ELECTRONIC TECHNICIAN / DEALER

WORLD'S LARGEST TV-RADIO SERVICE & SALES CIRCULATION

CCTV IN MEDICINE

SERVICING SOLID STATE STEREO

INSTALLING A TOWER

JUNE 1970 A HARCOURT BRACE JOVANOVICH PUBLICATION

The first and only solid-state test equipment guaranteed for 5 years.

Now EICO, because of its emphasis on *reliability* in engineering and manufacture, offers the industry this breakthrough.

EICO's new line of solid-state test equipment comes with an unprecedented 5-year guarantee of performance and workmanship. (Send for full details of this EICO 5-year GUARANTEE on factory-assembled instruments.)

Additional advanced features include: new functional design, new color-coordinated esthetics, new PC construction, new easier-to-build kit designs.

New EICO Solid-State Test Equipment

240 379 242 150 330

EICO 240 Solid-State FET-VOM $59.95 kit, $79.95 wired.
One all-purpose DC/AC OHMS Uniprobe®. Reads 0.01V to 1 KV (to 30 KV with optional HVP probe). 7 non-skip ranges, in 10 dB steps. AC or battery operated. RMS & DCV: 0-1, 3, 10, 30, 100, 300, 1000V P-P ACV: 0-2.8, 8.5, 28, 85, 280, 850, 2800V. Input Z: DC, 11 M; AC, 1 MΩ. Response 25 Hz to 2 MHz (to 250 MHz with optional RF probe). Ohmmeter reads 0.2 to 1 MΩ in 7 ranges. 4½" 200 μA movement. HWD: 8½", 5¾", 5". 6 lbs.

EICO 242 Solid-State FET-TVOM $69.95 kit, $94.50 wired.
All the versatility of the EICO 240 plus: AC/DC Milliammeter, 1 ma to 1000 ma in 7 non-skip ranges; single all-purpose DC/AC-Ohms — MA Uniprobe®; and large 6½" 200 μA meter movement.

EICO 150 Solid-State Signal Tracer $49.95 kit, $69.95 wired.
Multi-purpose troubleshooter for TV/FM/AM & Audio Equipment. Independent RF Audio inputs. Speaker and meter output indicators. 400 mW continuous power output. Substitution amplifier, output transformer, speaker. Input for rated output: 1 mV RF, 63 mV audio. Hum 60 dB below 400 mW. 105-132 VAC, 50/60 Hz, 5VA. HWD: 7½", 8½", 5". 6 lbs.

EICO 330 Solid-State RF Signal Generator. $59.95 kit, $84.50 wired.
5 fundamental bands 100 kHz to 54 MHz. Vernier control 0-100%. Output 300,000 μV into 50-Ohm load. External signal modulation or internal 400 Hz, 0 to 100%. 105-132 VAC, 50/60 Hz, 1.7 VA. HWD: 7½", 8½", 5". 5 lbs.

EICO 379 Solid-State Sine/Square Wave Generator. $69.95 kit, $94.50 wired.
5 sine wave and 4 square wave bands. Low distortion Sultzer feedback FET circuit. Sine: 20 Hz to 2 MHz; 0-7.5V rms into hi-Z, 0-6.5V into 600 ohms Max. distortion 0.25%. Square: 20 Hz to 200 kHz; 0-10V p-p into hi-Z, pos. direction, zero ground. Rise time at 20 kHz less than 0.1 μ sec. 105-132 VAC, 50/60 Hz, 10VA. HWD: 7½", 8½", 8½". 9 lbs.

New EICO High Performance Instruments

443 465 635 385 1025 633

EICO 385 — Solid-State Portable Color Generator $79.95 Kit, $109.95 Wired.
EICO 465 — Wideband Vectorscope/Oscilloscope $179.95 Kit, $249.95 Wired.
EICO 1025 — Solid-State Power Supply $34.95 Kit, $49.95 Wired.
EICO 443 — Semiconductor Curve Tracer $79.95 Kit, $119.95 Wired.
EICO 633 — CRT Tester & Rejuvenator $79.95 Kit, $119.95 Wired.
EICO 635 — Portable Tube Tester $44.95 Kit, $69.95 Wired.

New EICO Probes for the Pros

Hi-Voltage Probe HVP-5, Wired $19.95.
Convenient built-in voltmeter. Barrier sections isolate HV tip from handle and meter. Measures up to 30 KV. Lightweight, compact.

Solid-State Signal Injector Probe PSI-1, Kit $5.95, Wired $9.95.
Pen-size, 1-ounce, self-powered signal generator. Frequency range from 1kHz to 30MHz, with harmonics. Clip it to your pocket — ideal for signal tracing in the field.

Solid-State Signal Tracer Probe PST-2, Kit $19.95, Wired $29.95.
Flashlight-size, 2.2oz, self-powered. Hi-gain amplifier, 50Hz to 200MHz with demod tip. Input Z: 3500Ω, 35KΩ, 350KΩ; Output: 0.3 p-p volts. Noise —45dB. Distortion <5%. Complete with earphone, all probe tips, AA battery, pocket clip.

PST-2 PSI-1 HVP-5

SEND FREE 1970 CATALOG

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EICO®
EICO Electronic Instrument Co., Inc.
283 Malta Street, Brooklyn, N.Y. 11207
EICO Canada Ltd.
20 Millwick Drive, Weston, Ontario

. . . for more details circle 110 on Reader Service Card

ELECTRONIC
TECHNICIAN / DEALER

TEKFAX

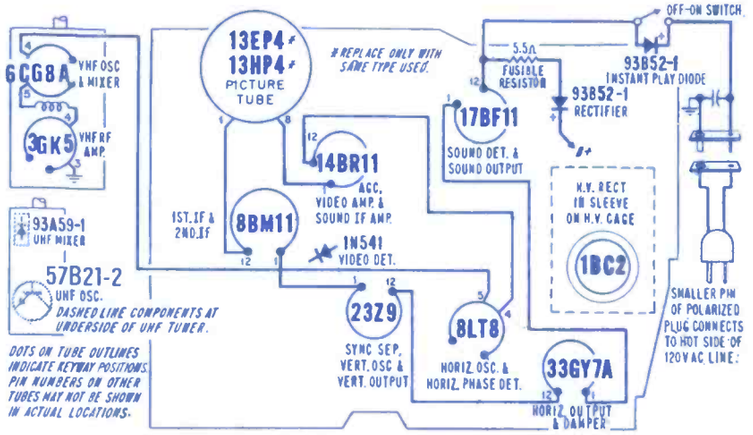
COMPLETE MANUFACTURER'S CIRCUIT DIAGRAMS
AND TECHNICAL INFORMATION FOR 6 NEW SETS

JUNE • 1970

1300
ADMIRAL
TV Chassis H1-1A, 1H1-1A, 1AH1, H2-1A

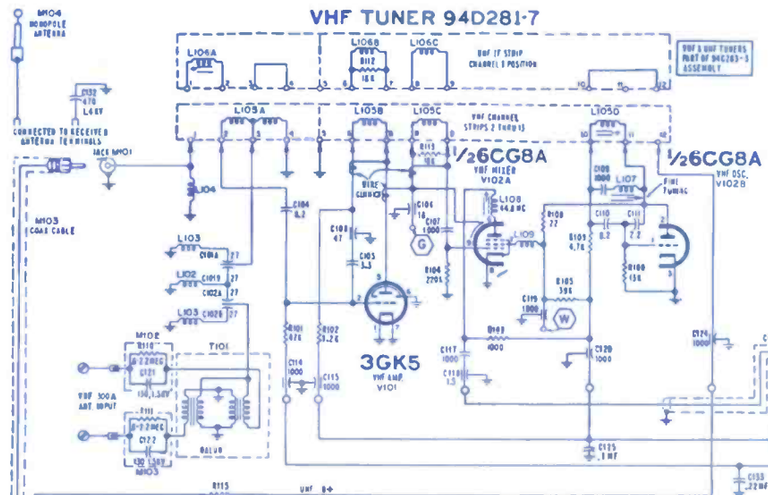
GROUP **214**

SCHEMATIC NO.		SCHEMATIC NO.	
ADMIRAL	1300	PHILCO-FORD	1305
TV Chassis H1-1A, 1H1-1A, 1AH1, H2-1A		TV Chassis 18CT24	
AIRLINE	1304	SYLVANIA	1301
TV Model GEN-13460A		Color TV Chassis D14-3-4	
EMERSON	1303	ZENITH	1302
TV Chassis 120962,964		Color TV Chassis 12A8C14	



TUBE LOCATION CHART

SYMBOL	DESCRIPTION	ADMIRAL PART NO.
R208	1M, vol con w/Sw	75C126-1
R311	25K, con cont (pt of (R208)	
R313	100k, bright cont (pt of (R208)	
R411	5M, ht cont	75C101-16
R412	1M, thermister	61C41-2
R417	1.2M, vert hold cont	75C100-8
R421	500K, vert lin cont	75C101-17
R501	5.5Ω, fus res	61C48-1
R502	250Ω, 5w	61C20-82
R503	100Ω, 5w	61C20-76
C428	130pf, 10%, 4KV, N1500 cer disc	65D10-400
C431	33pf, 10%, 5kv for 151P4	65D10-263
C503A	250µf, 165v elect	67C30-11
C503B	150µf, 150v, elect	67C30-11
C503C	200µf, 150v, elect	67C30-11
L201A&B	sound IF & phase shift coil	72C301-4
L202	ratio det	72C132-82
L301	47.25MHz trap	72C308-1
L302	IF input coil	72C308-1
L304	RF choke	73C31-3
L309	video peaking	73C55-30
L401	horiz lock coil	94D17-19
T201	audio output xformer	79C124-1
T301	1st IF xformer	72C308-2
T302	2nd IF xformer	72C310-1
T303	sound take off coil	72C185-7
T401	vert output xformer	79C123-1
T402	deflect yoke assy in H1	700C814-4
T403	horiz output	790D138-1
T402	deflect yoke assy in H2	700C305-40
UHF tuner		94D281-7
UHF tuner		94D296-4

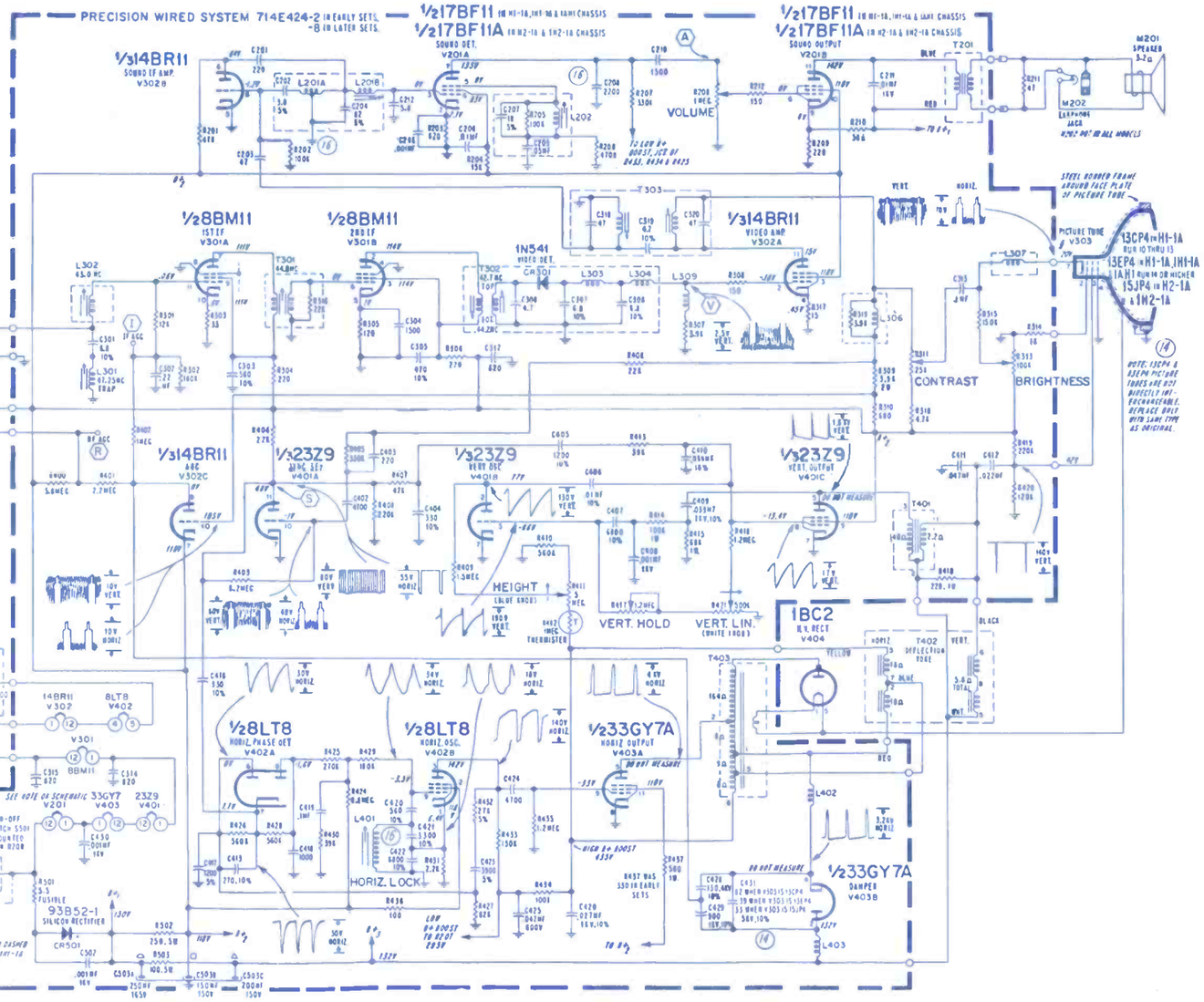


SCHEMATIC NOTES:
- CHASSIS GROUND
- PART OUT MOUNTED ON PRECISION WIRED SYSTEM. VOLTAGE WILL VARY WITH SETTING OF CONTROLS. RESISTOR VALUES 1/2 WATT 10%, CAPACITOR VALUES IN MICROFARADS, UNLESS OTHERWISE INDICATED. DC VOLTAGES MEASURED AT 120V AC LINE, NO SIGNAL, MAX. CONTRAST & BRIGHTNESS, & MIN VOLUME WITH TVM.

SYM	EARLY UHF TUNER	LATER UHF TUNER
R152	22K	12K
R153	1.2K	2.2K
R154	3.3K	2.2K
R155	220	270
C152	1000	100
C153	1000	30
L154	NOT USED	USED
L155	USED	NOT USED

RUN CHANGES

(12) Different Video and Sound IF circuit. See seperate schematic for chassis stamped runs 10 and 11.
(13) No service significance.
(14) Change to 13EP4 Picture Tube C431 changed to 39PF. See Note below Picture Tube
(15) No service significance.
(16) For improved reliability C421, C422 & C423 were moved from the top side of chassis to the underside to reduce possibility of sound drift, L201 & L202 part No was changed
(17) No service significance.



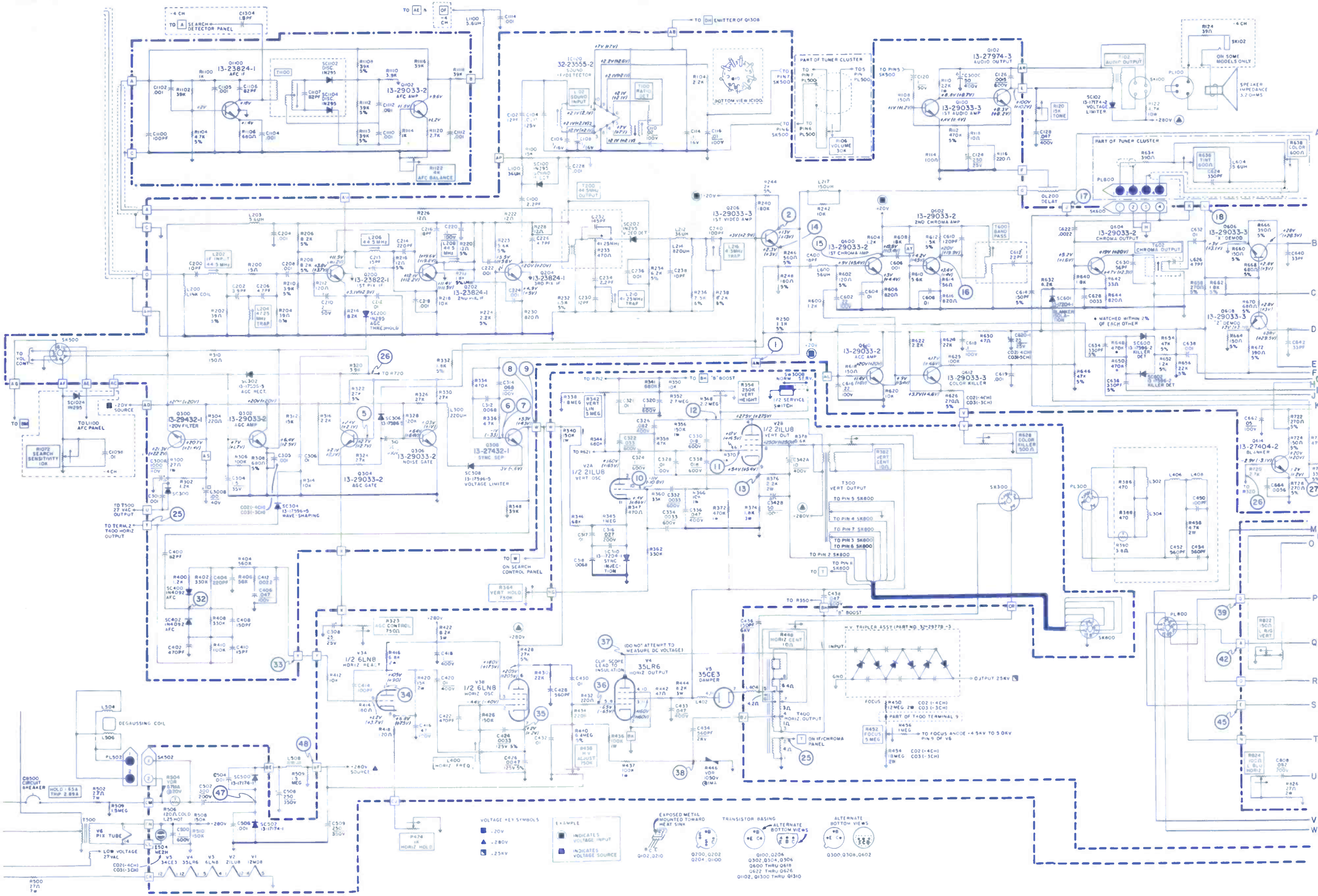
1301
SYLVANIA
Color TV
Chassis D14-3-4

JUNE • 1970

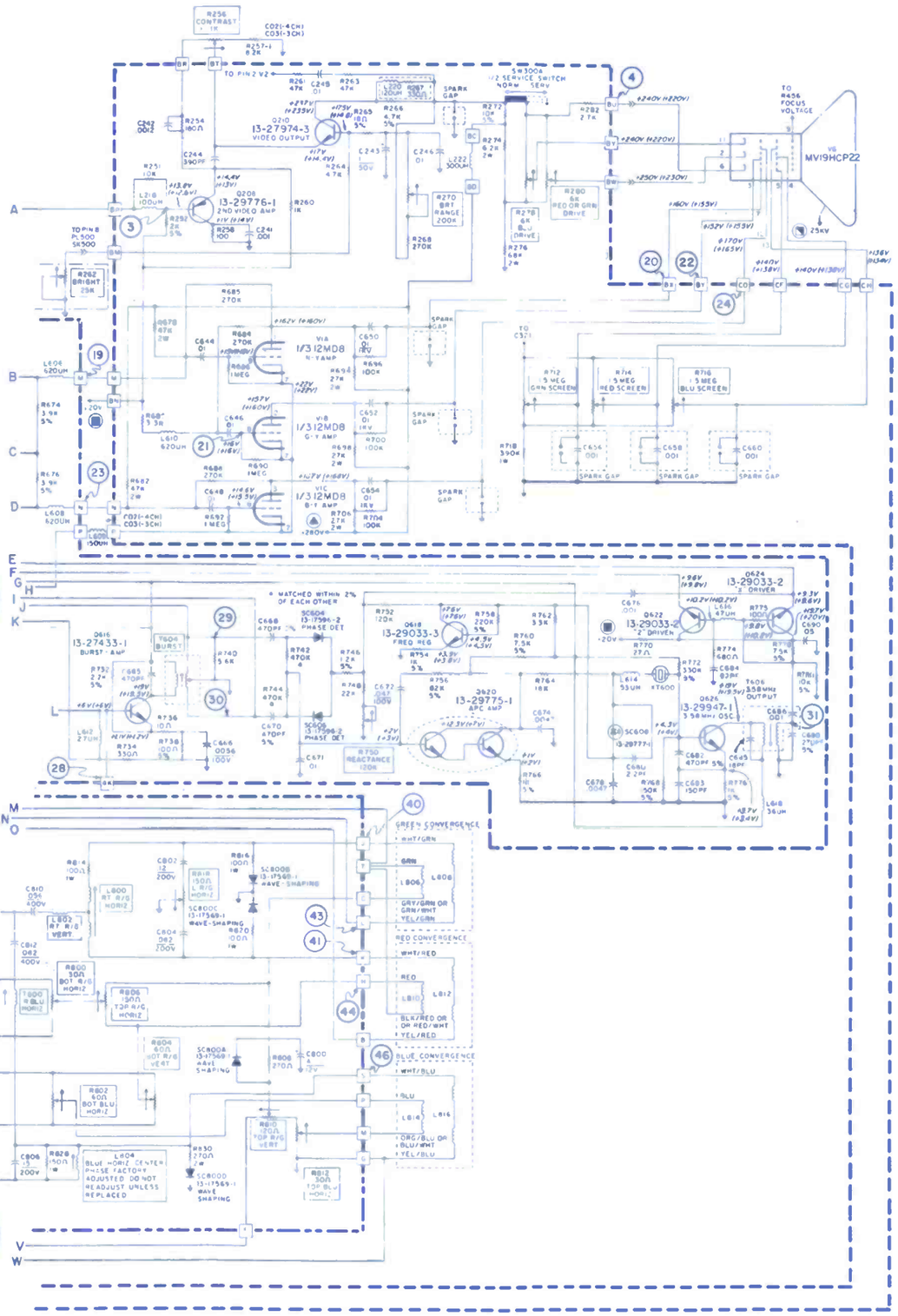
ELECTRONIC TECHNICIAN / DEALER TEKFAX

COMPLETE MANUFACTURERS' CIRCUIT DIAGRAMS AND TECHNICAL INFORMATION FOR 6 NEW SETS

SYMBOL — DESCRIPTION	SYLVANIA PART NO.
C300—3 sec elect	41-29788-1
C300A—1000/40v 3 sec elect	41-29788-1
C300B—100/40v 4 sec elect	41-29788-1
C300C—50/400v 3 sec elect	41-29788-1
C342—2 sec elect	41-27344-1
C342A—2 sec elect 10/400v	41-27344-1
C342B—2 sec elect 50/100v	41-27344-1
L102—sound input	57-23832-2
L400—horiz freq	50-23508-1
L402—5.6μh RF choke	50-15904-4
L500—Choke - power line	50-29833-1
L606—620μh	50-17593-1
T100—ratio det	57-23547-1
T102—audio output	56-16018-10
T200—44.5MHz output	57-23831-1
T300—vert output	56-29826-1
T400—horiz output	50-29664-1
T500—power	55-29827-1
T600—band pass	50-27405-1
T602—chroma output	50-29658-1
T604—burst	50-27406-1
T606—3.58MHz output	50-29784-1
R106—30K-volume (−3Ch.)	37-29779-1
R106—30K-volume (−4Ch.)	37-29785-101
R120—15K - tone	37-27242-23
R256—1K - contrast	37-27242-17
R262—25K - bright	37-29783-2
R270—200K bright range	37-29755-1
R323—750 AGC	37-29755-2
R342—5M vert lin	37-29832-1
R354—250K - vert height	Part of R342
R364—750K - vert hold	37-27242-2
R382—10-vert centering	37-29831-1
R424—1K - horiz hold	37-27242-1

