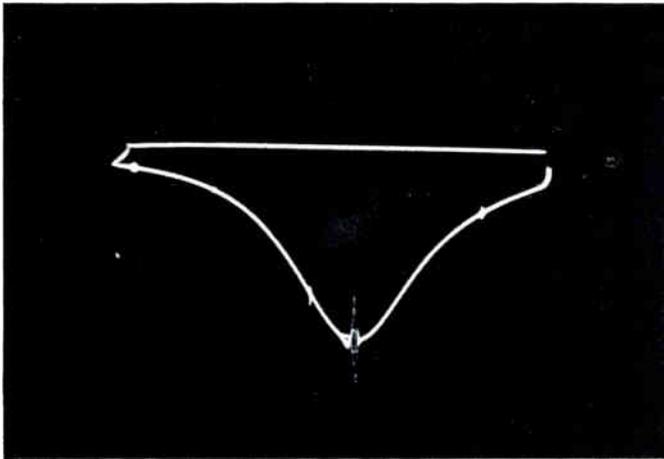


FIG. C-36. A normal curve with the signal generator at point "A" in FIG. C-37 and a short across point "B". This is a curve similar to that shown in the alignment instructions.

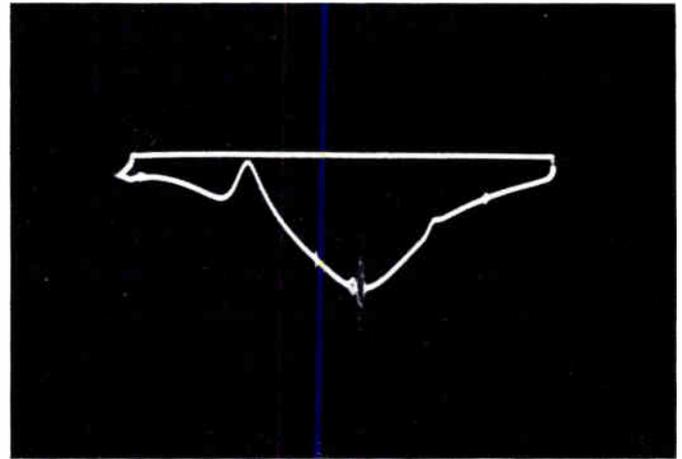


FIG. C-38. If the short is not placed across point B in FIG. C-37, the curve will have a double hump as shown above.

SHORTING COILS

Another important consideration when making a stage-by-stage alignment is to short out the preceding i-f stage. If this operation is overlooked, it may be difficult to obtain a curve similar to that shown by the manufacturer. Fig. C-36 is the curve which should appear across the diode load resistor when the signal is fed into point "A" in Fig. C-37 and a short placed across point "B". If the short across point "B" is removed, the curve looks like Fig. C-38. In some receivers, it is only necessary to connect the plate and screen terminals together. This can be

accomplished with a single alligator clip or a short lead with alligator clips on each end.

At this point it might be well to offer a suggestion on the alignment of older model receivers which have stagger tuned i-f transformers. Some of the alignment instructions for these receivers suggest that each stage be aligned with an ordinary signal generator and a VTVM. After these steps are completed, a touch-up adjustment with sweep equipment and an oscilloscope is recommended. Experience has shown that a considerable amount of additional time is usually required to complete this double operation. A considerable portion of this time may be saved by following the procedure recommended by the manufacturer and then make a drawing of the curves that will appear on the oscilloscope when the sig-

