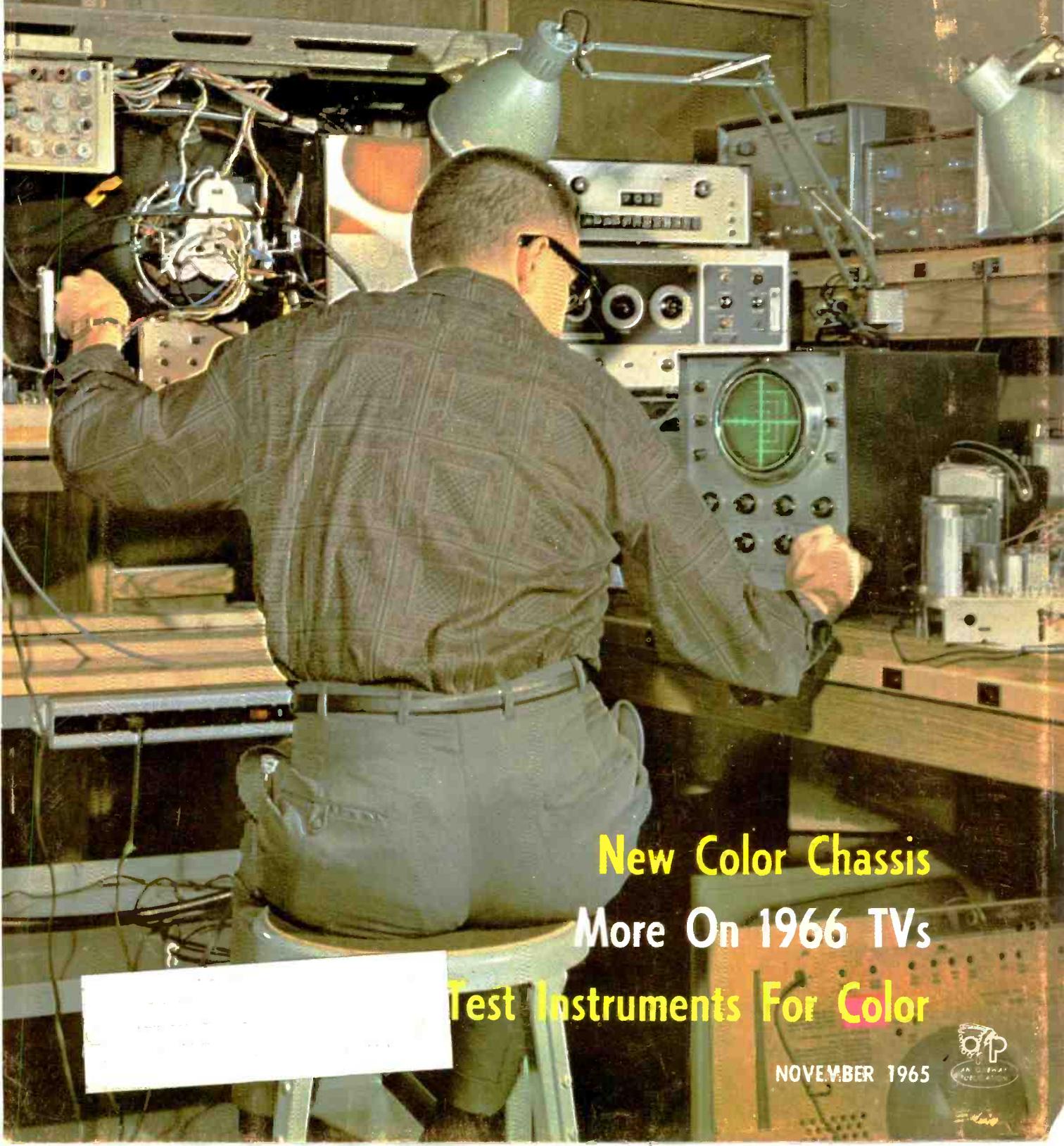


# ELECTRONIC TECHNICIAN

WORLD'S LARGEST ELECTRONIC TRADE CIRCULATION



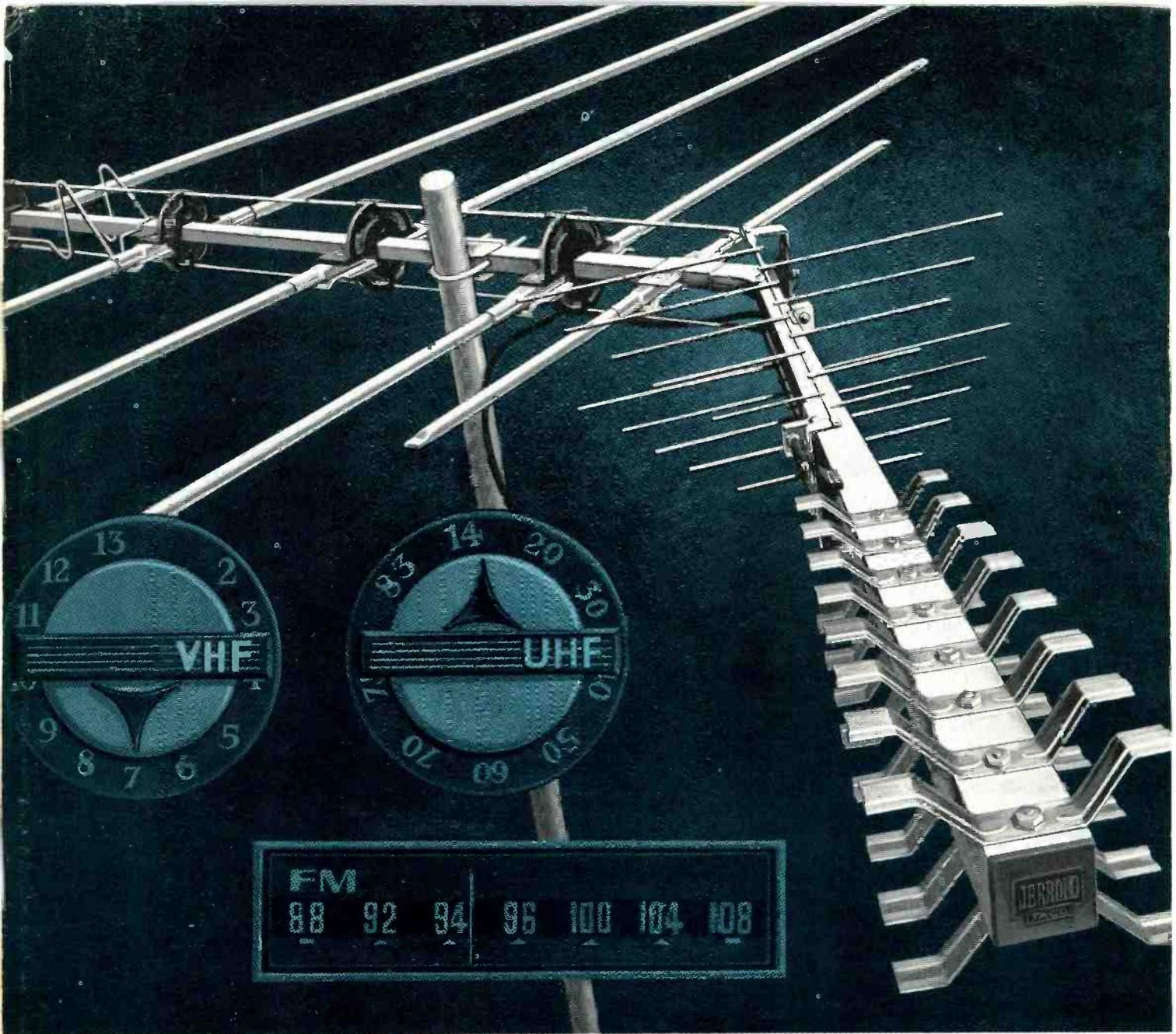
**New Color Chassis**

**More On 1966 TVs**

**Test Instruments For Color**

NOVEMBER 1965





**NOW...FIRST ALL-CHANNEL ANTENNA WITH INDIVIDUAL UHF and VHF ORIENTATION, 75- OR 300-OHM OUTPUT**

**New JERROLD Coloraxial™ Pathfinder™**

Here's the antenna to answer every VHF, UHF, and FM reception need from metropolitan to deep-fringe areas... Jerrold's new Coloraxial PATHFINDER.

The new PATHFINDER (Series PAB and PXB) is a unique combination—a cascaded-periodic VHF antenna plus an advanced-design UHF section, all in one pre-assembled unit. Both 75-ohm Coloraxial and 300-ohm models for every taste and budget. And look at the prices—as low as \$21.95!

VHF and UHF sections may be individually oriented for maximum directivity. While you get all the flexibility of separate VHF

and UHF antennas, PATHFINDER eliminates the splitters (with their inherent losses) needed to couple separate antennas with a common download.

Take advantage of the growing UHF and FM stereo markets by selling this all-purpose high gain antenna. Rugged square-boom construction and Golden Armor corrosion-resistant finish assure long life. Flat response across entire band (channels 2-83), low VSWR, excellent front-to-back ratio make PATHFINDER a "natural" for easy sales and satisfied customers. Talk to your Jerrold distributor today, or write for complete information. Jerrold Electronics Corporation, Distributor Sales Division, 15th & Lehigh Ave., Philadelphia, Pa. 19132.



... for more details circle 38 on postcard

# ELECTRONIC TECHNICIAN

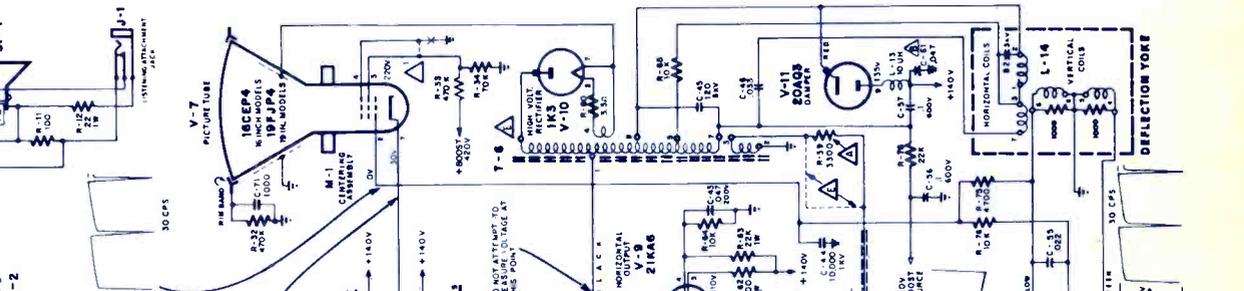
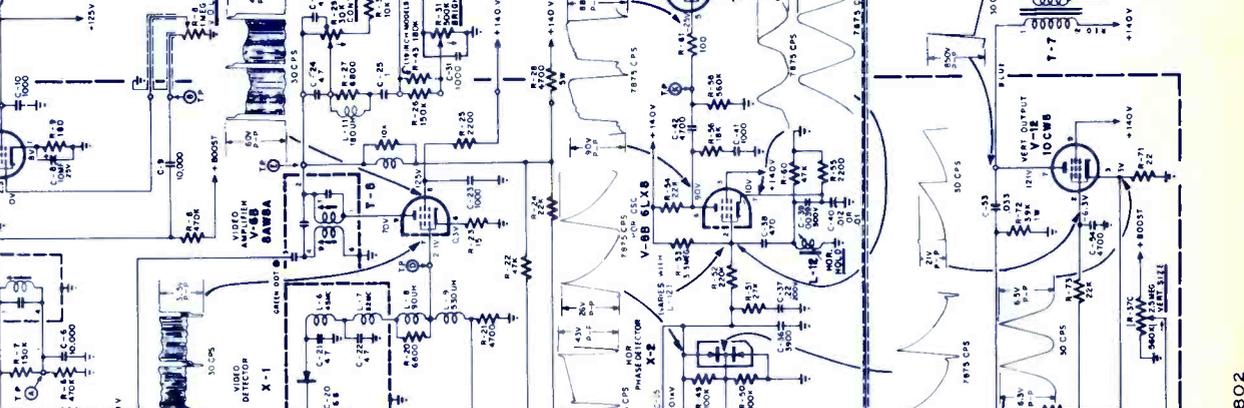
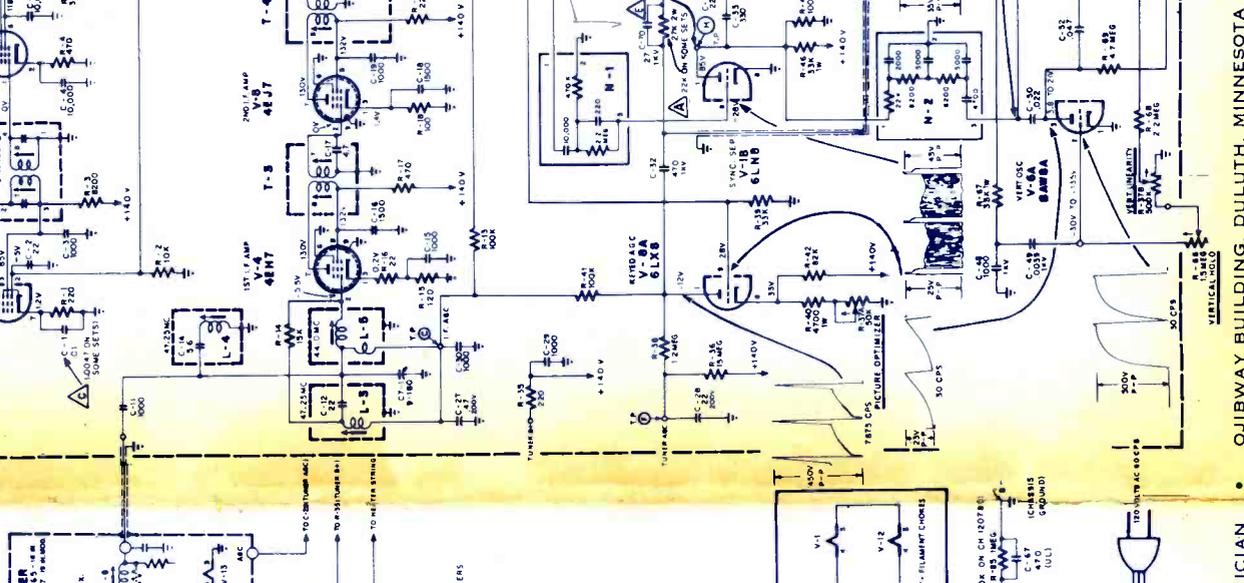
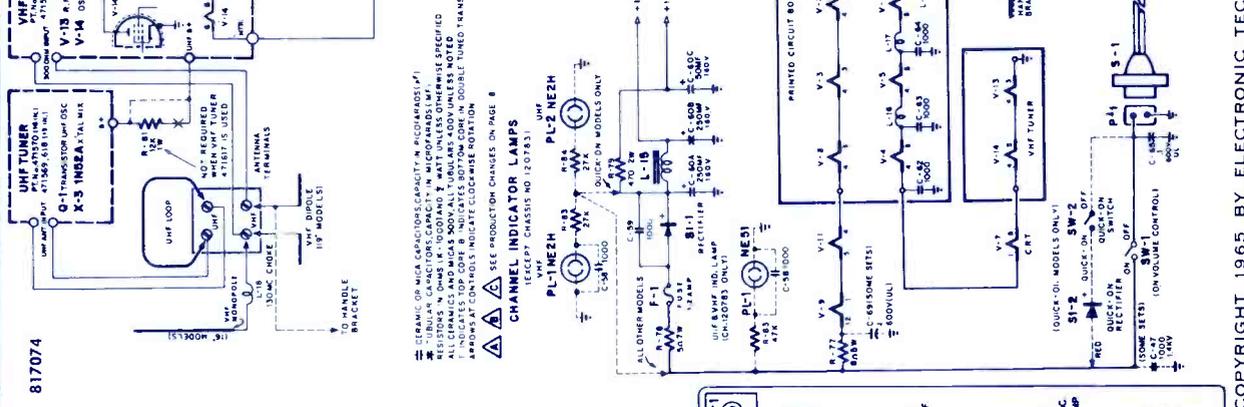
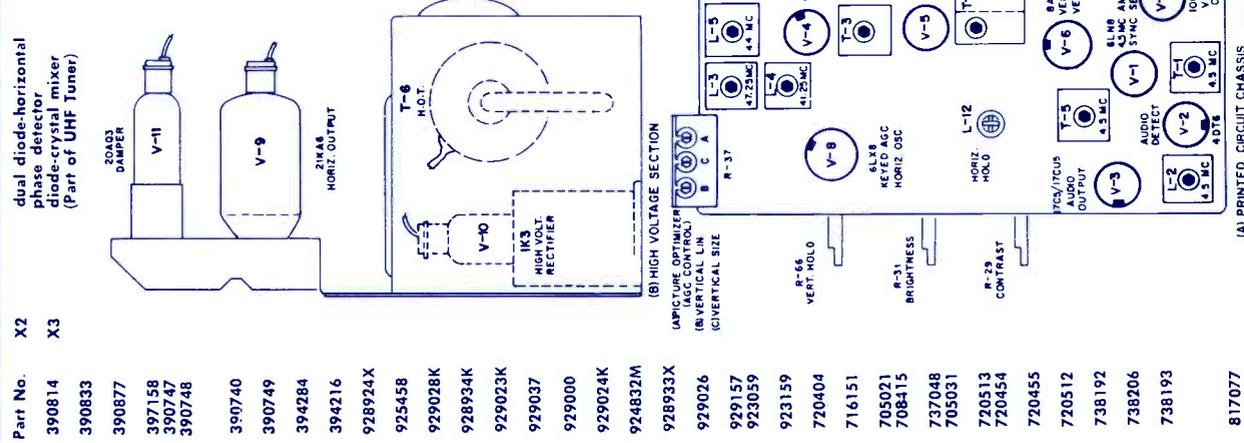
# TRIFLEX

## COMPLETE MANUFACTURERS' CIRCUIT DIAGRAMS AND TECHNICAL INFORMATION FOR EIGHT NEW SETS

Manufacturer	Model	Schematic No.
DUMONT	TV Chassis 120780, 783, 810	962
GENERAL ELECTRIC	TV Chassis 456, 70120, 456, 70121	967
MOTOROLA	TV Chassis AB	963
PHILCO	TV Chassis TS-588	964
RCA VICTOR	TV Chassis 16J126 and 16J126A	965
	TV Chassis KCS-155	966
	TV Chassis B04-1, -2	968
	TV Chassis 14N29	969



Symbol	Description
R10	Volume control - 1 M (Ch. 120780)
R28	Volume control - 1 M (Ch. 120783)
R29	Volume control - 1 M (Ch. 120810)
R31	resistor - 4.7K ±10%
R37A, B, C	contrast control - 30K
R66	control - triple - pict. opt. 50K, vertical lin. 500K
R77	vertical hold control - 1.5 M
R78	resistor - 8 Ω ±10% WW
C4, 6	resistor - 5 Ω ±10% WW
C8	Ceramic - 10,000 pf
C13	electrolytic - 10 μfd at 25 v
C32	ceramic - 15,000 pf ±20% 1Kv
C35, 44	ceramic - 470 pf ±10% 1Kv
C45	ceramic - 10,000 pf ±20% 1Kv
C47	ceramic - 120 pf ±10% 5Kv
C48	ceramic - 1000 pf 1.4Kv
C49	ceramic - 1000 pf ±10% 1Kv
C62, 63, 64	ceramic - 1000 pf - GMV 500 v
C67	ceramic - 470 pf - GMV 1.6Kv
C70	ceramic - 27 pf N1500 - 1Kv
N1	couple - sync separator
N2	couple - vertical inter-
L2	grator
L12	sound quadrature coil - 4.5 Mc
L13	horizontal oscillator coil (hold control)
L14	Choke - 10 μh - Damper
L15	Plate
L16, 17	Deflection Yoke Assembly
T1	Supply Filter Choke - Power filament choke
T3	sound interstage transformer 4.5 Mc
T4	IF transformer - interstage
T5	IF transformer - video detector
T6	sound take-off transformer - 4.5 Mc
T7	horizontal output transformer (or) horizontal output transformer
Q1	vertical output transformer
X1	transistor - UHF oscillator (part of UHF tuner) diode-video detector - 1N295



### CONDITIONS FOR CHASSIS READINGS

VOI TAGES AND WAVESHAPES were taken under actual operating conditions, with normal picture and sound being received. A.C. voltage developed on the I-F-GC line chassis under test was 120 volts, 60-cycle AC. Frequencies indicated for the components shown are approximate values. Frequency of signal being measured. All readings obtained may vary ±10% due to normal component tolerances and strength of input signal to chassis under test.

MODEL NO.	MODEL NAME	CABINET STYLE	TV CHASSIS	VHF TUNER	C.R.T.
46P01	LARK	P	120780A	471585	16CEP4
46P02	ROBIN	A	120780A	471585	19PJP4
46P03	MARINER	B	120780A	471585	19PJP4
46P06	SURVIVOR	E	120780A	471585	19PJP4

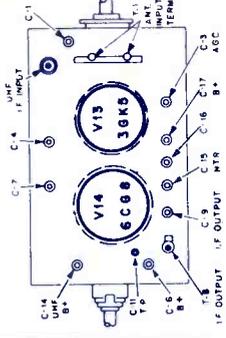
SYMBOL NO.	TUBE TYPE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9	PIN 10	PIN 11	PIN 12
V-1	6X4	10K	10K	10K									
V-2	6X4	10K	10K	10K									
V-3	6X4	10K	10K	10K									
V-4	6X4	10K	10K	10K									
V-5	6X4	10K	10K	10K									
V-6	6X4	10K	10K	10K									
V-7	6X4	10K	10K	10K									
V-8	6X4	10K	10K	10K									
V-9	6X4	10K	10K	10K									
V-10	6X4	10K	10K	10K									
V-11	6X4	10K	10K	10K									
V-12	6X4	10K	10K	10K									

NOTES: All resistance readings are in ohms, unless otherwise specified. Capacitors are in microfarads. "M" denotes megohms. "K" denotes kilohms. "P" denotes picofarads. "C" denotes common lead of meter connected to junction of L-13 and C-6B (8\* point).

# 962

**DUMONT**  
TV Chassis 120780,  
783, 810

**NOVEMBER**  
1965

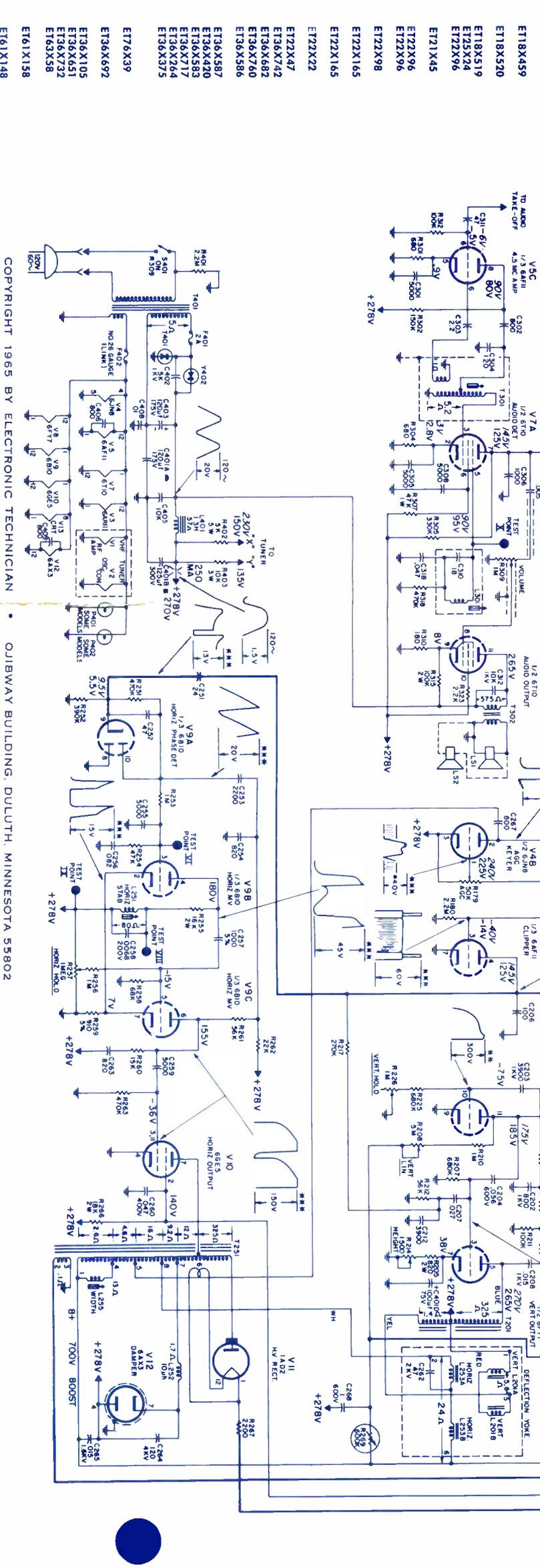
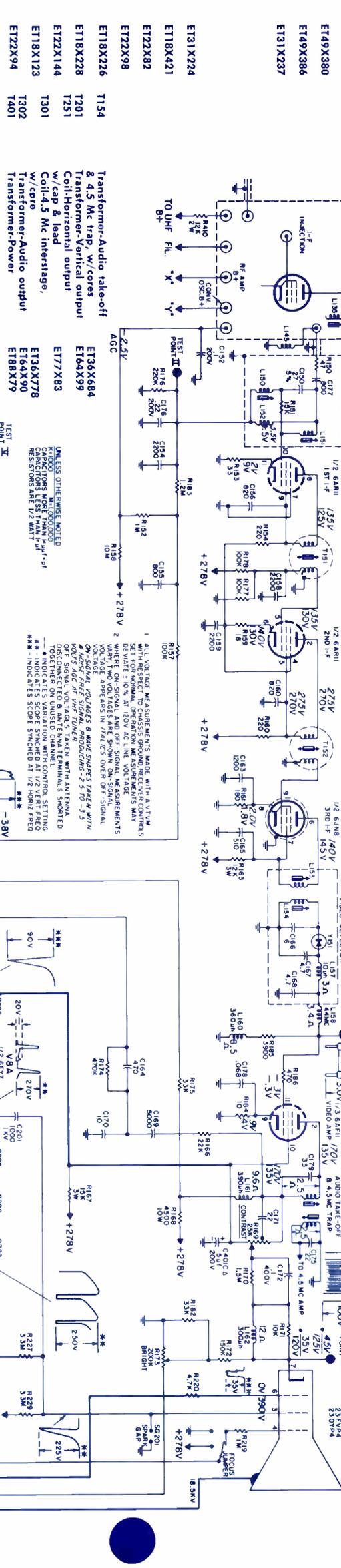
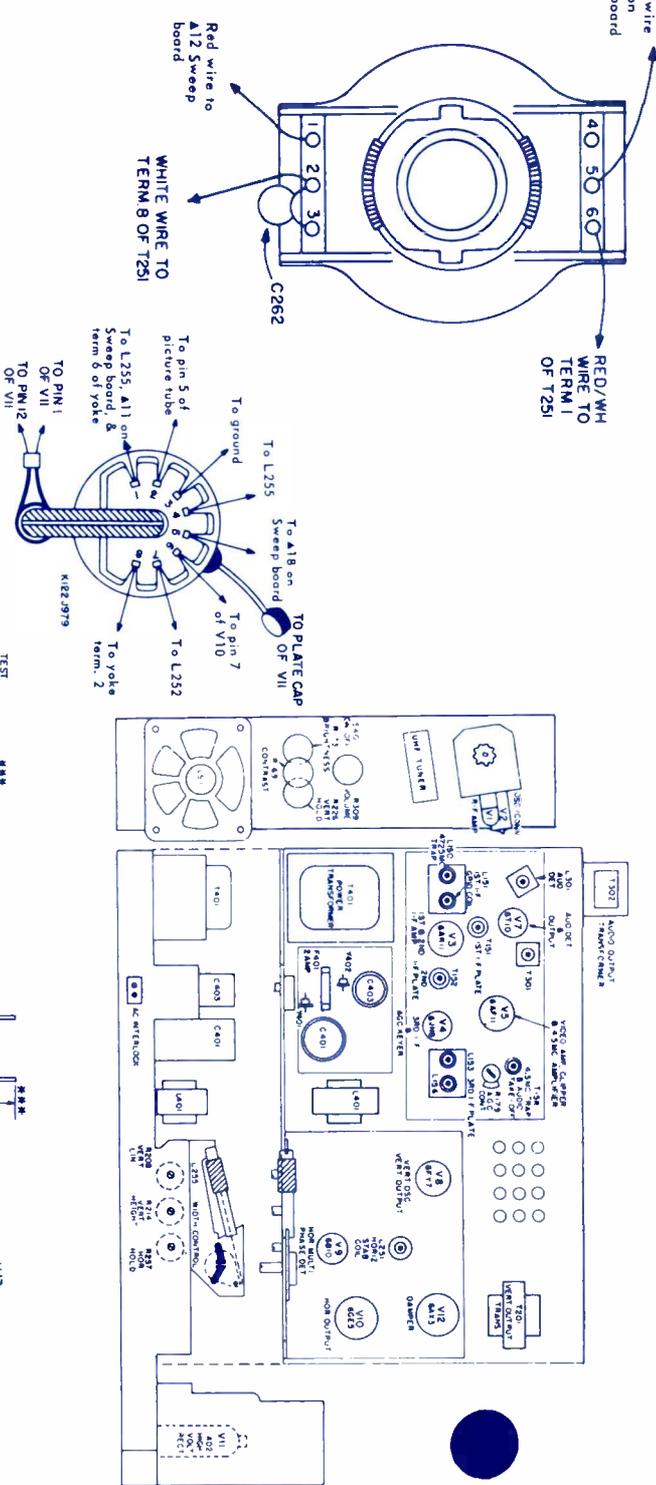
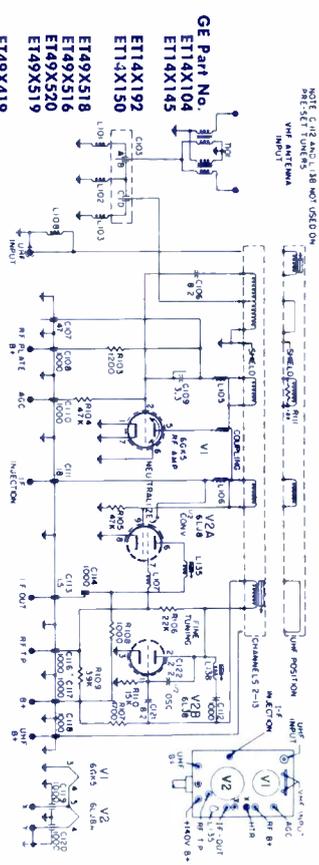


Symbol	Description
R163	12,000Ω, 10%, 7w, glass
R167	15,000Ω, 10%, 3w glass
R269	600,000Ω, 25%, Thermistor
R403	10,000Ω, 10%, 7w, glass
R169	25,000Ω, w/stop @22k, Contrast
R173	200,000Ω, 20% Bright
R179	50,000Ω, 30%, AGC
R208	5 M, 30%, Vert. Lin.
R214	15,000Ω, 20%, Vert. Height
R226	1 M, 20%, Vert. Hold
R257	1 M, w/stop @ 120k, Horiz. Hold
R309	2 M, volume, w/push-pull Switch S401 @ 175v
C401A	120 μf, +100 -10% @ 175v
C401B	125 μf, +100 -10% @ 300v
C401C	5 μf, +100 -10% @ 200v
C401D	100 μf, +100 -10% @ 75v
C403	120 μf, +100 -10% @ 175v, 500v, NPO
C130	27 pf, 5%, 500v, NPO Ceramic
C160	820 pf, 10%, 500v, Ceramic
C169	5000 pf, GMV, 500v, Ceramic
C170	10 pf, 5%, 500v, NPO Cer.
C206	100 pf, 10%, 500v, N750 Cer.
C212	3900 pf, 20%, 500v 55HK Cer.
C251	24 pf, 10%, 500v, NPO, Cer.
C254	820 pf, 10%, 500v, 55HK Cer.
C257	1000 pf, 5%, 500v Silver Mica
C262	47 pf, 10%, 2kv, N2200 Ceramic
C263	820 pf, 10%, 500v, N2200 Ceramic
C264	120 pf, 10%, 4kv, N1600 Cer.
C268	1 μf, 20%, 1kv Paper
C301	5000 pf, GMV, 500v Cer.
C303	2.2 pf, 5%, 500v Composition
C305	5000 pf, GMV, 500v Ceramic
C307	5000 pf, GMV, 500v Cer.
C308	5000 pf, GMV, 500v, Ceramic
C312	5000 pf, GMV, 1kv, Ceramic
C402	5000 pf, GMV, 1 kv, Semi HIK Cer.
C405	10,000 pf, GMV, 450v Semi HIK Cer.
C408	10,000 pf, GMV, 1400v, Cer.
L150	Coil-47.25 Mc trap w/core
L151	Coil-1st IF grid, w/core
L152	Coil-Choke, IF Coupling
L153	Coil-3rd, IF plate, w/core
L154	Coil-Video Det. secondary, w/core
L157	Coil-Choke, 10 μh
L158	Coil-Choke, 36.2 μh
L161	Coil-Choke, 360 μh, 7%
L162	Coil-Choke, 390 μh, 7%
L201, 253	Coil-Choke, 300 μh, 7% Deflection Yoke—less centering ring and retainer

# ELECTRONIC TECHNICIAN

## JTEKFAAX

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



- E101 res-cap, 2nd IF
- E102 diode, crystal (video det)
- E103 res-cap, AGC
- E201 diode, low power (blue)
- E301 res-cap, audio det plate
- E401 res-cap, quadrature det
- E501 diode, low power (blue)
- E502 diode, low power (blue)
- E602 diode, low power (blue)
- E801 res-cap, integrator
- E802 circuit breaker
- E803 diode, silicon power
- E803 diode, silicon power
- L107 choke, resonant (7.5  $\mu$ h)
- L104 4.5 Mc trap & audio
- L201 take-off: incl core
- L201 choke, suppressor (in CRT socket lead)
- L302 audio quadrature coil
- L302 audio quadrature coil
- L302 & C-310
- L502 choke, horz suppressor
- L503 choke, horz suppressor
- L701 yoke, deflection: 114
- L801 choke, filter
- Q126 noise gate: M
- Q128 contrast: 30K
- R202 brightness: 100K
- R310 on-off & vol: 2M
- R611 vert. size: 4M
- R619 vert. linearity: 500
- R622 vert. hold: 750K

- T101 1st IF interstage assem:
- T102 2nd IF interstage assem:
- T103 incl core & coil mtg nut
- T301 4.5 Mc audio IF: incl C302, C303, C304 & core
- T302 audio output (Use 25D6598A04)
- T501 horz. output & HV: compl.
- T601 vertical output

- Part No.
- 51D65239A17
- 48C65837A02
- 51D65239A04
- 48D67120A02
- 51D65239A29
- 51D65239A19
- 51D67056A11
- 48D67120A02
- 48D67120A02
- 51D65239A22
- 80C66390A11
- 48D66037A03
- 48D66037A03
- 24C6672A01
- 24D65950A03
- 24R132921

- 24P65132A04
- 24C66772A05
- 24C66772A05
- 24D66966A08
- 25C65806A11
- 18D66836A29
- 18D66966A20
- 18D66966A09
- 18D65083A46
- 18D66836A27
- 17D65820A08
- 18D66966A21
- 17K134084
- 17K132986
- 17K132552
- 17K754325
- 17K738297
- 24K747587
- 24K751248

**MULTI-MEASUREMENTS**

1. ALL TUBE MEASUREMENTS INDICATED TO CHASSIS WITH A V.T.M. 250K.
2. LINE VOLTAGE INDICATED TO CHASSIS UNLESS OTHERWISE INDICATED.
3. ALL OTHER CONTROLS IN NORMAL OPERATING POSITION UNLESS OTHERWISE INDICATED.
4. V.T.M. APPLIES SIGNAL THROUGH AT LEAST NOISE FILTER POSITION.

**REPEATER MEASUREMENTS**

1. TAPERS FROM POINTS INDICATED TO CHASSIS WITH A V.T.M. 250K.
2. ALL MEASUREMENTS TAKEN WITH SIGNAL INDICATED.
3. TAPERS FROM POINTS INDICATED TO CHASSIS WITH SIGNAL INDICATED.
4. ALL OTHER CONTROLS IN NORMAL OPERATING POSITION UNLESS OTHERWISE INDICATED.

**DRIVING COMPONENTS SPECIFIED**

RESISTORS: 5% TOLERANCE UNLESS OTHERWISE SPECIFIED. CAPACITORS: ARE DISC UNLESS OTHERWISE SPECIFIED. ALL CAPACITORS ARE DISC UNLESS OTHERWISE SPECIFIED. ALL CAPACITORS ARE DISC UNLESS OTHERWISE SPECIFIED. ALL CAPACITORS ARE DISC UNLESS OTHERWISE SPECIFIED.

**TO TUNER**

V3 6BZ6A 1ST IF

V4 6BZ6A 2ND IF

V5 6BZ6A 3RD IF

V6 6BZ6A 4TH IF

V7 6BZ6A 5TH IF

V8 6BZ6A 6TH IF

V9 6BZ6A 7TH IF

V10 6BZ6A 8TH IF

V11 6BZ6A 9TH IF

V12 6BZ6A 10TH IF

V13 6BZ6A 11TH IF

V14 6BZ6A 12TH IF

V15 6BZ6A 13TH IF

V16 6BZ6A 14TH IF

V17 6BZ6A 15TH IF

V18 6BZ6A 16TH IF

V19 6BZ6A 17TH IF

V20 6BZ6A 18TH IF

V21 6BZ6A 19TH IF

V22 6BZ6A 20TH IF

V23 6BZ6A 21TH IF

V24 6BZ6A 22TH IF

V25 6BZ6A 23TH IF

V26 6BZ6A 24TH IF

V27 6BZ6A 25TH IF

V28 6BZ6A 26TH IF

V29 6BZ6A 27TH IF

V30 6BZ6A 28TH IF

V31 6BZ6A 29TH IF

V32 6BZ6A 30TH IF

V33 6BZ6A 31TH IF

V34 6BZ6A 32TH IF

V35 6BZ6A 33TH IF

V36 6BZ6A 34TH IF

V37 6BZ6A 35TH IF

V38 6BZ6A 36TH IF

V39 6BZ6A 37TH IF

V40 6BZ6A 38TH IF

V41 6BZ6A 39TH IF

V42 6BZ6A 40TH IF

V43 6BZ6A 41TH IF

V44 6BZ6A 42TH IF

V45 6BZ6A 43TH IF

V46 6BZ6A 44TH IF

V47 6BZ6A 45TH IF

V48 6BZ6A 46TH IF

V49 6BZ6A 47TH IF

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V70 6BZ6A 68TH IF

V71 6BZ6A 69TH IF

V72 6BZ6A 70TH IF

V73 6BZ6A 71TH IF

V74 6BZ6A 72TH IF

V75 6BZ6A 73TH IF

V76 6BZ6A 74TH IF

V77 6BZ6A 75TH IF

V78 6BZ6A 76TH IF

V79 6BZ6A 77TH IF

V80 6BZ6A 78TH IF

V81 6BZ6A 79TH IF

V82 6BZ6A 80TH IF

V83 6BZ6A 81TH IF

V84 6BZ6A 82TH IF

V85 6BZ6A 83TH IF

V86 6BZ6A 84TH IF

V87 6BZ6A 85TH IF

V88 6BZ6A 86TH IF

V89 6BZ6A 87TH IF

V90 6BZ6A 88TH IF

V91 6BZ6A 89TH IF

V92 6BZ6A 90TH IF

V93 6BZ6A 91TH IF

V94 6BZ6A 92TH IF

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V96 6BZ6A 94TH IF

V97 6BZ6A 95TH IF

V98 6BZ6A 96TH IF

V99 6BZ6A 97TH IF

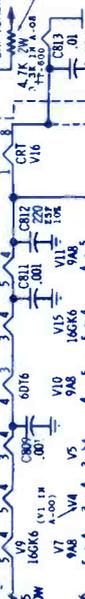
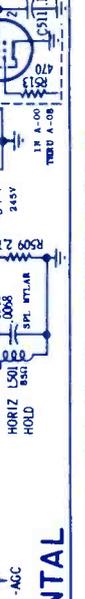
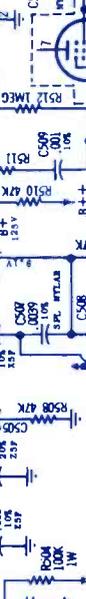
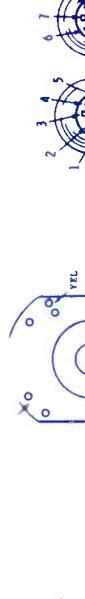
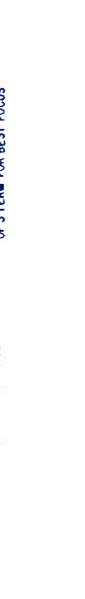
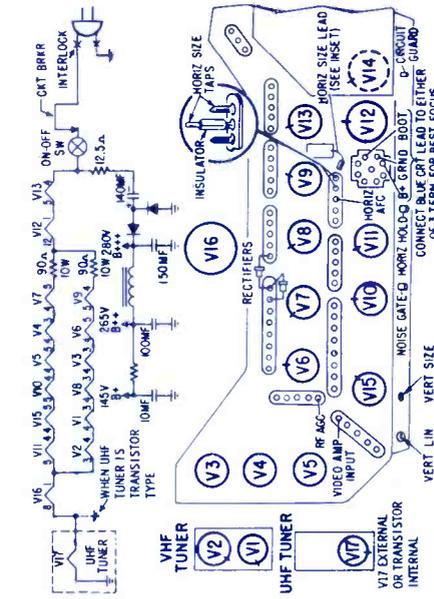
V100 6BZ6A 98TH IF

V101 6BZ6A 99TH IF

V102 6BZ6A 100TH IF

MODEL BREAKDOWN CHART

MODEL	CHASSIS	TUNER	UHF TUNER	CRT
Y23T35E	KTS-588	LCMTT-365Y	STT-600	23ARP4
Y23T35EF	SKTS-588	CPFTT-361Y	STT-600	23ARP4
Y23K136M,W	KTS-588	LCMTT-365Y	STT-600	23ARP4
Y23K136MF,W	SKTS-588	CPFTT-361Y	STT-600	23ARP4
23BT101AN,AE	VKTS-588	OPFTT-385Y	HIT-615	23FSP4
23BK164A,W	KTS-588Y	LCMTT-365Y	STT-600	23ARP4
23BU170AM,A,W	VKTS-588Y	OPFTT-385Y	HIT-620	23FSP4
23BS171AM,A,W	VKTS-588Y	OPFTT-385Y	HIT-620	23FSP4
23BU172AS	VKTS-588Y	OPFTT-385Y	HIT-615	23GSP4
23BL173AM,A,W	VKTS-588Y	OPFTT-385Y	HIT-615	23GSP4
23BL174AS	VKTS-588Y	OPFTT-385Y	HIT-620	23FSP4
23BL174AS	VKTS-588Y	OPFTT-385Y	HIT-615	23GSP4