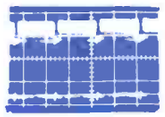


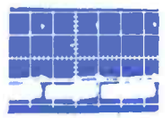
R438 — 750K-HV adjust
R448 — 10-horiz centering 37-29541-1
R452 — 5M - focus 37-17320-4
R628 — 500 - color killer 37-29755-2
R636 — 600 - tint (—4 Ch.) 37-29440-105
R712 — 1.5M - green screen 37-29755-3
R750 — 120K - reactance 37-14576-11
R1072 — 10K - sensitivity 37-27242-15
R1122 — 4K - AFC balance 37-14576-7
CB500 — circuit breaker 29-29563-6
DL200 — delay line 32-23216-1

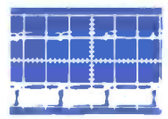


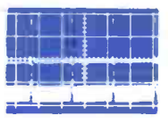
— WAVEFORMS —

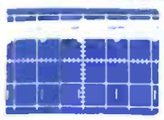
SYLVANIA
Color TV Chassis D14-3-4

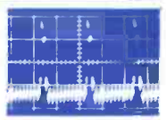

1 — 1 VPP Vert.

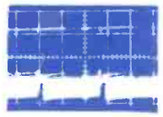

2 — 5 VPP Vert.

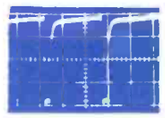

3 — 5 VPP Vert.

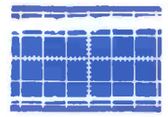

4 — 50 VPP Vert.

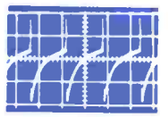

5 — .5 VPP Vert.

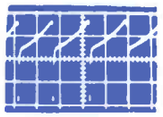

6 — 5 VPP Horiz.

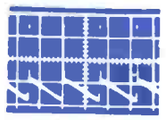

7 — 5 VPP Vert.

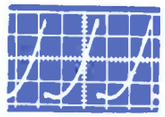

8 — 60 VPP Horiz.

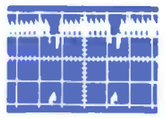

9 — 60 VPP Vert.

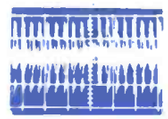

10 — 40 VPP Vert.

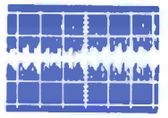

11 — 128 VPP Vert.

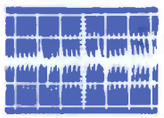

12 — 1000 VPP Vert.

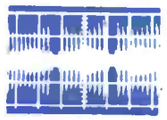

13 — 18 VPP Vert.

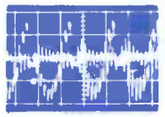

14 — .8 VPP Horiz.

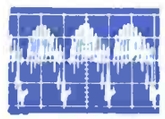

15 — .4 VPP Horiz.

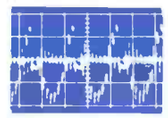

16 — 3 VPP Horiz.

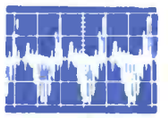

17 — 1 VPP Horiz.

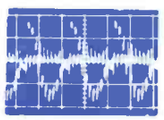

18 — 3 VPP Horiz.

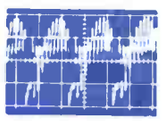

19 — 18 VPP Horiz.

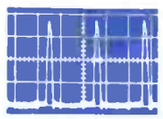

20 — 175 VPP Horiz.

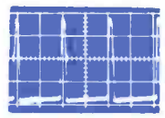

21 — 15 VPP Horiz.

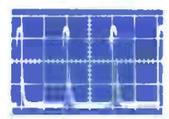

22 — 140 VPP Horiz.

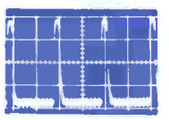

23 — 18 VPP Horiz.

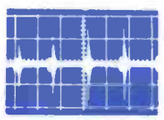

24 — 200 VPP Horiz.

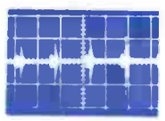

25 — 350 VPP Horiz.

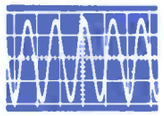

26 — 40 VPP Horiz.

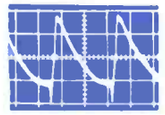

27 — 8 VPP Horiz.

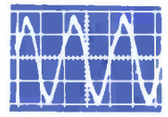

28 — 4 VPP Horiz.

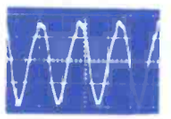

29 — 27 VPP Horiz.

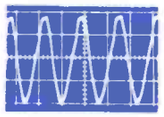

30 — 26 VPP Horiz.

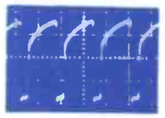

31 — 15 VPP 3.58MHz

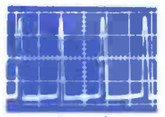

32 — 42 VPP Horiz.

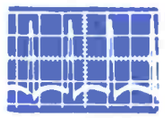

33 — 3 VPP Horiz.

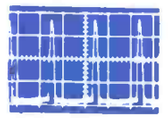

34 — 60 VPP Horiz.


35 — 70 VPP Horiz.


36 — 220 VPP Horiz.


37 — Depends on amt. of coupling Horiz.


38 — 1300 VPP Horiz.


39 — 350 VPP Horiz.

40 — 17 VPP Horiz.

41 — 19 VPP Horiz.

42 — 10 VPP Vert.

43 — 10 VPP Vert.

44 — 20 VPP Vert.

45 — 20 VPP Vert.

46 — 40 VPP Horiz.

47 — 300 VPP Vert.

48 — 18 VPP Vert.

49 — .5 VPP Horiz.

50 — 12 VPP Horiz.

51 — .4 VPP Vert.

1302

ZENITH

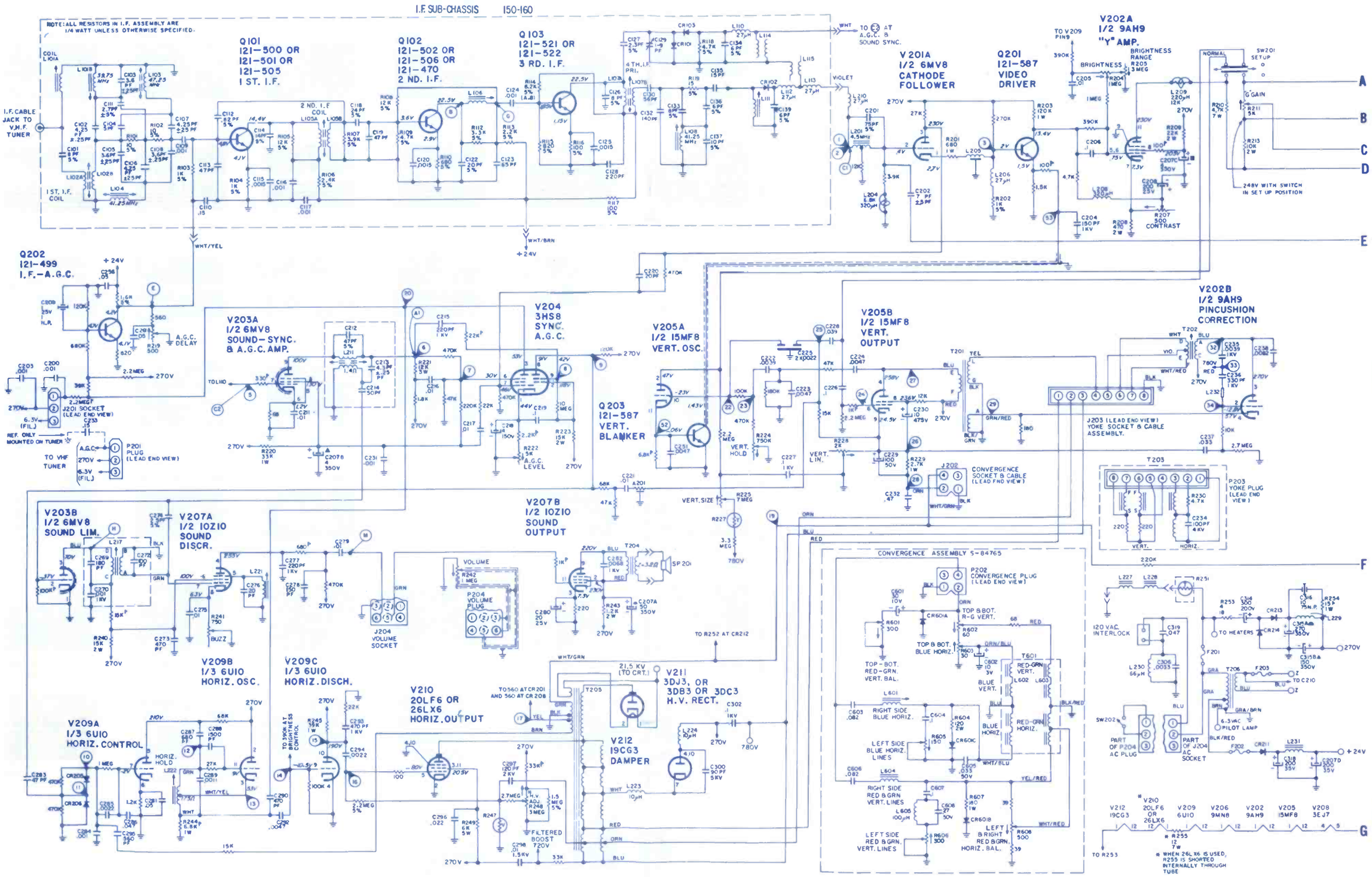
Color TV
Chassis 12A8C14

JUNE • 1970

ELECTRONIC TECHNICIAN / DEALER **TEKFAX**

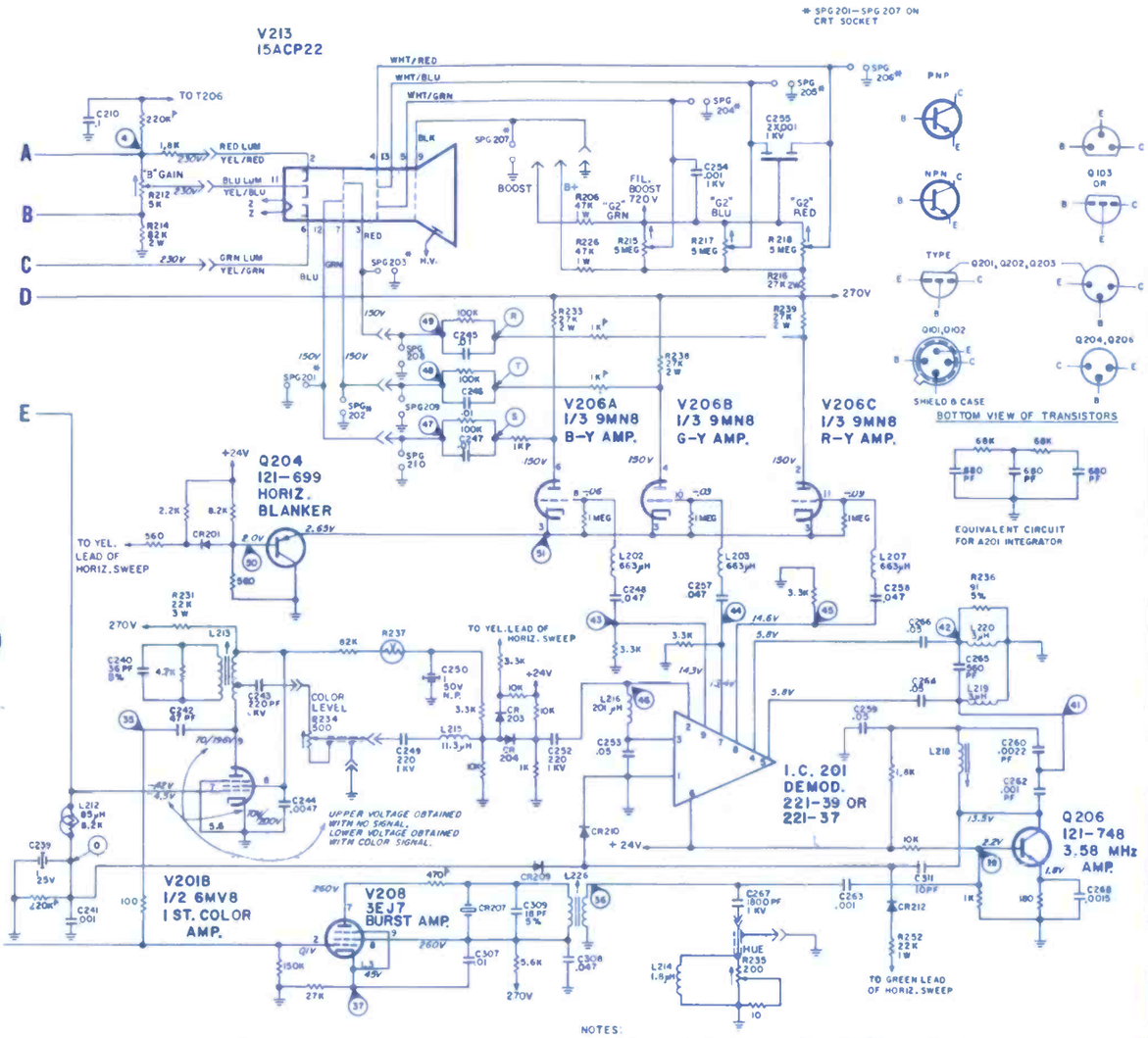
COMPLETE MANUFACTURERS' CIRCUIT DIAGRAMS AND TECHNICAL INFORMATION FOR 6 NEW SETS

SYMBOL	DESCRIPTION	ZENITH PART NO.
C207A	50µf elect cap 350v	22-5910
C207B	4µf elect cap 350v	22-5910
C207C	4µf elect cap 350v	22-5910
C207D	200µf elect cap 35v	22-5910
C315A	270µf elect cap 350v	22-5746
C315B	150µf elect cap 350v	22-5746
C316	10µf elect cap (NP) 75v	22-6008
R204	1M bright control	63-7974
R205	3M bright range control	63-7977
R207	500Ω contrast control	63-7975
R217	5M G2 blu control	63-6977
R218	5M G2 red control	63-6978
R219	500Ω AGC delay control	62-8543
R222	5K AGC level control	63-7976
R224	750K vert hold control	63-7973
R225	7M vert size control	63-6433
R227	thermistor	63-6824
R228	2K vert lin control	63-7983
R234	500Ω color level control	63-7981
R235	200Ω hue control	63-7980
R237	voltage dep resistor	63-7143
R242	1M volume control & AC sw	63-7979
R247	volt dep resistor	63-7658
R248	3M high volt control	63-7628
R251	therm (degausser)	63-7156
L101A	39.75MHz trap & link coil ass'y	20-1658
L101B	39.75MHz trap & link coil ass'y	20-1658
L103	47.25MHz trap coil ass'y	20-1659
L105A	2nd IF coil ass'y	20-1661
L105B	2nd IF coil ass'y	20-1661
L108	41.25MHz trap coil ass'y	20-1657
L201	4.5MHz trap coil	S-77669
L205	delay line	S-80475
L211	sound take-off coil	S-77414
L217	intercarrier coil	S-74445
L219	peak coil	20-2056
L221	quad coil	S-80480
L222	horiz osc coil	S-81595
L226	3.51MHz burst amp plate coil	S-80791
L231	filter choke (+24v)	95-2733



L605 — peaking coil	20-2021
T201 — vert output xformer	95-2764
T202 — pincushion coil ass'y	S-77784
T203 — def yoke	95-2781
T204 — sound otpt xformer	95-2688
T205 — horiz sweep xformer	S-84801
T206 — filament xformer	95-2763
A201 — integrator unit	87-7
F201 — 2.7 amp bel-fuse	136-76
F202 — .35 amp bel-fuse	136-75
F203 — heater fuse line 2½" min loop of no. 24 AWG copper wire	91-2061
SW201 — B/W set up sw	85-994
CR207 — 3.58MHz osc cry	103-152

ZENITH
Color TV Chassis 12A8C14



TEST POINTS
A1 SOUND-SYNC-A.G.C. AMP. OUTPUT
B 2ND. I.F. ALIGNMENT POINT
C1 PICTURE DETECTOR OUTPUT
C2 SYNC SOUND DETECTOR OUTPUT
E I.F.—A.G.C.
G 3RD. I.F. ALIGNMENT POINT
H SOUND LIMITER PLATE
M SOUND OUTPUT
Q A.C.C. VOLTAGE
R R-Y GRID OF CRT
S B-Y GRID OF CRT
T G-Y GRID OF CRT

123-4023

NOTES:

PHOTOGRAPHS TAKEN ON A STANDARD GATED RAINBOW COLOR BAR SIGNAL. THE HUE SETTING ADJUSTED FOR PROPER COLOR. THE WAVE SHAPES AT THE RED, GREEN AND BLUE GRIDS OF THE PICTURE TUBE DEPEND UPON THE HUE SETTING.

ALL VOLTAGES MEASURED FROM CHASSIS TO POINTS INDICATED.

ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.

ALL D.C. VOLTAGES TO BE MEASURED WITH A VACUUM TUBE VOLTMETER HAVING 11 MEGOHM INPUT RESISTANCE.

ALL VOLTAGE MEASUREMENTS TO BE MADE WITH NO SIGNAL PRESENT AND NORMAL SETTING OF CONTROLS AND CHANNEL SELECTOR SET TO CHANNEL 2 UNLESS OTHERWISE SPECIFIED.

RESISTANCE MEASUREMENTS SHOWN WITH COILS DISCONNECTED FROM CIRCUIT.

ALL RESISTORS ARE ±10% TOLERANCE, CARBON, 1/2 WATT UNLESS OTHERWISE SPECIFIED.

COIL RESISTANCE NOT GIVEN UNDER ONE OHM.

ALL CAPACITOR VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

FOR CAPACITOR TOLERANCE, SEE LEGEND.

CATHODE RAY TUBE 2ND. ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC OR 20K OHMS MIN. PER VOLT HIGH VOLTAGE METER.

ARROWS ON POTENTIOMETERS INDICATE CLOCKWISE ROTATION.

