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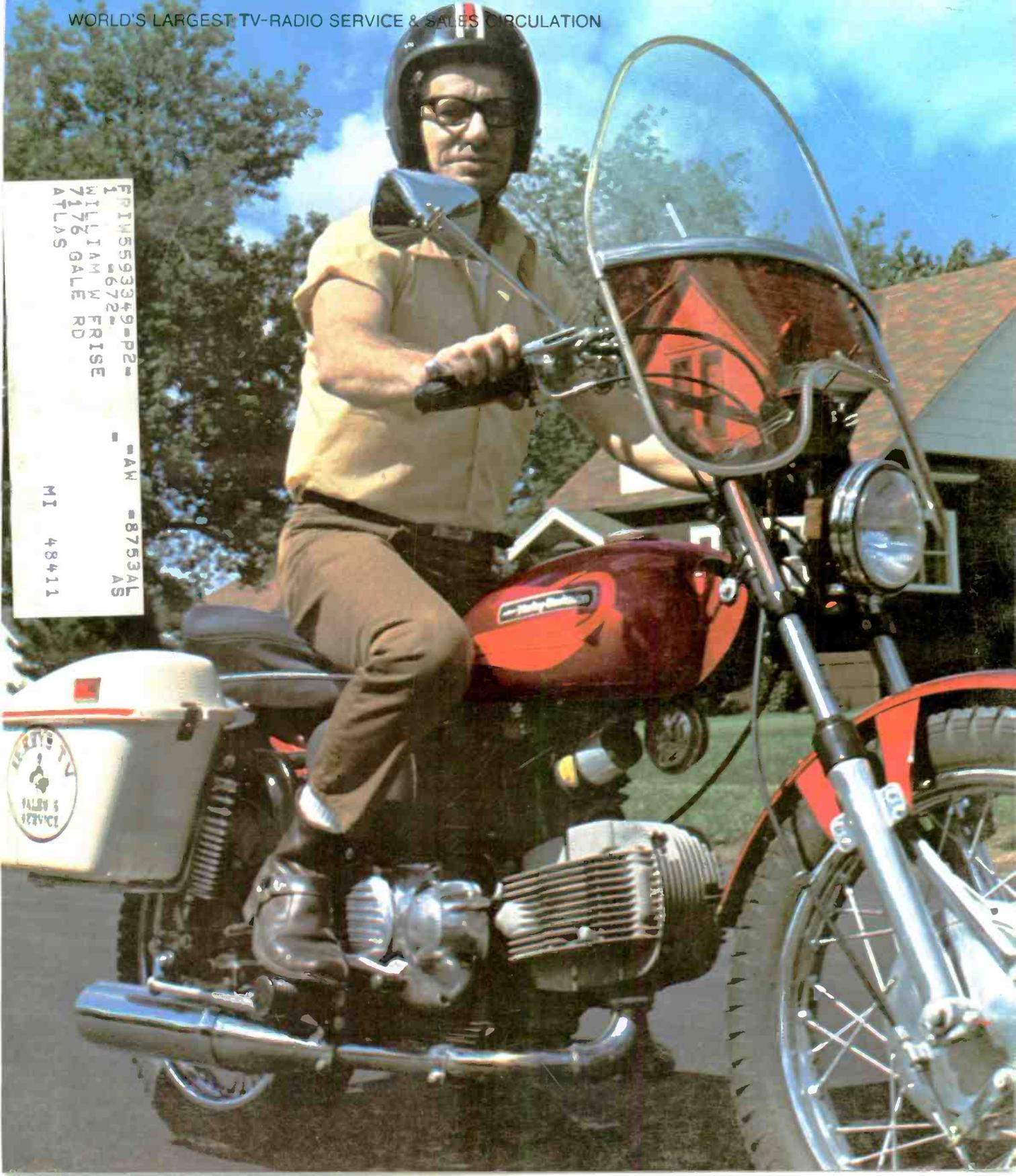
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**ROBERT UPTON**

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Gerald O'Geay of Jerry's TV is shown on this month's cover with his solution to the current fuel shortage—using his motorcycle to make house calls and the truck only if it becomes necessary to bring the set in.

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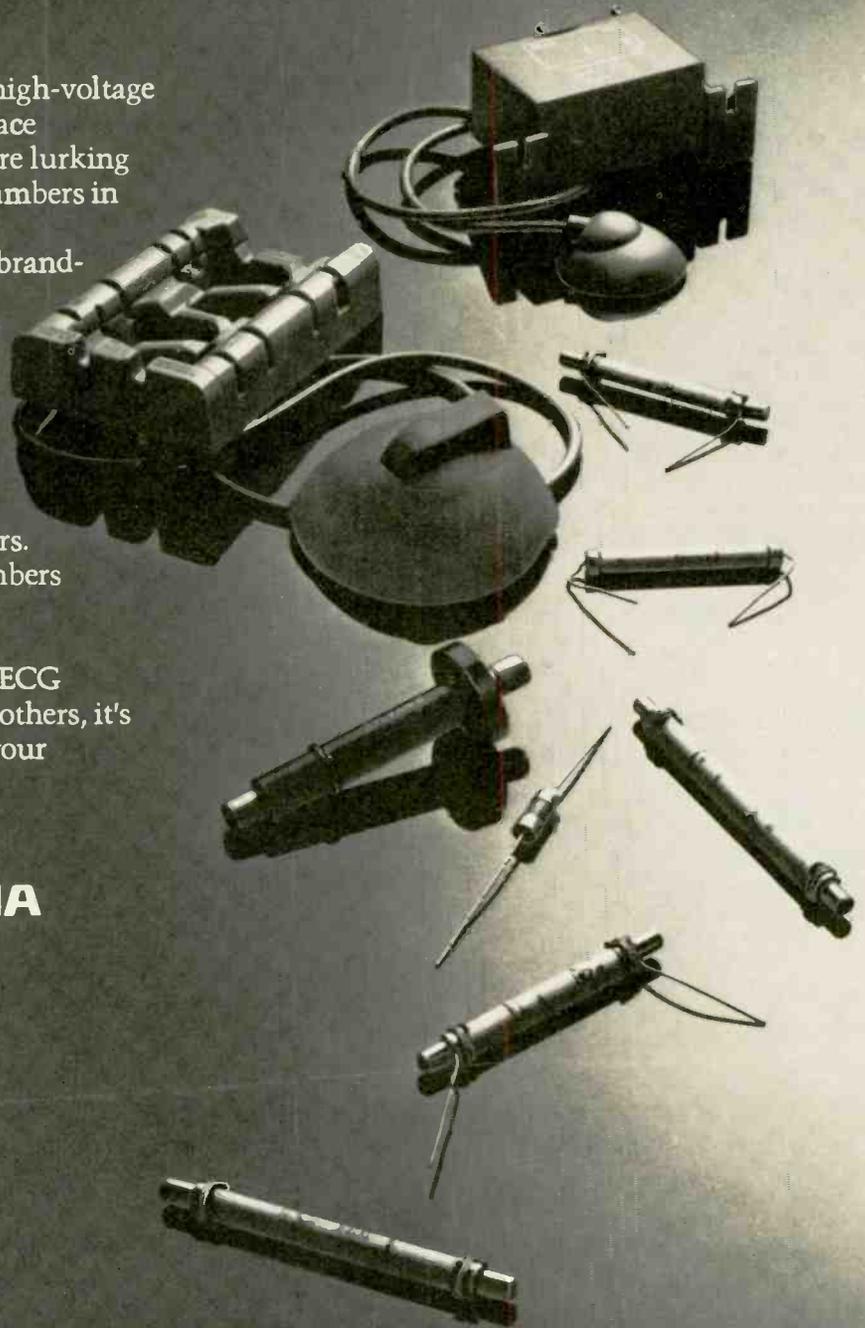
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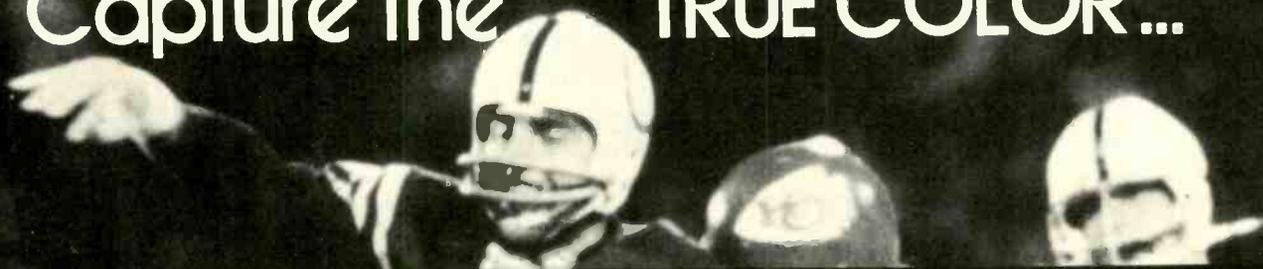
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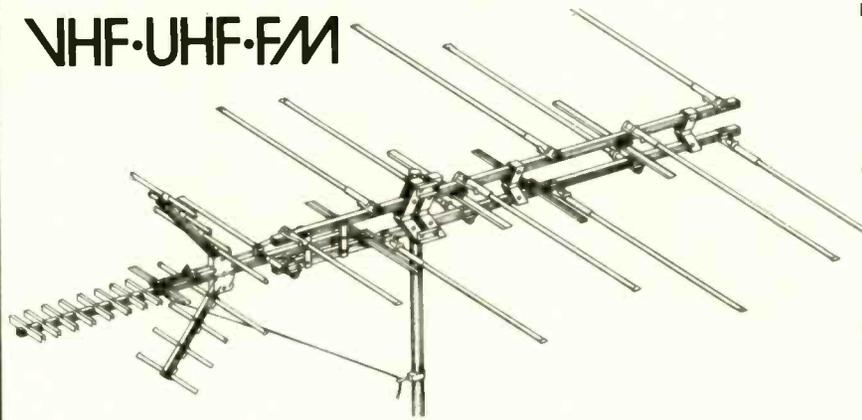
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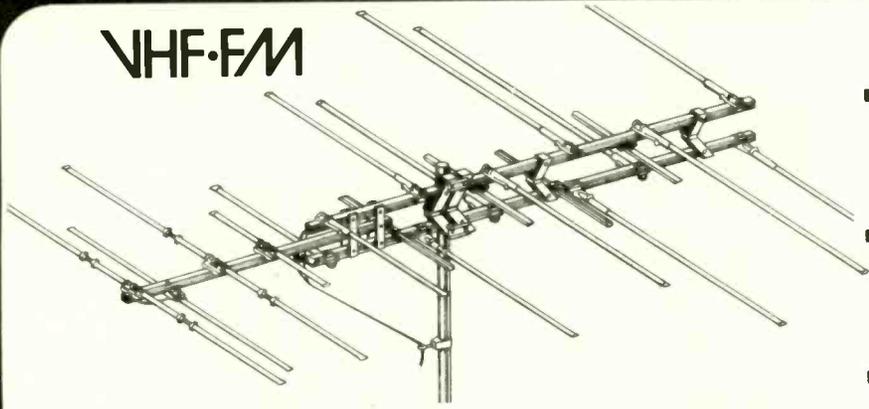

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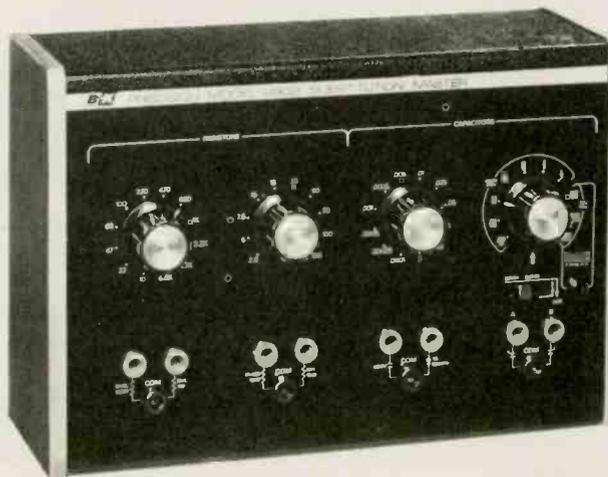
Thus you can make up a simple but complete

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## We Need Help!



In last month's editorial I wrote of the increased sophistication of solid-state circuitry and the automatic closed-loop circuitry that is now providing automatic controls much in demand

by the public—which still seems to lack the necessary basic skills to manually adjust their color-TV sets for a good picture. There is great competition on the part of TV-set manufacturers to meet this demand. However, much of this circuitry is far too complex for many of today's electronic technicians and thus the great merit of today's modular designs, which permit the repair of TV sets by a technique of substituting good modules for bad ones. That editorial praised the modular concept for the relief that it currently provides during our present technological gap—plus the advantage of being able to do intricate work on components outside the chassis in a more convenient location, should one elect to repair defective modules.

So much for the compliments . . . this month we will concentrate on the problems.

Just recently (prior to the mailing of the October issue) I had a phone call from a contact that works in the semiconductor division of a major manufacturer that produces both semiconductors and TV sets. Besides now being associated with the design of new sophisticated semiconductors, he at one time was involved in the design of TV sets, and has also serviced them in the field. He is up in arms concerning the current state of our technology! Although many of his complaints are well known to all of us, I will still list all of them that I can recall:

- When transistor circuits first came on the market, manufacturers promoted the myth that transistors virtually never failed or were at least certainly far more reliable than tubes. Thus the public was lead to believe that if one bought a transistor radio rather than a tube radio, you would probably never have to repair it. Although such claims are no longer made, the public still believes the myth.

(As an unusually extreme negative example, your editor purchased a modular solid-state color-TV set several years ago and has had more solid-state components completely fail or go intermittent than he would care to even attempt to count—while the hot, slow-to-warm-up, all-tube, color-TV set that he purchased a year later has never had a single component failure and serves as a frequent substitute for the other set while under repair.)

- Solid-state circuits, unlike tube circuits, require precise work when servicing. If something slips when servicing a tube circuit, you can see a tube plate glow red or trip a circuit breaker without necessarily damaging the circuit. However, when a technician makes a similar error while servicing a solid-state circuit, it is possible to destroy a whole hand full of transistors in an instant without so much as a puff of smoke—before a circuit breaker even has time to function.

- In some instances one defective module can burn out another. Thus, when substituting modules as a servicing technique, the customer may be billed the cost of additional modules that were destroyed as the technician attempted to locate the defective module causing the problem.

- Even when restricting one's efforts to but two or three name brands of color-TV sets, the electronic technician or service dealer may find himself faced with an extremely large inventory of modules—having to purchase for possible use modules that are never taken off the shelf. Yet, if he doesn't stock them, some manufacturers may not permit him to do their warranty work, or he may later encounter delays in purchasing them should they eventually be required.

- Although each TV-set manufacturer may have modules that will fit in a number of models in its product line, there is still a problem of module interchangeability even when servicing but one brand of products. And the up-dated circuits on the new modules in effect make the old replacement modules obsolete, even though both may work in an older color-TV set (possibly requiring minor TV-set modification in doing so). There has been no attempt to standardize modules amongst

manufacturers, let alone integrated circuits. (Some standardization between brands may inadvertently appear since certain TV-set manufacturers are now having their products marketed under a variety of brand names. Thus some sets sold as competing brands A, B and C may actually be manufactured by company B.)

- Despite all the advances in modern TV-set circuitry, these TV-set manufacturers have shown no apparent interest in developing instrumentation to assist the electronic technician or service dealer in his attempt to service these new circuits. As an example, there is no instrument currently on the market—available to you, our readers—that can check even one of the integrated circuits used in the TV sets that you must service. We have tube checkers, transistor testers, but no complete IC testers—let alone module testers.

- Manufacturer efforts at training electronic technicians (at least according to my contact) have been inadequate. Although it is true that electronic technicians and service dealers must upgrade themselves for survival in their profession, if no one can do an adequate job in servicing their products, where will the TV-set manufacturer stand tomorrow with the public and consumerism? Even if they bypass independent service and do their own servicing, these manufacturers have failed to develop the necessary instrumentation for effective local servicing by anyone.

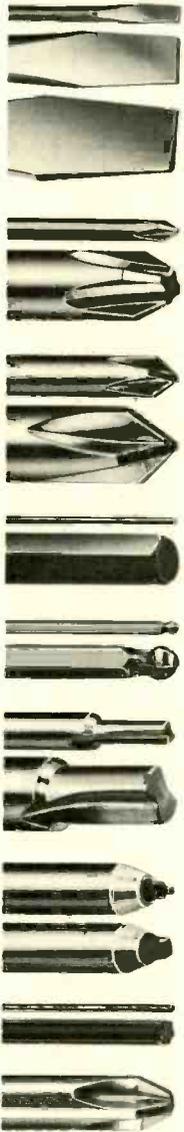
As you might guess, my contact has nearly had his head on the "chopping block" a number of times, and his name will remain confidential. However, some of his more general claims can be supported by another contact working for a TV-set manufacturer. The second contact is having a serious cost problem—first year part replacements are cutting heavily into sales profits.

Yes, we as electronic technicians and service dealers are faced with serious problems and we must have the help of TV-set manufacturers in order to successfully overcome them. Modules have helped, technical literature and publications have helped, so have seminars conducted by manufacturers and our trade associations. However, these are only serving as temporary

*continued on page 11*

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## LETTERS

Reader comments concerning past feature articles, Editor's Memos, previous reader responses or other subjects of interest to the industry.

### Provides Several Comments Concerning August Issue

Your cover picture of your electronics lab made me feel like donating an old tube checker, but I see on page 31 that you do have a little bit of test equipment, in addition to file cabinets.

The article, "Innocent Dealer Arrested," on page 32 makes the magazine, NEA and NATESA worthwhile.

I first read the Letter to the Editor from Fred Hall who wants more technical articles. He should realize that we are running a business, and that while expertise is necessary, in the long run, customer satisfaction is more important than knowing which way the holes and electrons run in a transistor.

MONTY HUCKLE, CET

### Some Thoughts Concerning Service Dealer Arrested

Concerning the article, "Innocent Service Dealer Arrested," in the August 1973 issue: Did Mr. Sabosto ever get any kind of an apology or remuneration of any type for all of the anguish? I would think that he could go after that testing laboratory! From the court transcript it would appear that their findings were exactly what someone told them to find out! It would appear to me that the same media that published the original "expose" should also print this court transcript. I really can't find decent words to describe my feelings about that D.A. I would like to hear from others on the matter.

PETE DALEY

*We received a great deal of complimentary reader comment concerning this article at the NATESA/NEA/ISCET conventions in Kansas City, Mo., last August. Additional reader comments are most welcome. At that convention your editor also had an interesting visit with Henry Wawryck, who testified for Mr. Sabosto.*

*Please read again the report submitted by the New York Testing Laboratories. It doesn't say that a resistor wasn't replaced, it says: "However, it does not appear obvious that a resistor was replaced." So far as your editor knows, all that Alex Sabosto received at the completion of the trial was a court decision in his favor—this was not a lawsuit, so he received nothing else for his trouble. What with the ex-*

*pense of having to defend himself against charges pressed by the D.A., your editor doubts that Mr. Sabosto would be in a financial position to hire lawyers for a suit against the D.A. or Testing Laboratories. Yes, the newspaper did cover the story that his innocence was proven—back somewhere in the paper where no one would bother to read it. To be arrested makes news, to be innocent doesn't! These are the cold hard facts in this world in which we live.*

*Remember, seven shops were charged by the D.A. with fraud and Mr. Sabosto was the only one to seek association help. It is quite possible that the others were innocent also, but feeling unable to defend themselves, pleaded guilty to save the expense of hiring a lawyer. We don't know, we are only guessing.*

*However, your editor has heard from competent sources that both the Federal Trade Commission and D.A.'s in various parts of the country are in the process of running similar spot checks, like the one that entrapped Mr. Sabosto. We hope that with the August article those that may be entrapped will be better able to defend themselves.*

*This again only proves that we must all stick together if we are to make a go of it. That is why your editor believes so strongly in professional associations! Ed.*

### Reader Comments Concerning Basic Digital Circuitry Article

I enjoyed your series on Basic Digital Circuitry and will look forward to future articles.

I would like to call your attention to a piece of equipment similar to the Hewlett Packard Logic Clip that is available at a fraction of the price. It's called the Digi-Viewer made by Southwest Technical Products of San Antonio, Texas. It contains 32 Darlington connected transistors and bright 5v lamps. With additional components, also available, it makes a good out-of-circuit tester. Catalog sheet enclosed.

JAMES T. SELF

### I Have Liked Your Attitude

You are a busy editor!

I liked your editorial very much in the May ELECTRONIC TECHNICIAN/DEALER magazine I just received. I have liked the fair and reasonable attitude you have shown.

I wish I was smart enough to merit a CET after my name. Perhaps I am too lazy to get that. I am 71 years old.

Perhaps you are appreciated by the "screwdriver mechanics" like me more than you know. They are a peculiar, independent bunch.

Best wishes for your continued success. We need leaders like you.

DAVID THOMAS

### Pro's and Con's Concerning The CET Program

I have for some time now been reading with great interest all the pro's and con's concerning the CET Program.

I have worked mostly on a part-time basis for over six years on home entertainment products for both myself and a service shop. My full-time field is broadcast engineering, presently transmitter supervisor. I am a CET and hold a First Class FCC license with radar endorsement.

I am as much or more proud of the CET title than the FCC license. Yes, I studied hard and while attending the wonderful JESUP Program seminar in Indianapolis, Ind. I took the CET test and passed. In fact, I would suggest that anyone considering the FCC exam should take the CET test as a prerequisite. I found the CET exam on the same level as Element III of the FCC exam for a Second Class license.

One may wonder why a full-time broadcast engineer becomes so interested in the CET exam and training seminars. I have found that attending service training seminars have helped keep me up to date on troubleshooting and basic theory, and also I learn about the latest devices and products. Also I can listen to problems which I may have a direct relation with. Don't forget that awful color pictures don't have to be the set—it could be the sending end.

I agree with Mr. Cmielewski, why should anyone scorn the CET Program? It's the best bet on your future.

I also agree with your constant advice that we all should attend those seminars, you and me. This field of electronics is changing at such a fast pace that yesterday's dream is today's reality. Either we keep up to date or we'll be sweeping up museums.

THOMAS M. WIMBERLY, CET

### Given Credit for Publicity Provided Glaring Case of Misguided Justice

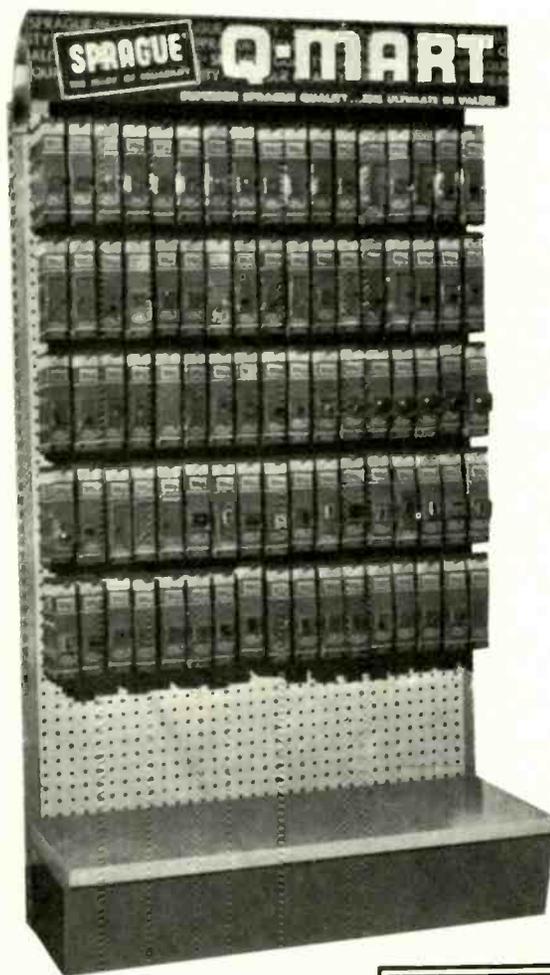
I give you credit for giving publicity to this glaring case of misguided justice. This smacks of the German

*continued on page 11*

# END OF THE REPLACEMENT TRANSISTOR NIGHTMARE

just 47 transistors replace over 22,500 O.E.M. part numbers.

Finding the right replacement transistor has been a real toughie for most service technicians. Over 22,500 existing part numbers have made life difficult. Now, they can be replaced with just 24 small-signal, 18 power, and 5 field effect transistors. You can get any or all of the 'Fantastic 47' on the self-service Semiconductor Q-Mart at your Sprague distributor's. While you're there, pick up a free copy of the 48-page K-500 Semiconductor Replacement Manual. Or . . . write to Sprague Products Co., 65 Marshall St., North Adams, Mass. 02147.



THE BROAD-LINE PRODUCER OF ELECTRONIC PARTS

... for more details circle 127 on Reader Service Card

NOVEMBER 1973, ELECTRONIC TECHNICIAN/DEALER | 9

# Announcing the Panasonic Parts Hot Line.

In 48 hours we can ship you anything we've got.

The New Panasonic Parts Hot Line is a performance promise: 24-hour-a-day, 7-day-a-week service. Now, if you have a problem getting the part you need, just call one central number.

Then things start happening fast: we'll ask our computer to locate your part (or parts) by searching all five regional Panasonic parts depots. In just seconds. Electronically. Then we'll telex an order to the depot which has the part you need and within

48 hours your order is on its way.\*

And we can make this promise with confidence, because our warehouses are now fully automated. We've got the 2,000 fastest moving parts on electronic order pickers. At the touch of a button any of these high traffic parts is at our fingertips.

To become a member of the Panasonic Parts Hot Line, call the toll-free number below. We'll send you a bright red emblem imprinted with the hot line num-

ber for your particular region. We'll also send you an easy-reference booklet that gives you the names of authorized Panasonic parts distributors in your area, and information on other Parts Division services.

We know that your business depends upon having the right parts at the right time — when your customer needs them. Our business is standing right behind your business, with quality parts for over 1,000 products.



Panasonic  
Parts  
Hot Line  
8-4712

**Panasonic**  
just slightly ahead of our time

Call toll-free anywhere in the U.S. 800-523-5336. (In Pa. 800-562-5395)

\*Of course we cannot ship on weekends and holidays.

# LETTERS...

continued from page 9

Gestapo.

In my opinion the testing lab displayed incompetence. They apparently contended that only a test of the faulty tube was necessary, and that all other tests and maintenance operations were superfluous. Of course they were aware that they had removed that one tube, beat it to death, and then replaced it in its original position. But how was the service technician to become aware of that fact? In my opinion the lab again displayed its incompetence by ducking the issue with the statement, "It is not obvious that a resistor has been replaced."

I feel that the D.A. in turn displayed his incompetence when he interpreted the above statement to say, "It is obvious that a resistor has not been replaced." What would have been a more logical decision by the D.A. would be "not guilty by reason of insanity." Any service technician who would attempt to cheat a customer on a one-Meg. resistor is truly insane.

It appears that at no time during the events leading to the arrest was a competent service technician called in to rate the quality of service performed.

Did the D.A. make a public apology for false arrest? Did he humbly seek to make amends with some monetary compensation such as a \$1000 credit on future taxes? If not, why not? Should not the authorities assume responsibility for their mistakes as an ordinary citizen is expected to?

What more can be done to assure that this tragedy will not be repeated? Is there something that I can do? I have distributed copies of your article to knowledgeable associates. The end result of such injustices repeated will be to give less value to the customer—the exact opposite of the intended goal.

I hope that you can pass the word to Mr. Sabosto that there are lots of us out here who stand solidly behind the Mr. Sabostos and are ready to stand up and be counted.

RICHARD H. KAUFMANN

In this country "justice" does not include either an automatic apology from a D.A. or tax credits to cover the expense of defending one's self. Mr. Sabosto might wish to sue, but that could also be expensive and require the time now needed to get the store back on its feet.

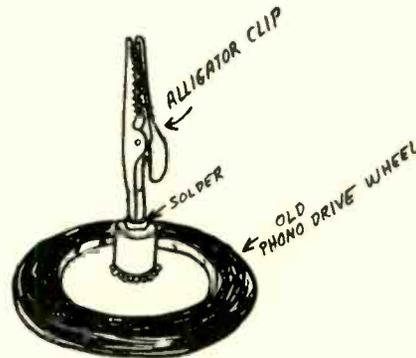
One local association in your state contacted a number of local D.A.'s and advised them of the pitfalls in attempting to do a "Clean-up operation."

They all agreed never to do such a thing, at least without association assistance, and then a few months later one of those D.A.'s broke his promise and did just that.