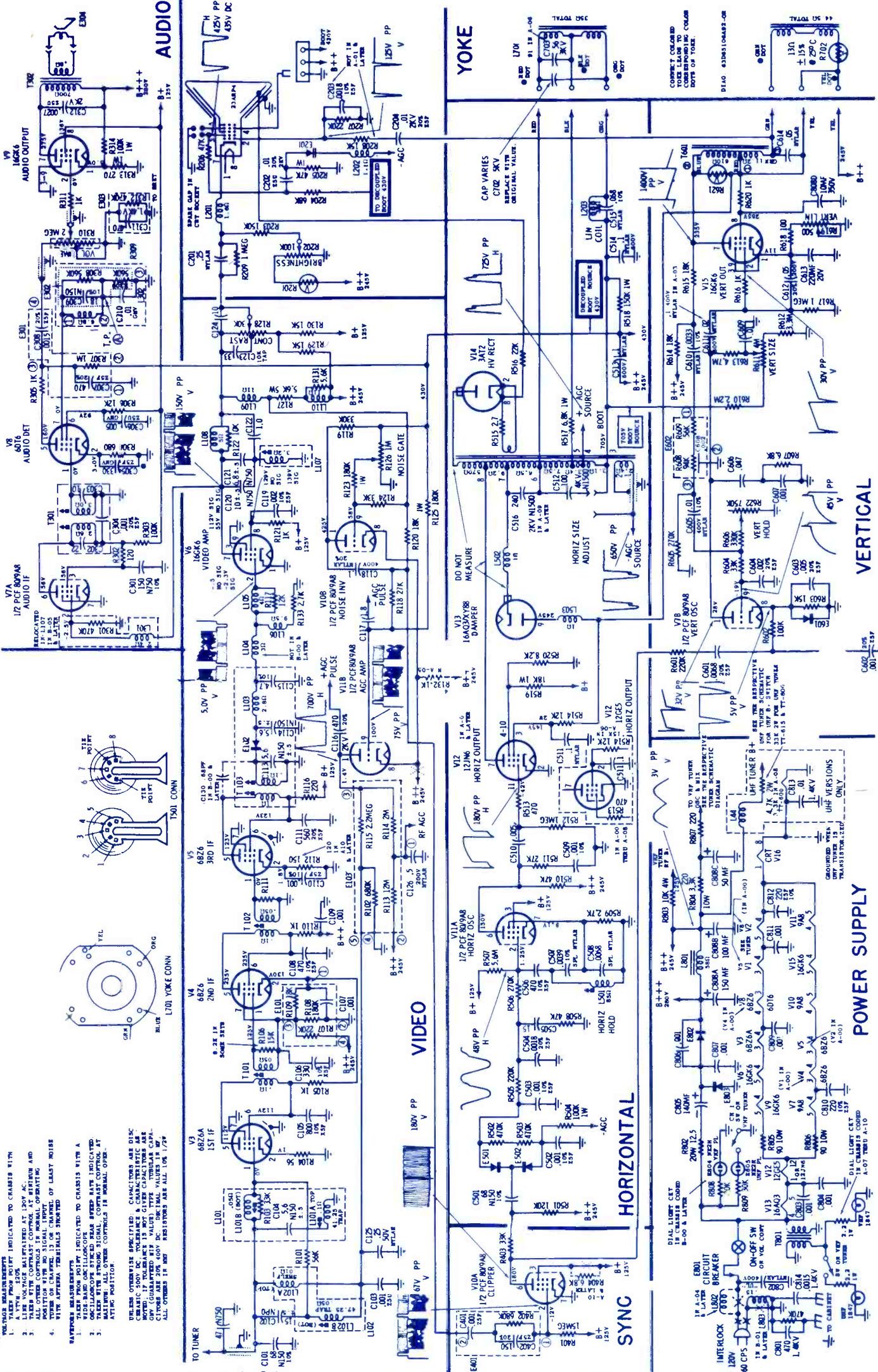


ELECTRONIC TECHNICIAN  
TEKFAK

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

MOTOROLA  
TV Chassis TS-588

NOVEMBER 1965



VERTICAL

POWER SUPPLY

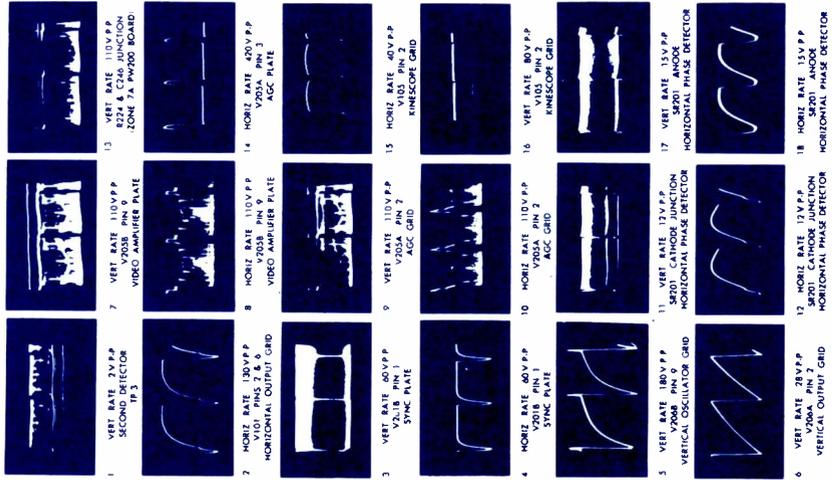
HORIZONTAL

VIDEO

YOKE

AUDIO





Symbol	RCA Part No.	Description
R93	502215	resistor, 1500Ω, ±10% 1/2W
R103	114215	control, on off volume, TMA64C
R104	115445	control, brightness
C109	111973	balun, antenna
C110	115423	matching, 47 pf, ±5%, ceramic, 500V N1500
C114	116010	ceramic, 51 pf, ±10%, 500V, N750
C115	115423	ceramic, 51 pf, ±10%, 2500V N1500
C129	115423	paper, 0.0027 μf, ±10%, 1000V
C130	115423	ceramic, 270 pf, ±10%, 5000V N1500
C131	115424	ceramic, 150 pf, ±10%, 2000V N1500
C132	115425	ceramic, 82 pf, ±10%, ±10%, 2000V N1500
C133	107419	ceramic, 68 pf, ±20%, 500V
C204	104224	ceramic, 5 pf, ±0.5 pf, 500V NFO
C217		ceramic, 2 pf, ±0.25 pf, 500V NFO
C218		ceramic, 2 pf, ±5%, 500V, N730
C237		ceramic, 0.0039 μf, ±10%, 500V N5600
L205	114485	reactor-RF choke, 2.7 μh
L207	114486	coil-horizontal frequency
R226	114260	control-contrast
R257	115433	control-vertical
R260	115434	control-height
R273	114494	control-horiz hold
SR101	113998	diode-selenium
SR201	109474	diode-selenium
T101	115428	transformer-output
T102	115422	transformer-hi-voltage
T103		transformer-vertical output
T104	115431	transformer-power
T201	115421	transformer-4.5 Mc
T202	114489	sound take off transformer-sound detector grid
T203	109948	transformer-sound detector grid
T204	113097	transformer-1st pix grid trap
T205	113097	transformer-1st pix IF grid trap
T207	113097	transformer-1st pix IF transformer-2nd pix IF
T208	114317	transformer-2nd pix IF yoke-deflection

# ELECTRONIC TECHNICIAN

# TEKFAK

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

Type	Function
RCA 41D6	1st Picture I-F Amplifier
RCA 41D6	2nd Picture I-F Amplifier
RCA 41D6	Sync. Sep. and Sound I-F Amp
RCA 41D6	Sound I-F Amp
RCA 11L04	Audio Output and AGC
RCA 11K78	Vert. Osc. & Vert. Output
RCA 8F07	Horizontal Sweep Oscillator and Control
RCA 22J16	Horizontal Sweep Oscillator and Control
RCA 17B53	Dumper
RCA 1G3GT/1B3GT	High Voltage Rectifier

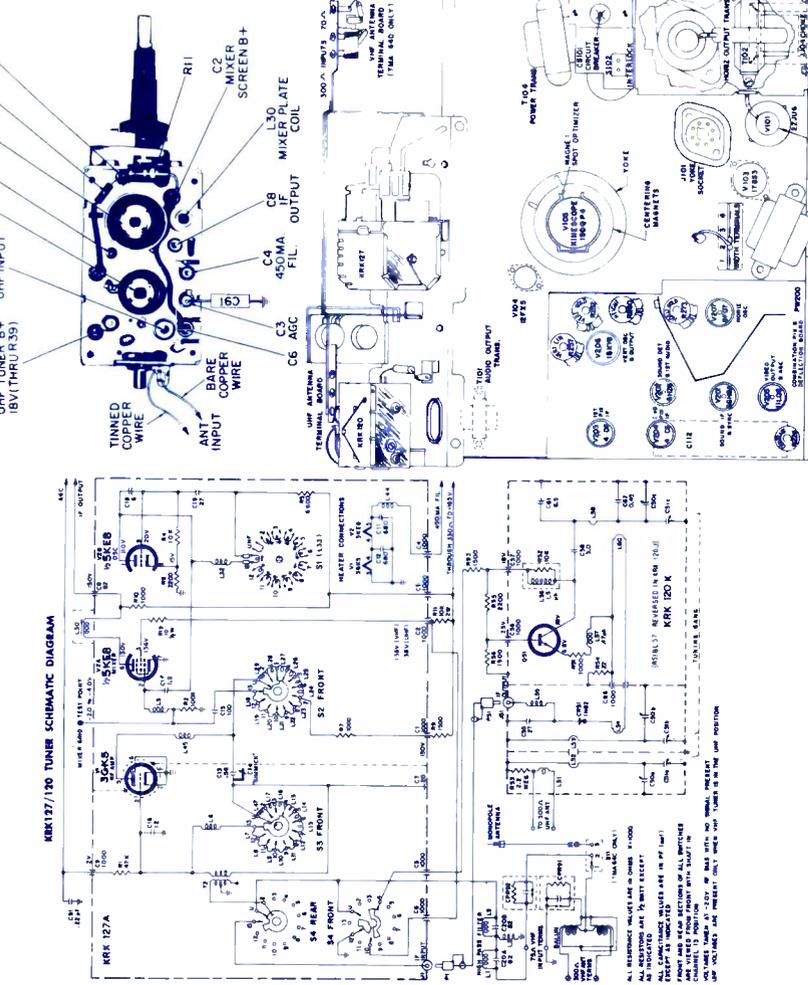
### ELECTRICAL SPECIFICATIONS

ANTENNA INPUT IMPEDANCE	75 ohm unbalanced
AUDIO POWER OUTPUT RATING	300 ohms balanced
FOCUS	1.5 watts maximum
INTERMEDIATE FREQUENCIES	Electrostatic, Fixed Focus
Picture I-F Carrier Frequency	44.75 mc.
Sound I-F Carrier Frequency	41.25 mc.
PICTURE SIZE	Approx. 17 1/2 sq. in. on a 19DQP4 Kinescope
POWER INPUT	120 Volts AC, 60 Cycle
SWEEP DEFLECTION	160 Watts
TELEVISION R-F FREQUENCY RANGE	Magnetic
Any of 12 VHF Channels	54 mc. to 88 mc., 174 mc. to 216 mc.
Any of 70 UHF Channels	470 mc. to 890 mc.
VIDEO RESPONSE	To 3.2 mc.

### MODEL AND CHASSIS CROSS REFERENCE

Model	Name	Chassis	TMA	Tuners	Kinescope	Antennas VHF/UHF
AG-050E, J	"PICKUP" TV	KCS155A	64C	KR127A/120JU	19DQP4	Monopole/Ring
AG-048E, H, Y	"SPORTSMAN" TV	KCS155B	64D	KR127A/120JU	19DQP4	Dipole/Ring

ALL RESISTANCE VALUES ARE IN OHMS  
K = 1000  
ALL CAPACITANCE VALUES LESS THAN 1.0 ARE IN μF.  
1.0 AND ABOVE ARE IN μF., EXCEPT AS INDICATED.  
\* INDICATES 5%.  
ALL RESISTORS ARE 1/2 WATT, EXCEPT AS INDICATED.  
DIRECTION OF ARROWS AT CONTROLS INDICATES CLOCKWISE ROTATION.  
ALL VOLTAGES MEASURED WITH NO SIGNAL INPUT.



# 967

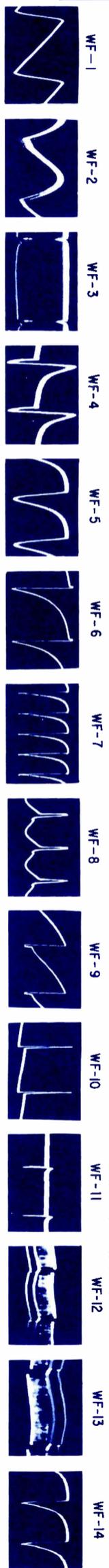
## SILVERTONE

TV Chassis  
 456,70120  
 456,70121  
 528,70120  
 528,70121  
 529,70120  
 529,70121

# ELECTRONIC TECHNICIAN

## TEKFAAX

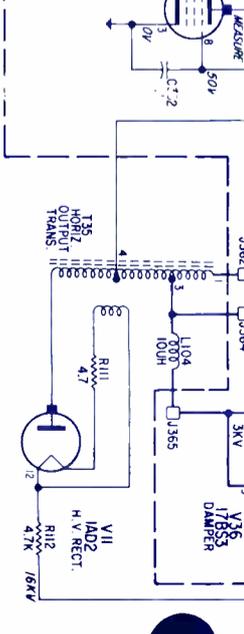
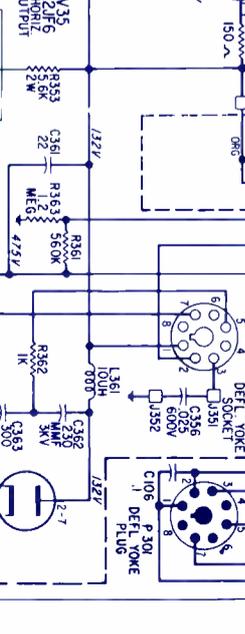
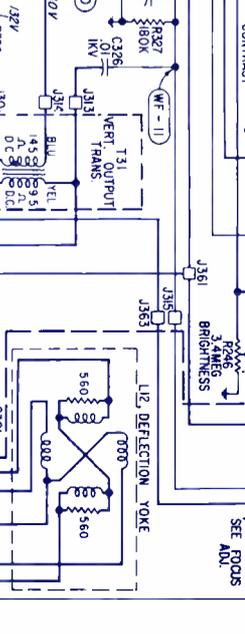
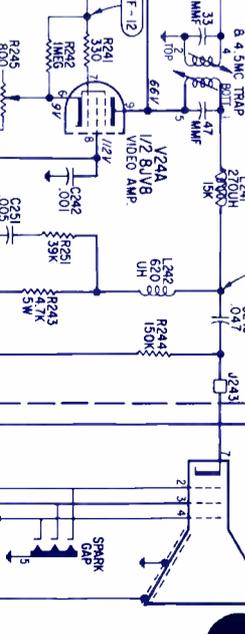
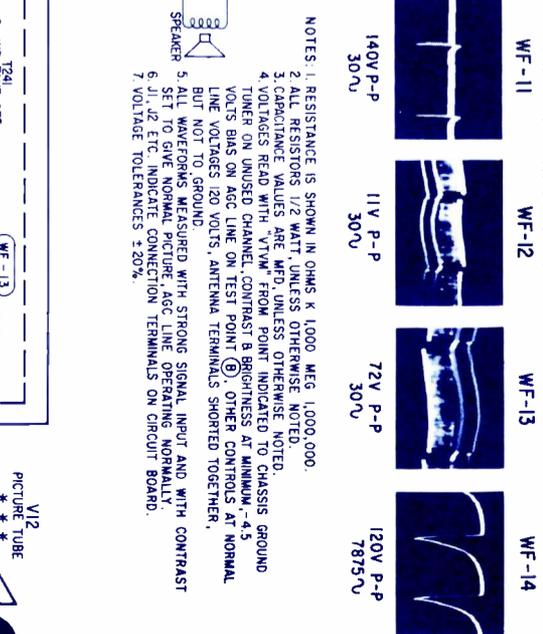
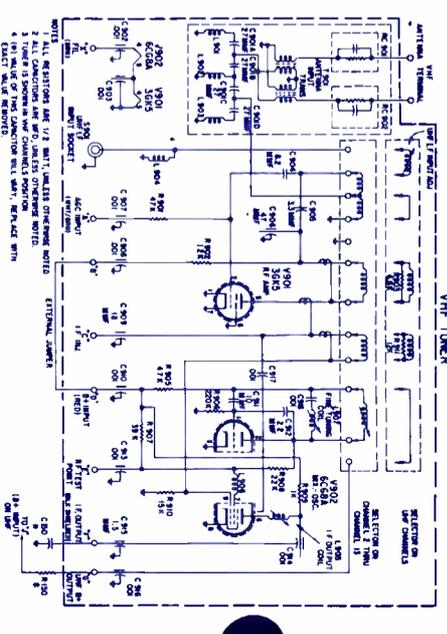
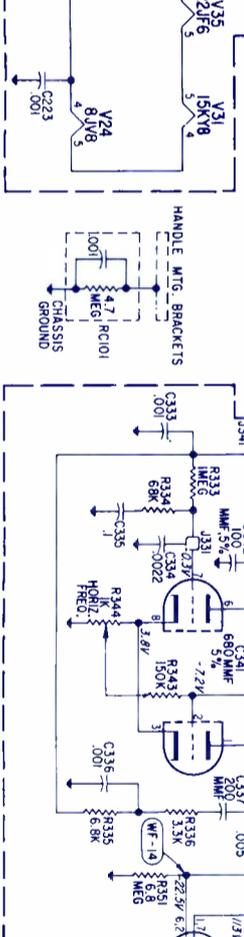
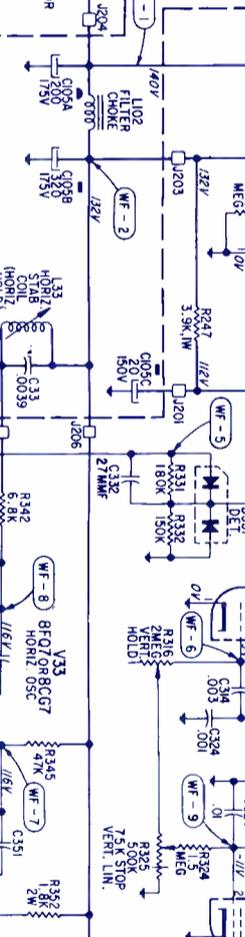
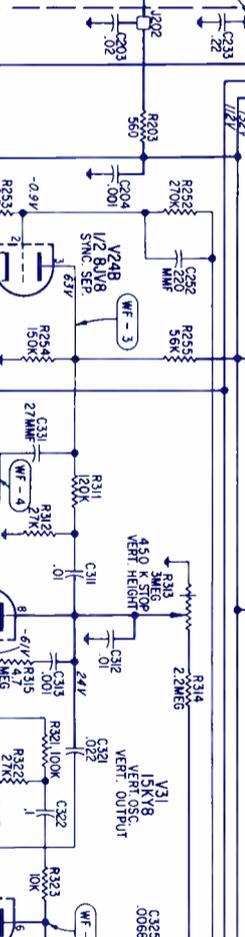
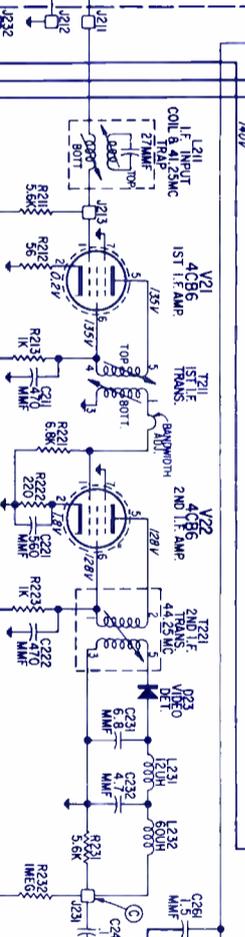
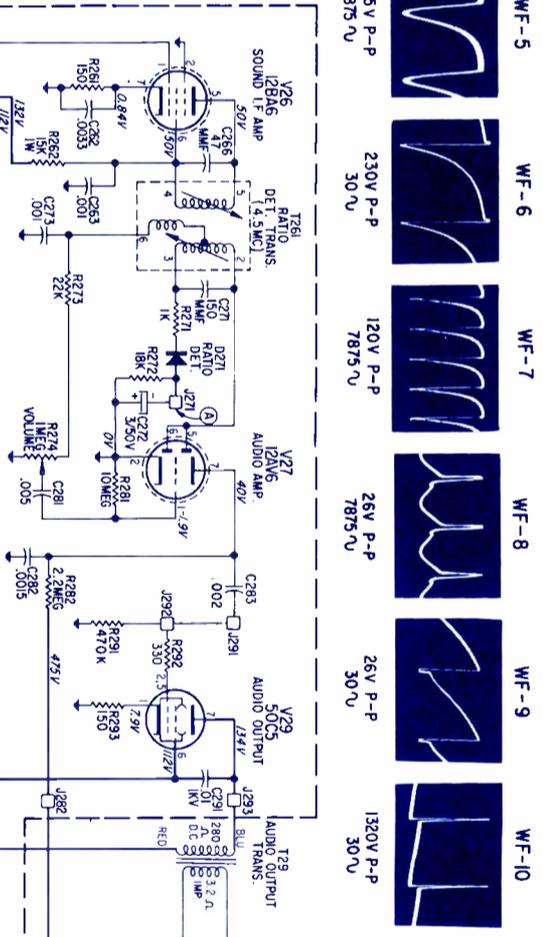
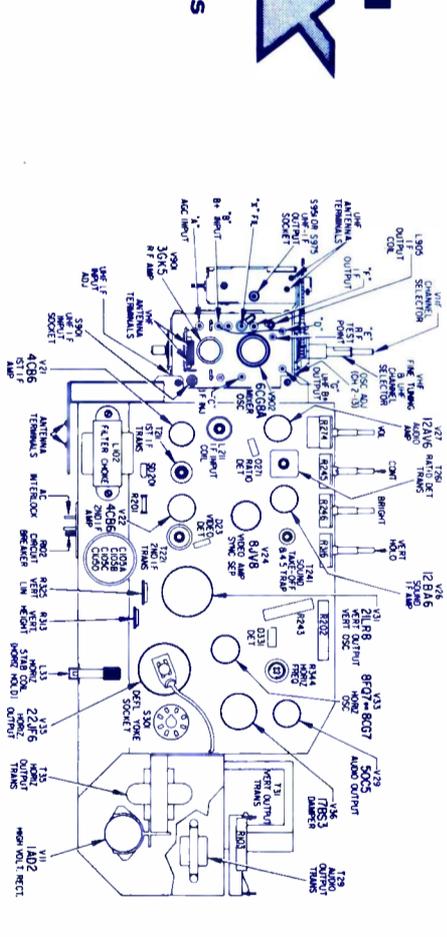
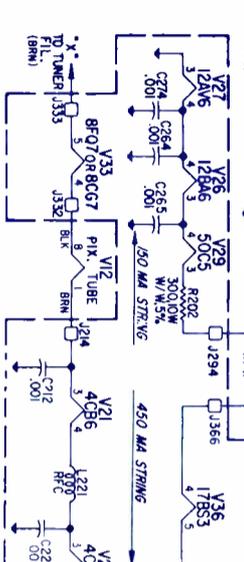
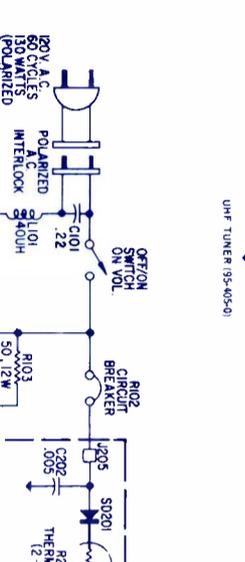
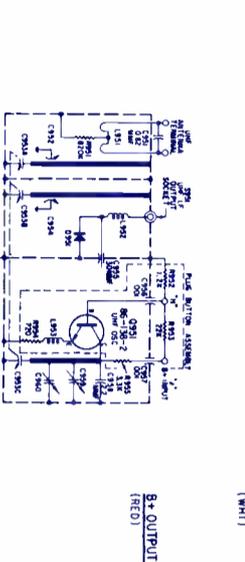
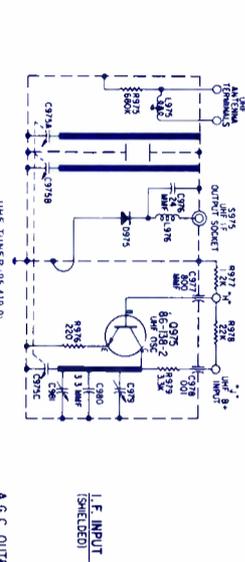
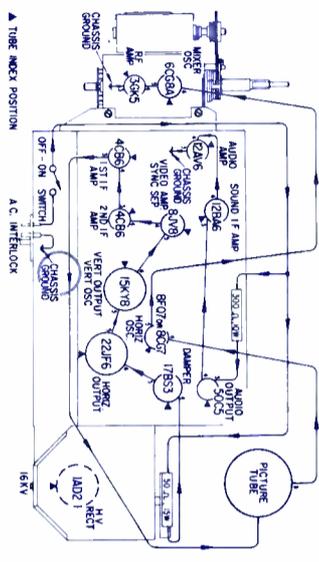
COMPLETE MANUFACTURERS' CIRCUIT DIAGRAMS  
 AND TECHNICAL INFORMATION FOR EIGHT NEW SETS



WF-1 20V P-P 30Ω  
 WF-2 1.25V P-P 30Ω  
 WF-3 52V P-P 30Ω  
 WF-4 3.0V P-P 7875Ω  
 WF-5 6.5V P-P 7875Ω  
 WF-6 230V P-P 30Ω  
 WF-7 120V P-P 7875Ω  
 WF-8 26V P-P 7875Ω  
 WF-9 26V P-P 30Ω  
 WF-10 1320V P-P 30Ω  
 WF-11 140V P-P 30Ω  
 WF-12 11V P-P 30Ω  
 WF-13 72V P-P 30Ω  
 WF-14 120V P-P 7875Ω

Symbol  
 C105A, B, C

Symbol	Description
C231	electrolytic 200 μfd, 175v (A); 300 μfd, 175v (B); 20 μfd, 150v (C)
C232	tubular, 4.7 pf, NPO
C233	tubular, 6.8 pf, 10%, NPO
C234	disc, .005 μfd, 250
C235	disc, 220 pf, 10%, Z5U
C236	disc, 150 pf, 5%, NPO
C237	disc, .001 pf, 10%, Z5F
C238	disc, .001 pf, 10%, Z5F
C239	disc, .005 μfd, 250
C240	disc, .01 GNV, 1kV
C241	tubular, .003 μfd, 10%, 200v
C242	tubular, .022 μfd, 10%, 400v
C243	tubular, 1 μfd, 100v
C244	disc, 230 pf, 3kV, N1500
C245	disc, 300 pf, 3kV, N1500
C246	circuit breaker
C247	50Ω, 15w, WW
C248	thermistor (2-10)
C249	300Ω, 10w, WW, 5% 4.7kΩ, 5w
C250	800Ω, contrast
C251	3.4 M, brightness
C252	1 M, volume
C253	3 M, vert. height
C254	2.4 M, vert. hold
C255	500kΩ, vert. lin.
C256	1kΩ, horiz. freq. transformer, audio output
C257	transformer, horiz. output
C258	transformer, vert. output
C259	transformer, 1st IF
C260	transformer, 2nd IF
C261	coil, 4.5 Mc trap & sound take-off
C262	coil, ratio detector
C263	yoke, deflection w/centering device
C264	coil, horizontal stabilizer
C265	choke line, radiation
C266	choke, filter
C267	coil, choke (10 μh)
C268	coil, IF input & 41.25 Mc trap
C269	coil, tweed (12 μh)
C270	coil, peaking (60 μh)
C271	coil, peaking (270 μh wound on 15K resistors)
C272	coil, peak (620 μh)
C273	coil, horiz. suppression



NOTES: 1. RESISTANCE IS SHOWN IN OHMS K 1,000 MEG 1,000,000.  
 2. ALL RESISTORS 1/2 WATT, UNLESS OTHERWISE NOTED.  
 3. CAPACITANCE VALUES ARE MFD, UNLESS OTHERWISE NOTED.  
 4. VOLTAGES READ WITH VTVM FROM POINT INDICATED TO CHASSIS GROUND.  
 5. TUNER ON UNUSED CHANNEL, CONTRAST & BRIGHTNESS AT MINIMUM, 4-5 VOLTS BIAS ON AGC LINE ON TEST POINT (B) OTHER CONTROLS AT NORMAL LINE VOLTAGES 200 VOLTS, ANTENNA TERMINALS SHORTED TOGETHER, BUT NOT TO GROUND.  
 6. ALL WAVEFORMS MEASURED WITH STRONG SIGNAL INPUT AND WITH CONTRAST & BRIGHTNESS AT NORMAL OPERATING POSITIONS.  
 7. J1, J2 & J3 INDICATE CONNECTION TERMINALS ON CIRCUIT BOARD.





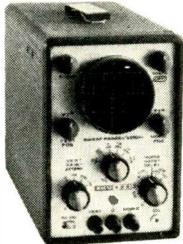
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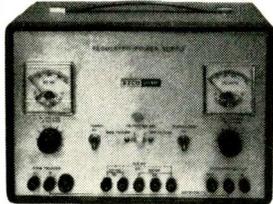
**New Model 435** — DC Wideband Scope. Top-quality DC 4.5mc scope with 3" flat-face CRT. Zener calibrator. Outputperforms 5" scopes three times its size, facilitates on-location color TV and other servicing. \$99.95 kit, \$149.95 wired.



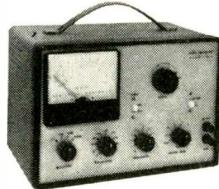
**New Model 342** — FM Multiplex Signal Generator. Design lab quality. Both composite audio and FM RF outputs. Inputs for stereo audio source for store demonstrations, critical A/B listening tests. \$149.95 wired.



**New Model 965** — FaradOhm Bridge/Analyzer. 9-range, low-voltage capacitance-resistance bridge safely measures even 1-volt electrolytics. Metered bridge balance, leakage test voltage (6 DC VTVM ranges 1.5-500V), leakage current (11 DC VTAM ranges 0.15ua-15ma). DC VTVM & VTAM externally usable. \$129.95 wired.



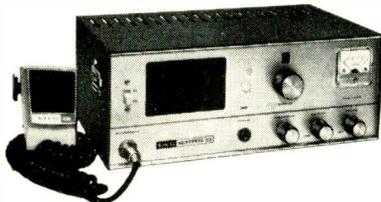
**New Model 1030** — Regulated Power Supply. Speeds troubleshooting, design work, production line testing, electronics teaching. Variable bias and plate sources regulated to 1/3 of 1%: 0-150V @ 2ma; 0-400V @ up to 150ma. Ripple less than 3mv rms. Unregulated fil. volts of 6.3V & 12.6V, @ 3A. Switchable, monitoring milliammeter and voltmeter. \$59.95 kit, \$99.95 wired.



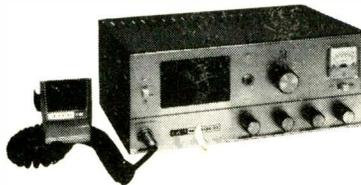
**New Model 378** Audio Generator. Near-distortionless sine wave generator (< 0.1% 20-20,000c) providing fast, convenient, switchable selection of frequencies from 1c to 1,000c (1c steps 10c-100c, 10c steps 100c-1kc, 100c steps 1kc-10kc, 1kc steps 10kc-100kc). 8-pos. 10db/step output attenuator & fine attenuator. Output meter (4 1/2" 200ua) with 8 voltage ranges & db scale. \$49.95 kit, \$69.95 wired.



**Model 232** Peak-to-Peak VTVM. A must for color or B & W TV and industrial use. 7 non-skip ranges on all 4 functions. With Uni-Probe.® \$29.95 kit, \$49.95 wired.



**New Model 779** — Sentinel 23 CB Transceiver. 23-channel frequency synthesizer provides crystal-controlled transmit and receive on all 23 channels. No additional crystals to buy ever! Features include dual conversion, illuminated S/R meter, adjustable squelch and noise limiter, TVI filter, 117VAC and 12VDC transistorized dual power supply. Also serves as 3.5 watt P.A. system. \$169.95 wired.



**New Model 712** — Sentinel 12 Dual Conversion 5-watt CB Transceiver. Permits 12-channel crystal-controlled transmit and receive, plus 23-channel tunable receive. Incorporates adjustable squelch & noise limiter, & switches for 3.5 watt P.A. use, spotting, & Part 15 operation. Transistorized 12VDC & 117VAC dual power supply. \$99.95 wired only.



**New Model 753** — The one and only SSB/AM/CW Tri-Band Transceiver Kit. 200 watts PEP on 80, 40 and 20 meters. Receiver offset tuning, built-in VOX, high level dynamic ALC. Unequaled performance, features and appearance. Sentionally priced at \$179.95 kit, \$299.95 wired.



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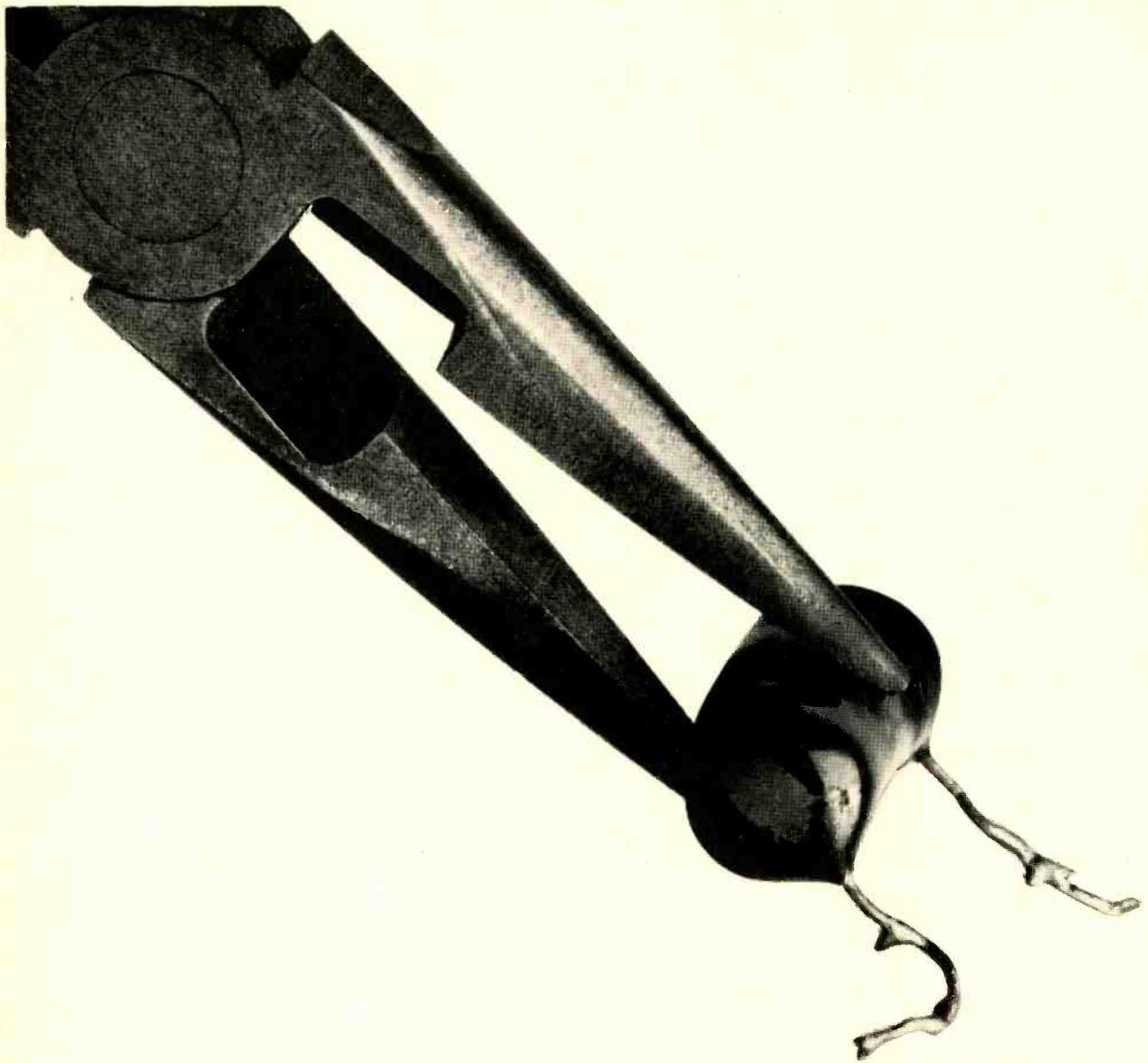
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NOVEMBER 1965  
VOL. 82 NO. 5

# ELECTRONIC TECHNICIAN

WORLD'S LARGEST ELECTRONIC TRADE CIRCULATION

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## Cover

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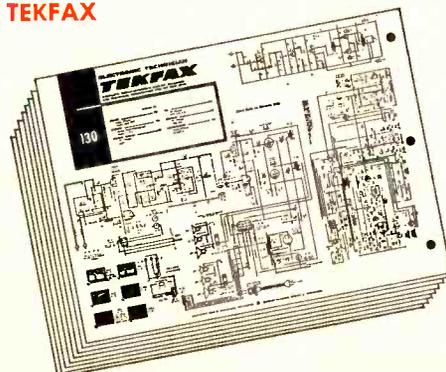
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## TEKFAQ



Group 159 November \* 1965

**DUMONT:** Tv Chassis 120780, 783, 810  
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**PHILCO:** TV Chassis 16JT26 and 16JT26A  
**RCA VICTOR:** TV Chassis KCS-155  
**SILVERTONE:** TV Chassis  
456.70120, 456.70121  
528.70120, 528.70121  
529.70120, 529.70121  
**SYLVANIA:** TV Chassis BO4-1, -2  
**ZENITH:** TV Chassis 14N29

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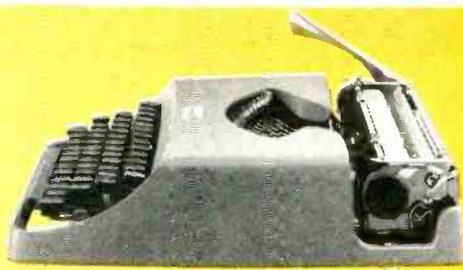
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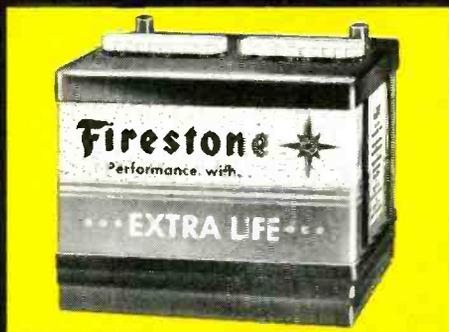
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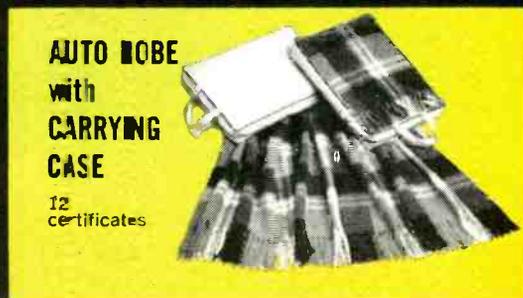
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## EDITOR'S MEMO

### 'Hand-Me-Down' Ideas

We are constantly but belatedly being reminded by certain sources that we are pioneers in our own way. For example, ELECTRONIC TECHNICIAN pioneered details on the "vectroscope" technique of servicing color TV (August 1957, page 34). And now we note an editorial in a recent TV-radio magazine calling attention to the havoc wreaked by hurricane Betsy and the sage observation that service-dealers and "servicemen" (we don't use the word in ET), should be alert to the antenna opportunities opened in the wake of this disaster. So, being lazy this month and not being opportunists, we would like to repeat the "meat" of an editorial which appeared on page 34 of the September 1964 issue of ET. This is by way of putting things back in their proper perspective. We quote:

"This is hurricane, tornado and just plain 'twister' season along the eastern seaboard, the gulf coast and in many inland areas we could poke a finger at on the map. And many technicians have grown to feel that it's antenna season, too. But it is and it isn't, depending on how you look at it. Actually, this is another one of those 'pearls of wisdom' that cultured itself on a grain of truth.

"Every day in the year is antenna season throughout a large section of the country and for at least 7 or 8 months a year in northern areas—for alert service-dealers and technicians, that is.

"From now until old-man winter clamps icy fingers on roof tops across more than half the nation, many of you will have an overflow of antenna business. And this winter some of you will be postponing or even turning down urgent requests for antennas in zero or sub-zero weather. Most of the antennas that fall apart in winter were already defective last summer—and they are wrecks right now. All they need is a puff of wind or a little icing to put them totally out of commission.

"Yes this is antenna season. But so was last summer when your business was slow and last spring when it was just beginning to pick up a little."

The point is, the cream of this industry — 82,000 service-dealers and technicians who read ET and keep us supplied with *original ideas* — are too alert to let us sink to the status of second-hand-idea rag pickers.

... for more details circle 62 on postcard →

# Fall lineup of STANDARD KOLLSMAN Television Stars

Featuring the fastest rising star in the TV tuner industry.  
Now available for replacement profits.

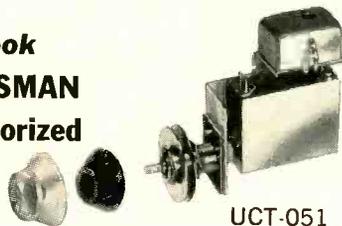
## NEW STANDARD KOLLSMAN COLOR and black and white VHF ARBOR TUNER WITH PRE-SET FINE TUNING



Guaranteed positive adjustment to eliminate service callbacks. Created to replace TV tuners in practically every set manufactured in the United States since 1956. A simple adjustment of the knob automatically adjusts the oscillators for easy, perfect tuning. Specially designed brackets permit simple installations in any position—guaranteed to eliminate all previous mechanical problems of replacement installations.

Three new models to sell.  
New SKi Arbor Tuner installed with the SKi UCT-051 UHF Tuner converts any set into a modern 82 channel TV.

### Sell the custom look STANDARD KOLLSMAN BUILT-IN Transistorized UHF Converter



UCT-051

Easily installed in about 45 minutes

- Best performance—low noise
- Fits all consoles, table models and most portables
- Compact size: 5½" x 1½" x 3¼"; weight 1¼ lbs.
- Easy to read dial calibrated to read at any angle regardless of installation position
- Easy tuning high-ratio ball bearing drive
- Reliable service-free tuning element
- All UHF channels—14 through 83
- Built-in safeguards against interference with other TV sets in vicinity
- Excellent for replacement of defective tuners
- Quick and easy way to make TV trade-ins saleable

### IF STANDARD KOLLSMAN MADE IT, STANDARD KOLLSMAN WILL FIX IT

- Only brand new parts used
- 48 hour service on all SK tuners
- Latest testing techniques to assure proper alignment
- No hidden costs—\$11.50 plus parts . . . \$13.50 maximum cost
- \$3.00 Trade-in allowance on new tuner.
- 6 month guarantee
- Special shipping cartons to avoid damage in transit

### INTRODUCING WORLD'S MOST BEAUTIFUL BEST PERFORMING TRANSISTOR UHF CONVERTER



Model TA

- Earns more profit because it's easier to sell
- More picture power with latest nuvistor amplifier circuits
- Easy tuning
- Exceeds minimum F.C.C. requirements for spurious radiation specifications
- Very low drift
- Easy hook up
- All channels 14 through 83
- U.L. listed
- Full year warranty on all parts and workmanship.

### NEW UHF TRANSLATOR MULTI PURPOSE TEST EQUIPMENT AND DEMONSTRATOR

- Translates VHF to UHF even when no UHF signals are on air
- Saves Time Servicing all Channel TV Sets
- Easier to Sell
- All Channel TV sets



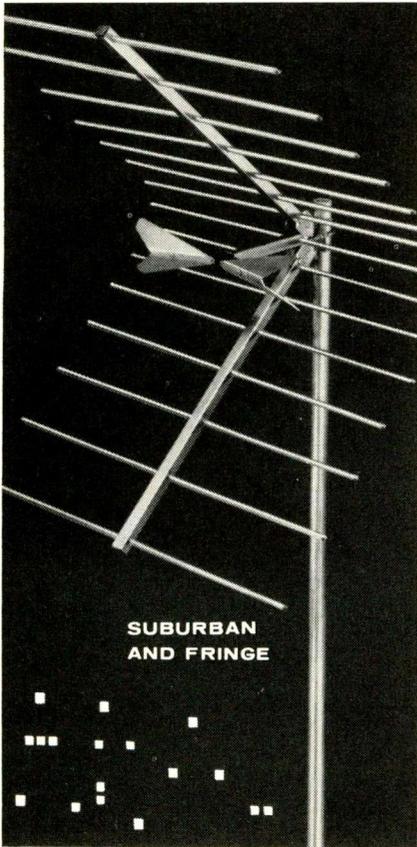
VUT-1

FOR MORE PROFIT FOR THE SERVICE DEALER • GREATER CUSTOMER SATISFACTION

GUARANTEED BY THE WORLD'S LARGEST  
MANUFACTURER OF TELEVISION TUNERS



Standard Kollman  
INDUSTRIES INC.  
2085 NORTH HAWTHORNE AVE., MELROSE PARK, ILLINOIS



↙ New RCA Strato Star II—15 Reflector UHF antenna for suburban to fringe area reception. Stock #7B141  
New RCA Strato Star I—11 Reflector UHF antenna for urban reception. Stock #7B140 ↘



What's  
the latest  
angle in

# UHF-ANTENNAS

... and how can it make money for you?

There's a lot of money to be made in UHF antenna installation in localities where UHF is established... or is coming, because top UHF reception requires a separate antenna designed for UHF... and UHF is coming to more and more communities every week.

These two RCA UHF antennas let you cover every UHF sales possibility from urban to fringe areas.

The "Latest Angle" increases gain. RCA has increased corner reflector angle to 100°. This feature increases gain up to 18% on the most popular UHF channels.

A "Snap" to install. Antenna arms snap into place and lock automatically. No rivets—no bolting—no bag of hardware. This feature alone can save valuable man hours on each installation.

Better Impedance Match... through new, improved dipole design.

Increased Directivity, plus rejection of unwanted ghosts and other types of interference, as a result of precision variable-spacing of reflector elements.

Better Front-to-Back Ratio, achieved by means of a special element at the apex of the corner reflector.

Don't miss out on UHF profits! Call your nearest Authorized RCA Antenna Distributor today.

RCA PARTS AND ACCESSORIES, DEPTFORD, N.J.



The Most Trusted Name in Electronics

### Likes TEKFAQ and ET

I received my TEKFAQ N06 today. I think it's the best I've ever used. Thank you for this and let me say it's on a par with the fine ELECTRONIC TECHNICIAN magazine which I think cannot be equaled.

FRANK M. YEAGER

Media, Pa.

### Needs VTVM Schematic

I need a schematic for a Heath model V1 VTVM. I would appreciate it if any reader could furnish me with one. The company says they no longer have them.

CLARENCE ENGLAND

Rose Hill, Virginia

### You Quit Too Easy

From 1918 to 1965—from the galena crystal days to color TV—is quite a while. Don't you think it's time for me to quit? I'm throwing in the sponge—I've had it. Let the younger boys and girls worry about it. I'm retiring—but keep up the good work on ELECTRONIC TECHNICIAN—it's tops!

JOHN VITKA

Hamden, Conn.

### More Of Same

Your magazine has done a wonderful job and without TEKFAQ I could not have rendered efficient service that my clientele expects and pays for. I am a self-taught technician of 30 years standing.

ROBERT A. BOTA

Montreal, Canada

### Wants More on Color

... Needless to say, I have enjoyed ELECTRONIC TECHNICIAN right from the beginning and have seen it grow and improve over the years. Many times your schematics helped me when nothing else was available. Hope you keep up the good work. I would like to see more articles on color TV, especially setups on convergence, purity, etc. . . .

JOHN LIND

Flushing, N.Y.

• We are increasing our coverage on color to encompass all phases — including basic chroma circuit operations and adjustments—ed.



# 1,863 reasons why Sprague Twist-Lok<sup>®</sup> Capacitors help you to protect your reputation

When you fool around with makeshift or "fits-all" capacitor replacements by substituting sizes and ratings, you leave yourself wide open for criticism of your work, you risk your reputation, and you stand to lose customers. With so much at stake, it just doesn't pay to use makeshifts when it's so easy to get exact replacement capacitors from your Sprague distributor.

With 1,863 different Sprague Twist-Lok Capacitors as standard catalog items, and more being added regularly, Sprague gives you the world's most complete selection of exact replacements.

We don't have to tell you that it's easier to service with exact replacements. And we don't have to tell you that it's better, too. When sets are designed, specific capacitance values are used for peak operation, so it takes exact replacements to restore original set performance.