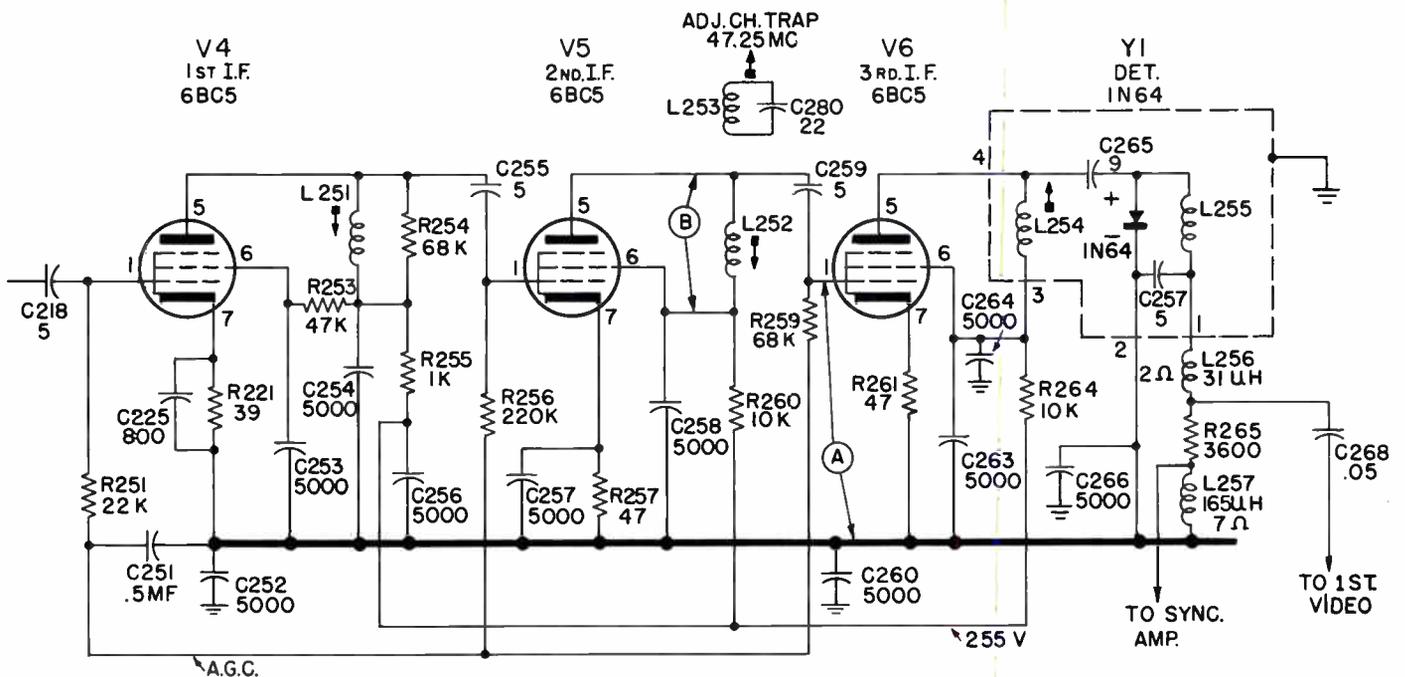


FIG. C-37. The video i-f amplifier section used in a number General Electric receivers including Model 17T4.

nal is inserted at the grid of each i-f stage. First align the receiver to obtain the proper curve. Then insert a signal at the grid of the last i-f stage and short out the plate coil on the preceding stage. Then make a drawing of the curve either on a separate piece of paper or someplace on the alignment instructions. Be sure to show both the shape and frequency marker locations. This procedure can then be followed on each preceding stage. These curves can be used when aligning other receivers of the same type. In this way only one operation is necessary and valuable time will be saved on future alignment or "touch-up" jobs.

TRAP ADJUSTMENT

Another factor which is very critical in the alignment of a TV receiver is trap adjustment. There are several different trap circuits in TV receivers. One of these is the sound trap which helps to eliminate the sound frequency from getting into the video and distorting the picture. In intercarrier receivers the sound frequency is 4.5MC and, therefore, the sound trap is this same frequency. In some receivers, an additional trap at the sound carrier frequency is used to reduce the sound carrier level. In conventional receivers, sound traps are the same frequency as the sound i-f. This type of trap is designed to eliminate the sound of the channel to which the receiver is tuned. There is another type of sound trap which is designed to eliminate interference from the sound carrier of the lower adjacent channel. Another trap is used to eliminate interference from the higher adjacent channel picture carrier. The reason why both a video and sound carrier on an adjacent channel can cause interference when each channel is 6MC apart may not be thoroughly understood. As an example, consider a receiver which has a video i-f of 45.75MC and a sound i-f of 41.25. The following i-f frequencies would be developed if the channel selector is switched on channels 2, 3 and 4.