If electronic technicians and service dealers do not get together to look out for one another's interests, no one will. That is why I believe so strongly in the importance of such organizations as NATESA, NESDA and NARDA. Ed.

## Reader Suggests Design of Technicians' Third Hand

This little third hand, constructed of old parts in about two minutes, has saved me a lot of time. It's great for



holding cartridge wires while soldering those little connectors to them, and also resistors, etc., etc. I would like you to pass this idea on to my fellow technicians for me.

DEVON R. WRUBLEWSKI, CET

## EDITORIAL...

continued from page 7

buffers for the real problem, which can be solved only with greater standardization of components and modules, more sophisticated instrumentation with which to service them, greater component safety tolerances, and more effective new servicing techniques.

I feel certain that just as our rapidly changing technology has produced many of these problems, future technological developments by manufacturers—pressured by you, consumer groups and persistent trade associations—will solve them.

*Phillip Dahlen, CET*

# ARROW AUTOMATIC STAPLE GUNS

## CUT WIRE & CABLE INSTALLATION COSTS

... without cutting into insulation!

**SAFE!** Grooved Guide positions wire for proper staple envelopment! Grooved Driving Blade stops staple at right depth of penetration to prevent cutting into wire or cable insulation!

**No. T-18—Fits wires up to 3/16" in diameter.**

BELL, TELEPHONE, THERMOSTAT, INTERCOM, BURGLAR ALARM and other low voltage wiring.

Uses T-18 staples with 3/16" round crown in 3/8" leg length only.

**No. T-25—Fits wires up to 1/4" in diameter.**

Same basic construction and fastens same wires as No. T-18.

Also used for RADIANT HEAT WIRE

Uses T-25 staples with 1/4" round crown in 9/32", 3/8", 7/16" and 9/16" leg lengths.

T-18 and T-25 staples also available in Monel and with beige, brown and ivory finish at extra cost.

**No. T-75—Fits wires and cables up to 1/2" in diameter.**

RADIANT HEAT CABLE, UF CABLE, WIRE CONDUIT COPPER TUBING or any non-metallic sheathed cable.

Also used as DRIVE RINGS in stringing wires.

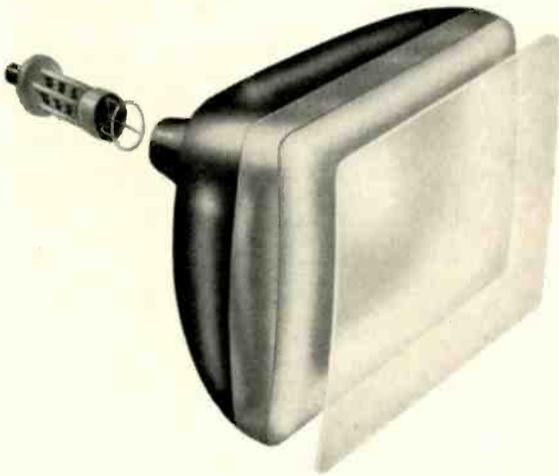
Uses T-75 staples with 1/2" flat crown in 9/16", 5/8" and 7/8" leg lengths.

Arrow Automatic Staple Guns save 70% in time and effort on every type of wire or cable fastening job. Arrow staples are specially designed with divergent-pointed legs for easier driving and rosin-coated for greater holding power! All-steel construction and high-carbon hardened steel working parts are your assurance of maximum long-life service and trouble-free performance.

Ask your Electrical Supply Dealer or write for further details.

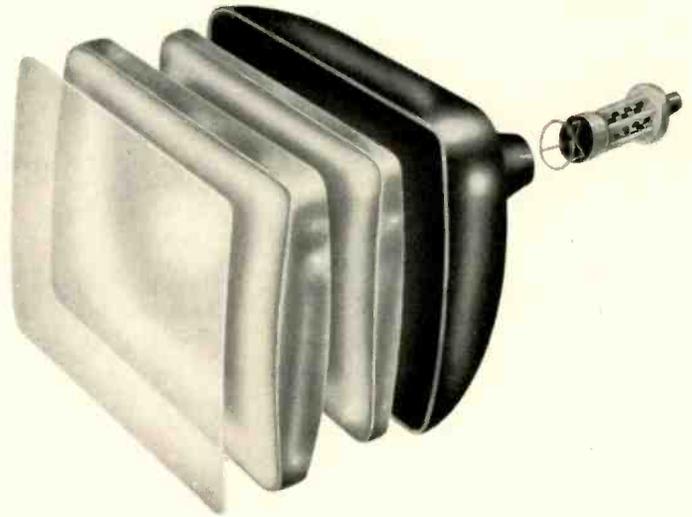
**ARROW FASTENER COMPANY INC.**  
Saddle Brook, New Jersey 07663  
"Pioneers and Pacesetters  
For Almost A Half Century"

... for more details circle 102 on Reader Service Card



## How some tubes are rebuilt.

1. Inspect screen and replace electron gun.
2. Reinstall safety glass.
3. Test tube.



## How our color bright 85<sup>RE</sup> is rebuilt.

1. Completely clean old glass so it gleams like new.
2. Apply new internal and external coating to the bulb.
3. Replace phosphors with Sylvania high-brightness types.
4. As required, install new aperture mask with Sylvania thermal compensation system.
5. Replace electron gun with Sylvania electron gun assembly.
6. Install new implosion protection system.
7. Final test.

Every tube is remanufactured and tested on the same assembly line used for our new color tubes. And that line includes the latest computer-designed improvements in screen exposure optics. In short, when you install a Sylvania *color bright 85RE* picture tube, you are installing a tube that is practically brand new except for the glass. In fact, if we rebuilt it any further, it would be a new tube.

Available at your local Sylvania distributor.  
Sylvania Electronic Components,  
100 First Avenue, Waltham, Mass. 02154

**GTE SYLVANIA**

## READERS' AID

Space contributed to help serve the personal needs of you, our readers.

### Wanted

I would like to obtain CRT test setup data for a No. CR-65 Adapter used with a B&K Model 466 TV Tube Tester.

B. J. KOZOL

P.O. Box 164  
Palo Alto, Calif. 94302

I need a type 24A tube for an old Zenith radio.

O. HICKS

Hicks Radio-TV Service  
1325 N. Mockingbird  
Abilene, Texas 79603

I would like to obtain parts and service data for Precision Model E410 Sweep Generator/Marker Adder, Crystal Osc., Marker Serial No. 1719. Paco Electronics, Model G-32 data would also apply.

NICHOLAS TOWSTEGA

322 Ave. Q South  
Saskatoon, Sask., Canada, S7M 2Y3.

I would like to purchase a KRK-49D tuner for an RCA CTC-9 Color-TV chassis. It must be in good or repairable condition.

JOHN W. COOK

2909 Elmwood Ave.  
Erie, Pa. 16508

I would like a schematic or any service information for two old Philco radios manufactured in the year of 1940. One is a model 40-150 Code 121, and the other is a Model 40-150.

TERRY SATRANG

1215 N. Dakota, Apt. 6  
Aberdeen, S.D. 57401

I would like to obtain the following Viking stereo tape equipment. Model 88 RMQ Deck and Model 86 Deck with electronics. Will buy or trade the units.

SUFFOLK AUDIO SYSTEMS

350 Brookville Ave.  
Islip, N.Y. 11751

I am rebuilding some old radios and need a 2A5 and a 58 tube.

EDDIE LEHMAN

Box 412  
Timmins, Ontario P4N-7E3

I would like to know where I can obtain speaker cones for reconing purposes.

N. B. VRAZEL

605 Irvine St.  
Yoakum, Texas 77995

### Business for Sale

I have a TV and appliance sales and service store for sale which includes a four-room apartment and a seven-room furnished apartment. All furniture and equipment are also included. Please write for details.

ED SWEENEY

Post Office Box 3803  
Springfield, Mass. 01101

I have for sale an established TV service shop in a good central location in an Orange County, Calif. shopping center. Priced for fast sale due to retirement.

P. C. ALAIMO

A & G Electronic Service  
10062 Cunningham Ave.  
Westminster, Calif. 92686

### Business Wanted

I wish to purchase a service business in southern California area. Prefer a business doing \$200,000 a year or more.

A. G. STALSEP

Suite 407  
6355 Topanga Canyon Blvd.  
Woodland Hills, Calif. 91364

### For Sale

I have for sale 190 Sams Photo-facts, No. 51 through 1113, at \$1.00 each or best offer for lot.

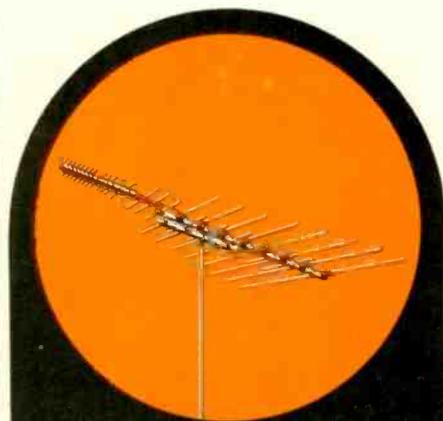
WILLIAM MCINERNEY

1941 Old Frederick Rd.  
Catonsville, Md. 21228

I have for sale a 40 years accumulation of hard-to-get obsolete tubes for \$1.00 each plus postage.

H. C. BROWN

P.O. Box 1111  
Goldsboro, N.C. 27530



# PUT YOUR TEAM ON THE BRIGHT SIDE



Whether it's your favorite football team or your sales team, ANTENNACRAFT scores with touchdown reception from total performance antennas.

WHY NOT get on the winning side — ANTENNACRAFT provides the products and service you deserve.

For information write to:

Antennacraft  
P.O. Box 1005  
Burlington, Iowa 52601

 **antennacraft**

... for more details circle 101 on Reader Service Card

# Which color TV needs fewest repairs?

Here are the questions and answers from a nationwide survey.

**QUESTION:** "In general, of the brands you are familiar with, which one would you say requires the fewest repairs?"

**ANSWERS:**

Zenith	35%
Brand A	14%
Brand B	11%
Brand C	5%
Brand D	3%
Brand E	3%
Brand F	2%
Brand G	2%
Brand H	2%
Brand I	1%
Other Brands	2%
About Equal	13%
Don't Know	11%

**QUESTION:** "In general, of the brands you are familiar with, which one would you say is easiest to repair?"

**ANSWERS:**

Zenith	37%
Brand A	24%
Brand B	13%
Brand C	5%
Brand D	4%
Brand E	3%
Brand F	3%
Brand H	2%
Brand G	1%
Other Brands	2%
About Equal	11%
Don't Know	4%

## HOW THE SURVEY WAS MADE.

For the second consecutive year, one of the best known research firms in America conducted a study of independent TV service technicians' attitudes toward brands of color television.

And again Zenith was the number one brand named in answer to each question, as shown in the charts.

Telephone interviews were conducted with TV service technicians themselves in April, 1972, and again in April, 1973, in more than 170 cities from coast to coast.

To eliminate the factor of loyalty to a single brand, the study included only shops which serviced more than one brand of TV.

Survey details are available on request. Write to:  
Zenith Radio Corporation, 1900 N. Austin Ave., Chicago, Ill. 60639

# Again this year, TV service technicians say Zenith.

**QUESTION:** "In general, which of the brands you are familiar with is the highest quality color TV?"

**ANSWERS:**

Zenith	45%
Brand A	24%
Brand B	10%
Brand C	6%
Brand G	5%
Brand E	4%
Brand F	3%
Brand D	2%
Brand H	2%
Brand I	1%
Other Brands	3%
About Equal	8%
Don't Know	4%

**QUESTION:** "If you were buying a new color TV set for yourself today, which brand would you buy?"

**ANSWERS:**

Zenith	35%
Brand A	23%
Brand B	12%
Brand C	6%
Brand D	4%
Brand E	4%
Brand F	3%
Brand G	3%
Brand H	2%
Brand I	2%
Other Brands	5%
Don't Know	8%

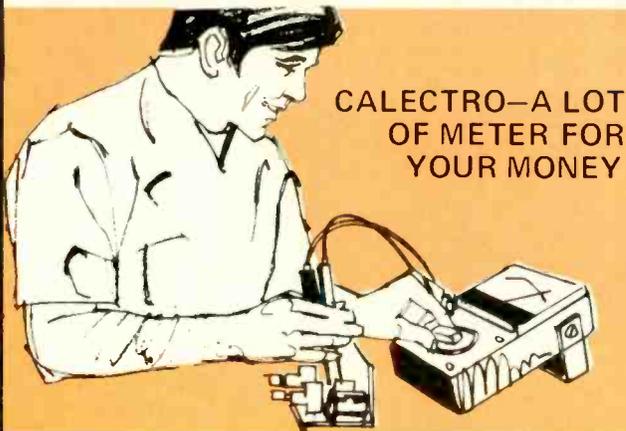
**NOTE:** Answers total more than 100% because some service technicians named more than one brand.



# GC ELECTRONICS

## CALECTRO

# test meters



CALECTRO—A LOT  
OF METER FOR  
YOUR MONEY

21 RANGE F.E.T.  
MULTI-TESTER  
Solid State V.T.V.M.  
with decibel scale.



22 RANGE  
"BENCH-STYLE"  
MULTI-TESTER  
with decibel scale.



18 RANGE  
MULTI-TESTER  
"Pop-up" meter  
movement.



INSTANT  
REPLACEMENT  
WARRANTY



**GC ELECTRONICS**

DIVISION OF HYDROMETALS, INC.  
ROCKFORD, ILLINOIS 61101 U.S.A.



... for more details circle 115 on Reader Service Card

## NEWS OF THE INDUSTRY

### NESDA Announces Plans for 1974 Hawaii Convention

The National Electronic Service Dealers Association (consisting of the former membership of NEA plus some former members of NATESA) has announced its 1974 convention plans. These plans include the following:

NESDA will hold its first annual convention August 7 through 11, 1974 at the Kauai Surf Hotel on Kalapaki Beach, Kauai, Hawaii.

Following that convention, ISCET (International Society of Certified Electronics Technicians) will hold its fourth annual Technicians Convention August 12 and 13, 1974 at the Kuilima Hotel on North Shore, Oahu, Hawaii.

NESDA will also conduct a one-day Business Management School August 15, 1974 at the Princess Kaiulani Hotel on Waikiki Beach, Honolulu, Hawaii.

NESDA's first offshore convention is arranged to allow electronics servicers a maximum of time to visit the Hawaiian Islands, while enjoying the company of fellow dealers and technicians, and also take advantage of tour rates and tax savings.

Attendees may also register for the ISCET Convention and the Business Management School, making their Island visit as long as 10 days. Or, they can register for the NESDA association meetings only and spend as little as two days.

Annual meeting business will take up only a portion of each day—allowing families plenty of time to sightsee—take pictures—and visit.

Manufacturers and suppliers may participate by sponsoring meal and entertainment functions and by scheduling a conference room for individual consultation with the service dealers, primarily during August 9 through 11, 1974.

Complete registration and schedule information will be distributed in December to all members of NESDA and ISCET, and to all associate member companies.

### Zenith Radio Corp. Warns Of Possible Fire Hazard

Zenith Radio Corp has announced that analysis of field reports indicates a fire hazard may be present in some of 12,000 19-in. (diagonal) color-TV sets produced between June 19, 1972 and August 15, 1972. Most of these models were sold during the summer and fall of 1972.

Owners who purchased 19-in. Zenith color-TV sets can determine if they have one of the affected sets by checking for the model, run number and serial numbers, which are printed on a white label affixed to the back of the receiver. Those models affected are: D4030W5, D4030W6, D4032W5, D4034P6 and T2838W6. Not all sets of these models are involved. Those having the potential defect will have a run number of 226C or 227C and also a serial number in one of the following series 6505665-6508999, 6513900-6514999, 6525385-6526999, 6527000-6529999, 6536000-6539427, 6550000-6550669, 6553000-6553720.

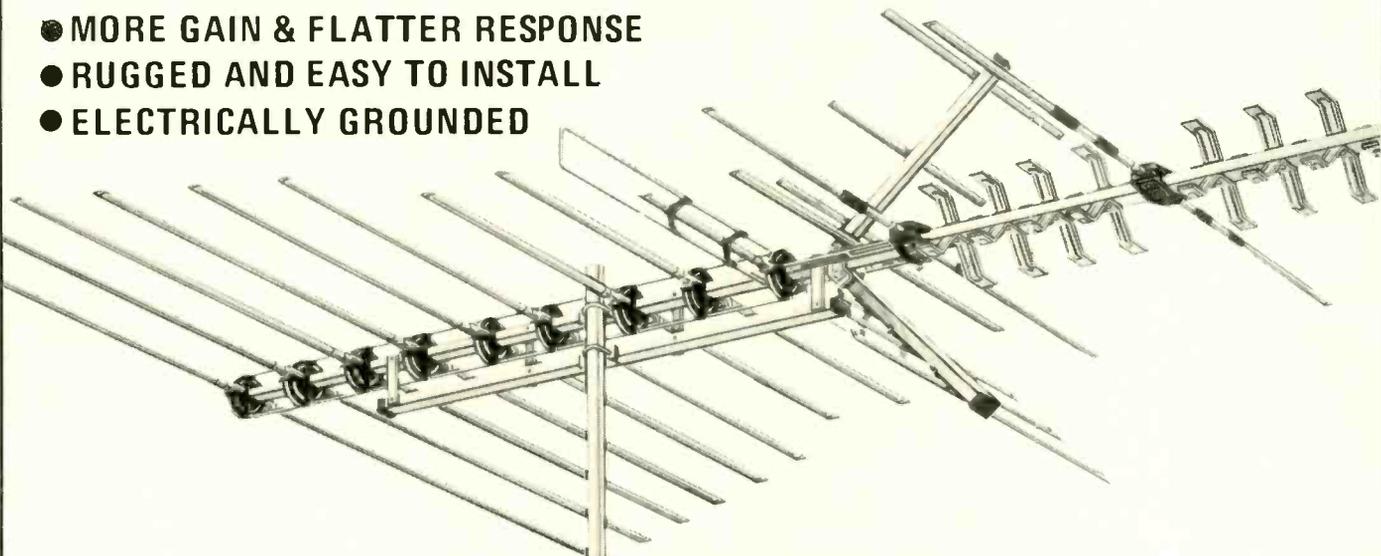
Nathan W. Aram, vice president of consumer affairs, said, "The company is taking immediate steps to notify owners of the receivers. Owners are advised to unplug the sets and not to use them until they are inspected and repaired, if necessary."

The safety defect, which could produce a fire hazard, involves an improper location of a high-voltage capacitor in some percentage of the receivers.

Mr. Aram said that Zenith's National Service Department is issuing detailed instructions to distributors, dealers and service technicians on inspection and repair procedures.

# Our tests show that JERROLD Super Vu-Finders And Paralogs Outperform All Others

- MORE GAIN & FLATTER RESPONSE
- RUGGED AND EASY TO INSTALL
- ELECTRICALLY GROUNDED



## WE WANT YOUR PROFESSIONAL OPINION.



(TOOLS  
NOT  
INCLUDED)

### FREE! HEAVY DUTY LEATHER TOOL POUCH

Last year we offered NFL Coffee Mugs for trying Jerrord antennas. This year it's Tool Pouches. Why do we make these offers? Because we know that once you stack Jerrord antennas up against the antennas you are using now, you'll switch to Jerrord. Hundreds of dealers switched last year.

If you're a professional antenna installer, you owe it to yourself to make this evaluation.

**FOR EVALUATING ANY SUPERVU-FINDER OR PARALOG 300 PLUS.**

**JERROLD ELECTRONICS CORPORATION**



P. O. Box 350, Dépt. DSD, 200 Witmer Road, Horsham, Pa. 19044

Please send me a free Tool Pouch. Enclosed is an instruction sheet from the following Super VU-Finder antenna.

(model) \_\_\_\_\_

**1** Before trying the Super VU-Finder, I was using the following antenna:  
(make) \_\_\_\_\_ (model) \_\_\_\_\_

**2** In my opinion the Super VU-Finder is:  BETTER  WORSE  
because: \_\_\_\_\_

**3** Comments: \_\_\_\_\_  
\_\_\_\_\_

NAME \_\_\_\_\_

COMPANY NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

COUPON MUST BE POSTMARKED BEFORE DEC. 31, 1973

... for more details circle 119 on Reader Service Card

# Kit...or

## Heath test equipment is your best buy

Now you can buy Heath test equipment in easy-to-assemble kit form...or factory-assembled and calibrated. Either way you get service equipment with all the things Heath has become famous for: high quality...low direct-to-you prices...trustworthy specifications...long-term reliability...simple, rugged design...necessary features and functions built-in, not optional...manuals with complete schematics, circuit descriptions, parts lists and operating instructions...handsome brown & beige styling for our kits, striking black and white for the assembled versions...and local sales and service at Heathkit Electronic Centers in major metropolitan areas.

And you get something else that's really more important than excellent engineering or realistic prices: the total support and attention of everyone at Heath...honest, friendly, capable people sincerely interested in solving your problems and answering your questions. At Heath, "the customer is always right" is not a slogan...it's a way of life.



Kit and assembled instruments  
available across the country  
at Heathkit Electronic Centers:

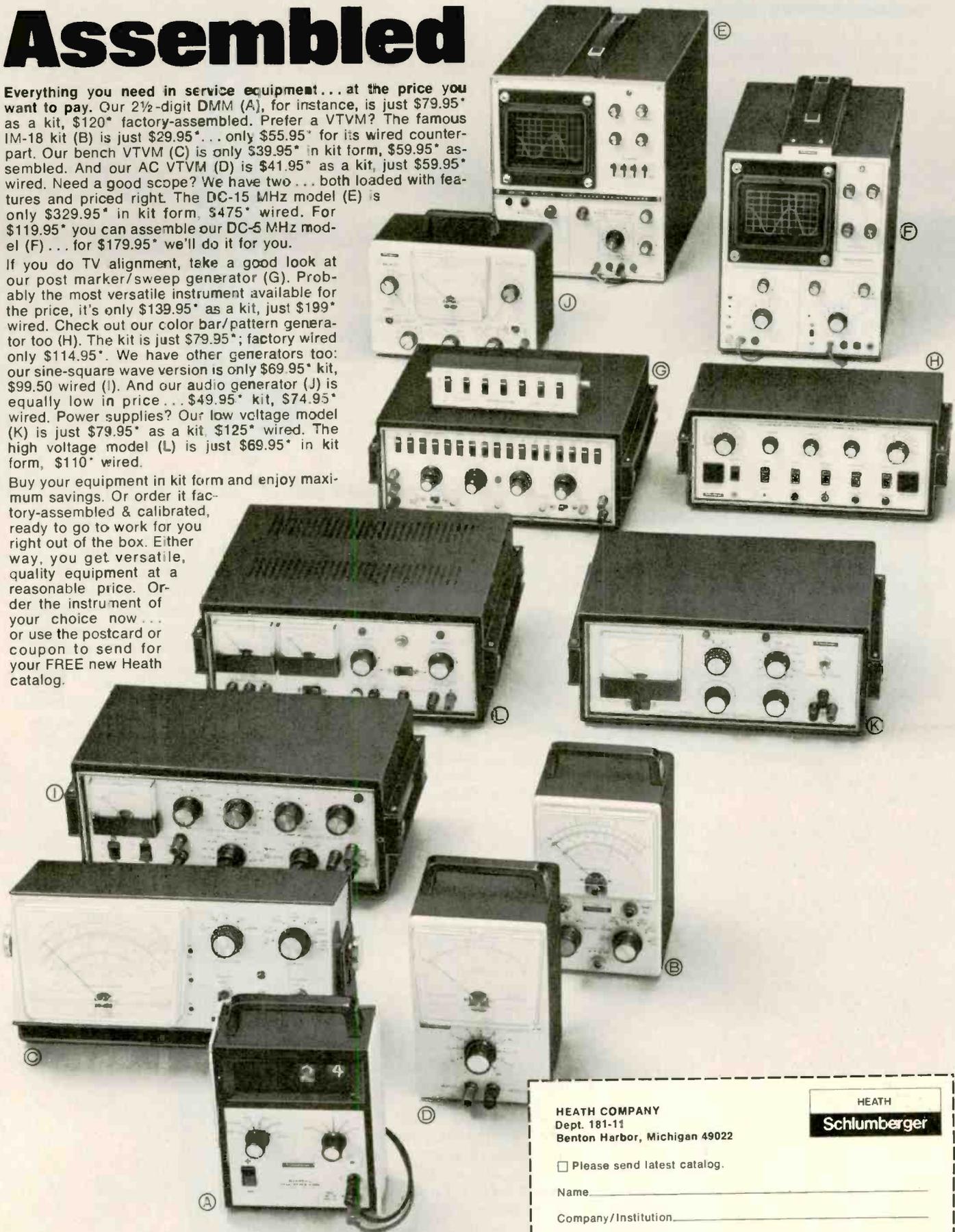
ARIZ.: Phoenix; CALIF.: Anaheim, El Cerrito, Los Angeles, Pomona, Redwood City, San Diego (La Mesa), Woodland Hills; COLO.: Denver; CONN.: Hartford (Avon); FLA.: Miami (Hialeah), Tampa; GA.: Atlanta; ILL.: Chicago, Downers Grove; IND.: Indianapolis; KANSAS: Kansas City (Mission); KY.: Louisville; LA.: New Orleans; MD.: Baltimore, Rockville; MASS.: Boston (Wellesley); MICH.: Detroit; MINN.: Minneapolis (Hopkins); MO.: St. Louis; N.J.: Fair Lawn; N.Y.: Buffalo (Amherst), New York City, Jericho; N.H.: Rochester, White Plains; OHIO: Cincinnati (Woodlawn), Cleveland, Columbus; PA.: Philadelphia, Pittsburgh; R.I.: Providence (Warwick); TEXAS: Dallas, Houston; WASH.: Seattle; WIS.: Milwaukee.

# Assembled

Everything you need in service equipment... at the price you want to pay. Our 2½-digit DMM (A), for instance, is just \$79.95\* as a kit, \$120\* factory-assembled. Prefer a VTVM? The famous IM-18 kit (B) is just \$29.95\*... only \$55.95\* for its wired counterpart. Our bench VTVM (C) is only \$39.95\* in kit form, \$59.95\* assembled. And our AC VTVM (D) is \$41.95\* as a kit, just \$59.95\* wired. Need a good scope? We have two... both loaded with features and priced right. The DC-15 MHz model (E) is only \$329.95\* in kit form, \$475\* wired. For \$119.95\* you can assemble our DC-5 MHz model (F)... for \$179.95\* we'll do it for you.

If you do TV alignment, take a good look at our post marker/sweep generator (G). Probably the most versatile instrument available for the price, it's only \$139.95\* as a kit, just \$199\* wired. Check out our color bar/pattern generator too (H). The kit is just \$79.95\*; factory wired only \$114.95\*. We have other generators too: our sine-square wave version is only \$69.95\* kit, \$99.50 wired (I). And our audio generator (J) is equally low in price... \$49.95\* kit, \$74.95\* wired. Power supplies? Our low voltage model (K) is just \$79.95\* as a kit, \$125\* wired. The high voltage model (L) is just \$69.95\* in kit form, \$110\* wired.

Buy your equipment in kit form and enjoy maximum savings. Or order it factory-assembled & calibrated, ready to go to work for you right out of the box. Either way, you get versatile, quality equipment at a reasonable price. Order the instrument of your choice now... or use the postcard or coupon to send for your FREE new Heath catalog.



HEATH COMPANY Dept. 181-11 Benton Harbor, Michigan 49022		HEATH <b>Schlumberger</b>
<input type="checkbox"/> Please send latest catalog.		
Name _____		
Company/Institution _____		
Address _____		
City _____ State _____ Zip _____		
* Mail order prices; FOB factory		TE-295

## NEW AND NOTEWORTHY

For additional information on products described in this section, circle the numbers on Reader Service Card. Requests will be handled promptly.

FOR MORE  
NEW PRODUCTS SEE  
PAGE 52



### OSCILLOSCOPE 701

*Laboratory features at a practical price*

A new 15MHz scope, Model 1220A, is designed with characteristics ordinarily found only in laboratory scopes yet at a practical price (\$625.00 for dual channel). Available in single- and dual-channel models, they have deflection factors, i.e., sensitivity from 2 mv/cm to 10v/cm. The CRT screen is large, 8 by 10 cm, with a 3% accurate calibrated vertical and horizontal display with a internal graticule. Other features include automatic triggered sweep, built-in TV sync separation, automatic triggering on frame or line for convenient TV troubleshooting. The vertical and horizontal channels are matched so phase measurements may be made in the X—Y mode with phase shift of less than 3° at 100kHz. The solid-state chassis employs 16 integrated circuits. Hewlett Packard.