And who better than Sprague knows which values and sizes are needed in the replacement market? Sprague, the world's largest component manufacturer, has the most complete specification file on original set requirements. That's why you're always right when you work with Sprague Twist-Lok exact replacements!

GET YOUR COPY of Sprague's comprehensive Electrolytic Capacitor Replacement Manual K-107 from your Sprague Distributor.



## HAVE YOU TRIED KWIKETTE<sup>™</sup> CONNECTORS?

Not just another wire spring connector! Copperweld wire inner core, a layer of flux, and an outer coating of solder... all you supply is heat! Now being packed with Sprague Atom<sup>®</sup> Capacitors at no extra cost to you! See your distributor!

\*TRADEMARK



WORLD'S LARGEST MANUFACTURER OF CAPACITORS

Sprague Products Co., 509 Marshall St., North Adams, Mass. 01248

# MAKE THIS A COLOR-FILLED HOLIDAY SEASON

*with valuable premiums and G-E tubes*



Look at these valuable premiums . . . there's something for everyone on your Christmas gift list . . . and they're all available with

purchases from General Electric's line of receiving tubes, the line with more tubes for color TV applications. Make this a real color-filled holiday—stock up on G-E color components and earn brand name merchandise for your family, friends, or yourself. Ask your G-E Distributor\*. Premiums available from October 21 through December 15. **Distributor Sales, Owensboro, Kentucky 285-08**

\*Premiums available at option of your G-E Tube Distributor.



#### WHITE DRESS SHIRT

Pima cotton oxford man's dress shirt with precision needle tailoring. Popular button-down collar with box-pleat back. Sanforized. White only, in neck sizes 14 to 17, sleeves 32 to 35.

Order ETR-4329

#### BATES TABLECLOTH & NAPKINS

Perfect for the lady of the house. Set includes one 52" x 52" tablecloth in 100% cotton with four matching napkins of pure Irish linen. Completely washable. Specify choice of orange/brown with orange napkins, brown/green with gold napkins, or blue/green with turquoise napkins.

Order ETR-4323

... for more details circle 31 on postcard



#### STRUCTO AUTO TRANSPORT

All-metal toy auto transport, multi-colored with two metal cars. Ramp extends for loading. Length 21 $\frac{7}{8}$ "

Order ETR-4327



#### RONSON BUTANE TORCH

Lightweight, easy-to-handle torch has many household and hobby uses. Adjusts from pinpoint to blowtorch flame. Complete with large-size Ronson multi-fill fuel container.

Order ETR-4328



#### D'ORSAY PERFUME SET

What lady wouldn't appreciate this. Set includes 3 oz. Nuage Parfume spray mist plus 1 dram flaconette of Parfum de Bain bath scent. Matched fragrance set comes gift boxed.

Order ETR-4326



#### TIMEX WATCH

Regular size man's watch with chrome plated bezel, sweep second hand, radiolite dial. Features Timex unbreakable mainspring; is shock resistant, gift boxed.

Order ETR-4333



#### G-E CHRISTMAS LIGHT SET

Your choice of either 10-lamp multiple indoor set or 15-lamp outdoor set. Both sets feature all-green, extra-durable sockets and cords. Use season after season.

Order ETR-4334 (Indoor),  
ETR-4335 (Outdoor)



#### KODAK CAMERA OUTFIT

Famous Hawkeye Instamatic F® outfit comes complete with camera with wrist strap, 1 Kodapak cartridge, 4 AG-1 flashbulbs, 2 AAA-size batteries, flashguard, and instruction book.

Order ETR-4332



#### PILE LINED JACKET

Stylish year-round Cougar jacket in 100% cotton poplin with 100% Orlon pile lining. Completely wash 'n wear, full zipper front, two slash pockets. Beige only in sizes 36, 38, 40, 42, 44, 46.

Order ETR-4330



#### MEN'S STRETCH HOSE

Three pairs 100% nylon stretch hose, one each of black, cordovan, and navy. Fits sizes 10-13. Available either Regular or Calf-length.

Order ETR-4325  
(Regular)  
ETR-4324 (Calf-length)



#### G-E CLOCK RADIO

Popular G-E AM clock radio features famous Snooz-Alarm® and Muted Slumber Switch. Handsome white cabinet; 4" Dyna-power speaker; built-in ferrite rod antenna; drift compensation and automatic volume control.

Order ETR-4331

GENERAL  ELECTRIC

# LETTERS TO THE EDITOR

## Right Between the Eyes

You probably won't print this but here goes anyway. Although I have subscribed to *ELECTRONIC TECHNICIAN* for the past 12 years and consider it and *TEKFAK* indispensable, I sometimes become impatient with your approach in certain areas. To be fair and frank at the same time (per-

haps I am lagging behind the Space Age), it seems to me that you underestimate the intelligence of the average technician in this business. You do not seem to trust him. Oh, I know, some of us are still hanging on to B/W TV until the Lawrence tube or some other innovation-of-the-future becomes popular; I know some of us have refused to keep up with developments in transistorized equipment and finally, some of us refuse to grow up—preferring to piddle around with many things that were buried along with the galena crystal 40 years ago. But the editors of *ET* seem to take a

rather smug, cock-sure, aloof and proud attitude most of the time. Why don't you loosen up, take chances and live a little? Why do you strive for perfection? Why do you always walk down the straight and narrow road? Why haven't you taken a position on CATV, on "pay TV," or on this monstrous coaxial cable hoax, for example? And I could mention a few other things you've side-stepped.

After all, as your editor put in a recent "Editor's Memo," in regard to those technicians who still buck color TV: "They prefer to wait for the will-o-the-wisp of never-arriving perfection to come rocketing around a corner that's infinitely long."

Now it seems to me that you are guilty of precisely the same attitude in certain respects, regarding your unending opposition toward "construction articles," for example. At least, why can't we have some articles on kit building? After all, you have a number of advertisers that manufacture kits. Almost everyone is going into kits including some of the big component Hi Fi manufacturers. Why don't you come off your big "ivory tower" and get down "among the trees" as your editor put it in another "Editor Memo"? We're not as stupid as some seem to think—and we do trust *ET*'s leadership and guidance.

BOB HYNES

St. Louis, Missouri

• *Whew! We're not smug, nor cock-sure nor aloof nor proud—except, perhaps, proud to hear *ET* readers brag about *ET*. We have not side-stepped CATV. In fact, we have a file on it six-feet high and we're studying it carefully. Pay TV is coming—but it won't affect us much—any more than other changes have and will. We're planning an article on the pros and cons of building test instruments from kits. And as far as this coax business you mention, we'll have our say when we're finished with our investigations. See this issue of *ET* on that subject. Hope you 'cool off' soon.—Ed.*

## Needs Scope Information

I recently came into possession of an oscilloscope built by Transvision—a Model 450A. It needs some work to put it in good operating condition. I have written the manufacturer but they can offer no help. I need any information and a schematic for this equipment. If any of the readers of *ELECTRONIC TECHNICIAN* could help me obtain this information—particularly a schematic—I would greatly appreciate their efforts and would return it when finished.

JAMES HENDERSON

Library, Pa.

# NOT JUST HORNS NOT JUST CONES OXFORD HAS THE FULL LINE

Model  
OP-6

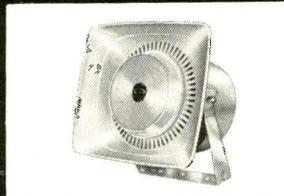


## to Supply Commercial Sound Needs...

Model  
DVC-8J4



Model  
OH-10



From the OP-6 & OP-8 paging and talkback horns and the OH-10 outdoor high fidelity system, which changed the outdoor speaker market in 1964, to the startling new DVC-8H4 and DVC-8J4 units with two separate voice coil winding, providing immediate access to the speaker, Oxford is the one source best qualified to supply all your speaker needs.

Our line also includes intercom speakers, public address speakers, all-weather cones, shallow ceramic magnet units, and the "Specialist Series." The Specialists (which includes models DVC-8H4 and DVC-8J4) are a series of popular 8-inch speakers that have been prepared for "instant use" by the commercial sound installer, with factory installed transformers and bulk packaging.

It makes good sense to use the line that is orientated toward the commercial sound installer by both design and marketing. For more information on the OXFORD line, write for complete catalog.

**OXFORD  
TRANSDUCER  
COMPANY**



A Division of Oxford Electric Corporation

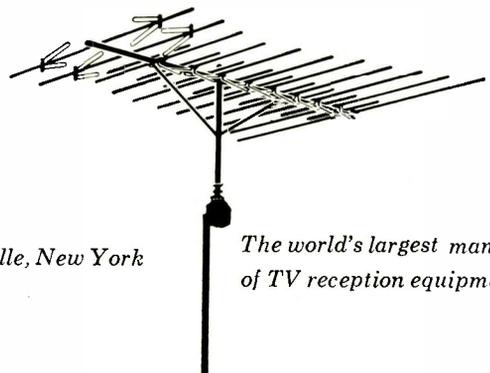
3911 South Michigan Avenue • Chicago, Illinois 60653

... for more details circle 49 on postcard

In the entire history of television no manufacturer has ever delivered as many antennas of one type in a two month period as Channel Master did with the revolutionary new Color Crossfire series during September and October.

Because of the unprecedented demand, Channel Master has greatly expanded production facilities to insure that you will continue to receive both quality and quantity in *all* antenna types, as well as new Color Crossfires... the world's most advanced antennas designed specifically for the age of color.

**CHANNEL MASTER** Ellenville, New York



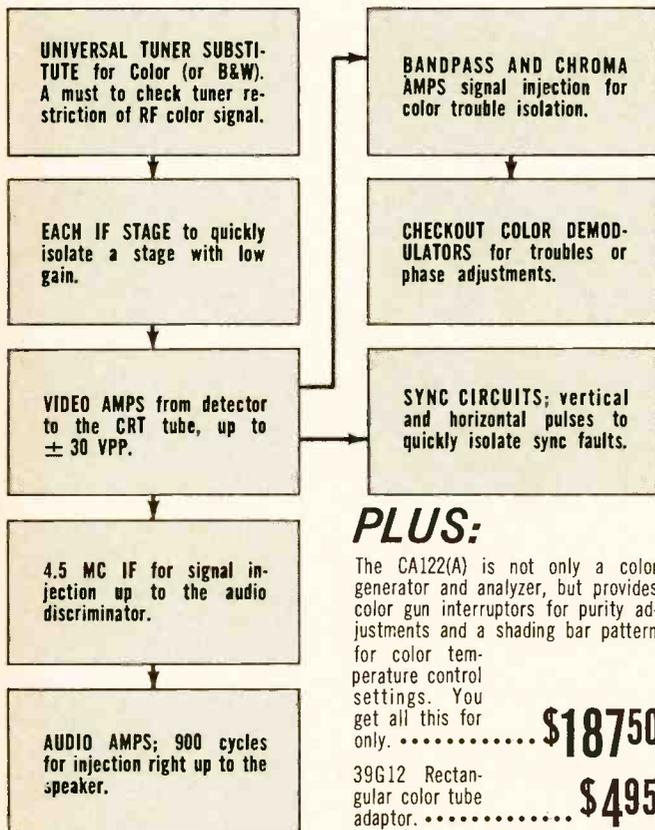
*The world's largest manufacturer  
of TV reception equipment.*

# PINPOINT COLOR TV TROUBLES IN SECONDS...



## WITH THE NEW IMPROVED SENCORE CA122(A) COLOR CIRCUIT ANALYZER

It's a standard ten color bar generator; produces vertical lines, horizontal lines, crosshatch, and adjustable dots, PLUS a complete TV analyzer for color and B&W—at less money than color generators only. Here is what the CA122(A) will do for you by tried and proven signal injection into these stages.



### PLUS:

The CA122(A) is not only a color generator and analyzer, but provides color gun interruptors for purity adjustments and a shading bar pattern for color temperature control settings. You get all this for only.....

**\$18750**

39G12 Rectangular color tube adaptor.....

**\$495**

See your distributor today. He has the CA122(A) in stock now.

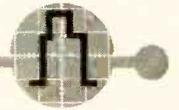
# SENCORE

426 SOUTH WESTGATE DRIVE

ADDISON, ILLINOIS

... for more details circle 55 on postcard

## SYNC ON BUSINESS



A "car desk" is not exactly unique, but this item may interest some of you hard-working service-dealers and technicians. Called the Mishek Car Desk, there is a "gim-



mick" to it. The price is \$15.95. But if you mention ET when you order one, the price is \$12.95. We consider this an attractive "gimmick." (See photo.)

A free gift of 100 personally imprinted holiday greeting cards is being sent by KINEMATIX, INC., a Chicago electronics manufacturer, to dealers and wholesalers purchasing the company's "Verba-Mite" auto reverberation system. The unit measures 6½x3¼x1½ in. For full details, write to KINEMATIX, INC., 2040 West Washington Blvd., Chicago, Ill. 60612, attention: Martin Santa.

A free color TV test CRT is being offered by RCA. A 21-in. round, 70 deg color test tube is being offered with each RCA WR-64B color bar/dot/crosshatch generator purchased between now and December 15, 1965. It is said the tube is ideally suited for test jigs. Additional information is available from any RCA distributor or by writing to RCA Electronic Components and Devices, Test Equipment Headquarters, Building 17-2, Harrison, N.J.

Don't let this hobby manual scare you. It could be worth its weight in gold if you make time to study it. The 200-pager lists details on projects for car, entertainment, home, camp and workshop. See your G-E distributor.

The rodent sentry, employing ultrasonic waves, claims to be a sure cure for rodents and pests. It's claimed to be effective on rats, bats and pigeons. The company says it's also working on a similar device for insect control—including flies, mosquitoes and roaches. Write: Haydu (Rodent Sentry Div.,) 505 E. Beach Blvd., Hallandale, Fla.

A control replacement chart is available from distributor products, Centralab, the electronics division of Globe-Union Inc. The chart covers all single controls in the company's FASTATCH II system.

YOU GET PRODUCT PLUS FROM YOUR SYLVANIA DISTRIBUTOR

# Now you can earn while you earn.

You earn valuable free prizes just by buying picture tubes and receiving tubes *now* in our Sylvania Means Business program.

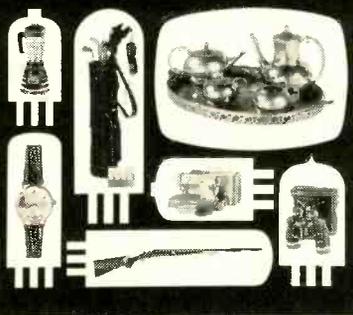
Every time you order Sylvania picture or receiving tubes from a participating distributor, you receive SMB Dealer Certificates. These certificates are redeemable for an exciting selection of gifts for yourself, your family and your home.

You get one certificate for every \$12.50 worth of receiving tubes and one certificate for every SILVER SCREEN 85®, color bright 85™ or COLOR SCREEN 85 picture tube.

So you earn twice: even bigger profits and top quality prizes. **Sylvania Means Business.**

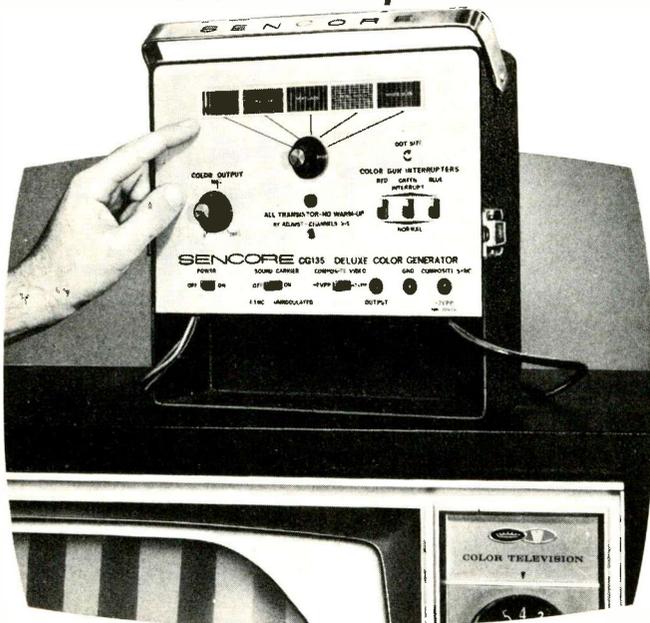
See your participating Sylvania distributor for all the details. Or write to CADD, 1100 Main St., Buffalo, N.Y.

Earn valuable prizes  
in Sylvania's new SMB  
Dealer Awards Program



**SYLVANIA**  
SUBSIDIARY OF  
GENERAL TELEPHONE & ELECTRONICS **GTE**

at last...  
instant color patterns  
at your finger tips...  
zero warm-up time



## THE ALL NEW SENCORE CG135 DELUXE TRANSISTORIZED COLOR GENERATOR

The big push is on in Color TV. Equip yourself now with the new, solid state Sencore CG135 and cash in on the zooming volume of new service business as Color-TV booms! Instant, service-ready RCA standard color bars, cross-hatch, white dots and individual vertical and horizontal bars enable you to set up or trouble-shoot more Color TV sets per day; earn top money in this fast growing service field. It's an analyzer too: Color gun interruptors, unmodulated video for chroma circuit trouble isolation and unmodulated sync pulses to keep Zenith receivers in sync for this test, make color trouble shooting a snap. Sturdy all-steel construction for rugged, heavy duty in the field or shop. Another Best Buy in profit-building service instruments from Sencore at

**\$149<sup>95</sup>**

COMPARE THESE FEATURES: SEE WHY THE CG135 IS IN A CLASS BY ITSELF

- Solid state construction employs high priced GE "Unijunctions" to develop six "jump out proof counters" that guarantee stable patterns at all times with no warm-up
- Standard RCA licensed patterns as shown on schematics throughout the industry
- Handy universal color gun interruptors on front panel
- Lead piercing clips insure non-obsolence
- CRT adaptors optional
- Crystal-Controlled 4.5mc Sound Carrier Analyzing Signal to insure correct setting of fine tuning control
- RF output on Channel 4 adjustable to Channel 3 or 5 from front of generator when Channel 4 is being used
- No batteries to run down; uses 115 V AC
- Less than one foot square, weighs only 8 lbs.

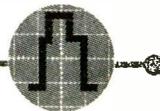
professional quality — that's the difference!

# SENCORE

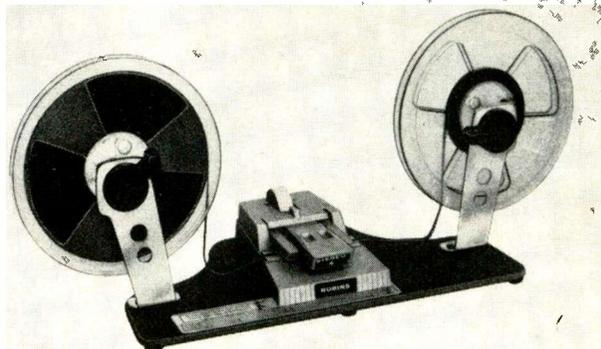
426 SOUTH WESTGATE DRIVE • ADDISON, ILLINOIS

... for more details circle 56 on postcard

## SYNC ON BUSINESS



A tape editing workshop may be just the thing to sell your tape recorder enthusiasts. Robins Industries has one that can be used to splice, edit, repair and combine reel-to-reel tapes. The thing has an accurately calibrated, edit-



ing and timing scale, according to Robins, and shows at a glance how much tape time is being added to or cut from tapes. All four standard recording speeds are clearly indicated on the timing scale.

• • •

A shielding tape, in 25 and 100 ft rolls, is available for shielding cable harness and cable splices. The 1-in. wide tape, knitted from 37 gage tin-coated, copper-clad steel wire, is said to provide a high degree of radiomagnetic shielding.

• • •

Precision Apparatus is no more—as most everyone knows. But you can still get tube data charts for your Precision tube tester from Howard Coleman, former manager of Precision's tube data dept., at Coletronics Service, Inc., 78-63 76th St., Glendale, N.Y. 11227. If you have any difficulty, let us know.

• • •

Saving five-bucks isn't easy, but Cleveland Institute of Electronics claims they're knocking \$5 off their famous electronics slide rule and auto-programed lessons. The price is now \$14.95 instead of \$19.95. Mention ET if you order one.

• • •

A Christmas promotion features a 24-piece window display, toy-filled stockings in two sizes and a consumer direct-mail program. The package is being offered by Philco to dealers to promote consumer gift-buying of monochrome and color TV receivers, console and portable stereo Hi Fi phonographs and radios.

## MOVING?

Be sure to let us know your new address. Please enclose a complete address label from one of your recent issues.

... for more details circle 33 on postcard →

*your most profitable tool is know-how . . .  
keep it up-to-date with rider books*

*available from*

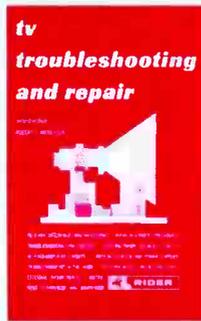
**ELECTRONIC  
TECHNICIAN**

**TV Troubleshooting  
and Repair** (*second revised edition*)

**Robert G. Middleton**

Newly revised and updated, this book reflects the rapid changes in TV technology. It covers new circuits, new tubes and the transistor, discussing the new test equipment, and giving the latest troubleshooting methods and techniques.

Volumes I and II of the former volume are combined and expanded in this new edition, which considers visual-alignment, sweep troubles, video amplifier circuits, external interference, high voltage power supplies, and much more. 216 pages, illustrated, paper—**\$3.95.**



**basic radio repair**



**Basic Radio Repair**

**Marvin Tepper**

A sensible, up-to-date approach to servicing both receivers and transmitters. Beginning with clear discussion of more than 20 test instruments, the book then proceeds to clarify the significant aspects of various components. A general presentation of servicing procedures is followed by the practical techniques for repairing superheterodyne, portable, automobile and FM receivers.

Transistor receivers are treated in four full chapters. Later sections deal with the long neglected area of transmitter servicing. 212 pages, illustrated, paper (2 vol. set) — **\$5.30, cloth — \$5.95.**

**Advanced Servicing Techniques**  
(*second edition*)—two volumes

**Vol. 1 by Paul B. Zbar and Peter W. Orne, Vol. 2 by Orville Neely, Lawrence Massaro, Robert S. Harris, Murray Rosenthal, and William P. Kist**

Prepared under the sponsorship of the Electronic Industries Association. Volume 1 covers black-and-white and color TV and gives you all the latest industry-approved trouble-shooting methods that lead you right to the source of the trouble.

The second volume includes up-to-the-minute information on maintenance, repair, and troubleshooting procedures for the latest home audio and intercom equipment.

Every chapter is completely illustrated with charts, graphs, schematics, photographs, and several full color forms to speed up and simplify all your repair work. Now in its second big edition, **ADVANCED SERVICING TECHNIQUES, Vol. 1 and 2, brings you right abreast of the latest developments in the electronic servicing field. 476 pages, 700 illustrations, \$14.20. By individual volumes: Vol. 1, \$8.25—Vol. 2, \$5.95.**

**How to Service UHF TV**

**Allan Lytel**

Explains some of the peculiarities and special characteristics of uhf, so that the serviceman will have no trouble with its troubleshooting. First, the book treats the general characteristics of uhf signals and then discusses in detail essential equipment features, uhf tuner and converter circuitry, special uhf channel strips and completely illustrated, step-by-step servicing procedures for different uhf tuners and converters. 127 pages. 5½ x 8½, illustrated, paper. **\$3.50.**

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Presents methods for the repair of transistor radios. Includes basic transistor theory transistorized circuitry, design and superheterodyne radio receiver principles. Cover step-by-step procedures, trouble check points, charts, test equipment and tools. 159 pages, illustrated, paper—\$3.50.

## BASIC TELEVISION

by Alexander Schure

Presents the basic theory, operation and circuitry of black and white television in a clear, thorough and accurate 5-volume "picture book" course. Individual volumes completely cover the transmitter, organization of the TV receiver and receiver circuit explanations. The text is supported by more than 500 informative illustrations that help you to visualize each individual concept. 5 volumes, 664 pages, illustrated, paper—\$11.25, cloth—\$12.75.

## HOW TO TROUBLESHOOT TV SYNC CIRCUITS

by Ira Remer

A practical, valuable book which covers the many variations in monochrome and color television sync circuits and possible troubles that might occur in them. Discusses fundamentals of sync circuits, takeoff, clipping, limiting, noise cancellation and time consultants. The section on output circuits includes integration and horizontal circuit signals. 128 pages, illustrated, paper—\$2.90.

## HOW TO USE GRID-DIP OSCILLATORS

by Rufus P. Turner

Deals with the construction and use of this versatile instrument as well as its application to all kinds of radio and television receivers. Chapters include: Principles and Circuits; Grid-Dip Adaptors; Resonant Circuit Measurement; Capacitance Measurements; Inductance Transmitter Applications; Antenna and Transmission-Line Tests; Applications; Commercial Grid-Dip Oscillators. 112 pages, illustrated, paper—\$2.50.

## ITS EASY TO USE

### ELECTRONIC TEST EQUIPMENT

by Larry Klein and Ken Gilmore

Various techniques for using electrical and electronic test instruments are completely explained in this up-to-date book. An extremely wide range of test instruments are covered, from very simple VOM to the distortion analyzer and oscilloscope.

More than 100 illustrations provide a full grasp of the test instruments and their various applications. 192 pages, illustrated, paper—\$4.00.

### MATHEMATICS FOR ELECTRONICS AND ELECTRICITY

by National Radio Institute Staff

Beginning with a complete review of arithmetic, the book progresses through algebra, trigonometry, Boolean Algebra, and the binary number system. It relates every topic to its electronics applications such as finding resistor tolerance with percentages, and solving complex vector problems with trigonometry.

There are several other valuable sections which help you to save time in setting up equations, simplifying a-c and d-c circuit calculations, constructing and applying many types of widely used graphs, etc. Example problems throughout are worked out in detail. 256 pages, illustrated, paper—\$3.95, cloth—\$5.60.

### LASERS AND MASERS

by Stanley Leinwell

This introduction to a fascinating area of technology clearly explains what laser and masers are, how they work, and what they can be made to do in the future. Beginning with the development of the maser, the book goes on to discuss the ruby, gas, and injection laser with applications to medicine, biology, chemistry, weapons systems, and communications. The last chapter considers the various lasers that are commercially available, as well as some of their component parts. Includes information on do-it-yourself kits. 96 pages, illustrated, paper—\$1.95.

## FUNDAMENTALS OF TELEVISION

by Walter H. Buchsbaum

Providing complete understanding of the fundamentals, this book covers the elements of television through every section of the black-and-white and color TV receiver. Emphasis is placed on circuits, both transistor and tube, used in the latest models. Troubleshooting and alignment details are given for each receiver function. 304 pages, illustrated, cloth—\$9.95.

### PLANNING AND INSTALLING MASTER ANTENNA TV SYSTEMS

by Lon Cantor

Fully and clearly explains economic and technical considerations involved in setting up master antenna systems. Discusses systems for home, repair shop, showroom, as well as hotels, high rise apartment buildings and even entire communities. Gives you all the information you need to sell and install even the biggest master antenna system. 127 pages, illustrated, paper—\$3.95.

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This brand new, two-volume handbook, introduces the oscilloscope and explains its applications—without using technical jargon—for technicians, radio operators, servicemen and hobbyists.

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by Fred D. Rowe

This completely revised and up-to-date book contains the latest techniques for locating and eliminating radio and TV interference. The latest electronic components are discussed at length, and their applications analyzed. Extremely practical in its approach, this book tells you what to look for, what to do and how to do it. 168 pages, illustrated, paper—\$2.90.

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# SYNC ON BUSINESS

**Test equipment clinics** sponsored by Sencore will be doubled this fall, according to a recent announcement. These service-dealer and technician clinics will present live demonstrations with test equipment on color TV sets and FM stereo receivers. The program, under the direction of field engineers, will give complete instructions and helpful hints on servicing. The instrument manufacturer will have two wagons, equipped with all test equipment, color TV sets, FM stereo receivers and four field engineers on the road. Don Multerer and Don Nelson will cover the Eastern half of the nation and Jim Smith and Dick Reed will cover the Western half.

• • •

**Upgrading technicians** to meet rapidly changing needs has become a problem throughout the electronics industry. Voorhees Technical Institute is expanding its evening program to meet the increasing demand for electronics technicians. For additional information write the Registrar, Voorhees Technical Institute, 450 W. 41 St., New York City 36.

• • •

A **lavalier microphone** is now available from Shure for public address systems. See your jobber.

• • •

An **open fault detector** for paired communications cables is being manufactured by Delcon Div., of Hewlett-Packard Co. It is said the instrument will pin-point opens in lines up to 20 miles in length, employing an automatic charge sampling technique to provide a reading directly in feet. The instrument is battery-operated and weighs only 5 lb. A chart permanently etched on the instrument case gives correction factors for build-out capacitors within the cable circuits. The unit has five linear-reading distance scales ranging from 100 to 100,000 ft.

• • •

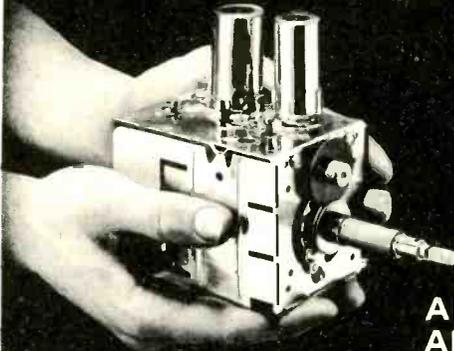
A **special radio paging system** is designed for medium-to-small sized industrial plants, hotels, motels, hospitals, nursing homes, offices and commercial buildings of all types—where a relatively inexpensive installation is desired and where only a few key individuals, usually less than 10 persons, need to be contacted. The alert system is a tone generating unit attached to the base station transceiver. All persons on the system hear a "tone" through their personal radio receivers when the operator presses the key of the "page alert." Upon hearing the tone, receiver-carrying personnel press a switch on their receivers. Complete information is available from the E. F. Johnson Co., Waseca, Minn.

• • •

A **high-speed precision drill**, with variable-speed head, can bore holes down to 0.004 in. It is claimed the drive is vibrationless and the precision chuck, mounted directly on the motor spindle, has a thrust race to take the vertical load. Drilling speed is varied by turning a control knob on top of the unit. Drilling depths of up to 1 1/8 in. can be obtained. Chuck capacity is 1/8 in. The company invites inquiries from prospective agents. Kandux Precision Instruments, Ltd., Main Cross Road, Great Yarmouth, England.

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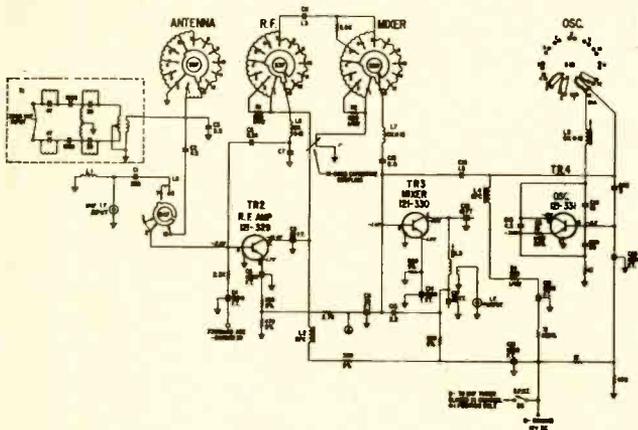
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# TECHNICAL DIGEST

## ZENITH

### TV Chassis 1M30T20 — Circuit Operation

The UHF tuner is a transistorized continuous type. These tuners essentially are the same as the transistorized UHF tuners used currently except for the  $-12$  v, fed directly from the power supply of the associated TV receiver. (No dropping resistor is required.)



The VHF tuner is a transistorized rotary-switch employing three transistors as RF amplifier, mixer and oscillator. The signal from the antenna transformer is applied to the base of the RF amplifier, TR2. The RF amplifier, as in any VHF tuner, is one of the most important stages in the receiver. The RF stage provides about 40 db gain with a low signal-to-noise ratio. The output of TR2 is fed directly to the base of the mixer transistor, TR3. The signal of the lower frequency channels is fed directly, but note that the higher frequency channels are capacitively coupled to the base of TR3.

Forward AGC (a negative voltage in this tuner) is applied to the base of the RF stage from the tuner AGC delay circuit in the main chassis. The AGC action of the RF stage is transferred partially to the mixer stage because of the direct connection of the emitter of TR2 to the base of TR3. The mixer stage provides about 20 db gain.

The oscillator TR4, is a specially designed high-frequency transistor which would oscillate readily without

any visible form of feed-back. To stabilize the circuit, small values of fixed capacitors are connected between electrodes. The output from the oscillator is taken from the base of TR4 and coupled into the base of the mixer by the capacitors C16 and C22.

### IF Amplifier Stages

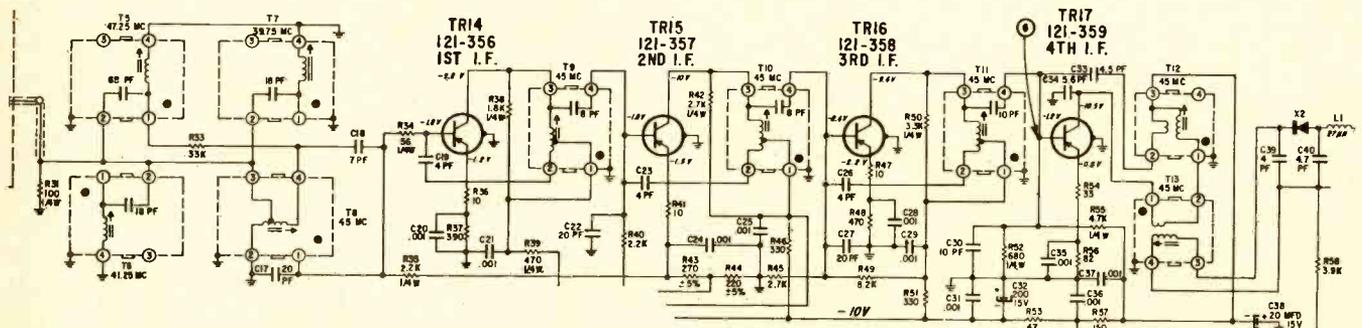
The IF output from the VHF tuner is applied to the base of the 1st IF transistor by the IF input transformer (T8) and the coupling capacitor C18 (7 pf). The coils T5, T7 and T6 are the adjacent sound (47.25 Mc), adjacent video (39.75 Mc) and associated sound 41.25 Mc) traps respectively.

Four IF stages are used to provide for good selectivity and high gain. Each IF stage with a transistor can provide a sufficiently wide response, because of the inherently low impedance involved, so that all four IF stages can be tuned to the same frequencies (not staggered) to provide the required gain.

The IF amplifier circuit consists of transistors TR14, TR15, TR16 and TR17. Note that the 1st, 2nd and 3rd IF circuits are closely similar, but the 4th IF transformer is split into two separate transformers, T12, the primary winding, the T13, the secondary; both link-coupled together. As far as function and alignment are concerned, both of the 4th IF transformers can be considered and are in effect the same as one transformer having two adjustable coils.

All four IF transistors are connected as common emitter type circuits. The 1st and 2nd IF transistors are designed for AGC action. The AGC voltage is taken from the emitter of the AGC output transistor, TR23, and applied to the base of the 2nd IF transistor. The 2nd IF transistor controls the 1st IF by using the tap-off at the junction of R41 and R43, to the base of TR14. The other tap-off at the junction of R43 and R44 is used to supply a portion of the IF signal to the emitter of the tuner AGC delay transistor (TR13).

The transistors in the IF section are specially designed for each stage. Because high frequency transistors tend to oscillate rather easily, each interstage IF coil has a feedback winding coupled back to the base of the associated transistor through a small (4 pf) capacitor. Feedback capacitors C19, C23, C26 and C33, are used to stabilize each of the four circuits to prevent regenerative feedback coupling that would normally cause unwanted oscillations.

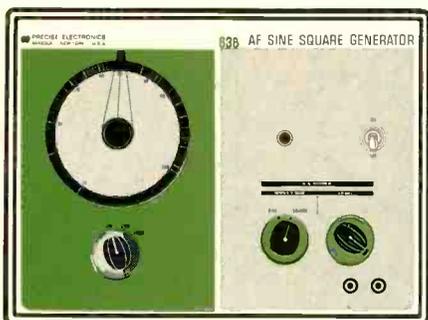




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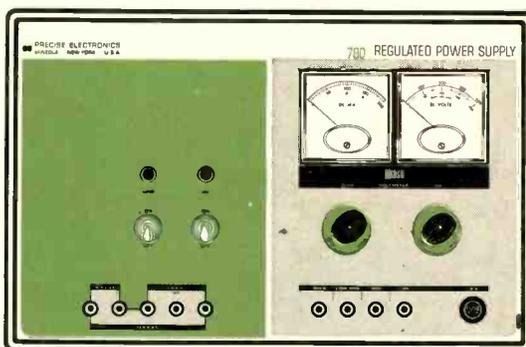
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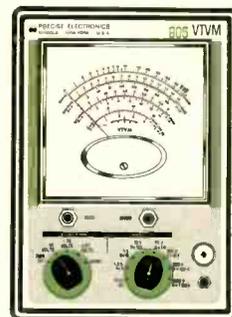
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### MODEL 905

**VACUUM TUBE VOLTMETER**—Comes with assembled dc/ac-ohms probe. Direct reading of p-p voltages. Separate ac low voltage scale. Low 0.5 vdc range for transistor circuit measurements.

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# WINEGARD'S FALL COLOR SPECTACULAR

# SPECTACULAR

Know how many color TV sets will be sold before the end of the year? Close to 2 million! There's no telling how many more will be sold during 1966. But the figure will be way up in the millions—and we'd like every single one of those sets to be hooked-up to a new Winegard made-for-color antenna. Impossible? Maybe. But we're sure going to try. And here's how we plan to do it. We're going to tell more people than ever before (and more often than ever before) that they do need a special antenna for color TV reception. Then we're going to tell them how very special Winegard made-for-color antennas are . . .

- \* They effectively reduce snow, ghosts and distortion in all reception areas—metropolitan, suburban and deep fringe!
- \* They make color TV brighter, sharper and more brilliantly alive!
- \* They make all-channel black & white reception better than ever!
- \* And they make expensive new color sets (black & white sets, too) worth every penny!

We're going to tell them on television, in magazines and via in-store merchandising aids. And the nice thing about advertising is, if you have an outstanding product, a truthful story and sensible prices—and if you tell people often enough, they'll buy. We call it our Fall Color Spectacular. Winegard dealers will call it the best thing that ever happened to antenna and accessory sales. Better call your Winegard distributor or write for complete information about Winegard's Fall Color Spectacular. It's here now!

## Spectacular WINEGARD Made-For-Color TV Commercials . . . thousands of them!

Winegard has actually scheduled more than 2,000 minute and 30-second commercials to run before the end of the year. They'll be seen from coast to coast and in color as well as black & white. And here's the best part. They're more than commercials. They're station testimonials! That's right. Station engineers throughout the country have tested Winegard made-for-color antennas and found them to be everything we say they are and more. Wait 'til color TV prospects (and owners) hear these commercials. And they'll start hearing them in October!

## Spectacular WINEGARD Made-For-Color Ads in \* LIFE \* PARADE \* SUNSET

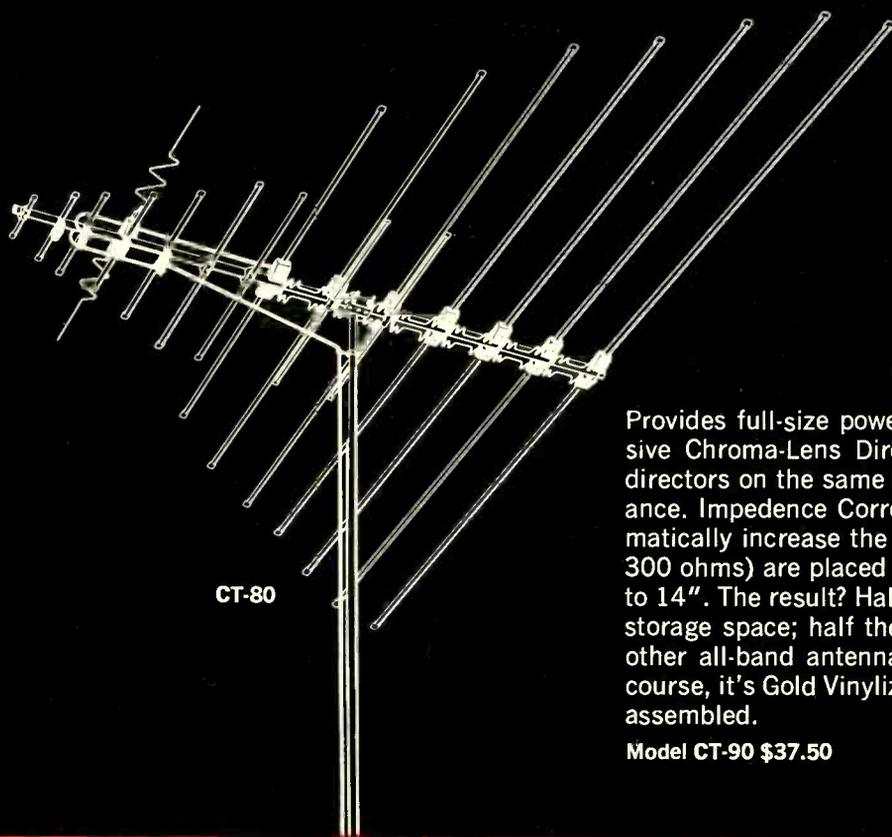
They're the powerful, hard-selling publications that are read, believed and used as a buyers' guide by families (more than 6 million of them) now in the market for color television sets. They're your prospects and they'll soon read about Winegard made-for-color antennas . . . believe in them . . . and buy!

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# MADE-FOR-COLOR ANTENNAS



CT-80

## WINEGARD CHROMA-TEL

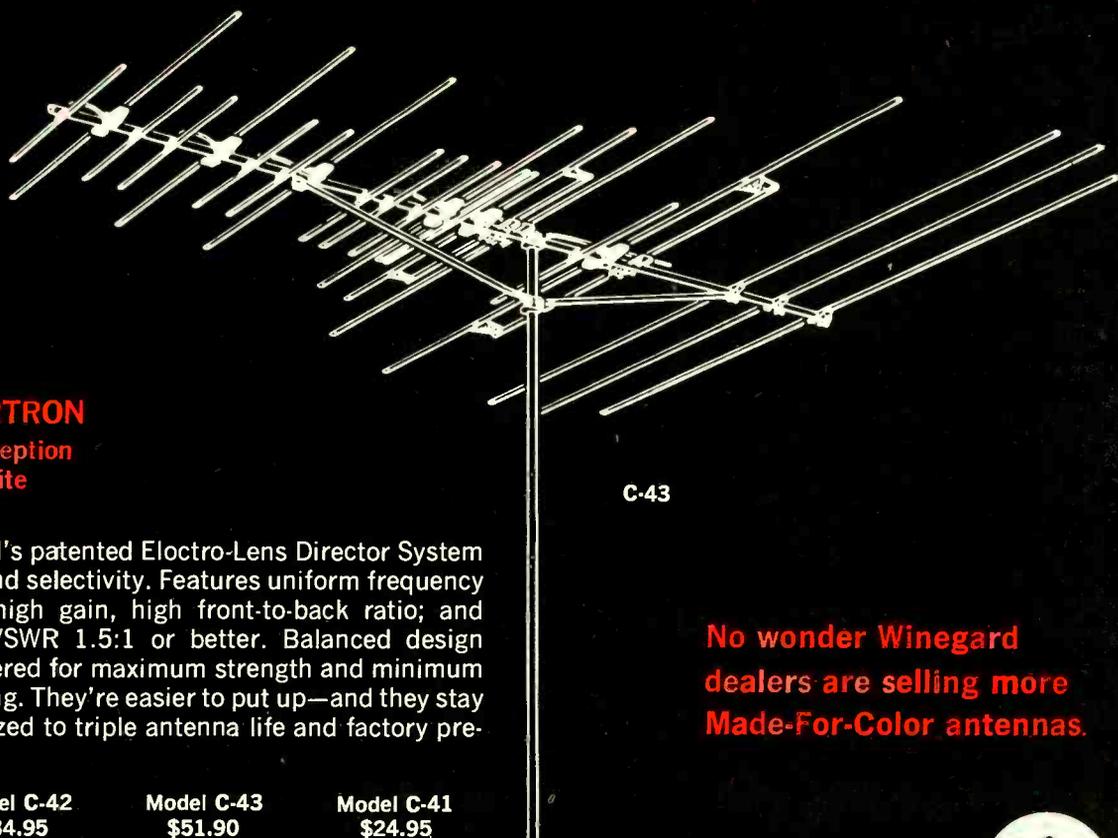
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Provides full-size power in a half-size all-band antenna. Exclusive Chroma-Lens Director System intermixes VHF and UHF directors on the same linear plane without sacrificing performance. Impedance Correlators (special phasing wires that automatically increase the impedance of Chroma-Tel's elements to 300 ohms) are placed only 5 $\frac{3}{4}$ " apart instead of the usual 10" to 14". The result? Half the bulk; half the wind loading; half the storage space; half the truck space; and half the weight of all other all-band antennas—and at a much lower price. And, of course, it's Gold Vinylized to triple antenna life, and factory pre-assembled.

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C-43

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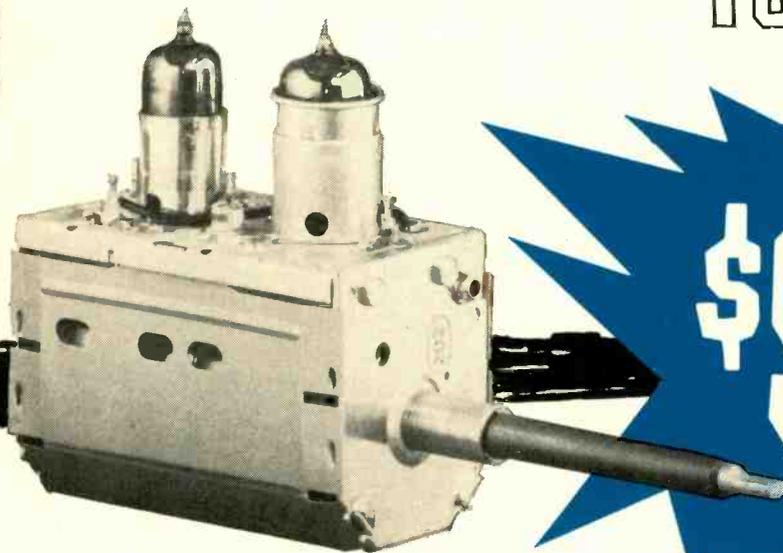
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**Plus . . .** over 1200 foreign tubes, not checked by other checkers, giving you a total of more than **3,000** tubes in all. In a nutshell, the Mighty Mite is so popular because it checks . . .