Channel No. and Carrier	Carrier Frequency in mc	Receiver osc. freq. in mc	Difference or I-F freq.
2 Video	55.25	101.00	45.75
2 Sound	59.75	101.00	41.25
3 Video	61.25	107.00	45.75
3 Sound	65.75	107.00	41.25
4 Video	67.25	113.00	45.75
4 Sound	71.75	113.00	41.25

Most head-end circuits are necessarily broad-band and have a band width somewhat wider than a single channel bandwidth of 6 mc. If the receiver is set on channel 3 and video and sound carriers are present from stations operating on channels 2 and 4, we may have the following frequencies present at the input to the video i-f amplifiers as a result of the oscillator frequency mixing with the various carrier frequencies:

Channel No. and Carrier	Carrier Frequency in mc	Receiver osc. freq. in mc	Difference or I-F freq.
2 Video	55.25	107.00	51.75
2 Sound	59.75	107.00	47.25
3 Video	61.25	107.00	45.75
3 Sound	65.75	107.00	41.25
4 Video	67.25	107.00	39.75
4 Sound	71.75	107.00	35.25

Since the 51.75 mc frequency which is the video carrier for channel 2 would fall way beyond the extreme edges of the i-f alignment curve, it can be disregarded since very little if any would get through. The sound carrier of channel 2, however, would have a frequency of 47.25 which is only 1.5 mc above the channel 3 video carrier of 45.75 mc. This could cause sound bars if not trapped out. The video carrier for channel 4 would have a frequency of 39.75 which is only 1.5 mc below the channel 3 sound carrier of 41.25 and could also cause interference if not trapped out. The 35.25 mc sound carrier for channel 4 like the 51.75 mc video carrier for channel 2 falls far enough away from the skirts of the i-f curve to be disregarded. Since both of these trap frequencies are multiples of 1.5 mc away from the video carrier, the 1.5 mc marker frequencies produced by the General Electric ST-5A

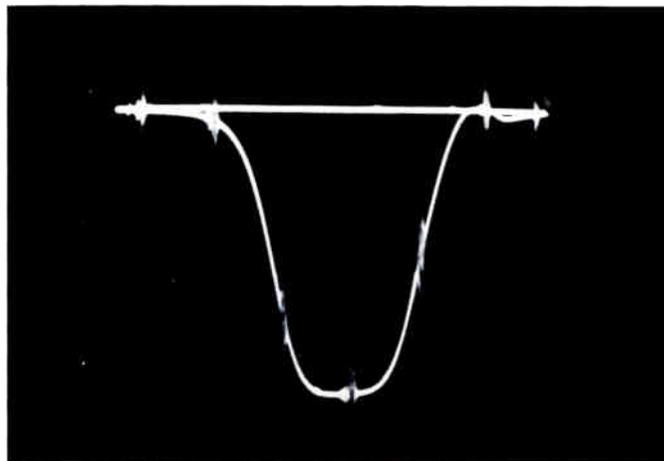


FIG. C-39. Normal alignment curve with 1.5MC markers. The adjacent channel sound trap is the second marker from the right. The adjacent channel video carrier trap marker is at the extreme left.

Marker Generator can be used without changing the marker frequency setting. The position of these markers is shown in Fig. C-39. When making trap adjustments with the ST-5A Marker Generator, it is very easy to make these exact by increasing either the amplitude of the input signal or the vertical gain control on the oscilloscope or both. In this way, the portion of the alignment curve on which the trap frequencies fall can be enlarged as shown in Fig. C-40. Since the marker itself is not absorbed as explained in Technical Manual #2, it will always appear and an exact adjustment can be obtained.

The correct trap adjustment is very important for several reasons. One of these is to eliminate those frequencies which could cause interference. Another reason for correct trap adjustment is the change in a normal curve when

the trap frequency is incorrectly adjusted to fall within the i-f pass band. Fig. C-41 shows one trap changed from 47.25 to 45.75 mc. This adjustment would result in practically a complete loss of video information as well as the synchronizing pulses if the fine tuning control is set at the normal oscillator frequency. If the oscillator in the receiver is changed so the video carrier falls at the 50% point on this curve, the bandwidth will be reduced to about 2.4 mc as shown in Fig. C-42 which shows 1.5 mc markers. If this is compared with the 1.5 mc markers in Fig. C-39, the loss in bandwidth is apparent. If the trap frequency is moved to 44.5 mc, the curve is changed as shown in Fig. C-43. This can hardly be recognized as the same curve as shown in Fig. C-15 and it is hard to believe that only one trap is misadjusted.