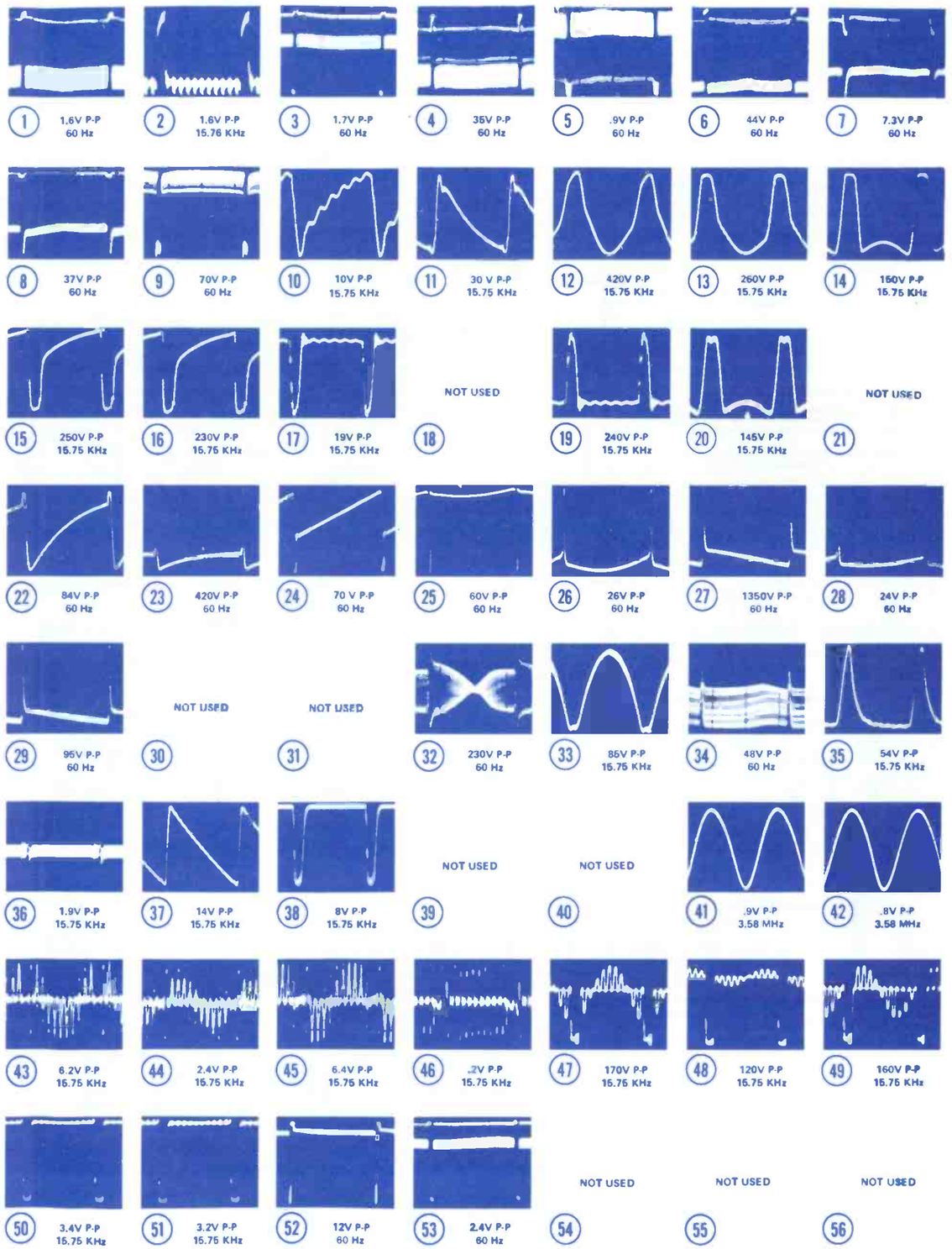
(E)→ INDICATES ALIGNMENT & TEST POINT.

PF = PICOFARAD MHz = MEGAHERTZ µH = MICROHENRY

▶ INDICATES ± 20% MAY BE USED. —o— INDICATES VOLTAGE SOURCE

⏚ INDICATES CHASSIS GROUND —⫸— INDICATES CONNECTORS

(2) INDICATES WAVEFORM (SEE PAGE SHOWING WAVEFORMS)



1303

EMERSON

TV Chassis
120962,964

JUNE • 1970

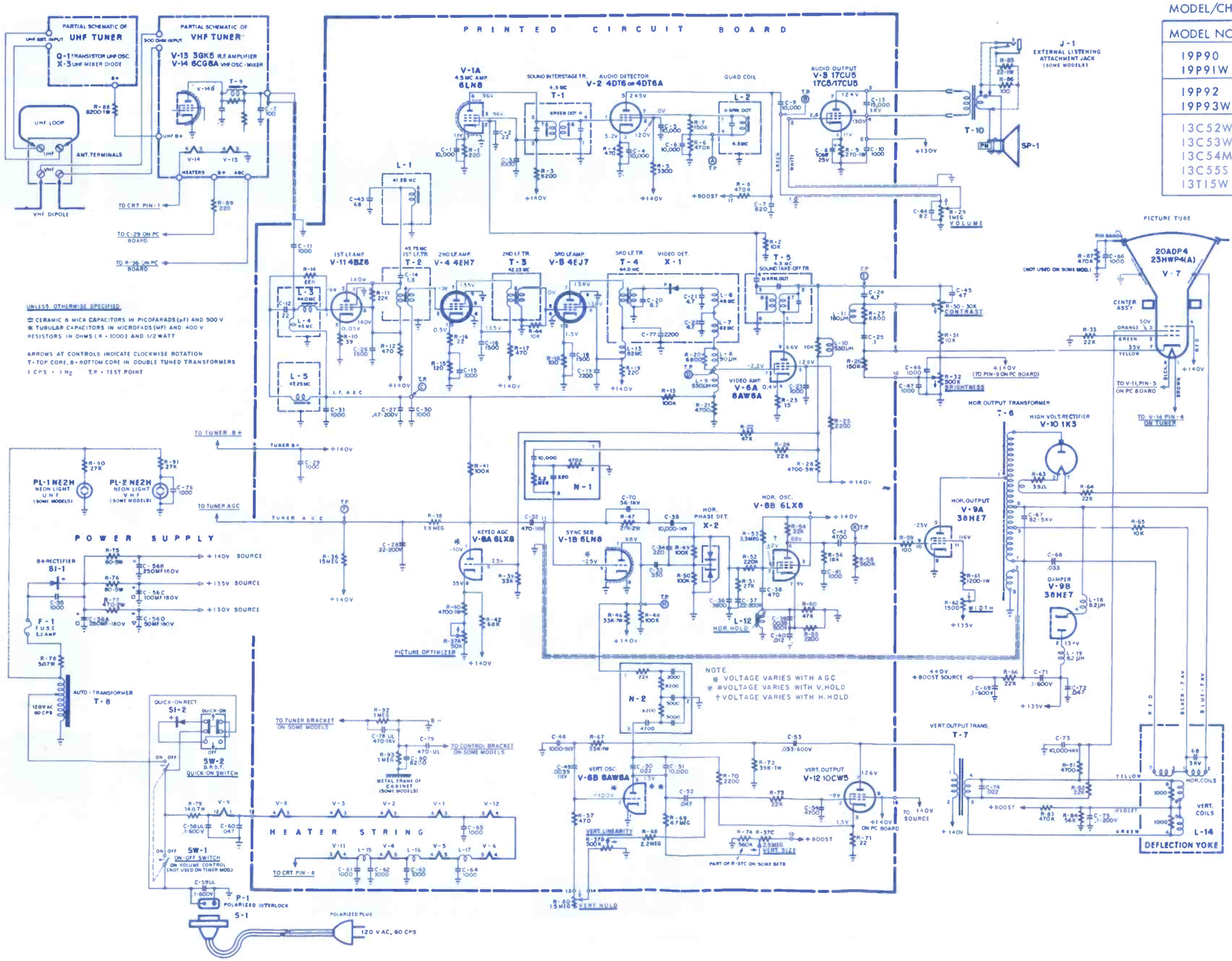
ELECTRONIC TECHNICIAN / DEALER **TEKFAX**

COMPLETE MANUFACTURERS' CIRCUIT DIAGRAMS AND TECHNICAL INFORMATION FOR 6 NEW SETS

SYMBOL	DESCRIPTION	EMERSON PART NO.
R-29	volume/on-off (Ch 120962)	391081
R-29	volume (Ch 120963)	391079
R-29	volume/on-off (Ch 120964)	390912
R-30	contrast	391048
R-32	Bright	391046
R-37A,B,C	vert lin, vert. size, AGC	391082
R-62	width	390993
R-80	vert hold	391047
R-28	4.7K 5w	397158
R-75	80Ω 5W	394307
R-78	5Ω 7w	394216
R-79	14Ω 7w	394312
C-2, 12	22pf NPO	928824X
C-14	1.8pf NPO	928207
C-43	68pf NPO	928828X
C-70	56pf N1500	929220X
C-T (tuner)	100pf NPO	928829
C-56A,B,C,D	250-250-100-50/180v	925713
T-1	Sound interstage	720513
T-2,3,4	IF interstage	720540
T-5	sound take-off	720512
T-6	horiz output	738210
T-7	vert output	738193
T-8	auto trans, 4-wire (Ch-120963)	730175
T-8	auto trans, 3-wire (Ch-120962)	730176
T-10	audio output (part of speaker)	
L-1	self sound trap (41.25 MHz)	720317
L-2	quad coil	720404
L-3	IF input	720589
L-4	choke	705065
L-5	adjacent channel trap (47.25MHz)	720452
L-7	choke	705066
L-12	horiz osc	716165
L-14	yoke, deflection	708532(A)
L-15	choke	705031
L-16	choke	705031
F-1	fuse, 1.2a	808236
N-1	couplate, sync sep	923059
N-2	couplate, vert integ	923159
X-1	crystal, vid det	817077

MODEL/CHASSIS/CRT CROSS REFERENCE

MODEL NO.	CHASSIS NO.	CRT
19P90 19P91W	120962A	20ADP4
19P92 19P93W	120963A, B	20ADP4
13C52W 13C53W 13C54M 13C55S 13T15W	120964A, B	23HWP4(A)



ELECTRONIC TECHNICIAN / DEALER

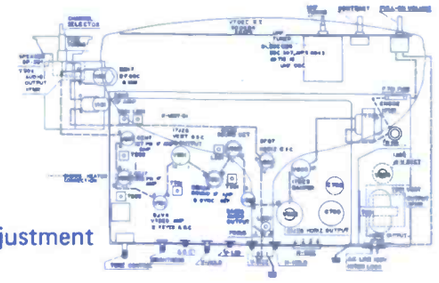
TEKFAX

JUNE • 1970

1304
AIRLINE
TV Model
GEN-13460A

COMPLETE MANUFACTURERS' CIRCUIT DIAGRAMS AND TECHNICAL INFORMATION FOR 6 NEW SETS

Chassis Tube Layout and Adjustment



SYMBOL	DESCRIPTION	AIRLINE PART NO.
C709A	120µf/100µf/20µf/10µf	TV32169
C709B,C,D	@350v, elect	TV32169
C720	.1µf, spec tublr	TV33328
R223	100KΩ, AGC (9v-150)	TV25243
R315	1M, tone (9v-149)	TV25235
R316	1M, vol w/on-off	TV25236
SW-701	switch (9v-151ul)	TV25236
R521	1M, vert hold (9v-117)	TV25237
R522	1M, vert size (9v-119)	TV25238
R523	1M, vert lin (9v-119)	TV25238
R627	50KΩ, horiz hld (9v-121)	TV25240
R714	250KΩ, bright (9v-118)	TV25239
R715	20KΩ, contrast (8v-007)	TV2572
L301	coil, sound det (TIF-551)	TV61478
L601	coil, horiz hold (TL-23)	TV61174
L603	coil, horiz lin (2TL-984)	TV61479
T202	trans, 2nd pix IF (TIF-383)	TV62342
T203	trans, pix det (2TL-957X)	TV62343
T301	trans, sound IF (TIF-378)	TV62341
T302	trans, audio output (7T-182)	TV11219
T501	trans, vert output (8T-195)	TV11220
T601	trans, horiz output (8H-650)	TV11221
T701	trans, 4.5MHz trap (2TIF-491)	TV62252
T702	trans, power (9T-219)	TV11222
M501	Cap (PRC-302)	TV3455
M701	Cap (PRC-366)	TV3465
F701	fuse, 2a	*315002
SP301	tuner, UHF (UT7-2u2)	TV35158
SP301	tuner, VHF (PTB-Ju2G)	TV35184
SP301	yoke, defl (DC-188)	TV61617

1305

PHILCO-FORD

TV Chassis 18CT24

ELECTRONIC TECHNICIAN / DEALER **TEKFAX**

JUNE • 1970

COMPLETE MANUFACTURERS' CIRCUIT DIAGRAMS AND TECHNICAL INFORMATION FOR 6 NEW SETS

SYMBOL	DESCRIPTION	PHILCO-FORD PART NO.
C103	3000/25V,1000/25V,500/25V B+	30-2616-4
D106	damper	34-8057-15
D110	hi-volt rectifier	34-8053-6
F1	lamp AC line/fast blow	45-2656-71
F2	2.5a (fast blow) PW4	45-2656-70
L4	xformer, 4.5mc trap	32-4905-1
L5	xformer, sound takeoff	32-4901-1
L7	choke 40MHz	32-4837-1
L9	47.25Hz trap	32-4652-78
L10	41.25Hz trap	32-4652-80
L12	47.25Hz trap	32-4652-78
L21	xformer, horz drive	32-10086-1
L101	choke, vert output	32-10087-1
L102	horiz hold	32-4924-1
L103	xformer, horiz output	32-10085-1
L105	choke, B+ filter	32-4857-1
L106	choke, B+ filter	32-4857-1
N1	RC network, vert lnt	30-6067-1
R74	1 /1w-WW, vert bias	66-9104360
R75	.33 /1w-WW, vert	66-8334360
S102	switch funct	42-2159-12
T101	power	32-10089-1
T102	audio driver	32-10090-1
VR1	3K, det bias	33-5628-4
VR4	100Ω, vert lin	33-5629-2
VR5	12Ω, vert bias	33-5629-1
VR101	30K, contrast	33-5624-8
VR102	25K,off-on-volume	33-5623-25
VR103	250K, bright	33-5623-24
VR104	500Ω, vert hold	33-5624-9
VR105	vert height	33-5624-10
Tuner VHF TT-203C		76-13955-5
Tuner UHF TT-152C		76-13827-4
Yoke		32-9748-1

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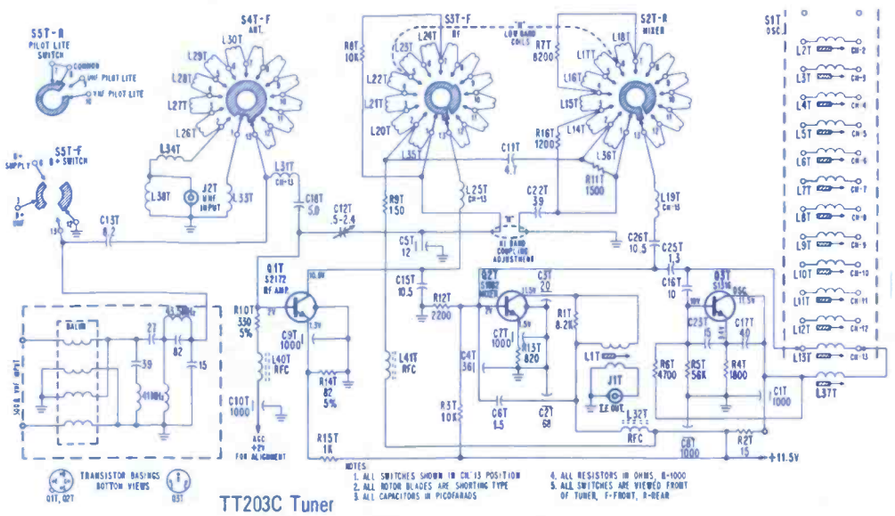
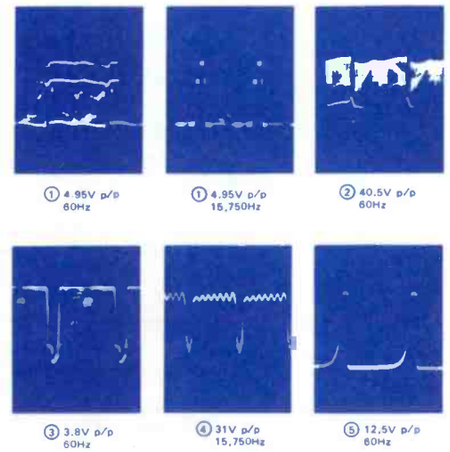
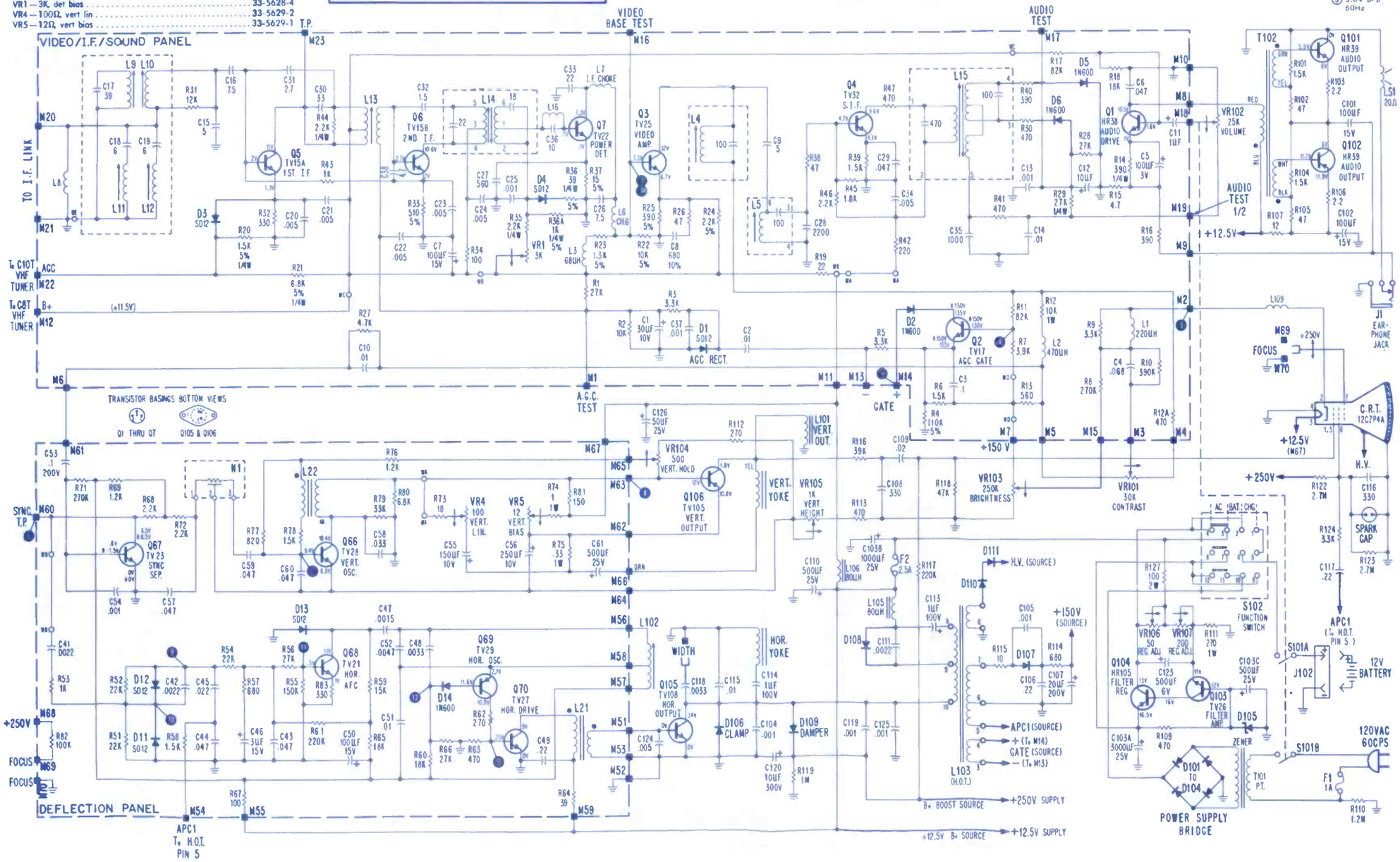
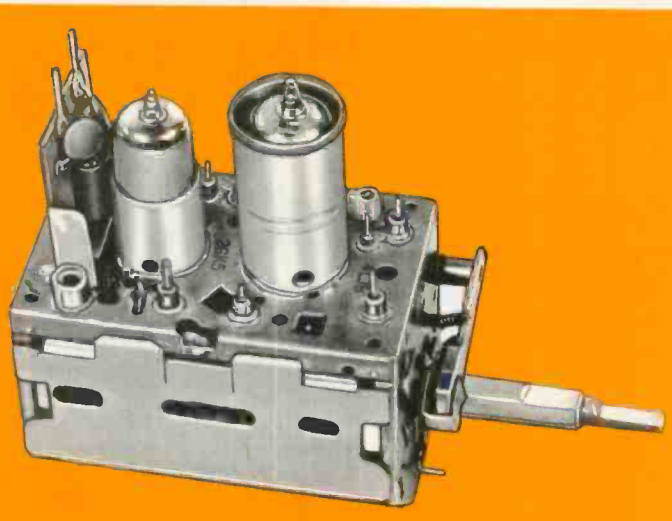


TT203C Tuner







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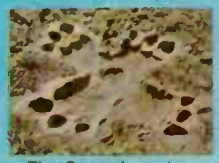

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JUNE 1970 • VOL. 91 NO. 6

COVER

Electronics is becoming more and more a major tool in the medical profession's fight to prevent and cure disease. Heart monitoring equipment such as shown on this month's cover is one such instrument and leads us into our feature article which discusses closed-circuit TV systems and its many applications in medicine.