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## TECHNICAL DIGEST

### Sylvania

Color TV Chassis D01 and D02—Circuit Changes

#### Focus Range

Some D01 and D02 color chassis may have optimum focus when the focus control is turned all the way out or nearly all the way out. The range of this control can be centered by changing the location of resistor R464 from one side of R462 to the other side of R462. R464 is a 66 M resistor presently connected to the junction of the focus rectifier and the 4.7 M in series with the CRT focus grid. After this change the 66 M resistor will be located between the 4.7 M and the focus grid.

#### Killer Improvement

The 6KT8 tubes used in D01 and D02 color chassis have varying cut-offs. Because of this, killer action may be poor. If necessary to improve the operation, make the following changes. Remove R608, a 470 K resistor, from ground and connect it to pin 6 of the V16A. Install a 1N4092 diode across C608 (the point where R608 was removed) with its cathode to ground.

#### Horizontal Improvement

With certain signal conditions the D01 and D02 color chassis may exhibit poor horizontal hold or may lock off sync. A better locking range and greater stability may be obtained by installing a 10 M, ½ w resistor from the sync separator's plate to the grid.

### Admiral

Color TV Chassis G11 Series—Vertical Jitters

A condition of vertical, or interlace, jitter can be encountered on the G11, IG11, 2G11 and 3G11 chassis in areas with bad power line conditions. The following circuit change will minimize this condition. The vertical jitter is reduced by decoupling the B+ supply to the deflection board, PWS400, and the red lead of the vertical output transformer. This is accomplished by adding a 270Ω, 3w resistor from the input side of the filter choke to the B+ foil pattern on PWS400 and bypassing this point with an 80μf electrolytic. This will supply approximately 265v to PWS400. To maintain the original B+ to the IF and chroma sections, the jumper wires connecting B+ from PWS400 are removed and connected directly to the 280v supply. To make the change follow these instructions:

1. Locate the red lead supplying 280v B+ to PWS400 and unsolder it from the board. Connect one end of a 270Ω, 3w resistor to this point on the board. Mount an 80μf, 350v axial lead electrolytic under the chassis near the damper tube and connect the negative to chassis ground; connect positive lead to the 270Ω resistor.
2. Connect the other end of 270Ω resistor to "CC" on PWS400 (junction of CR405 and CR406).
3. Disconnect red lead of vertical output transformer (T702) from B+. Splice in a length of 22AWG wire and connect to junction of 80μf capacitor and 270Ω resistor.
4. Remove red jumper wires connecting B+ from PWS400 to "E" on PWS300 and "D" on PWS500.
5. Connect B+ lead removed in step 1 to "E" on PWS300. Install a wire from "E" on PWS300 to "D" on PWS500.
6. If R442 (screen resistor of 6LU8) is 27K connect a 15K, 1w resistor in parallel with it.

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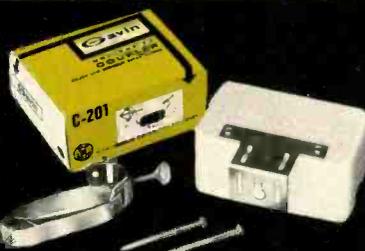
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A single down lead is all you need! First and only kit on the market doubles unit sales, doubles profits. Lifetime Implex housing. Polypacked kit in self-service merchandiser. Model C-201/-2.



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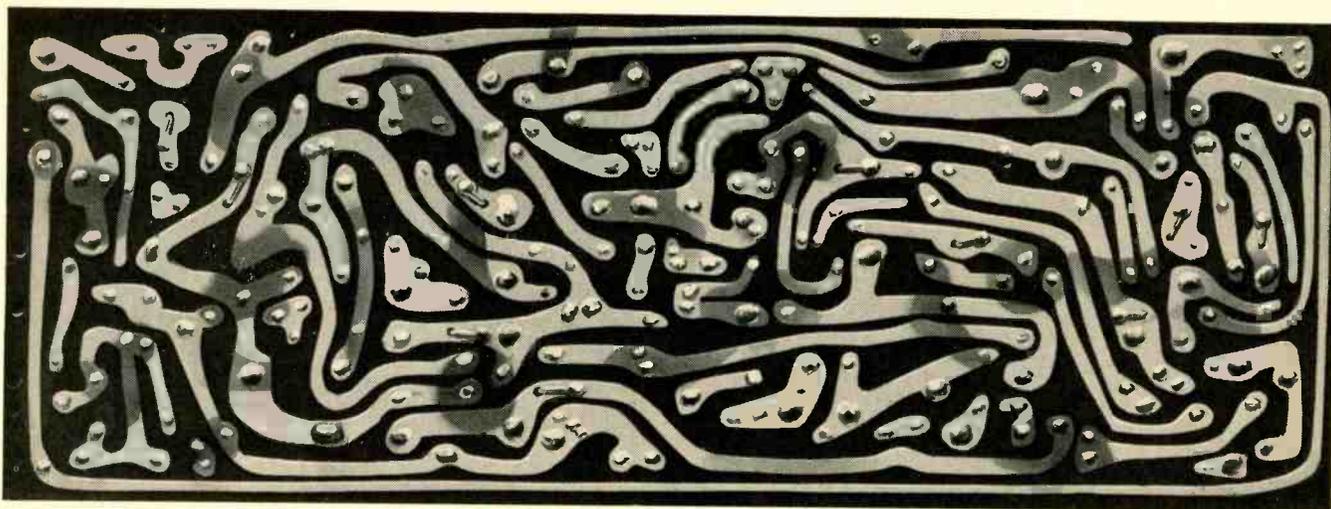
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# You and Color TV

Know your chroma and luminance signals and you'll find color servicing much easier

*by Don R. Borden*

■ Previous articles in this series have covered various color TV fundamentals, including chroma circuits, bandpass amplifiers, demodulators and basic considerations necessary to thoroughly understand these circuits and how to troubleshoot and repair them.

But the secret of successful color servicing exists almost entirely in understanding one important point regarding the nature of monochrome TV signals, how chroma and luminance signals are produced, how both function together

as a compatible color system and how they are employed to produce B/W pictures on a monochrome set and both B/W and color pictures on a color TV receiver. Let's review briefly and then get to the meat of the subject. And we'll begin our review with a quick reminder regarding one important aspect of monochrome TV signals.

### 'Holes' In the Spectrum

The most important thing to recall about monochrome video signals is this: They do not fill *all* the space allotted to a given channel—about 4.5 Mc.

The composite monochrome video signal is made up of information which contains frequencies ranging from about 30 cps to 4 Mc. Because of the nature of its composition, monochrome video information appears in clusters around the harmonics of the horizontal scanning frequency, 15750 cps (see Fig. 1). Briefly, these spaces are used for transmission of color information (Fig. 2). This is called frequency interleaving.

### Nature of Light

As we have already seen ("Basic Color Principles" ELECTRONIC TECHNICIAN May 1965), when rays of light having wavelengths between 400 and 700 milli-microns contact the eye simultaneously, we "see" white light. Conversely, we have also observed how white light from

Fig. 1—Monochrome video signals do not take up all available space in the video passband.

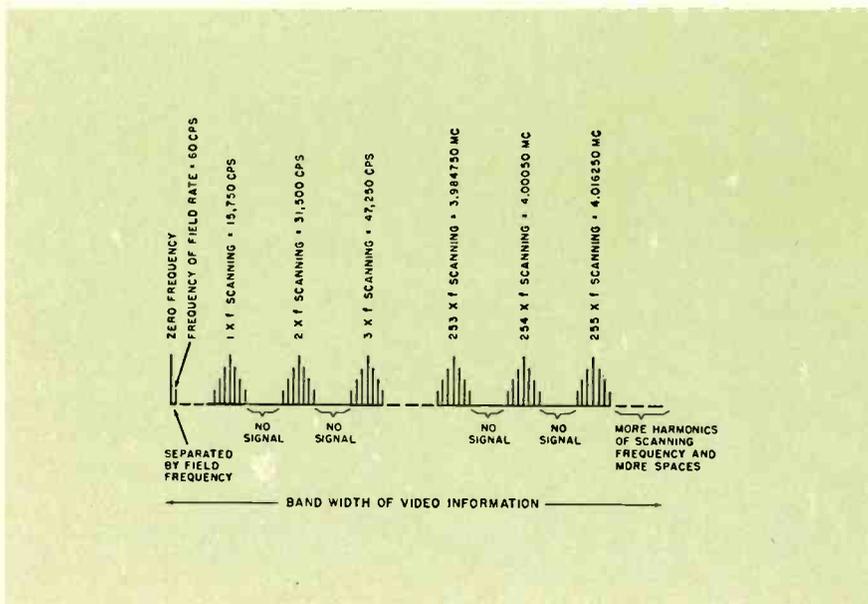


Fig. 2—Color signals are 'sandwiched' in between monochrome signals.

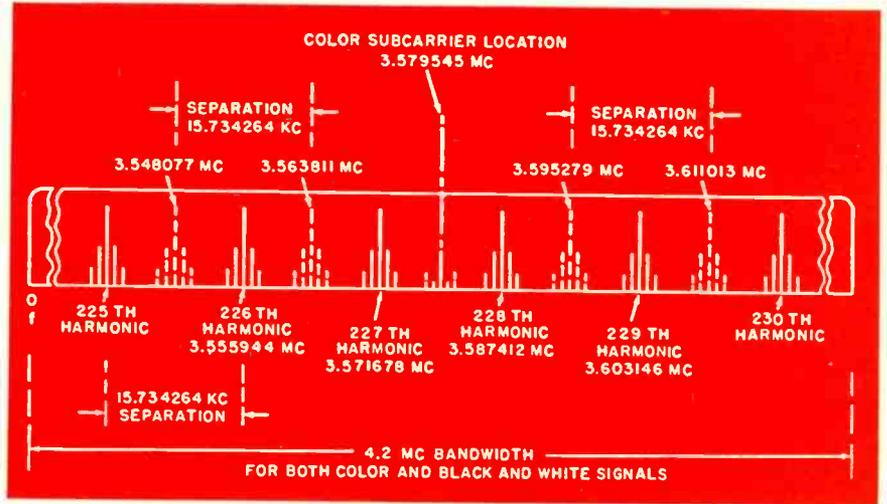


Fig. 3—Arrangement of a tricolor camera. Special mirrors divide incoming light into primary colors.

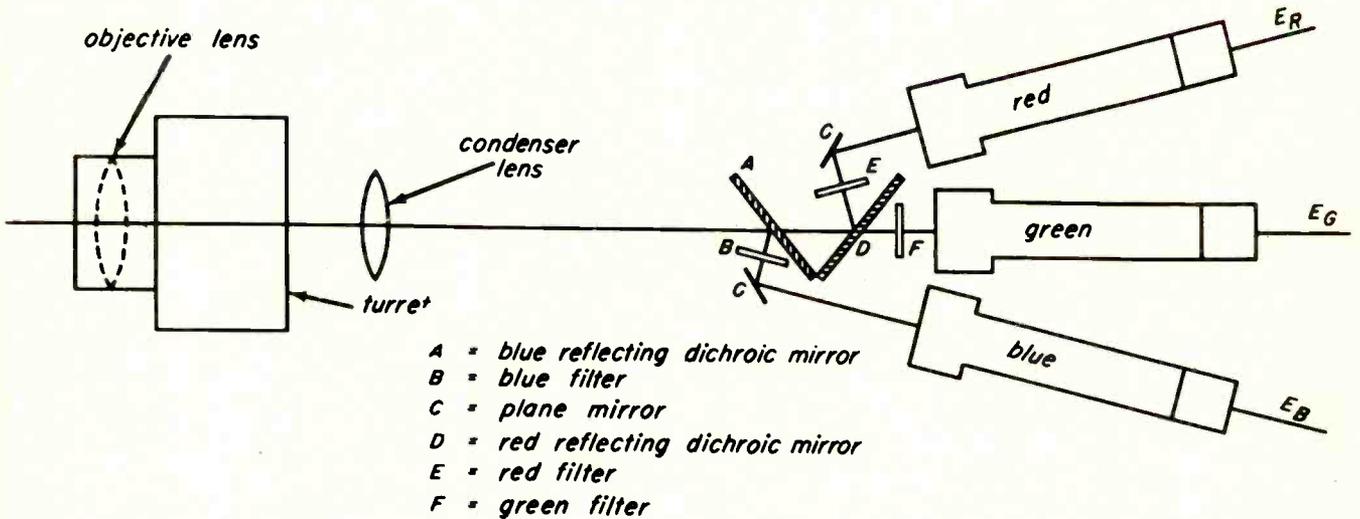
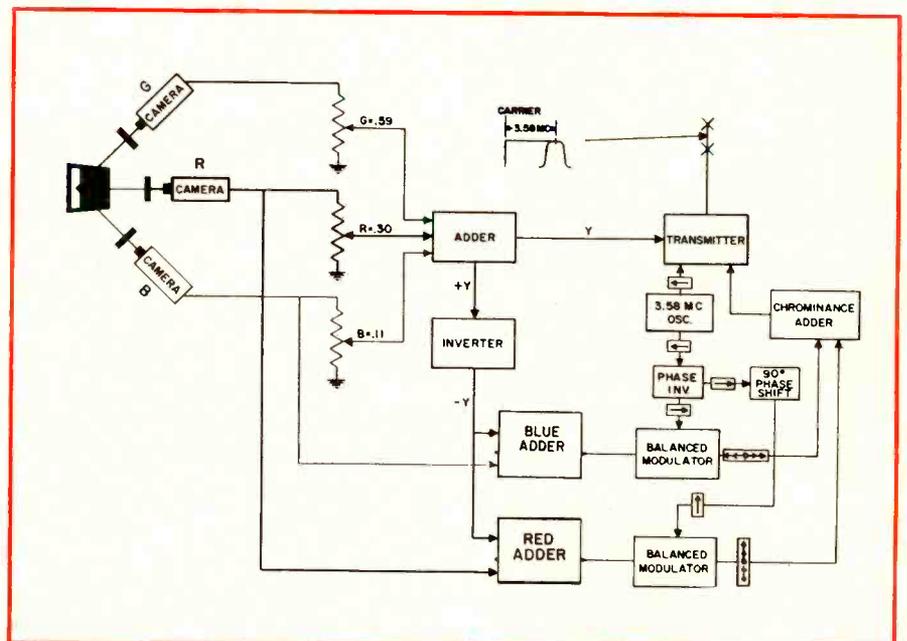


Fig. 4—The compatible color TV transmission system.



the sun, reflected and refracted through raindrops or glass prisms, is composed of the familiar "rainbow" colors which range from deep red to deep violet—with all other pure colors in between.

We also learned that the three colors selected for Color TV (green blue and red) are known as "additive" primaries and the system used for reproducing colors from additive primaries is entirely different from the "subtractive" system employed to produce various colors with pigments in color printing, painting and in filter color separations.

### Luminance Signals

The "luminance" signals are also called the "brightness" or "Y" signals. And, in a simplified way, could be said to be the signals used to produce B/W pictures on monochrome sets. This is a slight oversimplification, however. It's better to define luminance from a color-camera's "three-eyed" view.

As shown in Fig. 3, a color camera is used to scan a scene in a telecasting studio. The camera contains a series of filters and special mirrors (called dichroic mirrors) to separate the individual colors. Each camera produces a voltage which varies in direct relationship with the amount of its particular color (green, blue or red) observed in

the scene being scanned. These signals are used to form a "luminance" or "brightness" signal—called the "Y" signal.

Because the human eye is what it is and functions in a certain way—more sensitive to colors in the green and yellow region of the color spectrum—the Y signal should contain more green signal than either red or blue and more red than blue. These percentages are based on unity (the color camera is adjusted so each of the three tubes read 1 v when viewing a perfectly white pattern). The total voltage of the luminance signal then  $(0.59 + 0.30 + 0.11)$  is also 1 v.

Whatever colored scenes the camera may observe will show up on a B/W set in gray scale—from black to white—with the various colors falling at different points in the scale, depending on the color. So all we have here are "brightness" variations in the color picture—which is the basic principle involved in making the system compatible. The luminance signal is the first step in creating color pictures.

### Color (Chrominance) Signals

Now, since the Y signal contains green, red and blue components, if we pass the luminance signal through an inverter at the transmitter we will end up with a  $-Y$  voltage at the output. Chroma signals are

formed by adding this  $-Y$  component to each of the individual color-camera signals (Fig. 4). This results in a new set of signals. These are called the *color difference* signals and are identified as G-Y, R-Y and B-Y. These are transmitted as a separate part of the composite signal, in effect, through "holes" in the spectrum—as shown in Fig. 2.

This process is simplified somewhat, however, by mathematically eliminating one difference signal and transmitting only the remaining two. The G-Y signal need not be transmitted because the "G" information is contained in the Y component and if the Y, R-Y and B-Y information is sent, the G-Y voltage can be derived from these at the receiver. For those who like their color served in mathematically oriented language, a forthcoming article will develop this further.

Now we come to the ingenious concept of producing color signals—a system that transcends the colors of the rainbow, the prism and beyond anything that can be produced with pigments or printers' inks.

### Phase Modulation

As we learned in a previous article, phase modulation is used to impress the two color difference signals on the color carrier at the transmitter.

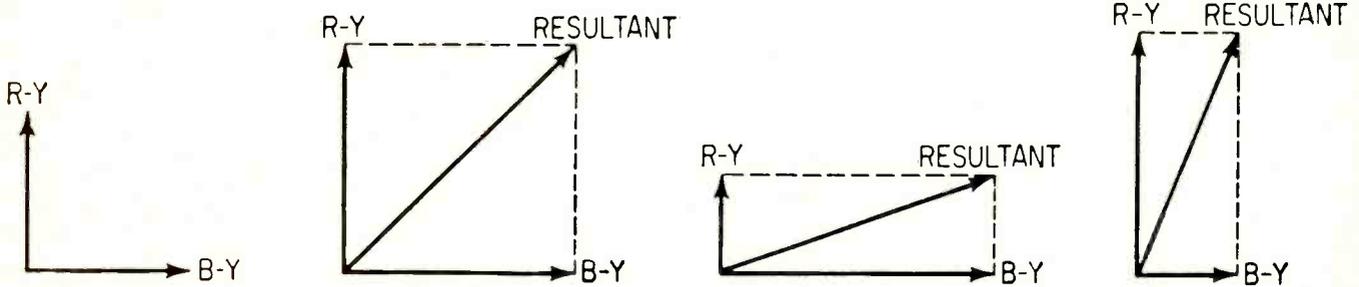


Fig. 6—Angular position and amplitude of the resultant carrier for various amplitudes of B-Y and R-Y. (A)—R-Y and B-Y vectors. (B)—Resultant when both signals are equal in strength. (C)—Resultant when B-Y is stronger. (D)—Resultant when R-Y is stronger.

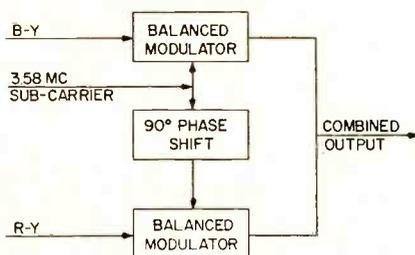


Fig. 5—Block diagram of balanced modulators.

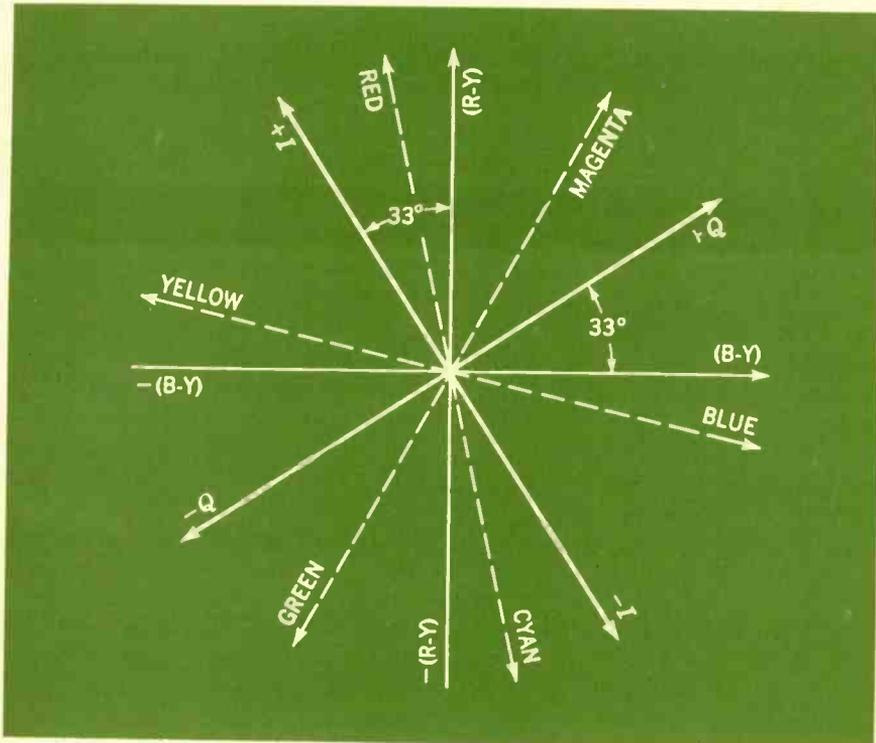
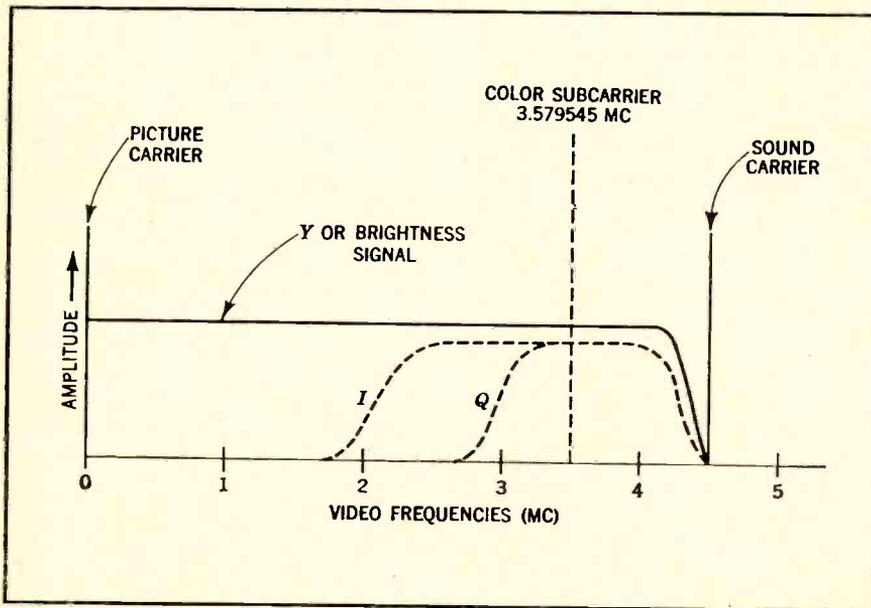


Fig. 7—Any color in the spectrum can be formed by varying the amount of R-Y and B-Y voltage.

Fig. 8—Distribution of the compatible color signals over the 4.5 Mc TV spectrum.



A 3.58 (3.579545 Mc) oscillator generates a sinewave subcarrier at the transmitter and its signals are fed into the grids of two balanced modulators, together with the B-Y and R-Y components. One subcarrier signal and one difference frequency signal is shifted 90 degrees before arriving at the modulator grid (Fig. 5) and the two color difference signals amplitude modulate their respective sinewave carriers. The 3.58 Mc is suppressed and the two modulator outputs are added. Putting it another way, the 3.58 Mc subcarrier is modulated by the two color difference signals and after the subcarrier's suppression, sidebands remain that vary at the B-Y rate and at the R-Y rate. These two signals are 90 deg out of phase and their *phase* and *amplitude* vary.

How the gamut of spectrum colors is produced can be graphically viewed by using vectors (see Fig. 6). The voltages represented by the vector diagram in Fig. 6A are 90 deg out of phase. When these two voltages are combined, a resultant sine-wave is formed. Its amplitude and phase angle is shown in Fig. 6B. It can be seen in Fig. 6C and 6D that a change in amplitude of one vector will cause a change in amplitude and phase angle of the resultant. Note the resultant when B-Y and R-Y are equal in strength (6B), when B-Y is stronger than R-Y (6C) and finally, when R-Y is stronger than B-Y (6D). Thus the phase angle of the resultant is controlled by the stronger vector—the angle of the resultant varies with color variations—hence, the hue or tint (sometimes incorrectly called "shade") of the color. Note, too, that the amplitude (length) of the resultant indicates the strength, intensity or "saturation" of a color.

The vector diagram in Fig. 7 shows that any color in the spectrum can be formed by varying the amount of R-Y and B-Y voltage.

Distribution of the compatible color signals over the 4.5 Mc TV spectrum is shown in Fig. 8.

Now our compatible color signals actually have three dimensions: brightness, saturation and hue.

Forthcoming articles will elaborate on hue, saturation, burst signals and other important aspects of color.

# 'DISCOUNTER' ADVERTISING DOESN'T HURT THIS STORE

Circulars used in show window to educate customers

by Ralph Butz

■ When the discount houses and department stores in nearby cities bombard the residents of Boyertown, Pa., with a barrage of giant circulars, this is considered so much free advertising for Schaffer's TV and Appliance Store.

"I suppose we are fortunate," explained David Schaffer and his wife, Joanne, "because our town is about 20 miles distant from the largest discount houses and department stores."

Mrs. Schaffer, who is in charge of sales, reported that when circulars are distributed in the area offering TV sets and radios at so-called discount prices, these circulars are displayed in their window with cards listing Schaffer's prices for the same items. And Schaffer's prices usually are as low or lower than the discounters' prices.

"Our people quickly note that they can buy the same items here at so-called bargain prices," she continued, "and what is more important, they know there'll be no delay in giving service when needed. Some local people found that the discounters want to add a service charge when they sell a TV set, while we include the one year service without added cost."

David Schaffer who takes care of the service and technical work of the business, averages about 15 service calls each day, and part of his work is to appraise the value of sets to be traded in on new units.

"On trade-ins," he said, "we also have an edge on the mass merchandisers. They don't want used sets and usually offer less than actual value. We trade in quite a few good

used sets, hoping to find time to recondition them for sale. Our problem is to find the time to check a set so we can offer it for sale with our service guarantee. At present we have a warehouse filled with sets and if we can't find time to work on them we will have to sell some at an auction to make room for several hundred sets that will be traded in during the next six months."

Schaffer believes it is good policy to concentrate sales and service within a ten-mile radius of the store.

*Continued on page 108*



Mrs. Schaffer stands before display she arranged to promote stereo. Her best customers don't listen to radio music.



Small appliance display. Items are sold at regular prices to yield a fair profit.



Transistor radio display attracts teen agers and peak volume occurs from May to



Color and portable TV set display in one corner of store. Color sales have increased over 100 percent during the past few months.

# SYLVANIA'S 25 INCH DO2 COLOR CHASSIS

A continuing series covering

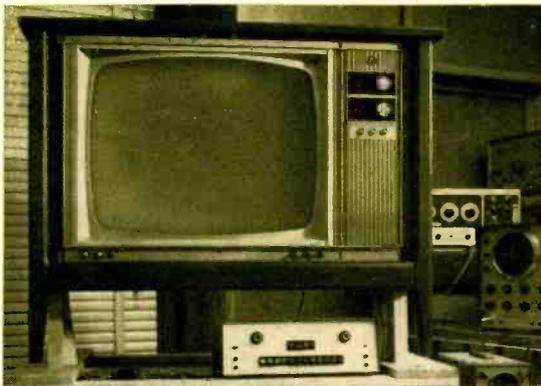
■ Sylvania's 1966 25 in. color sets use the DO2 chassis. It employs 26 tubes and a RE25CP4 CRT. The horizontal mounted chassis can be removed easily from the cabinet since plug and socket connections for the tuner, yoke, convergence unit and degaussing unit are provided. Chassis design varies considerably from 1965 chassis.

### VHF and UHF Tuners

This set uses VHF tuner No. 54-15492-7, a switch-type unit having a 6HA5 "guided grid" triode RF amplifier and a 6KZ8 oscillator-mixer (Fig. 1). The UHF tuner (Fig. 2) has a transistor oscillator and 1N82 diode as mixer. Both tuners are remotely mounted and as mentioned previously can be disconnected from the main chassis by removing a plug from its socket.

### Video IF

A three stage video IF uses frame grid tubes 6JH8, 6GM6 and 6EJ7 (Fig. 3). The first two stages are stacked with AGC voltage applied to only the first stage but effectively controlling both stages. The 3rd IF stage uses a very high gain pentode, 6EJ7. Two outputs are taken from the plate of this tube, one is fed



Sylvania's 25 in. color set finds a temporary home in ET's TEKLAB.

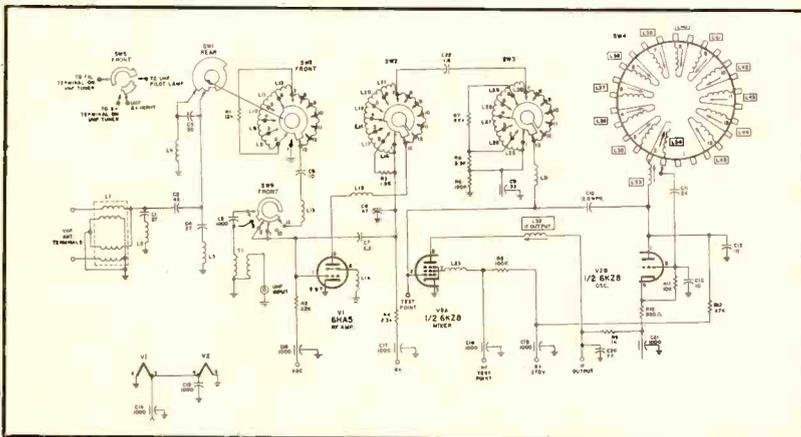
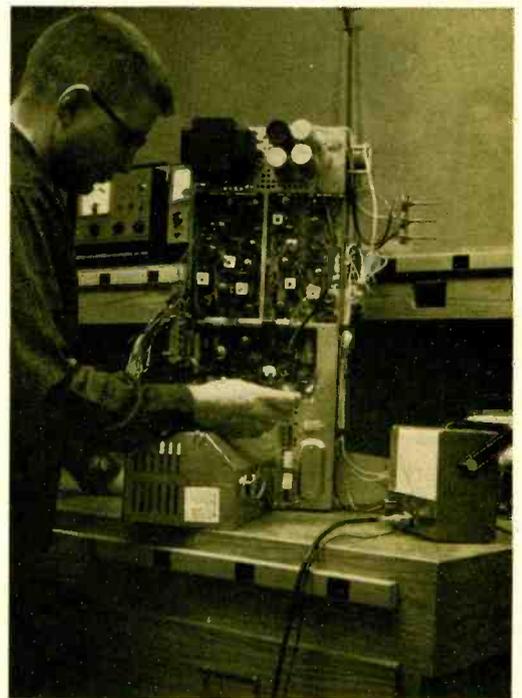
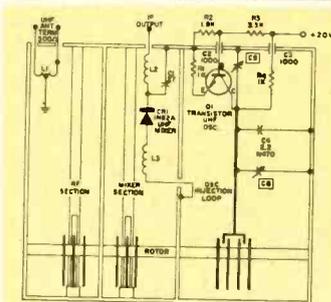


Fig. 1—Sylvania VHF tuner schematic.

Fig. 2—UHF tuner schematic.



ET's technical editor, Quint Bocchi, puts the DO2 chassis on bench.

## various color TV chassis from ELECTRONIC TECHNICIAN's TEKLAB

to the video detector and on to the 1st video amplifier. The other is applied to the sound detector, SC200. This detected signal is fed to sync amplifier V7A, amplified and advanced to the sync separator stage. The 4.5 Mc sound signal is taken off by L208 and applied through C244 to the grid of V1A — the 1st sound amplifier.

### Video Amplifiers

The video detector (SC202) output is applied to the grid of V7B, (triode section of a 6CG8) the 1st video amplifier (Fig. 4). Since the sound signal is detected separately, care is taken to attenuate all 41.25 Mc sound carrier or 4.5 Mc beat frequency signals that may be present. The 1st video amplifier has low gain and a low output impedance necessary for correct match to the low impedance delay line connected in the plate circuit of this stage. The sync-positive output of the video detector is inverted by the first video amplifier, fed to the 2nd video amplifier, V8A and amplified, inverted again and fed sync-positive to the CRT cathodes. Both the brightness and contrast controls are in the 2nd video amplifier or "luminance" amplifier stage. A peaking switch which changes the frequency

response of this stage is connected in the cathode circuit.

### Chroma Circuits

The 3.58 Mc chroma information is removed at the 1st video amplifier cathode and fed to V15, the chroma amplifier (Fig. 5). This set has a second chroma amplifier, V16A, which provides further chroma signal amplification. The stage output is applied through the color control to the demodulator grids.

A portion of the color signal is taken at terminal "A" of L604 and fed to the burst amplifier. This stage, V17B, separates the burst signal from the composite color signal. The tube is gated into conduction only during retrace time by V17A. A positive pulse from the horizontal output transformer is applied to the grid of V17A during retrace time. This causes V17A to conduct which then allows V17B to operate. Both tubes are cut off when no positive horizontal pulse is present.

The chassis has the familiar 6GY6's as demodulators and 6GU7 color difference amplifiers. Other portions of the chroma circuitry are similar to previous chassis. ■

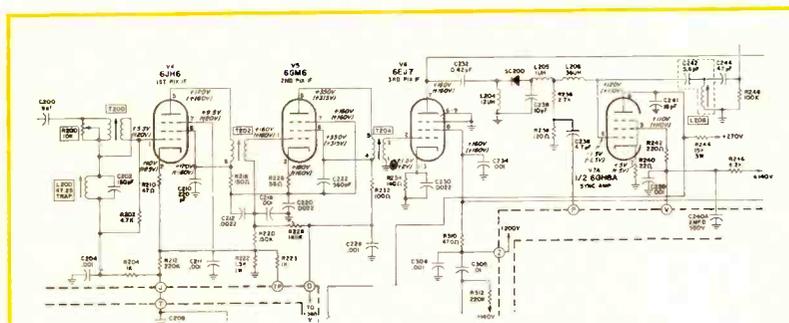


Fig. 3—The three stage video IF of the DO2 has frame grid tubes.

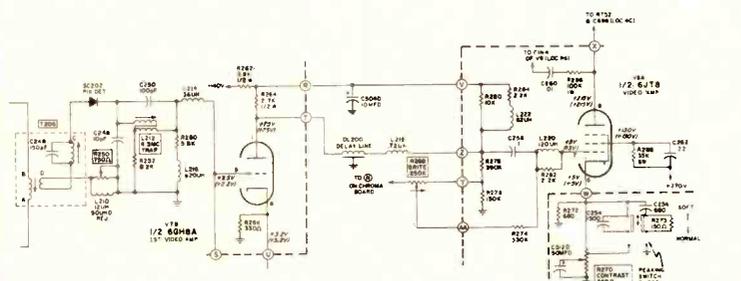


Fig. 4—Schematic of video detector, 1st video amplifier and final output amplifier.

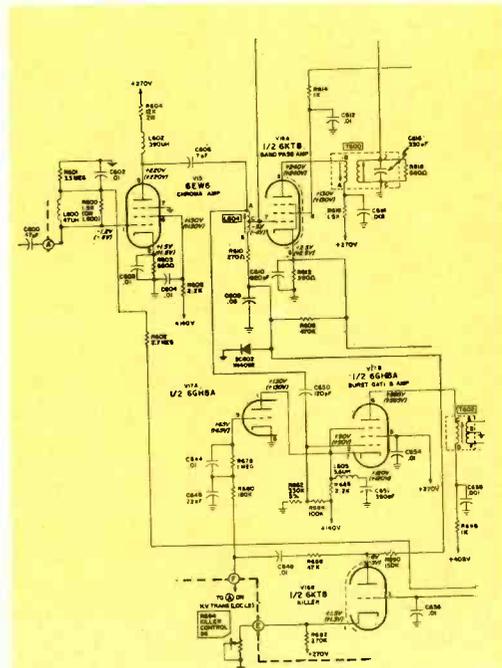


Fig. 5—Schematic of the DO2's chroma amplifier.

# What's New In

■ In addition to a larger variety of color CRT sizes and a continuing trend toward solid-state circuitry, new approaches to basic circuit designs predict further reduction in manufacturing costs in the months and years ahead. The expected shortage in rectangular color CRTs—mentioned in last month's article of this series—has resulted in some CRT manufacturers placing their customers on allocation. Hence, TV set manufacturers are unable to deliver sufficient sets to meet present demands. We feel that this is a temporary situation but some sources predict it will extend well into 1966.

It is generally understood that TV service technicians have a better chance of giving satisfactory service if they understand how circuits function. It appears logical that you cannot quickly diagnose and isolate faults unless you know how normally functioning circuits operate. To that end, we have devoted considerable space to new circuit functions.

### General Electric

G-E's "CB" color chassis, used in both the 21 and 25 in. models, has a number of circuit innovations not

used in the 1965 chassis. The largest number of changes appear in the chroma circuitry. An operational description of this circuitry follows.

**Chroma bandpass amplifier.** Positive composite monochrome and chroma information is coupled from the 2nd video amplifier transistor, Q701's emitter, by C703, R705 and L701, to the grid of the chroma bandpass amplifier, V701B (Fig. 1). L701 is the chroma take-off coil which maximizes the chroma component and attenuates the "brightness," or monochrome component. Bandpass amplifier, V701B, amplifies the chroma signal which is inductively coupled by a transformer, T701, to the cathode of the burst gate, V702A, and to the synchronous detector diodes, CR701, 702, 703, 704, 705 and 706 through the chroma gain control, R115.

**The 3.58Mc subcarrier generator.** This circuit reflects another approach to an old problem. A positive-going flyback pulse, from T101, shocks the resonant circuit (L703, C710) into oscillation near 90kc and the wave is damped by R717. The first positive half-cycle of this highly damped wavetrain causes the NE2 neon lamp to conduct. The pulse produced—by cur-

Competitive pressures, reflected in color circuit developments, forecast lower retail prices eventually

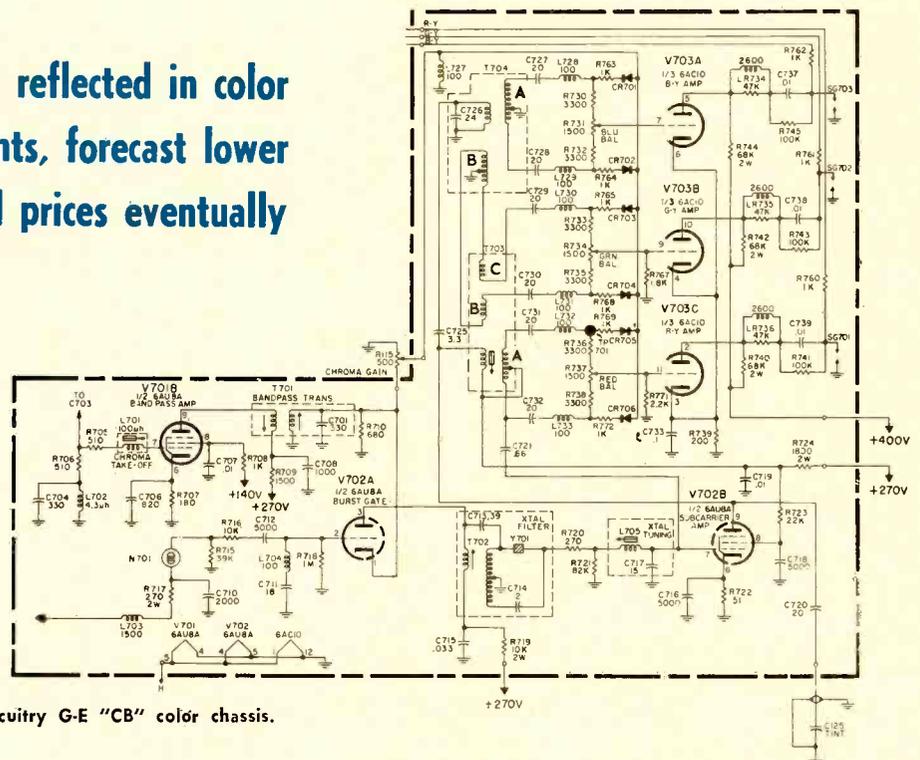


Fig. 1—Chroma circuitry G-E "CB" color chassis.

# 1966 TV Sets

rent flow through the neon lamp and R715—is shaped into a squarewave by R716. The squarewave at the burst gate amplifier grid causes it to conduct and pass the burst component from cathode to plate.

The LC network, L704 and C711, resonates at 3.58Mc and functions as a trap to prevent capacitive coupling of chroma information between cathode and plate when V702A is cut off. The primary of T702 tunes the amplifier for maximum output at 3.58Mc. The burst signal, inductively coupled to the secondary of T702, excites the high-Q resonant crystal circuit (T702, C714, Y701) into sinewave oscillation. Since the burst “rings” the crystal circuit only during retrace time, the resulting wavetrain is decaying during trace time. L705 adjusts the sinewave amplitude.

Reference amplifier, V702B, amplifies and also limits this decaying signal to produce a constant amplitude modified sinewave in the primary of T703. The same signal is fed to the primary of T704 through C725 which shifts the phase 90 deg. C726 tunes T704's primary. T703's primary is tuned by C720 and the tint control, C125.

The 3.58Mc carrier in the primary of T704 is in-

ductively coupled to its secondary “A” (Fig. 1). This secondary is connected to the B-Y detector diodes, CR701 and 702.

The carrier for G-Y detection is derived from portions of the R-Y and B-Y carriers. The B-Y carrier is inductively coupled into winding T704B which is connected to windings T703B and T703C. The output of windings T703B and T703C is connected to the G-Y detector diodes, CR703 and 704.

**Synchronous detection.** Six diodes serve in three balanced synchronous detector circuits. Each circuit has a balancing potentiometer to remove the carrier and set the detector output at zero dc so no carrier-effects appear on the color difference amplifier grids. Although limiting action of the reference amplifier, V702B, produces a sinewave carrier with fairly constant amplitude, some variations in amplitude do exist. If these variations reach the grids of the color difference amplifiers, color shading would appear in the picture. Balancing out the carrier at the detectors eliminates this condition and also provides gray-scale stability by maintaining the color-difference amplifier grids at zero dc.

Since each of the synchronous detectors functions

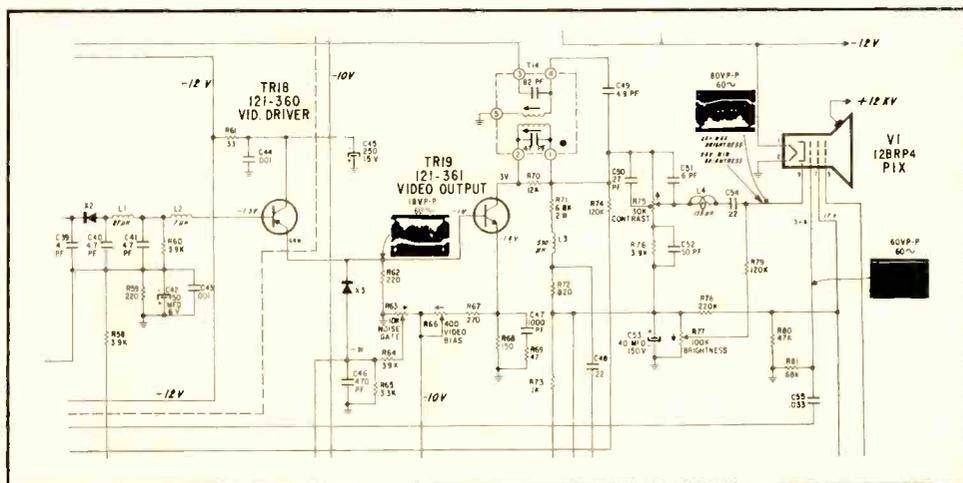


Fig. 3 (top)—Video amplifier section of Zenith transistorized chassis.

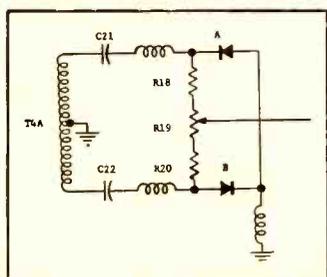


Fig. 2 (left)—Simplified schematic of synchronous demodulators in the G-E CB chassis.

in the same manner and has the same circuit and component values, only the B-Y detector will be analyzed.

The carrier from winding T704A is connected to detector diodes CR701 and 702 through C727 and 728. The composite chroma signal from the secondary of T701 is connected to the anode and cathode of CR701 and 702, respectively.

Referring to the simplified diagram in Fig. 2, each diode is functioning as a peak detector. C21 (C727) and C22 (C728) charge to the peak value of the reference pulse when the diodes conduct. With the diodes cut off, both capacitors discharge slightly through the series resistors R18, R19 and R20 (R730, 731 and 732). Further diode conduction then occurs only at reference pulse peaks.

Diode "A" (CR701) conducts when a negative pulse from T704A appears at its cathode. At the same instant, a positive pulse arrives at the other end of T704A and diode "B" (CR702) conducts—but in a direction opposite that of diode A (CR701). These equal but opposite currents result in no output at the center of the balancing potentiometer, R731.

When the diodes are conducting, the chroma signal is detected by each diode. Diode "A" (CR701) develops a positive voltage which is proportional to the sum of the chroma and the in-phase reference signal. Diode "B" (CR702) develops a negative voltage which is proportional to the sum of the chroma and the 180 deg out-of-phase reference signal.