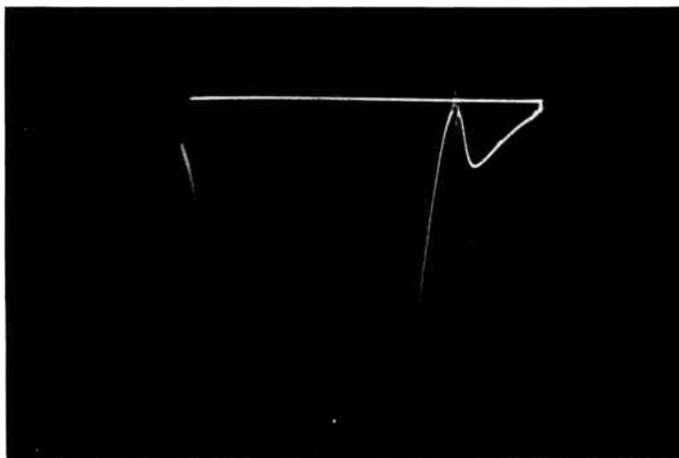


FIG. C-40. A more exact adjustment of the traps circuits can be made by advancing both the horizontal and vertical gain controls. The above photograph shows the adjacent channel sound trap with these controls advanced.

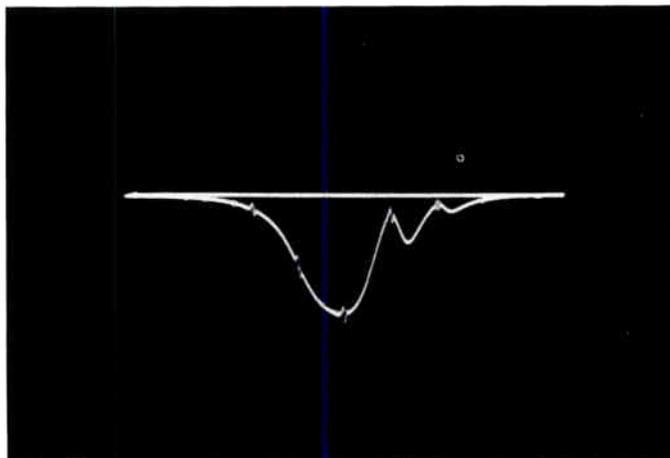


Fig. C-42. Same curve shown in FIG. C-41 with 1.5MC markers to show reduction in bandwidth.

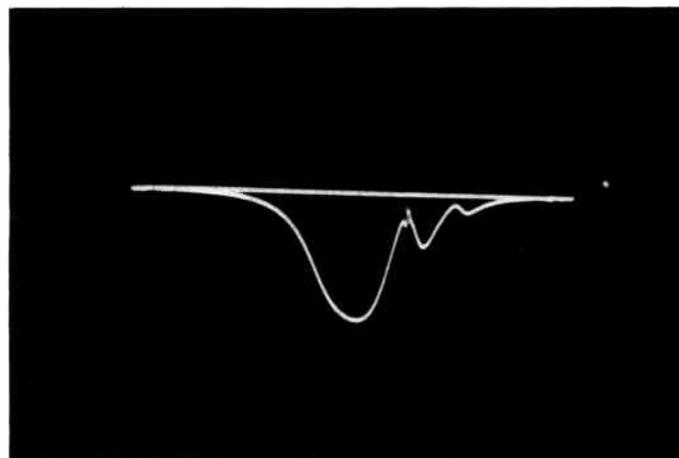


FIG. C-41. One adjacent channel audio trap set at 45.75MC instead of 47.25MC. This was the only change made to the normal curve previously shown in FIG. C-15.

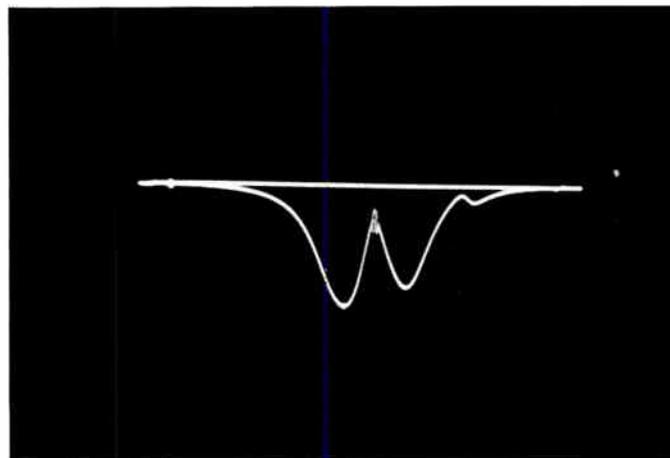


FIG. C-43. One 47.25MC trap adjusted to 44.5MC. This curve would appear like FIG. C-15 if this one adjustment was returned to its normal point.