TEKFAX • 16 PAGES OF THE LATEST SCHEMATICS • **Group 214**
ADMIRAL: TV Chassis H1-1A, 1H1-1A, 1AH1, H2-1A
AIRLINE: TV Model GEN-13460A
EMERSON: TV Chassis 120962,964
PHILCO-FORD: TV Chassis 18CT24
SYLVANIA: Color TV Chassis D14-3-4
ZENITH: Color TV Chassis 12ABC14

A HARCOURT BRACE JOVANOVICH PUBLICATION
Harbrace Publications, Inc.

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ET/D EDITOR'S MEMO

Better Reader Inquiry Service

It's great to see the number of letters that pour in each month from our readers requesting information on products. Many letters cross my desk concerning this service—not all of them praising it. I talked to our publisher, Scotty Wallace, about the process of handling the inquiry cards and find that they are processed as soon as they come in and forwarded to the respective companies. From then on it's up to the company receiving the inquiry to send out the information.

Not long ago I received the following letter which is typical of the types of complaints we receive. We urge our advertisers, as well as the other manufacturers whose products we list, to take note of this letter and assist us in providing a better, more efficient product information service. The letter goes like this:

"Dear Sir:

I wonder if I may be permitted to call to your attention something that has occurred many times over the past several months. Upon receiving my monthly copy of your magazine, I read through the items that interest me and time permitting, may even go from cover to cover. On occasion, I pick out one or two advertised items in which I am interested and desire further information.

Although I return the Reader Service Card with the numbers circled, only rarely do I receive the information that has been offered. I cannot help wondering what happens to these returned service cards. Are they just thrown away or are the advertisers uninterested in selling the products they advertise?"

To help us meet our objectives of serving the reader and making him aware of new trends, we hope for and anticipate better, more efficient cooperation in the future from all concerned.

1. 10-inch-longer useable loadspace.

2. Independent front suspension and 3½-inch-longer wheelbase for better ride and handling.

3. 345 pounds more payload. Up to 3930 pounds on Tradesman 300.

4. Hidden cargo step. Cargo doors easier to open. Won't stick or collect ice or snow.

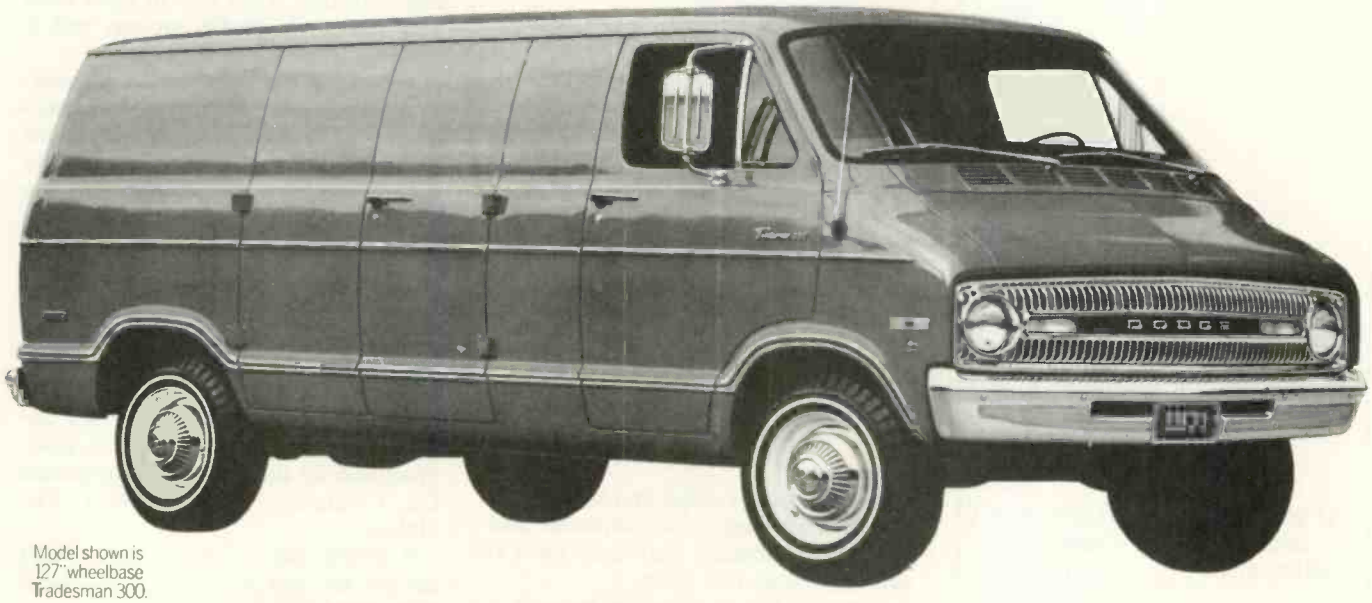
5. 6. Power steering, optional. Power brakes, optional.

7. 7-inch-larger hood opening. Easier battery, dipstick, and radiator servicing.

8. Engine cover is 4 inches lower, 10 inches shorter. Makes it easy for driver to reach cargo area.

9. Integral air conditioning, optional.

10. Car-style instrument panel. All controls within easy reach



Model shown is 127" wheelbase Tradesman 300.

11. **Bumper jack** can be used with full load on Tradesman 100 and 200.

12. 13. **Engine can be removed quickly** and easily through front of truck. **Wider doors and door steps** and less wheelhouse intrusion make for easier ins and outs.

14. 15. **Two-stage door checks** stop front doors from accidentally closing on you. **Posi-latch doors** won't spring open.

16. **Automatic transmission** optional with all Tradesman models.

17. **Independent suspension and standard track** allow inexpensive front wheel alignment on passenger car equipment.

18. **Bigger standard engines.** 198 Six, 318 V8.

INTRODUCING THE ALL-NEW 1971 DODGE STRONG BOX

The big, new Tradesman Van that outdoes the better idea people 31 ways.

19. **26-gallon gas tank.**

20. 21. **Two-inch-wider seats** with square corners for better leg support. **Full-foam padding** means softer ride, more comfort.

22. 23. **Full-width sun visors. Larger windshield wiper pattern.**

24. **Front seat does not block the cargo door entrance.**

25. **Extra rust protection** for underside and rocker panels.

26. **High-level air intake** keeps incoming air cooler and cleaner.

27. 28. **Wind tunnel body shape** and 60" radius windows reduce wind sway effect. **Doors adjustable three ways** for better sealing.

29. 30. 31. **Fiber-glass engine cover** reduces interior heat and noise. **Ashtray on engine cover.** Easy to reach. **Heater located in engine compartment** for more leg- and footroom.

Dodge Trucks

CHRYSLER MOTORS CORPORATION

. . . for more details circle 107 on Reader Service Card

ET/D LETTERS TO THE EDITOR

Readers' Aid

I need a circuit diagram for a CB radio—a Star Caster, Model 7114—and am willing to pay for it.

DENNIS LESMEISTER
5603 PENNSYLVANIA AVE. S.
MINNEAPOLIS, MINN. 55419

Can I get, from the readers of ETD, any diagrams for building an electric power supply (with silicon diodes) similar to the Olson RA-472 transistor Power Supply? It uses a dc voltmeter, 0 to 15v, and has a range of 6, 9 and 12v.

FRANCO
FRANCO RADIO AND TV SHOP
20 N. SAN ANTONIO ST.
RIO GRANDE, PUERTO RICO 00745

I am presently employed in the U.S. Navy as an electronics instructor, and have been working part time on TV sets for about two years.

I would like to know if there is a TV tuner course available, since I would like to get into this type of business. I started a tuner course offered by Frank Boceh Tuner Service but after completing two sections he wrote and said the rest of the course would be delayed for some time.

I also would like some information on video-tape recorders. I am mainly interested in servicing and installation as I feel this item will be very popular with the public if the technician can properly demonstrate their operation.

A home study course is what I had in mind.

DENNIS R. CARPER
12011 BLACKMER
GARDEN GROVE, CALIF. 92641

I would like to have someone contact me that has any of the old E. H. Scott schematics. I would gladly pay someone for Xerox copies of these.

ROBERT DE HAAN
Osceola Electronics
126 Mill Street
Marion, Michigan 49665

Can any of your readers advise me where to obtain a 35D5 tube or a suitable replacement?

This tube is used in an imported record player and the manufacturer does not answer my letters, although I know they are still in business.

I think one of the things that gripes me most is the lack of service data on so many of the "off shore products." Recently, a customer brought in a dead radio he had purchased less than four months ago from a discount house. When I wrote the "Importer," it replied that there was no service data available as the radio was "discontinued" two years ago.

I can't face my customers with an alibi like that. They buy in good faith and expect reasonable service, and if they don't get it, we all suffer.

I would like to suggest that all products sold in this country require certification as to the availability of service data and parts. Then the certificate should have to be attached to the product for all to see.

DALE SMITH
DALE'S TV & ELECTRONICS
P.O. BOX 415
GRANITE FALLS, WASH. 98252

I have just acquired a Crosley regenerative receiver, Ace Type V, manufactured by the Precision Equipment Co., Cincinnati, Ohio. It is of a 1921 vintage.

I would like to obtain information on the set and locate a replacement tube, No. WD-12.

If you have any information on this set or could possibly refer me to some other source, I would be greatly appreciative.

JOE FERNANDEZ
2584 PEBBLE BEACH DR.
SANTA CLARA, CALIF. 95051

I desperately need to locate a source of parts for a Bell Sound Div. (TRW) tape recorder Model T-347. Specifically, I have an immediate need for one reel platform, Bell Part No. 89A12, and for one meter, Record Level Indicator, Bell Part No. 46B10.

I hope one of your readers will be able to help me.

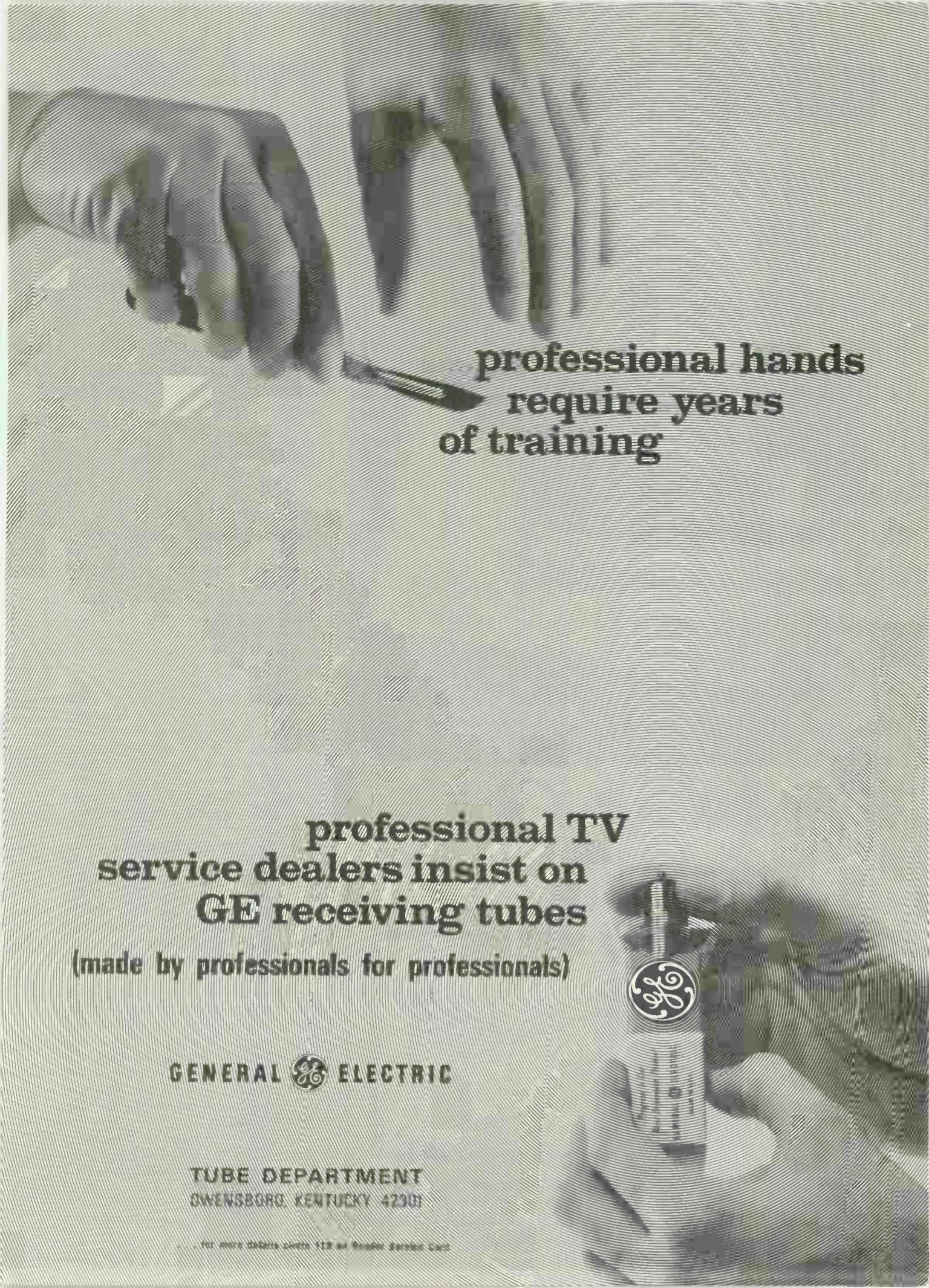
I enjoy reading your magazine and find it helpful. Thank you.

ROBERT L. CARNEY
18117 OCCIDENTAL AVE. S.
SEATTLE, WASH. 98148

I have a Silverfunken radio to repair, but cannot find schematics for this set anywhere. This set has AM-FM, short-wave and a stereo record player. I think this radio was made in West Berlin, Germany, about 1963 or 64.

Its serial no. is 146965. Some of the tubes used are ECL82, ECH81, ECC85, EABC80, EF85 and a bridge-type rectifier.

I would greatly appreciate receiving


professional hands
require years
of training
professional TV
service dealers insist on
GE receiving tubes
(made by professionals for professionals)
GENERAL ELECTRIC
TUBE DEPARTMENT
OWENSBORO, KENTUCKY 42301

ET/D LETTERS TO THE EDITOR

schematics for this radio and will send a money order for same.

FRED POOLE
1470 Howard Ave.
Windsor 14, Ontario

As a new subscriber to ELECTRONIC TECHNICIAN/DEALER, let me congratulate you on a very fine technical magazine.

Could any of your readers help me locate operating instructions for a Model 56 oscilloscope manufactured by Conar Products of Washington, D.C.?

I have written to Conar, but to no avail.

I will gladly pay postage, photo copy them and return them within 48 hours.

DONALD W. SHUTT
Rt. No. 1, Box 99
St. Regis Falls, N.Y. 12980

I would sure appreciate it if one of your readers could supply me with a schematic, or copy thereof, for a Morrow Model MB-560 amateur transmitter.

CHAN SHIPPY
RFD 2
Colome, S.D. 57528

I am interested in finding out where I can get information about new and used radio and television broadcast equipment. Would you be able to help me in any way?

ERROL D. MOEROYK
RR 6, Box 261
Three Rivers, Mich. 49093

I would like to obtain Vol. 5 and 6 of Tekfax. If you don't have them, perhaps a reader has.

HENRY L. MARPLE
30 Meadow St.
Buckhannon, W. Va. 26201

Finds Errors in Article

Having just read the second article on Selling CCTV in the March issue, I must find fault with a few of your comments.

My specialty over the past couple years has been cleaning and maintaining video tape recorders, and this is naturally a sensitive point with me in talking with customers.

The article states that *Q tips* should be used to clean the head and to rub it *up-and-down* across the video head. Both of these recommendations will be certain to break the video head. Instead, the head should be rubbed sideways, and it is much more efficient to clean the head with a piece of fine *linen* (handkerchief material).

In addition, the article states that alcohol or carbon tetrachloride should not be used for cleaning video tape units. There is no reason why alcohol cannot be used! In fact, alcohol is the safest liquid to use, especially on the rubber capstan and video head. For stubborn cases, the video head can be cleaned with Zylene, but only if heavily clogged.

Elsewhere, the article states that when degaussing the tape guides, the degausser should be applied near the metal guide and *then* turned on. If this instruction is taken literally, the metal guide may very well be *magnetized* to the point where the degausser will subsequently not be able to neutralize the guide.

I found the balance of the article very well written and helpful. I trust you will welcome constructive criticism like this in trying to maintain practical accuracy in your material.

T. DAVID THOMPSON

ET/D TECHNICAL DIGEST

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

DELCO RADIO

Radio Tape Player—Fast Motor Speed Check

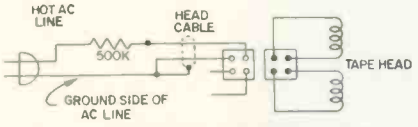
Since an Electronic Motor Speed Control Circuit is now being used to control the motor speed, the speed adjustment procedure has been changed. The adjustment is made by inserting a "large hex" alignment tool into speed control, R111, and rotating it clockwise to increase the motor speed and counterclockwise to decrease the speed. A very slight rotation of R111 makes a considerable speed variation.

Using the J-22683 Test Tape and adjusting R111 until the "beeps" on Track six are sixty seconds apart is a satisfactory but time consuming way of adjusting for proper motor speed.

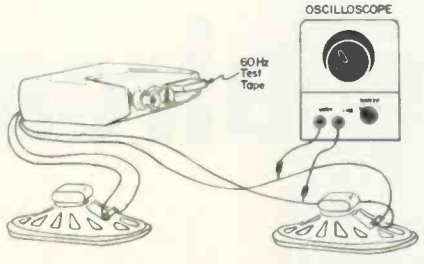
The following procedure is a fast and accurate way of adjusting the speed on any Delco Radio tape player:

Obtain a tape cartridge with a 60Hz signal on one or more of the tracks. You can make your own, using the following simple procedure.

(1) Obtain a blank tape cartridge or erase an existing tape using a strong magnet. (2) Obtain a Delco tape player and set the motor speed using a conventional test tape to exactly 59sec. (3) Disconnect both leads of the head cable from the circuit board and connect one lead as shown in the illustration to ac line.



Caution: Using a 120v range ac voltmeter, make certain the hot ac line is connected to the 500K resistor as shown. On commercial power lines, one side of the ac line is at earth ground, the other is hot. To determine which is which, connect one lead of an ac voltmeter to earth ground (cold water pipe, electrical conduit, etc.) and measure the voltage at the end of the wires going to the plug. The ground wire will have no voltage, and the other lead, the hot side, will have 110vac to ground. Failure to observe the proper connections could result in damage to the tape head and danger of serious electrical shock. (4) With the 60Hz signal applied to the tape head as shown, insert the blank cartridge and allow the tape to go through the player one complete cycle (four track changes). You now have a tape with a calibrated 60Hz signal.



To adjust the tape speed, insert your 60Hz test tape into the player. Connect an oscilloscope across the speaker producing the 60Hz signal. With the scope sweep in the "line position" (60Hz ac sweep), adjust the speed control, R111, until the pattern on the scope is a circle or an oval and the pattern is standing as still as possible. When this occurs, the tape player is putting out a 60Hz signal which means the speed of the tape is exactly right.