### SOLDERING GUN 702

*Battery operated but will  
solder 50 to 100 connections per charge*

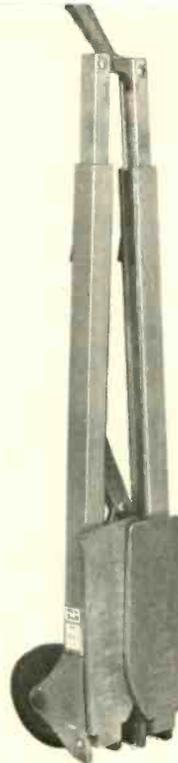
A new pencil, cordless soldering gun, Model 17, reportedly heats in only 5 sec and has a built-in spotlight that lights up when the gun is in use. It has a convenient trigger control with a work range equivalent to a 15 to 25w pencil soldering iron. The unit is operated on rechargeable nickel cadmium batteries and will reportedly solder 50 to 100 connections per charge. It also features a plug-in charger that can be operated even while soldering. Other features include handy, right-angle styling and a guaranteed for life unbreakable case. Wen Products, Inc.

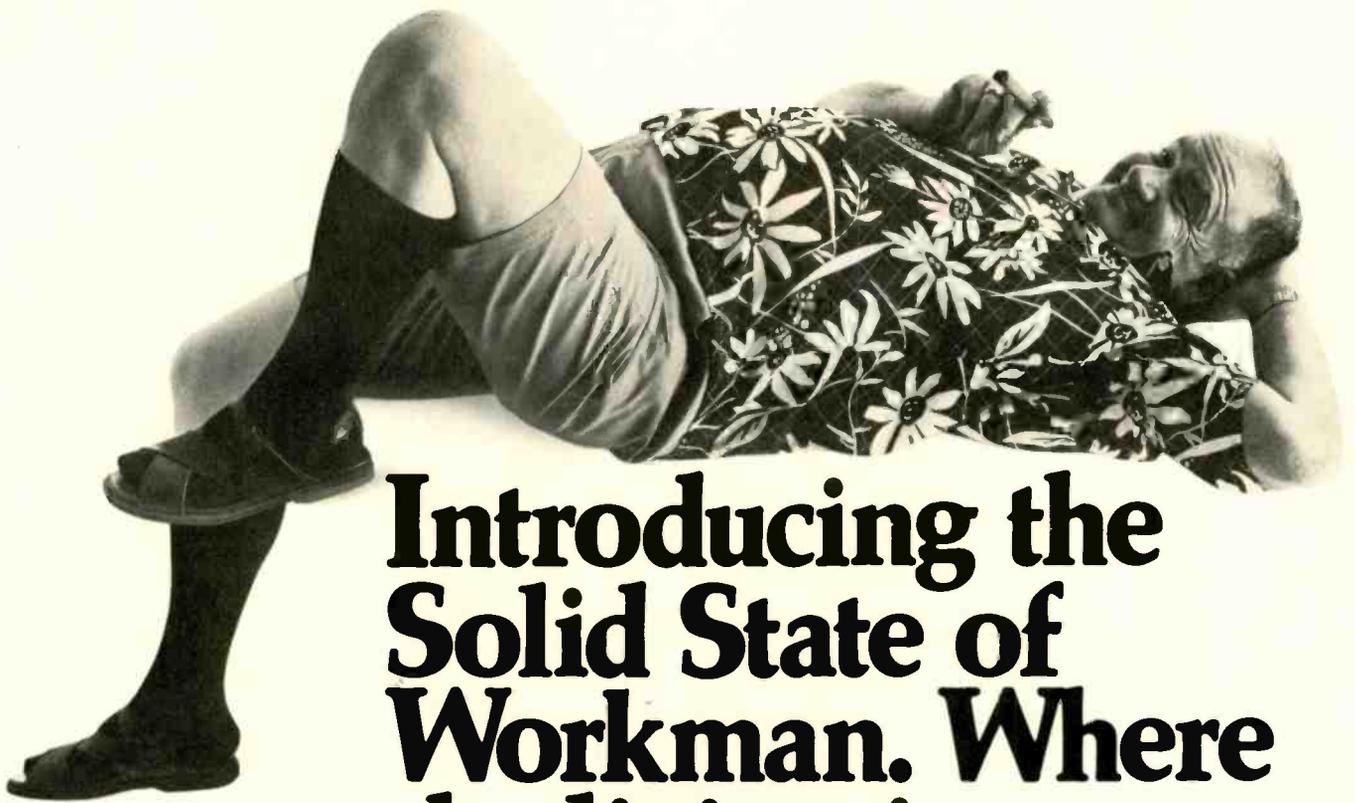


### HAND TRUCK 700

*Collapsible unit for loads of up to 300 lb.*

A collapsible, aluminum two-wheeled hand truck, called Tota/Ton, is designed to transport loads up to 300 lb without strain. The 15-lb unit can be used at the 36-in. height for moving short loads or extended to 54-in. for taller loads. It reportedly unfolds quickly, then collapses to a flat 6 in. by 36 in. for car, truck or other convenient storage. S & H Industries, Inc.





# Introducing the Solid State of Workman. Where the living is easy.

Workman's new WEP semiconductor line is, to say the least, uncomplicated.

Our packaging does a lot of work for you: Cross-referenced to all major lines right on the face of the card. Easy-reading model number and description. Blister-packed to protect what you're paying for.

The back of the card makes life easier too — basing diagram, full specs with symbol and ratings.

WEP semiconductors are all fully warranted so you can relax about that.

About 200 WEP numbers give you one-for-one replacement against competitive numbers and our complete cross referencing enables them to replace up to 1000 numbers in other lines.

And when the big names fail you, Workman is waiting right there with off-the-shelf delivery.

In fact, that's pretty much the story on all Workman components: Uncomplicated.

In times, like these, who needs complications?



WEP 53027

AUDIO POWER AMPLIFIER

Characteristics	Symbol	Rating	Unit
Collector-Base Voltage	$V_{CB0}$	35	Vdc
Collector-Emitter Voltage	$V_{CE0}$	35	Vdc
Emitter-Base Voltage	$V_{EB0}$	d	Vdc
Collector Current	Ic	1.5	Amps
Total Dissipation	Pp	8	Watts
Small-signal Cut-off Freq.	$f_c$	50	Mhz
Current Gain (h <sub>FE</sub> )	N/A	110	Typical

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# “IT WAS FANTASTIC: WHEN THE YELLOW PAGES CAME OUT, BUSINESS ALMOST TRIPLED.”

Michael A. Cozzolino, A&M TV Sales and Service, Alameda, California



Doreen and Michael Cozzolino

“My wife Doreen and I have sure learned a lot in our 2 years in business,” related Mr. Cozzolino. “One thing is the value of being in the Yellow Pages. Would you believe, our gross almost tripled the first full month after the ad came out. In fact, it’s brought us about 95% of our business.

I guess we’re doing something right, too: lately we’ve been getting a lot of repeat customers. We help out a little by offering discounts. And by lending TV sets to Navy families and retirees while we work on theirs. I like to help, because people have given me the chance to show what I can do despite being blind and having one arm. I do just fine with special auditory test equipment and some assistance from my wife.

And, of course, the Yellow Pages is my star sales representative. There’s nothing like it for bringing in new customers.”



**3 OUT OF 4 PROSPECTS LET THEIR FINGERS DO THE WALKING.**

**TEKLAB REPORT**

# Zenith's Titan 300V Vertical Color-TV Chassis

by Joseph Zauhar

A new Power-Sentry system employs a magnetic rather than an electronic system of voltage regulation for protecting all chassis circuitry

■ About nine and a half million Americans are expected to buy a color-TV set this year and table model color-TV sets are still high on the list in demand.

The consumer buying a TV set today will benefit not only from advancements in technology and innovative set designing, but also from an increased emphasis on consumer benefits by manufacturers. One-button tuning, brighter picture tubes, voltage regulation for increased component life and extended warranties are just a few examples.

After reviewing the new sets for 1974, we received for lab purposes a Zenith table color-TV set, Model E4025W, employing a 19-in. (measured diagonally) screen. It employs a Power-Sentry system of magnetic voltage regulation, Chromatic tuning, Automatic Tint Guard and an advanced Chromacolor picture tube.

Viewing the TV set from the front, most of the customer tuning controls are found to be located on the front control panel with the exception of the PICTURE PEAKING and HORIZONTAL HOLD controls, which are located on the rear cabinet panel. The Chromatic tuning system has a push-button switch located at the top of the control panel. Pressing the button selects Automatic Tint Guard and factory pre-set adjustments of BRIGHTNESS, CONTRAST, COLOR LEVEL and TINT.

If you should want to change the

Chromatic color adjustment (factory pre-set) for personal preference, it can easily be done from the front of the TV set while viewing the picture—which we feel is a good feature. Should you desire to change the picture color-tones received, set the chromatic color switch to ON (the color switch will glow), and use an insulated screwdriver to make the following adjustments: First pry off panel cover emblem for access to the panel-holding screw, then remove this screw and the panel. To readjust the BRIGHTNESS and CONTRAST level, insert an insulated screwdriver into the hole in the center of the customer BRIGHTNESS and CONTRAST knob. To adjust the color level, insert an

insulated screwdriver into the hole of the center knob in the COLOR LEVEL control and readjust for desired color intensity. For TINT, insert the screwdriver into the hole of the TINT control knob and adjust for desired facial skin tones.

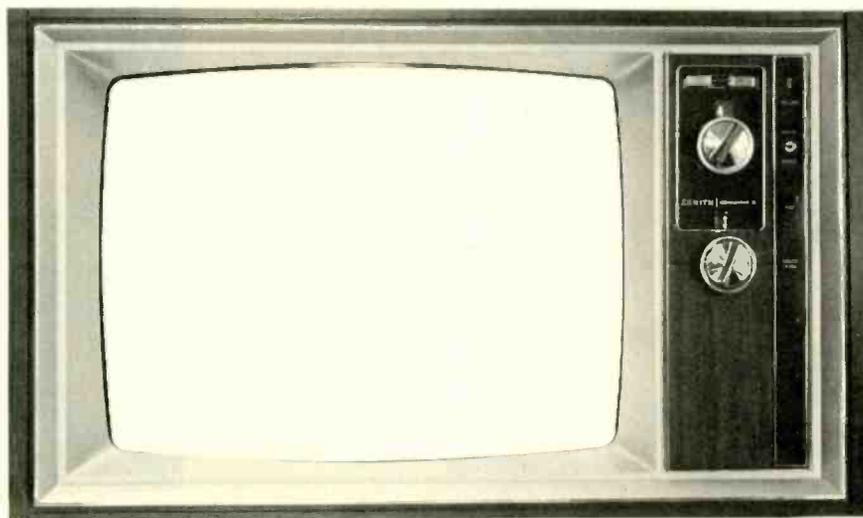
The TV set's back cover is easily removed by removing five standard ¼-in. screws—the antenna terminals stay intact with the cabinet.

Even at first glance, we were amazed at the chassis—a vertical wall of easy-to-remove modules. The 19EC45 chassis employed is one of the three new all solid-state chassis used in the "E" line color-TV receivers. This chassis is used in the new 19V and 23V models employing the new type (29.6kv) Chromacolor II picture tube.

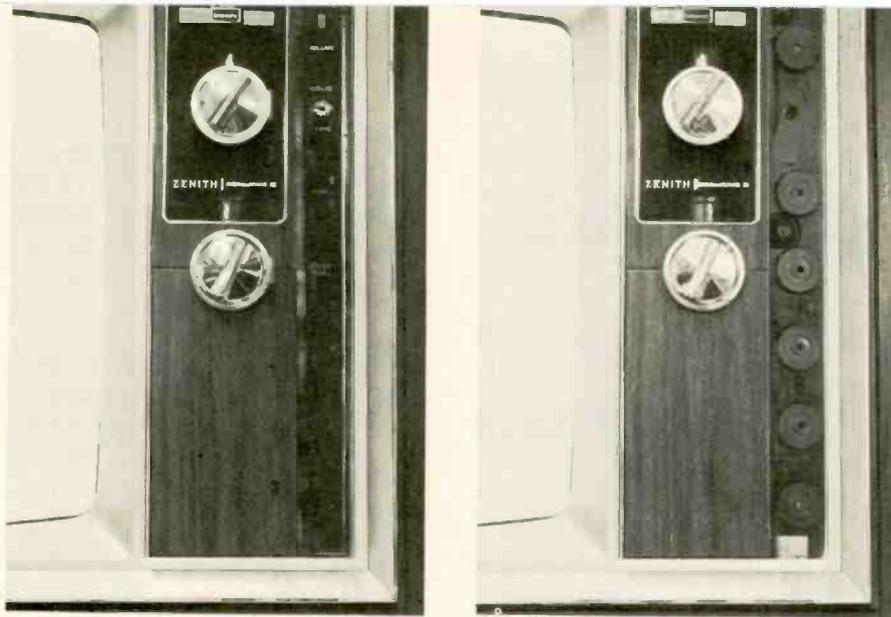
The vertical Titan 300V is one of the most powerful chassis ever produced by Zenith for either its big- or small-screen color-TV sets. It is an expansion of the company's modular solid-state circuitry that began in 1969 with the use of dura-modules in the company's TV sets.

The Dura-modules are special carrier panels that mount and interconnect solid-state devices in a desired circuit configuration. The modules vary in size from single ones that are 3½ in. by 2¾ in. to the largest that measures 4¾ in. by 3½ in.

This chassis has five integrated circuits, one more than last year. The newcomer includes the audio amplifier and sound-output stage. Each integrated circuit does the

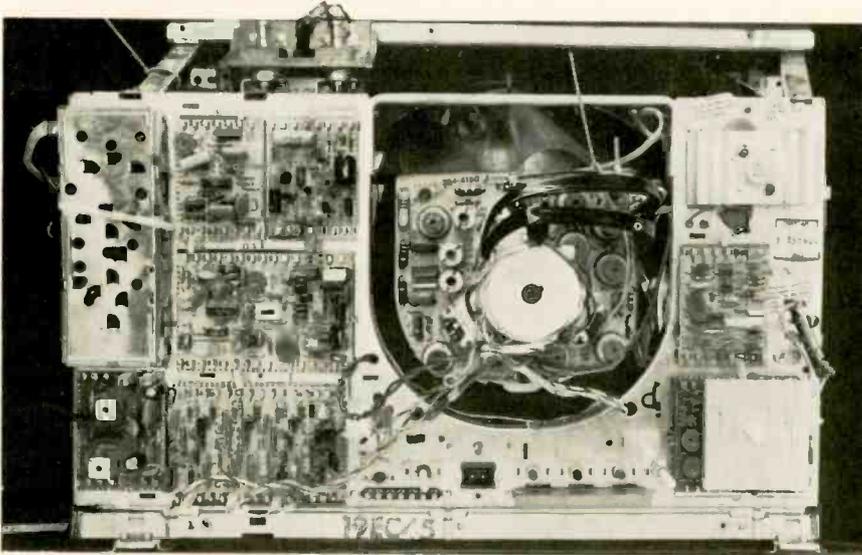


Zenith's Model E4025W Chromacolor II color-TV set employs a 19-in. (measured diagonally) screen.



Most of the customer tuning controls are located on the front panel with the exception of the PICTURE PEAKING and HORIZONTAL HOLD. The AFC, CHROMATIC and ON/OFF are pushbutton type switches.

After removing one screw and prying off the control panel cover, an insulated screwdriver is inserted through the center holes of the customer controls to adjust the factory preset controls.



The Titan 300V is one of the most powerful chassis produced by Zenith. Employing eight dura-modules, it is designed for a nominal high voltage of 29.6kv.

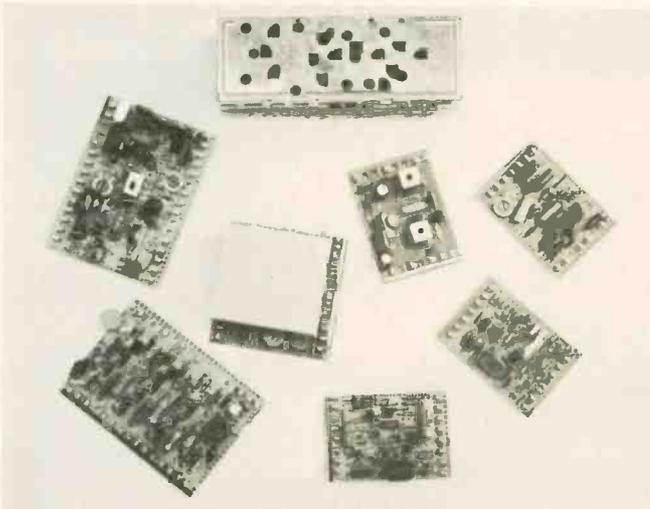
work of many larger components. One of the IC's (the chroma amplifier/color demodulator) for example contains the equivalent of 43 transistors, 53 resistors, 14 diodes and 3 capacitors. (See this month's Tekfax Schematic No. 1496.

In addition to the chroma amplifier/color demodulator, the integrated circuits include color sub-carrier regenerator, signal processor/fringe-lock circuit, audio amplifier and sound output and the sound IF, limiter, detector and pre-driver circuit.

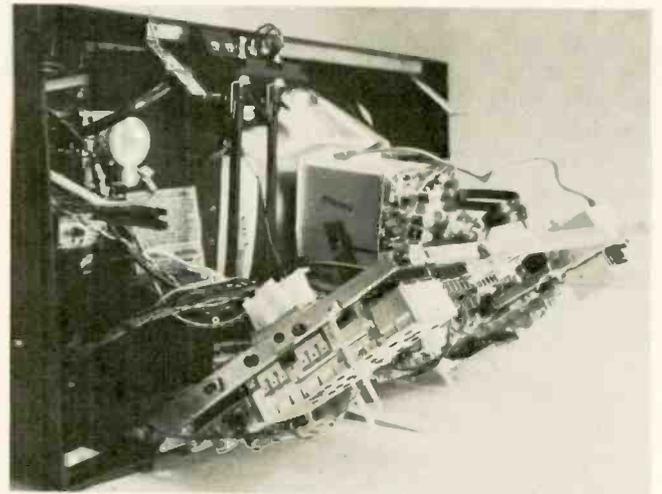
The vertical chassis consists of a vertical "wall" positioned on a narrow horizontal steel base. Eight dura-modules are wall-mounted and secured by plastic turnbuckles. This arrangement positions 74 percent of the chassis circuitry on modules so that these circuits directly face the service technician when the cabinet back cover is removed.

On the back of the chassis are the plug-in connectors for the tuner package plus the solid-state high-voltage tripler and divider package and the sweep transformer. The power supply, including the protective Power-Sentry system, is located on the horizontal base.

Removal of two screws and loosening of the side support hinge allows the vertical wall of the chassis to swing down for easy access to the back-of-the-wall components by the service technician. This also allows access to the tuner package. The convergence circuitry is placed



Approximately 74 percent of the chassis circuitry are contained on the eight dura-modules, with five integrated circuits.



After removing two screws and loosening the side-support hinge, the vertical wall of the chassis swings down for easy access to the back of the chassis.

around the neck of the picture tube for fast, convenient adjustment.

### Power-Sentry System

The Power-Sentry system, employing magnetic voltage regulation rather than an electronic system of regulation, replaces the conventional power transformer and complex electronic voltage regulation circuitry found in many other solid-state color receivers. It converts unregulated ac line voltages to a regulated ac voltage for use in the set, maintaining it at the specified operat-

ing level. It operates internally within the power transformer, which supplies all parts of the TV receiver, and thus all circuitry are protected. The system helps to protect the receiver against transient surges or "voltage spikes" which are especially damaging to solid-state components.

### High-Voltage System

An integrated solid-state high-voltage tripler and focus divider are used in this chassis to take the output of the sweep transformer and

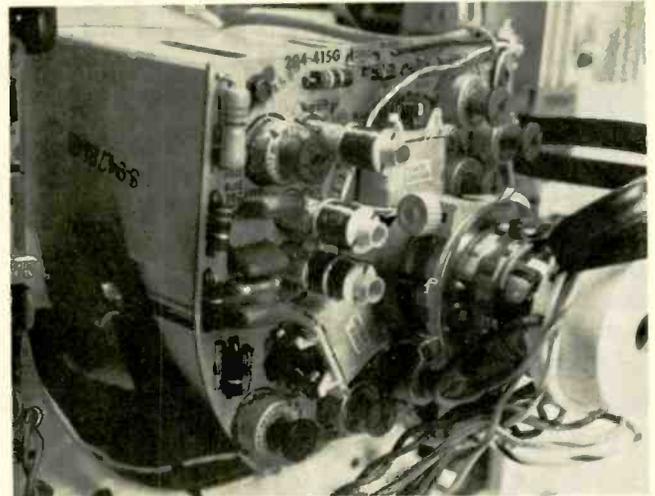
step it up to a design average of 30kv, rectify it and provide the proper voltage regardless of applied voltage changes. The high-voltage transformer and tripler are mounted behind the vertical main chassis.

### Video IF Module

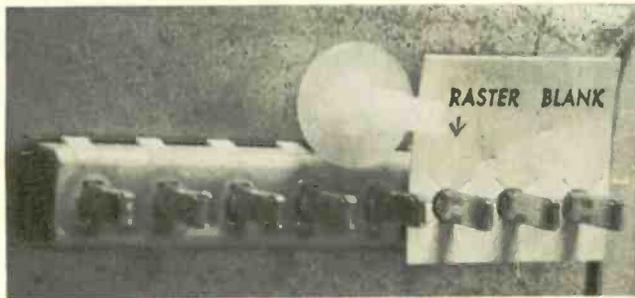
The Video IF amplifier stage of the 150-190 IF Subchassis module includes an added video amplifier transistor (the first Video Amplifier for improved gain and better noise factor performance). In the previous IF module (150-180), an emitter-



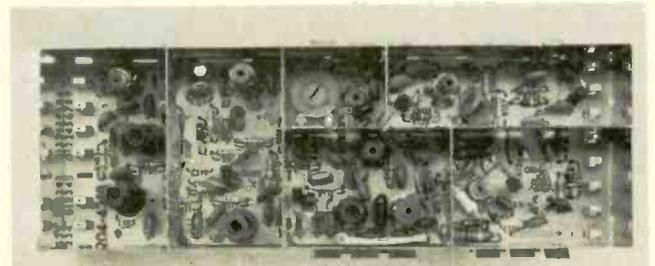
The voltage regulating type transformer employed in the Power-Sentry system appears a little higher and larger than the conventional-type power transformer.



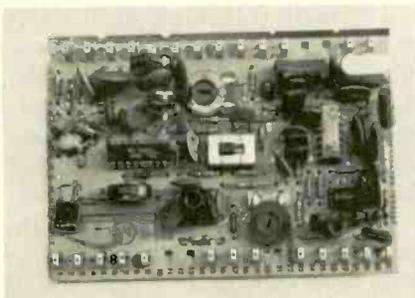
The convergence board is placed around the neck of the picture tube, allowing for a more compact chassis and simplifying convergence of the TV set.



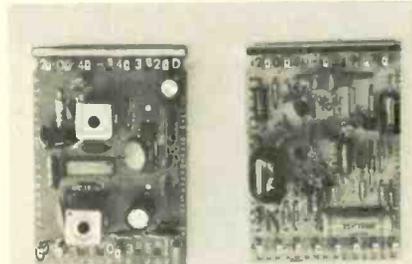
Shown are the dura-module connector pins and the plastic turnbuckles used to secure the modules.



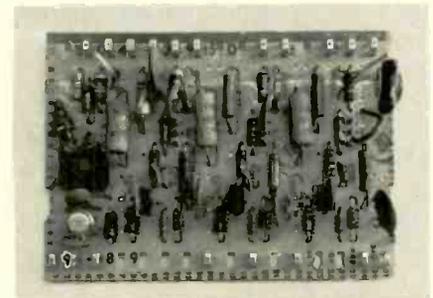
The Video IF Module, 150-190, is shown with the shield removed. Also included is a Video IF transistor and DETECTOR LEVEL control, previously located on the Video Processor board.



The Chroma Amplifier, Chroma Demodulator and the Sub-Carrier Regenerator have been combined into one module (9-86).



The Sound-IF Amplifier and Sound-Output stages are two IC units on one dura-module (9-103) shown to the left and the Luminance dura-module (9-88) on the right in the picture.



The third Video Amplifier and the three (R G & B) Video Output transistors are combined into one dura-module (9-89).

follower stage was known as the first Video Amplifier. In this module, the emitter follower is called the Video Follower. The Video Follower, the same as before, provides better impedance matching and improved coupling to the video stages that follow.

The DETECTOR LEVEL control, previously located on the Video Processor board, has been incorporated into this IF module. The 150-190 IF module has all component symbols printed on the board for easy parts identification.

### Chroma Module

The Chroma Amplifier, Chroma Demodulator and the Sub-Carrier Regenerator have been combined into one dura-module, 9-86. The COLOR-ALIGN (set-up) switch, the TINT RANGE (hue) adjustment coil, the ACC, APC, COLOR THRESHOLD and CROSS-TALK controls are all located on this board, not on the chassis. The basic circuit and alignment procedures, however, remain the same as in previous chassis.

### Luminance Module

The Luminance dura-module (9-88) includes the second Video Amplifier, three blankers (horizontal, vertical and video) and the brightness limiter transistors. The 3.58MHz trap coil is located on this board.

### Video-Output Module

The third Video Amplifier and the three (R, G and B) Video-Output transistors are combined into one dura-module, 9-89. The R, G and B chroma gain taps are located on this board and are adjustable from high (H), medium (M), to low (L) by moving the red, green and blue color-coded leads from the "H," "M," "L" (printed on the board) connection pins as required for proper color alignment.

The Video Processor dura-module (9-87) contains the Sync and AGC circuits, the active element is the Integrated Circuit unit, 221-45. The AGC delay control is located on this board.

### Horizontal and Vertical Module

The horizontal dura-module, 990, contains all the transistors in

the horizontal circuit, except the horizontal output which is mounted above the board on the main part of the chassis on an adequate heat-sink bracket.

The vertical dura-module, 9-92, contains all of the vertical circuits including the vertical-output transistors, mounted on special heat-sinks. The vertical circuit contains a differential amplifier, employing a pair of 121-972 transistors. This new module has been designed for direct coupling to the deflection yoke, eliminating the bulky vertical output transformer and the need for a VERTICAL LINEARITY control. The vertical SIZE and CENTERING controls are located on the board, not the chassis.

### Sound Module

The Sound-IF Amplifier and Sound-Output stage are two IC units located on one dura-module (9-103). The integrated circuit unit, 221-48, is the 4.5MHz Sound IF Amplifier and Quadrature Detector; the IC unit, 221-77, is the Sound Preamplifier and Output. The module is designed for direct

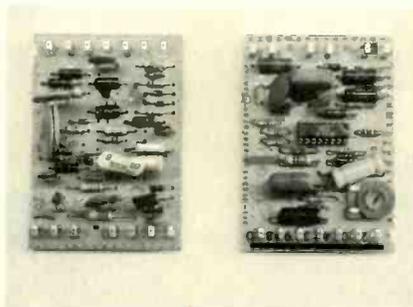
coupling to the speaker voice coil, thus eliminating the bulky sound transformer.

The Chromacolor II, 19VDZP22, picture-tube employed in this chassis is the fourth generation of the company's Chromacolor family. Until the first Chromacolor picture-tube was introduced by the manufacturer, a positive guard-band type was used to safeguard the color purity in their pictures. With the negative guard-band picture tube, the electron beam is larger than the phosphor dot. The beam illuminates the entire dot and some of the black-surround. Now, if the beam is slightly misaligned, it still lights the entire dot. The needed tolerance is still provided; but the area between the dots is greater and black material is present in this area to reduce light reflection and improve contrast, permitting use of a non-tinted face plate and increased useful light output on the picture tube brightness. The negative guard-band concept was made possible through the development of a new Iris mask. This mask, which fits over the inside face of the tube and replaces the earlier standard shadow mask, has 450,000 apertures (in the 25-in. diagonal size). These apertures in the original Chromacolor picture tubes were nine-thousandths of an inch in diameter. The mask is first used much like a stencil during the application of the phosphor dots to the inside face of the tube. The dots of each color are applied and the mask is then acid etched so that the center apertures are opened to 13.5 thousandths of an inch. In the present generation of Chromacolor tubes, the center apertures are 14.5 thousandths of an inch and with the new process they are nearly identical in circularity.