HEAD-END ALIGNMENT

The alignment of head-ends vary considerably in different receivers. The head-end has a much wider pass-band than the i-f strip and is also less susceptible to distortion due to tube changing. Under ordinary conditions it should seldom be necessary to do more than make slight oscillator trimmer adjustments. If an overall head-end alignment is required, be sure to carefully read and follow the manufacturers instructions.

The General Electric ST-5A marker generator is extremely useful when aligning a head-end because of the individual picture carrier marker crystals which are available for each channel. The sound carrier marker can be obtained on any channel merely by flipping the crystal modulation switch. The position of adjacent channel carriers can also be seen by changing the picture carrier selector switch.

It is also possible to adjust the oscillator trimmer on each channel in most head-ends so that the picture and sound carriers for each channel will fall at the same position on the overall curve. This will enable the set owner to change channels without readjusting the fine-tuning control. Adjustments of this type should be made only on those channels which can be received in your area.

A point of interest which may not be generally known is that the carriers from the transmitted signal can be seen superimposed on an alignment curve. One way of observing these carriers is to make the overall i-f alignment, and when this is finished do not disturb any adjustments or connections. Now connect an antenna to the receiver, set the channel selector on a local station and tune it in. The

output of the sweep generator may have to be adjusted either up or down depending on the amplitude of the signal received. The picture carrier oscillator in the marker generator should be turned off so that only the station markers will be visible. The curve will appear similar to Fig. C-44. The video signal appears at the 50% point on the right slope and the sound carrier can be seen near the base line on the left slope of Fig. C-44. If the fine-tuning control is adjusted both carriers will move either up or down the alignment curve. A vertical sync pulse appears near the center of Fig. C-44 and the "grass" is due to horizontal sync pulses. The amplitude of the carriers as well as the sync pulses will depend on the amplitude of the incoming signal in relation to the amplitude of the signal from the sweep generator.

The signal generator can also be connected across the antenna terminals parallel with an antenna. The oscilloscope will then show a trace similar to C-44 depending on the setting of the fine tuning control. Obviously the frequency of the sweep and marker generators will have to be changed to the channel frequency. The accuracy of the marker generator calibration can be checked by turning the picture carrier oscillator on and then increasing the amplitude of the marker generator until it is visible. Since the frequencies of the station carriers are known, the marker frequency can be changed until it is superimposed over one of the station carriers. The frequency indicated by the marker can then be checked against the crystal controlled station carrier.

The information in this booklet has been general in nature. This was necessary since many volumes could be written on the alignment of the many different makes and models of TV receivers. It would also be a repetition of information already available in service manuals or the set manufacturers service notes. It is hoped that the material and illustrations included in this booklet will help service technicians to better understand the importance of TV alignment as well as some of the reasons why "good" TV alignment equipment is necessary in this highly competitive electronic field.

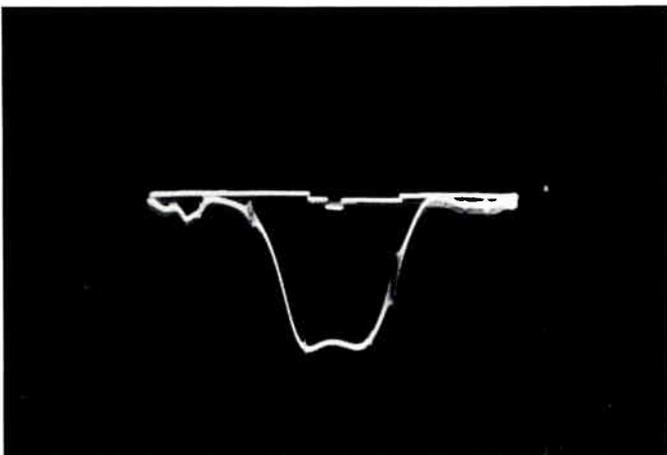


FIG. C-44. A normal alignment curve with an antenna connected to show the station carriers. The signal generator and oscilloscope connections were not changed.

TUBE DEPARTMENT

GENERAL  **ELECTRIC**

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