DELCO RADIO

1970 AM/FM or Stereo AM/FM Radio—Dead When Tuned to High End of FM Band and Connected to Windshield Antenna

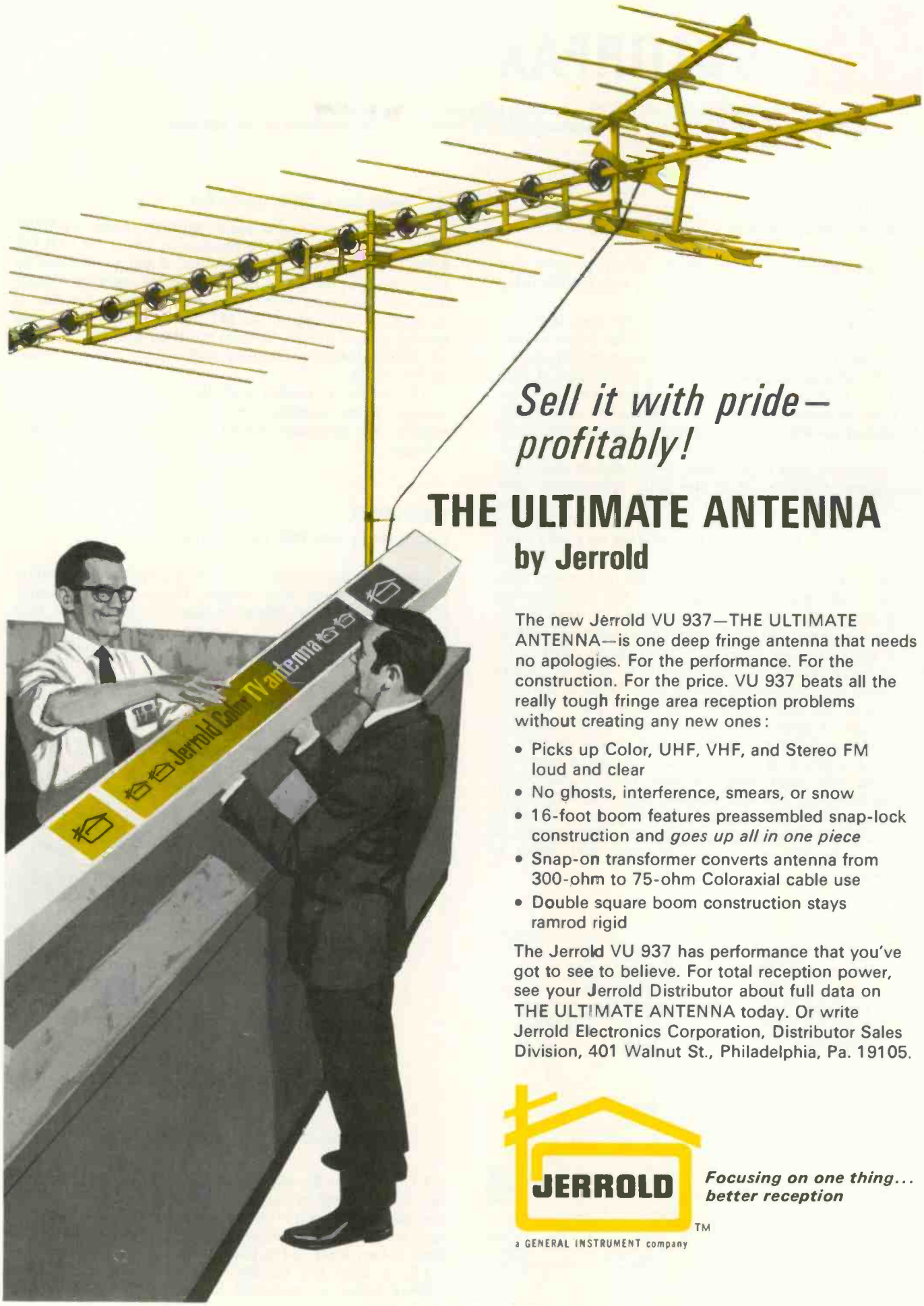
Condition: 1970 AM/FM or Stereo AM/FM radio goes dead or intermittently goes dead near the high end of the FM band. The radio may be "blocking up." (This means completely dead or no sound at all.) Cause: When a metallic object such as the windshield wiper passes by the windshield antenna, the impedance of the antenna is changed. This could cause a momentary or permanent high frequency oscillation in the FM RF stage, causing the radio to "block up" or go dead on both strong and weak FM stations. NOTE: The "block-up" condition will not show up when the radio is connected to a whip antenna due to its different impedance characteristics. Some windshield wiper "swish" or partial loss of signal is normal on weak stations.

Bench Diagnosis: The "block-up" problem only occurs when a windshield antenna is connected to the radio, due to the impedance characteristics of the windshield antenna. Therefore, it is necessary to simulate the impedance of the windshield antenna when the radio is operated on the bench. This can be done by using the following procedure:

(1) Remove the covers of the radio. (2) Connect 14vdc and a speaker to the radio and tune the radio to the low end of the dial. (3) Switch the radio "on" and to the FM band. Turn the volume control up so that loud "FM hiss" is heard from the speakers. (4) Using a screw driver (not a jumper lead), short the center conductor of the antenna socket to ground. The FM hiss should still be heard. (This shorted antenna test results in approximately the same impedance as is present when the windshield antenna is connected to the radio.) (5) Tune the radio slowly toward the high end of the FM band. If the "FM hiss" disappears near 104 to 108MHz, the radio is "blocking up." Cure: On the FM and Stereo FM radios having a ratio detector, solder a 10K resistor in parallel with R11, the 3.9K resistor. This resistor is located on the IF circuit board and connects the base of the RF amplifier to the FM AGC diodes. For models using the DM-11, ICQD, solder a 15K resistor in parallel with R16, a 6.8K resistor. This resistor is located on the RF circuit board and connects the base of the RF amplifier to ground. Use this fix only on sets that were diagnosed as "blocking up" above.

Radio Model 05CMWK1—AM Dead and Wonder Bar Tuner Inoperative

Condition: A radio owner may complain that he cannot receive AM and when he depresses the Wonder Bar the tuner will not seek. Cause: The AM antenna trimmed lead may have shorted against the Wonder Bar relay applying 14v to the primary of the AM antenna transformer (L1D). This can deform the antenna coil enough to cause the core to bind in the coil sleeve. This fault also may open the AM antenna transformer. Correction: (1) Replace the coil board with new part number 1223074. Note: The part number printed in the 6D-1970-1 Service manual is in error. (2) Remove the short at the relay and antenna trimmer to prevent recurrence.



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by Jerrold

The new Jerrold VU 937—THE ULTIMATE ANTENNA—is one deep fringe antenna that needs no apologies. For the performance. For the construction. For the price. VU 937 beats all the really tough fringe area reception problems without creating any new ones:

- Picks up Color, UHF, VHF, and Stereo FM loud and clear
- No ghosts, interference, smears, or snow
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- Snap-on transformer converts antenna from 300-ohm to 75-ohm Coloraxial cable use
- Double square boom construction stays ramrod rigid

The Jerrold VU 937 has performance that you've got to see to believe. For total reception power, see your Jerrold Distributor about full data on THE ULTIMATE ANTENNA today. Or write Jerrold Electronics Corporation, Distributor Sales Division, 401 Walnut St., Philadelphia, Pa. 19105.

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Focusing on one thing... better reception

. . . for more details circle 117 on Reader Service Card

COLORFAX

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

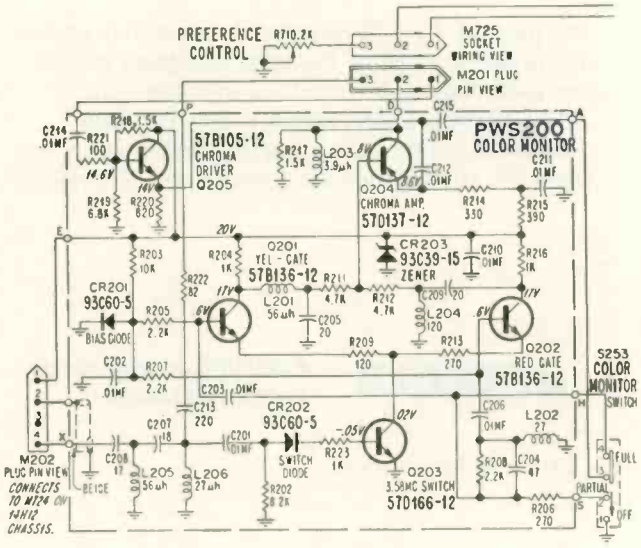
ADMIRAL

Color TV—Color Purity Information

This revised procedure applies to all recent tube type color TV sets and is more important on new models using the extra bright picture tubes.

Place the set in position where it will be used. If the set is portable and will be moved around, the purity adjustments should be made with the set facing north or south.

(1) Let the set operate for at least 15 minutes at high brightness level but below blooming before setting purity. (2) Careful degaussing with a manual coil is recommended and may be required on installation. Do not turn set off while still in the degaussing coil's field. (3) Check for correct location of neck components. (4) Rough-in center dot convergence as explained in the static convergence procedure. (5) Loosen deflection yoke clamp and slide yoke back to convergence assembly. (6) Set both round purity tabs on top. (7) Remove 3rd IF tube (6JC6A). (8) Turn green and blue background controls to minimum or pull cathode leads from drive pins. Turn red background control up if necessary to get red raster. (9) Slowly rotate purity rings and at the same time spread tabs apart to adjust for a uniform red field around center area of screen. Never place the two round tabs 180 degrees apart. (10) Slowly move deflection yoke forward on neck of picture tube while observing entire screen area. Position yoke for best overall red screen without shadow or purity error at outer edges of screen. (11) Check green raster and blue raster by turning down other two background controls as explained in step 8. If necessary, touch up purity rings and deflection yoke until fields are pure. (12) Tighten yoke ring securely but not overly tight. (13) Replace 3rd IF tube. Adjust blue and green background controls for white raster. The yoke and purity tabs can be moved slightly to provide a uniform white raster if each field purity is maintained.



Color Monitor Chassis 14H12—Service Hint

All of the color signal passes through transistors Q204 and Q205 regardless of the position in which the COLOR MONITOR switch is set. Therefore, if the picture has no color, the trouble could be in the color monitor circuit. You can determine whether or not the color monitor is at fault by unplugging the M725 three wire socket and placing a short jumper between positions one and two. The set should function normally without the color monitor in the circuit.

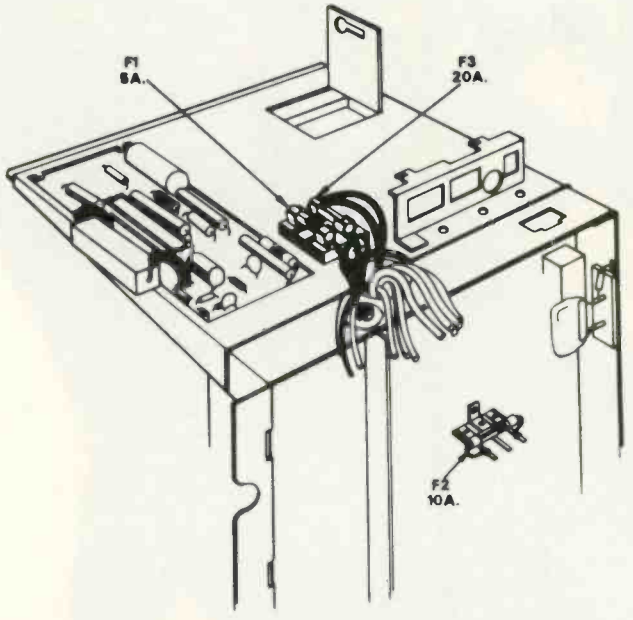
The schematic packed with the sets did not show the voltages at the transistor connections in the color monitor section. The schematic shown is complete with transistor voltages.

MAGNAVOX

Color TV Chassis T936, T939, T940—Fuses Added

Recent production changes have incorporated additional fuse protection on these chassis. These fuses are clearly identified by a label affixed to the chassis near the fuse location.

On the T940 chassis there are three fuses in addition to the circuit breaker.

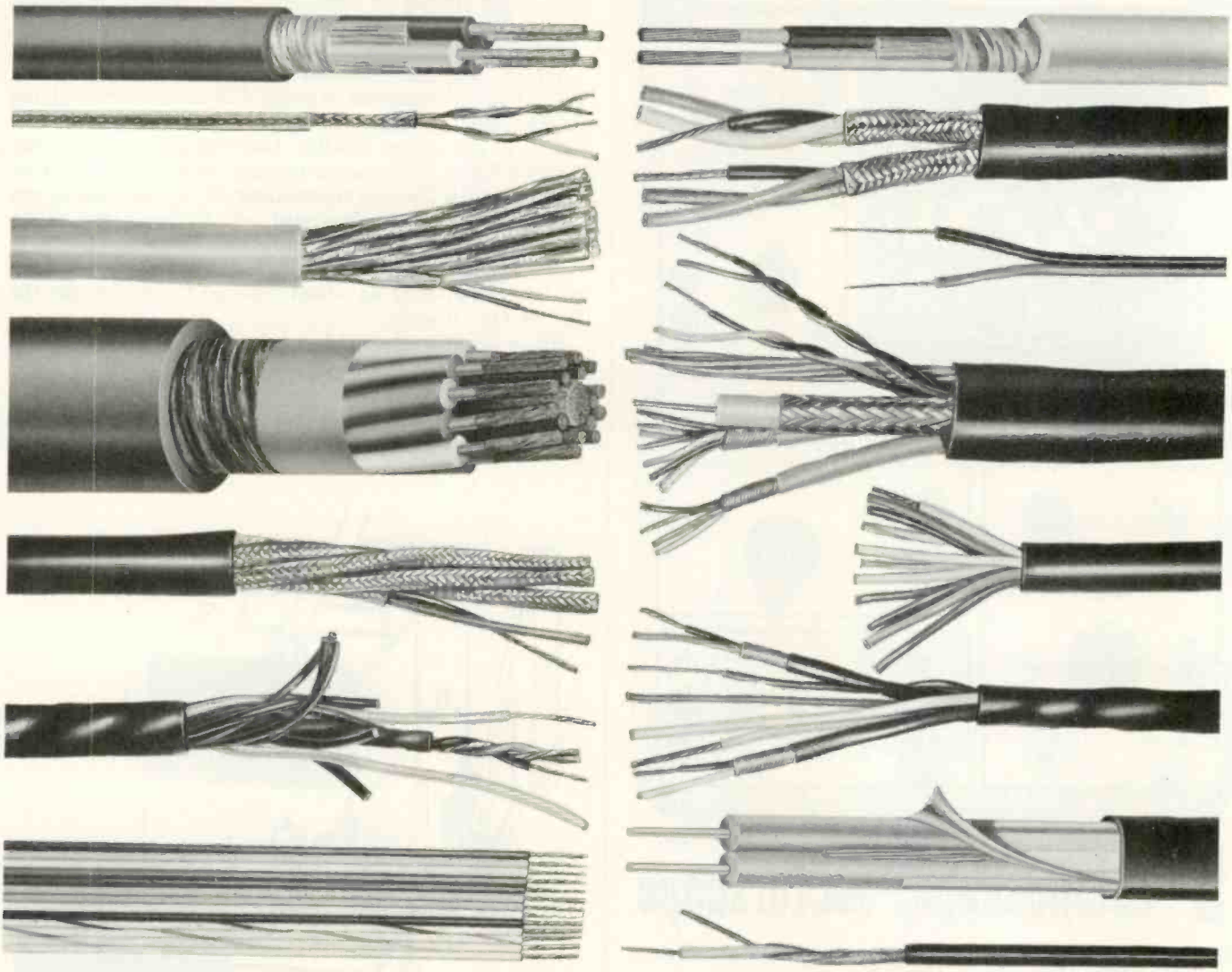


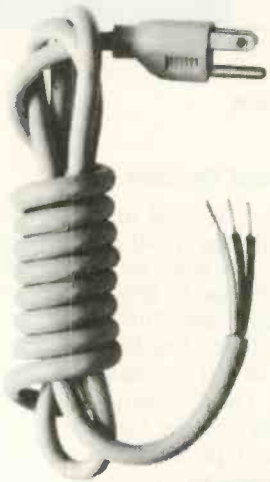
T940 Chassis (bottom view)

F1, a 5a, 125v Slo-Blo fuse (Magnavox Part No. 180157-19) is connected in the 120vac supply line prior to the line choke and power transformer primary winding. This fuse provides additional protection even when the instrument is turned off and in the "Quick-On" position.

F2, a 10a, 32v Slo-Blo fuse (Magnavox Part No. 180948-3100) is connected in the "H2" heater supply

Columbia- the complete wire and cordset line.





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Columbia Electronic Cables

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. . . for more details circle 108 on Reader Service Card

ET/D COLORFAX

which provides heater voltage for the color CRT, Shunt Regulator and AGC Amp.

F3, a 20a, 32v Slo-Blo fuse (Magnavox Part No. 180157-39) is connected in the "H3" heater supply circuit.

F1 and F3 are mounted in fuse holders located on the side of the chassis, as illustrated below, and F2 is located on a terminal board on the underside of the chassis.

On the T939 chassis there are two added fuses.

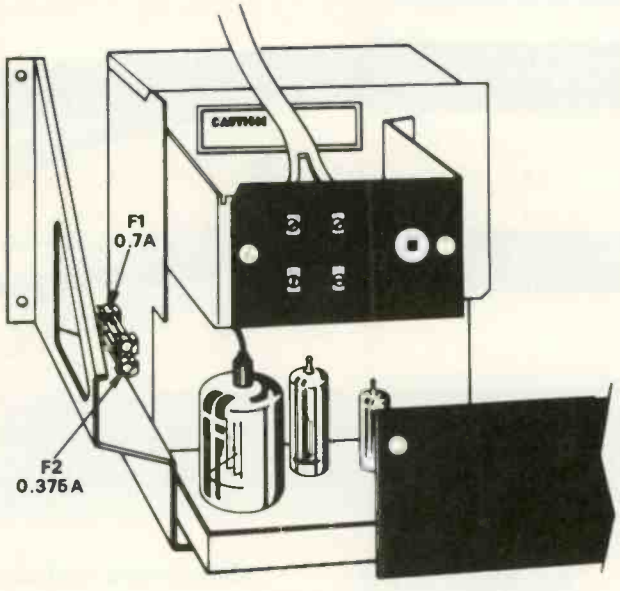
F1, a .5a, 125v Slo-Blo fuse (Magnavox Part No. 180157-17) is connected in series with the primary winding of the filament transformer.

F2, a .6a, 125v Slo-Blo fuse (Magnavox Part No. 180948-5060) is connected in series with the "Quick-On" winding of the filament transformer. F1 is mounted on the side of the chassis as illustrated, and F2 is located on the underside of the chassis.

On the T936 chassis you will find either one or two added fuses, depending on whether or not the model uses the "Quick-On" feature.

F1, a .7a, 125v fuse (Magnavox Part No. 180157-37) is connected in series with the primary winding of the filament transformer.

Both fuses are located in fuse holders located on the side of the chassis as illustrated.



T936 Chassis

Color TV Chassis T939 and T940—Improved Thermistor

Thermistor, Part No. 230170-2, is used in the auto-degaussing circuit on both the T939 and T940 chassis. Some cases have been reported, where the leads on this thermistor have separated from the body due to heat in the T939 chassis. A new improved version of the 230170-2 thermistor is now being used which can be identified by the fact that approximately 75 percent of the surface area of the body on both sides is soldered. On the early version, the leads appeared to be spot soldered to the body.

You should use only the later type as a replacement in the T939 chassis. The early version can continue to be used as a replacement in the T940 chassis. Magna-Par will stock and ship only the improved version.

continued on next page

Don't sell a color picture tube unless its been on a test ride.

Down at the bottom of the page, you have a major advance in space-age homeliness.

And a major advance in color tube testing as well.

That machine squatting down there is our beloved Iron Horse, the fully-automated, revolving carousel we use to test our color bright 85® tubes for emission, gas leakage, shorts, arcing and screen uniformity prior to shipment.

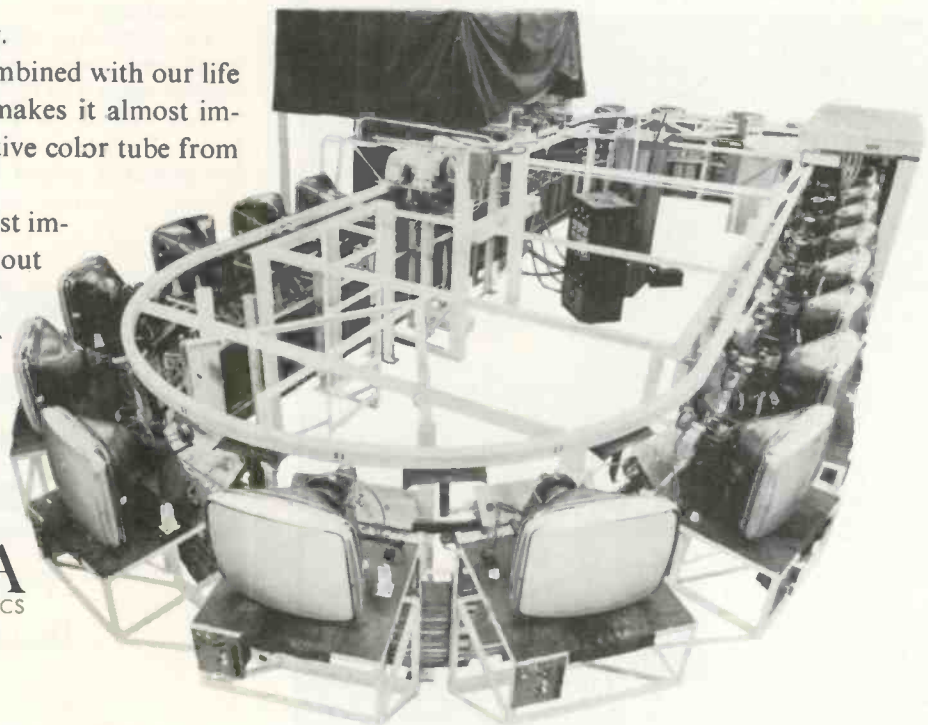
Now we don't intend to go into a song and dance on how total automation reduces testing error.

But we will tell you one thing.

Our Iron Horse test ride, combined with our life testing and 100% set testing, makes it almost impossible for you to get a defective color tube from us.

Which in turn makes it almost impossible for you to get chewed out by a customer.

Next time you need a color replacement tube, remember the great thing about the color bright 85. We don't send it to you till it's been around.



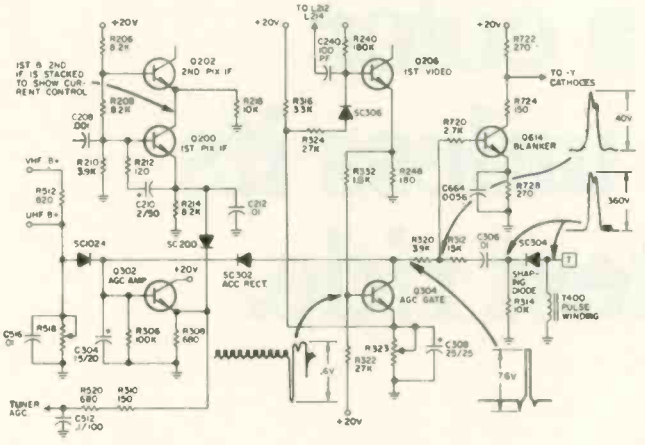
SYLVANIA
GENERAL TELEPHONE & ELECTRONICS

ET/D COLORFAX

SYLVANIA

Color TV Chassis D14—Peak Detector—AGC Circuit Description

The new color TV chassis, D14, uses a peak detector-AGC system to control signal gain in the first and second IF stages.