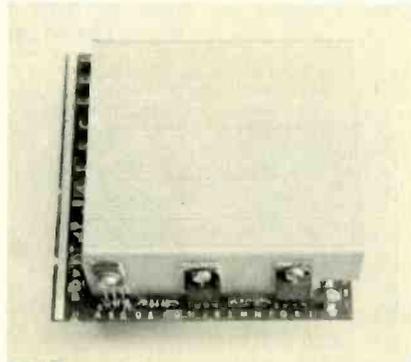
The mask is then mounted about 1/2-in. behind the inside face of the tube. The beams coming from the electron gun pass through the apertures to reach the phosphor dots and the diameter of the beams striking the dots is larger than the dot itself.

Additionally, a jet-black light-absorbing material surrounds each dot. This black-surround reduces room light reflections which cause color wash-out and absorbs light splash

*continued on page 43*



The Horizontal dura-module (9-90) shown at the left, contains all of the transistors in the horizontal circuit except for the output transistor. The Video Processor module (9-87) is shown in right of the picture.



The Vertical dura-module (9-92) contains all of the vertical circuitry, including the vertical-output transistor.

# A Look at the 1974 TV Sets – Part II

by Joseph Zauhar

New modular chassis, increased high voltage and cable-ready chassis will highlight the new TV sets for the coming year

■ Last month we reviewed the new features found in Admiral, Channel Master, Electrohome, General Electric and Magnavox color-TV sets for the coming year. In continuing our review we again find the manufacturers working towards a common goal of simplified customer controls employing one-button tuning systems and in a few cases completely eliminating some of the customer controls. Increased high voltage and in-line picture tubes will be employed for a sharper brighter picture, making color picture tube replacements almost as easy as B/W.

Motorola's Model YA-15 remote control becomes practically immune to noises that cause false triggering. Panasonic's new "Quatrecolor" chassis employs five vertically mounted individual modular circuit boards with edge connectors. The new chassis employs 40 transistors and six integrated circuits. A full two-year parts and labor warranty highlights Philco-Ford's modular solid-state color-TV line in the 25-in. (measured diagonally) console models.

RCA introduces the most powerful XL-100 solid-state chassis, compared to their previous chassis. It combines with the Super Color black matrix picture tube a second anode voltage of 31kv at zero beam current. Introduced by Sylvania is a self-adjusting color-TV set that requires the viewer to only activate the set and select the channel. Zenith introduces a vertical solid-state chassis with a self-regulating and protective power supply system.

## MOTOROLA

Headlining Motorola's 1974 color-TV line entries are the initial entries in the 12- and 17-in. (measured diagonally) screen size categories, a broader assortment of 25-in. (measured diagonally) "works in a drawer" console models and extension of wood look cabinetry to more models.

Motorola indicates that 14 of the 20 introductions are 25-in consoles and 11 feature 100-percent solid-state chassis models. All models have plug-in modular chassis construction for ease of service, plus Insta-Matic one-button color-TV tuning. There are no carry over



Panasonic's Model CT-911, the Heightside 19-in. (measured diagonally) Quatrecolor portable color-TV set. *Courtesy of Panasonic.*

models in the 25-in. 100-percent solid-state category. Eight of the introductions are remote controlled models.

Portable, table-model and console categories are included in the color-TV introductions comprising screen sizes in the 12-, 17-, 19-, 21- and 25-in. categories. The previous smallest Quasar portable was a 14-in. (measured diagonally) model introduced one year ago. The 12-in. portable Model WP333KW, as with all portable and Quasar introductions, has solid-state components replacing all but four chassis tubes. Other features include Insta-Matic one-button color-TV tuning control, wood-grain appearance cabinet and a detachable color guard filter.

Continuing in the Quasar color-TV line are 17 models, including 9 portables and 8 table models and consoles of which 12 were introduced in the spring line.

## PANASONIC

Panasonic has added four new sets to its color-TV line—one consolette and three portables, all with "Quatrecolor" features, which include 100-percent solid-state circuitry, modular chassis, one-button Q-lock tuning and a Pana-Matrix black-background picture tube.

The Haskell, Model CT-256, is a 25-in. (measured diagonally) consolette. It offers such features as a Panalock AFT button, Panabrite dial, SHARPNESS control, VHF Set-and-Forget memory fine tuning, a UHF "Click-Stop" tuner, Speed-O-Vision for instant picture and sound, a vacation switch, three IF stages and a CATV/master-antenna connector.

The Heightside, Model CT-911, is a 19-in. (measured diagonally) Quatrecolor portable color-TV set. It features Panalock AFT, VHF Dipole and UHF antennas, VHF Set-and-Forget memory fine tuning, a UHF "Click-Stop" tuner, Panabrite dial, precision SHARPNESS control, Speed-O-Vision for instant picture and sound, a vacation switch, CATV antenna connector and a personal earphone.

The Matson, Model CT-910, is a 19-in. (measured diagonally) Quatrecolor portable which features a Panalock AFT button, VHF Set-and-Forget memory

fine tuning, UHF "Click-Stop" Speed-O-Vision, a vacation switch and a CATV/master-antenna connector.

The Covington, Model CT-912, is a 19-in. (measured diagonally) Remote Control Quatrecolor portable TV set. It offers the Panamatic Electro-Tuner, which teams up with a wireless remote control hand unit TV operation, Panalock AFT, Panabrite dial, VHF Set-and-Forget tuning, Speed-O-Vision, precision SHARPNESS control, eight-position UHF detent tuner, vacation switch, earphone and CATV/master-antenna connector.

The "Quatrecolor" chassis (covered in the Teklab Report, August 1973) is all solid-state with the exception of the picture tube. A large majority of the components are mounted on five vertically mounted individual modular circuit boards with edge connectors. The chassis employs 40 transistors and 6 integrated circuits.

Panasonic has added two new B/W portable sets to its TV line.

The Putman, Model AN-269A, is a 19-in. (measured diagonally) portable with matching stand and in a vinyl-clad metal cabinet. It features a remote speaker for pillow listening, Speed-O-Vision, VHF Dipole and UHF antennas and three IF stages.

The Greendale, Model AN-182, is a 12-in. B/W portable which features a UHF "Click-Stop" tuner, Speed-O-Vision, a telescopic VHF antenna and a drop-down handle.

## PHILCO-FORD

A full two-year parts and labor warranty highlights Philco-Ford's modular solid-state color-TV line covering 25-in. (measured diagonally) console models.

In addition to the standard two-year warranty on consoles, the company will offer an optional two-year warranty for new 19-in. (measured diagonally) solid-state portable models.

The all solid-state modular chassis again employs 14 "command modules," each about the size of a file card and each bearing solid copper engraved circuits printed on a durable fiberglass board. Each module can be removed easily from the chassis, and since the modules work independently of each other, they can be replaced

with advanced models as new technologies are developed. According to the manufacturer, before the module is incorporated into the chassis, it is evaluated for acceptability by a massive automatic test and alignment device that is tied into a computer which signals final acceptance or rejection of each module. Also, the 100-percent modular color chassis undergoes a factory "burn-in," during which electric current flows through the chassis for up to eight consecutive hours.

Many of the 19- and 25-in. (measured diagonally) all solid-state modular TV sets employ the Philcomatic "hands off" tuning system which features a network of automatic circuits to simplify the tuning process. With the Philcomatic Master Control button engaged, the viewer merely selects any VHF or UHF channel, and when the Philcomatic Color Control light comes ON he removes his hand and the set is tuned instantly and automatically.

Three deluxe Philcomatic III models feature an electronic varactor pushbutton channel selector that can be preset for any combination of 12 UHF or VHF channels. A 70-position detent rotary channel selector for UHF channels, which stops or "clicks" as each channel is reached, is standard on all other solid-state color-TV sets.

There are six all-transistor Boss chassis in the 1974 "E" line and two hybrid chassis. All chassis are similar to those employed in the "B" line. The all-transistorized color-TV sets employ the 4CS71, 4CS72, 4CS73, 4CY87, 4CY90 and 4CY91 chassis. The 4CY80 and 4CS40 are hybrid chassis.

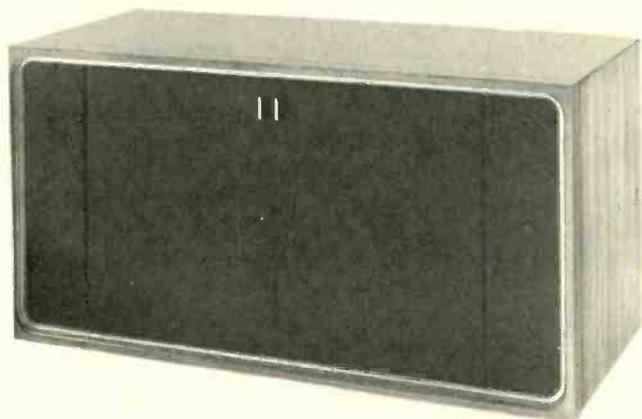
The biggest difference in the new Boss chassis, as compared to the "B" line, is that a new simplified convergence is utilized. Other changes in the new line include a new deflection and signal mother boards. The changes in the former were required to accommodate the convergence system. The convergence socket is now a four-pin inline socket instead of an octal type. Some improvements were also made in the copper of the signal mother board.

Three new modules are used in the "E" line chassis. All three have new part numbers assigned, but only two can be used as substitutes for their counterparts used in the "B" line. These are the Sync AGC (Part No. 69-1023) and Low Level Video (Part No. 69-1022). The other new module is the vertical module (Part No. 69-1021) and is not interchangeable because of the new convergence circuitry.

The old Sync AGC Module (Part No. 69-1014) would work in the "E" line sets but it does not contain the improved circuitry. The old Low-Level Video Module (Part No. 69-1011) will not work in the new "E" line because it lacks the plug for the new CONTRAST control cable. The new Low Level Video Module (Part No. 69-1022) incorporates a SCR modification. The old Vertical Sweep Module (Part No. 69-10151) will not substitute for the new version because of major circuit changes required for the new convergence system.

The two "E" line hybrid chassis are similar to the last year's chassis except for ACT and preset accommodations.

Philco-Ford's new B/W-TV line is offering selections



An ultra-modern 25-in. (measured diagonally) color console TV, Model C2550ELK, is housed behind "slide-in" black plexiglass doors and rests on a brushed chrome base. Courtesy of Philco-Ford.

ranging from 8-in. to 22-in. (measured diagonally) consoles. A new 9-in. all solid-state TV set can be operated by an attachable battery pack or on regular house current.

A 13-in. set is offered with cabinets in white, tangerine, black and a finish to match walnut. Rounding out the line are nine models in 8-, 16-, 19-, 22-in. diagonal categories.

## RCA CORPORATION

RCA is introducing a new line of color-TV sets combining an RCA developed Super AccuColor black matrix picture tube and the most powerful XL-100 solid-state chassis yet to produce the brightest big-screen picture in the company's history.

Super AccuColor black matrix picture tubes are used in all new solid-state 19-, 21-, and 25-in. (measured diagonally) XL-100 color TV models and selected 19-in. "XL-Color" models. The name "XL-Color" is an RCA designation for sets that are solid-state in many key areas and establishes the design relationship between



A compact, solid-state electronics unit (left) is now incorporated into the new ready-for-cable TV sets to replace the separate 24-channel selector (right) previously required for cable TV systems. RCA's new line of 25-in. (measured diagonally) color-TV features wireless remote control, AFT, and instant picture—all features previously unavailable with cable reception. *Courtesy of RCA Corp.*

them and 100-percent solid-state RCA XL-100 receivers.

First of the new chassis introduced in the "S" line is the CTC58 chassis. This chassis evolved from the now familiar CTC46, CTC48 series. All modules are directly interchangeable but there are several new features. Changes have been made in the video peaking and contrast, width adjustment and vertical output circuits.

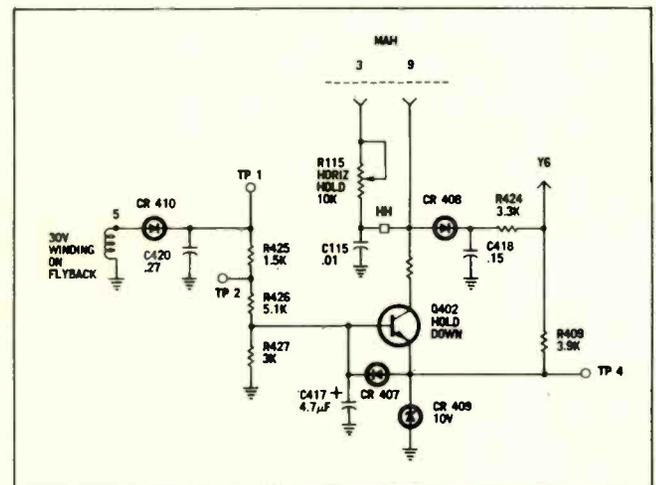
Introduced are two additional all solid-state chassis to be used in console TV sets which display a 25-in. (measured diagonally) screen. The CTC64 and CTC68 chassis have basically the same chassis configuration and in many respects are similar to the recently introduced CTC58 chassis.

The modules are directly interchangeable with those employed in other RCA S-line modular console chassis. The second anode and focus voltages are generated in the same manner as in previous XL-100 chassis by a solid-state tripler driven by the horizontal-output transformer. The second anode voltage is now 31kv at zero beam current rather than 26.5kv as in previous chassis. To achieve the higher anode voltage, the horizontal-output transformer is designed with tighter coupling and more turns in the secondary winding to provide a pulse of greater amplitude to the input of the tripler. Although functionally the same, internal components of the tripler have been changed, which prevents interchangeability with versions used in other chassis. The anode cup on the high-voltage lead is made considerably heavier because of the increased voltage.

The accompanying schematic illustrates the horizontal oscillator-disable or "hold-down" circuit used in the CTC64 and CTC68 chassis.

Several models using the CTC68 chassis are especially designed for localities where there is extensive use of cable systems. These sets are equipped to receive VHF and UHF broadcast signals, cable signals in the VHF-TV band, as well as cable signals in the "Mid" and "Super" bands.

Channel selections include the standard VHF channels 2 through 13 by the KRK 211 VHF tuner. And 12 positions, A through L, are available for off-the-air



Simplified schematic of the high-voltage hold-down circuit employed in RCA's color-TV chassis CTC64/68. *Courtesy of RCA Corp.*

UHF channels, which are processed by the varactor-tuned KRK 194B UHF tuner. A cable converter, KRK 212, provides the means of processing up to 12 cable signals.

The CTC66 is a hybrid chassis introduced for use in S-line portable and table model TV sets that display a 19-in. (measured diagonally) picture. The basic chassis layout is different; however, electrically the CTC66 is very similar to the CTC63 chassis used in S-line products.

The new CTC71 modular chassis is similar in most respects to the CTC60 chassis which it supersedes. It is employed in color-TV sets with a 19-in. (measured diagonally) screen.

The signal processing parent board (PW300) employs the same set of modules that are used in other current XL-100 chassis.

The deflection circuits of the CTC71 and the CTC60 are similar and the vertical system is basically the same as that which is in the other XL-100 chassis. The horizontal-deflection and high-voltage systems are completely different. Two additional diodes and a resistor have been added to the base circuits of the vertical-output transistors to improve performance at crossover. Otherwise, the output circuit is similar to the ones used in R-Line chassis.

A transistor output stage is used in the horizontal system instead of the familiar SCR deflection system.

The familiar CTC39 chassis is continued to be used in S-Line products. The basic chassis configuration is very similar to the R-Line version and is employed in several console TV sets with a 25-in. (measured diagonally) screen.

Portable color-TV sets with a 14-in. diagonal screen use the continued CTC51 chassis. Two versions are used, one features AccuTint.

Two versions of the CTC52 chassis appear in S-Line portable color-TV sets which provide a 17-in. diagonal screen. One version, the CTC52XAH, is basically similar to the R-Line chassis. The CTC52XAK is modified to use a bi-potential picture tube and includes the AccuMatic IV feature.

The CTC53 and CTC63 remain in the current line with no major revisions in the basic chassis. The AccuMatic IV featured in S-Line TV sets provides one-button control of the four picture qualities—COLOR, TINT, BRIGHTNESS and CONTRAST.

A new AccuLine color-picture tube is employed in portable TV receivers which use a precision in-line assembly and a screen consisting of continuous phosphor lines instead of dots to improve picture sharpness and brightness. The deflection yoke and neck components can be pre-adjusted and are permanently attached to the picture tube by the manufacturer. This system allows the installation and set-up of a color-picture tube to be essentially comparable to that of a B/W-tube in simplicity.

There are 14 chassis used in the 1974 B/W TV line, which offers a variety of personal portable, table and console models with screen sizes from 5- to 22-in. (measured diagonally).

Two new chassis, KCS192 and KCS190, are intro-

duced equipped with solid-state second Video IF stages and—except for minor differences—are electrically similar to the previously introduced KCS189 chassis.

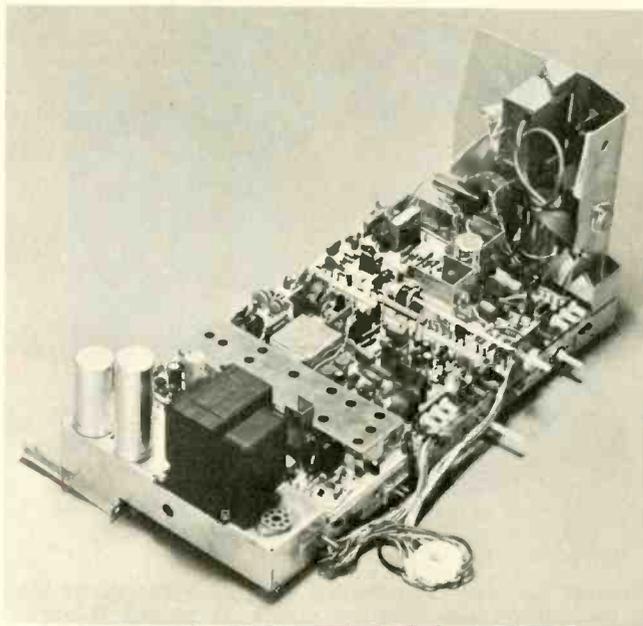
## SYLVANIA

Highlighting Sylvania's new color-TV line for 1974 is a self-adjusting color-TV set that requires the viewer to only activate the set and select a channel. All other major tuning functions are performed electronically by an advanced solid-state chassis. (See Teklab Report, September and October, "Sylvania's Modular E05 Color-TV Chassis.")

The three chassis in the GT-Matic series are designated E03, E04 and E05. The E03 is the basic chassis and is used in 21- and 25-in. TV sets. The E05 is elec-



Sylvania's Model CL3421R color-TV set employing the varactor tuning system and the GT-Matic chassis. Courtesy of GTE Sylvania.



Sylvania's GT-Matic chassis, designated E03, E04 and E05, employ plug-in circuit boards and plug-in transistors. The chassis automatically compensates for most signal deficiencies, electrical noise, and voltage fluctuations. Courtesy of GTE Sylvania.

trically identical to the E03 but is packaged to fit a 19-in. (measured diagonally) cabinet. Similar to the E03, the E04 version also includes a varactor tuning system and is available with remote control.

Two 19-in. (measured diagonally) portables, three 21-in. and twenty-eight 25-in. models have the GT-Matic tuning system.

There are three basic circuit boards—IF sound, Video/Chroma and deflection. The latter two are common to all three chassis models. The E04 requires a slightly different IF board and it also has a fourth board containing circuitry for the varactor tuning system.

Nine automatic control circuits compensate for most variations and deficiencies in station transmission, electrical interference and voltage fluctuations.

A "vertical countdown" integrated circuit, that is equivalent in performance to about 120 conventional solid-state devices, eliminates the need for a VERTICAL HOLD control and keeps the picture steady despite electrical "noise."

All three chassis are CATV-ready—an industry standard cable connector is included for easy hook-up to CATV or coaxial systems.

## ZENITH

Zenith's 1974 color-TV sets will include 50 basic models and offer a total of five different screens in either a 16-, 17-, 19-, 23-, or 25-in. (measured diagonally) size. The 17-in. screen size is new in the TV line.

Zenith's Chromacolor II system is a totally advanced solid-state color-TV system which is new from chassis to picture tube. The Chromacolor picture tube is used in four different screen sizes—17-, 19-, 23- and 25-in. (measured diagonally). The chassis employed includes a 30kv horizontal chassis, Titan 300H; a 30kv vertical chassis, Titan 300V; a 27.5kv vertical chassis, Titan 275V; and a self-regulating and protective Power-Sentry system of magnetic voltage regulation.

The horizontal Titan 300H, vertical Titan 300V, and the vertical Titan 275V are the most powerful chassis

Zenith has ever produced for either of its big- or small-screen color-TV sets.

The Dura-modules employed in the chassis are special carrier panels that mount and interconnect solid-state devices such as transistors, diodes, integrated circuits, resistors, capacitors, inductors, etc., in a desired circuit configuration. The dura-modules vary in size from single ones that are 3½-in. by 2¾-in. to the longest that measure 4¾-in. by 3½-in. Each is a plug-in unit that is removable for replacement and repair—if and when needed.

All of the solid-state chassis in the new color-TV line will have five integrated circuits, one more than last year. The newcomer includes the audio amplifier and sound output stage. The integrated circuits include: The chroma amplifier/color demodulator; the color sub-carrier regenerator; the signal processor; Fringe-Lock circuit; the audio amplifier and sound output; and the sound IF, limiter, detector and the pre-driver.

An integrated solid-state high-voltage tripler and focus divider are used in the vertical chassis to take the output of the sweep transformer and step it up to a design average of 30kv or 27.5kv (depending upon chassis), rectify it and provide the proper picture focus regardless of voltage changes.

The horizontal Titan 300H chassis is employed in 27 different 25-in. (measured diagonally) consoles and combinations, including 13 remote-controlled sets.

There are 12 new receivers (four 23-in., five 19-in. and three 17-in. (measured diagonally) that employ the first vertical chassis ever developed by Zenith for color-TV sets. (See this month's Teklab Report and Tekfax schematic No. 1496 for a detailed report on the 300V chassis.)

Nine of these sets have the Titan 300V chassis and the remaining three sets have the 17-in. (measured diagonally) screen size. The difference between the Titan 300V and the Titan 275V chassis is in the high voltage.

Each of the vertical chassis consists of a vertical "wall" positioned on a narrow horizontal steel base. Eight dura-modules are wall-mounted and secured by plastic turnbuckles. This arrangement positions 74 percent of the chassis circuitry on dura-modules so that these circuits directly face the TV service technician when he removes the cabinet back of the color-TV set.

The power supply, including the protective Power-Sentry system, is located on the horizontal base. Zenith's Power-Sentry system of magnetic voltage regulation is reportedly the first to be built into the power supply of a color-TV set. The Power-Sentry is standard equipment in all 39 solid-state sets in the color-TV line.

By maintaining the voltage supplied to the TV set at or near its design level, there are a number of benefits. The picture performance is stabilized under low-voltage conditions. It also provides potentially longer life for the picture tube and components by preventing over-voltage operation and providing isolation from voltage transients or surges. It protects against "turn on" voltage dips when electrical appliances start. The system also reportedly cuts down on the amount of electricity

*continued on page 51*



Zenith's Model SE1750R, the Balboa, includes an innovative cabinet design and tilted picture screen and the Space Command 500X Ultrasonic system of remote control. *Courtesy of Zenith Radio Corp.*

# Use Utmost Care in Correcting those Mistakes

by Ernest W. Fair

The business wherein a mistake is never made in handling customers at some stage of the relationship simply does not exist. The shop owner who thinks otherwise believes so only because the customers who were victims of those mistakes never called them to his attention—simply because the business never saw them again.

■ Utmost care is a necessity for handling every relationship with the customer all through the business. The simplest small error in a customer relationship must be avoided if he is kept a loyal friend of the business. Listed here are some points well worth keeping in mind.

Whenever any mistake was made in the business, be quick to admit that it did happen. The customer knows for sure that the error was made and will seldom tolerate evasion of responsibility.

This is always one's first reaction when a mistake has been pointed out. It definitely pays to stop and be certain that what the customer is calling to one's attention was very definitely an error on the part of someone on the staff of the shop.

The next step is to be sure that a full explanation as to what is wrong is received from each customer. If some small element is overlooked in the process of correcting that mistake, the shop owner can be sure his customer will blame his business for certain.

Correction always means handling the situation totally and completely if full loyalty of the customer is to be retained. Even though something exists which the individual forgot to bring up, he will still

blame the shop owner for it not having been handled, even though the latter knew nothing about this detail.

Remedy any mistake called to your attention quickly, even if it means that something else has to be set aside or overtime will be required to handle the matter that same day.

It is easy to defer correction until tomorrow or next week, but all too often the whole thing is forgotten as new pressures and problems arise. **TODAY** is the only day to correct any mistake made within the business.

Double check every corrective effort that is made during such a situation and particularly with small matters such as in bookkeeping and billing records where most errors arise in the operation of a business.

If another mistake is compounded on top of the first one, this is almost positive assurance that the particular customer will never be seen again.

Accept blame for the error on behalf of the business itself, even though you have but one person working therein. This makes the whole thing a much more impersonal procedure. It is seldom advisable to single out a specific employee in-

sofar as the customer is concerned. When the shop owner does so, he ducks his own responsibility in the eyes of his customer, who considers everything involved as a very personal thing between himself and the shop.

If the customer is definitely to blame in part for what has happened, be sure to so inform him, **BUT** make the total correction anyway. This always gives it even greater value in the customer's eyes as he looks back on what happened later on.

Save correction of employees for those mistakes where they are definitely to blame until after contact with the customer has been terminated.

Nothing is to be gained by making such a correction in view of a customer. The individual who derives pleasure in the humiliation of others is seldom worth having as a customer anyway.

It is also good procedure to have every correction that is made carefully checked by the customer himself and to secure his approval on what has been done. This helps reduce the chance for further error and also makes it clear to him that you are seeking to do everything possible to set things aright.

Apologize honestly to the customer for whatever inconvenience he may have suffered because of what happened when the mistake was made. This is important whether or not someone in the business was guilty of the error or it happened to be one of those things that just occurred. It is something which sits very well with every customer.

Treat the mistake occurrence as something that rarely happens in the business while you are talking with the customer about it. If he thinks that such things are routine, he may very well never come through the front door again. Even if he does so, he will be eternally suspicious and constantly looking for something to arise again.

Never forget the occurrence after the whole thing has been settled satisfactorily with the customer. Keep records of every such incident. Study such records from time to

*continued on page 43*

# Take the time Repair it right Charge what it is worth

by Bob Cook, CET

What kind of a reputation do you have as a shop or technician?

- Butcher?
- Sloppy Workmanship?
- Recalls for Same Trouble?
- Recalls for Trouble Not Reported in First Complaint?
- Beautiful Work, Set Never Worked Better?

■ The first two character references (butcher and sloppy workmanship) are acquired in the mind of the next technician that follows you into the set. The second two (recalls for same trouble and recalls for trouble not reported in first complaint) are acquired in the minds of your customers as a result of the practices in the first two. We have all heard customers say about some other shop: "I had them out there three times before they finally fixed my set. I won't ever call them again." The last reference (beautiful work) is earned by technicians that take the time to do it right.

Let's explain some of the characteristics of the first two character references and see how you stack up. Maybe you are costing yourself money.

## Butcher

*Shotguns whole circuits* replacing everything in the circuit instead of taking the time to properly isolate the defective component.

*Uses high-wattage soldering gun* on printed boards—loosening foil and burning sections so badly that the circuit must be reconstructed with wire. Only low-wattage fine-tipped irons should be used on

printed circuitry; and if it is solid state, one of the low-voltage type irons should be used to avoid blowing a transistor through induction.

*Bridging components.* Bridging one section of a three- or four-section electrolytic can with a paper capacitor may be quicker and easier than replacing the can; but, if salting has opened up one section of that filter, it is only a question of time before it attacks another section and more trouble develops—possibly within your warranty time. Bridging any other component, i.e., resistors, capacitors, diodes, etc., leaves the possibility of the original component intermitting and causing problems. Bridging an open resistor on the top of a printed board instead of pulling the chassis and replacing the resistor in the same manner as the original is certainly faster, but how much more reliable and neater your repair will be if you do it right. When a resistor is bridged in this way, it is almost impossible to avoid melting the solder on the bottom of the board and you are leaving a set with a cold solder joint that has been known to cause thermal intermitting.

*Trimming component leads.* Many sets come in with only the

ends of the new component's full leads tack soldered to the connecting points. This leads your author to believe that some technicians have an aversion to cutting anything off. He has even had an RCA CTC16 come in with four new power diodes, which were mounted in a space about 2-in. square, bridged across the original parts and tack soldered to the ends of the full leads. They looked like miniature palm trees and it doesn't take much imagination to see how easily the power supply could be shorted out.