Since the chroma signal is in the same direction in both diodes, the two chroma outputs add across the series resistors R730, 731 and 732. The chroma output from the center of R731 is then one-half the sum across the three resistors.

**Color difference amplifiers.** The three R-Y, G-Y

and B-Y color difference amplifiers have identical circuitry. The three triodes are contained in a 6AC10 compactron, V703.

Again, using the B-Y signal as an example, the signal from R731 in the B-Y detector circuit is connected to the B-Y color difference amplifier (V703A) grid. The amplified signal at the plate is connected to the blue grid of the CRT through the coil and resistor combination LR734 and the RC network, C737, R745 and R762.

The three color difference amplifiers have a common cathode resistor, R739. The unwanted signal information developed across R739 is bypassed to chassis by C733.

### Zenith

Zenith's transistorized TV chassis, 1M30T20, is a 12 in. set which can be operated from a 120vac line, any external 12vdc source or from its own battery pack. The CRT is a "rimbonded" 73 sq in. viewing area type. The tube has a 12v heater and is supplied with 12000v.

**Video amplifier.** A two stage transistorized video amplifier (Fig. 3) employs a common collector circuit (emitter follower) in the 1st stage (TR18). The 2nd stage (TR19) is the video output amplifier. The video driver is needed for impedance matching between the detector and video amplifier. The output transistor is an NPN type and requires a highly positive collector voltage. The collector voltage source is the positive 125v focus-supply. Because this output stage handles large-signal voltages its operating bias is critical and is set with the video bias control, R66, located in the emitter circuit.

**AGC system.** The gain of most RF or IF electron

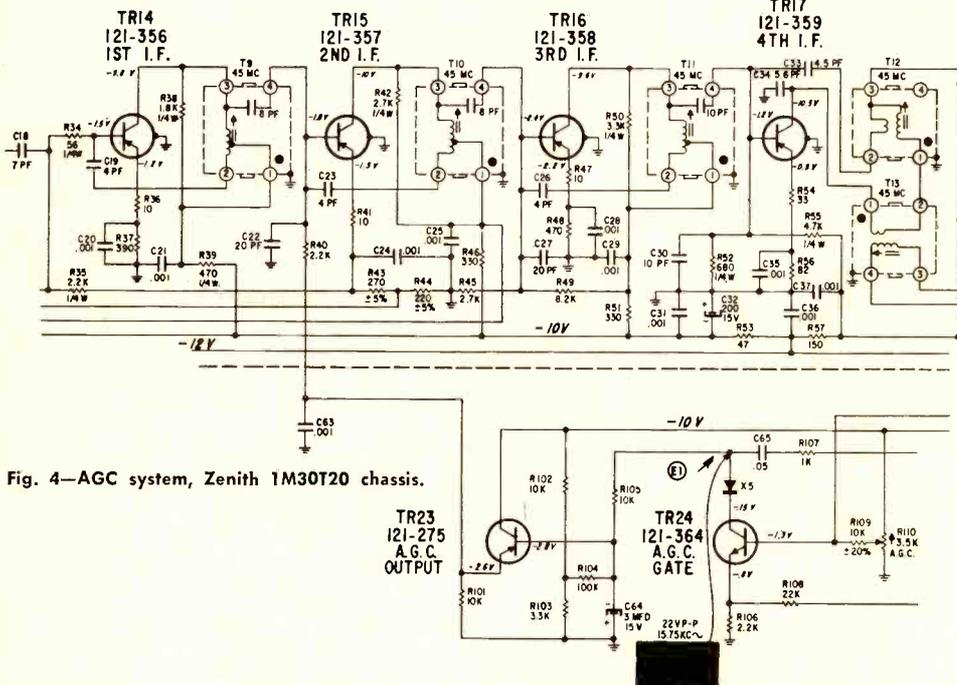


Fig. 4—AGC system, Zenith 1M30T20 chassis.

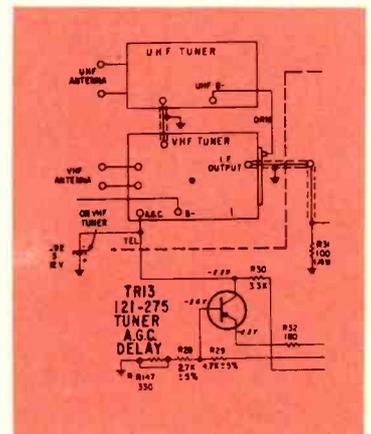


Fig. 5—AGC tuner delay stage in Zenith solid state chassis, 1M30T20.

tube amplifiers is varied inversely proportionally to the average amplitude of a received carrier by a negative dc bias, the level of which is roughly proportional to the received carrier's amplitude. The gain of especially designed transistorized RF and IF amplifiers, however, can be varied directly with the collector-to-emitter voltage and inversely with collector current.

In this circuit (Fig. 4), AGC voltage developed at AGC output transistor TR23's emitter is applied to the base of TR15, the 2nd IF amplifier. If the incoming carrier amplitude increases, the bias increases and TR15 becomes more conductive, dropping more voltage across the 330  $\Omega$  load resistor, R46. Since this decreases the collector-to-emitter voltage, the stage's gain decreases. The reverse is true if the incoming carrier level decreases.

At the same time, the 2nd IF stage controls the 1st IF amplifier's gain because the 2nd IF amplifier's emitter is connected to the 1st IF amplifier's base.

The technique of applying a negative voltage to a PNP transistor's base is called "forward AGC." Forward AGC is not possible in electron tube circuits but in specially designed transistorized circuits it provides better AGC operation than possible with reverse AGC.

The NPN AGC gate transistor (TR24) is biased to conduct only when a positive horizontal pulse is applied to the collector simultaneously with the positive sync pulse on the base. The AGC output voltage amplitude is determined by the particular setting of the AGC control, R110.

Diode X5 is used to prevent the negative AGC voltage from forward biasing the transistor (base-to-collector) and at the same time allow the positive going pulses to reach the collector.

**VHF tuner AGC delay.** The 2nd IF amplifier stage,

under control of the IF AGC system, is not capable of providing sufficient gain reduction for the higher incoming signal amplitudes. To overcome this disadvantage and provide a full range of proper AGC action, a portion of the IF signal is taken from the 2nd IF stage (at the R43/44 junction) and applied to the tuner AGC delay (TR13) emitter (Fig. 5). This stage is designed to supply a minimum of  $-2v$  when the input signal reaches a certain pre-determined value.

Transistor TR13 is connected as a common base amplifier but the biasing makes it act like a rectifier and dc amplifier. TR13 is biased to pass only the stronger negative signal half-cycles which are rectified, amplified and then filtered by the 5  $\mu f$  capacitor, C92. "AGC delay" refers to voltage delay, not time delay. TR2, in the VHF tuner, is a PNP type transistor and hence the biasing method of the RF stage provides forward AGC action.

### Magnavox

The T904 Magnavox chassis now employed with 25 in. color CRTs is basically the same as last year's 45 Series chassis and this year's 21 in. sets. A different vertical and horizontal output transformer and deflection yoke are used to provide additional sweep voltage requirements. Pin cushion correction circuits have been added.

**Automatic frequency control (AFC).** Variations or drift in the local oscillator frequency can degrade color pictures. In a number of the 45 Series chassis versions and the T904, automatic frequency control circuitry has been added. Receiver sections associated with AFC are shown in Fig. 6.

The TV signal from the VHF or UHF tuner is amplified by the three IF stages and coupled to the

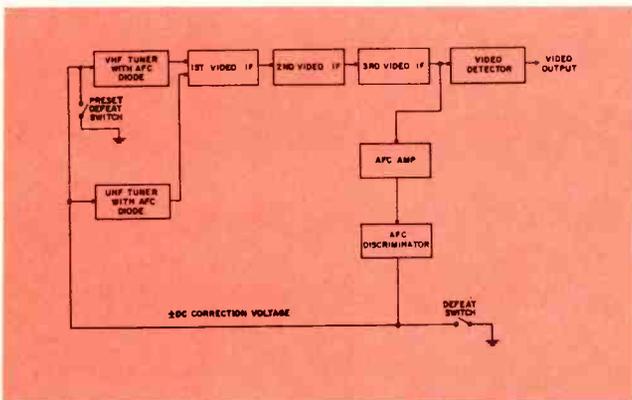


Fig. 6—Block diagram showing origin and application of AFC correction voltage Magnavox T904 color chassis.

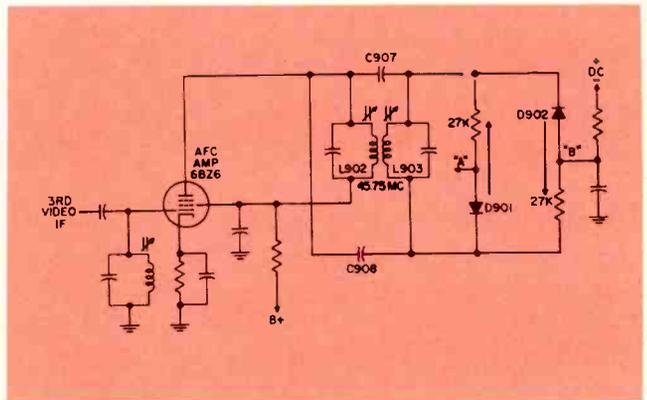


Fig. 7—AFC amplifier and discriminator, Magnavox T904.

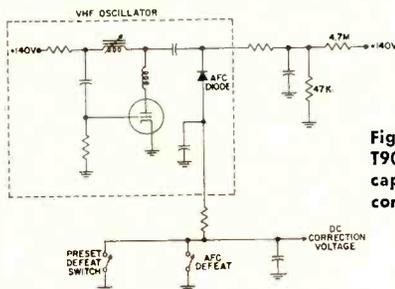


Fig. 8—AFC diode in Magnavox T904 tuner acts as variable capacitor when varying dc correction voltage is applied.

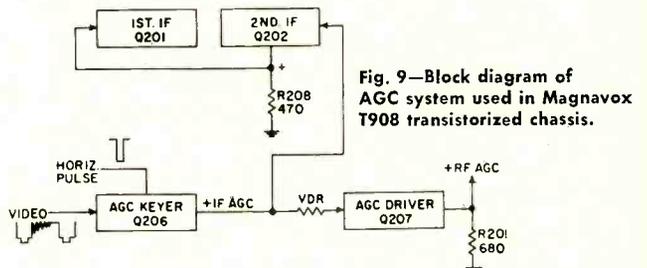


Fig. 9—Block diagram of AGC system used in Magnavox T908 transistorized chassis.

diode detector in the usual manner. The IF signal is also coupled to the AFC amplifier which is, in effect, another IF stage. The AFC amplifier output circuit is tuned to 45.75Mc which is the IF video carrier frequency. The video carrier is then applied to the AFC discriminator. Frequency variations between the video carrier and the resonant frequency of the discriminator transformer result in a plus or minus dc correction voltage in the output circuit. The correction voltage is then fed back to an AFC diode in the tuner oscillator circuit which causes the oscillator frequency to shift to the correct tuning point. In this manner, tuning errors and oscillator drift are corrected automatically.

Signals from the 3rd IF stage are amplified by the AFC amplifier and coupled through C907 and C908 to the discriminator diodes, D901 and D902 (Fig. 7). The IF signal is also coupled to the discriminator transformer. Actually, L902 and L903 are separate coils, but they are placed close enough to each other to provide transformer action. These coils are tuned to 45.75Mc. While passing through the transformer, the IF signal is phase-delayed 90 deg. This delayed signal adds to the direct signal coupled through C907 and C908. As a result, the ac voltage applied to D901 is 90 deg out of phase with the voltage applied to D902. The diodes conduct equally through their respective load resistors—resulting in no voltage between points "A" and "B." This is the condition we would find when the tuner oscillator is accurately set.

Should the oscillator drift off frequency or if it

has been mistuned slightly, the IF video carrier will be shifted above or below 45.75Mc. The secondary tuned circuit, which "looks like" a resistor at resonance, will now appear as an inductance or a capacitance, depending on the direction of frequency shift. The phase shift introduced by the transformer will now be *more* or *less* than 90 deg. The resulting ac voltage applied to the diodes will then cause one diode to conduct more while the other will conduct less.

If we assume that diode D901 conducts less, then the heavier current flow through D902 will cause point "B" to become negative with respect to point "A." This negative voltage is filtered and coupled to the tuner to correct the oscillator frequency.

When diode D901 conducts heavily, point "A" becomes negative with respect to point "B," or, to say it another way, point "B" becomes positive with respect to point "A." The positive correction voltage at point "B" then corrects the oscillator frequency in the opposite direction.

Operation of the AFC diodes in the VHF and UHF tuners is the same. The AFC diode, shown in Fig. 8, acts as a voltage variable capacitor. As the dc voltage across the diode increases, the capacity decreases; and as the dc voltage decreases, capacity increases. The diode then acts as a small variable capacitor across the oscillator tank. Any change in dc voltage across the diode changes the diode capacity which, in turn, alters the oscillator frequency.

The AFC diode must be operated in a reverse-

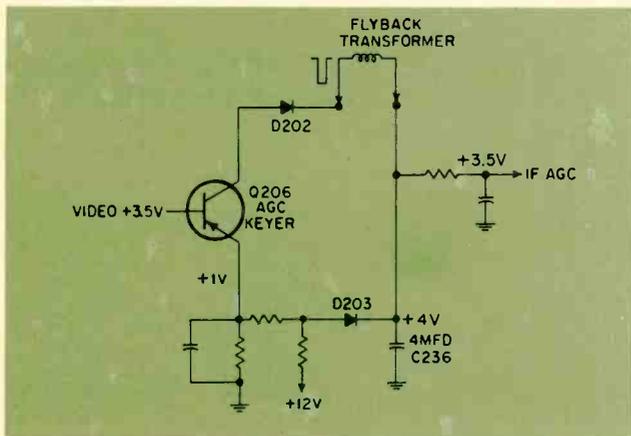


Fig. 10—Simplified schematic AGC keyer stage in solid state Magnavox TV.

Fig. 11—Simplified drawing of T908 AGC system with driver stage added.

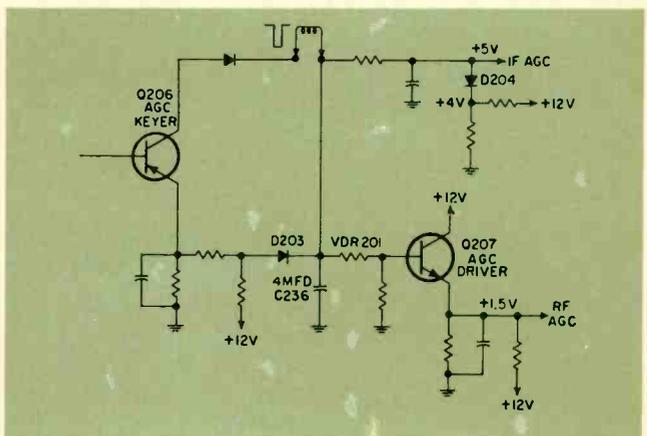
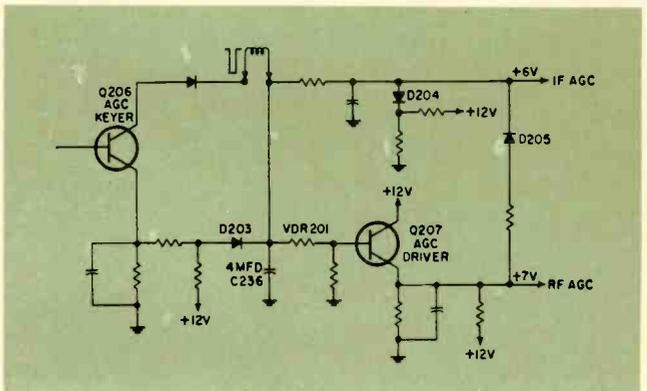


Fig. 12—Action of diode D205 in Magnavox T908 chassis.



biased condition to be usable as a frequency control. This is done by placing a fixed positive voltage on the cathode and then using the discriminator correction voltage to vary the anode voltage. The plus or minus correction voltage adds to or reduces the total voltage across the diode, thereby decreasing or increasing the capacity across the tank circuit. A positive correction voltage reduces the total voltage across the diode, increases capacity, and lowers the oscillator frequency. A negative correction voltage produces the opposite effect.

The dc correction voltage is shorted to ground by the PRESET DEFEAT switch when the VHF fine tuning control is adjusted. This allows the customer to tune the receiver to approximately the correct point. When the fine tuning control is released, the PRESET DEFEAT switch opens and the AFC circuit takes control.

A second AFC DEFEAT switch on the brightness control may be used to disable the AFC if desired. This switch might be used in weak signal areas where excessive snow may detract from the picture. With AFC defeated, the picture can be detuned to minimize snow. This procedure would be suitable only for monochrome reception, however, since very much detuning of a color program would result in loss of color. This defeat switch would also be used when tuning in a UHF station.

Magnavox has introduced a line of large screen TVs using solid state chassis. Both 24 and 27 in. consoles and combinations are included in the line. The

T908 Series chassis is used and employs 22 transistors, a number of diodes and a 1K3 HV rectifier tube.

**The AGC system.** The block diagram (Fig. 9) shows the stages involved in producing AGC voltage. A keyed AGC system is driven by a negative horizontal pulse from the flyback transformer and a video signal from the video driver stage. It is similar to its tube counterpart but forward AGC is employed.

The AGC system has three modes of operation as determined by the received signal amplitude. One operation mode occurs when a weak signal is received. When a medium strength signal is received, additional circuit components become active and we have second mode operation. With extremely strong signals, still other components become active to produce a third operation mode.

A simplified drawing of the AGC keyer stage is shown in Fig. 10. These are the active elements of the first operating mode when signals are 1mv or less at the antenna terminals. Voltages shown are when no signal is being received. A voltage divider network places a positive 1v on the emitter of the AGC keyer. The supply also charges C236 through D203 to approximately 4v. Voltage across the 4 $\mu$ f capacitor acts as a bias source which is coupled through an RC filter network to the 2nd IF amplifier base.

A PNP germanium transistor (Q206) is used as the AGC keyer. The collector voltage is a negative horizontal pulse from the flyback transformer. The base-

*Continued on page 106*

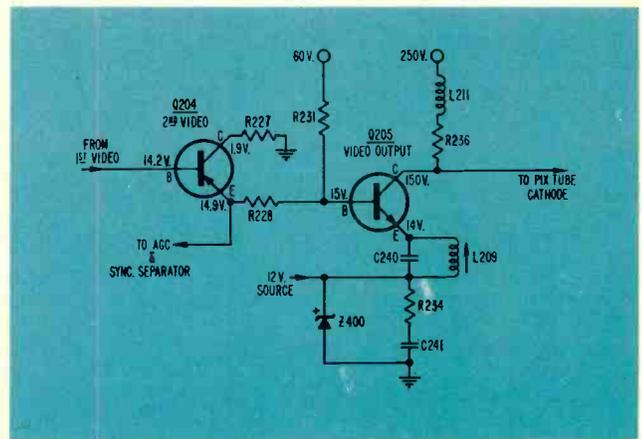
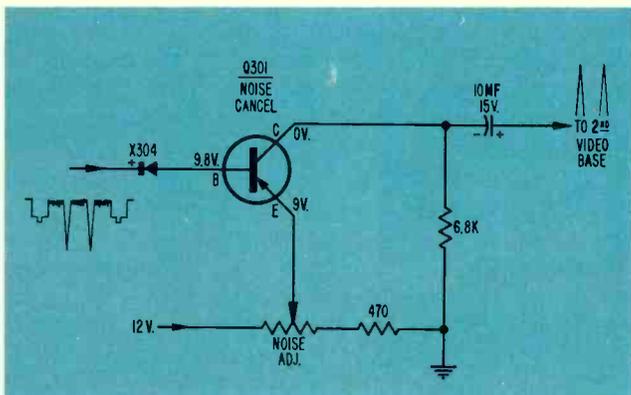
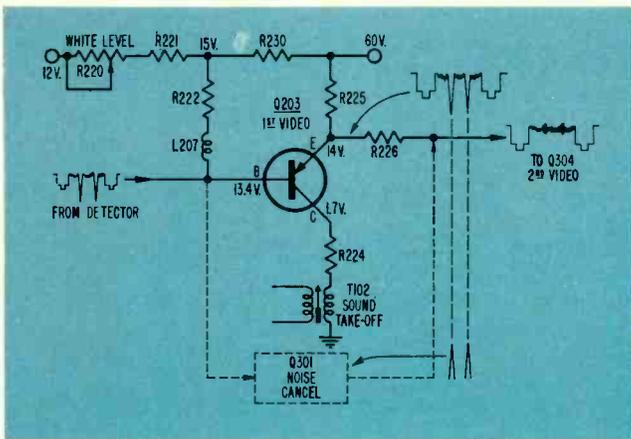


Fig. 13—First video amplifier stage, Westinghouse chassis V2483-1.

Fig. 14—Second video and video output stage used in Westinghouse solid state 19 in. TV.

Fig. 15—Noise cancellation circuit employed in Westinghouse transistorized portable TV.

## Color Bar/Dot Generators



RCA Model WR64B Color Generator

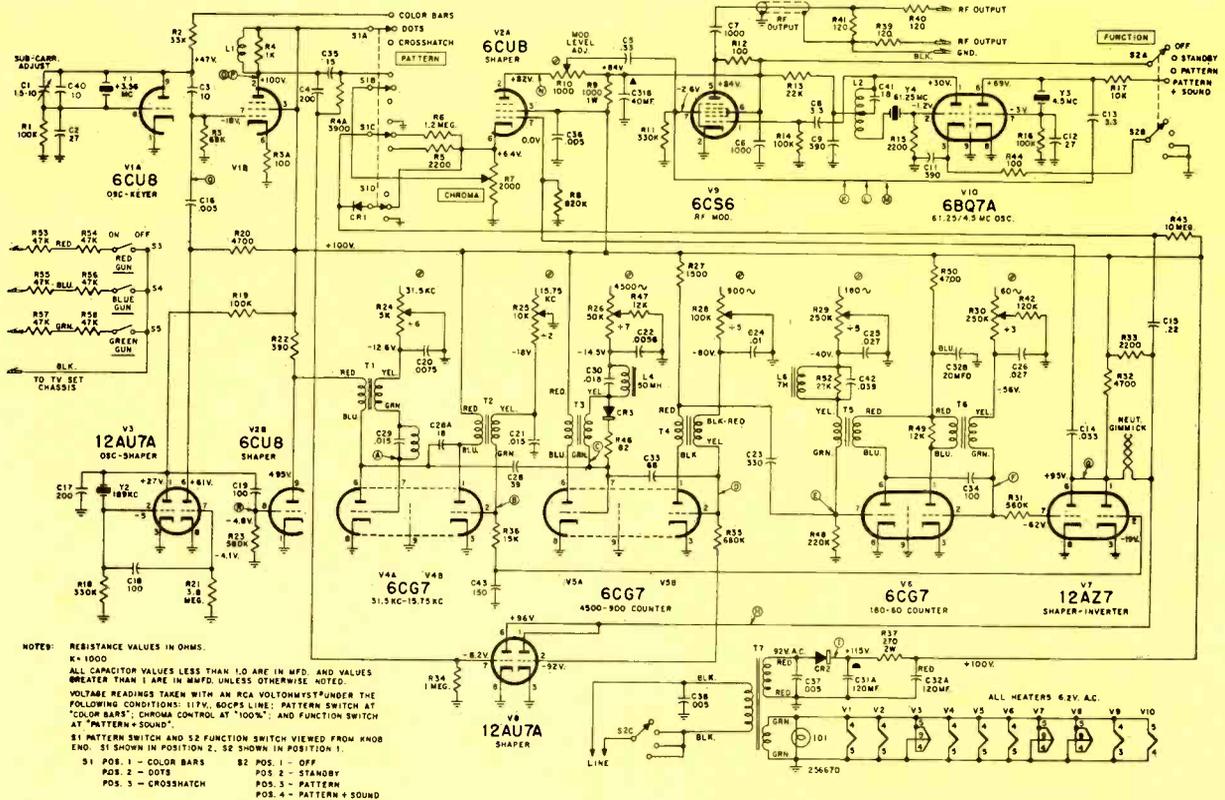
# RCA

### Functions, controls, signals and circuit description

■ In addition to providing a standard keyed rainbow color bar pattern, this generator also has dot and cross-hatch patterns available. Three slide switches on the front panel comprise the color gun killer control, enabling the user to disable the individual or groups of guns as needed.

Crystal controlled RF output is provided on channel 3. The unit can be operated on channel 4 by replacing the channel 3 crystal with a channel 4 crystal.

The instrument employs the "offset-subcarrier" principle to generate color bars. The frequency of the subcarrier is offset 15,750 cps below the normal frequency of 3.579545 Mc. Hence, the frequency of the offset subcarrier is 3.563795 Mc. This signal, when it appears at the demodulators of a color set, mixes with



Schematic of WR64B Color Bar/Dot/Crosshatch Generator

# Model WR-64B Color Generator

the local oscillator (3.579545 Mc) signal. The resultant difference in frequency, one cps for each complete horizontal scanning period, causes a relative phase change of from 0 to 360 deg in the output of each demodulator. This appears as a color "rainbow" on the CRT. The offset subcarrier is gated to produce ten distinctly different colors accurately spaced at 30 deg intervals. Narrow brightness pulses are added at the edges of each color bar to aid in checking the "fit" or registration of the brightness and color signals.

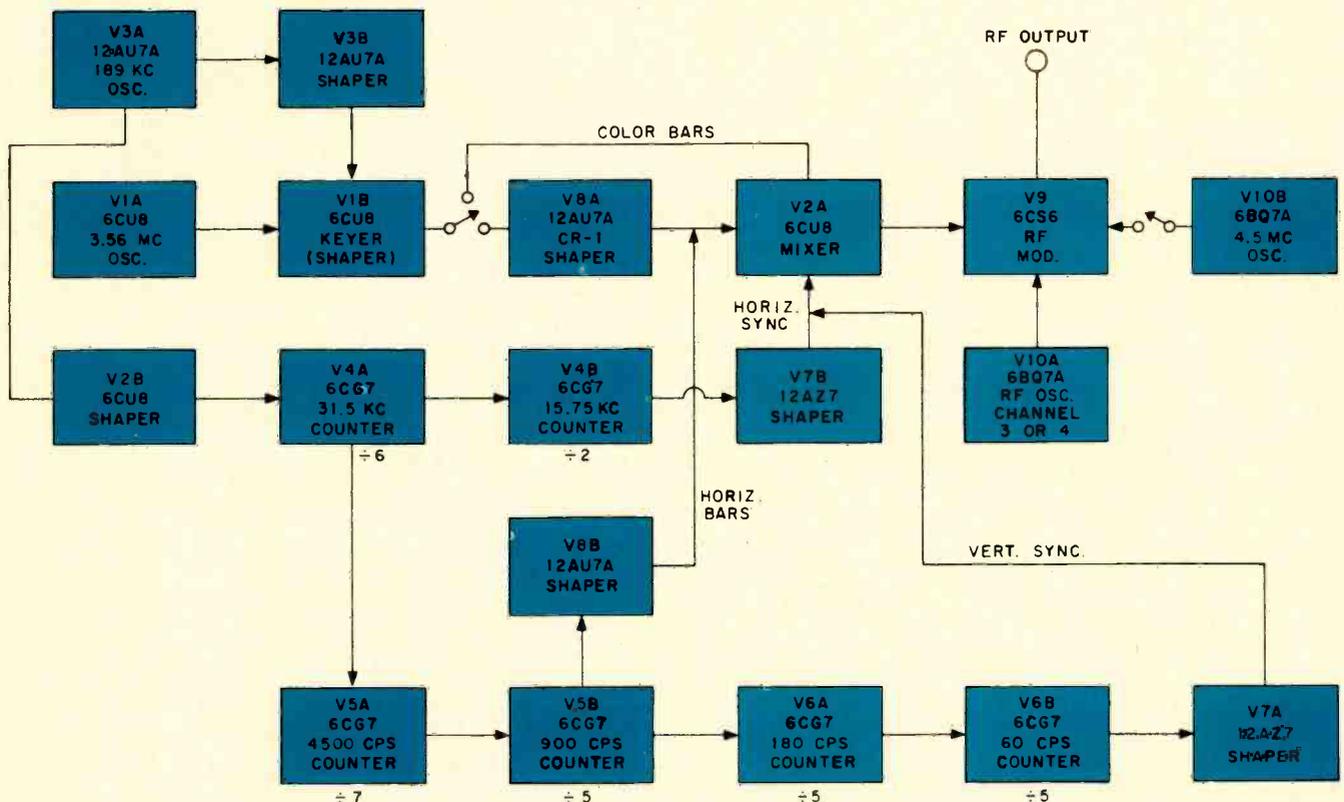
The chroma control located on the front panel is used to vary the subcarrier amplitude from 0 to 200 percent modulation with 100 percent considered as the normal position. The desired pattern—color bar, dot or crosshatch—is selected by the PATTERN switch. A

FUNCTION switch enables the user to leave the unit in a standby state, choose a pattern or choose a pattern plus sound. In the PATTERN PLUS-SOUND position an unmodulated sound carrier signal is added to the generator output. This important feature makes it possible for the user to properly adjust the receiver fine tuning.

## Circuit Functions

The generator develops a 189 kc pulse for color bars, dots, crosshatch and vertical lines; a 15.75 kc pulse for horizontal sync, 900 cps for horizontal bars and a 60 cps pulse for vertical sync.

The 189 kc pulses are formed by the crystal-controlled oscillator, V3A. Blocking oscillator counters are used to divide the 189 kc oscillator frequency down



Block Diagram of WR64B

to the required frequencies. The pulses are then shaped, clipped and fed to the mixer, V2A, which in turn feeds the RF modulator, V9.

An RF signal generated by a crystal-controlled oscillator, V10A, is also fed to the modulator. In the pattern plus-sound position a 4.5 Mc signal is generated by V10B and fed simultaneously to the modulator. This produces a beat which provides an unmodulated sound carrier of appropriate frequency for use in properly adjusting the fine tuning control of the color receiver.

Crystal-controlled oscillator, V1A, operating at 3.563795 Mc, provides the color subcarrier signal. Keyer stage, V1B, gates the subcarrier signal at the 189 kc rate. The output of the keyer stage is fed to the mixer, V2A, and on to the modulator, V9.

The 189 kc signal is used to generate pulses that produce 10 vertical lines on the CRT. Actually, 12 pulses are generated but two of the pulses occur during horizontal retrace and are not visible. The sinewave signal generated by the 189 kc oscillator is coupled directly to a shaper tube, V3B. The signal is amplified, shaped and applied to a keyer-shaped stage, V1B. The 189 kc signal is further shaper and the pulses are applied to another shaper, V8A. The output of V8 then, produces the vertical lines.

The horizontal line signals also originate in the 189 kc oscillator. The 189 kc signals are shaped into pulses by V2B and used to trigger counter, V4A. The 31.5 kc output of V4A is further divided to 4500 cps

by counter V5A and finally reduced to 900 cps by V5B. This 900 cps signal is coupled to shaper stage, V8B. With the plates of V8A and V8B tied together, a composite 189 kc and 900 cps video waveform is produced. This composite waveform can be switched by the pattern selector to form either a dot or cross-hatch pattern.

In the crosshatch position the composite signal is applied directly to the cathode of mixer stage, V2A. From the plate of V2A the signal is fed to the suppressor grid of the modulator tube, V9. This results in a white crosshatch pattern on a black background.

When the pattern selector is switched to the DOT position, the composite pulse is fed through diode CR1 to the cathode of the mixer stage. The diode acts as a peak detector and conducts only on the peaks of the 189 kc and 900 cps pulses. It conducts only when the vertical and horizontal lines intersect so the result is a white dot pattern on the CRT.

The vertical sync signal is derived from the 60 cps counter, V6B. The 60 cps pulse is removed from the plate of V6B and fed to the shaper tube, V7A, grid. The output of this stage is applied to the mixer, V2A, providing vertical synchronization for the generator output.

The 15.75 kc horizontal signal is taken from the plate of V4B and fed to the grid of V7B, a shaper, and the output of this stage is also applied to the mixer grid. This pulse furnishes horizontal synchronization for the desired pattern. ■

Know the principles and instruments involved in evaluating 2-way communications receivers

## Noise Figure Measurement Fundamentals

by H. Olson and H. Howard

Stanford Electronics Laboratories

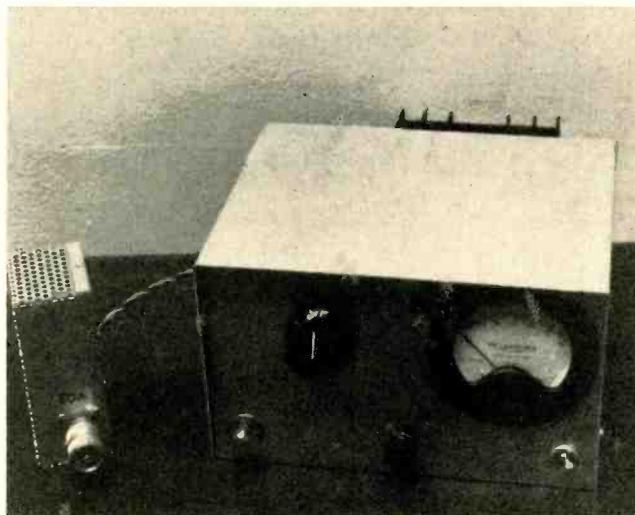
■ In a previous article (ET, February 1965) it was made clear that noise figure measurements are the only reasonable way to determine communications receiver performance—especially at the high end of the frequency spectrum. A number of preliminary considerations—including tube characteristics—were explored. This article will detail the techniques and instruments required for making noise figure measurements.

### Amplifiers

Over the 25 to 450 Mc range we will encounter at least three RF amplifier types used in communications receivers (Fig. 1). All will appear in several combinations—the cascode amplifier is one (Fig. 2). Only basic circuits are shown here—without regard to bypassing and bias variations. Impedance variations are shown as coil taps but may take other forms—links or special transformers. Typical neutralization schemes are shown in Fig. 3 and all serve the same purpose, of course: to feed a properly phased voltage of the required amplitude to the grid circuit to cancel or negate voltage coupled through grid-to-plate capacitance. Three “almost neutralizing” circuits are shown in Fig. 4.

### Noise Figure Measurement Methods

The two methods employed in



Noise generator.

making noise figure measurements are as follows: 1) A standard signal generator is used and bandwidth of the system-to-be-measured must be known precisely; 2) a noise generator is required.

Although the “known bandwidth” method certainly has its place in measurement techniques, it is a much slower process than the “noise-generator” method which will be discussed here.

The generator is connected to the receiver input and the diode in the “noise head” is switched off. The noise power output of the receiver is measured. The diode is then switched on and its plate current increased (by increasing the filament voltage) until the noise power output of the receiver is doubled. The reading of the diode plate current (in ma) is then converted to db for the noise figure. This measurement setup is shown

in Fig. 5. The theory behind this measurement is well covered in source reference 1, listed in the bibliography appearing at the end of this article.

The noise diode is shown schematically since it is basically a very simple device. Similar noise diodes have been used satisfactorily for many years (see references 2, 3, 4). Numerous commercial noise generators are available that provide very precise measurements, but for most practical receiver work one can be constructed that will provide satisfactory results.

### Noise Generator

The circuit of the generator we use is shown in Fig. 6. Shielding and by-passing shown keeps extraneous noise and interference out of the noise diode head unit. By using a transistor series regulator with a zener diode, several improvements

in operation are obtained over the simple circuit. Other methods of regulating noise diodes have been presented in the past, but this system is perhaps the simplest. The separate noise diode head is built in a small metal box with suitable connectors for *direct* connection to the receiver under test.

Note the power supply and control circuitry of our noise generator is assembled in the larger box and the "noise-head" is in the smaller.

A number of precautions are necessary in the actual measurement of noise factor. The most often neglected area is the method of measuring noise output power. Ordinarily, the receiver output will not respond in a calibrated way to noise power; so any readings on "S" meters or "audio output" meters must not be used as calibrated-noise, power-output indicators. We have found that the best way to measure a 3 db increase in noise-power output is to connect a true RMS voltmeter in the last IF stage. If the meter has a frequency response greater than the IF frequency, this technique works just fine.

If the IF is too high to measure RF noise power directly with a meter, then a *comparison* technique can be used. In this technique we insert a 3 db pad in the receiver (between the front end and the IF,

or between IFs, if the receiver is so sectionalized). Note the receiver's output with its own detector and meter and then add noise until we get the same reading again. In this way the 3 db pad is the calibrated device (it can be calibrated at high level using a signal generator), and the receiver's detector and output meter serve only to equate two values.

The technique of putting a 3 db pad in the system assumes that the front-end has a fairly high gain. Unless the front-end has about 20 db gain we will get an incorrect noise figure measurement. This is easily understood by noting the system noise figure equation:

$$F_s = F_1 + \frac{(F_2 - 1)}{G_1}$$

Where:  $F_s$  is the system noise factor;  $F_1$  and  $F_2$  are the noise factors of the 1st and 2nd stages; and  $G_1$  is the gain of the 1st stage. Clearly then, if  $G_1$  is small and we degrade  $F_2$  (by 3 db with the pad in) we must take note of this factor. With most converters, the gain is high enough and the IF noise factor low enough so no correction is needed.

A few other precautions are necessary when measuring noise figure, but may not be necessary if the receiver is well designed. A check should be made with a signal generator to see if the image frequency

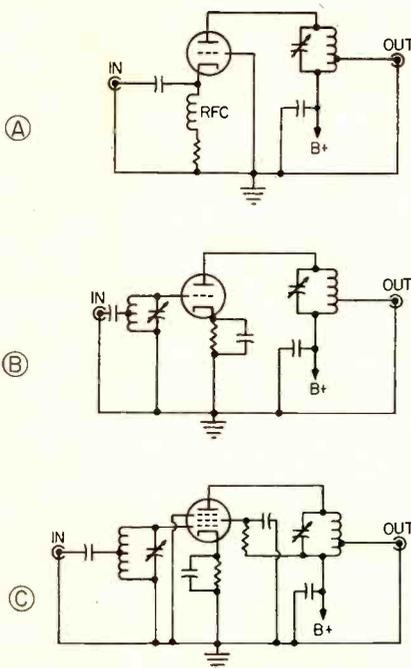


Fig. 1—Three amplifier types used in communications receivers. (A)—Grounded-grid triode. (B)—Grounded cathode triode. (C)—Grounded cathode pentode.

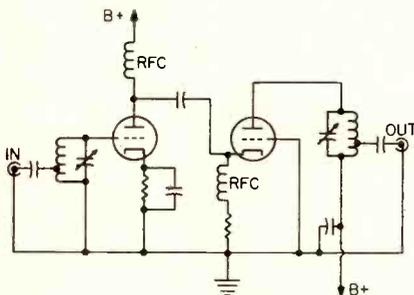


Fig. 2—Basic cascode amplifier circuit.

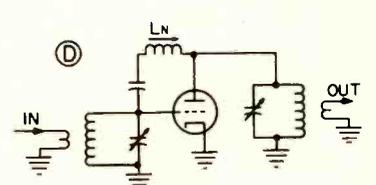
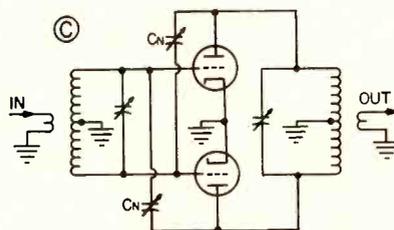
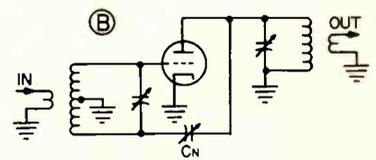
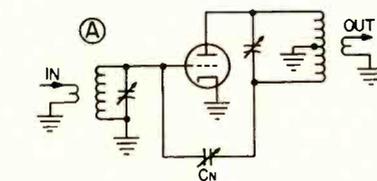


Fig. 3—Typical basic neutralization schemes. (A)—Hazeltine. (B)—Rice. (C)—Cross-neutralized push-pull. (D)—Coil neutralization.

response contributes much noise power. This should not usually occur if the RF to IF frequency ratio is 10 or 20 to one and input selective circuits are reasonably sharp. Spurious receiver responses, of course, result in the same degradation of noise figure (caused, for example, by undesired crystal local oscillator harmonics getting into the mixer and converting undesired frequencies to the IF).

Since the noise generator is a broad-band device, it will put out noise on these image and spurious response frequencies and the effect will be to indicate a better noise figure than the receiver has. If, for instance, we have a 50 Mc receiver with an IF of 500 kc (100/1 ratio) it would not be odd to find the image response (at 49 Mc for a 49.5 Mc local oscillator) equal to the desired response. In this case, twice as much noise power (since the noise power comes from two different parts of the spectrum) would be fed into the receiver IF as we would expect, and our indicated noise figure would be 3 db better than it is.

Other problems may arise in poorly designed receivers: noise nonlinearity ("flat-topping" or noise clipping), and frequency ripple in the metering.

Nonlinearity can be observed

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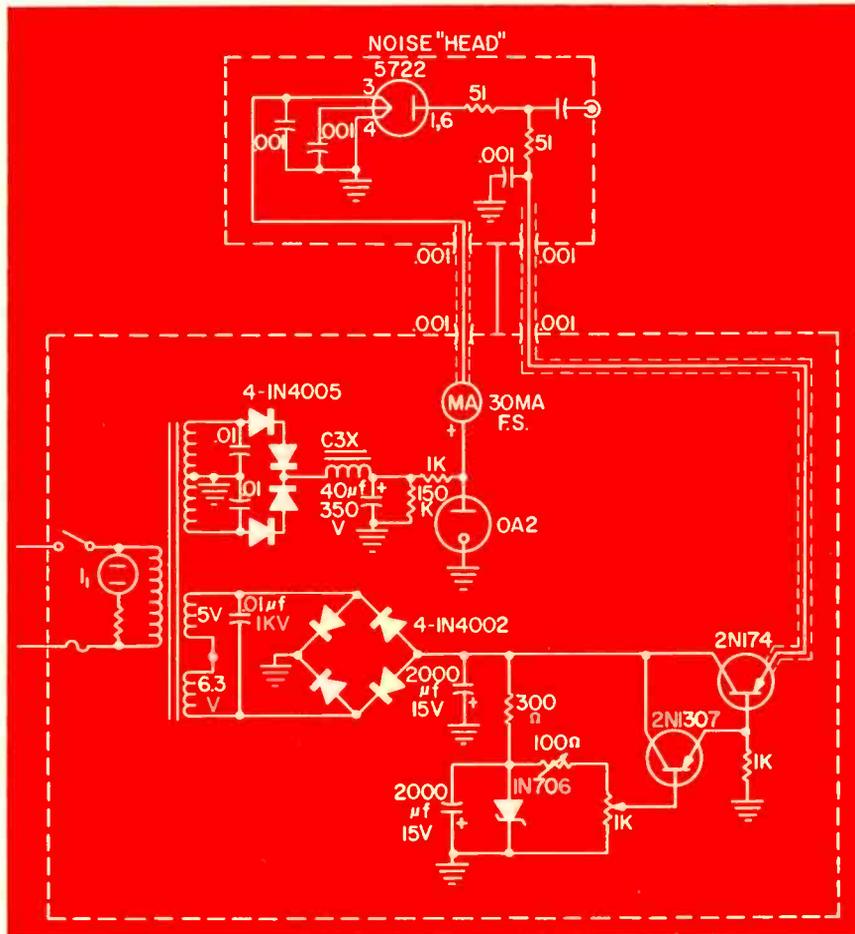


Fig. 6—Practical noise generator suitable for 25 to 450Mc.

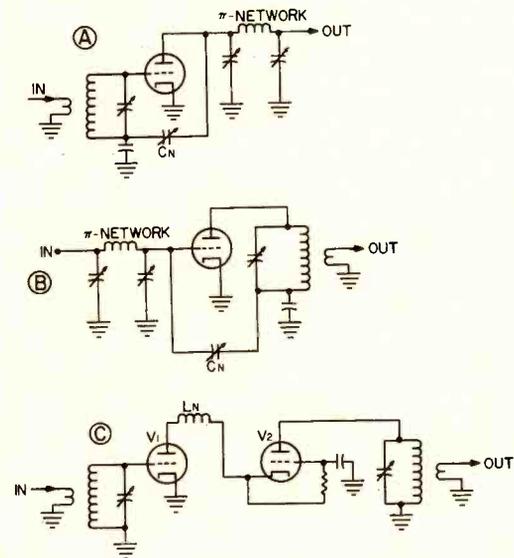


Fig. 4—Commonly used compromise neutralizing circuits. (A)—Bridge neutralization, divider on grid side. (B)—Bridge neutralization, divider on plate side. (C)—Series-neutralized cascode.

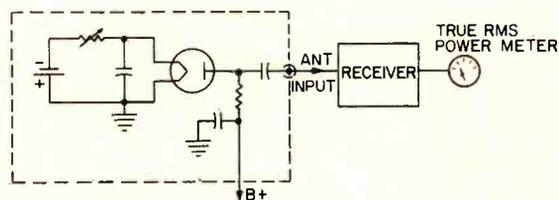


Fig. 5—Simplified noise generator and noise figure measuring circuit.

# When You Hire Help



Take a look at federal and state laws before you make up your mind

■ You've been working late in the evening to finish your calls and bench work. You feel run down, tired, pushed. You've made a careful analysis of the amount of work you are now doing and you could handle quite a bit more business if you had a good technician. You are ready to hire one.

But, before you do, you'd better check the federal and state employment laws, even if it is only for review, because severe penalties are prescribed for failure to comply with these laws.

## Federal Laws

Designed primarily to protect employees, these laws generally provide minimum standards of wages, minimum standards of working conditions and maximum use limitations for their health and welfare protection.

The Fair Labor Standards Act provides, for example, regulation for minimum wages, requires time and one-half of regular wages paid for hours worked over 40 hours in one week, by employees classified as "not exempt" from provisions of the act, requires records to be kept of wages, hours worked, deductions, benefits, etc., and sets penalties for failure to comply with the laws.