The peak detector's AGC gate characteristics are variable in terms of impedance. When the base signal amplitude on transistor Q304 is high, the gate impedance is high. Likewise, when the composite signal applied to the base is low, the gate impedance is low.

The AGC gate collector voltage is applied during flyback trace when a positive pulse from the T400 pulse winding triggers Q304 collector positive through attenuating resistors R322, R312 and coupling capacitor C306. The base-emitter forward voltage is coupled from the voltage divider resistors, R322, R332 and R248, placing Q304 in the "on" mode. Negative sync signal is applied to the base of Q304 from the 1st video amplifier emitter resistor R248. This negative going signal blocks the forward voltage from the bias network, reducing Q304 conduction. When Q304 is in a low conduction state, it presents a high shunt impedance to the positive pulse applied to its collector and thus causes no appreciable attenuation.

When SC200 is reversed biased, the only conduction path for Q200 is through R214. This 8.2K ohm voltage drop increases the emitter voltage, reducing the V_{be} and stage gain.

Weak signals result in a lower amplitude sync applied to the base of Q304 placing less blocking voltage against the forward bias. This forward bias puts Q304 into a high conduction mode, making the transistor act like a low impedance when it receives the collector positive pulse. This low shunt impedance effectively reduces the pulse amplitude applied to the AGC rectifier, SC302.

When Q200 emitter impedance is lowered, the emitter voltage decreases causing the transistor V_{be} to increase and result in more IF stage gain.

Signal Condition	Q No.	Function	Vc	Vb	Ve	Symptoms
Normal	304	AGC Gate	2.4	2.9	2.7	None
Weak	304	AGC Gate	2.125	2.85	2.125	Noisy Pix

Test point [T] 350 to 360V pk/pk pulse.

Signal Condition	Q No.	Function	Vc	Vb	Ve	Symptoms
Normal	302	AGC Amp.	19.6	7V	6.4	None
Weak	302	AGC Amp.	19.6	3	2.5	Noisy Pix

Component Number	Failure Mode	Symptoms	Vc	Vb	Ve
SC302	Open	No Raster	20	0	2.4
C304	Open		20	3	4
R306	Open	Raster Brightens	20	8	7.5
R308	Open	Raster Brightens	20	8	8
Q302	Open	No Raster	20	20	3

A dc scope can be used as a voltmeter for both dc and peak to peak voltage readings, or use a VTVM for the dc measurements.

The following readings were taken under two signal conditions: normal and weak, at Q304 collector, base and emitter using a VTVM.

Test Procedure: (1) Connect the color bar generator to the TV set tuner antenna terminals. (2) Adjust color bar generator output to normal (preselected).

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*The number of dots, lines, and bars indicated for a 9 x 9 display is the number displayed if the receiver under test has no overscan.

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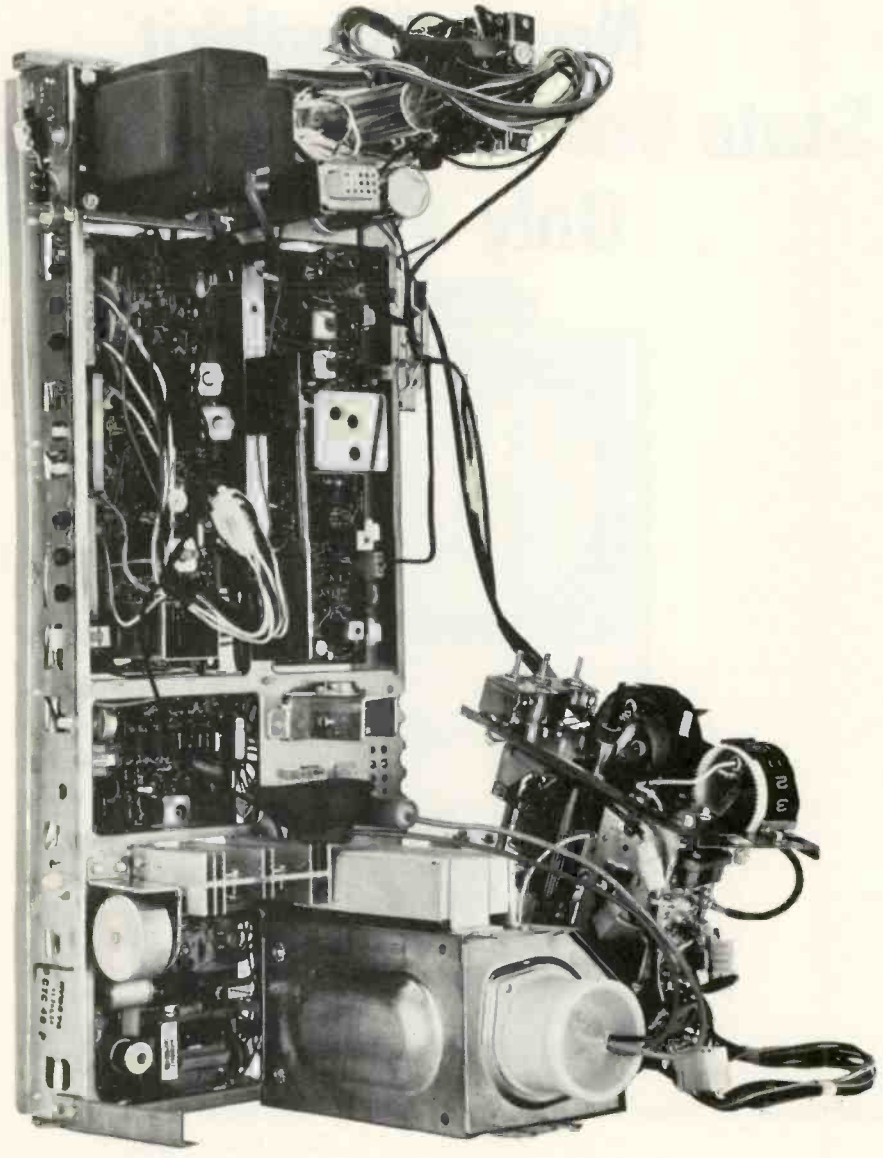

There's more here than meets the eye.

What you are looking at is RCA's solid-state color chassis—the CTC-40. A whole lot went into that chassis. Like fifteen years of technical research. Pioneering in the development of Solid State. And the backing of a national workshop program like nobody else's.

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RCA

ET/D TEKLAB REPORT

Integrated circuits are now employed in the color demodulator and sound circuits, reducing the number of separate components

By JOSEPH ZAUHAR

Introducing Motorola's Quasar II Color TV

PART 2

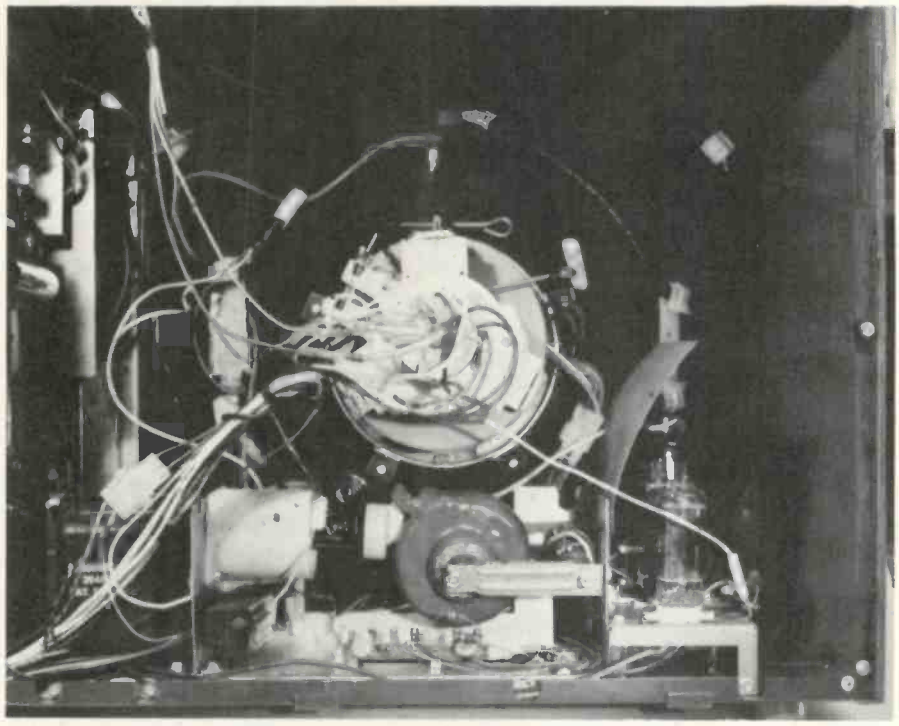
■ Last month we reviewed the Power Supply, DC Path, ACC Amplifier and Color Killer, Crystal Driver, Amplifier and the 3.58MHz Oscillator circuits.

We will now continue with more of the important circuits, some with Integrated circuits.

RED, BLUE AND GREEN VIDEO OUTPUT STAGES

All three video output stages are identical so only one will be discussed. This stage, shown in Fig. 3, is a linear amplifier driven by a low impedance video signal and an emitter follower video amp in the "IC." It is important to have the proper cathode current at each CRT gun to produce proper tracking (white) at high brightness. A "drive" control is placed in the emitter of each video output transistor to set the current through the device and control the CRT collector voltage.

Each drive control is connected



The power transformer and HV circuits are located in the center rear portion of the cabinet. The horizontal transformer is shown completely exposed, after removing six screws and a panel.

to a voltage source by a voltage divider between ground and the regulated 20v supply. The collectors are supplied a relatively constant voltage (+200v) through 10K collector load resistors.

The advantage of using a regulated low impedance supply source is apparent if we consider the alternative of using a dropping resistor in place of the regulator circuit to lower the 285v to the desired 200v level. Let's set up the conditions for magenta and use 50 percent conduction of both the red and blue video output transistors with the green cut off. We will have some definite amount of 1R drop across the dropping resistor, placing collector voltage at a given level. If the green video output is now turned on, a greater 1R drop will occur across the dropping resistor and cause the collector voltage on the red and blue outputs to drop, which increases conduction of the red and blue gun in the CRT.

The regulator circuit provides a low impedance, relatively constant voltage source to the video output transistors. The regulator transistor is protected from CRT arcing by the diode (emitter to base) and in the event of regulator transistor shorting the 3.3K resistor in the regulator collector will still drop some of the

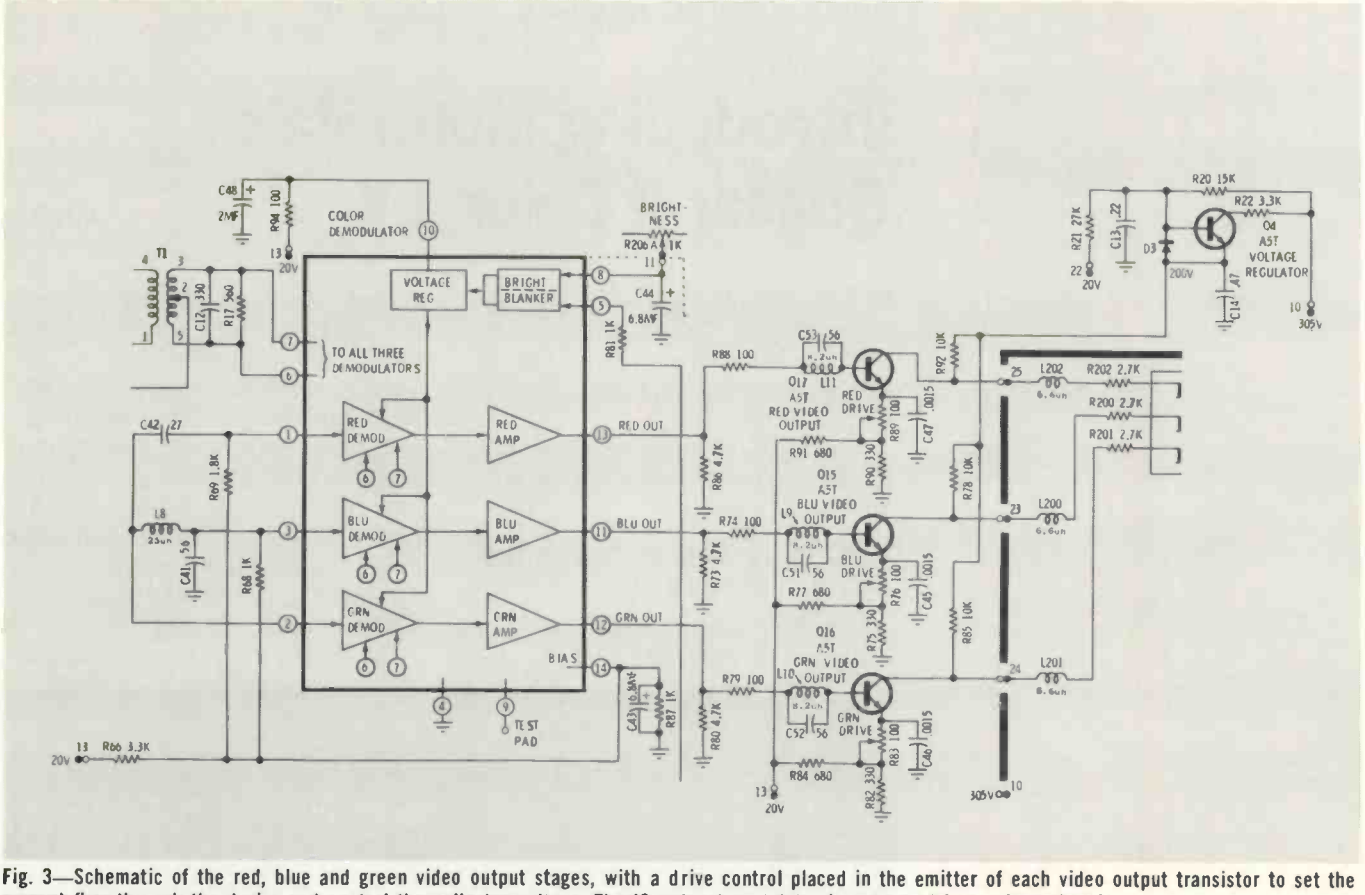
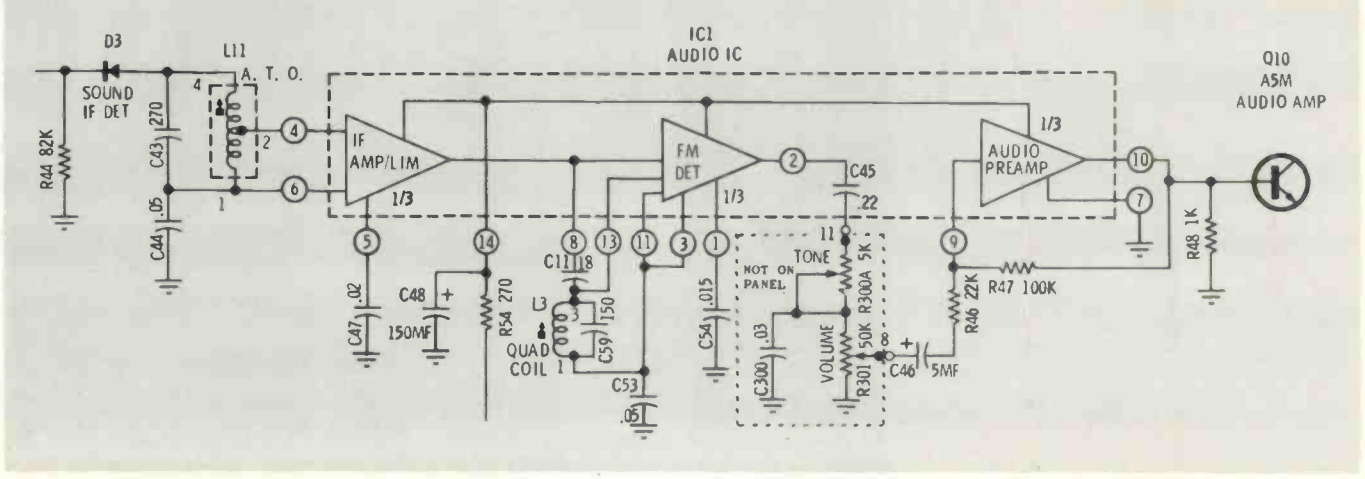


Fig. 3—Schematic of the red, blue and green video output stages, with a drive control placed in the emitter of each video output transistor to set the current flow through the device and control the collector voltage. The IC color demodulator is not found in previous chassis.

Fig. 4—Schematic of the audio "IC" which provides automatic recovery of the audio and cancellation of the 4.5MHz carrier.



B+ to the video outputs.

IC COLOR DEMODULATOR

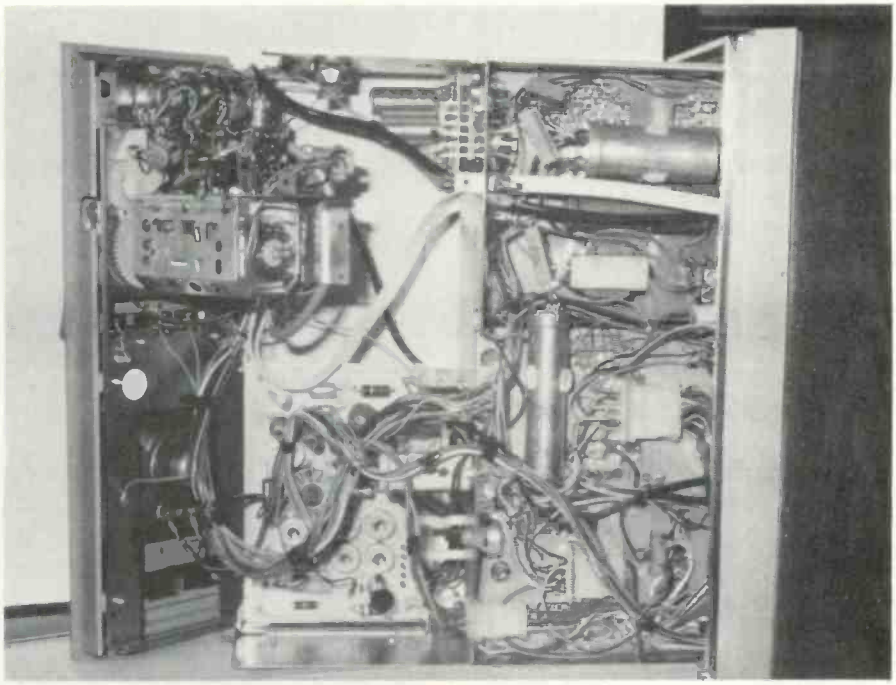
This new device, shown in Fig. 3, provides color fidelity and functions not previously found in discreet components and previous sets. Some of the features found in this circuit include: (1) The three separate demodulators produce linear color outputs according to the phase of the color IF information. Internal gain compensation makes further external matrixing unnecessary and undesirable. (2) The 3.58MHz subcarrier is automatically cancelled in the demodulator eliminating the need for traps. (3) An internal "voltage regulator" helps eliminate color variations with supply voltage changes. (4) B/W (Y) signals are also processed through and amplified in the IC independently of the color signals present. (5) DC coupling for the Y signals continues the dc path from the detector to the CRT. (6) Blanking and brightness control are achieved by low-level voltages applied to the IC.

The B/W signal is applied to terminals six and seven of the IC through the secondary of the 2nd color IF transformer. The color demodulators in the IC amplifies the B/W signal, with a phase shift of 180 degrees. The red, green and blue amplifiers in the IC are emitter followers and no further phase reversal occurs. The amplified output B/W signal is unchanged in waveform but now has negative going sync and blanking.

Color sideband information is applied to all three demodulators in parallel. For color demodulation, the 3.58MHz reference signal is compared with the color information at all three demodulators.

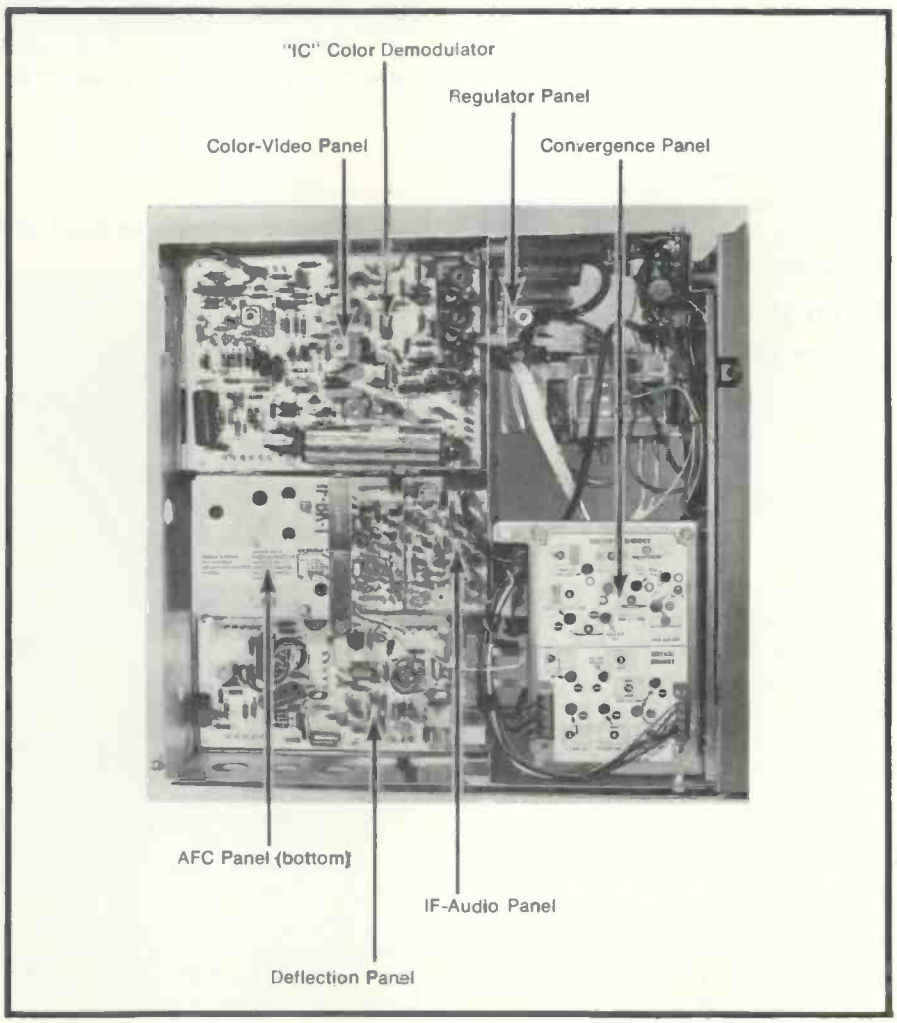
The red, green and blue demodulators each receive the 3.58MHz reference signal, but the phase of the reference is shifted to correspond to the color to be recovered. The reference is applied directly to the green demodulator (terminal two) and shifted by the external phase shifting network to the red (terminal one) and blue (terminal three) demodulators.