## Sloppy Workmanship

*Removing and not replacing* tuner and IF strip cover shields. You can be sure that manufacturers would not spend the money to fabricate and install these shields if they were not necessary for the proper operation of the TV set. Leaving them off allows stray radiation to enter the front end of the receiver, degrading the picture. Also, in some sets leaving them off will seriously detune the alignment of the circuits. Your author has found several sets of the RCA and Admiral variety in which the previous technician had removed the IF cover panel to re-

*continued on page 43*

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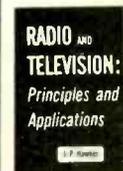
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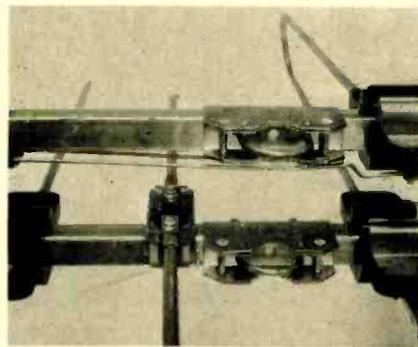
... for more details circle 104 on Reader Service Card

# Zooming in that Station

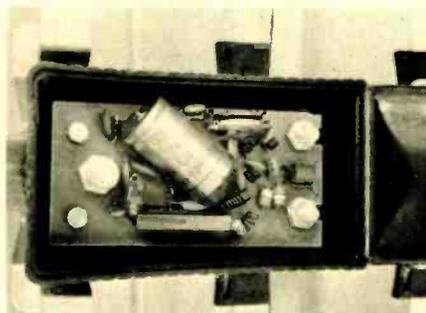
by Joseph Zauhar

A built-in solid-state amplifier employing an integrated circuit and a zoom control permit adjustment of the antenna to any reception requirement

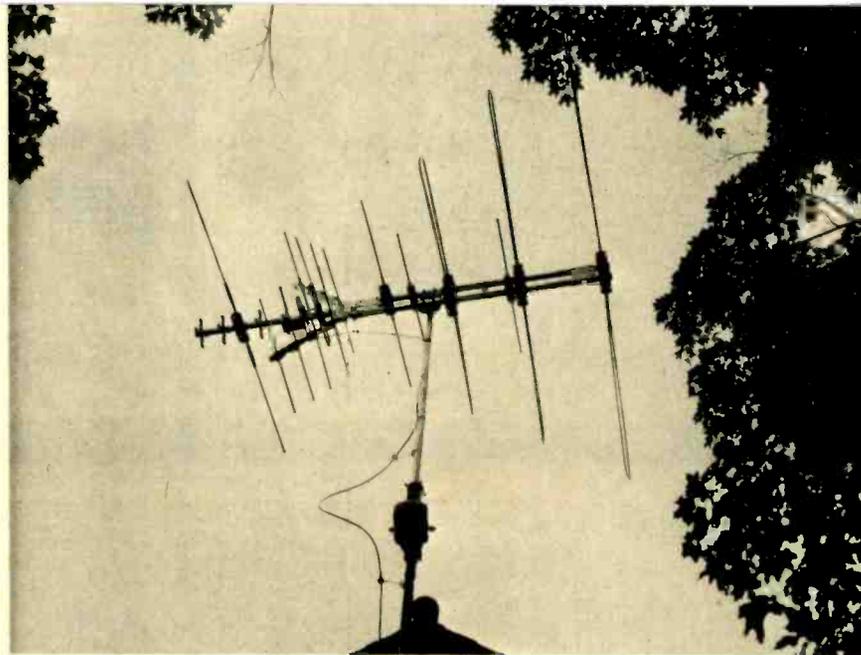
■ Solid-state technology today has influenced practically every field of electronics. As an example, we now have new antenna designs that include the very latest advancements in electronics, combining solid-state circuitry—to produce a compact, lightweight antenna with enough gain for fringe operation at approximately half the size of conventional antennas.



A mast clamp is employed on each of the booms for positive locking and positioned at the center of gravity for stability.



The antenna amplifier board employs an integrated circuit and a unique ZOOM control which permits adjustment of the antenna to any reception requirements.



Kay-Towne's Model ICA-500 antenna is designed for deep-fringe reception areas at half the size of conventional antennas.

I would object and know others in fringe area localities who would also object to a large antenna, but who would allow installation of a smaller antenna with equal gain.

The small size and design of the Kay-Towne's Model ICA-500 antenna received for evaluation is ideal for most types of installations—whether it is placed in the attic or on the roof—yet it is not distracting

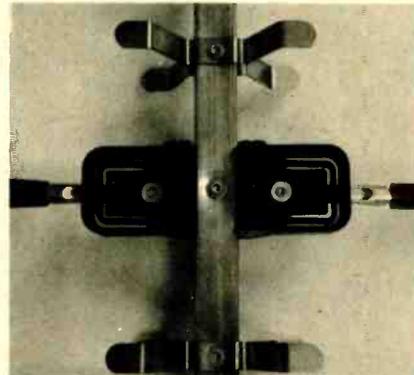
from the natural roof lines. In many applications the antenna can be installed without guy wires, using a sturdy mount if the mast is 10 ft or under in length. The smaller antenna has low wind resistance, little mechanical noise and less surface for the icing conditions experienced in our northern climate. Another important reason for the service technician is that it requires less installation time, thus possibly offering a better profit.

We installed the antenna in a fringe reception area located approximately 45 miles west of Duluth's VHF stations and approximately 175 miles north of Minneapolis, which we hoped to also receive.

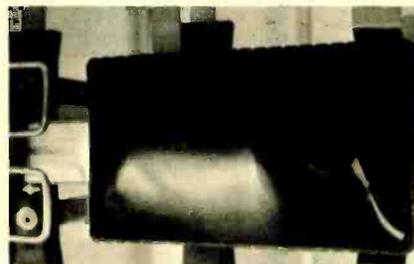
## Design and Construction

The antenna is constructed of heavy aluminum with an "Alchrome gold" finish for weather protection. The dual square boom design employs two mast clamps at the center of gravity and heavy cyclocac insulators to support the elements. The antenna employs a number of folded dipoles which are cut for half-wave operation, which is especially effective in the low band of frequencies—compared to that of a simple dipole. A number of high-band passive elements are also used with a corner reflector acting as a UHF reflector and director for higher gain on all TV frequencies.

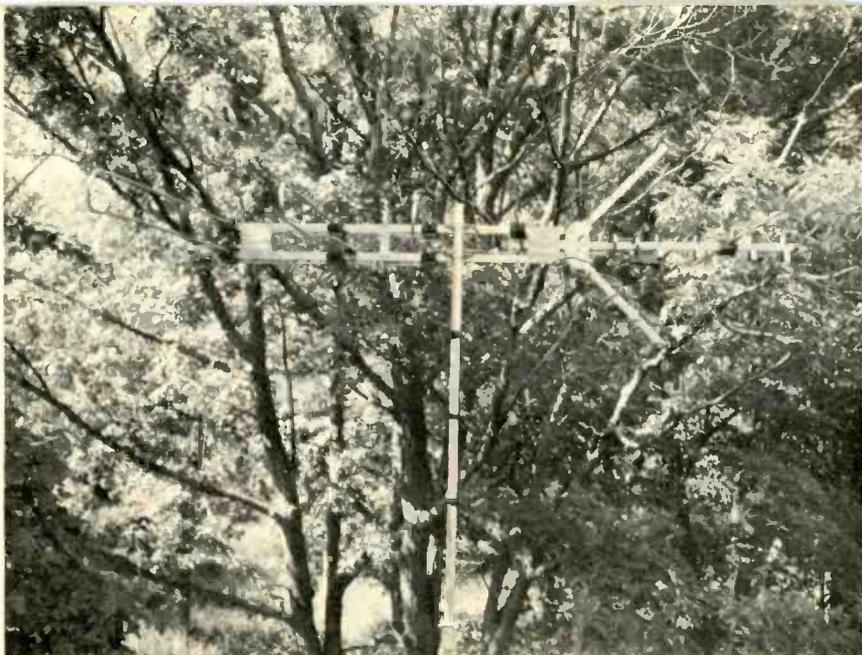
Probably the most important part of the antenna design is the inte-



The antenna elements are mounted on square booms with heavy-duty cyclocac insulators and an "Alchrome gold" finish for weather protection.



The amplifier cover protects the amplifier circuit and swings down for easy installation of the RG-59 coaxial cable and access to the ZOOM control adjustment.



Despite the wooded area surrounding the antenna installation, we measured very high signal strength from the antenna.

grated circuit amplifier located on the antenna itself with a unique ZOOM control (gain adjustment) which is adjustable for any reception requirement. The output coaxial connector on the amplifier accepts an RG-59 coaxial cable.

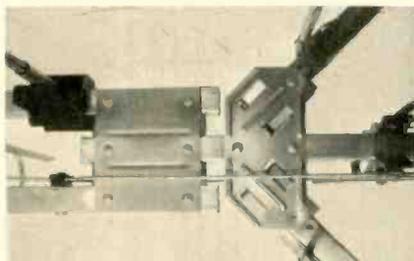
### Antenna Installation

The antenna was received pre-assembled and all that was required was the insertion of boom end plugs and swinging the elements out until a "click" was heard as they were locked into position. The compact size of the antenna permitted rooftop assembly and the taping of the cable to the mast before erecting and placing it into the existing rotator. We used the RG-59 all-channel coaxial cable which was required by the manufacturer. A F-59 coaxial cable connector supplied with the antenna was placed on the end of the cable, then fed through a hole in the amplifier cover and tightened into the amplifier connector. A slight modification was made by placing a rubber grommet in the cover hole, making a snug fit around the cable. The coaxial down-lead was taped to the existing 1/4-in. galvanized pipe erected from the ground level to the peak of the house, and a loop of excess cable was formed around the rotator to permit full rotation.

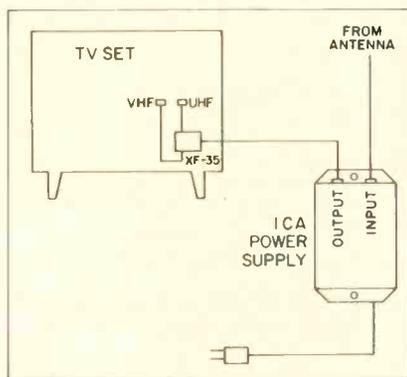
Although the antenna is protected with a dual diode, shunt coil circuit and ac surge circuit, the outer shielding of the cable was grounded

with a lightning arrester as it entered the house for more protection.

The cable was then connected to the ICA power supply input connector, which we mounted to the rear cover of the TV set, but could be located next to any convenient ac power receptacle. A short piece of coaxial cable was assembled and connected to the supplied XF-35 matching transformer plus the UHF



Heavy-duty plates riveted to the square boom are typical of the rugged construction of the antenna.



The ICA power supply can be mounted to the rear cover of the TV set or near any convenient power outlet. The supplied XF-35 matching transformer is connected to the VHF/UHF antenna terminals of the TV set.

and VHF terminals of the TV set.

### ZOOM Control Adjustment

The power supply was activated and the antenna rotated to the strongest signal.

In reception areas which are more than approximately 50 miles from the VHF/UHF stations, no adjustment of the ZOOM control may be necessary. The ICA antenna was shipped from the factory with the control set at maximum gain.

In strong reception areas, adjust the ZOOM control until interference free. Typical interferences are two pictures super imposed, bars rolling through picture, distorted pictures, etc.

This adjustment can be made by temporarily mounting the antenna on the mast in an easy-to-reach position and taking a gain measurement with a portable field strength meter, such as a Sencore Model PS134.

We left the ZOOM control at maximum gain for our weak VHF stations from a distance of 175 miles, since the nearest station was 45 miles away and did not cause interference or overload conditions on the TV set.

*continued on next page*

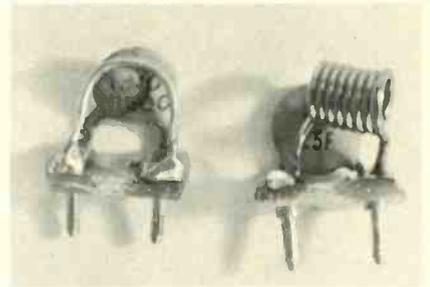
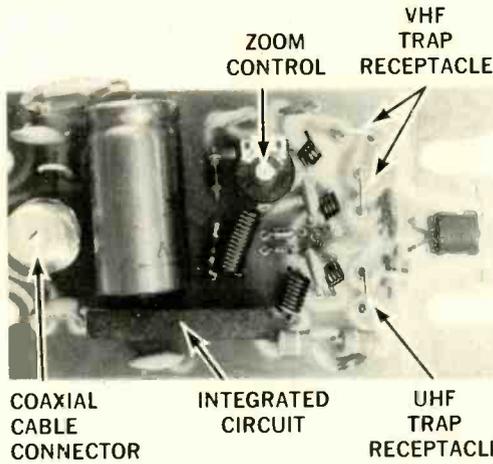


The ICA Power Supply supplies the voltage needed for the antenna amplifier through the coaxial lead.



Sencore's Model PS134 Field Strength Meter was used to measure the antenna gain while adjusting the amplifier ZOOM control.

A close-up view of the ICA amplifier board, showing the location of the integrated circuit, ZOOM control and the locations of the receptacles for the single channel traps.



If the ZOOM control has no effect on the interference—such as caused by a strong local signal source—single channel traps can be installed in the amplifier board.

We measured a maximum gain of 25dB on the strongest signal with the ZOOM control set at maximum while at minimum gain we measured 0 dB of signal.

Should the ZOOM control have no effect on the distorted pictures and the interference is caused by a strong local signal source—such as a single TV transmitter close by or a strong FM station signal—special channel traps are available from the manufacturer. In most cases the source or sources of interference will be a channel or channels within two to five miles from the antenna.

### ANTENNA PERFORMANCE

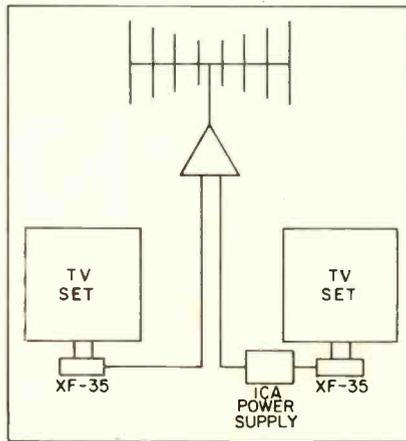
Channel	DB Gain Video	DB Gain Audio	Distance (Miles)
3	25	22	45
4	-10/ -13	-13	175
5	-10/ -15	-15	175
6	25	18	45
8	16	11	45
10	20	13	45

Determine the source of interference and select the proper ICA-T trap which is available to be used with the antenna and install in the following method:

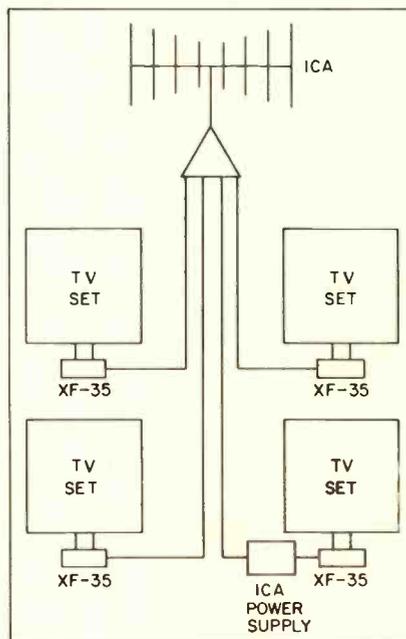
Remove the buss bar found on the amplifier circuit board mounted on the antenna. Positions 1 and 2 are designed for two ICA-T VHF or FM channel traps and position 3 is used for a ICA-T UHF channel trap. If an FM signal is the source of interference, a ICA-T-FM trap may be used in receptacle 1.

### Multi-Set Installations

The ICA antenna can supply signals to more than one TV set by using special coaxial set couplers.



A typical ICA antenna installation supplying signal to two TV sets, employing the SCSC-2 splitter and two matching transformers.



A SCSC-4 four set splitter is used to supply signal to four TV sets using one power supply.

The Model SCSC-2 is employed for two-set operation and the SCSC-4 is used to operate four TV sets from one antenna and ICA power supply. One XF-35 matching transformer is employed for each TV set used. The special SCSC-2 and SCSC-4 are not supplied but can be purchased from your local parts distributor or from the manufacturer.

### Summary

We were quite pleased with the performance of the antenna—producing good picture quality and high signal gain which was quite flat across the VHF stations received.

Our aim was to receive the Twin Cities stations Channels 4 and 5 a distance of 175 miles—and we succeeded, although the picture was on the snowy side. We felt the gain was good considering the terrain and wooded area surrounding the antenna.

The preassembled antenna was very easily and quickly installed because of its compact size and light weight. The construction of the antenna should make it rugged enough to withstand the most severe weather conditions.

Adjustment of the ZOOM control could be a little difficult if the antenna was installed more than 10 ft above the base, but can be simplified by mounting it temporarily and taking a signal measurement.

The performance of the antenna can be contributed to new advancements in antenna designs employing solid-state technology not available in the past. ■

### MANUFACTURER'S SPECIFICATIONS

ICA-500	Gain dB		Front to Back		Imp.	Turning Radius	Boom Length	Range	Beam Width	Shipping Weight
	VHF	UHF	VHF	UHF						
	30	32	27	29	75	42-in.	76-in.	200 Mi.	28°	12 lb.

## USE UTMOST CARE...

*continued from page 34*

time to guide not only yourself but everyone on the staff in procedures for the future. Doing so is the very best way to reduce the number of times any steps will have to be taken in mistake correction in the future.

Give the customer no opportunity to demand that anything be done about the mistake when it is called to your attention. Quickly seize the initiative from the first moment you are aware of what he is talking about. Hold that initiative from there on out and those demands from the customer will always be less than if you neglect to do so.

Check back on each correction that is made a day or so afterward in order to make sure that everything was all right the second time. Customers do not always call a second mistake to the shop owner's attention, but just forget about the whole thing and go elsewhere in the future. If everything is not satisfactory with the correction that has been made, the odds are almost certain that you have lost another customer.

Even when you have suspicions that the customer may have had a good deal to do with the situation—though he admits nothing—it is still best not to challenge him. The shop owner has little to gain if he succeeds with the challenge. The unpleasantness which is sure to arise will be certain to produce a lost customer regardless of how many concessions have been given to him.

Remember always that this is probably not a pleasant situation for the customer any more than it is for yourself. Handle the whole thing accordingly. Call on every capability for consideration and good taste that you have available for handling situations of this nature.

Do a little something extra for the customer if it is possible to do so without too great a cost while the correction itself is being made. Such an action leaves him very much in debt to your business.

Give every customer a full record of exactly what has been done in handling the correction. All of those small details will make it something of much greater importance to him than if he knows nothing about them.

The correction of mistakes offers a wonderful opportunity to build lasting friendship for the business on the part of every customer. Do it always with that thought first in mind. ■

## TAKE THE TIME...

*continued from page 35*

place a burned plate load resistor, probably destroyed by a shorted tube. You guessed it—the new resistor was tack solder bridged across the original part with full leads. Then, probably to avoid shorting the replacement to the cover, he left it, along with the screws, at one side of the cabinet. Sure, he had a picture and ran in record time, but is this the kind of work you would want on your equipment? Needless to say, if and when you come across this kind of work, it behooves you to take the time and clean it up before you call the job done. Even though you didn't do the work, the last one in the set is usually the one blamed for it.

*Removing and not replacing mounting and grounding screws in chassis, tuner assemblies and grounding straps. This can cause a basket full of problems all the way from arcing and a hot faced CRT to blowing a string of IF transistors in a solid-state set. Take the time and put them all back where they came from.*

*Too much or too little solder along with cold-solder joints, especially on printed-circuit boards, can cause thermal intermittent opens and shorts that can consume hours of wasted time later. Take the time to do it right!*

### Conclusion

A proper repair should require an expert to determine where the repair was made. The defective components should be located with modern trouble-shooting techniques and only the defective parts removed and replaced with an exact replacement part in the same manner as the original. Your author realizes that many of these sloppy-work syndromes are caused by hard-pressed technicians trying to put out more work than can be properly done in the time allowed. Hence the title of this article. It is really more profitable—for you the technician and you the boss—to insist that repairs

are properly made. You will not only gain a reputation for excellent work, but you will make more money by eliminating the cause of many expensive recalls. In the process, you will have to raise your flat rates, if you use flat rate schedules, but remember that in the customer's mind "the bitterness of poor quality remains long after the sweetness of a low price is forgotten." ■

## TEKLAB REPORT...

*continued from page 28*

from adjacent phosphor dots.

The development of the mask along with the jet black-surround that soaks up reflected ambient room lighting made it no longer necessary for the manufacturer to use the low-transmission glass in the face of the picture tube.

### Summary

The vertical chassis will enable the service technician to quickly remove any of the eight dura-modules with just a half turn of the plastic turnbuckle. By removing two screws and loosening the side support hinge, it allows the vertical wall of the chassis to swing down for easy access to the back-of-the-wall components. If the chassis requires shop service, just unplug the tuner and speaker leads, remove six screws and the picture tube and all slide out together as one single unit.

The new "E" line chassis are designed for a nominal high-voltage and many picture tubes now in stock and supplied for use in earlier models are not rated high enough for use with these higher voltage chassis and may not be used.

We were pleased with the operation of the Power-Sentry power supply and we were able to drop the line voltage down to 68v before we noted margins on the screen of the TV set. The TV set produced a good, bright, picture with plenty of contrast and sharpness even under the bright lights of our laboratory. ■

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## Triplet's Model 8035 Digital VOM

by Phillip Dahlen

Includes automatic polarity selection and over-range blanking circuitry

■ Although digital multimeters have been on the market for several years now, too few electronic technicians are well enough acquainted with these new instruments to put them to proper use—a must for the effective servicing of newer solid-state circuitry. Thus, although this instrument does have many noteworthy characteristics, also of importance is the detailed instruction manual supplied with the instrument. The 44-page manual not only includes a complete schematic but specifications, a safety notice, detailed operating instructions for all scales and functions, complete theory of operation, plus calibration and maintenance information.

A sample was sent to our electronics lab for evaluation and we found the large, clear, green, digital numerals to be quite bright and easy on the eyes. It is designed to provide just about every ac or dc voltage or current measurement required for tube or solid-state circuit testing, plus all necessary resistance ranges.

Manufacturer specifications for this useful bench instrument include the following:

### DC VOLTAGE

#### Ranges:

0 to .1, 1.0, 10, 100 and 1000vdc

Accuracy: (23°C ±1°C or 73°F ±2°F)

±.1% RDG ±1 digit

Temperature Coefficient:

±.01% RDG/°C ±.01% F.S./°C

Input Resistance:

10M ±1% on all ranges

Normal Mode Rejection:

Greater than 30dB at 60Hz

Common Mode Rejection:

Greater than 80dB

Overrange:

100% (1999 counts) on all except

the 1000v range, which is 10%

Full-Scale Step Response:

2 sec (3 sec on the 1v range)

Overload Protection:

1100vdc on all except the 100mv range

125v ac or dc on the 100mv range

### AC VOLTAGE

Type of Response:

Average sensing, RMS calibrated

Ranges:

0 to .1, 1.0, 10, 100 and 1000vdc

Accuracy: (23°C ±1°C or 73°F

±2°F)

±.5% RDG ±1 digit

Range

Frequency

100mv

40Hz to 20kHz

1.0v

40Hz to 20kHz

10v

40Hz to 20kHz

100v

40Hz to 10kHz

1000v

40Hz to 1kHz

Temperature Coefficient:

±.05% RDG/°C ±.02% F.S./°C

Input Impedance:

10M ±1% shunted by less than 50pf

Overrange:

100% (1999 counts) on all except the 1000v range

No overrange on the 1000v range

Full-Scale Step Response:

4 sec

Overload Protection:

1100v ac or dc on all except the 100mv range

250v ac on the 100mv range

### RESISTANCE

Ranges:

100Ω, 1K, 10K, 100K, 1M and 10M

Accuracy: (23°C ±1°C or 73°F ±2°F)

±.25% RDG ±1 digit on all except the 1M and 10M ranges.

±.5% RDG ±1 digit on the 1M range

±2.0% RDG ±1 digit to 10M on the 10M range

Temperature Coefficient:

±.05% RDG/°C ±.01% F.S./°C on all except the 10M range

±.1% RDG/°C ±.01% F.S./°C on the 10M range

Overrange:



Triplet's Model 8035 Digital VOM. For more details circle 900 on the Reader Service Card.

100% (1999 counts) on all ranges except the 10M range, which has none

Full-Scale Step Response:

2 sec on all except the 10M range

15 sec for the 10M range

Voltage Across Resistor Under Test:

100mv at F.S.

Test Current:

100Ω Range: 1ma 100K Range: 1μa

1K Range: 100μa 1M Range: 100na

10K Range: 10μa 10M Range: 10na

Overload Protection:

+1000v dc or -125v dc on all except the 10M range

±400v dc or 250v ac on the 10M range

CURRENT, AC & DC

Ranges:

100μa, 1ma, 10ma, 100ma and 1000ma

Accuracy: (23°C ±1°C or 73°F ±2°F)

DC: ±.2% RDG ±1 digit for all except the 1000ma range

±.4% RDG ±1 digit on the 1000ma range

AC: ±.7% RDG ±1 digit, 40Hz to 20kHz, for all except the 1000ma range

±1.0% RDG ±1 digit, 40Hz to 20kHz, on the 1000ma range

Temperature Coefficient:

DC: ±.01% RDG/°C ±.01% F.S./°C

AC: ±.05% RDG/°C ±.02% F.S./°C

Overrange:

100% (1999 counts)

Full-Scale Step Response:

DC: 2 sec

AC: 3 sec

Voltage Drop Across Input:

100mv dc and RMS ac at full-scale reading

Overload Protection:

2a fused on 1000ma, 100ma and 10ma ranges

100 times overload on the 1ma range

300 times overload on the 100μa range

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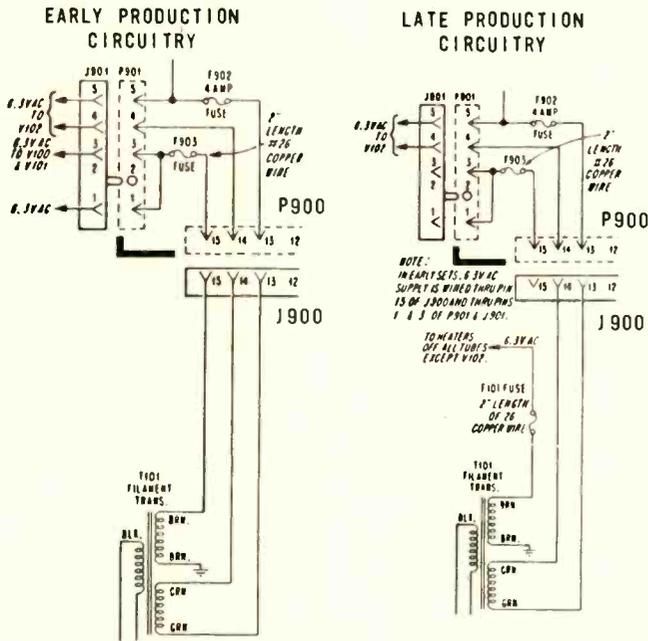
NOVEMBER 1973, ELECTRONIC TECHNICIAN/DEALER | 45

The material used in this section is selected from information supplied through the cooperation of the respective manufacturers or their agencies.

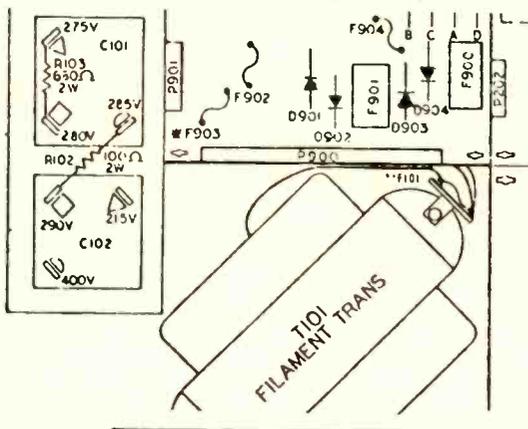
## ADMIRAL

### Color-TV Chassis M20—Filament Fuse

There have been several reports of intermittent operation of the receiving-tube filament fuse in early M20 chassis. The problem usually occurs at the Molex connector, J900.