The Social Security Act requires you pay each quarter an amount equal to 3½ percent of the employee's salary for retirement benefit and deduct from each employee's pay a similar amount up to a max-

FORM 55-4 (11-62)		U. S. TREASURY DEPARTMENT - INTERNAL REVENUE SERVICE	
PART 1		APPLICATION FOR EMPLOYER IDENTIFICATION NUMBER	
(See Instructions on Reverse)		PLEASE LEAVE BLANK	
1. NAME (TRUE name as distinguished from TRADE name.)			
JOHN J. JONES			
2. TRADE NAME, IF ANY (Enter name under which business is operated, if different from Item 1.)			
JONES DRY GOODS STORE			
3. ADDRESS OF PRINCIPAL PLACE OF BUSINESS (No. and Street, City, Zone, State)			4. COUNTY
234 MAIN STREET ANYTOWN, IOWA			SMITH
5. CHECK (X) TYPE OF ORGANIZATION (If "other" specify, such as "Estate," etc.)			
<input checked="" type="checkbox"/> Individual <input type="checkbox"/> Corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Other (Specify)			
7. REASON FOR APPLYING (If "other" specify such as "Corporate structure change," "Acquired by gift or trust," etc.)			6. If individual, enter your social security account number
<input checked="" type="checkbox"/> Started new business <input type="checkbox"/> Purchased going business <input type="checkbox"/> Other			000-00-0000
10. NATURE OF BUSINESS (See Instructions)			8. Date you acquired or started business (Mo., day, year)
DRY GOODS STORE			JAN. 3, 1964
			9. First date you paid or will pay wages (Mo., day, year)
			JAN. 6, 1964
			11. NUMBER OF EMPLOYEES
			Agricultural    Non-agricultural
			4
12. Have you ever applied for an identification number for this or any other business? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
If "Yes," enter previous number, if known, or the approximate DATE and STATE where you first applied			
DATE	SIGNATURE	TITLE	
JAN. 13, 1964	John J. Jones	OWNER	

Fig. 1—Specimen of Form 55-4, page 1, showing how it should be filled in by an employer.

FORM W-4 (Rev. July 1963) U. S. Treasury Department Internal Revenue Service	EMPLOYEE'S WITHHOLDING EXEMPTION CERTIFICATE	
Print full name	City	State
Print home address	Social Security Account Number	
<b>EMPLOYEE:</b> File this form with your employer. Otherwise, he must withhold U. S. Income tax from your wages without exemption.		
<b>EMPLOYER:</b> Keep this certificate with your records. If the employee is believed to have claimed too many exemptions, the District Director should be so advised.		
<b>HOW TO CLAIM YOUR WITHHOLDING EXEMPTIONS</b>		
1. If SINGLE, and you claim your exemption, write "1"; if you do not, write "0" . . . . .		
2. If MARRIED, one exemption each is allowable for husband and wife if not claimed on another certificate.		
(a) If you claim both of these exemptions, write "2" . . . . .		
(b) If you claim one of these exemptions, write "1" . . . . .		
(c) If you claim neither of these exemptions, write "0" . . . . .		
3. Exemptions for age and blindness (applicable only to you and your wife but not to dependents):		
(a) If you or your wife will be 65 years of age or older at the end of the year, and you claim this exemption, write "1"; if both will be 65 or older, and you claim both of these exemptions, write "2" . . . . .		
(b) If you or your wife are blind, and you claim this exemption, write "1"; if both are blind, and you claim both of these exemptions, write "2" . . . . .		
4. If you claim exemptions for one or more dependents, write the number of such exemptions. (Do not claim exemption for a dependent unless you are qualified under instruction 4 on other side.) . . . . .		
5. Add the number of exemptions which you have claimed above and write the total . . . . .		
6. Additional withholding per pay period under agreement with employer. See Instruction 1 . . . . . \$		
I CERTIFY that the number of withholding exemptions claimed on this certificate does not exceed the number to which I am entitled.		
(Date)	19	(Signed)

Fig. 2—Form W-4, employee's withholding exemption certificate.

imum of \$174 per year. A table for computing this and other federal taxes may be obtained at your local post office.

The Federal Income Tax legislation requires that you deduct the tax from wages according to the tax table and turn it over to the government.

The Federal Unemployment Tax Act requires that you pay an amount that may range from about 1 to 3.1 percent of wages paid to the first \$3000 during the calendar year. This is *not* deducted from the wages. This applies to a firm with four or more employees on at least one day of each of 20 calendar weeks in the calendar year.

**JOHN C. DOE**  
**10 E. Main St.**  
**Anycity, Anystate**  
**524-6543**

**In case of emergency contact: Mrs. Ann Doe same address**

**Social Security Number: 000-00-0000**

**Education:**

**Experience:**

**Reason for termination: (useful in completing or contesting an unemployment insurance claim)**

**Notes: (skills, benefits extended, etc.)**

Fig. 4—Information for your records can be kept on file card.

**APPLICATION FOR SOCIAL SECURITY ACCOUNT NUMBER**  
 (Or Replacement of Lost Card)  
 Information Furnished On This Form is CONFIDENTIAL

Read instructions on Back Before Filling in Form. Print in Dark Ink or Use Typewriter.

DO NOT WRITE IN THE ABOVE SPACE

1 First FULL NAME YOU USE IN WORK OR BUSINESS: LEWIS JAY SMALLWOOD (First Name, Middle Name or Initial, Last Name)

2 First FULL NAME GIVEN YOU AT BIRTH: LEWIS JAY SMALLWOOD

3 DATE OF BIRTH: MAR. 3 1935 (Month, Day, Year)

4 PLACE OF BIRTH: ANYTOWN SMITH IOWA (City, County, State)

5 AGE ON LAST BIRTHDAY: 28

6 SEX: MALE  FEMALE

7 COLOR OR RACE: WHITE  NEGRO  OTHER

8 MOTHER'S FULL NAME AT HER BIRTH: MARY JANE WILLIAMS

9 FATHER'S FULL NAME (Regardless of whether living or dead): JAMES ROBERT SMALLWOOD

10 HAVE YOU EVER BEFORE APPLIED FOR OR HAD A SOCIAL SECURITY OR RAILROAD RETIREMENT NUMBER? YES  NO  DON'T KNOW

11 IF ANSWER IS "YES" PRINT THE STATE IN WHICH YOU FIRST APPLIED AND WHEN

11 ARE YOU NOW— EMPLOYED  SELF-EMPLOYED  UNEMPLOYED

12 MAILING ADDRESS: 9620 POPLAR STREET ANYTOWN IOWA (Number and Street, City, Zone, State)

13 TODAY'S DATE: JAN. 2, 1964

14 WRITE YOUR NAME AS YOU USUALLY WRITE IT. (Do Not Print or Type—Use Dark Ink)

TREASURY DEPARTMENT Internal Revenue Service Form SS-5 (Revised 2/61)

Fig. 3—Specimen of Form SS-5 showing how it should be filled in by an employee.

The Equal Pay Act states that men and women receive equal pay if they perform the same work.

**State Laws**

All states have their own standards and limitations concerning the use of employees generally equivalent to the federal Fair Labor Standards Act, such as minimum wages, working conditions, rest periods, regular wage payments, time limitations for women, etc. Since most of these laws vary from state to state, you can inquire about your own state laws from the Department of labor at your state capitol.

Workman's Compensation is insurance of prompt payment of benefits, regardless of fault, for employees injured in the course of their employment. These benefits

cover medical expenses, payment during recovery, supplemental wages in permanent partial disabilities, wages for permanent total disabilities, wages for the family in case of death, and some rehabilitation expenses. The payments are based on the rate set by your particular state laws. Some states set weekly maximum benefits, aggregated maximums, term or period of payment, and waiting period.

There are variations as to the type of law in each state. Some are compulsory and some elective. Some require that you insure through a state fund and some allow private insurance agencies or you personally to handle such insurance.

Penalties vary from fine and imprisonment to suit, to interest on default of premiums, to being en-

joined from doing business until compliance with the requirements.

State Unemployment Insurance may also be required.

**Records**

Records must be kept for a period of four or more years for each employee for inspection by officers of the Internal Revenue Service if the need should arise. They can be simple, however.

Authorization is necessary for all monies withheld. The only exceptions are the Social Security Tax and, in most states, garnishments or wage assignments issued by a court.

Every employer subject to federal taxes is assigned a nine-digit identification number which must appear on all records and tax returns. Application for this number is Form SS-4 (Fig. 1) attained from and sent to your District Director of Internal Revenue or the Social Security Administration office.

Each new employee must fill out Form W-4 (Fig. 2), the Employee's Withholding Exemption Certificate, to be held with your records and used in computing the taxes withheld. This form is attained from your District Director of Internal Revenue.

To be able to completely fill out Form W-4, the employee must have a Social Security number. If for any reason he does not have one, application must be made on Form SS-5 (Fig. 3), attainable from your district office of the Social Security Administration, post office or any

**JOHN C. DOE**  
**10 E. Main St., Anycity, Anystate, 524-6543**  
**In case of emergency: Mrs. Ann Doe, same address**  
**Social Security No.: 000-00-0000**  
**Dependents: 3**  
**Education:**  
**Experience:**  
**Reason for termination:**  
**Notes:**

**FRONT**

**JOHN C. DOE**      **Week ending: Oct. 4, 1964**  
**Gross Earnings:**  
**F.I.C.A.:**  
**Withholding Tax:**  
**Deductions:**  
**Net Pay:**  
**Overtime Pay:**

**BACK**

Fig. 5—Other necessary records can be kept on the front and back of a suitable file card.

## Hire Help

District Director, and submitted to the Social Security office.

The majority of your records can be kept on two sheets of paper or two cards. Note Fig. 4 and 5 for the type of information which must be kept.

Each month you must add together the amount of employee taxes deducted and employer tax for Social Security Tax for that month. If the total for any month (except the third month of a quarter) exceeds \$100, the total amount of such taxes must be deposited with any commercial bank qualified as Depository for federal taxes or to the Federal Reserve bank which serves your district. If you wish, you may make deposits even if you have less than \$100 of taxes withheld. The deposits for the first two months of any calendar quarter must be made within 15 days after the close of each such month. The timing of the deposit for the last month of the quarter should allow sufficient time for the Federal Reserve bank to return the validated receipt, Form 450 (Fig. 6), for filing with the quarterly return. The amounts and dates of such deposits must, of course, be kept in your records.

After each quarter of the year, you must remit the full amount of

*Continued on page 108*

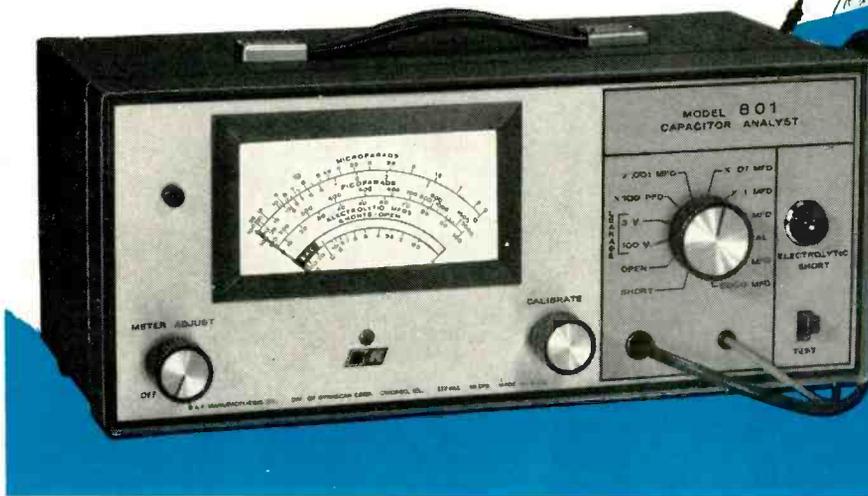
TABLE I		
Quarters	Quarter Ending	Due Date
Jan.-Feb.-March	March 31	April 30
April-May-June	June 30	July 31
July-Aug.-Sept.	Sept. 30	Oct. 31
Oct.-Nov.-Dec.	Dec. 31	Jan. 31

Fig. 6—Specimen of Form 450 showing how it should be filled in by the employer.

Fig. 7—You must give two copies of Form W-2 to each employee.

Now you can quickly locate defective capacitors affecting the performance of electronic circuits —and prevent costly call-backs!

## CAPACITOR TESTING IN-CIRCUIT/OUT-OF-CIRCUIT IS QUICK AND EASY



# NEW **B&K** MODEL 801 CAPACITOR ANALYST

*for TV, Radio, Transistor Radio, Auto Radio, Hi-Fi, and other electronic equipment*

Unique new B & K development puts the measurement of capacitors and electrolytics on a practical basis—picks up all defects that will affect performance—turns lost time into profit dollars.

Servicemen are aware that capacitors and electrolytics are second only to receiving tubes in creating the most servicing problems.

The new B & K Capacitor Analyst enables you more easily to measure capacitance and leakage resistance—detect both opens and shorts—both in-circuit and out-of-circuit. In-circuit leakage resistance test can be made on low-voltage circuits such as transistor radios, or on higher voltage circuits. Checks capacitor value from 25 pfd to 100 mfd.

Tests electrolytic capacitors by unique circuit (Pat. Pend.) which determines how well the electrolytic does the job of storing electrical energy and returning it back to the circuit. Detects marginal electrolytics that should be replaced. Also predicts life expectancy of any electrolytic capacitor rated 3 volts or more.

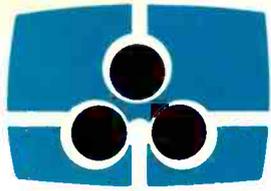
Model 801 Capacitor Analyst is attractive, rugged, and easy to use.

NET, \$ 109<sup>95</sup>

*Ask Your B & K Distributor for Details,  
or Write for Bulletin No. 108-T*



**B & K MANUFACTURING CO.**  
DIVISION OF **DYNASCAN CORPORATION**  
1801 W. BELLE PLAINE AVE. • CHICAGO, ILL. 60613  
Canada: Atlas Radio Corp., 50 Wingold, Toronto 19, Ont.  
Export: Empire Exporters, 123 Grand St., New York 13, U.S.A.



# COLORFAX

## Sylvania's 1965 Output Of Color CRT

Sylvania Electric Products, Inc. said that at the end of the third quarter it already has more than doubled its 1964 production of color television picture tubes, and that by the end of the year it will have produced nearly three times as many as last year.

Merle W. Kremer, a senior vice president of Sylvania in charge of the company's Electronic Components Group, said 1966 production at the color tube plants in Seneca Falls, N.Y., and Ottawa, Ohio, will be approximately double the number of tubes manufactured this year.

Sylvania currently is supplying color tubes to about 15 of the country's 21 television set manufacturers, including the company's own Entertainment Products Div. at Batavia, N.Y., according to Mr. Kremer.

"To fulfill our obligation to the customers who have relied on Sylvania as their source of supply during the past two decades, all tube customers, unfortunately, must be on allocation," Mr. Kremer said.

"Although Sylvania has been approached by several manufacturers for long-term contracts to assure them a continuing source of supply of tubes, no agreements have been signed," he added.

At the Seneca Falls plant, Sylvania is producing 25-inch and 19 inch rectangular tubes and 21 in. round tubes. Construction on the new Ottawa plant started this summer and production will begin there in the first quarter of 1966. Manufacture of 19 in. rectangular tubes then will be shifted to Ottawa. At the two plants, more than half-million square feet of manufacturing space will be devoted to color tube production.

## Motorola 21 in. Color CRT

Motorola, Inc. has started pilot production on a 21-in. rectangular color CRT, announces Elmer H. Wavering, president.

The tube went on the drawing board in January of this year and for the past few months Motorola and Owens Illinois, Inc., which will supply the color glass bulbs for the tube, have been working together on the project, Wavering disclosed.

This will be the second screen size that Motorola has introduced in rectangular color TV picture tubes. In 1963, Motorola introduced the 23-in. 92 deg rectangular color CRT.

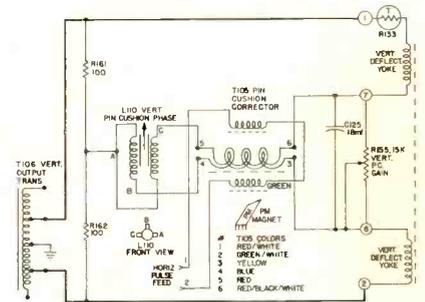
Wavering said that following the start of pilot production, life tests and field checks will be made.

## Admiral Pin-Cushion Circuits

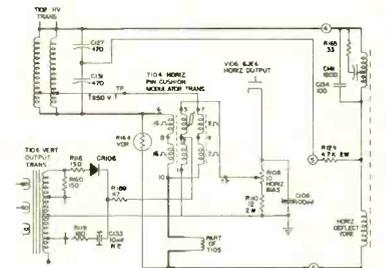
With the 23 and 25 in. CRTs being used in the Admiral G12 chassis, a condition known as "pin-cushioning" arises. That is, the edges of the raster on all sides tend to bow inward near the "center," while the corners fill out to points. This natural condition is corrected by cross-feeding a small amount of properly shaped horizontal and vertical output current into the deflection yokes.

**Vertical Dynamic Pin-Cushion Correction** is added to the vertical deflection yoke to correct for horizontal line distortion at the top and bottom of the raster. R161 and R162 are the damping resistors and R133 is a thermistor in the vertical yoke for temperature compensation. The correction current is injected in series with the two vertical yoke coils which are connected in series. Each half of the yoke is in a series connection with one winding on L110 and one winding on T105. The horizontal pulses for the correction are derived from the horizontal output section and fed to T105. The proper waveform is obtained by biasing T105 with a permanent magnet strapped to its core. Since C125 and L110 form part of a resonant circuit at the horizontal frequency, adjusting the inductance of L110 affects the phase of the correction signal. Notice that R115 is across the total correction circuitry. With this control in the minimum (CCW) position, the correction is effectively out of the circuit and the vertical yoke operates without correction current.

**Horizontal Dynamic Pin-Cushion Correction** is added to the horizontal deflection yoke to correct for vertical line distortion at the sides of the raster. Both horizontal yokes are in series with the *Horizontal Pin-Cushion Modulator Transformer* T104. In addition to C127, C131, and R129;



Vertical Pin cushion circuit Admiral G12 chassis.



Horizontal pin cushion circuit Admiral G12 chassis.

C141 and R165 are used for sweep linearity correction.

R108 feeds a dc current into the control winding of this transformer and establishes the proper hysteresis (magnetic) bias, just as the permanent magnet did in T105 in the vertical section.

The source for this dc current is the cathode of the *Horizontal Output Tube*, thus the bias for T104 tends to adjust automatically for changes in horizontal output current. The correction signal is fed to the center tap of the control winding, and is developed equally across each half. Since the correction signal is varying the fixed bias at an ac rate, it is "modulating" the hysteresis curve of the transformer and producing an AM modulated current in the yoke coils.

The ac correction control current supplied to the control winding is derived from the *Vertical Output Transformer* through the isolating resistors R116 and R119. CR106 and C133 shape the waveform to the proper shape for modulating transformer T104. With the vertical and horizontal correction properly set, the raster will produce straight vertical and horizontal lines over the entire face of the picture tube.

# Tom Burke stuck by a repair problem? Never.

Tom Burke keeps up to date. It pays off. When Tom is called to service a new model, he doesn't have to waste time. He's ready for action as soon as the new models come on the market.

How does Tom do it? Philco Tech Data Service keeps him up to date. Gives him Philco facts faster, fuller and at lower cost than any other service.

And Tech Data Service is only one reason Tom likes doing business with Philco. His Philco Parts Distributor gives him fast, reliable service. He has the parts Tom needs right on hand. And the one rare time he doesn't, he makes sure Philco's Lifeline Emergency Service ships the part Tom needs in 24 hours or less.

Not long ago, Tom decided to make his shop a Philco Qualified Service Center. He gets extra business when his name appears under a Philco listing in the Yellow Pages. He gets a complete accident insurance program for himself and his men. And he gets valuable advice on how to make his shop more profitable.

Tom Burke likes being teamed up with Philco. You will, too. Talk to your Philco Parts Distributor, or contact Parts & Service Department, Philco Corporation, Tioga & "C" Streets, Philadelphia, Pa. 19134.

PARTS & SERVICE DEPARTMENT  
**PHILCO**  
A SUBSIDIARY OF *Ford Motor Company*



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## Prices of 15 in. Rectangular Color CRT Announced

RCA announces that its 15 in. rectangular, 90 deg color CRT will be priced, to manufacturers, at \$90 for a laminated version and \$85.50 for a non-laminated type. The prices will become effective during the first quarter of 1966 when the tube is made available to color TV set manufacturers, according to Michael J. Carroll, manager, marketing department, picture tube div.

The laminated type will have a

safety plate bonded to the tube's faceplate. The non-laminated version is intended for color sets which utilize a separate safety glass built into the receiver. Mr. Carroll said that development samples of the 15-in. CRT will be ready in limited quantities during the latter part of the fourth quarter of 1965 at a price of \$150 each. These tubes will be used by color TV set makers in their preliminary design work.

"We plan to start production of the 15 in. tube using the etched integral

window system," he said. This laminated system is currently used in their 21 in. round, 25 and 19 in. rectangular color tubes. RCA previously announced a 15 in. tube incorporating a formed rim band and tension band system. An unanticipated delay in the availability of the required tinted glass bulbs, Mr. Carroll explained, forced abandonment of this design approach.

The 15 in. color tubes will be made at the company's plant in Lancaster, Pa. A laboratory mockup simulating the 15 in. tube was first demonstrated to industry executives during August of this year at special seminars held in Chicago and Newark, N. J.

The tube uses the three-gun shadow-mask principle. It will have the following approximate dimensions: minimum screen area 102 sq in.; minimum picture height 9.1 in.; minimum picture width 11.7 in.; minimum picture diagonal 13.5 in. and tube length of about 15 in. Estimated weight of the laminated tube is 12.5 lb. and the approximate weight of the non-laminated version is 10.5 lb. The tube screen will have straight sides with sharply rounded corners. The laminated type will be designated the 15LP22, while the non-laminated type will be identified as the 15KP22.

# ARTIFICIAL RESPIRATION FOR CRT'S

CREATES MORE PROFIT FOR YOU



Easy, professional way to check and correct B&W and Color Picture Tubes

### TESTS AND REJUVENATES

- all picture tubes at correct filament voltage from 1 to 12 volts.
- all Hi G-2 and Lo G-2 picture tubes, including tubes that require as low a G-2 voltage as 30 volts.
- 110° tubes and the new 19" and 23" tubes.
- color picture tubes, including the new 90° 23" 23EGP22. Checks and corrects each gun of color tube separately.



## ALL-IN-ONE B&K CRT 445

THE INDUSTRY'S STANDARD  
Most Widely Used Today  
by Professional Servicemen

### SAVES CUSTOMERS—ADDS SERVICE INCOME—MAKES NEW TUBE SALES EASIER

Does the job in a few minutes right in the home without removing tube from TV set.

Gives new life to weak or inoperative tubes. Checks for leakage, shorts, open circuits and emission. Removes inter-element shorts and leakage. Repairs open circuits and low emission. Restores emission and brightness. Life Test checks gas content and predicts remaining useful life of picture tube.

Quickly pays for itself.

Net, \$74.95

See Your B&K Distributor for Demonstration, or Write for Catalog AP21-T

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... for more details circle 15 on postcard

### Color TV to Boom in Canada

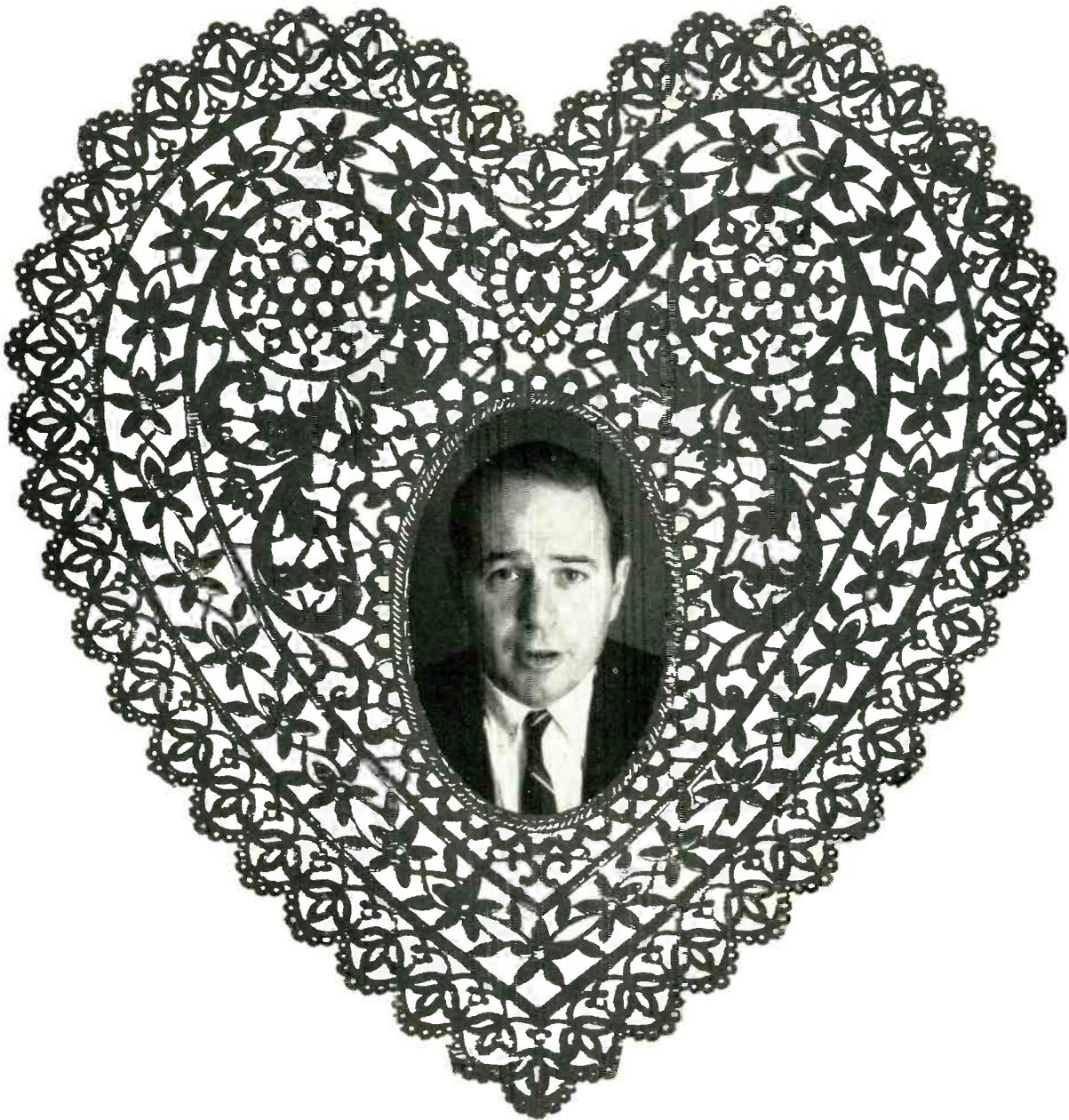
Canadian broadcast-advertising leaders predict color TV north of the border will achieve in four years what it took ten years to accomplish in the United States.

Slated to go color October 1966, Canada will be only one year behind the United States in percentage of color-set penetration by 1970 when 22 percent of all Canadian TV households will be color-equipped.

CBC, the government owned network, says it will have 50 percent of all daytime programming in color and more than 85 percent of nighttime by the end of 1966. CTV, the independent network, according to its president, Gordon Keeble, will be 100 percent color day-and-night by the same date.

### Admiral Announces 21 in. Color CRT

Admiral Corporation announces a 21-in. rectangular color CRT. The new tube will be manufactured for Admiral by National Video Corp. Ross D. Siragusa, chairman of the board and chief executive officer, said that sets incorporating this new tube will be shown to Admiral distributors in December, with deliveries scheduled in the second quarter of 1966.



## **No one's asking you to love this man. Just to listen to him.**

He may not be your idea of a great guy...but he might be a guy with a great idea.

He's got eye-popping information about your top prospects. Information that can give you solid new ideas on how to sell them when they're ready to buy.

Ask your Yellow Pages salesman how the Yellow Pages National Usage Study can help you. He's helped a lot of others. He's in the Yellow Pages under Advertising — Directory & Guide.



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# NEW PRODUCTS

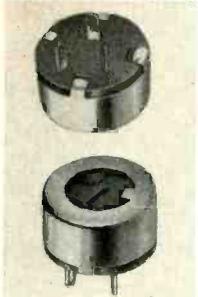
FOR MORE INFORMATION CIRCLE NEW PRODUCT NUMBERS ON POSTCARD INSIDE LAST COVER.

## Color Tuner Cleaner 200



A tuner cleaner, especially designed for cleaning and lubricating tuners on color TV sets, is announced. It is said the cleaner will not cause drift and detuning in the critical components of a tuner's electronic circuitry. The product is called "color lube," and is said to contain a chemical product known as "TC 5." Chemtronics.

## Trimmers 201



A line of economical - type trimmers, with hot molded carbon elements, is announced. Construction consists of the stable hot molded base and resistor with a carbon contact brush, pressure spring and cover. Adjustment is made by screwdriver. Size is  $\frac{1}{2} \times 5/16$  in. They are rated at 0.25w at 70°C, 300acwv. Values from 100Ω to 1M. Clarostat.

## Speaker 202

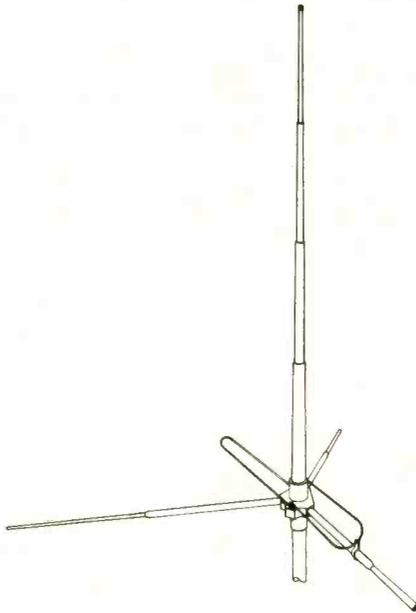
Styled in a contemporary upright walnut cabinet with a Spanish wood fretwork grille, the "Seville 847A,"



is adaptable for small rooms. The enclosure houses a 12 in. bass speaker, an exponential horn and a compression high-frequency driver. A two-section 3000 cps crossover network is also provided. The unit is rated at 20w, impedance 8 or 16 Ω and has a frequency response of 40 to 22,000 cps, the announcement said. Size 26 x 19 x 14 in. List \$231. Altec.

## Two-Way Antenna 203

A base station two-way antenna for the 27.230 to 50 Mc business band is announced. Known as the "dispatcher DP275," it is a  $\frac{5}{8}$ -wave vertical with radial radius of 9 ft and is 20 ft high at 27 Mc. The radiation



pattern, according to the announcement, is 360 deg circular. A coaxial female connector is incorporated into the weather-proof radial support assembly. VSWR is reported to be 1.5:1 or better and gain at 3.4 db over a quarter-wave ground plane. Mosley.

## Miniature Soldering Irons 204

A line of miniature soldering irons, known as the "little dandy," features 40, 50 and 60w capacity. It is said the No. 3112 reaches working heat in two minutes and comes with either clad or nickel-plated tips. Other features include anti-roll handle molded



of G-E's "Lexan" and Tennessee Eastman's "Tenite," combined to provide a grip impervious to perspiration or oil, according to the manufacturer. American Beauty.

## Antenna Coupler-Amplifiers 205

Six transistorized signal boosters and signal-splitting network units are announced. The units are said to offer optimum combinations of gain, s/n



ratios, overload characteristics, bandwidth, linearity, interference rejection and signal power for multi-set distribution. Units are available for the entire TV/FM spectrum. JFD.

---

# MATV

---

## Market Arrives... Tremendous Volume

---

The demand for Master Antenna TV installations has entered a totally new phase . . . one which goes far beyond the already big market for commercial applications and reaches to millions of newly created multiple set homes.

Color TV . . . as well as increasing FM multiplex popularity is the big reason why. Every homeowner who buys a color set instantly becomes a prospect for a residential MATV installation to operate two, three, or more receivers with maximum quality reception from one antenna.

---

## The Home MATV Market is Here Now!

---

**This potential...**

---

**plus the vast Commercial MATV Market...**

---

**enables Channel Master to  
reduce prices drastically.**

New Channel Master mass production techniques on the same precision-quality, commercial-grade MATV components designed for big building applications have resulted in equipment price reductions that average 25% and more per installation. For MATV installing companies this means more volume and profit from highly competitive commercial jobs. For radio-TV service dealers it means an opportunity to get started in a totally new, high-income business meeting the booming demand for residential master antenna system.

---

Contact your nearest Channel Master Distributor.

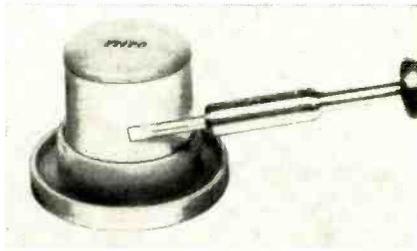
**CHANNEL MASTER**

Ellenville, N.Y.

# NEW PRODUCTS

## Soldering-Tip Cleaner 206

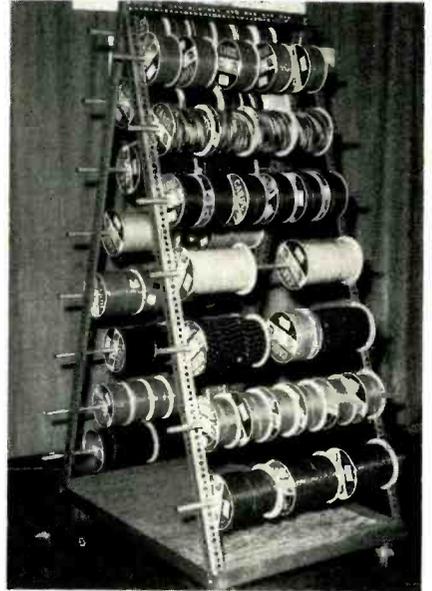
A soldering iron tip cleaner, said to provide a fast cleaning method for soldering iron tips, is announced. The cleaner eliminates the need for using wiping rags or other tip cleaners that may lead to removal of tip solder or to contamination of the solder tip, the announcement said. A fast stroke of the tip across the wet, vertical sponge surface removes undesirable



flux and solder residue, the manufacturer claims. The unit is provided with a center plug in the aluminum base for anchoring the cleaner in a specific place on the workbench. Price \$2.50. Electric Soldering Iron Co.

## Wire Cart 207

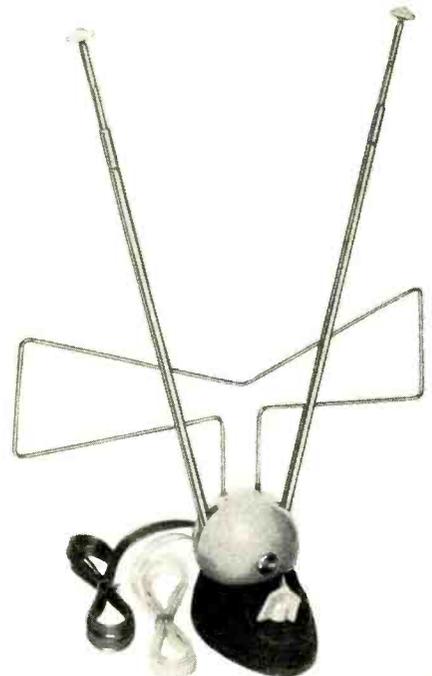
Announced is a wire-cart capable of holding 80 spools of small gage wire. It is made of heavy duty steel and rolls 1000 lb loads on lockable



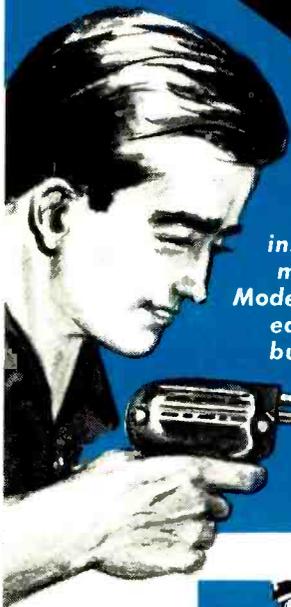
ball bearing wheels, according to the announcement. Empty spools can be replaced by one man. The model SP is 30 x 42 x 75 in. Net weight, 55 lb. Additional information including literature and prices furnished on request. Allcart.

## Indoor Antennas 208

A line of UHF/VHF indoor TV antennas is announced. It is said the TV antennas feature two lead-in cables for simultaneous UHF and VHF reception, a double set of phasing bars, one used as a UHF reflector and the other for VHF and color reception. This line includes three models. Snyder.



# The famous MERCURY Model 1101 TUBE TESTER NOW in a wire-it-yourself KIT!

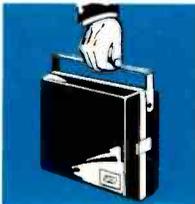


illustrated  
step-by-step  
instructions  
make the  
Model 1101  
easy-to-  
build...



### A PORTABLE MASTERPIECE

Modern, airplane luggage design scuff-proof gray case... Weighs only 4 lbs. 8 1/8" x 11 3/8" x 3 1/4".



### EMPLOYS EXCLUSIVE 2-POINT TEST PRINCIPLE

- ✓ assures a 100% short test (shorts are one of the most common causes for tube failure)...they cannot get by the Model 1101
- ✓ assures that all sections of multi-section tubes will be fully tested
- ✓ your greatest safeguard against obsolescence

See your parts distributor... or write for complete catalog

Nothing has been spared, engineering-wise or production-wise in making the Model 1101 your best tube tester buy. Tests more tubes for dynamic cathode emission, shorts, grid leakage and gas than many testers costing hundreds of dollars. Will test the new Decals, the new 7-pin Nuvistors and the new Magnovals. Also tests Compactrons, 10-pin types, Novars, Nuvistors, battery type, auto radio hybrid tubes foreign and hi-fi tubes and industrial tube types. Includes the most complete tube chart in the field.

• Also tests all popular picture tubes

Model 1101K...Kit..... **\$34.95** Net  
Model 1101...Wired... **\$49.95** Net

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manufacturers of quality electronics products

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... for more details circle 43 on postcard



## **“Where have I been? If we’d get that G-E two-way radio you’d know!”**

You could’ve reached him. General Electric two-way radio instantly reaches those people you can’t reach by phone. It gives you complete control of your business.

So you run a snappy service. Quick deliveries. Speedy pick-ups. Fast emergency calls. Instant re-routing. On-the-spot changes, cancellations and sales information.

With service like this, you keep customers. And make new ones. You also get more use out of your fleet. Waste fewer man-hours. Save on gas mileage. Save on tele-

phone charges. Save time and more time. And that’s money.

When a two-way radio is counted on for so much, it has to be good. That’s why companies going for two-way systems, go for General Electric.

G-E started the two-way radio business. It’s the world’s largest electronics manufacturer. The world’s largest manufacturer of electrical equipment. So who else could know more about it?

For big, busy companies or small, busy companies looking to get big, there’s a com-

plete line of appropriate General Electric high performance FM two-way radio equipment. Look into it.

Call your G-E communications consultant listed in the Yellow Pages under “Radio Communication.” Or write for complete descriptive information. General Electric Company, Communication Products Dept., Section 115115, Lynchburg, Virginia.

**First in Two-Way Radio**

**GENERAL  ELECTRIC**

... for more details circle 30 on postcard

## NEW PRODUCTS

### Voice-Control Recorder 209

A voice-operated automatic portable tape recorder, called the "sound camera", is battery-operated. The model F88 is 5 x 7 x 3 in. and weighs 2 lb. The unit is dual track and permits an hour's play on one tape reel, according to the manufacturer. The unit may also be operated manually by pushbuttons if desired. Other features include record-



level and battery-level indication, extension speaker jack, and ac-adaptor jack. It uses four size "C" cells. Price under \$80. Concord.

### Stereo Amplifier 210

Announced is a 90w solid-state (IHF music power both channels) stereo amplifier using silicon transistors. The unit has a mono 3rd channel which can be used to power accessory speakers. Sensitivity: Tape



head — 1.0 mv, phono — 1.8 mv, tuner — 0.25v, according to the announcement. Harmonic distortion and intermodulation distortion are said to be 1/3% at rated output, 1/10% at 10w or below and 1% respectively. Sherwood.

### RC Bridge 211

A laboratory quality instrument, known as the 965 "FaradOhm Bridge-Analyzer," is introduced. The instrument combines the functions of resistance-capacitance-inductance comparator, a capacitance leakage/I-R ana-



lyzer, a dc VTVM and a DC VT nano-micro-milliammeter, according to the manufacturer. Full specifications on request. Price \$129 factory wired and tested. EICO.

### Spray Cleaners 212

A line of aerosol-packed cleaners for tuners, controls, switches and general use, is announced. Extender tubes are furnished with these cleaners. Ac-



ording to the announcement, the cleaners will not harm plastics or metal and are non-conductive, non-flammable, non-corrosive and safe to use on all electronic equipment. Quietrol.

# Jackson

... IT'S THE FINEST

Color Keyed

## Model 825 Picture Tube Tester/Booster

the most versatile and accurate of all CRT testers...for all

BLACK/WHITE and COLOR PICTURE TUBES...



**look**

at all the valuable and profitable functions

Tests for continuity, leakage, emission, picture tube cut-off and life-expectancy • Removes shorts • Welds cathode • Boosts picture tube back to life

**look**

at these brilliantly engineered Jackson features

12 separate heater voltages including color • Line indicator control for accurate voltages • Grid guard limits peak current for protection of picture tube • Checks each color gun separately • Plug-in socket cable for easy replacement or repair • Separate variable voltages applied to G1-G2 of picture tube

**look**

at all these convenient operational features

Color keyed—push buttons for ease and speed in testing • FM tuning eye...no separate lights to interpolate • Angled view roll chart on panel...tube set-up information at your fingertips • Easy to keep up-dated

Size: 14 3/4" W x 13 1/2" D x 5 3/4" H.

Wt.: 13 lbs. 3 oz. Dealer Net \$11995

See your Jackson distributor, or write for catalog

## JACKSON ELECTRICAL INSTRUMENT COMPANY

124 McDonough Street, Dayton 2, Ohio

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8900 Park Ave., Montreal

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458 Broadway, New York 13, N.Y.

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# "I can ship anytime day or night..."



**that's why I always specify Greyhound Package Express!"**

Greyhound Package Express never stops for lunch, never quits at five, never sleeps at night. Not on weekdays. Not on weekends. Not even on holidays. Your shipments travel on regular Greyhound buses... via fast, frequent Greyhound schedules. Your shipments get moving *faster* so they can arrive *sooner*. Packages shipped hundreds of miles frequently arrive the very

same day. And even on longer trips, overnight deliveries are routine. Save time! Save money! Save trouble, too! Ship C.O.D., Collect, Prepaid or open a Greyhound Package Express Charge Account.

*For information on service, rates and routes, call Greyhound, or write: Greyhound Package Express, Dept. 53-L, 140 S. Dearborn St., Chicago, Ill. 60603.*

## It's there in hours...and costs you less

For Example	Buses Daily	Running Time	20 lbs.	30 lbs.	40 lbs.*
DALLAS— SAN ANTONIO	10	7 hrs. 15 min.	\$1.90	\$2.15	\$2.45
CINCINNATI— LOUISVILLE	14	2 hrs. 20 min.	1.65	1.90	2.15
CLEVELAND— COLUMBUS	10	3 hrs. 5 min.	1.80	2.05	2.40
LOS ANGELES— SAN FRANCISCO	28	9 hrs. 20 min.	2.10	2.45	2.80

\*Other low rates up to 100 lbs.



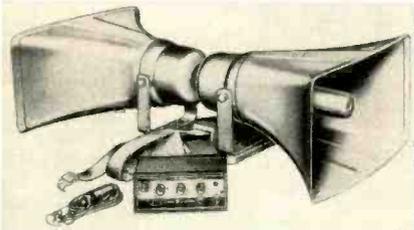
**One of a series of messages depicting another growing service of The Greyhound Corporation.**

... for more details circle 32 on postcard

## NEW PRODUCTS

### Public Address System 213

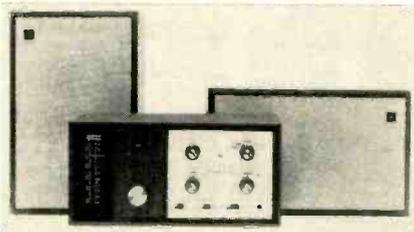
A public address system which can be mounted on a car or other motor vehicle, is announced. Two flat exponential speakers, bracket-mounted



on top of the vehicle, direct the audio forward and to the rear to obtain optimum sound diffusion, according to the announcement. If desired, these can be mounted to direct the sound in one direction; and two extra speakers may be used to obtain four-way diffusion, the maker says. Geloso.

### FM/Stereo Receiver 214

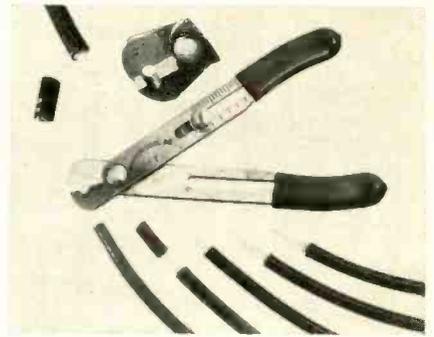
A solid-state FM--stereo receiver, the "Stereomaster 2400," is an-



nounced. It is specifically designed to provide stereo audio in areas where limited space is a problem, the announcement said. The unit is encased in a hand-rubbed oiled walnut cabinet with two matching low resonance speaker systems, each of which contains a separate low frequency and high frequency speaker, as well as a crossover network. It is provided with connections for tape recorder, stereo record changer or stereo earphones. Price and full specifications available on request. Scott.

### Coax Tool 215

A compact stripper, designed to cut and strip RG59/U coax, is announced. It is adjustable and has two stripping holes. The larger hole is for removing outer insulation and braid while the smaller hole easily removes inner insulation, the announcement said. The stripper is made from high



quality spring steel and the cutting edges are honed and heat treated to give long service life, according to the maker. Price \$1.98. Hunter.

### CB Transceiver 216

An 11-channel, solid-state CB transceiver, the "Escort II," is announced. A special crystal circuit pro-



vides additional channels with the installation of a single crystal for each new channel, instead of two. Pearce-Simpson.