Color IF signals applied 180 degrees out of phase terminals six and seven are compared with the refer-



The control panel swings open on a hinge by simply removing three screws, making tuner and control servicing easy.

Panel side of the "works in a drawer" chassis removed from the cabinet exposing the six removable panels.



ence signal in the demodulators. Red, green and blue signals are recovered directly from the demodulators and applied to the emitter follower stages to drive the respective video output transistors. Demodulation and amplification for each color occurs in the IC.

Additional circuitry in the "IC" provides for voltage regulation, vertical and horizontal retrace blanking, brightness control and stabilization circuitry. Most defects in an IC are found by a simple voltage check.

HORIZONTAL OSCILLATOR DRIVER AND OUTPUT STAGES

The horizontal output, damper and HV circuitry is similar to that used in previous tube sets.

A modified Hartley circuit is used in the horizontal oscillator circuit and employs a transistor as the oscillator.

The oscillator is direct coupled to the grid of the driver tube (½ of a 6BL8), the driver amplifies and the associated circuitry shapes the driving signal which is coupled to the horizontal output tube (6LF6) grid.

Sweep regulation is provided by coupling a pulse from the flyback transformer back to a voltage dependent resistor (VDR). The action of the VDR is to provide a lowered resistance with an increase in voltage across it.

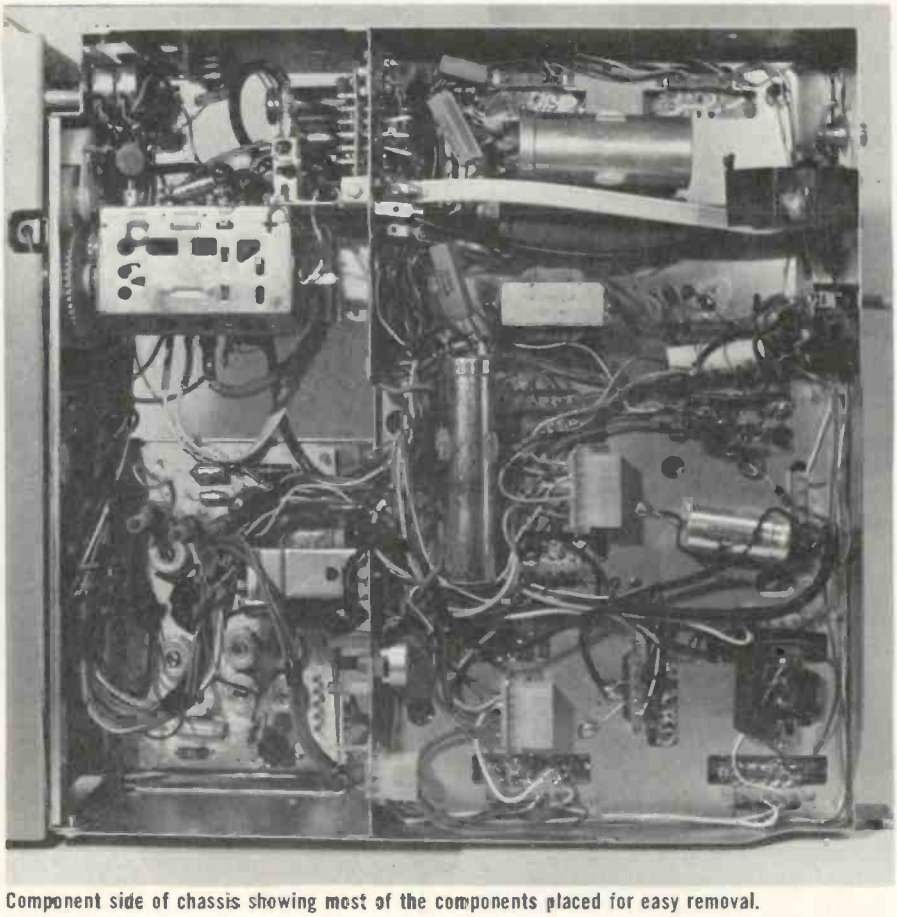
AUDIO IC

A new phase detector in the "IC," as shown in Fig. 4, provides automatic recovery of the audio and at the same time cancellation of the 4.5MHz carrier. A 90 degree phase shift coil is needed and is externally connected at terminals eight and thirteen.

The recovered audio at the output of the detector is available at terminal two and goes to the tone and volume controls. The audio is returned to the "IC" at terminal nine for low-level amplification.

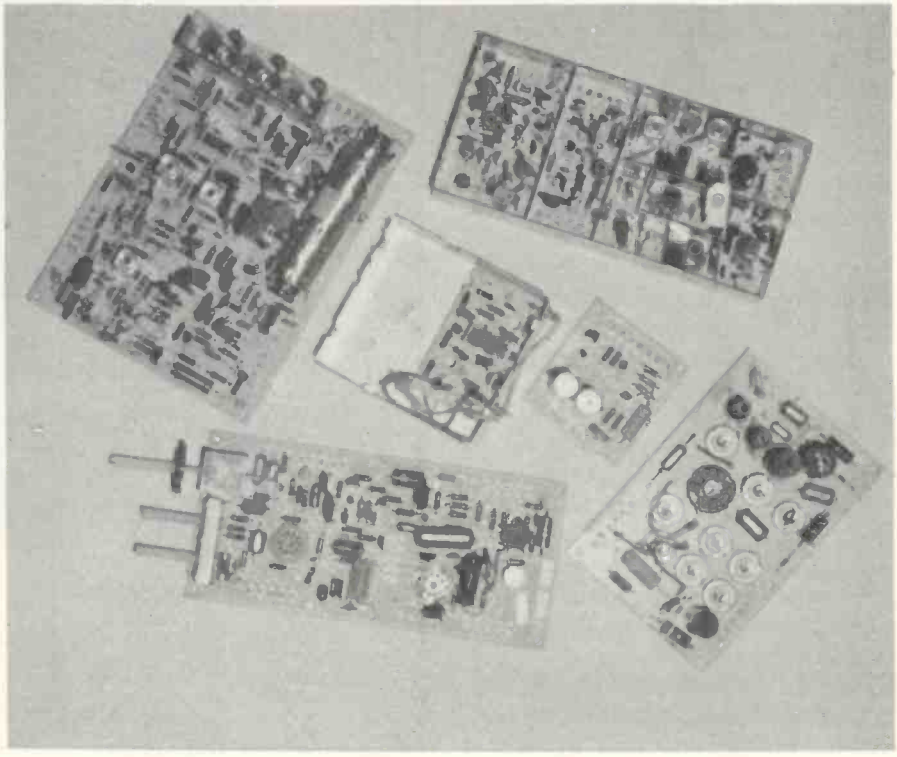
The audio from the "IC" is direct coupled from an emitter follower stage at terminal ten for impedance matching into the first stage of the audio amplifier.

If you are interested, the audio IC contains about twenty-two resistors, twenty-three transistors and seven diodes. ■



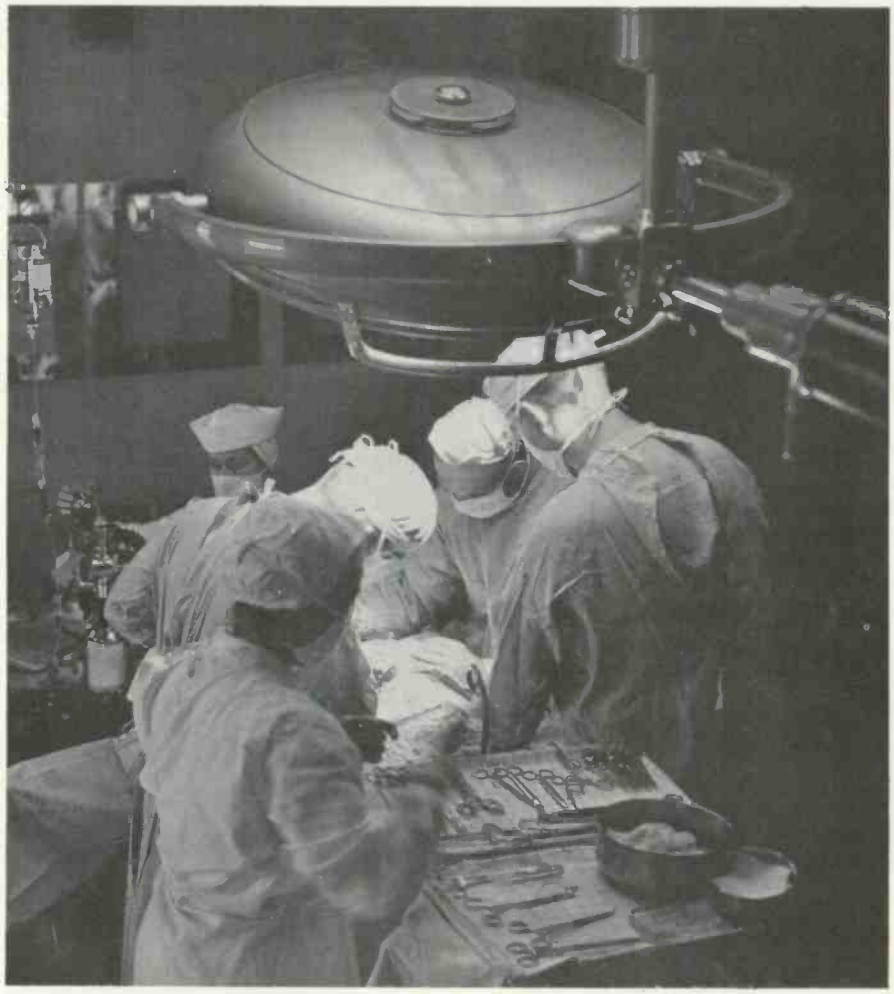
Component side of chassis showing most of the components placed for easy removal.

Major portions of the circuits are placed on the six snap-in panels, allowing more of the service to be done in the home.



CCTV in Medicine

When television pictures were first beamed to earth from live cameras on the moon, the field of closed circuit TV reached (if you'll pardon the pun) a high point. But CCTV has also been used to tremendous advantage in pushing back the frontiers of medicine



■ Although medical CCTV is still just in its infancy, the results are already impressive. Television is currently being used by the medical profession in five basic ways:

- As a training aid for doctors, nurses and medical students.
- As a means of remote diagnosis (Fig. 1).
- To observe the apparent condition of patients in intensive care wards, recovery rooms, radiation treatment rooms, etc. (Fig. 2).
- To permit children to visit patients via two-way TV hook-ups, as well as allowing visitation of patients with contagious diseases.
- To record operations as a defense against malpractice suits.
- For hospital security, speech therapy and psychiatric study.

Currently the most important use of medical CCTV is in training. According to Dr. Irving R. Merrill, director of the Communications Office for Research and Training at the University of California Medical Center in San Francisco, there are six CCTV capabilities of special use to doctors and medical educators:

- CCTV can *multiply* an image, enabling it to be viewed in 100 hospitals simultaneously.
- It can *magnify* a slide or surgical procedure so that it can be studied by large groups.
- It can *associate* the image of a damaged heart and its characteristic EKG, displaying them simultaneously on the same TV screen.
- It can *transport* a picture of a patient isolated in a sterile area to an adjacent conference room or to an auditorium filled with doctors.
- It can *transform* the grey scale within an image (on an x-ray, for example) to reveal information not available to the naked eye.
- It can *store* (on video tape) the image of a clinical condition or procedure for future presentation at an appropriate time.

Of the approximately 100 medical schools operating in the United States, about half already use television. While most of these systems are monochrome, the field is moving rapidly into color. Color is expensive, but its advantages in the medical field are obvious. In such areas as surgery and pathology, color is vital, especially for televising fresh tissue and microscope slides.

Incidentally, new technological developments are reducing the cost of color CCTV systems. Just a few years ago a color TV camera cost about $70,000, while one can now be purchased for under $15,000, and one of the industry's largest CCTV suppliers predicts that before the end of the year quality color TV cameras will be sold for less than $10,000.

MEDICAL MICROWAVE SYSTEMS

One of the problems in medical CCTV is the transmission of training materials from one hospital or medical school to another. The best solution to date has been the use of 2500 MHz systems. In 1963, the

FCC set aside 31 channels in the 2500 to 2686 MHz band for educational and cultural material. This band of frequencies, called ITFS (Instructional Television Fixed Service), is in the microwave spectrum, making it ideal for point-to-point transmission. Its prime advantage is that ITFS transmission is considerably less expensive than conventional broadcast or cable systems. A four channel ITFS transmitter costs as little as $50,000, while receivers and converters in individual hospitals or schools can be installed for $1000 to $1500. Fig.3 shows a typical ITFS system diagram, while Fig. 4 illustrates some typical transmitting and receiving equipment.

In May 1967, the first medical ITFS went on the air. Based in Atlanta, Ga., this system is run in conjunction with the National Medical Audiovisual Center (NMAC). It reaches some 24,000 medical personnel in 19 institutions, including 1500 doctors and 5000 nurses.

What kind of programs does NMAC transmit to compete with Laugh-In and Bonanza? They produce intriguing titles such as "Pathogenesis of Anemia," "New Diagnostic Procedures in the Diagnosis of Pituitary Diseases," and "Maternal and Fetal Physiology During Labor and Delivery."

TYPICAL MEDICAL CCTV SYSTEMS

The Passavant Memorial Hospital in Chicago, Ill., has $100,000 worth of CCTV equipment, and presents over 2000 hours of TV instruction to medical students each year. Since the hospital is associated with Northwestern University, video tapes are "bicycled" between the campus and hospital.

At the hospital a remote controlled zoom camera is built into the surgical lamp over the operating table. This camera picks up details of the surgical procedure. In addition, two cameras are used to provide an overall view of the two rooms in the surgical suite. A fourth camera is mounted on a tripod and dolly, and operated by a cameraman. Sound is provided by a wireless microphone around the surgeon's neck, plus an auxiliary microphone near the overhead camera.

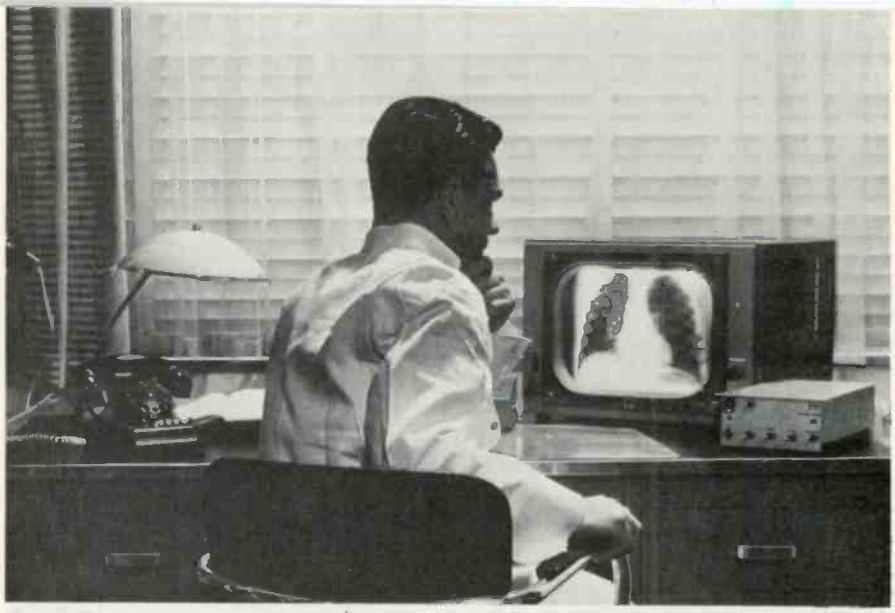
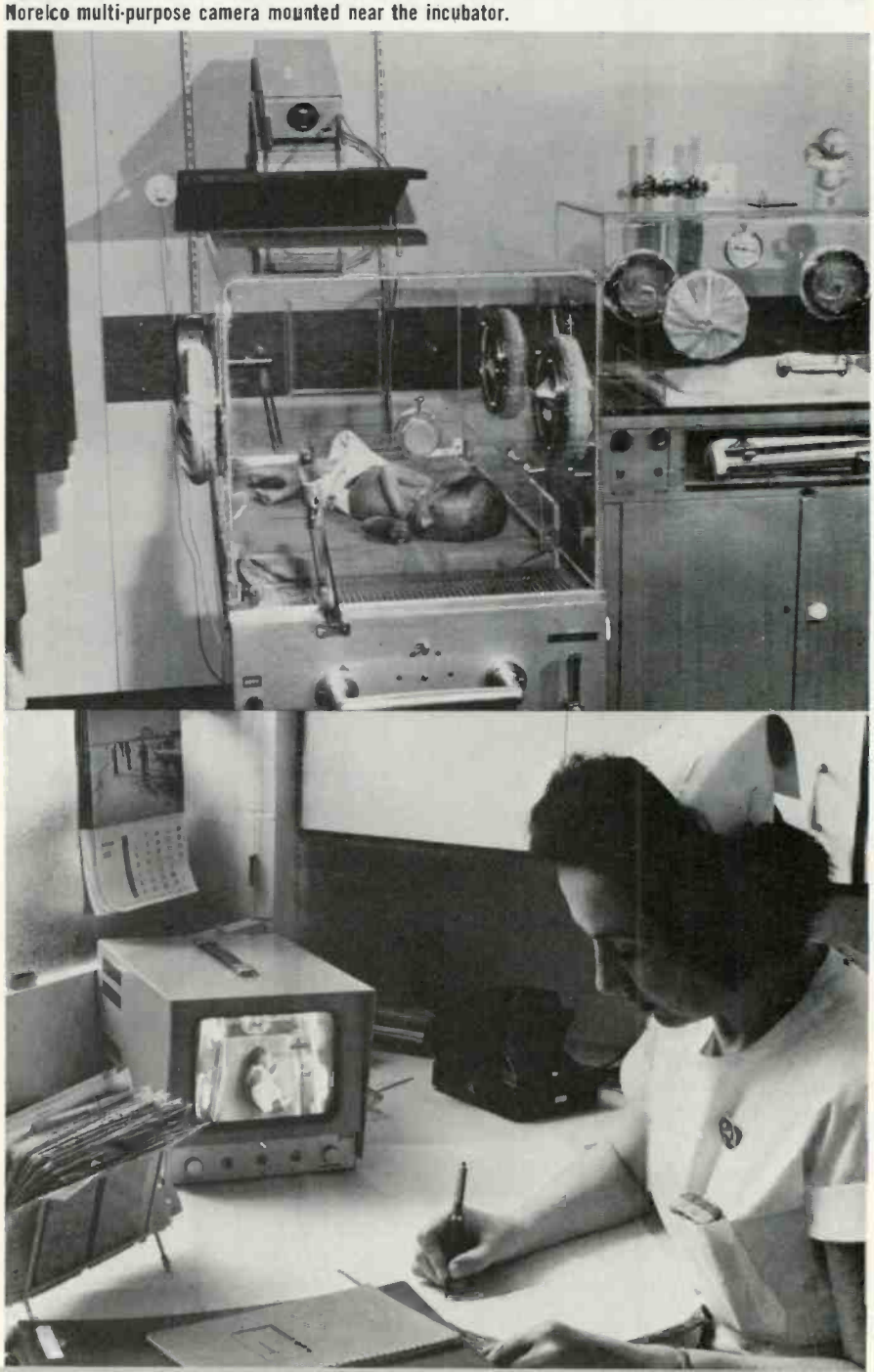


Fig. 1—The x-ray picture on the Norelco television monitor in the doctor's office originated from the x-ray filing room. Similarly, a TV camera in the laboratory can show the doctor an x-ray immediately upon development.