TOP VIEW OF CHASSIS SHOWING LOCATION OF TERMINAL STRIP.



After the beginning of production, the fuse for the 6.3v ac receiving-tube filament circuit was moved from the Power Supply Module (M900) to a terminal strip on the chassis. This fuse on the module is symbol F903; on the chassis it became symbol F101.

All M900 Power Supply Modules contain the F903 fuse; on later production chassis, it is simply wired out of the circuit by a change in connector wiring.

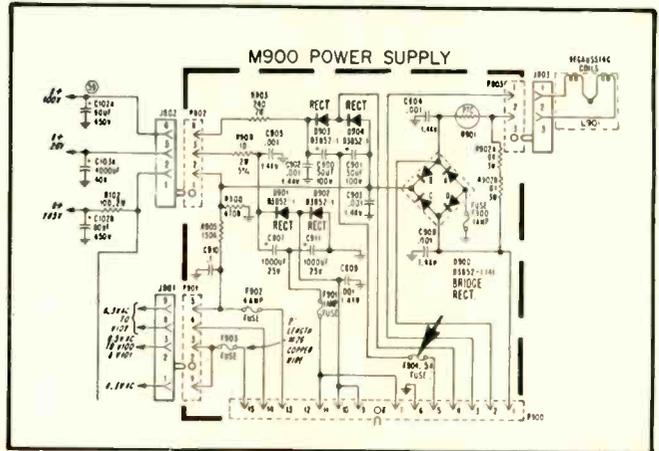
You can change early chassis by adding a terminal strip and fuse and by transferring the filament circuit leads from the Molex connectors to the terminal strip. The components required for this change, plus instructions, are available as part number 98A136-6.

## EMERSON

### Color-TV Chassis M20—Excessive Brightness, Washed Out Video and No BRIGHTNESS Control

There have been reports of an unusual condition in the M20 chassis which can result from failure of a fuse in the low-voltage power supply module. You would not expect an open fuse to cause this condition, but it does.

The problem can be caused by open fuse F904 which has a 1/2a pigtail, Part No. 84A7-16 on the power-supply module. The F904 fuse is in the secondary of the power



transformer, supplying ac to the 400v B+ circuit. Because of the power supply design, 285v still remains on the 400v B+ line when the fuse opens. The reduction of B+ voltage to the cathodes of the picture tube will result in excessive brightness and no control of brightness.

Check the circuits supplied by the 400v B+ and associated components. When repairs have been made, replace the open fuse.

### Color-TV Chassis M-20—Sound Okay, No Picture, Set Smokes

Examination of the M400 chroma processor module and/or M700 video chroma output shows burnt or damaged components. When either or both modules are replaced, the same components in the replacement module are immediately damaged.

Normally module problems are contained in the specific module showing a problem. However, in this instance, the fault is due to a defective component in an associated module. Capacitor C310 in the M300 signal processor module is shorted causing a much higher than normal horizontal pulse to be applied to the M400 chroma processor and the M700 video output module.

Repair the M300 signal processor, the M400 chroma processor, and the M700 video chroma output module as shown in the chain reaction information.

#### Module M300

When capacitor C310 shorts, a much higher than normal pulse is applied to capacitor C311, causing this capacitor to split open.

Replace capacitor C310 and open capacitor C311.

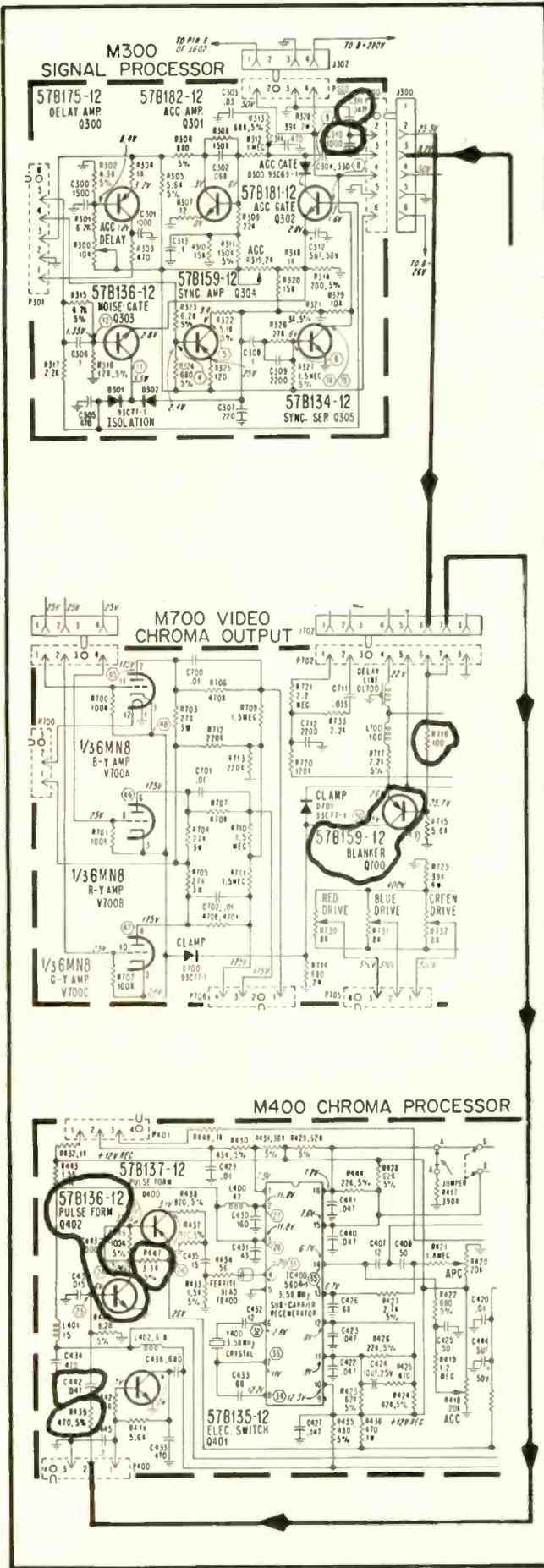
#### Module M700

When capacitor C310 shorts, a much higher than normal horizontal pulse is also fed to resistor R716, causing it to burn to an almost open condition and blanker transistor Q700 to split apart.

Replace burnt resistor R716 and damaged transistor Q700.

Module M400

When capacitor C310 shorts, a much higher than nor-



continued on page 48

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## COLORFAX...

continued from page 47

mal horizontal pulse is fed also to module M400, causing resistor R439 to burn, capacitor C442 to short, and transistor Q402 to turn ON very hard and conduct heavily, resulting in damage to resistor R447.

Replace burnt resistor R439, shorted capacitor C442 and damaged resistor R447.

## MOTOROLA

Color-TV Chassis Early 16 and 18TS-929—Fuse Failing for No Apparent Reason

It is assumed that the horizontal driver, output and damper tubes are good and that the horizontal-output tube grid bias has been checked and is near normal.

If the horizontal output cathode fuse is the clip-in type, use a special red-banded .5a fuse (Fuse Part No. 65-138460). If fuse is a soldered-in type, install a special kit (Part No. 65P65192A91).

It is suggested that the following checks be made in the following order:

Beam current may be set too high. Allow five minute warm up time, then measure the boost voltage with no raster (zero beam current, using the 1000v dc scale on the meter). In manual operation and with the BRIGHTNESS control at maximum, adjust the MASTER BRIGHTNESS control for a 50v drop in the meter reading.

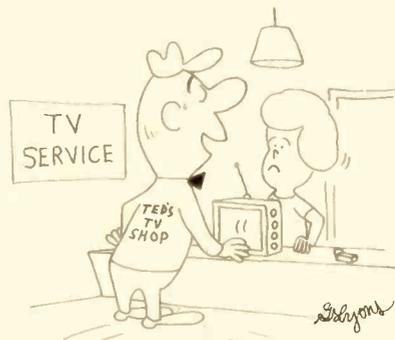
Check pincushion transformer T-500 for overheating or

for discolored insulation. Replace any defective transformers with a new type: TS-929B45 and earlier, use 25D70067A01; TS-929B46 and later, use 25P65192A67.

If the above steps do not solve the problem, install a new type horizontal output transformer (Part No. 24P65174A43). It also includes a .6a fuse which should be installed. (Do not use the .6a fuse used with the old-type transformer.)

If the problem causes the horizontal-output tube plate to turn red and trips the circuit breaker (blows cathode fuse on early TS-929), check the following components and voltages:

Check for grid drive bias on the horizontal-output tube. If present, inspect pincushion transformer T-500. If insulation is discolored, remove leads 4 and 6 to the primary of T-500. If overheating is corrected, change the transformer.



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The new RCA WR-538A Super Chro-Bar is rugged inside because it has a high-quality glass epoxy PCB and the latest digital-IC circuits. Outside, its abuse-resistant die-cast aluminum case provides the kind of rugged protection you need for hard day-to-day field use.

Added features:

- 75 ohm/300 ohm output for MATV/CATV/CCTV
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**RCA** Electronic Instruments

\*Optional Price

... for more details circle 125 on Reader Service Card

## TECHNICAL DIGEST

The material used in this section is selected from information supplied through the cooperation of the respective manufacturers or their agencies.

### ADMIRAL

TV Chassis H3/H4/K2/K3/K4—Weaving or Pulling in the Picture

Weaving or pulling in the picture can possibly be caused by heater-to-cathode leakage in the horizontal oscillator tube, 8LT8. This condition will appear as if the electrolytic capacitor in the low voltage power supply is defective. Confirm this possibility by substituting another horizontal-oscillator tube.

### Servicing Solid-State TV Receivers

Most electronic technicians are pretty well aware by now of the special precautions that must be taken when servicing solid-state devices, but it is so easy to forget and take certain shortcuts that were considered perfectly acceptable before the advent of solid-state that we feel a reminder is in order.

Take, for instance, the formerly accepted practice of using a screwdriver to draw an arc to test for the presence of electrical potential, or to bleed off the charge from a picture tube or electrolytic capacitor. This practice is absolute-

ly forbidden in solid-state servicing. It will almost invariably damage solid-state components, even if there is no immediately apparent damage, the life of one or more components may have been seriously shortened, thus resulting in subsequent failures.

Troubleshooting in solid-state TV chassis consists primarily of voltage and resistance measurements. Such procedures, using the appropriate instruments, should disclose most defects in any circuit.

### RCA CORP.

TV Chassis KCS192—Horizontal Retrace Blanking and Second Video IF Circuits

A new hybrid chassis, KCS192, is introduced this year in a 16-in. (measured diagonally) B/W portable TV receiver, Model AS164. This chassis is electrically similar to hybrid chassis KCS189, which was introduced last fall in the 9-in. (measured diagonally) models; and all-tube-type chassis KCS188, which was introduced previously in 12-in. (measured diagonally) models.

Like the KCS189, the KCS192 chassis is equipped with a solid-state second Video IF circuit, shown in the illustration. However, in the KCS192 chassis double-tuned inter-stage coupling (T206, C222 and T207) is used between the tube-equipped first Video IF instead of the untuned transformer coupling used in the KCS189. Ferrite beads FB201, FB203 and FB205 are included in the design to eliminate the possibility of "beat" interference on Channel 8.

Another significant difference between the KCS192 and *continued on page 50*

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- ★ Convergence Yoke
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- ★ 4' Anode Extension
- ★ 4' 90 degree CRT Extension
- ★ 4' Yoke Extension
- ★ Convergence Load
- ★ 4 Yoke adaptors for Solid State



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found in your junk box.

A point of interest is that the battery holder is made out of a tube shield. Take the shield and shape it to the battery as shown in the illustration and solder it to the tuner shield.

The ON/OFF switch is eliminated by removing the battery clip when not in use, saving the cost of a switch. The

## 1974 TV SETS...

*continued from page 33*

needed to operate color-TV sets.

Zenith's new electronic tuning system is incorporated in 15 receivers covering the 17-, 19-, and 25-in. (measured diagonally) screen sizes. It makes possible "custom programming" of as many as 14 VHF and UHF channels operating in the area in any sequence desired. Consumer controls at the set in all models with electronic tuning are concealed under a vertical access panel at the side of the picture tube.

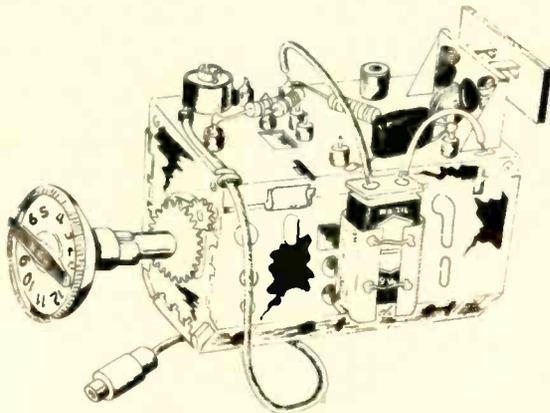
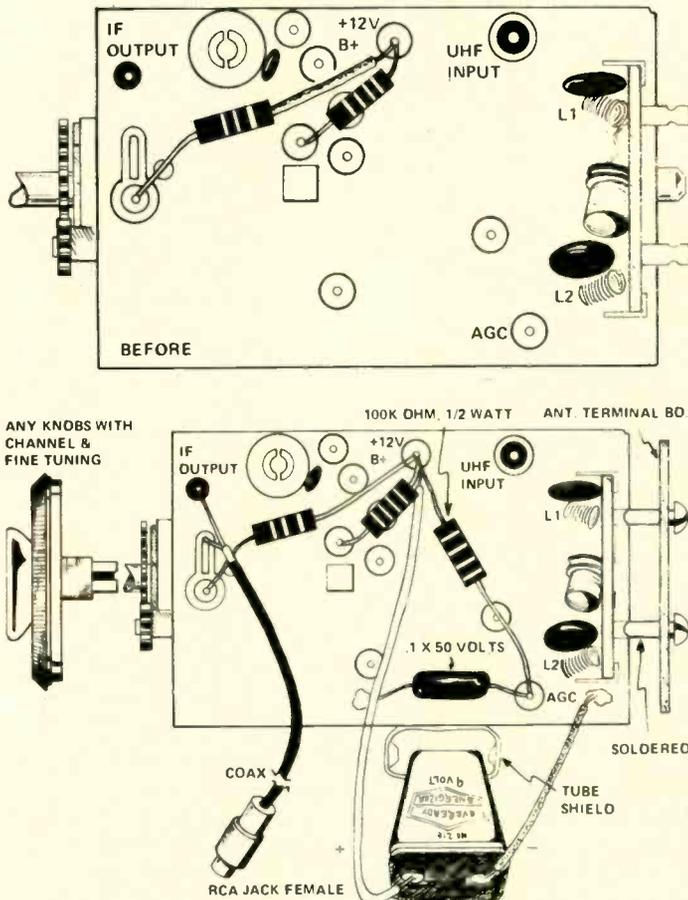
In remote control tuning, the new Zenith line offers two new systems—the Space Command 600Z for 25-in. and 19-in. diagonal solid-state sets, and the Space Command 500X in a 17-in. diagonal table model. The remote system is offered in 19 different sets in the 1974 color-TV line.

Chromatic tuning is offered in 47 receivers with a front-of-the-set control button. Pressing the button selects Automatic Tint Guard and factory preset precision adjustments of BRIGHTNESS, CONTRAST, COLOR LEVEL and TINT controls.

Zenith features revolutionary styling for the B/W-TV line for 1974. New colors, shapes and materials have been used to give them a bright, contemporary look.

A 12-in. (measured diagonally) TV set on a swivel-and-tilt base which can be swiveled 360° or tilted 10° up or down, is also offered.

Larger portable B/W receivers have been redesigned. Some new 19-in. diagonal portables combine an "A-line" design and a cantilevered base for a distinctive look. ■



life of the battery is estimated at better than 15 hr. The total amount of battery drain is approximately 10ma with or without signal.

Basic Parts Needed :

One each: VHF tuner, No. 54-17907-3; resistor, 100K. 1/2w; capacitor, .1µf, 50v; battery, No. 9VEV216 or equivalent.

Accessories From Junk Box:

One each: channel indicator knob; fine tuning knob; antenna terminal board; tube shield—spin type; battery clip—taken from discarded 9v battery; coax cable—small flexible type with an RCA female jack.



"You had put the back on upside down, and left your FIX IT YOURSELF BOOK inside!"

## NEW PRODUCTS

For additional information on products described in this section, circle the numbers on Reader Service Card. Requests will be handled promptly.

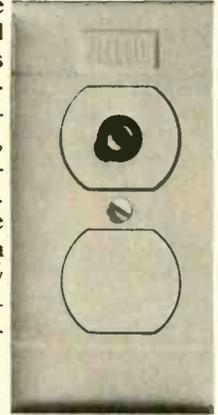
### SOUND LEVEL METER 703

*Measures and monitors noise environments*

A new, hand-size, easy-to-read-and-operate Sound Level Meter (SLM) is designed to economically determine sound pressure levels and to help pinpoint "noise pollution" sources such as found in industrial and audio systems in concert halls, etc. The portable, Type 3 SLM, Model 370, is a general purpose survey sound pressure level meter that meets or exceeds ANSI specifications, SI. 4-1971, for Type 3 sound level meters. The simple to operate unit has an operational range of from 40dB to 140dB in nine steps, an omnidirectional lead-zirconate-titanate ceramic microphone and selectable A, B and C weighted response. It is powered by two 9v transistor radio batteries with an estimated service life of approximately 40 hr. The output for the meter will reportedly not overload for input levels of up to 8dB above maximum scale reading for frequencies from 63Hz to 8000Hz on any range. The unit features a meter suspension movement with 1.5 in. dial length, and a flat black aluminum case with high impact plastic cone measuring 7¼ in. long by 2 in. deep by 3 in. wide. Triplett Corp.



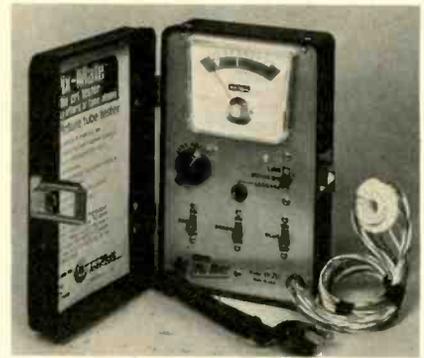
with insertion loss between 1.2dB and 0.5dB maximum at UHF. Equipped with gamma "G" receptacles, the unit will accept 75Ω and 300Ω push-on plugs. Simple crimp-on patented universal bushings and a positive-gripping clutch reportedly make fast, solderless connections to the feeder. The unit can be flush mounted in standard 2 in. by 4 in. electrical boxes. Jerrold Electronics Corp.



### PICTURE TUBE TESTER 705

*Three-color scale and line adjustment for accuracy*

A Model KP710 Picture Tube Tester is designed for portable, "on the job" use as well as on the bench. Economic pricing makes it "affordable" to



take on every call. The picture tube checker (Telematic Pix Mate) checks each gun for emission, leakage and shorts, with a legible three-color scale and line adjustment for accuracy. It reportedly checks all 90° tubes. An adapter is available for 70° picture tubes. TeleMatic.

### MATV TAP-OFF 704

*Available with four different isolation values*

A new low-loss extended-range tap-off for Master Antenna TV (MATV) systems is based on the company's ULTRA-TAP design. Features of the new units reportedly include: lower insertion loss; extended passband to include sub-channels VHF, FM and UHF; adaptability for extra services. Designated Model UT-82 (single output), the tap-off is available with four different isolation values. Models B, Y, R, W ranging from 12dB to 30dB

### ANTENNA 706

*Higher UHF gain and electrical isolation*

A new series of VHF/UHF Crossfire antennas incorporating new-type colinear elements and a specially designed corner reflector are designed to provide better performance on the UHF band, particularly the lower channels which carry most of the UHF programming. The antenna, in eight models, is called the "Ultra-Hi Crossfire" and is designed for all types of reception areas. The UHF section has been specially engineered to avoid

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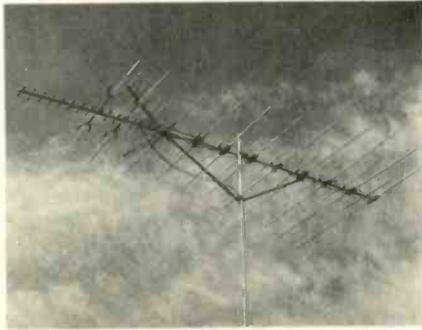
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interference with the rest of the antenna. The antennas replace the previous VHF/UHF Crossfires model for model. Previous tubular construction of the colinear elements has been replaced by stronger metal stampings,

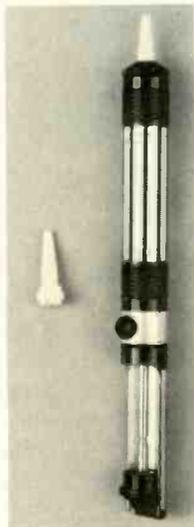


which also fold more compactly and fit into smaller cartons. The antenna has a single set of terminals and includes a band splitter which employs separate VHF and UHF circuits, affording complete electrical isolation between outputs. Channel Master.

## SOLDER VACUUM 707

*Includes safety feature to prevent eye injury*

A self-contained vacuum tool for fast, efficient desoldering of components on PC boards or terminal strips is designed. In operation, the solder



is first melted, then the suction tip is placed in contact with the molten puddle and the trigger button is pressed. Because of a high onset of vacuum, the solder is sucked up and the tool then cleans itself automatically when it is reloaded. The tool called "Mini," has a 20mm by 2mm Teflon tip which is ideal in restricted spaces. It measures 8½-in. long and

features a design to prevent eye injury. Consell.

## AUDIO DISTRIBUTION AMPLIFIER 708

*Provides six completely isolated balanced outputs*

A Model DA-6 distribution amplifier is designed to bridge or match a 600Ω audio line, balanced or unbalanced, and provide six completely

*continued on page 54*

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When you're finished cleaning, you can re-lubricate just as easily, with Chemtronics premium cleaner lubricants. Like Tun-O-Foam, Tun-O-Brite, Tun-O-Lube or Color Lube.

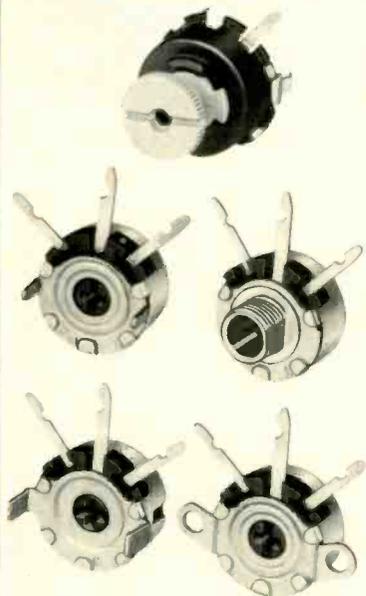
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DISTRIBUTOR PRODUCTS



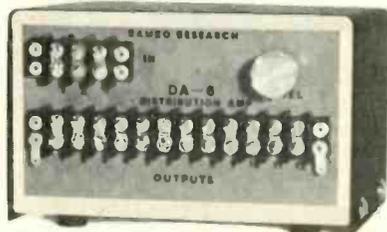
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## NEW PRODUCTS...

*continued from page 53*

isolated balanced outputs. Integrated circuits are used to achieve the following manufacturer performance characteristics: 25dB gain; +20dB output maximum; 0.1% or less distortion; ±0.5dB response; 10Hz-20kHz. The



unique circuitry allows the outputs to work into any impedance over 125Ω without affecting either response or distortion. The unit contains its own internal power supply and operates off 115v ac/60Hz. Ramko Research.

### FIELD STRENGTH METER 709

*Designed for the antenna installer*

A low-cost antenna installation meter, Model FS-380, reportedly measures absolute voltage levels, identifies picture and sound carriers, identifies interfering stations, measures daily signal fluctuations and is very helpful for conducting antenna surveys and setting up multiple antenna installations. It features a VHF range of 25 to 10,000μv (both ranges easily increased by using fixed external input pads). DBmv scales from -20 to +40dBmv, separate VHF and UHF tuning sections, a phone jack for identifying sound carriers (earphone provided), easy built-in calibration, standard "F" connectors, completely portable, measures all 82 TV channel pictures and sound levels as well as all carriers between 88 and 174MHz. The unit is supplied with a rugged carrying case and powered by a 9v battery. Winegard Co.



### MULTI-TESTER 710

*Taut-band suspension meter with decibel scale*

Introduced is the 22-range "bench style" Multi-tester, No. H3-365, with decibel scale and featuring a taut-band suspension that enables its indi-

cating needle to be set at any position up to center scale. The units fused

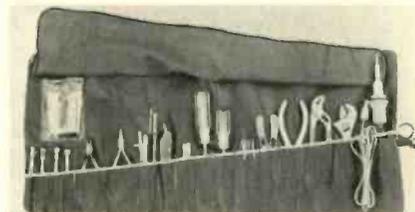


circuits prevent accidental overloads or burnout, and it is equipped with a special switch for polarity inversion. GC Electronics.

### ELECTRONIC TOOL KIT 711

*25 professional tools in heavy-duty roll pouch*

A new roll pouch kit containing 25 professional tools is designed primarily for service technicians, and advanced students of electronics. The entire assortment is neatly packaged in a heavy-duty roll pouch. Tools reportedly included in the JTK-80 kit are a soldering iron, double-end solder aid, combination wire stripper/cutter, reverse action heat-sink tweez-



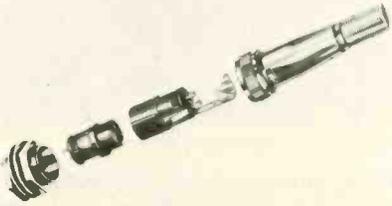
ers, 8-in. adjustable wrench, six-key hex wrench set, six-key spline wrench set, two Phillips driver blades (No. 1 and 2), two regular-slot driver blades (3/16 in. and 5/16 in.), four nut-driver blades (3/16 in., ¼ in., 5/16 in., and ¾ in.), two handles for the driver blades, two pocket screwdrivers (No. 0 Phillips and 3/32 in. regular-slot), a general purpose alignment tool, burnisher, electrician's pocket knife, long nose pliers (6 in.), miniature chain-nose pliers (4¾ in.), miniature diagonal cutters (4¼ in.), a pair of slip-lock pliers, and a 6-in. stainless steel scale. Jensen Tools and Alloys.

### AUDIO CONNECTOR 712

*Can be made up as male or female gender*

A new advanced series of miniaturized connectors is designed with interchangeable inserts which allow any plug or receptacle to be male or female. Interchangeable inserts provide

the user with maximum flexibility. The connector is designed so that the housing shields internal connections



and provides ground (common) connections without using a pin/contact. Inserts, molded of stable high-strength black plastic, are completely interchangeable between plug and receptacle housings at anytime. These inserts are keyed to housings and male and female inserts are polarized to prevent mismatching. The cord plug accepts cables up to 9/32-in. O.D. Receptacles are designed for flange mount, rear or front panel locknut mount. Switchcraft, Inc.

## WISE

713

*Holds material in practically any position*

Designed is a vise called PanaVise that rotates the locking base 360°, full circle. The vice head revolves 360°



and the tilt action is 180°. The tool holds the material firmly in place and by the adjustment of one pressure knob, the craftsman can place the work in any desired position. It is

reportedly easily rotated, tipped, tilted, elevated, lowered, moved left or right or turned over. Colbert Industries.

## TAPE-HEAD CLEANER

714

*Formulated spray solvent for all tape heads*

A specially formulated aerosol spray solvent for cleaning of broadcast, industrial and home entertainment tape heads is available. Designated CD-270, the non-flammable, non-conductive and odorless spray reportedly contains no abrasive chemicals which might cause undue wear on capstans, tape heads or any other ingredient which may cause plastic parts to degrade. The solvent



*continued on page 56*

# These new IR devices make replacing Zenith Semiconductors a local buy... everywhere!



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## NEW PRODUCTS...

continued from page 55

was especially designed for use with broadcast VTR's, tape mechanisms and professional high-quality audio decks and reportedly will not affect any delicate mechanisms, leave residue while removing dust, dirt or atmospheric film deposits. Cole-Flex Corp.

### CASSETTE HEAD ALIGNER 715

*Allows precision alignment of height, zenith and azimuth*

A new instrument, the Collimeter V, is designed for rapid, accurate head and guide alignment of cassette recorders. The instrument allows precision alignment in all three axis—height, zenith and azimuth—offering more consistent tape tracking, reproduction and fidelity. The instrument is designed for use with all stereo and

mono machines by home and auto service technicians. By employing precision scribe lines and a magnified viewing window, the user is allowed to check and or adjust guides and heads



easier and more rapidly than before. In addition, it enables checks of head wear with a special wear pattern fluid included. It also comes complete with its own illumination source and storage case. Ramko Research.