# new!

## All-Transistor Color Bar Generator

*Rugged, solid-state Seco 900 puts you on top of the booming Color-TV Service Market... with the finest unit in the field!*

Setting new standards in both engineering and design, Seco's new Model 900 will outperform every other color bar generator on the market!\* A true precision instrument that offers brightest dots and purest color quality, the 900 takes the "guess" out of color TV-servicing, makes possible big new profits in the booming color service field!

**Only the Seco 900 offers all of these features:**

- Single Burst Dots are bright—"rock" solid... will not move
- Purest Color Quality—10 completely different color bars... positive graduation from color to color
- Single Trace Horizontal Lines—are bright, sharp... begin and end during horizontal retrace
- No Blinking On Cross Hatch—at any intensity level
- All Transistor Circuit—for highest reliability and instant operation with no warm-up
- Outstanding Stability—Zener regulated power supply... crystal controlled oscillators!



SECO ELECTRONICS CORP., 1205-B So. Clover Dr., Minneapolis, Minn. 55420

**\$12995**

Dealer Net



... for more details circle 54 on postcard

ELECTRONIC TECHNICIAN



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# no order is too small

He's geared to supply any industrial and commercial tube in any quantity, large or small. He's a specialist in fast service, too. He likes the big orders (who doesn't!), but the small ones get the same prompt attention. Same-day delivery, wherever possible.

Next time you need tubes, call your Authorized Sylvania Distributor. You'll find him knowledgeable, helpful, and ready to serve you.

Electronic Tube Division, Sylvania Electronic Components Group.

**SYLVANIA**  
SUBSIDIARY OF  
GENERAL TELEPHONE & ELECTRONICS **GTE**

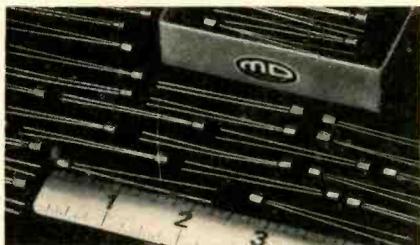
NEW CAPABILITIES IN: ELECTRONIC TUBES • SEMICONDUCTORS • MICROWAVE DEVICES • SPECIAL COMPONENTS • DISPLAY DEVICES

## NEW PRODUCTS

### Subminiature Fuse

217

Announced is a line of subminiature, hermetically sealed thermal



fuses. The fuse is particularly well suited to serve as a thermal monitor in thermal batteries, in shaded pole blower motors, percolators, electric cookers, corn poppers, electric baseboard heaters and in other applications, the announcement said. Opening temperatures range from 135°F to 1000°F. Micro Devices.

### Low B+ Tubes

218

A line of tubes, designed for low B+ color TV service, is announced. According to the announcement, the tubes will make possible lower cost, higher quality and more reliable color



TV since they can deliver top-performance at B+ voltages of 240 to 270 v. The tubes currently available are the 6KG6 horizontal output pentode; 6EC4 damper diode and 3BH2 high voltage rectifier diode. Amperex.

### In-Store Coax Display

219

A self-service display, called "Coloraxial," measures 35 x 36 in. The

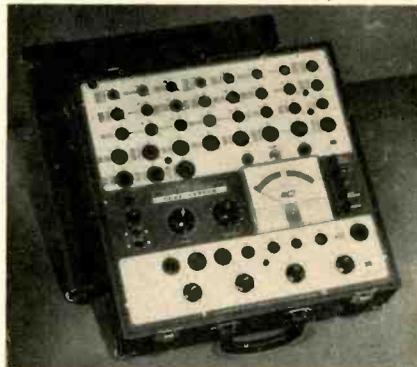


in-store display is designed for distributor showrooms. The "Coloraxial" system uses 72Ω coaxial lead-in. Jerrold.

### Tube Tester

220

A tube tester, said to test all TV and radio tubes — nuvistors, novars,



10-pin tubes, 12-pin compactrons, etc. — is announced. Known as the model 707, the dynamic mutual conductance tester permits checking other types in an emission circuit. B&K.



## NEW DUO-BEAM 10 by Hy-Gain

Now, with Hy-Gain's Duo-Beam 10, you can add miles of distance to your Citizens Band range...transmit and receive stronger and clearer signals in the area you've been working. And, because the Duo-Beam 10 is ROTATABLE, you can do it with PINPOINT ACCURACY in any of the 360 degrees surrounding your station! The Duo-Beam 10 is a twin-driven 10 element beam that re-forms the 5 watts output power from your transceiver and funnels it in a "ray-like" path close to the ground to deliver you power equivalent to what you'd get from a CB rig with output power as high as 120 watts. That's "Talk Power." The Duo-Beam 10 is rugged, too...all heavy gauge aluminum construction with iridite treated hardware...designed to survive 80 mph winds. Easy to install on rooftop towers, TV towers, or on a 1% mast...It's guaranteed to outperform any legal antenna for CB. Model 1110DB \$99.95 Net

### 93 Watts TALK POWER...

**DUO-BEAM 6**—Another new rotatable Duo-Beam by Hy-Gain...twin-driven 6 element model that delivers 93 watts "Talk Power." Guaranteed to outperform any legal CB antenna other than the Duo-Beam 10. Model 116DB . . . \$69.95 Net

### 42 Watts TALK POWER...

**DUO-BEAM 4**—The smallest of Hy-Gain's new rotatable Duo-Beams...a 4 element model that delivers 42 watts "Talk Power." Guaranteed to outperform any legal CB antenna other than the Duo-Beam 6 or 10. Model 114DB . . . \$39.95 Net

Contact your Hy-Gain Representative for complete details or write...

**HY-GAIN ELECTRONICS CORPORATION**  
8466 N.E. Highway 6—Lincoln, Nebraska 68501

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**NOW YOU CAN HAVE THE BEST...  
FOR ONLY PEANUTS PER MONTH**

**See Your Distributor About  
The New Hickok Credit Plan**

- ONLY 10% DOWN
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- INTEREST RATE ONLY 2/3% A MONTH
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You can own

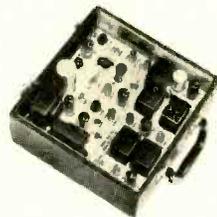
any of this

test equipment

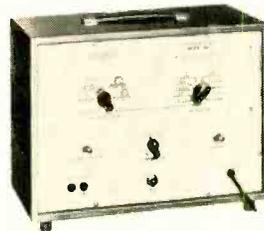
for as little

as \$15

a month



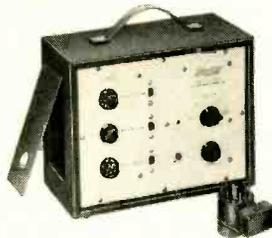
**Model 660**  
White Dot  
Color Display  
Television Generator



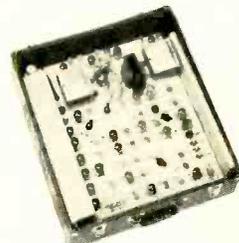
**Model 661**  
Chrom-aligner  
NTSC Standard  
Color Bar and  
White Dot Generator



**Model 677**  
Wide Band Service  
Technician's  
Oscilloscope



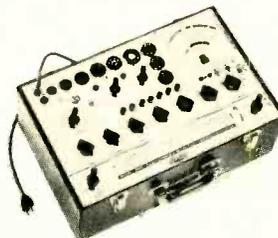
**Model 662**  
Installer's Color  
TV Generator



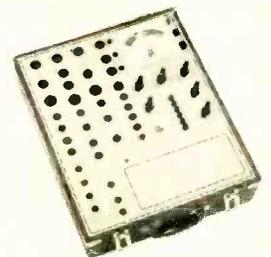
**Model 656XC**  
Color Space Bar,  
White Dot  
TV Generator



**Model 6000A**  
Service Technician's  
High Speed  
Deluxe Portable  
Tube Tester



**Model 800A**  
Portable Tube Tester,  
Transistor and  
Diode Checker



**Model 799**  
Multi-socket  
Tube Tester

**Hickok**

**THE HICKOK ELECTRICAL INSTRUMENT CO.**

10523 Dupont Avenue

Cleveland, Ohio 44108

Represented Internationally by Hughes International, Culver City, California

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# DURAFOAM<sup>\*</sup> and new Super- DURAFOAM

the  
TV  
trans-  
mission  
lines  
that have  
set new  
performance  
standards  
for the industry

For VHF and UHF television transmission nothing quite measures up to the high performance standards of Durafoam and new Super Durafoam. Backed by a 15 year unconditional guarantee, you know they have to be good to merit such recognition.

Each stranded conductor is encased in a tube of cellular polyethylene for lowest signal loss. This construction is, in turn, covered with heavy black polyethylene insulation that gives maximum protection against deterioration caused by moisture, chemicals, salt air, and sunlight as well as normal aging.

Both products are constantly tested and re-tested to assure top quality performance when they go to work for you. Impedance of cable is 290 ohms. Attenuation per 100 feet is 1.04 DB at 100 MC, 3.5 DB at 500 MC and 4.5 DB at 900 MC. Cable width is .410-in.

Available on 500 and 1,000 ft. spools and in 50, 75 and 100 foot coils with factory attached terminals on one end. You'll be delighted with the flexibility and workability of this line.

Write for samples and literature.

Over 8 Million Feet Already  
Providing Highly  
Satisfactory Performance

\*Pat. App. For.

## Columbia

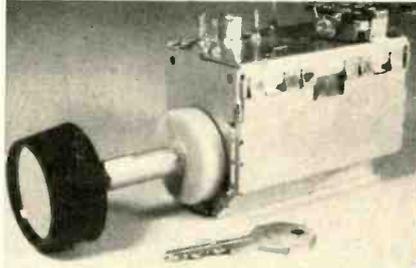
**WIRE & SUPPLY CO.**  
2850 IRVING PARK ROAD  
CHICAGO 18, ILLINOIS

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## NEW PRODUCTS

### Television Tuner 221

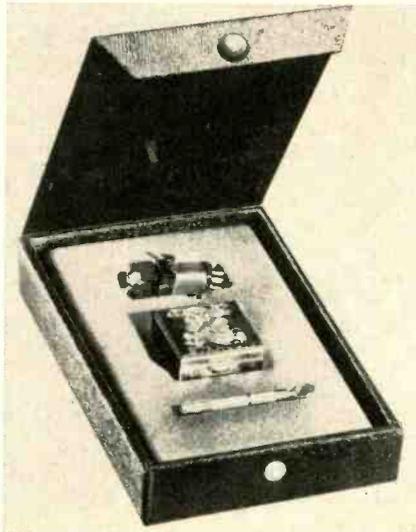
A line of transistorized TV tuners is announced. The model V102, turret-type tuner is designed for transistorized TVs. The model V105 is a



hybrid tuner with RF tube and two transistors for conventional tube-type TVs. Model V106 a hybrid with nuvisor and two transistors, is also for conventional TVs. Electro-Netic Steel.

### Dust-Removing Stylus 222

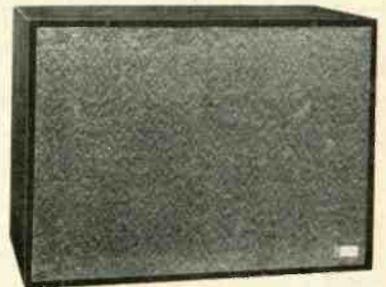
A completely integrated dust removing device — built into the stylus



of a cartridge — is announced. Called the "Longhair" cartridge, the 581 has a free-riding long haired brush extending from the front of the plastic stylus guard, according to the announcement. Prices \$49.50 to \$60 net. Stanton.

### Speaker System 223

A fixed grille bookshelf speaker system, said to have an undistorted response from 20 to 40,000 cps, is in-



troduced. The system employs a 12 in. woofer, an 8 in. mid-range and a tweeter. Called the "medallion monitor," the cabinet is finished in oiled walnut. LTV University.

### CB Transceiver 224

A GSA approved CB transceiver, the 625G, is announced. The unit is a fully transistorized regular 5w mo-



bile-base station transceiver and operates from 117vac or 12vdc. Complete specifications available on request. Amphenol.

## NEW...POSITIVELY NEW

### Positively—

- CONTAINS NO CARBON TETRACHLORIDE
- HARMLESS TO ANY PLASTICS KNOWN TO KRYLON
- CLEANS AS IT LUBRICATES
- NON-FLAMMABLE
- NON-CORROSIVE . . . NON-TOXIC

Contact your local jobber for Tuner Cleaner and other everyday Krylon aerosol products—Crystal Clear, Let-Go (oil penetrant), Red Insulating Varnish, Silicone Lubricant, Cleaner and Degreaser

If you prize it... KRYLON-ize it!®



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# FREE!

*From now through December 15, 1965*

## Get a Color-TV TEST Picture Tube with every RCA WR-64B Color Bar/Dot/Crosshatch Generator you buy

Yes! You read right!

From now through December 15, 1965—with every purchase of an RCA WR-64B Color Bar Generator—you get a FREE color-TV TEST picture tube for use in your color-TV test jig. This is a 21-inch 70° round color-TV TEST picture tube, electrically guaranteed six months from first installation date. These tubes will have minor mechanical (not electrical) defects... they're not quite good enough to go into a new TV set but perfectly adequate for testing purposes.

### How to get your FREE Color Test Tube

Simply buy an RCA WR-64B Color Bar Generator—*THE* essential color-TV test instrument—between now and December 15, 1965. Fill out your warranty registration card and attach the red identification label on the WR-64B carton. Send them to RCA, Test Equip-

ment Headquarters, Bldg. 17-2, Harrison, N.J. We send you the tube (either from Lancaster, Pa. or Marion, Ind.) freight charges collect. To allow for postal delay, we will honor cards received up until December 31st.

Don't miss out on this never-before offer. You've got to have a color-bar generator anyway—so be sure you buy it now—at the regular price—while you can get a FREE color test tube.

\$189.50\*

Optional distributor resale price; subject to change without notice. Price may be higher in Alaska, Hawaii and the West.

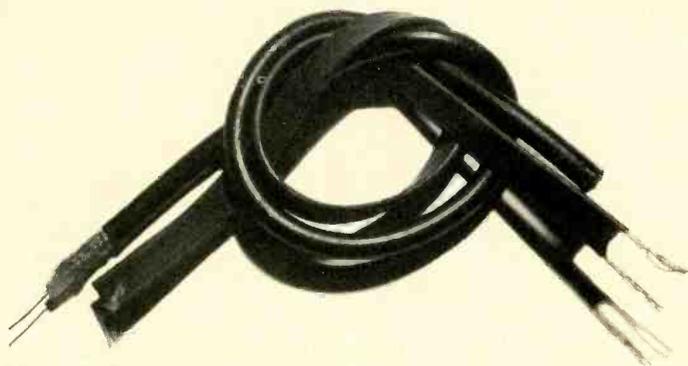


**RCA WR-64B Color Bar/Dot/Crosshatch Generator**

RCA ELECTRONIC COMPONENTS AND DEVICES, HARRISON, NEW JERSEY



**The Most Trusted Name In Electronics**



## Does the Coax Flat Lead-in Controversy Have You Tied in Knots?

■ We have all grown accustomed to a space-age world of rapid and continuous obsolescence. But every few decades, out of a clear sky, a "spectre" suddenly pounces upon us and upsets conventional forms of technological development — to say nothing of merchandising methods.

"After serving the TV-reception industry for almost two decades," one reader says, "300  $\Omega$  twin-lead (all kinds of 300  $\Omega$  twin-lead apparently, including open line) has suddenly become "inferior" and "unsuitable" for TV reception — particularly for color TV reception."

Another writes, "It has suddenly been discovered that 300  $\Omega$  twin-lead, which I have been using for 18 years, is no longer any good for TV reception — especially color.

I used coax cable before flat twin-lead, on DuMont, Crosley-DuMont and Pilot TV sets. Please let me know what new developments have taken place in coax which now makes it so superior to flat twin-lead."

Another long letter from a prominent antenna manufacturer opines, "After withstanding the test of time for two decades of television reception, 300  $\Omega$  twin-lead, the venerable standby for antenna installations, is now being attacked as unsuitable for color reception . . ."

Another asks, "What kind of a new "Barnum shell game" is this? Flat twin-lead (even the new and improved encapsulated type presumably) has suddenly, *ipso facto*, become obsoleted by coax. Not obsoleted, mind you by a newly developed product, but by an old friend that has been around as long — if not longer — than regular 300  $\Omega$  twin-lead." And so it goes.

But other antenna and lead-in manufacturers say that coax is the thing — especially for color reception — and they come up with some convincing information.

And back come some others who say that this is not exactly so — you have to specify and qualify the conditions under which each type of lead-in is used.

ELECTRONIC TECHNICIAN has observed this "knotty" question being kicked and fumbled and tossed around now since last spring. We are now doing private research on this subject and plan to give our readers the *whole* story in a forthcoming article — or series of articles. We are going to compare various lead-in types under both laboratory and practical-use conditions and when we are finished with our investigations we will report our findings.

In the meantime, don't get yourself tied in knots over the controversy. And use whatever lead-in that your experience dictates will give your customer the best and longest-lasting reception on color or monochrome. ■

# NOW

from ALLIANCE—the world's leading antenna rotator manufacturer . . .

# NEW

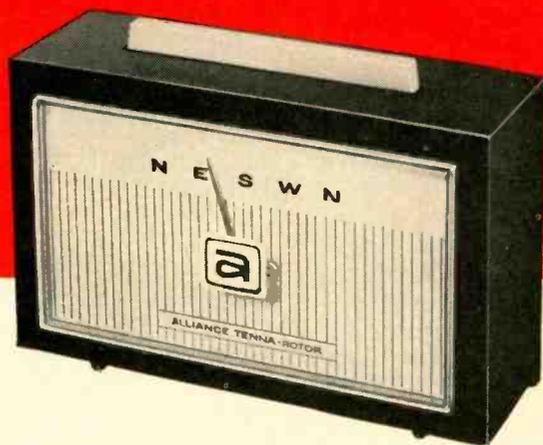
# T-45

## TENNA-ROTOR®

The new Alliance T-45 Tenna-Rotor® will meet the most exacting requirements of today's TV viewers. It has the same built-in quality that has won millions of satisfied customers for other Alliance products.

A new, patented five wire bridge circuit provides a precision system that's unaffected by motor current, cable length and line voltage variations. This improved electrical system, plus stable indication and expanded meter scale, assures positive antenna direction and readability through a stepless 360° cycle.

The T-45's motor is stronger — has more torque — to support, hold and turn the largest new antennas. Outstanding engineering — and smart styling — make the T-45 America's finest manually operated antenna rotator. Order the T-45 and other quality Tenna-Rotors® from Alliance — the world's leading manufacturer of antenna rotating devices.



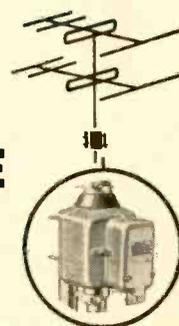
### "TV's better color getter"

For Complete Details write . . .

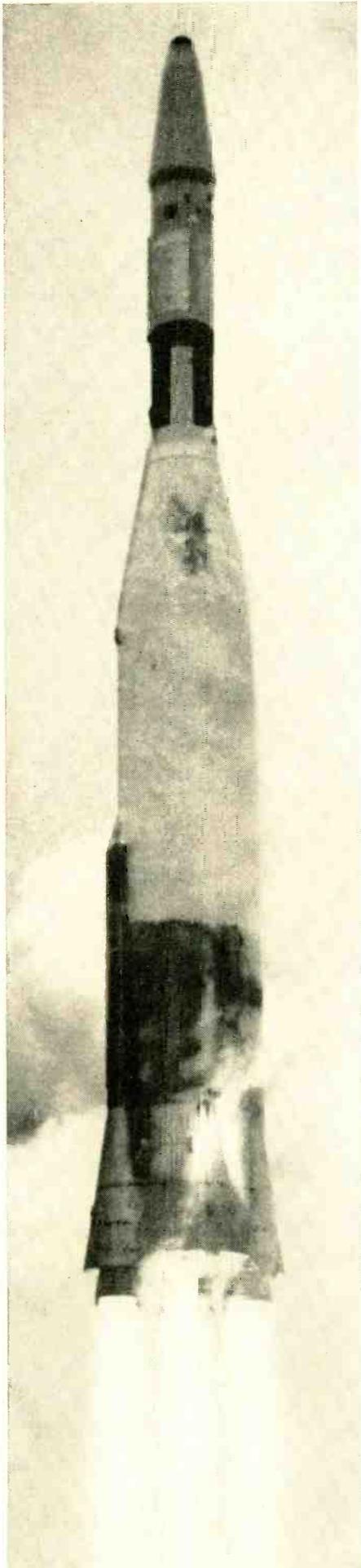


The  
**ALLIANCE**  
Manufacturing Co., Inc.  
Alliance, Ohio

(Subsidiary of Consolidated  
Electronics Industries Corp.)

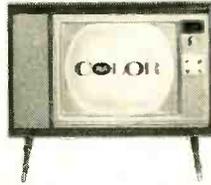


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ELECTRONIC TECHNICIAN

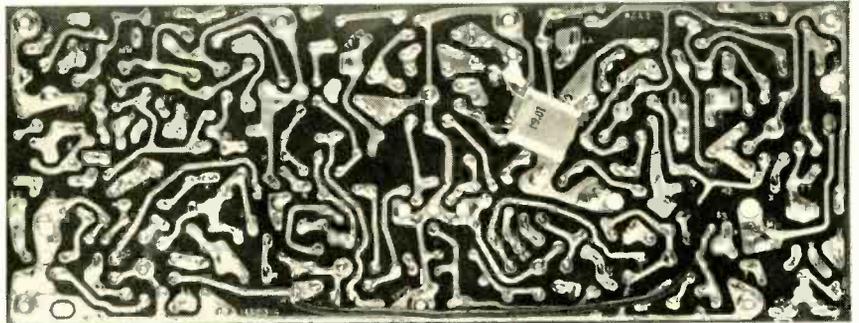


**America's most successful space programs have it.**

**RCA Victor Color TV has it.**



**The reliability of RCA circuitry. The solid kind.**



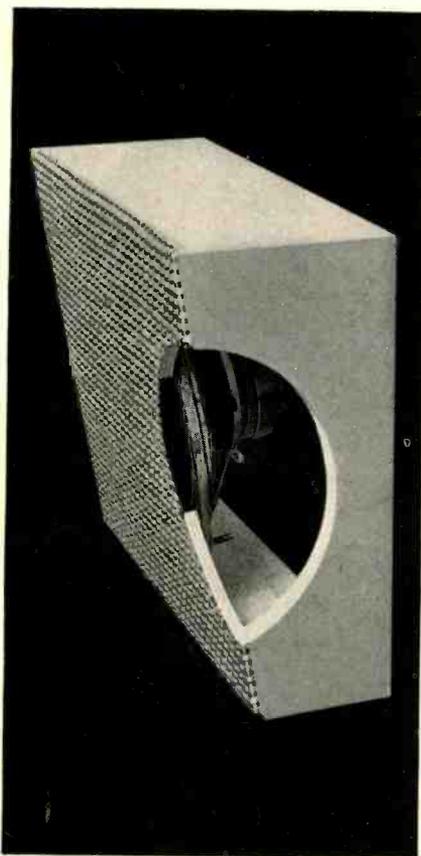
Solid Copper circuit, shown, from RCA Victor Color TV.

**RCA Solid Copper Circuits won't come loose. Won't short circuit. Won't go haywire. They're the latest advance over old-fashioned "hand wiring" and bring Space Age dependability to Color TV.**



The Most Trusted Name in Electronics

Tmk(s)®



**GET PLUS  
PERFORMANCE  
FROM  
OAKTRON  
SPEAKERS**

All Oaktron speakers feature the exclusive Aluminum Voice Coil. This tempered, all aluminum form eliminates warpage from humidity changes and from severe overload. The unique aluminum Voice Coil also provides increased sensitivity and longer speaker life.

A complete range of sizes and styles are available in Oaktron Baffles. Styled in smart furniture finish, Oaktron Baffles feature 1/2" hardwood, double strength interlocking corners, and solid glued and stapled grills.

For complete information, write today for your FREE Catalog.



OAKTRON INDUSTRIES, INC., MONROE, WIS.

... for more details circle 47 on postcard

## A Service-Dealer Marketing Program

The key to better money management and increased profits

### PART I

■ You're probably wondering how you could possibly use a marketing program. The fact is, most of you already have one but you don't call it marketing. You just consider it part of running a business. But it would be a good idea if you outlined and defined a total program to better fit a service-type business.

#### What Is Business?

For a variety of reasons, most businessmen have reserved the term "marketing" for a production type business. But it is high time that we all realize that any business, regardless of its nature, must have a set of clearly defined goals, and must have a sensible operating plan. To leave these factors to chance is to invite trouble.

Far too many businesses today are not business at all, in a true sense, but are simply refuges for men who would otherwise be completely without work. If this statement seems strong and cutting, it is meant to be. There is only one real justification for the existence of a business, and that is to make money.

Of course, we all know that business provides employment, produces a useful product or provides a necessary service, helps to distribute wealth, and is the basis of our economy. But business is first and foremost, a profit making institution. To forget or ignore this fact is, indeed, to invite trouble.

So now we know that a business must make money. This, I am sure,

is no great secret to you. While you may be conscious of this "law," it is entirely possible that you are not obeying it. Even though a business continues from one year to the next, and even shows a small profit, it may not be taking maximum profits. When you come right down to it, it is almost as bad to settle for a small or minimum profit as it is to settle for no profit at all. A businessman must do more than just show a net gain at the end of the year. He must continually strive for maximum gains. In short, he must seek to maximize profits in every conceivable way. This is where a marketing program comes in.

#### Marketing

Marketing can be considered the science of running a business. It includes every aspect of the business, and every person within the business. Because it is a science, marketing can take a lot of the guesswork out of running a business. It can provide management with different answers to many questions. And a marketing program doesn't cost a dime. It can be set up within the existing framework of a business and not disrupt anything. How, then, can such a program be adapted to a predominantly service business?

The answers to this question will depend largely upon the degree of confidence one has in marketing. If one is willing to try a few innovations and make a few changes, he can look forward to correspond-

## AGC PROBLEMS?

### SENCORE BE113 ALIGN-O-PAK DUAL TV BIAS SUPPLY

... a *MUST* for AGC trouble shooting; Quickly isolates the problem by direct substitution of TV AGC voltage with a variable bias supply. A *MUST* in B&W TV alignment, and *NOW*; a *MUST* for Chroma Bandpass amplifier alignment in color TV sets. The BE113 ALIGN-O-PAK provides all the voltages recommended by TV manufacturers with two non-interacting bias supplies of 0 to 20 volts DC at less than 1/10th of 1% ripple with calibration accuracy better than standard battery tolerances. Eliminate those messy time consuming batteries and get your BE113 from your distributor today.

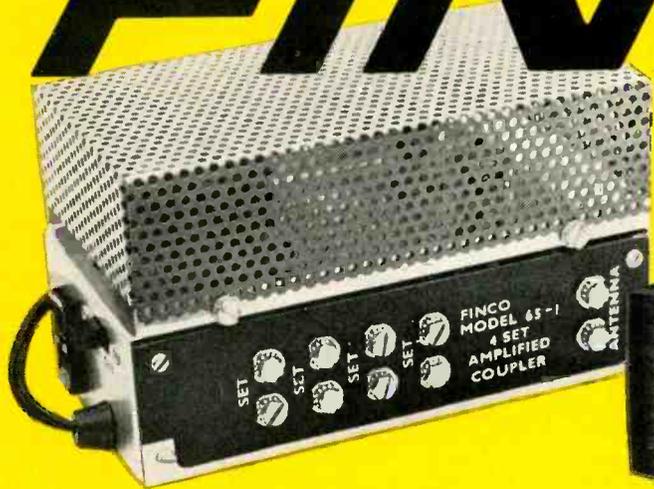


\$12.75

SENCORE 426 South Westgate Drive • Addison, Illinois 60101

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ELECTRONIC TECHNICIAN

# NEW from **FINCO**



## **BOOSTER-COUPLER**

Model No. 65-1 List \$29.95



## **UHF CONVERTERS**

Model U-Vert 300 List \$39.95

Model U-Vert 200 List \$26.90

Model U-Vert 100 List \$19.95

ALL FINCO PRODUCTS "COLOR"  
ARE ENGINEERED FOR

### **The BOOSTER-COUPLER**

*"for Deluxe Home and Commercial Use"*

Two tube, 4 set VHF-TV or (FM) Distribution Amplifier for home and small commercial distribution systems . . . with low loss splitters (FINCO #3001 or #3003) can feed 16 or more sets, depending on signal level and line length losses. FEATURES:

- On-Off Switch
- AC convenience receptacle
- Ventilated perforated steel cabinet 6 $\frac{5}{16}$ " x 3 $\frac{3}{16}$ " x 3 $\frac{3}{16}$ "
- Metal enclosed to eliminate shock hazard
- Easy access for tube servicing
- Convenient, easy mounting . . . bracket and screws supplied
- UL listed AC cord
- 117 Volts, 60 cycles
- Attractive appearance with rugged commercial construction
- No strip terminals
- Minimum "snow" (very low noise figure)
- 100% test for all electronic characteristics

### **The CONVERTERS**

*"That challenge all competition"*

#### **FEATURES:**

- Drift free fine tuning
- Post conversion signal amplification
- Solid state chassis — shockproof
- Convenient AC outlet on converter
- Exact input-output impedance match
- Lighted dial tuning
- Full color and black-white signal conversion
- High gain — low noise
- Conforms to FCC radiation specifications
- Easy installation — UL approved
- Instant warm-up — Operates at Channel 5 or 6
- A model for every reception area

*Write for beautiful color brochures — Numbers 20-338 and 20-377*

Atlanta  
Fort Worth  
Kansas City  
Chicago  
Cleveland  
Detroit

## **THE FINNEY COMPANY**

34 West Interstate Street Bedford, Ohio 44014 Dept. 110

New York  
Pittsburgh  
San Francisco  
Los Angeles  
Boston  
Albany

. . . for more details circle 28 on postcard

ing improvements in his business. Basically, what we want to do is to take some of the hit-and-miss techniques out of the service business and install more scientific and exacting methods. In a nutshell, a dealer marketing program should consist of:

- 1) Setting realistic goals for the business.
- 2) Establishing a budget and determining the *break-even point*.
- 3) Operational organization.
- 4) A "service-mix" analysis.
- 5) Cost and pricing analysis.

6) Re-evaluating the advertising and sales promotion role.

#### Set Realistic Goals

First off, we want to set realistic goals for the business. Essentially, what we want here is an outline of basic directions and accomplishments. This should be done in the short run, on a monthly and yearly basis, and in the long run, as a master plan for future growth and expansion in the years to come. Every businessman should have such a plan, and should stick to it

as closely as possible. Allowances must be made, of course, for innovations and variations in the industry and in the national and local economy, but the plan must be present, and it must be utilized.

#### Budgeting and The Break-even Point

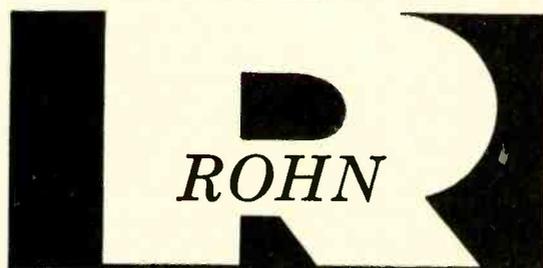
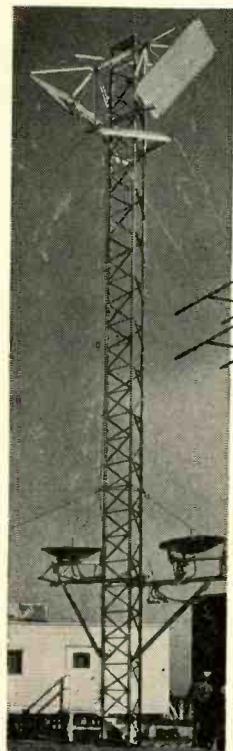
Once the ultimate goals of the business have been set down, the next task is to set up the framework for carrying out and pursuing these goals. This framework should more properly be called a budget, and it should be *written down*, not just mentally recorded. Such a budget should set forth a schedule of expected expenses, both operating and sales, as well as fixed expenses of labor, rent, trucks, insurance and taxes (assessments, water tax, real estate taxes, etc.).

Although such a budget may seem to be unnecessary in a service business, this is not the case. Any business must know what it expects to spend in a given period, so it will be able to gage its *break-even point*. This last factor applies to the point at which a business takes in enough revenue to cover its expenditures. Once this point has been reached, all additional moneys taken in can be properly considered profit.

In an effort to present the concept of budgeting in more concrete terms, Frank J. Moch, executive director of NATESA, the National Alliance of Television and Electronic Service Associations, was contacted. Mr. Moch was most cooperative, and presented some pertinent facts and figures regarding the service dealer. Here, then, is the essence of Mr. Moch's opinions:

In attempting to set up an operating budget for a TV-radio service-dealer, we are immediately confronted with the fact that there is no such thing as an "average operation." Variations are extremely wide, and include — service and sales of domestic electronics, service only, contract service, diversified service, diversified service and sales — audio communications etc. The cost, income, manpower, all vary greatly.

So to try to come up with a budget, we decided that in the absence of more specific facts, we confine ourselves to the following



*The most Famous Name in*  
**TOWERS of ALL KINDS!**

**Here are the advantages you get when you insist on ROHN TOWERS**

**LARGEST FULL RANGE OF TOWERS**—you can get anything from home TV and amateur radio towers to heavy-duty communication and micro-wave towers. Included are 500 foot self-supporting towers, 1,000 foot guyed towers, "fold-over" and crank-up towers. Regardless of your needs, ROHN can supply it.

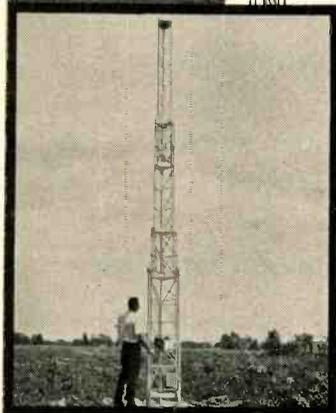
**UNQUESTIONED LEADERSHIP IN DESIGN AND MANUFACTURE**—you get the latest in advanced tower engineering. All communication towers are engineered to EIA specifications, and are proved by thousands of installations. No other manufacturer can surpass the quality and fine reputation of ROHN.

**QUALITY MATERIALS AND WORKMANSHIP**—Only highest quality steel is used which fully meets the specifications for the job. ROHN towers are hot-dipped galvanized *after fabrication*—a feature ROHN pioneered!

**SERVICE WHEREVER YOU WANT IT**—ROHN representatives are world-wide. Complete erection service for communication systems, broadcasting, micro-wave, and other needs is available; also competent engineering service to help you.

**Settle for the BEST in TOWERS**—ROHN—today the world's largest, exclusive manufacturer of towers of all kinds!

*For your needs, contact your local ROHN salesman, distributor or dealer; or write direct for information.*



SEND THE HANDY COUPON INDICATING YOUR NEEDS

**ROHN**  
Manufacturing  
Co.  
BOX 2000  
PEORIA, ILLINOIS

ROHN Manufacturing Co.

Box 2000

Peoria, Illinois

Send me complete literature on the following ROHN Products:

- |   |  |
|---|--|
| <input type="checkbox"/> Home TV Towers       | <input type="checkbox"/> Amateur Towers            |
| <input type="checkbox"/> Communication Towers | <input type="checkbox"/> AM-FM Broadcasting Towers |
| <input type="checkbox"/> Micro-Wave Towers    | <input type="checkbox"/> Government                |

Name \_\_\_\_\_

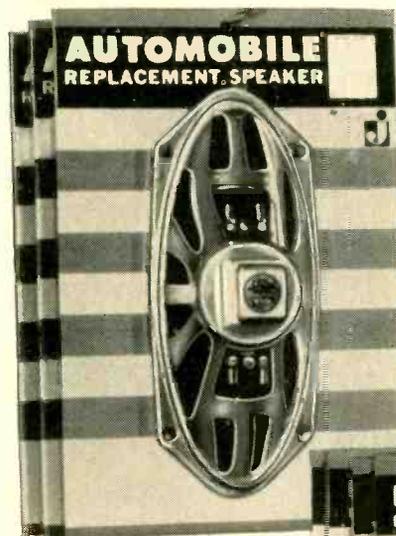
Firm \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

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# Jensen **VIKING** Replacement Loudspeakers



## Now in **SHOW PACK** Visual Packaging for Greater Impulse Sales Appeal

Nineteen of the most popular Jensen Viking replacement loudspeakers are now available in new SHOW PACK visual display packaging.

Extra sturdy cards and transparent plastic have been selected to keep your display of Jensen Viking loudspeakers dustproof. Famous Jensen Viking replacement loudspeakers in SHOW PACK visual packaging are perfect for display or off-the-shelf sales by electronic and automotive parts distributors and dealers . . . also simplifies inventories. SHOW PACK is adaptable to a variety of display mountings such as pegboard, wire racks, etc.

The line of nineteen replacement speakers includes the most commonly required speakers for automotive, radio, television and hi-fi replacement. Write for price list and further information.



JENSEN MANUFACTURING DIVISION / THE MUTER COMPANY / 6601 SOUTH LARAMIE AVENUE, CHICAGO, ILLINOIS 60638  
Canada: Radio Speakers of Canada, Ltd., Toronto • Argentina: Ucoa Radio, S.A., Buenos Aires • Mexico: Fapartel, S.A., Naucalpan, Mex.

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# it's here! most advanced color TV test instrument ever developed



- OBSOLETES ALL OTHERS
- ELIMINATES ALL GUESSWORK

## LECTROTECH V7\*

A sensational new color generator with 4 major Lectrotech exclusives . . . plus all of the time-proven standard features . . . in one compact, portable unit. For the first time, you can install and service color TV completely, accurately and faster! Here are the facts:

**EXCLUSIVE—COLOR VECTORSCOPE**—Until now, available only in \$1500 testers designed for broadcast. Accurately measures color demodulation to check R-Y and B-Y plus all 10 color bars for color phase angles and amplitude. A must for total color and those hard to get skin tones.

**EXCLUSIVE—SELF-CALIBRATING** — Adjust timing circuit without the use of external test equipment. No need to return unit to a factory for adjustment.

**EXCLUSIVE—DIAL-A-LINE** — Now, you can adjust horizontal line to any width desired from 1 to 4 lines wide.

**EXCLUSIVE—SOLID STATE RELIABILITY** — Only two tubes are used in combination with fully transistorized diode-rectifier circuit.

**PLUS—** the V7 produces all Crosshatch, Dots, Vertical only, Horizontal only and Keyed Rainbow Patterns. RF at channels 3, 4 or 5. Video Output (Pos. and Neg. adjustable) for signal injection trouble-shooting. Red-Blue-Green Gun Killer. All transistor and timer circuits are voltage regulated to operate under wide voltage ranges. Lightweight, compact — only 8¼" x 7½" x 12½". Net. . . . . **189.50**

ONE YEAR WARRANTY

For the full story on the V7, write for complete catalog or see your distributor.



**V6** Complete color bar generator with all the features of the Lectrotech V7 except the Vectorscope. Only **99.50**



Distributors: Phone or Wire Collect. Dept. ET-11  
**LECTROTECH, INC.**  
1737 Devon Ave. ■ Chicago, Ill. 60626 ■ Area 312 465-2622

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of a basic budget covering a simple basic service operation entailing 1½ men, operating 44 hours per week.

Mr. Moch was also good enough to provide a sample budget, which we present below for your own evaluation.

### SAMPLE MONTHLY BUDGET FOR SERVICE DEALER

<b>GROSS SALES</b>		
Parts & Accessories	\$1300.00	
Service Fees	1188.00	
<b>TOTAL</b>		\$2488.00
Cost of materials sold		650.00
<b>Gross Profit on Sales</b>		<b>\$1838.00</b>

<b>EXPENSES</b>		
Direct Labor Cost	\$1039.50	
Rent	100.00	
Supplies (expendable stationery, solder, etc.)	15.00	
Utilities (heat, light)	50.00	
Phone	35.00	
Vehicle Operating Expense	85.00	
Taxes, licenses, etc.	21.00	
Insurance	60.00	
Repairs & Maintenance	18.00	
Accounting, bank charges	26.00	
Depreciation	40.00	
Advertising & Promotion	80.00	
Miscellaneous	92.00	

**TOTAL** \$1661.50  
176.50

Net Income \$1838.00

Although it is possible for a business to continue and make money without a budget, it seems much wiser to spend the time necessary and be able to see just at what point a profit occurs. Why take a chance when, for just a little investment of time, you can be sure.

This point is especially clear when one wants to analyze why a business is *not* showing a profit. If the owner of such a business has a written budget, he can use this as a valuable tool in ascertaining the cause of his problem. A written budget, then, can be seen as an invaluable tool to the profit- and marketing-conscious service-dealer.

#### Operational Organization

The next step in a dealer marketing program should be the proper organization of everyday business activities. This includes the proper delegation of responsibilities, a simple and efficient routing scheme, a schedule of the work for the day, and a simple system of recording and categorizing customer calls.

Work should be laid out in such a way as to facilitate little or no overlap. Two men working on the same chassis is a drain on your labor price. Only one of those men is being productive. By all means, there should be consultation on sticky problems, but this should only be advisory. If a man is stuck on a set, it would be better for him to turn it over to another technician and go on to some other job.

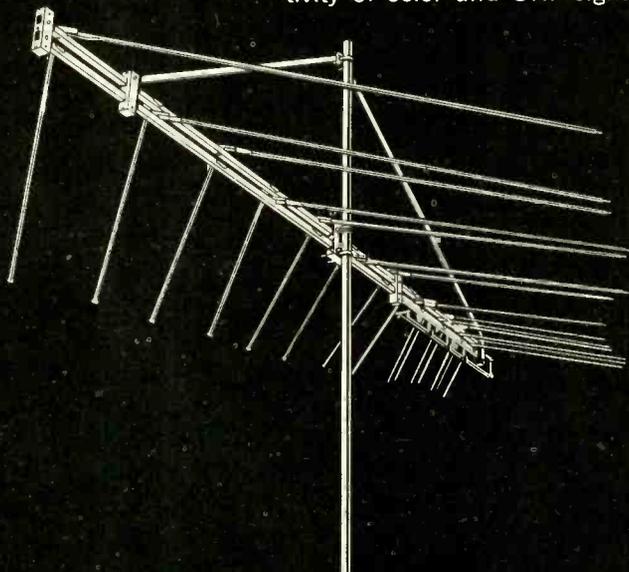
If two men spend half an hour each on two dif-



The quality goes in before the name goes on

## FOR THE FINEST COLOR AND UHF RECEPTION INSTALL ZENITH QUALITY ANTENNAS

... to assure finer performance in difficult reception areas!  
More color TV sets and new UHF stations mean new antenna installation jobs for you. Proper installation with antennas of Zenith quality is most important because of the sensitivity of color and UHF signals.



### ZENITH ALL-CHANNEL VHF/UHF/FM AND FM-STEREO LOG-PERIODIC ANTENNAS

The unusually broad bandwidth of the new Zenith VHF/UHF/FM and FM-Stereo log-periodic resonant V-dipole arrays pulls in all frequencies from 50 to 900 mc—television channels 2 to 83 plus FM radio. The multi-mode operation provides high gain and good rejection of ghosts.

These frequency independent antennas, developed by the research laboratories at the University of Illinois, are designed according to a geometrically derived logarithmic-periodic formula used in satellite telemetry.



### ZENITH QUALITY HEAVY-DUTY ANTENNA ROTORS

Zenith quality antenna rotors are heavy-duty throughout—with rugged motor and die-cast aluminum housing. Turns a 150-lb. antenna 360 degrees in 45 seconds. The weather-proof bell casting protects the unit from the elements. Each rotor mounts easily to either a mast or tower without an adapter.



### ZENITH QUALITY WIRE AND CABLE

Zenith features a full line of quality packaged wire and cable. Also especially designed UHF transmission wires, sold only by Zenith. Zenith wire and cable is engineered for greater reception and longer life, and is available in various lengths to suit every serviceman's needs.

Check the Yellow Pages for the Zenith Distributor nearest you.  
Or write to Zenith Sales Corporation, Parts and Accessories Division,  
5801 West Dickens Avenue, Chicago, Illinois 60639,  
for Distributor name plus complete catalogue and technical  
information on Zenith Quality antenna installations.

Specifications subject to change without notice.

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ferent sets, you get a total of one hour's worth of productivity. You, as a businessman, should be able to take it from here. Basically, what we are striving for is maximum daily efficiency. This has to lead, ultimately, to maximum daily productivity.

### Service Mix Analysis

Once the business is functioning efficiently on a daily basis, it is ready for the next phase of the marketing plan. This can be called "Service Mix Analysis," a term derived from the manufacturer's

"product mix analysis."

Basically, what we want to do is find out what aspects of the business yield the greatest margin of profit for the same investment. Return on investment incidentally, is the only accurate reflection of a business' profitability. Measuring profit simply by gross volume less expenses does not really indicate anything. Certainly, it looks good, but it fails to account for the growth of the businessman's capital investment. We are presently discussing service mix, however, and to this extent, several things must be kept

in mind. First, there are areas in any business that bring in a greater share of profit. This is so because we can simply do certain fixed dollar jobs at a lower cost.

If we charge the same for two jobs, but can buy the parts for one cheaper, we can make more money. (This assumes the same amount of time to do both jobs. Conversely, if the cost of parts for two jobs is the same, and we can charge the same for both, but can do one of the jobs in less time, then we can make money in terms of time invested.

Let's look at this in terms of dollars and cents. First, let's assume we have two jobs that will take the same amount of time to do, and that we can charge the same amount for each.

Example #1—Bench job—	
1 hour—\$25	
Parts \$10 (your cost) Profit	\$5
on Parts	
Labor (1 hr.) 8 Labor Cost	2
Miscellaneous (tune up and	
cleaning, etc.)	2
<b>Costs</b>	
\$10—Parts	
2—Labor	
2—Misc.	

\$14

Customer Pays \$25

Your gross profit \$11 (before operating expenses).