### TONE GENERATOR 716

*Microphone-level signal source*

The Model A15TG Tone Generator is a portable, self-powered, microphone-level signal source which can be used in setting up and troubleshooting audio equipment in recording, broadcasting, or sound reinforcement applications. The generator reportedly will drive low-impedance, balanced-line inputs like those normally used in conjunction with the company's A15 Series products. Housed in a 3/4-in. diameter case, it has a professional three-pin male con-



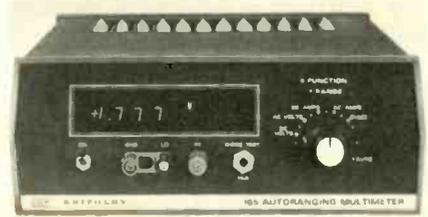
necter at the output end. The opposite end houses a miniature mercury battery with a threaded end cap for replacement of the battery. Shure Brothers Inc.

### DIGITAL AC/DC MULTIMETER

*Fully-automatic with 3 1/2-digit readout* 717

The Model 165 AC/DC Digital Multimeter is said to include such features as 10 $\mu$ v ac and dc resolution, ac and dc current resistance, high-level overload protection without fuses, and a large direct-reading LED display. On the six ac voltage ranges it is designed to permit measurements over a wide frequency range of 20Hz to 20kHz with specified mid-

band accuracies of 0.7% to 0.9%.



The ac current ranges reportedly cover five decades from 0.1 $\mu$ a resolution to 2a, with the same frequency range as ac voltage; while the dc current ranges span seven full-scale decades, with overall sensitivity of 1na to 2a. Full range voltage drop is only 10mv except on the la range where it is 100mv. Resistance ranges also cover seven decades, with 0.1 $\Omega$  to 200M sensitivity. The instrument reportedly provides better than 60dB rejection of line-frequency noise that may be superimposed on an input signal. Keithley Instruments Inc.

### VOLT/OHM METER 718

*Offers protection against reversal and overload*

A VOM, Model LT-70, is designed with full protection against polarity reversal and overload. The meter will reportedly read as low as 0.25v full scale and 250 $\mu$ a on normal readings for measurements of small solid-state dc voltages and currents. LI scales are also said to be included for measuring back currents as low as 75 $\mu$ a to check



diode and transistor quality. Its sensitivity is reportedly 20K/v dc and 8K/v ac, with resistances rated up to 40M. Other specifications include the following: nine current ranges; DC—75 $\mu$ a to 2.5a and AC—2.5a. Voltage ranges from 0.25v to 1kv DC (10 steps) and 10v to 250v ac (3 steps). The output in the 10v range of -20 to +22dB, ac and in the 50v range

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<input type="checkbox"/> SK3040-HEP712 (list \$3.75 ea.)	5 for \$3.75
<input type="checkbox"/> SK3041-HEP245 (list \$4.20 ea.)	5 for \$4.20
<input type="checkbox"/> SK3052-HEP642 (list \$3.90 ea.)	5 for \$3.90
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<input type="checkbox"/> SK3122-HEP736 (list \$2.20 ea.)	5 for \$2.20
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GENERAL

<input type="checkbox"/> 3 Amp. 1000PIV Rectifier	40 for \$5.00
<input type="checkbox"/> Philco Color Fly-Equiv. Y109 Yoke	\$4.95
<input type="checkbox"/> Philco Color Fly-32-10132-1	\$4.95
<input type="checkbox"/> RCA Color Fly-109221	\$4.95

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<input type="checkbox"/> 340MFD at 250v	10 at 250v	3 for \$1.00
<input type="checkbox"/> 200MFD at 350v	40 at 350v	3 for \$1.00
<input type="checkbox"/> 250MFD at 150v	Mallory	3 for \$1.00
<input type="checkbox"/> 100MFD at 250v	Sprag	3 for \$1.00
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of +20 to +36dB ac. It is powered by two 1.5v batteries and one 22.5v battery. The instrument measures 5¾ in. H by 4 in. W by 2¼ in. D. Leader Instruments Corp.

## TV CAMERA

719

*Charge-coupled device sensors used in place of vidicon tube*

An all solid-state TV camera that is approximately the size of a cigarette package and operates in conditions ranging from bright sunlight to subdued room light is developed. The Model MV-100 camera is the first in a series that utilize charge-coupled device (CCD) sensors in place of conventional vidicon tubes. The result is a camera that is extremely small (measuring 3½ by 1½ by 2¼ in.) and lightweight (6 oz), has low power consumption (1w) and operates under a wide dynamic range of light levels. The camera uses an array of 10,000 photosensors assembled on a standard 24-pin dual-in-line package. The CCD sensors are basically bulk silicon that release charge carriers in proportion to the amount of light reflected from the scene. These charge carriers are transferred by a clocking system and transmitted to a TV receiver as standard TV signals. Fairchild.



## TRANSISTOR TESTER

720

*Tests Bipolar transistors in circuit*

A Model 120 Automatic Transistor Tester is designed to quickly isolate faulty transistors in-or-out-of-circuit. The unit will reportedly operate in almost any circuit where curve tracers fail, executing a two-phase test sequence so that testing becomes possible in low impedance circuits. RF, audio and regulator transistors are said to now be tested reliably, in-circuit. Three LEDs indicate if the transistor is an NPN, PNP or faulty. Conveniently packaged, the tester reportedly includes rechargeable Ni-Cad batteries and an in-circuit probe. Testline Instruments.

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In Canada: E-V of Canada, Ltd., Gananoque, Ontario

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## DEALER SHOWCASE

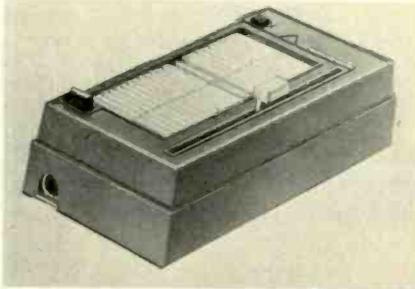
For additional information on products described in this section, circle the numbers on Reader Service Card. Requests will be handled promptly.

### REPERTORY DIALER

721

*Compatibility to meet all domestic telephone standards*

A contemporary 50 address repertory dialer, the Acro-Dial 50, is designed to handle over 85 percent of



the market needs. The unit is reportedly an economical desk or wall mounted module that meets telephone company standards. Simple two-wire connection is quickly attached to any phone and does not require special tools. It is conveniently programmed

by removing address cards and writing in the name of the party to be dialed, reinsert, plug-in programmer and dial the number. For reliability, it has minimal mechanical drives and solid-state electronic circuits. The magnetic storage medium uses long wearing chromium dioxide tape. The dimensions of the unit are 2 1/4 in. H by 4 11/16 in. W by 10 in. L and it is molded of high-impact plastic. Acron Corp.

### TAPE PLAYER CLEANING KIT

722

*Contains the correct recorder care product*

The Model QM-7 inspection and cleaning kit is produced for all eight-track cartridge machines. The kit is



said to contain exactly the right recorder care products required to inspect and clean the recorder. The Inspection & Cleaning Kit contains one each of QM-103 Spray Tape/Head Cleaner, QM-182 Head/Capstan Cleaner, QM-504 Maintenance Brush and QM-509 Inspection Light. Nortronic Co. Inc.

### REMOTE TV CHANNEL CHANGER

723

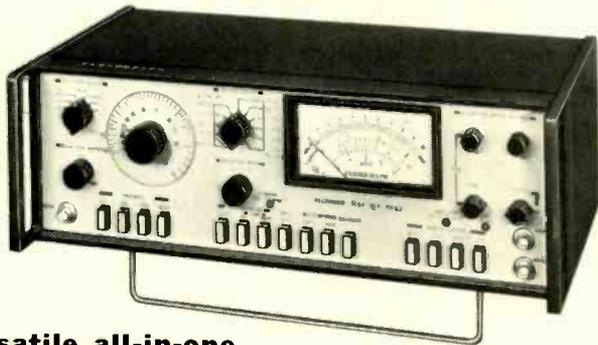
*Changes channels and turns TV set ON or OFF*

Introduced is the Daltone TV Channel Changer which reportedly converts any standard rotary knob tuner into a wireless remote control TV. The wireless remote control unit changes all VHF channels and can turn the TV



set ON or OFF. Requiring no special tools, installation is simple—remove the channel selector knob from your TV set and replace it with the Channel Selector Dial. Then plug in the line cord from the unit to an ac outlet. By simply pressing the channel changer button on the remote unit, channels change on command from anywhere in the room. Channel selections may also be used manually if desired. Dalamal Electronics Corp.

## Everything you need for complete tape recorder testing. Ferrograph RTS-2 with Auxiliary Unit

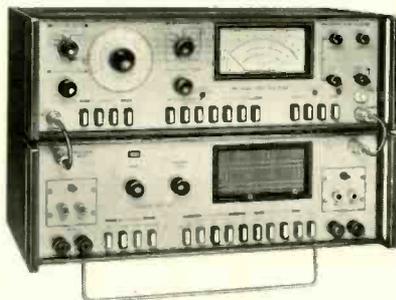


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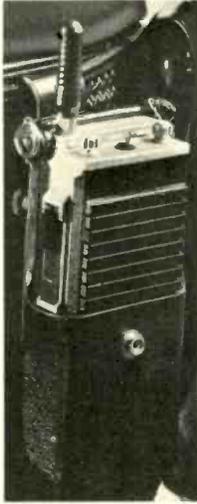
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## TWO-WAY RADIO

724

*Plug-in modular construction for simplified servicing*

An ultra-compact two-way radio, Model FM545, features plug-in modular construction for simplified servicing. Sophisticated "dual phase-lock loop" circuitry reportedly keeps the receiver on frequency even if the transmitter being received should drift off frequency. The unit is said to be rugged, reliable and watertight to Coast Guard specifications (optional). The rugged aluminum frame and high impact polycarbonate cover can reportedly withstand the rough treatment a portable radio can receive. The two-way radio set measures 6.8 in. H by 2.6 in. W by 1.5 in. D and weighs 21 oz. E. F. Johnson Co.



in use. You may use your phone to dictate, record your answering service pick-ups, record incoming orders, etc.,



all automatically on a standard cassette recorder. This "Call-Track System" consists of a new compact telephone recorder and a switching coupler. Usable with any model Phone-Chek system, the coupler tracks the user's calls on an office-type multi-line telephone. What ever line is being used, the coupler automatically contacts the line in use. The unit measures 2 in. by 4 in. by 6 in. and accepts standard cassettes up to 90 minutes per side. Answer Line Assoc. Inc.

## CASSETTE RECORDER

725

*Low cost, with built-in condenser mike and automatic shut-off*

A Model 6393 Cassette Player/Recorder is designed to appeal to the col-



lege and youth market. The portable ac/dc unit has a sensitive built-in condenser mike and automatic shut-off. It also features built-in ACL, piano-key controls, wood-grain styling and good tonal quality. Channel Master.

## TELEPHONE RECORDER

726

*Monitors any phone or its extension in use*

A compact Automatic Line-Switching Telephone Recorder System, Phone-Chek, Model PC-Four-CT5 is designed to automatically monitor your telephone conversations when any phone or any of its extensions are

## PORTABLE B/W TV

727

*All solid-state circuitry and operates on ac or dc*

A new B/W-TV receiver with an 11-in. (measured diagonally) screen is introduced. The compact unit reportedly weighs a little more than 14 lb. and can be carried easily from room to room, or outside the home. The set has all solid-state circuitry and operates on ac or dc. The controls are front mounted as is the speaker. A ear-phone is provided for private listening and it comes in a black with chrome trim cabinet. Sony Corp. of America.



## SSB CB TRANSCEIVER

728

*Small enough for any mobile application*

The Sideband III, a 23 channel



SSB only Citizens Band transceiver,

has eliminated AM transmitter components to permit the radio to be reduced to a size small enough for any mobile application. Features include public address, noise blanker, a back lighted meter, plug-in microphone, plus all the necessary controls for proper SSB operation. The product, which is reportedly completely synthesized for 23 channel operation, has a double-conversion receiver with sensitivity better than  $1\mu\text{v}$ . The unit measures 2 1/16 in. by 5 7/8 in. by 8 7/8 in. and weighs 4 lb. Linear Systems Inc.

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## TECHNICAL LITERATURE

### Speakers

Illustrated literature provides complete mechanical and electrical data, application recommendations and a list of options for the seven-model WR/WT line of element-protected speakers. The all-metal single and coaxial units are said to provide music fidelity, high intelligibility voice signals and intercom efficiency for applications including hotels/motels, leisure areas, shopping malls, schools, service and industrial facilities. Atlas Sound, Division of American Trading and Production Corp., 10 Pomeroy Rd., Parsippany, N.J. 07054.

### Electrolytic Capacitors

A 56-page replacement guide for electrolytic twist prong capacitors lists 276 capacitors that can reportedly replace 97% of all the twist prong units now in service. The brochure tabulates the capacitors in three ways; by catalog number, OEM number (manufacturer's name) and by ratings. Cornell Dubilier Electronics, 150 Ave. L, Newark, N. J. 07101.

### Phono Cartridges

A new phono-cartridge catalog, that is claimed to be the most complete guide ever published, includes a set-model-to-cartridge listing which makes possible the identification of a replacement cartridge for thousands of sets without knowing the make and model of the cartridge. Compiled over five years of study and research, this exclusive reference simplifies the duplication of correct replacements for most of the major U.S. and many foreign

makes. Cross-indexing is also provided by cartridge make and model number as well as by visual methods which includes measurements of Japanese replacements that are difficult to identify. Pfanstiehl, 3300 Washington St., Waukegan, Ill. 60085.

### Test Instruments

A 16-page test instrument catalog, No. 59-T, features an easy-to-read tester selection guide that allows direct comparison of performance characteristics of each model. The catalog lists the full range of VOM's and accessories, including general-purpose, special-feature, laboratory-accuracy, digital FET portables, leakage adaptors, cases, shunts, probes, and tester stands. Each model is shown with its technical characteristics and price detailed, and its most pertinent performance features succinctly listed. The handy selection chart gives a quick comparison of ohmmeter, ac and dc voltages, and dc current readings, complete with ranges, number of ranges, sensitivity and accuracy. Triplett Corp., Bluffton, Ohio 45817.

### Engineering Manual and Purchasing Guide

An Engineering Manual and Purchasing Guide, Catalog No. 740, includes engineering drawings of all included electrical components. All physical dimensions are given to allow efficient design of electronic "packages" before components are purchased and the electrical properties of all items are included. These include IC's, LED's, tubes, relays, timers, transformers, resistors, capacitors, connectors, coils, chokes, sockets, plugs, jacks, switches, fuses, batteries, clips, lamps, wire and cable, test equipment, intercoms, power supplies, electronic counters, sound systems, chemicals, books, tools and equipment. Any-

one can now obtain their catalog for the cost of postage and handling for \$1.00. Allied Electronics, 2400 W. Washington Blvd., Chicago, Ill. 60612.

### Soldering Equipment

A four-page catalog, No. 240-CP, describes conduction and resistance type soldering equipment, thermal wirestrippers, tubing shrinkers and ultrasonic cleaners. Also included is information on special catalogs listing hundreds of AB industrial soldering products. A. E. H. Co., 6110 Cass Ave., Detroit, Mich. 48202.

### Audio Equipment Selling Guide

A selling guide called "The Hitachi Maxi-Fi Guide," is a compilation of audio basics written to be used by retail salesmen. It is a primer and introduction to the most commonly used audio terms. Complete with definitions, illustrations and diagrams, it runs the gamut from "acoustic suspension speaker" all the way through "woofer" and "wow." As a special feature, it includes one of the clearest explanations anywhere of the various systems for four-channel sound. Advertising Dept., Hitachi Sales Corporation of America, 48-50 34th St., Long Island City, N.Y. 11101.

### CCTV Equipment and Accessories

A 15-page distributor price schedule for 1973 is now available from one of the largest suppliers of CCTV accessories and equipment in the U.S.A. GBC Closed Circuit TV Corp., 74 Fifth Ave., New York, N.Y. 10011.

### Digital Timing and Measuring Devices

A colorful six-page catalog is available describing a total line of digital products. Listed are low-cost programming instruments and controls, timers, clocks, counting and measuring devices. Also included is a complete listing of modular display units for custom digital instrumentation and a section outlining their digital clock, multimeter and frequency counter kits. E S Enterprises, 10418 La Cienega Blvd., Inglewood, Calif. 90304.

### Wire and Cable

A 72-page publication features a wide line of wire and cable products with a host of new designs. Among the new products is a miniature two-

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conductor shielded cable designed for automatic stripping equipment, an expanded line of multiple-pair audio cables, a new line of audio, data, sound and control cables supplied in polyethylene conduit for direct burial and lines of preterminated coaxial TV and CB-amateur cables. A full section of the catalog is devoted to a range of appliance, power-supply and extension cords. Also featured are microphone cables, retractile cords and cables, antenna rotator cables, hookup wire, etc. There are cable selector charts also included. Belden Corp., Electronic Div., 2000 S. Batavia Ave., Geneva, Ill. 60134.

### Soldering Tools

A full-line catalog, No. 523, on soldering tools is now available, which is condensed and simplified for the consumer, covering all mainline products with accents on pre-assembled soldering kits. Informative instructions are given for tip use and maintenance, an all important feature of the catalog. Soldering irons, desoldering equipment, production aids and a new heat gun are also featured. Ungar, Div. of Eldon Industries, Inc., 233 E. Manville, Compton, Calif. 90220.

### Tools

A 96-page handbook, "Tools for Electronic Assembly and Precision Mechanics," is available. The catalogue describes over 1900 individual items of particular interest. A solder section lists tin-lead alloys as well as eutectic alloys, copper-bearing, coreless, silver-bearing, aluminum and low melting-point solders. Also featured are four pages of technical data on tool selection. Jensen Tools and Alloys, 4117 N. 44th St., Phoenix, Ariz. 85018.

### Outdoor Antennas

An outdoor antenna full-line chart, called "Increase Your Viewing Pleasure" is now available. This chart is a complete buyers and sellers guide to outdoor antennas—UHF-VHF/FM, VHF/FM, UHF-only, FM-only; rotators, including the newly introduced Selecta-channel 10W606; three different types of antenna mounting kits and a revolutionary new Mini-State antenna system with an exclusive hand-held rotator remote control unit. Used as a point-of-purchase piece, this full-color 11- by 44-in. chart permits dealers to show the variety of antennas to fill any need, the inside com-

ponents of the Mini-State antenna and cabinet design of the rotators. It also lists the components of the antenna mounting kits that are available. RCA Parts and Accessories, P.O. Box 100, Deptford, N.J. 08096.

### Electronic Components and Equipment

A 68-page catalog, No. FR-73-A, is available featuring over 570 items—illustrated, described and priced. Everything necessary for the proper care and maintenance of sound equipment, plus a complete assortment of security alarms, antennas and installation hardware are covered. GC Electronics Division of Hydrometals, Inc., 400 South Wyman, Rockford, Ill.

### Chemical Sprays

A four-page catalog is available on the company's specially formulated line of industrial grade chemical aerosol sprays. The catalog includes photographs, applications and government specifications for: Contact Cleaner Electrical grade; 1, 1, 1, Trichloroethane Solvent and Cleaner; Magnetic Tape Head Cleaner; Solder Flux Remover and Cleaner; High-Temperature Dry Lubricant; Demoisturizer and Water Repellent Lubricant and the Teflon Dry Lubricant and Mold Release. Cole-Flex Corporation, 91 Cabot St., W. Babylon, N.Y. 11704.

### Communications Equipment

An 18-page color brochure is available entitled "Extensions of Control for Physical Distribution," describing the impact communications equipment can have on physical distribution efficiency. It covers a wide variety of communication equipment applica-

tions that can significantly reduce physical distribution costs and improve overall operational efficiency. Mobile radios, mobile teleprinters, portable radios, radio pagers and CCTV are only a few of the types of equipment mentioned. Motorola Communications and Electronics, Inc., 1301 E. Algonquin Rd., Schaumburg, Ill. 60172.

### Phono Parts

A 240-page catalog listing over 690 phonograph cartridges, 650 phonograph needles, 400 wheels and belts, plus a complete listing of phonograph changer motors, center posts, 45 adaptors, plug-in heads, shells, cartridge mounts and many accessory items is now available. There are numerical, alphabetical and sectional indexes. Each product line is tab indexed. The catalog can be obtained through any EV•Game distributor.



"The wife insisted that I quit trying to fix our TV!"

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ICC/Mullard & Raytheon Tubes  
Telematic Test Rigs

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(Signature) Richard Moeller  
Treasurer

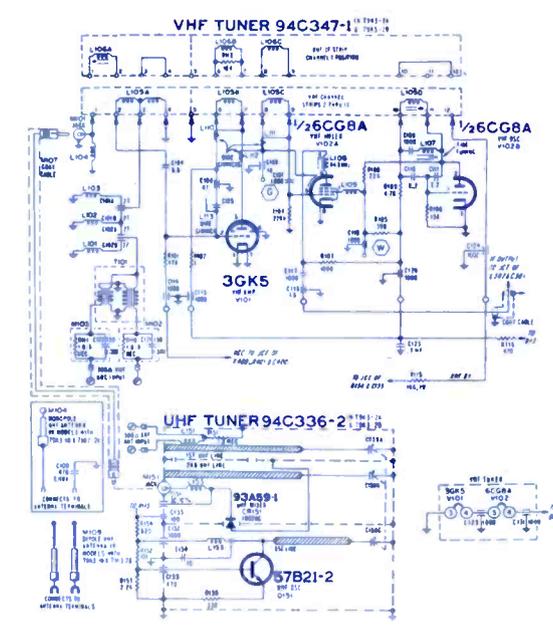
COMPLETE MANUFACTURER'S CIRCUIT DIAGRAMS  
AND TECHNICAL INFORMATION FOR 5 NEW SETS

GROUP  
**255**

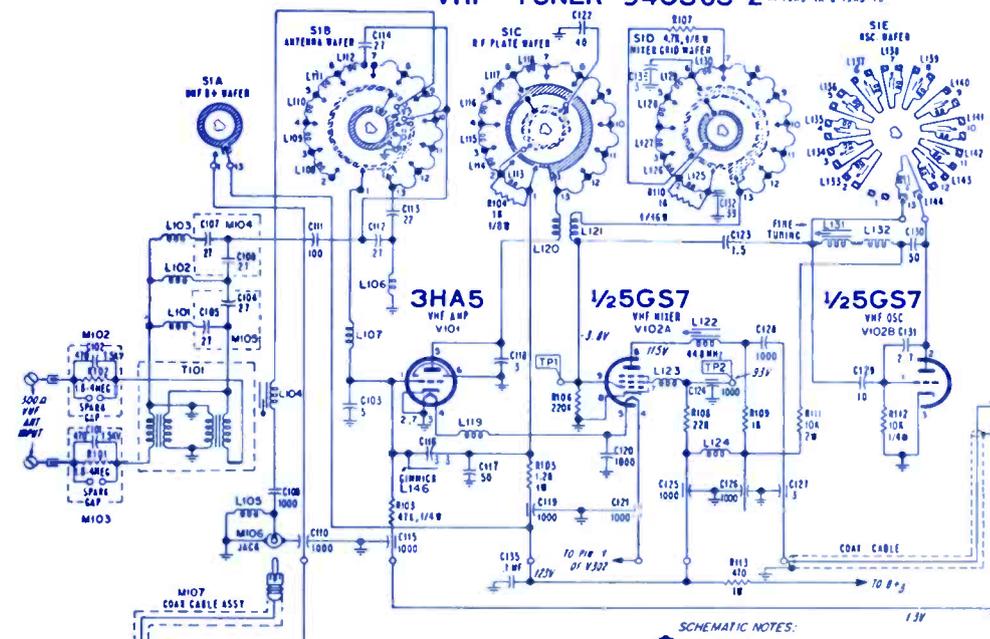
ADmiral	Schematic No.	1495	MAGNAVOX	Schematic No.	1498
TV Chassis T9K3-1A,1B			Color-TV Chassis T981,T982,T987		
AIRLINE		1499	ZENITH		1496
TV Models GAI-11204A,B/GAI-11234A,B			Color-TV Chassis 17EC45/19EC45		
GENERAL ELECTRIC		1497			
Color-TV Chassis 25MB					

**1495**  
**ADMIRAL**  
TV Chassis  
T9K3-1A,1B  
**NOVEMBER • 1973**

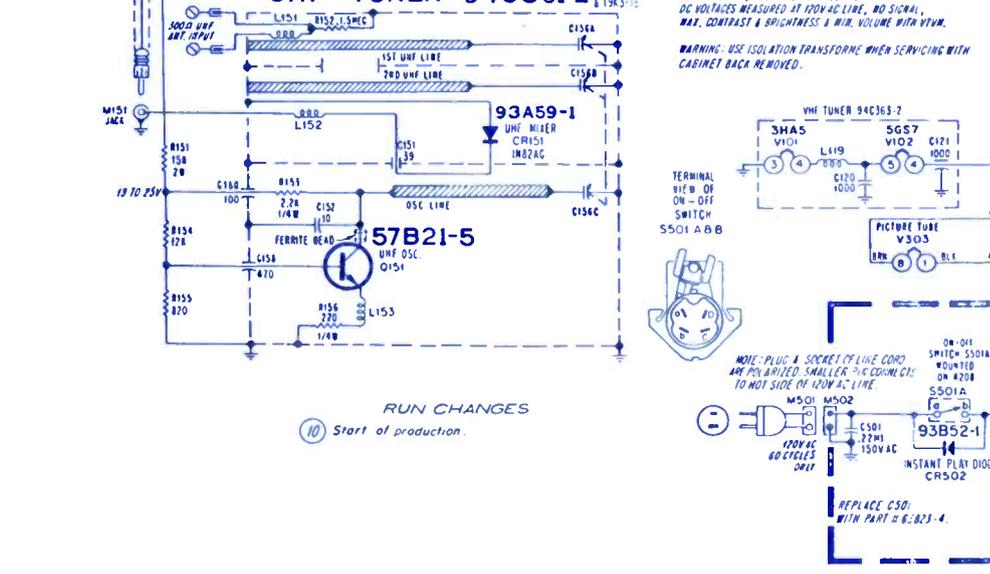
SYMBOL	DESCRIPTION	ADMIRAL PART NO.
R208	1M vol control w/switch	75C149-10
R311	25K, contrast control	75A149-9
R411	5M, height triple control	75C129-3
R417	1.2M, vert hold triple control	75C129-3
R421	500K, vert lin	75C129-3
R501	5.5 Ω, fusible resistor	61C48-1
C503A	250 μf, 165v elect	67A30-11
C503B	150 μf, 150v elect	67A30-11
C503C	200 μf, 150v elect	67A30-11
L202	ratio detect	72C132-82
L301	47.25M trap	72C308-8
L401	horiz lock coil	94D17-19
L501	filter choke	74A18-63
T201	audio output xformer	79C124-3
T302	2nd IF xformer	72C310-1
T303	sound take off coil	72C185-7
T401	vert output xformer	79C139-5
T402	deflect yoke assembly	700C1089-12
T403	horiz output	79D138-14
	VHF tuner -1A	94A363-2
	-2A, -2B	94A347-1



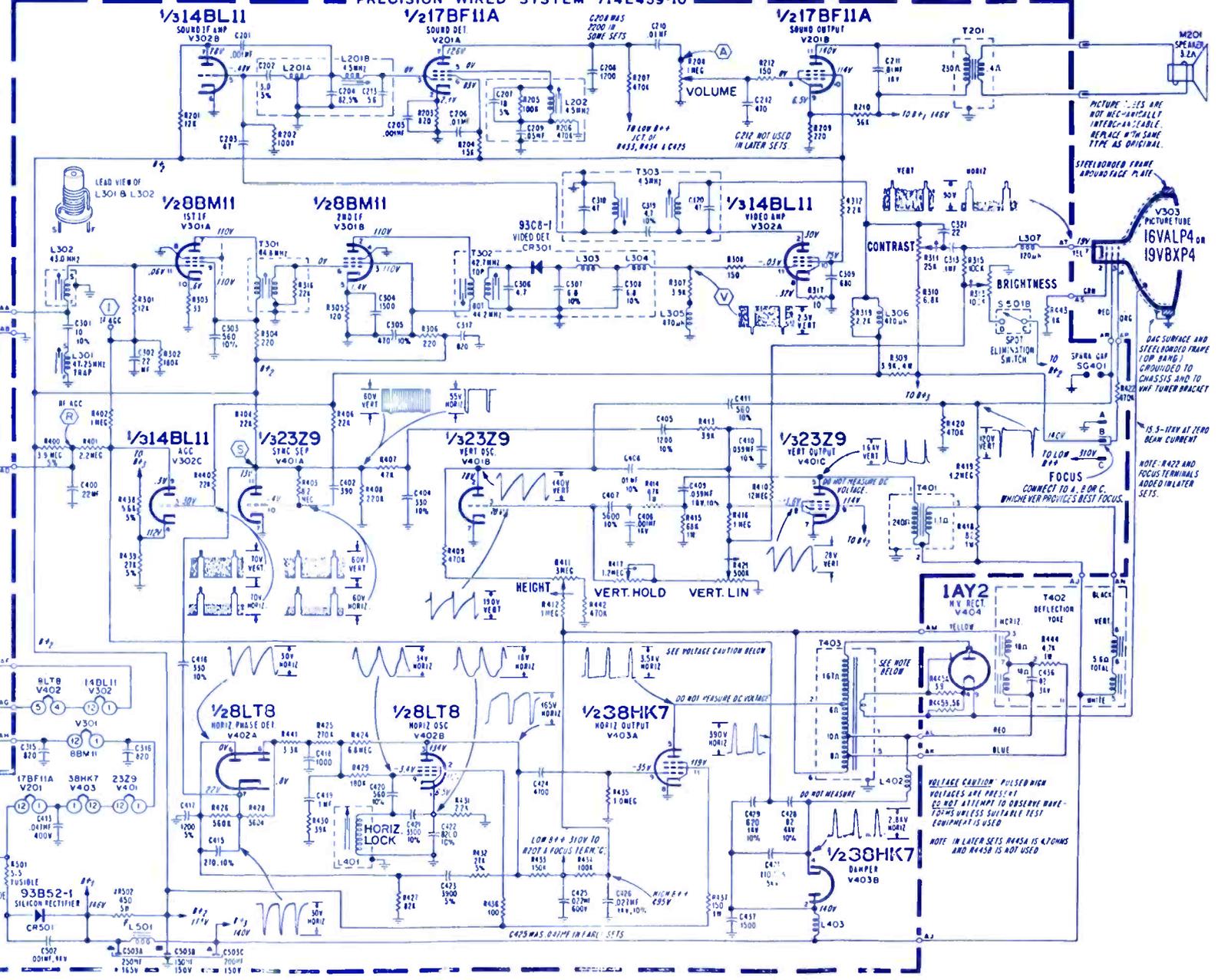
VHF TUNER 94C363-2 IN T9K3-1A & T9K3-1B



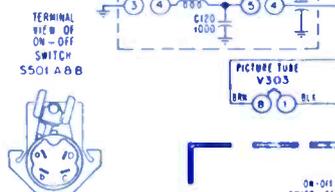
UHF TUNER 94C361-2 IN T9K3-1A & T9K3-1B



PRECISION WIRED SYSTEM 714E459-10



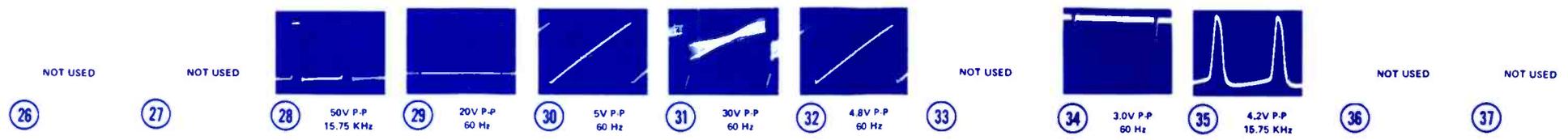
**SCHEMATIC NOTES:**  
CHASSIS GROUND.  
VOLTAGE WILL VARY WITH SETTING OF CONTROLS.  
RESISTOR VALUES 1% TOL, 10%, CAPACITOR VALUES IN PICOGRAMS, UNLESS OTHERWISE INDICATED.  
DC VOLTAGES MEASURED AT 100V AC LINE, NO SIGNAL, MAX. CONTRAST & BRIGHTNESS & MIN. VOLUME WITH VIEW.  
WARNING: USE ISOLATION TRANSFORMER WHEN SERVICING WITH CABINET BACK REMOVED.