Example #2—Antenna Installation—1 hour—\$25

Parts—Your Cost	
Antenna	\$3.50
Mast	1.00
Mount	1.50
Lead	1.50
Misc. Hdwe.	.50
Labor	2.00

\$10.00

You charge customer \$25

Your gross profit \$15 (before operating expenses).

As you can readily see, example #2 represents \$4 in additional profit for the same investment of time. This being the case, the marketing oriented dealer will immediately see which job is more profitable, and will seek to do more of these jobs.

This, of course, deals with an ideal situation. If we could do only the most profitable jobs, we would have nothing to worry about. Such is not the service dealer's lot, how-

*Continued on page 104*



## JEWELRY for your best gal— STUNNING PINS

from  
**Perma-Power**

you get them **FREE** with either  
of these **BRITENER PACKS**

Whether it's a special occasion or an unexpected surprise—the gals all love to receive jewelry. Give your best gal one of these unusual Gold-Fashioned pins (they'd cost as much as \$4.95 in an exclusive shop). Watch her face brighten up!

Brightening up is a Perma-Power specialty, although it's usually directed at faded picture tubes. Vu-Brite and Tu-Brite boost picture tube brightness, and boost your popularity with your customer. Always keep both kinds on hand!



The pin is free (many unusual designs)—when you buy 12 Vu-Brites, Series or Parallel, at the special \$9.95 price.



You also get one of these "Gold-Fashioned" beauties with a pack of 4 Tu-Brites. If the base is right, the boost is right. Only \$8.95.

SEE YOUR DISTRIBUTOR NOW FOR BOTH THESE SPECIALS.

**PERMA-POWER COMPANY**

5740 North Tripp Avenue, Chicago, Ill. 60646  
Phone (312) 539-7171

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# Use this check list before you install a home TV distribution system

	COAXIAL VHF	TWINLEAD* VHF	COAXIAL UHF/VHF	TWINLEAD* UHF/VHF AND UHF ONLY
Channels received	2-13	2-13	2-83	2-83 (14-83 for UHF only)
Color reception when properly installed	Excellent	Excellent	Excellent	Excellent
Cable loss: @ channel 13 for VHF only @ channel 83 for UHF/VHF	4 db (foam filled) 6 db (solid)	1.8 db/100 ft. @ Channel 13	9 db (foam filled) 13 db (solid)	5.6 db/100 ft. @ Channel 83
Loss increase when wet	Nil	Negligible	Nil	Negligible
Reception when run near or through small metal areas	Excellent	Excellent when properly installed	Excellent	Excellent when properly installed
Reception when run near or through considerable amounts of metal	Excellent	Not recommended	Excellent	Not recommended
Ease of installation	More difficult	Easy	More difficult	Easy
Extra parts required	Connectors, matching transformers	None	Connectors, matching transformers	None
Performance in strong-signal areas	Excellent	Excellent—fair**	Excellent	Excellent—fair**
Performance in weak-signal areas	Excellent	Excellent	Excellent	Excellent
Cable pickup of interference (ignition, appliances, etc.)	None***	None—slight**	None***	None—slight**

\*A high quality, low-loss foam encapsulated cable type \*\*Depends upon local conditions \*\*\*Poorly designed accessories will pickup interference.

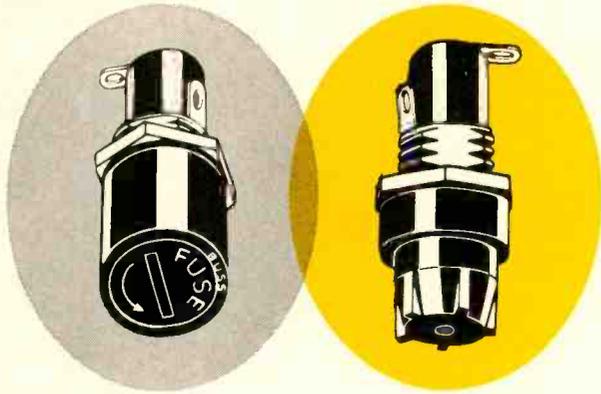
Once you know the facts—there is one best choice for your home system—Blonder-Tongue. Whether you prefer 300 ohm or a 75 ohm coax system, Blonder-Tongue has the products you'll need. There is only one way you can protect your home TV system against obsolescence when new UHF stations come on the air—that's with a Blonder-Tongue all-channel UHF/VHF system.

Blonder-Tongue products designed for all-channel home systems include: All-channel signal amplifiers (V/U-All-2 indoor and U/Vamp-2 mast mounted); all-channel couplers (A-102-U/V two-set and A-104-UV four-set). Rounding out the all-channel concept are UHF/VHF matching transformers (Cablematch U/V set mounted; MT-283 mast-mounted) and the TF-331-U/V flush-mounted feed-thru.

Take your pick. Blonder-Tongue makes them all—and all are "Color Approved". Buy the line with 15 years of quality leadership. Write for free booklet "How to Plan a Color-Approved Home TV System".

 **BLONDER-TONGUE**  
9 Alling Street, Newark, New Jersey 07102  
home TV accessories • closed circuit TV •  
community TV • UHF converters • master TV

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Screw type slotted knob that is recessed in holder body and requires use of screwdriver to remove or insert it.

Screw type knob designed for easy gripping, even with gloves. Has a "break-away" test prod hole in knob.

## BUSS Space Saver Panel Mounted Fuseholders

Fuseholder only  $1\frac{1}{8}$  inches long, extends just  $\frac{2}{32}$  inch behind front of panel. Takes  $\frac{1}{4} \times 1\frac{1}{4}$  inch fuses. Holder rated at 15 ampere for any voltage up to 250.

Military type available to meet all requirements of MIL-F-19207A.

Insist On  
**BUSS**

**QUALITY**  
Fuseholders

Write for  
BUSS  
Bulletin SFH-10

BUSSMANN MFG. DIVISION, McGraw-Edison Co., St. Louis, Mo. 63107

## BUSS: The Complete Line of Fuses and . . .

### NEWS OF THE INDUSTRY

#### Bogen Appoints Sales Reps

Two sales representatives have been named by the Bogen Communications Div. of Lear Siegler, Inc. Ron Bowen & Associates of Denver will handle Bogen public address, Hi Fi, and engineered sound (audio) systems in Colorado, Utah, Wyoming, eastern Montana, southeastern Idaho and western Nebraska. C. T. Carlberg & Associates of Albuquerque will represent Bogen's line of products in New Mexico and western Texas.

#### EV/Calrad Settle Suit

A patent infringement action brought by Electro-Voice, Inc. is terminated by an agreement with California Radio and Electronics Co. (Cal-Rad). The terms of the agreement state that Cal-Rad will not: "manufacture, sell, import, offer for sale, or trade in microphones known as the 'Cal-Rad DM-17' or microphones having the appearance of the said 'Cal-Rad DM-17,' or a near resemblance thereto." The same statement applies to "loudspeakers known as the 'Cal-Rad CR-12A,' or a near resemblance thereto." Electro-Voice claimed that these products infringed on its own microphones and loudspeakers covered by U.S. Patent numbers DES-183,114; DES-173-608; and DES-186,670.

#### RCA Stock Widely Held

The RCA's family of common shareowners has soared 70 percent over the past 18 months, placing the company among the top 10 most widely held corporations. The manufacturer had nearly 271,000 common shareowners as of June 30, 1965, up 111,084 from the 159,864 on record as of January 1, 1964, just prior to the three-for-one split of the common stock. The 270,948 stockholders of record June 30, 1965, owned a total of 58,093,998 shares valued at \$1,975,000,000.

#### Microwave System

A solid-state 2KMc microwave system developed by ITT Telecommunications Div., has been granted FCC type acceptance for the common carrier band. This system, which has found wide acceptance by oil and pipeline industries for control and message functions between various inland and offshore facilities, is now available and approved for licensing by common carriers.

#### G-E Transfers Portable Operation

General Electric announces the transfer of its personal portable television operation to Portsmouth, Va., to free manufacturing space and manpower in Syracuse for the company's rapidly expanding color television business. W. E. Davidson, general manager of G-E's TV receiver department, said the company had purchased an existing facility which includes a 200,000 sq ft building and accompanying acreage.

### BUSS SHIELDED FUSEHOLDERS



**PREVENT  
RADIO  
FREQUENCY  
INTERFERENCE**

For use where fuse and fuseholder could pick up radio frequency radiation which interferes with circuit containing fuseholder—or other nearby circuits.

Fuseholder accomplishes both shielding and grounding.

Available to take two sizes of fuses— $\frac{1}{4} \times 1\frac{1}{4}$ " and  $\frac{1}{4} \times 1$ " fuses.

Meet all requirements of both MIL-I-6181D and MIL-F-19207A.

Insist On  
**BUSS**  
**QUALITY**  
Fuseholders

For complete information  
write for  
BUSS Bulletin SFH-12

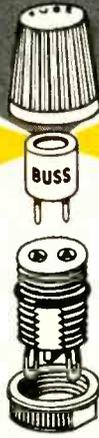
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ELECTRONIC TECHNICIAN

VISUAL INDICATING FUSES

FUSE ONLY  
.270 x .250  
INCHES



GMW FUSE  
and HWA  
FUSEHOLDER

## BUSS SUB-MINIATURE FUSEHOLDER COMBINATION

For space-tight applications. Fuse has window for inspection of element. Fuse may be used with or without holder.

Fuse held tight in holder by beryllium copper contacts assuring low resistance.

Holder can be used with or without knob. Knob makes holder water-proof from front of panel.

Military type fuse FM01 meets all requirements of MIL-F-23419. Military type holder FHN42W meets all military requirements of MIL-F-19207A.

Insist On  
**BUSS**

**QUALITY**  
Fuses and Fuseholders

Write for  
BUSS  
Bulletin SFB

BUSSMANN MFG. DIVISION, McGraw-Edison Co., St. Louis, Mo. 63107

### Stromberg-Carlson Enters CATV

Stromberg-Carlson Corp., announces entry into the community antenna TV (CATV) field in association with Entron, Inc. Under terms of the association, Stromberg-Carlson, using some Entron-developed equipment, will finance, engineer, furnish and install complete CATV systems for telephone operating companies. The CATV systems are designed to improve and increase TV reception in areas where terrain or other interference hinders TV quality and limits the number of channels available. William A. Rockwood, vice president of Stromberg-Carlson's telecommunications group and Robert J. McGeehan, Entron president, said in a joint announcement that many independent telephone companies are looking to CATV as a way to provide new communications for their areas and to improve TV reception.

### TI and G-E Announce Patent Agreement

Texas Instruments and General Electric have entered into an agreement for the exchange of patent licenses in the field of semiconductors, including integrated circuits. Under the agreement, the pending patent suit between GE and TI in the U.S. District Court for the District of Delaware will be dismissed.

### LTV University Changes Name

LTV University announces a change in its name to University Sound. The company was founded as University Loudspeakers 30 years ago. The name was changed to LTV University in 1959 when the company became one of 22 divisions of Ling-Temco-Vought, Inc.

## Fuseholders of Unquestioned High Quality

### NEWS OF THE INDUSTRY

#### Mono CRT, Receiving Tube Sales Rise

Unit sales of mono TV CRT's totaled 743,335 in June, an increase of 10.4 percent over the June 1964 figure of 673,283. The dollar increase was 3.1 percent, to \$12,191,776 from \$11,822,997. The June unit increase was 14.8 percent over 647,574 for May 1965 and dollar value was up 13.0 percent from \$10,789,935. Unit figures for mono TV tubes for the first half of 1965 totaled 4,334,447, down 6.6 percent from 4,640,774 units for the corresponding period of 1964. Dollar figures for the 1965 first half were down 12.1 percent, to \$72,523,093 from \$82,538,954. Unit sales of receiving tubes totaled 31,842,000 in June, an increase of 11.1 percent from 28,673,000 in June 1964 and a rise of 8.1 percent from 29,464,000 in the previous month of May 1965. Figures for the first six months of 1965 showed an increase of 6.2 percent to 188,049,000 units from 177,070,000 in the January-June period of 1964.

#### Philco Appoints Distributor

Philco Corp. announces the appointment of the Woodlawn Distributing Co. as distributor for its full line of appliance and consumer electronic products in the Louisville, Ky., and Nashville, Tenn., areas.

# BUSS QUALITY

small  
dimension  
fuses



#### For protection of all types of electronic and electric devices

The complete line of BUSS and "TRON Family" fuses includes quick-acting, slow-blowing, signal or visual indicating fuses in sizes from 1/500 amperes up.

All standard items are easily obtained through your BUSS distributor, but if you don't find what you want get in touch with us.

Insist On  
**BUSS**  
**QUALITY**  
Fuses

Write for  
BUSS  
Bulletin SFB

BUSSMANN MFG. DIVISION, McGraw-Edison Co., St. Louis, Mo. 63107

... for more details circle 18 on postcard

# PEARCE-SIMPSON PUTS YOU WHERE THE PROFITS ARE!

**NEW**



**IBC 301**

**TWO-WAY BUSINESS BAND RADIO with remote head\***

Close competitive volume sales to truck and auto fleets with the low-price IBC 301. Exclusive remote head and low power drain permits installation in any type of vehicle. Pearce-Simpson backs you with a lead-producing advertising and promotion program!

12 Volt Model **\$329.90**

\*Can be dash mounted as a complete radio or the removable remote head can be installed independently with its own mounting cradle. Remote head weighs less than 2½ pounds — small enough to fit in your hand • Solid state power supply and receiver for low power drain and greater efficiency • Illuminated operating indicators • Adjustable squelch, noise limiter • Universal mounting bracket — slide-rail • Optional AC power supply

**NEW**



**SENTRY**

**CB TWO-WAY RADIO**

6 CHANNELS — Specially designed for the new H.E.L.P. program. Features exclusive Pearce-Simpson hybrid circuitry with all transistor power supply and receiver for low current drain.

**\$99.90** with FULL dealer mark-up!

- Car keys on unit illustrates extremely compact size • Uses less current than a dash-board clock. Will operate even when battery is so low it will not turn over the engine
- High level 100% modulation — all transistor modulator • Superhet receiver • Superior squelch and automatic noise limiting circuitry
- Provision for additional H.E.L.P. channels

Pearce-Simpson all SOLID STATE CB models



**DIRECTOR**  
23 channels  
(all crystals included)  
**\$299.90**



**ESCORT II**  
11 channels  
**\$239.90**



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# NEWS OF THE INDUSTRY

## Nine TV Technicians Awarded RCA Grand Prizes

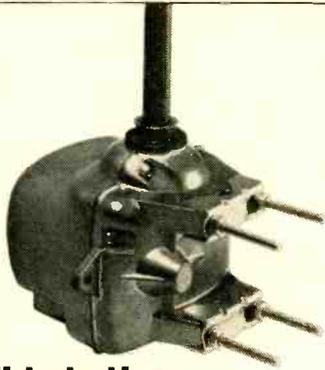
Nine TV technicians have been awarded 1965 Chevy-Van trucks loaded with RCA products as grand prize winners in a regional sweepstakes contest. In addition to the service truck, the following products were part of the grand prize in the nationwide contest sponsored by the manufacturer: A pair of new mark nine CB radios; a tube caddy filled with popular receiving tube types; a "Colorama" and two "Silverama" TV picture tubes; a counter merchandiser stocked with batteries; two complete kits of "SK" replacement transistors; five test instruments for color TV servicing. The following grand prize winners were announced by H. F. Bersche, division vice president, the distributor products division: central district: Salvany J. Bonadona, 155 Mildred Lane, Chicago Heights, Ill., a technician for Illinois TV and Appliances; Mideastern district: Garabed Terzian, 4301 Chestnut St., Philadelphia, Pa., a technician and owner of Master TV and Radio Service; Western District: Frank B. Garcia, 1543 166th Ave., San Leandro, Calif., a technician for his own business called Garcia Radio and Television Repair; Southeastern District: Aaron C. Edmundson, 206 North Grandelle St., Edenton, N.C., manager of the Western Gas Service Co.; Southwestern District: Tommy L. Shell, 2103 West 32nd St., Pine Bluff, Arkansas, a partner in James E. Shell Radio TV Service; Eastern District: Joseph A. Miro, 185 Bronx River Rd., Yonkers, N.Y., owner of Yonkers Audio Service; Northeastern District: Daniel J. Murphy, 8 Federal St., Nantucket, Mass., owner of Radio & TV Sales Service; West Central District: Anthony Larotonda, 6585 Winona Court, Denver, Colo., owner of Larotonda Radio and TV Repair Shop; East Central District: John R. Agner, 1010 East Second St., Ottawa, Ohio, a technician for Meyers Electric Co. in Leipsic, Ohio.

## June Television Production

Total TV production in June reached 945,658, a gain of 13.2 percent over 835,510 for the previous June and a gain of 25.9 percent over the 751,100 sets produced in the previous month. January-June production totaled 5,045,427, up 12.3 percent from 4,492,801 units during the 1964 period. Of total TV production, monochrome TV reached 714,405 units in June, up 0.4 percent from the June 1964 total of 711,785 and up 22.9 percent from the 581,438 figure for May 1965. January-June production of mono TV sets totaled 3,962,334, a rise of 1.8 percent over 3,893,456 in the 1964 period. Of the total TV production, color TV reached 231,253 in June, 86.9 percent above the June 1964 figure of 123,725 and 36.3 percent above the 169,662 units for May 1965. January-June color production totaled 1,083,093, a rise of 80.7 percent from the comparable 1964 figure of 599,345.

## IRC Appoints

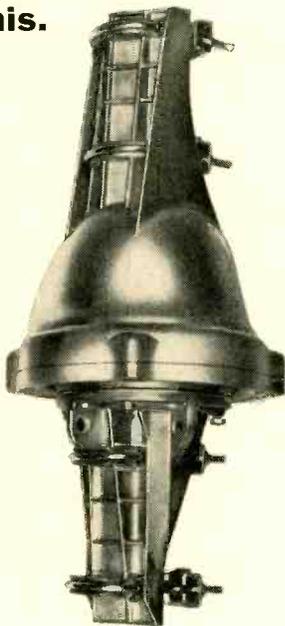
International Resistance Co. has appointed Joseph P. Coughlin Director of Marketing, a new post. Mr. Coughlin has been with General Electric Co. for 24 years, becoming Manager, Western Region in 1960.



**This is the antenna rotor for people who'll settle for second best.**

It's our 10 series. Specifically designed for metropolitan and suburban areas, it does everything our best rotor does. Of course, it's not the heavy-duty unit the CDE Bell Rotor is. Nor will it take the larger size antenna rigs the Bell Rotor will. It's not designed that way. Still, it's heavier-duty and more dependable than the third or fourth best. And the 10 series is priced below them. It's the second best rotor you'll ever install.

**If they won't settle, sell them this.**



For your information: A new 8 page booklet all about all of the CDE Rotor systems. It's free. Send for it.

**CDE CORNELL-DUBILIER**

50 Avenue "L", Newark, N. J.

**MATV System At Sheraton Motor Inn**

■ Guests at the new Sheraton Motor Inn in Huntsville, Alabama can now observe channels 19 and 31 from Huntsville, plus channels 23 from Decatur — which are converted to VHF channels 2, 5 and 4 respectively. This is possible on a master antenna TV distribution system made by Blonder-Tongue Labs.

The multi-million dollar hotel, located on a ten-acre site, consists of a large commercial building incorporating a "sidewalk" cafe, a dining room, private club, lounge and a meeting room complex.

The complex, which is able to accommodate up to five simultaneous activities, and four guest-room buildings with a total of 210 units, was opened to the public last February.

According to the Hotel's manager, Marion B. Melton, the master antenna TV set-up enables the guests to enjoy the conveniences available to them with the new system. People staying at the hotel "are particularly satisfied with our audio master system," Mr. Melton commented. He noted that the system enables his guests to listen to three channels of FM radio and one of background music in addition to the TV channels. The system also provides a maid call service.

The MATV installation, built into the hotel at the time of construction, also contains a number of different sound systems. The public address system for the housekeeper incorporates dual amplifiers so music and paging can be selectively programed to various areas.

"There is also a sound system for our maitre'd," said Mr. Melton, "which enables him to page or be paged in the dining room, the lounge, kitchen and service areas."

Another facet of the MATV system's separate sound channels is located in the meeting room complex. Here microphones and speaker switching systems are employed in this area in addition to remote control of mikes and music fading, and provision for feeding the systems program material from external sources."

The system was designed and installed by Signal Distributors, Inc., of Birmingham, a franchised Blonder-Tongue distributor. ■

**University reduces everything but the sound!**



**REVOLUTIONARY NEW UNIVERSITY SHORT HORN & ID-75 DRIVER —75-WATT SYSTEM, ONLY 10" DEEP!**

It's happened to you. Half-way through a new installation, you're in trouble. Client wants plenty of power, but space is tight. Here's the solution—the ultra-compact, super-efficient, Model SH Short Horn. Use it with the new ID-75 driver—or with any University driver. It will provide maximum power conversion and clean, intelligible, High 'A' (high audibility) sound, comparable only to costlier and larger systems! And, with the ID-75 driver you'll overcome the toughest ambient noise problem! So efficient, it makes any amplifier more powerful.

So rugged, you can use it anywhere—in P.A. installations and special applications such as fire and police vehicles or ship-board use as a fog horn. Whatever the need, look to University to fill it. And remember, University's exclusive five-year warranty is your guarantee of unexcelled performance and reliability!

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**UNIVERSITY SOUND**  
A DIVISION OF LTV LINE ALTEC, INC.

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# How's Your Health?

## by An 'Old Timer'

■ If you think the title of this article is provocative and you are wondering what it's doing in a TV-radio technician's magazine, just think of this fact: You could have every desirable test instrument made, from a simple voltmeter to the most expensive scope or color bar generator, but without *you* being there in the shop to operate the instruments or interpret the results of the readings or displays, the instruments might just as well not exist.

Even a health or accident insurance policy won't insure you against the lost business or customers who will go elsewhere while you are laid up at home or in the hospital after sickness or an accident, and who may never come back to you for service when you are on your feet again trying to make up for lost time and lost income.

An accident need not be a calamity — like having a broken arm or leg — to interfere with your business and ability to earn enough for you and your family day after day and year after year. Some things begin insidiously and get worse with time because we disregard the symptoms and what we are doing detrimental to our health.

Let's take a simple example: You are sitting on a chair in front of your typewriter, perhaps making out a bill, when a customer comes in the shop door. You turn slightly in your chair, move one foot out to the side a bit and start to stand up even before the other foot has left its original position. If so, you better start your own health maintenance program right there before you get up a little too soon some day and get a very painful twist in your knee you won't soon forget. Try it *very* slowly and see for yourself just what we are talking about. Then do it the right way — when you want to get up off your seat, first turn from the desk and plant both

feet in the direction you plan to face *before* you get up — then stand up. If you drop your hands on your knees before you rise, you'll find you can't help but do it safely.

Another thing: When you are working at the bench you're standing up a good portion of the time. If so, what kind of floor are you standing on, terrazo, wood, asphalt or cork tile? The first two are hardest on your feet since no cushioning is provided when you walk on them — or even stand on them.

Buy yourself a cheap piece of carpeting and lay it down in front of your bench, and while you are about it, you may as well get another strip for the floor behind the counter — the part you stand on when you are out front waiting on a customer. It may even help your disposition! A carpet or rug is helpful on any surface and in addition will tend to hold small screws or parts near the area where they fall off the bench.

But don't get the kind of carpet or rug which slips on the floor and creates its own hazard! Remnants can be purchased so cheaply they can be thrown away when they get too dirty or you can borrow your wife's vacuum cleaner and make the carpet or rug presentable once more.

How about your eyes? Do you have them checked every couple of years or do you wait until months have gone by since you began noticing that things look a bit blurred. If you wear glasses now, how long has it been since you've had them changed and do you find yourself cleaning them more often on the assumption that the reason for poor vision is dirty lenses? Don't forget: As we grow older our eyes don't accommodate as well or as quickly to change of distance and that small objects or printing must be held farther away — so far, in fact, that they are too small for proper definition. ■

# Nurse Call System

■ A transistorized "Audio-Visory" nurse call system is said to provide effective and instantaneous communications for hospitals. The patient stations are also completely solid state. No relays are used and equipment is expected to be practically maintenance free, according to the announcement.

The nurse master station provides instant visual indication of the calling room and classifies the call according to urgency.

The nurse on duty can see which room is calling and through voice communications, determine what the specific need of the calling patient is. In case of an emergency call, a continuous buzzer is triggered that can only be turned off at the calling station. For routine calls, the buzzer, which sounds every five seconds, is automatically silenced after the nurse has spoken with the patient.

The nurse master station is encased in a heavy duty metal housing having a sloping front, which allows easy viewing of the annunciation lamps and places the entire panel in a more comfortable operating position.

Another feature of the system is "status tab" programing which offers the nurse two alternative colors to indicate a priority patient, such as a reminder for patient service, or an indication of special care feeding. If the patient is a priority case, a yellow tab, permanently mounted on the face of the cabinet, may be located over the room number. A blue tab, indicating a patient reminder, may be used in the same way. A third status can be obtained by combining both the yellow and blue tabs to obtain green.

The unit also features one hand operation. The operator simply activates the switch corresponding to the calling room to put her in communication with the patient, and then uses either a talk bar or an option handset to speak and listen to the patient.

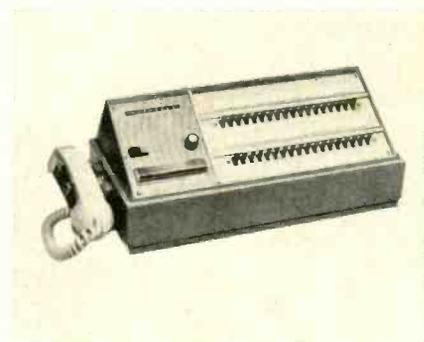
The unit is also capable of group monitoring, and has a built-in transistorized audio amplifier.

The patient station is capable of

being used with either a push button call cord or a program speaker, which provides both control and audio of a television set or a wired radio system. Pressing the call cord button, or the NURSE switch on the program speaker, registers the call at the nurse master station. The patient talks and listens to the nurse through a wall mounted speaker/microphone. The speaker/microphone unit is protected by directional louvers which allow conversation without turning toward the unit or operating any switches.

A safety disconnect socket connects either program speaker or call cord to the wall station. An excessive pull from any angle separates the connectors and registers a call on the system, assuring attention in case of accidents.

The patient listens to television or radio through the personal pro-



Motorola's transistorized nurse call system.

gram speaker, allowing him to enjoy entertainment without disturbing other patients. He can choose either television or radio, change TV channels, and control volume from his bed.

Staff and duty stations are also available with the "Audio-Visory" system for use in treatment, work and operating rooms. They provide hands-free communications to the nurse master station. The equipment is manufactured by Motorola's communications division. ■

## NOW! Solve Electronics Problems fast with New Patented Slide Rule.



That's right! This amazing new Electronics Slide Rule will save you time the very first day you use it. It's a patented, all-metal 10" rule that features special scales for solving reactance, resonance, inductance and circuitry problems . . . an exclusive "fast-finder" decimal point locator . . . widely-used formulas and conversion factors for instant reference. And there's all the standard scales you need to do multiplication, division, square roots, logs, etc.

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of four **AUTO-PROGRAMMED** lessons. You'll quickly learn how to whip through tough problems in a jiffy while others plod along the old-fashioned "pad and pencil" way.

Electronics Slide Rule, Instruction Course, and handsome, top-grain leather carrying case . . . a \$50 value for less than \$20. Send coupon for FREE illustrated booklet describing this Electronics Slide Rule and Instruction Course and FREE Pocket Electronics Data Guide. Cleveland Institute of Electronics, 1776 E. 17th St., Dept. ET-106 Cleveland, Ohio 44114.

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**A leader in Electronics Training... since 1934**

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## MARKETING PROGRAM

*Continued from page 96*

ever. You have to do all of the jobs to satisfy all of your customers. This does not mean, though, that you must sit idly by and let good money blow away. Not by any means. You must try to schedule your activities so you do more of the profit building jobs.

This is difficult but not impossible. By actively soliciting the profit builders, you can expect an increase in this department. At the same time, your regular and so called

courtesy jobs will remain fairly constant. By properly scheduling your workers and your work, you'll find you have the capabilities to handle more. These additional jobs will be the real profit builders. They will help immeasurably to improve your profit position.

An integral part of service mix analysis is the computing and outlining of your cost structure for each different job that you do. This does not refer to individual jobs, but more precisely, to different kinds of jobs. These would include

major set repair, minor set repair (changing fuses, tubes, speakers, etc.), set tune up, radio repair, FM stereo and amplifier repair, air conditioning work, antenna work, two way radio work, and auto radios. Not all service dealers do all of the jobs outlined. Many do all of these and more. In any case, the individual will have to decide just what his job categories are, and will have to set them down.

The next step is to roughly compute the cost of doing each job. In this connection, we must bear in mind that not all expenses and costs will be obvious. There are many hidden costs in any business, and especially in the service business. The dealer should be aware of contribution to overhead (by each job done), amortization of shop equipment, depreciation of vehicles, and obsolescence. That's right, Mr. Dealer, Obsolescence. It is unfortunate that dealers continue to hold on to outdated or discontinued parts. These take up valuable shelf space and represent an investment that could have otherwise resulted in unseable merchandise. This must be figured as an expense when setting up your price structure.

Once all costs have been taken into account, a reasonable margin of profit should be added, and a price arrived at for each job. This schedule should then be employed and adhered to for every job. The less you deviate from it, the better will be your chance of showing a greater profit.

What we want to look for, then, are all of the costs and expenses connected with any particular job. Among these are: 1) Cost of parts and equipment; 2) labor costs; 3) operational costs; 4) hidden costs of:

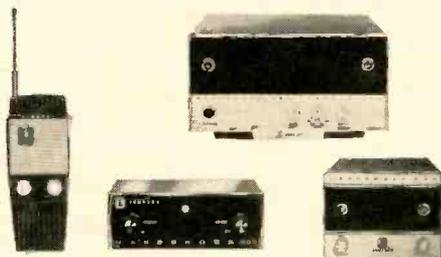
- a) contribution to overhead
- b) amortization of shop equipment
- c) depreciation
- d) obsolescence

### Advertising and Sales Promotion

Also included under the heading of marketing is advertising and sales promotion. Most service dealers do have these programs in effect, and are aware of their worth. Basically, a good advertising program will help greatly to improve the dealer's image and generate new business. *To be continued in forthcoming issue.*

## If you're not handling Johnson Business/Industrial 2-Way AM radio

...you're missing your share of  
a hot, profitable market!



You can sell Citizens Band equipment for many Business/Industrial applications—and we recommend it! However, our 25 to 50 Mc. AM BUSINESS INDUSTRIAL 2-WAY LINE opens *new* profit potential for you!

Johnson has the equipment, experience and marketing support to enable you to get your share of this expanding, profitable market. Because Johnson AM equipment costs less to buy, less to service—you'll find doors open to you that are closed to other Business/Industrial radio equipment dealers and distributors!

Shouldn't you be selling Johnson  
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**GET THE FACTS!** Send today for informative  
booklet with AM and FM marketing facts!

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# NEW LITERATURE

## Cord Sets 300

This illustrated catalog describes a line of replacement and jobber cord sets. Information is given on extension cords, appliance cord sets, dryer and range cords and many special-purpose cords, such as TV set "cheaters." Also included are descriptions and prices for a line of trouble lights. ITT.

## Variable Transformers 301

A line of manual and motor-operated variable transformers are described in this 16 page bulletin. The publication provides application data, ordering and engineering information, complete dimensional drawings for typical units, and details on terminal arrangements, connections and wiring for a number of single and three phase units. G-E.

## Industrial Components 302

This 554 page catalog lists over 60,000 electronic components, communications gear, sound and allied equipment. Engineering data and

prices of a line of relays, panel meters, variable and fixed transformers, wire and cable, and oscilloscopes are shown. A section containing specifications and prices of semiconductors is also included. Allied Electronics Corp.

## Soldering Irons 303

A 12 page catalog describes a line of industrial soldering irons, including models for medium and heavy duty production soldering of busbars, relays, chassis, heavy lugs, cables, switchboards and similar equipment. G-E.

## UHF Antennas 304

A number of different types of UHF antennas for local and fringe areas are listed in this four-page brochure. A short description and application of each type is given. The Finney Co.

## All Channel Antennas 305

A line of UHF-VHF-FM antennas are described on this one page brochure. Photographs and prices of the all channel antennas are included. Antennacraft.

## Tape Recorders 306

This four page brochure gives mechanical and electrical specifications

for a series of magnetic tape recorders. Stancil-Hoffman.

## Two-Way Radio 307

Features and applications of a line of business and industrial two-way radio equipment are described in a six page brochure. The line includes units from 1½ w to high power units for extended range. E. F. Johnson.

## Hygrometer 308

A catalog sheet describes a hygrometer. Photos and specifications are included. Also covered are the applications of the unit. Abrax.

## Screwdrivers 309

A line of screwdrivers are described in this four page bulletin. Vaco.

## Desoldering/Resoldering Iron 310

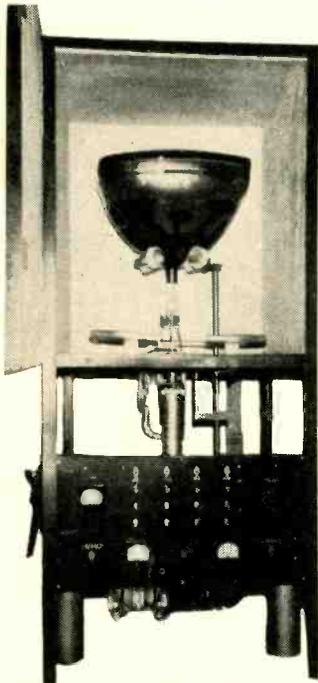
A combination desoldering and resoldering iron is described in this bulletin. Dimensions and applications of the tool are included in the bulletin. Enterprise.

## Wire Guide 311

This wall chart includes data on standard annealed copper wire, theoretical values and copper wire stranded construction. Birnbach.

## Me...? Rebuild Color Tubes???

*Why Not!*



Windsor Equipment  
Handles Color & Bond-  
ed-Face As Well As  
Black-and-White Tubes.

### So What?

Rebuilding with Windsor is a **QUALITY PROCESS . . . and PROFITABLE !!!**

Rebuild Color Tubes for a Cost of \$11.75 each  
... You Sell them for???

Windsor Equipment pays for itself in a few months.

Financing Available  
Free Training at our Plant

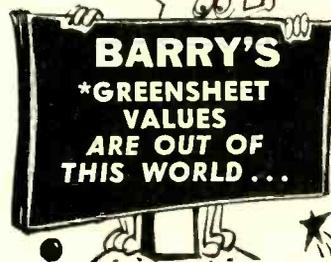
Write for our Booklet "The Open Door to TV Profits"

## WINDSOR ELECTRONICS, INC.

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\* A complete catalog of specialized Industrial Electronic TUBES and COMPONENTS . . . featuring Barry Electronics savings to industry, Servicemen, Experimenters, and purchasing agents. 64 pages.

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We'll also purchase your equipment and unused tubes. Send details:

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# MANUFACTURER'S LIQUIDATION!!!

**WE MUST CLOSE OUT THESE ITEMS AT LESS THAN OUR COST!**

All are fully factory guaranteed—brand new in perfect condition. You know the name . . . you know the equipment . . . we invite you to compare these close-out prices with any other in the field.

**ACT TODAY! THIS OFFER LIMITED TO EXISTING STOCK ONLY!**

## PERFECT FOR COLOR TV! COLOR CONVERGENCE DOT GENERATOR



- AUTOMATIC LOCKING — Guarantees "Jitter-Free" Dot Pattern
- PRE-SET RF CHANNEL — No Manual Tuning
- COMPLETE SIGNAL PROGRAM — DOTS, CROSS HATCH, VERTICAL OR HORIZONTAL BARS

APPLICATIONS — COLOR TV CONVERGENCE — • Dynamic Convergence — vertical and horizontal test and adjustment • D.C. Convergence and beam magnet test and adjustment • DYNAMIC PHASE and TILT Control Test and Adjustment • DEFLECTION COIL positioning for best convergence • WHITE BALANCE AND "Y" MATRIX TEST AND ADJUSTMENT. • FOCUS — test and adjustment of D. C. and dynamic focus.

Model 250  
Dealer's Net Price  
\$129.95

Close-Out Price **\$59.95**

## DYNAMIC SWEEP & SYNC CIRCUIT ANALYZER

MODEL 820

### 3 INSTRUMENTS IN ONE



- Horizontal and Vertical sawtooth/square wave generator
- Complete compatible flyback and yoke tester
- Horizontal and Vertical sync generator

Model 820  
Dealer Net Price  
\$69.95  
over 5000 sold  
at this price

COMPATIBLE FOR COLOR AND BLACK & WHITE  
Close-Out Price **\$29.95**

**ORDER TODAY! SUPPLIES ARE LIMITED**  
No C.O.D. Send check or money order.

**winston electronics**  
DIVISION OF JETRONIC INDUSTRIES, INC.

Main & Cotton Sts.

Phila. 27, Pa.

Manufacturers of Ray Jefferson Marine Products

## WHAT'S NEW . . .

Continued from page 59

emitter junction is reverse biased under extremely weak or no signal conditions by the dc emitter voltage on the video driver stage.

As signal strength increases, the signal from the video driver is applied to the base of Q206 and the sync tips *forward bias* the stage into conduction—which occurs only while the negative pulse is on the collector. It is said to provide good noise immunity.

When the video signal increases enough to forward bias the emitter-base junction, collector current charges the 4 $\mu$ f capacitor (C236). The charge across the capacitor becomes more positive and increases the forward bias on the IF stage to produce IF gain reduction. D203 becomes reverse biased as soon as an AGC voltage is developed across C236. The IF AGC voltage increase continues until signal amplitude reaches approximately 1mv. IF gain reduction at this time is around 40db. As signal amplitude increases above 1mv, the AGC system moves into its second operating mode.

The AGC driver stage (Fig. 11) has been added along with D204 and a voltage divider network on the IF AGC bus. The transistor (Q207) is an NPN type and inoperative during weak signal reception. It is reverse biased by placing a positive 1.5v on the emitter through a voltage divider network. This 1.5v is also used to forward bias the RF amplifier. In addition, the base voltage is held to a low positive voltage by VDR201 (voltage dependent resistor) action. The VDR has a high resistance (300K) until voltage is applied to it.

As the voltage across the 4 $\mu$ f capacitor continues to increase with signal amplitude, the VDR resistance decreases and raises the driver base voltage. At about 1mv signal amplitude the driver becomes forward biased and emitter current flow produces a more positive voltage across the emitter resistor. The higher emitter voltage reduces the RF amplifier gain.

When the AGC driver begins to conduct, the rate of gain reduction in the IF amplifier slows down. This allows the RF amplifier to help reduce receiver gain. A positive 4.2v is applied to D204's cathode from the voltage divider resistors. When the IF AGC voltage reaches 5v, the diode becomes forward biased and tends to hold the AGC potential near 5v. As a result, more AGC voltage is applied to the RF amplifier and the IF receives a slower AGC voltage increase. The AGC system will usually be operating in the second mode since most signal levels will fall in the range of 1mv to 1.25v. The IF gain reduction during this mode ranges from 40 to 60db while the RF amplifier provides up to 40db additional gain reduction.

With signal levels greater than 1.25v, the AGC circuits go into a third mode of operation. Diode D205, in series with a limiting resistor, is connected between the two AGC busses as shown in Fig. 12. As the RF AGC voltage reaches approximately 7v, D205 becomes forward biased. This allows a portion of the AGC voltage on the RF bus to be applied to the IF AGC bus. The result is that the IF voltage increases at a faster rate to produce additional IF gain reduction while gain reduction in the RF amplifier continues to increase, but at a slower rate.

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## Westinghouse

The Westinghouse V2483-1 TV has 27 transistors, a 1K3 and a 19CMP4 CRT.

**The 1st video amplifier and noise canceler.** The entire video amplifier section has three transistors which boost the video signal to a level that drives the low-drive CRT. Direct coupling is used from the video detector to the arm of the contrast control. From here it is capacitor coupled to the CRT cathode.

As shown in Fig. 13, the 1st emitter-follower video amplifier is primarily an impedance arrangement to match the high impedance video detector to the following low impedance amplifier stages. A negative-going composite video signal is applied between base and collector and —cathode-follower style— taken from emitter-to-collector. Although no voltage gain is obtained, a small current and power gain results.

This circuit also provides a sound take-off point from a 4.5 Mc coil in the collector circuit.

A white level control, R220, is also shown. It controls the 1st video amplifier (Q203) base voltage. Since the 2nd detector diode is forward biased, and the 1st two video stages are connected as emitter followers, the voltage at the video output stage (Q205) base (Fig. 15) will be a direct function of the WHITE LEVEL control setting. The white level of the composite video signal is the "grassy" area between the bases of the blanking pedestals as shown at the right side of Fig. 13. It represents the maximum conduction level of the CRT as opposed to the cutoff level which is represented by the top portion of the blanking pedestals.

The WHITE LEVEL control is preset at the factory to provide optimum conduction in the video output transistor, Q205. Field adjustment of the control should not be necessary unless the characteristics of the video amplifier transistors should change or if one is replaced.

The first video amplifier stage is shunted by the noise canceling circuit. Two noise pulses are shown riding in the video information. The effect of the noise canceler is to remove and invert only these pulses and couple them back to the video signal.

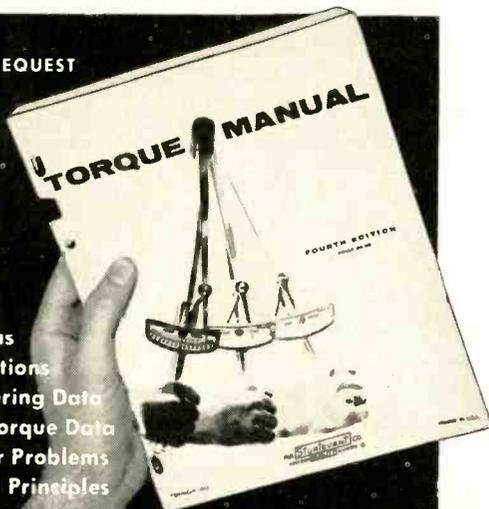
The noise canceler circuit is shown in Fig. 14. Transistor Q301 is cut off because of reverse bias between base and emitter. Diode, X304, is also reverse biased. Under these conditions the noise canceler circuit will be inoperative until a negative going pulse of sufficient amplitude appears in the video signal to make the cathode of X304 negative with respect to the anode. When this occurs, Q301's base becomes negative with respect to the emitter. The transistor is then forward biased and conducts for the duration of the noise pulse. Only peak noise pulse amplitudes will forward bias transistor Q301. Thus, only the inverted noise pulses will appear at the collector. Pulses are coupled through the 10 $\mu$ f electrolytic to the 2nd video amplifier base. In addition to its function of passing strong noise pulses, diode X304—normally back biased—serves to isolate the canceler circuit from the 2nd video amplifier.

The noise adjust control in Q301's emitter circuit is adjusted to a point just before the picture bends.

The 2nd video amplifier, Q204, and the video output circuits are shown in Fig. 15. The 2nd video amplifier is an emitter-follower.

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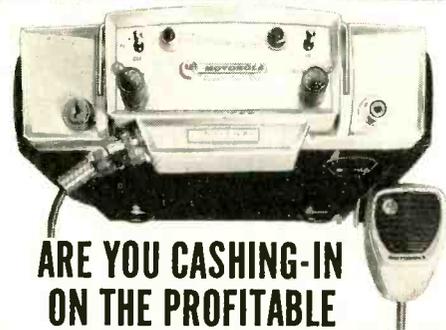


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## . . . HIRE HELP

Continued from page 68

the income tax withheld and the Social Security taxes for which you are liable with your return (Form 941) to the District Director. Table I shows the due dates.

Form 940 is the Annual Federal Unemployment Tax return form which you will receive from and must return to your District Director by January 31 following the year to which it relates.

By that same date you must furnish each employee from whom income tax was withheld, or would have been withheld if the employee has claimed no more than one withholding exemption, two copies of the withholding statement (Form W-2, Fig. 7). One copy of the W-2 form you will keep for your records, and one must be sent to your District Director together with Form W-3, reconciliation of income tax withheld from wages.

You must, of course, keep a copy of all return forms made by you for your employees and yourself.

Your state may also require similar taxation in addition to these.

Severe criminal and civil penalties are provided for the willful failure to make returns and payments prescribed, or willfully filing false or fraudulent returns.

The aforementioned description

of laws and tax returns are only a generalized picture of the over-all system. Complete and specific rules and regulations, inclusions and exclusions of taxes should be sought from the related offices. ■

## NOISE FIGURE . . .

Continued from page 65

with a scope connected in the last IF. This may be caused by too much RF or IF gain and will make our noise figure measurement incorrect—a saturated receiver cannot be expected to increase output very much. Additionally, power frequency ripple in the metering—another cause of error—can also be detected on the scope. After all, we are supposed to be measuring noise power—not line hum!

### References For More Information

1. Terman, "Radio Engineering," 3rd Ed., p. 770-771, McGraw-Hill.
2. Goodman, B. "How Sensitive is Your Receiver," *QST*, Sept. '47, p. 13.
3. Tilton, E. "Noise-Generator Techniques for the VHF Man," *QST*, Aug. '49, p. 20.
4. Tilton, E. "Noise-Generators—Their Uses and Limitations," *QST*, July '53, p. 10.

## DISCOUNTER . . .

Continued from page 53

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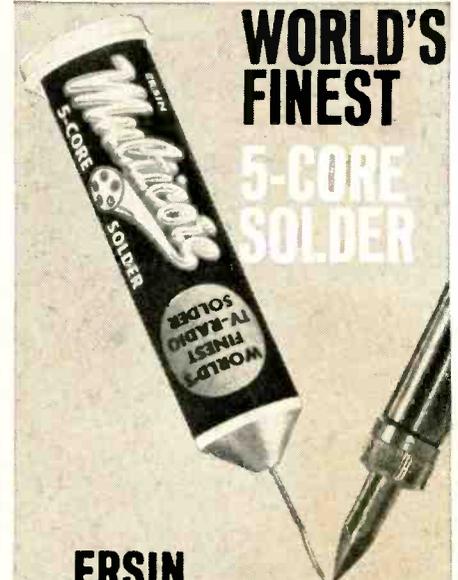
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