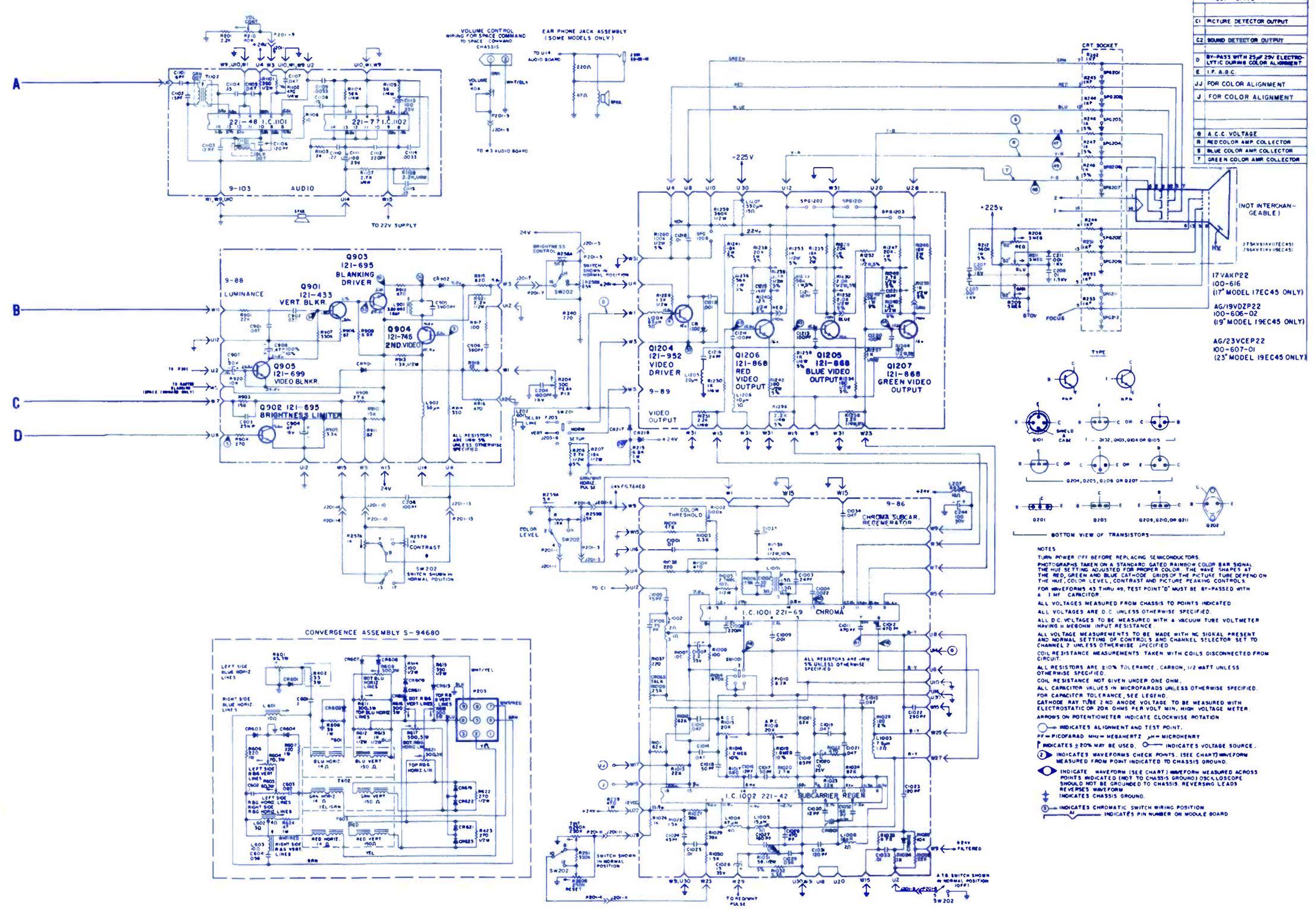
NOTE: PLUS A SOCKET OF LINE COIL ARE POLARIZED. SMALLER 1/2 C.O.M. COIL TO NOT SIDE OF 120V AC LINE.  
REPLACE C501 WITH PART # 93B52-1.

**RUN CHANGES**  
⑩ Start of production.

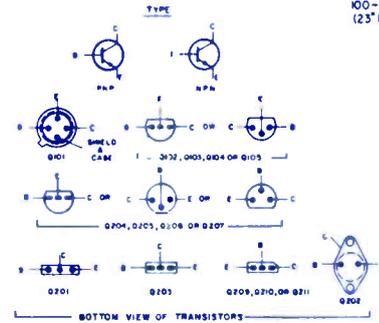
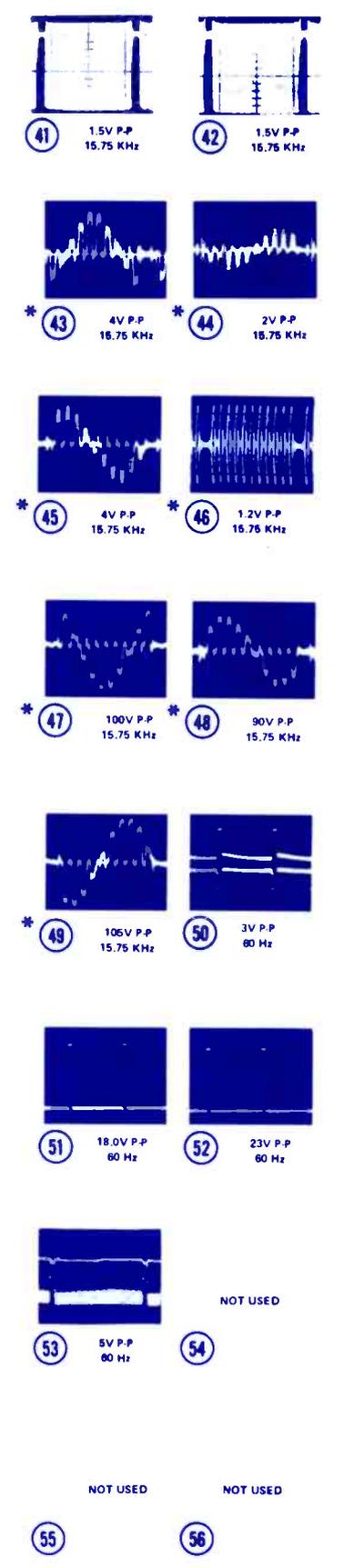




\* FOR WAVEFORMS 43 THROUGH 49, BYPASS TEST POINT "D" WITH 1.0 MF CAPACITOR.  
\*\*WAVE FORM MAY BE TAKEN WITH LEAD (PROBE) CLIPPED ONLY TO INSULATION.



TEST POINTS	
C1	PICTURE DETECTOR OUTPUT
C2	SOUND DETECTOR OUTPUT
D	BY-PASS WITH 25µF 25V ELECTROLYTIC DURING COLOR ALIGNMENT
E	I.F. A.C.C.
J1	FOR COLOR ALIGNMENT
J2	FOR COLOR ALIGNMENT
B	A.C.C. VOLTAGE
A	RED COLOR AMP. COLLECTOR
C	BLUE COLOR AMP. COLLECTOR
F	GREEN COLOR AMP. COLLECTOR



NOTES  
TURN POWER OFF BEFORE REPLACING SEMICONDUCTORS.  
PHOTOGRAPHS TAKEN ON A STANDARD GATED RAINBOW COLOR BAR SIGNAL. THE HUE SETTING ADJUSTED FOR PROPER COLOR. THE WAVE SHAPES AT THE RED, GREEN AND BLUE CATHODE GRIDS OF THE PICTURE TUBE DEPEND ON THE HUE, COLOR LEVEL, CONTRAST AND PICTURE PEAKING CONTROLS.  
FOR WAVEFORMS 43 THRU 49, TEST POINT "D" MUST BE BY-PASSED WITH A 1 MF. CAPACITOR.  
ALL VOLTAGES MEASURED FROM CHASSIS TO POINTS INDICATED.  
ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.  
ALL D.C. VOLTAGES TO BE MEASURED WITH A VACUUM TUBE VOLTMETER HAVING H MEGOHM INPUT RESISTANCE.  
ALL VOLTAGE MEASUREMENTS TO BE MADE WITH NO SIGNAL PRESENT AND NORMAL SETTING OF CONTROLS AND CHANNEL SELECTOR SET TO CHANNEL 2 UNLESS OTHERWISE SPECIFIED.  
COIL RESISTANCE MEASUREMENTS TAKEN WITH COILS DISCONNECTED FROM CIRCUIT.  
ALL RESISTORS ARE 210% TOLERANCE, CARBON, 1/2 WATT UNLESS OTHERWISE SPECIFIED.  
COIL RESISTANCE NOT GIVEN UNDER ONE OHM.  
ALL CAPACITOR VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED. FOR CAPACITOR TOLERANCE, SEE LEGEND.  
CATHODE RAY TUBE 2 NO. ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC OR 20K OHMS PER VOLT MIN. HIGH-VOLTAGE METER.  
ARROWS ON POTENTIOMETER INDICATE CLOCKWISE ROTATION.  
○ INDICATES ALIGNMENT AND TEST POINT.  
PF = PICOFARAD MH = MEGAHERTZ µH = MICROHENRY  
◇ INDICATES 2-20% MAY BE USED. ○ INDICATES VOLTAGE SOURCE.  
② INDICATES WAVEFORMS CHECK POINTS. (SEE CHART) WAVEFORM MEASURED FROM POINT INDICATED TO CHASSIS GROUND.  
◇ INDICATE WAVEFORM (SEE CHART) WAVEFORM MEASURED ACROSS POINTS INDICATED (NOT TO CHASSIS GROUND) OSCILLOSCOPE SHOULD NOT BE GROUND TO CHASSIS. REVERSING LEADS REVERSES WAVEFORM.  
⊕ INDICATES CHASSIS GROUND.  
⊖ INDICATES CHROMATIC SWITCH WIRING POSITION.  
⊙ INDICATES PIN NUMBER ON MODULE BOARD.

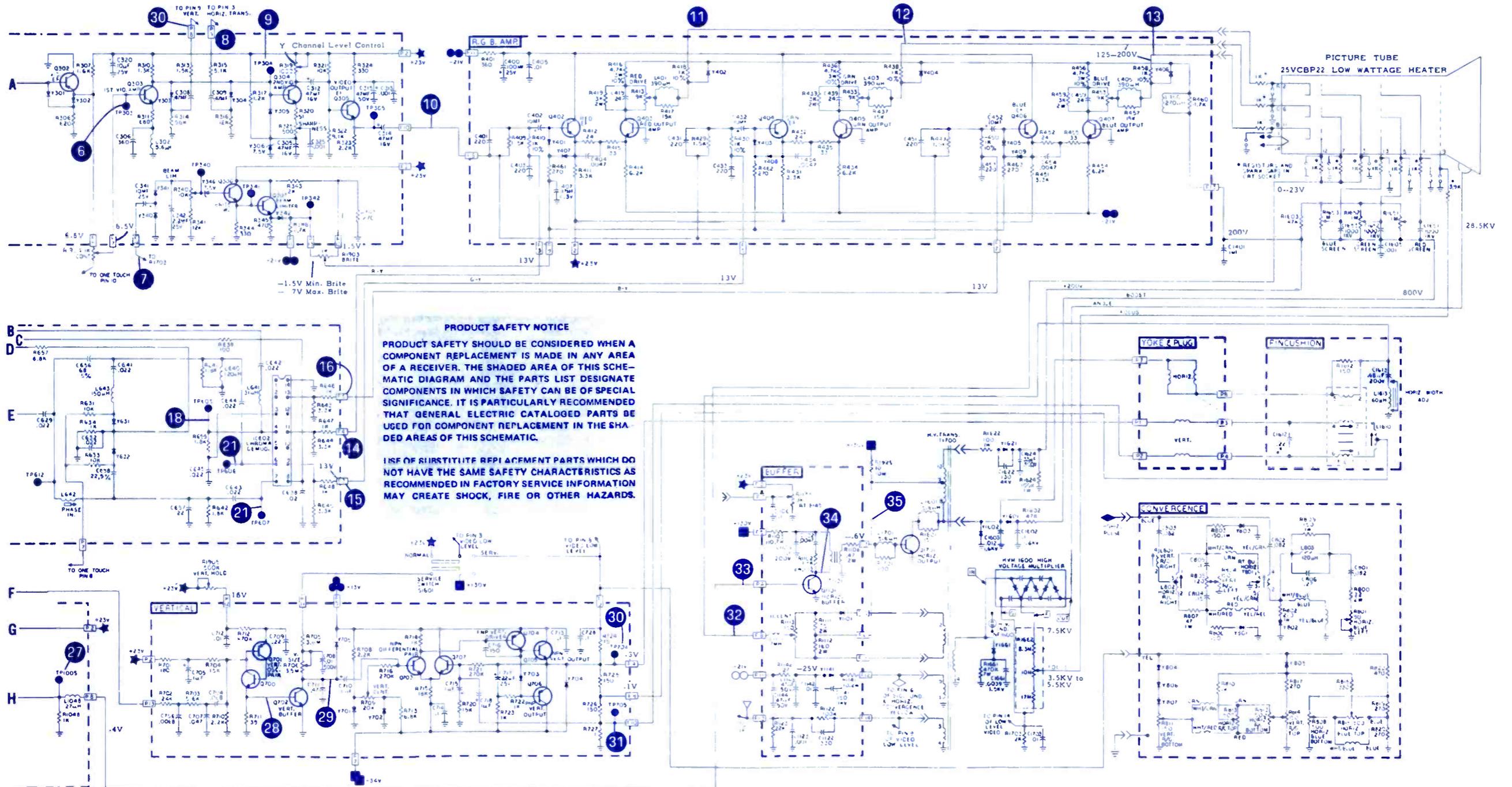


**GENERAL ELECTRIC**  
Color-TV Chassis  
25MB

**SYMBOL DESCRIPTION GENERAL ELECTRIC PART NO.**

R1625-10 n, 10%, 10w	EP14X52
R1661-470K, 10%, 7w	EP14X57
R205-1F AGC, 250 n, 20%	EP49X142
R206-RF AGC, 250 n, 20%	EP49X142
R340-brite limit, 10K, 20%	EP49X140
R413-red drive	EP49X141
R433-green drive	EP49X141
R453-blue drive	EP49X141
R606-killer adj 50K, 20%	EU49X35
R619-chroma gain equal 5K, 30%	ES49X627
R623-ACC adj 100K, 20%	EP49X143
R706-vert size, 3.5M	EP49X144
R709-vert center	EP49X147
R1113-horiz center 150 n	EP49X148
R1133-CRT bias	EP49X148
R1404-chroma set 50K	EU49X35
R1408-tint center 20K	EP49X96
R1662-focus pot asm	EP62X42
L207-41.25MHz trap	EP36X92
L215-4.5MHz trap	EP36X111
DL301-delay line	EP36X105
L502-quad	EP36X107

L617-chroma, 4.3MHz	EP36X112
L618-chroma 2.7MHz	EP36X112
L626-coil tint bal adj	EP36X112
L634-phase, 3.58MHz	EP36X112
L642-chroma phase	EP36X112
L1001-horiz osc hold	EP35X2
L1610-pincushlon phasing coil	EP36X74
T624-3.58MHz osc	EP36X113
T1201-power xformer	EP62X34
T1202-CRT filament	EP64X22
T1700-high voltage	EP77X13
IC201-IF	EP84X1
IC202-AFC	EP84X5
IC501-audio	EP84X6
IC601-chroma processor	EP84X7
IC602-chroma demod	EP84X3
fuse .4a 250v fast blo F701	EP10X18
fuse 2.5a 125v slo blo F1201	EP10X13
fuse .5a 250v fast blo F1202	ES10X43
tripler HV HVM 1600	EP62X41
tuner VHF solid state	EP86X19
tuner UHF solid state	EP85X13
Yoke deflect	EP76X10



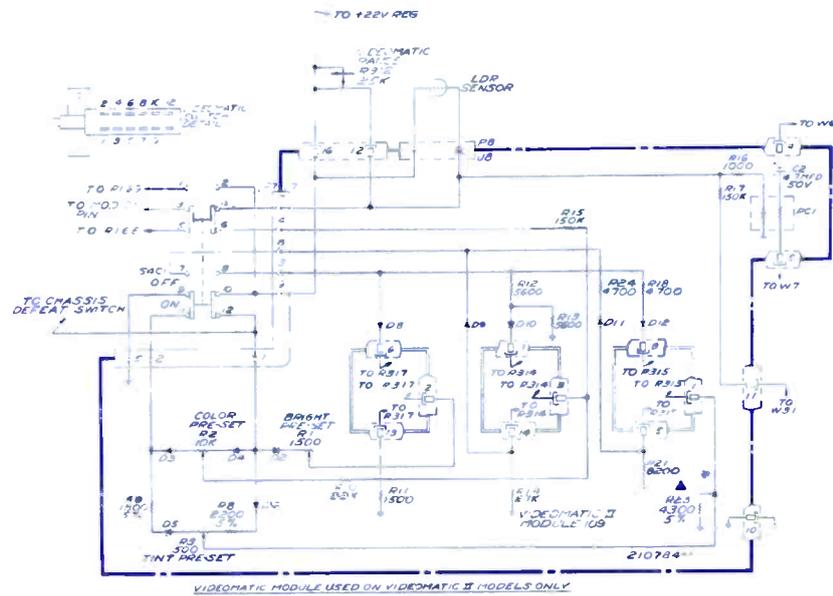
**PRODUCT SAFETY NOTICE**  
PRODUCT SAFETY SHOULD BE CONSIDERED WHEN A COMPONENT REPLACEMENT IS MADE IN ANY AREA OF A RECEIVER. THE SHADED AREA OF THIS SCHEMATIC DIAGRAM AND THE PARTS LIST DESIGNATE COMPONENTS IN WHICH SAFETY CAN BE OF SPECIAL SIGNIFICANCE. IT IS PARTICULARLY RECOMMENDED THAT GENERAL ELECTRIC CATALOGED PARTS BE USED FOR COMPONENT REPLACEMENT IN THE SHADED AREAS OF THIS SCHEMATIC.  
  
USE OF SUBSTITUTE REPLACEMENT PARTS WHICH DO NOT HAVE THE SAME SAFETY CHARACTERISTICS AS RECOMMENDED IN FACTORY SERVICE INFORMATION MAY CREATE SHOCK, FIRE OR OTHER HAZARDS.

COMPLETE MANUFACTURERS' CIRCUIT DIAGRAMS  
AND TECHNICAL INFORMATION FOR 5 NEW SETS

SYMBOL	DESCRIPTION	MAGNAVOX PART NO.
L109	4.5MHz quad coil	361389-2
L114	3.58MHz output coil	361388-9
T101	chroma bandpass xformer	361498-1
R202	vert hold 250K	220220-20
R203	vert lin 25K	220220-26
R227	horiz hold 1M	220220-38
R302	focus 12M	220249-4
R308	horiz center	220181-19
S200	service switch	160462-1
RV200	thermistor	230207-5
T301	power xformer T981-01, 02	300297-3

T301	power xformer T981-03	300299-2
T301	power xformer T982-01, 02	300310-4
T302	horiz output xformer T981	361488-1
T302	horiz output xformer T982	361488-2
R301	HV/focus divider T981	230199-4
R301	HV/focus divider T982, T987	230199-3
R313	vert hold 250K T981	220293-28
R313	vert hold 250K T982	220293-30
R313	vert hold 250K T987	220293-22
R314	color 10K T981	220293-27
R314	color 10K T982	220293-29
R314	color 10K T987	220294-8
R315	tint 10K T981	220293-3

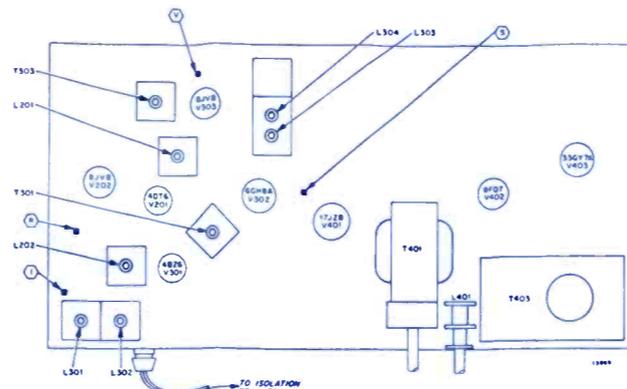
R315	tint 10K T982	220293-17
R315	tint 10K T987	220294-7
R316	contrast 1.5K T981	220293-4
R316	contrast 1.5K T982	220293-18
R316	contrast 1.5K T987-01	220294-6
R316	contrast 1.5K T987-02	220293-23
R317	brite 1.5K T981	220293-4
R317	brite 1.5K T982	220293-18
R317	brite 1.5K T987-01	220294-6
R317	brite 1.5K T987-02	220294-6
R319	sharpness 1K	220293-6
S401	videomatic switch T981-02, T982-02, T987-02	160511-7





SYMBOL	DESCRIPTION	AIRLINE PART NO.
C504A, B, C	250 $\mu$ f/165v, 150 $\mu$ f/150v, 200 $\mu$ f, 150v, electrolytic	67A30-11
R208, S501	500K, on/off, volume	75A1-185
R320-30K	video	75A112-13
R41B-5M	height	75A101-16
R422-1.2M	vert hold	75A100-8
R466-500K	vert lin	75A101-17
L202	coil, quadrature w/C207	72A132-77

L401	coil, horiz hold	94A17-19
T201	x-former, audio output	79A124-5
T303	x-former, sound take-off	72A185-5
	4.5 MHz, w/C315, 314, 316	
T401	x-former, vert output	79A139-4
T402	deflect yoke	94A372-2
T403	x-former, horiz output	79A138-1
CR301	diode, video detector, IN60	93A8-1
CR401	diode, horiz phase detector	93A5-9

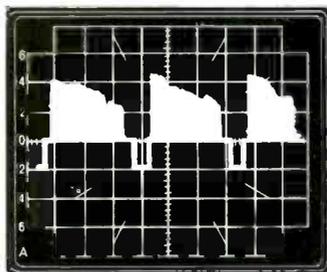




LBO-502 \$529.95

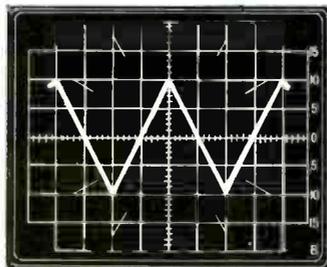
# THE NEW LEADER LBO-502 5" SOLID STATE TRIGGERED SCOPE MAKES VOLTAGE READINGS AS EASY AS...

The 3 segment "A", "B", "C" scale on the lighted graticule is another example of Leader know-how to help you save time, labor and money. For this solid state, 15MHz bandwidth performer delivers push button convenience, too — triggering source, slope, mode and other functions. Add to this a rectangular bezel, front panel adjustable illumination, scale tilt adjustment and a separate on-off triggering light. Now, consider the lab grade performance and the broad range of uses in most every electronic area . . . the LBO-502 is also a vectorscope. Basic specifications include: Automatic and Triggered sweep ranges from  $1\mu\text{sec}/\text{cm}$  to  $0.5\text{sec}/\text{cm}$ , 17 steps calibration; magnification is 5X, max sweep  $0.2\mu\text{sec}/\text{cm}$  and vertical sensitivity is from  $10\text{mVp-p}/\text{cm}$  to  $20\text{Vp-p}/\text{cm}$ ; bandwidth is DC to 15MHz and the rise time is 35 nanoseconds. Compact, lightweight and complete with probe, adapter and leads.



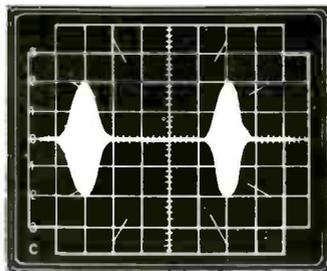
• "A" Scale

For readings in multiples of 2, from 0 to 6 (+ and -) peak to peak.



• "B" Scale

For readings in multiples of 5, from 0 to 15 (+ and -) peak to peak.



• "C" Scale

For readings in multiples of 1, from 0 to 3 (+ and -) peak to peak.

"Put us to the test"

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INSTRUMENTS CORP.

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**popular** hand-sized V-O-M...  
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Actual Size

Model 310  
\$46

1. Hand-size V-O-M with diode overload protection.
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3. Single range switch; provision for clamp-on AC ammeter.

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