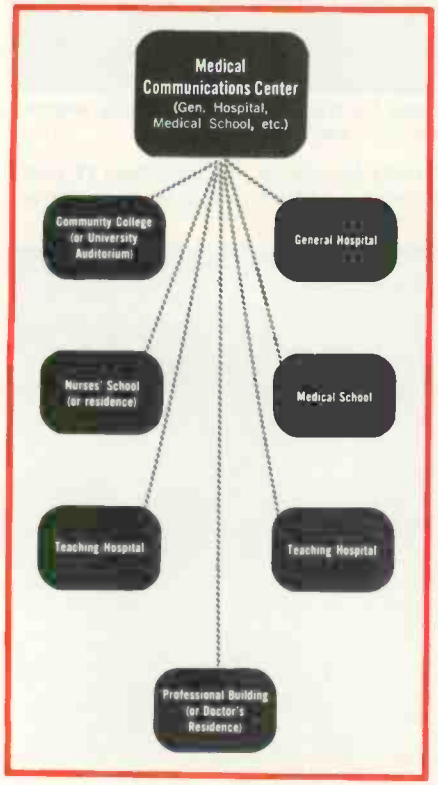
Fig. 2—A monitor at the nurse's desk enables her to watch an infant in its incubator—note the Norelco multi-purpose camera mounted near the incubator.



Students view the operation from an auditorium two floors below the surgical suite. They see the panoramic view of the rooms projected onto a 5- by 7-ft screen by a projection monitor. The other cameras are viewed on 25-in. monitors. Special effects and split screen techniques are used to dramatize important parts of the operation, and sometimes the camera pictures are supplemented by slides, x-rays or other visual aids. The entire operation is explained by a moderator, who can converse directly with the surgeon.

At Yale University's School of Medicine, faculty and students have been evaluating the desirability of video recording emergency cases. Tapes made at the scene of the accident were reviewed immediately in the emergency room of the Yale-New Haven Hospital. As a result, hospital physicians can see the position of the victim when the ambulance arrived, how the victim is treated before he is moved and how he is moved. In addition to the medical value of videotaping emergency cases, it is also a useful legal tool. Tapes made at accidents are also excellent for training nurses, ambulance crews, policemen, firemen and all paramedical personnel likely to be involved in emergency care.

Fig. 3—A typical instructional-television transmission network.



At the University of Oregon Medical School, hospital officials have recently been instrumental in the installation of two closed-circuit TV systems to monitor open heart surgery procedures conducted in the Portland, Oregon, institution.

Given the nod by Dr. Albert Starr, head of Heart Surgery and co-inventor of the famous Starr-Edwards valve used in the first heart valve implant conducted by him in 1961, this Sylvania lighting-camera unit (Fig. 5) collects invaluable video data for working surgeons and serves as a dynamic aid in the university's medical teaching role.

At the University of Tennessee, Dr. Harold P. McDonald, Jr., associate professor of Urology, uses color TV to record the view through a cystoscope. This instrument provides a view into the patient's bladder, peritoneal cavity, bronchus or stomach. Using a color TV camera and a color video tape recorder, the examining physician can share his view with colleagues and medical students.

The Brooke Army Medical Center at Fort Sam Houston, Texas, has a closed circuit color TV system regarded as the most extensive ever designed for medical training purposes. Center officials say that the use of color in TV training adds (Fig. 6) realistic dimensions and increases the lesson's impact and effectiveness. Viewing locations are planned in 12 center buildings, including two 1000-seat theaters.

At the University of Pennsylvania's School of Dentistry in Philadelphia, Pa., a closed circuit system (Fig. 7) carries pictures and the instructor's commentary to students at 16 monitoring locations. The two cameras in the system are equipped with variable gamma control, which insures that the TV pictures are properly balanced in the black-and-white scale between the white teeth and the darker surrounding area of the patient's mouth.

At Memorial Hospital in New York City, a single camera/monitor system is being used to observe patients in the cobalt treatment room. Nurses cannot be in the room during cobalt treatment; and, in fact, the walls are made with 6-in. lead and no windows in order to avoid radiation dangers. But the cobalt treatment can be watched on a TV monitor in complete safety.

Beth Israel Hospital has installed a color CCTV system for televising and videotaping brain operations. Their CCTV system is also being used extensively to facilitate patient visiting, nurse surveillance of wards and the observation of special treatment rooms.

Remote diagnosis is another more intriguing use of medical

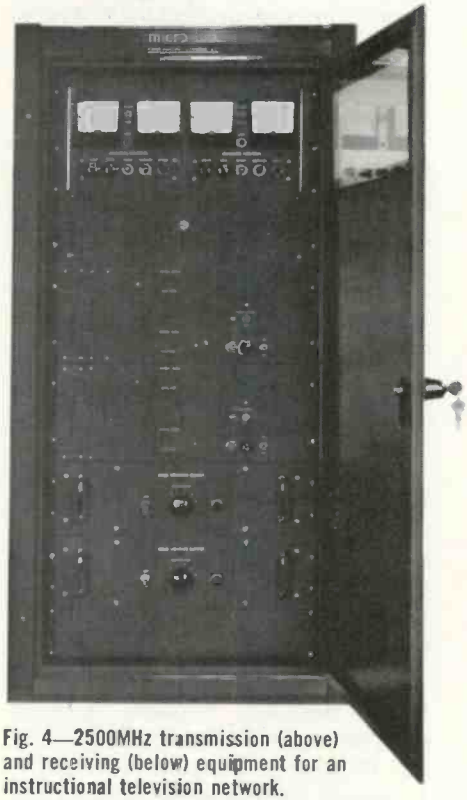


Fig. 4—2500MHz transmission (above) and receiving (below) equipment for an instructional television network.

CCTV. Some airports, for example, use a CCTV link between their first aid room (run by a competent nurse) and the doctor's office in a major hospital. The physician tells the nurse what tests to make, observing the results on a television screen. He then prescribes treatment without ever having seen the patient in person.

MEDICAL CCTV EQUIPMENT

The equipment used for medical CCTV is basically the same as that used in other CCTV systems. Fig. 8 shows a typical medical CCTV origination studio. For patient visiting systems, a camera and monitor system with built-in two-way sound, such as the system shown in Fig. 9, can be used. One camera for color medical telecasts is shown in Fig. 10, while several cameras for monochrome use are shown in Fig. 11 and 12. A number of monochrome monitors are shown in Fig. 13, 14 and 15.

MEDICAL CCTV SYSTEM MAINTENANCE

With medical CCTV growing by leaps and bounds, many technicians are likely to be called upon to service them. If you are familiar with CCTV in general, medical CCTV should present no especially difficult problems.

One thing to watch for is adequate lighting. Modern vidicon cameras have automatic light control ranges on the order of 4000-to-1, but to get the detail needed for medical TV, good lighting is essential.

Before trying to make any adjustments, make sure that all connections are secure and that all lines are properly terminated. An unterminated line results in a very poor picture. Many an unwary technician has spent a half hour adjusting target and beam controls only to find out that the trouble was an unterminated line.

Read the instruction manuals for the equipment involved and make adjustments carefully. If adjustments do not help, a little logic will usually isolate the problem to one particular camera, monitor or other piece of equipment.

Fig. 5—Monitors throughout the teaching and medical lounge area at the University of Oregon Medical School provide first-hand viewing of live or video taped operations for students, visiting physicians, nurses and medical staff alike.

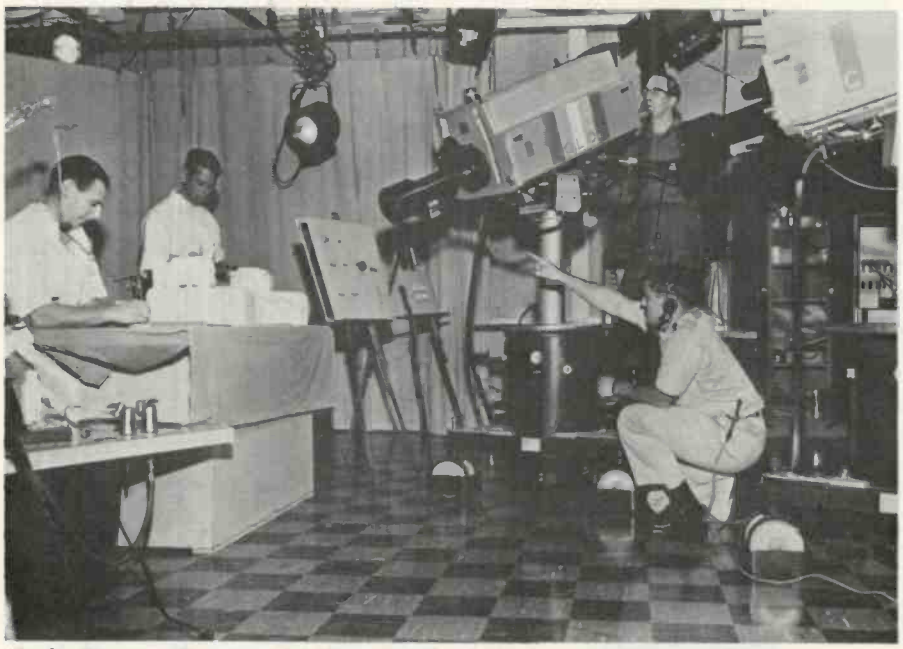


Fig. 6—RCA color TV cameras are shown in action during the production of a TV training program on dental procedures at the Brooke Army Medical Center, Fort Sam Houston, Texas.

Fig. 7—The University of Pennsylvania's School of Dentistry has upgraded its educational TV facilities with the installation of an RCA system, which produces pictures comparable in quality to those aired by commercial broadcasters.

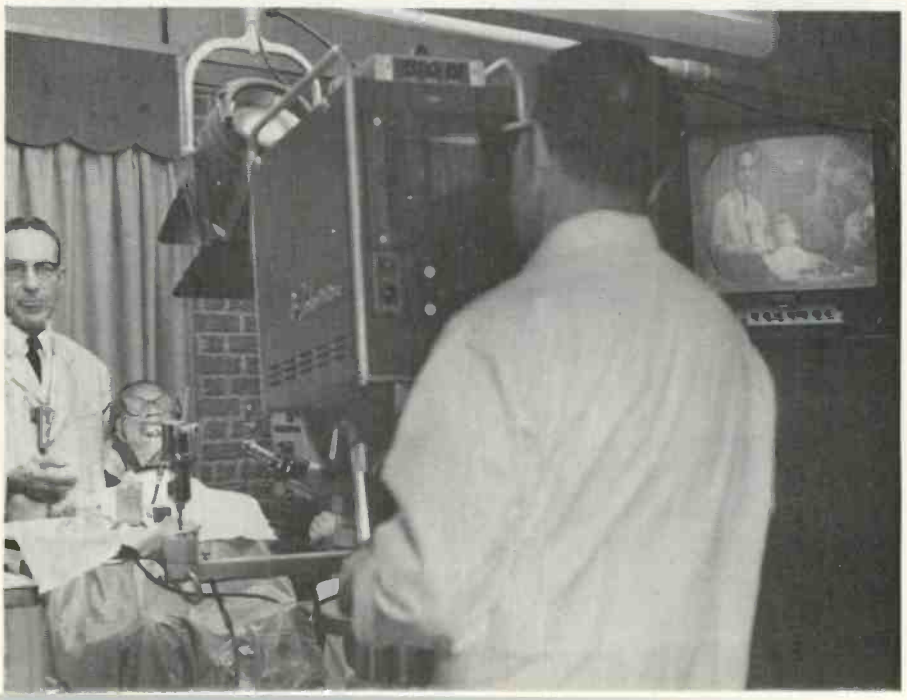


Fig. 8—The equipment used in this typical medical CCTV origination studio is basically the same as that used in other CCTV systems.

Fig. 9—Closed circuit TV sight and sound systems, like the one shown, can be used for constructing patient visiting systems.

Fig. 10—GBC's Model VF-7001 color TV camera lists for $8000 and is said to be completely solid-state in design, except for its three vidicon tubes. Specifications indicate that it requires only an 8 minute warm-up time.

Fig. 11—An all silicon transistor viewfinder/camera has been developed by Diamond Electronics, which is said to weigh only 45 lb. It comes with a zoom lens that is controlled from the rear turret and features plug-in modular construction.

Fig. 12—The Ampex CC-326 series studio camera features a 9-in. viewfinder and a 25mm, F9.5 lens. The camera frame and operating features are identical in all models of this series.

Fig. 13—The Sony PVJ-510 solid-state video monitor comes with an 8-in. screen.

Fig. 14—The Conrac RCA series solid-state video monitor provides for automatic field-rate and line-rate sensing. Available with 14-, 17- or 21-in. picture tubes, the monitor is designed to automatically search and lock on vertical field frequencies of 15 to 60 fields per second and horizontal rates of 500 to 4930 lines per frame.

Fig. 15—The Setchell Carlson M941T "Director," a monochrome TV monitor with 172 sq in. of viewable picture area, features plug-in circuits and full power transformer operation.

The repair of a monitor should be easy for anyone who has had experience with a TV receiver, but cameras are a little more difficult. You may have to ask for help from the manufacturer.

One last word of caution: Vidicons are easily burned out by direct light, *even when the camera is not turned on!* With all the bright lighting usually used in an operating room and most other medical CCTV set-ups, this is a real danger. Keep the vidicon lens capped when not in use and instruct operators to keep direct light out of the camera when they are using it. Vidicons are not hard to replace, but they cost $30 to over $100 each. ■

Installing A Tower

Many technicians shy away from this type of work but they are overlooking a good source of additional income

By PHILLIP DAHLEN

■ "I'm no steeplejack" is the usual reply from some technicians that shudder at the thought of climbing to the top of a swaying tower to work on an antenna. But such daring is not required of the progressive technician seeking to expand his business. Elaborate antenna-tower systems today can be installed without even leaving the security of terra firma. And the demands for more sophisticated MATV systems and two-way communications systems mean good money in the tower business.

SELECTING A SITE

Seldom will a customer agree to have a tower installed in his front yard—even if such a location does permit the installation of a less expensive tower for the reception desired. Aesthetic tastes are important in determining the antenna site—but on the other hand it is just as ridiculous to select a well secluded location in line with some distant building that blocks the desired signals. Some sort of compromise must be made.

Determining the location of an antenna for optimum TV reception is more of an art than a science. After installing a 100-ft tower for receiving a distant TV station, it may be discovered that good reception can be obtained only when the antenna is 40ft up the tower, clamped to a brace extending 10ft off one side of the tower. Such a discovery may reduce customer relations to an all-time low, result in a demand for a refund for the unused portion of the tower and require additional bracing at the technician's expense. These unfortunate occurrences can be virtually eliminated by investing in a portable tower (similar to the one shown in Fig. 1) and taking the time to determine, with the customer, the most desirable location for the best TV signal practical—then the permanent tower and antenna can be ordered. In such a manner a technician can quickly develop a good reputation more valuable than extensive advertising, rather than being endangered with adverse publicity from a streak of "bad luck."

At one time technicians thought nothing of simply mounting antennas to chimneys. In some instances the results were disastrous—chimneys crumbled under the load—and in many parts of the country building codes now prohibit such installations. There are occasions when it is desirable or even necessary to install a tower on the roof of a large well constructed building (and such installations will be described in this article); but like the chimney mounts, it is felt that it is a mistake to use the side of a house to support a tower.

Competition forces many reputable manufacturers to produce such mounts. However, extra care must then be taken to be certain that these mounts are secured directly to the frame of the house rather than to just some surface boards. Not only is there a danger that high winds might tear the tower free of the house or even tear free a portion of the house, there is also the annoyance of "singing." All towers vibrate to some degree during high winds and supporting brackets tend to carry this vibration to the wall of the house, causing the sound to resonate within. This can be quite an annoyance to those in the house. For these reasons, there will be fewer customer complaints with towers that stand free of the building.

As has already been mentioned, there will also be fewer customer complaints if the customer participates in the selection of the tower site—viewing the TV image received from each site suggested.

SELECTING THE TOWER

Once the tower site has been selected and the required tower height has been determined, the necessary information is available for selecting a tower. If the tower is of any significant height, it should be constructed of steel—adequate weather proofing requiring that the steel at least be galvanized, though a coat of paint would also be desirable.

The tower selected may be made of either tubular or angular steel. A few decades ago angular steel towers were preferred due to corrosion problems with tubular steel. However, most manufacturers have overcome this difficulty and there should be no problem if the tubes at the top of the tower are capped (this also prevents them from resonating like organ pipes) and proper drainage is provided at the base of the tower. Tubular construction offers the advantage of lower wind resistance—the angular frame of the other type tower tending to catch the wind.

In addition to portable use, crankup towers are very practical in parts of the country frequented by tornadoes and hurricanes. There they can be quickly removed from service when the weather conditions are too severe. Once the storm has ended, these towers can be returned to normal use with a simple turn of a crank (or in some installations the flip of a switch for electrically cranking the tower back into position).

There is generally little reason (other than mobile applications) for using crankup towers in less windy portions of the country where towers can be permanently positioned. There self-supporting or guy-wire-supported towers are generally preferred.

Guy wires are generally required for supporting roof-mounted towers, while it is felt that self-supporting towers should be constructed on lawns—there then being less danger of someone being hurt by running into wires on foot during the night.

If space permits fencing off a large piece of land, then guy-wire-supported towers are the least expensive towers for the heights attained (depending on the value of the land required). Self-supporting towers become economically more feasible as the degree of congestion increases.

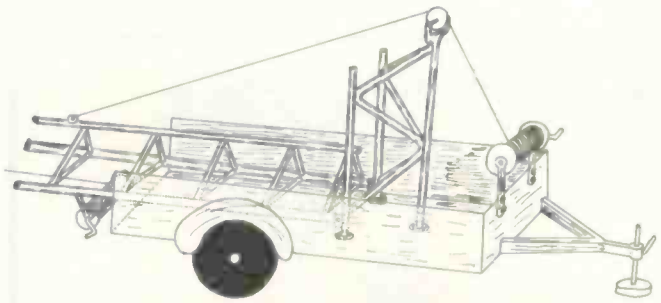


Fig. 1—By using a portable tower the technician can determine tower requirements (height and location) before making an installation. This illustration shows a portion of a portable crankup tower laying in a horizontal position. One winch is used to raise the tower to a vertical position while the other winch is used to telescope the tower to the desired height.

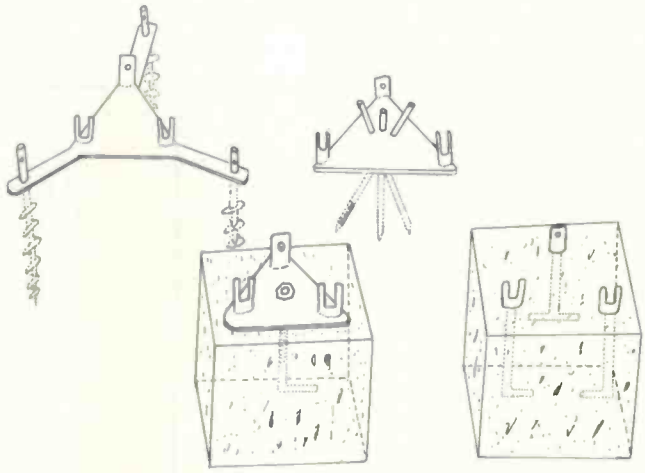


Fig. 2—An assortment of less complex bases for supporting a tower.

SECURING THE TOWER BASE

There is quite a variety of tower bases available on the market. Competition has forced the development of such an assortment of bases that they range from "excellent" to "hardly safe for temporary use." Some of the less complex bases are shown in Fig. 2. They range from a base plate secured by driving three long metal stakes through it into the ground (upper right), a screw anchor base secured to the ground with three augers (upper left), a base plate bolted with a single nut to a metal rod embedded in a block of concrete (lower left), to a set of three tower brackets embedded in a single block of concrete (lower right). The first three tower bases would require guy wires to reduce the strain on the stakes, augers or single bolt; and even then there is some question as to the resulting safety if relatively high towers are constructed. More secure tower installations will result if the concrete blocks are formed in the ground instead of being inserted precast.

Cylindrical bases (Fig. 3) offer still another way of securing towers to the ground. When installing this type base, a hole should be dug deep enough for just the top portion of the cylinder to extend above the ground (Fig. 4). The cylinder should be tightly bolted together and secured to the bottom segment of the tower before forcing dirt down into the central portion of the base

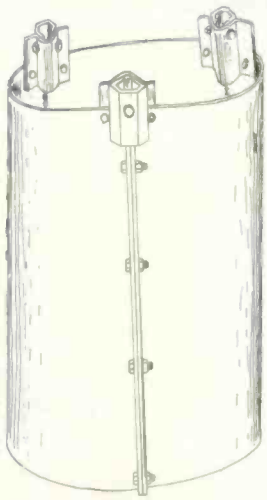


Fig. 3—Cylindrical bases offer still another way of securing towers to the ground.

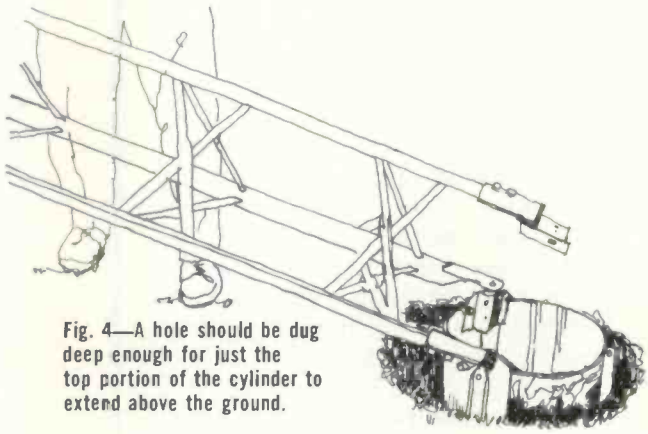
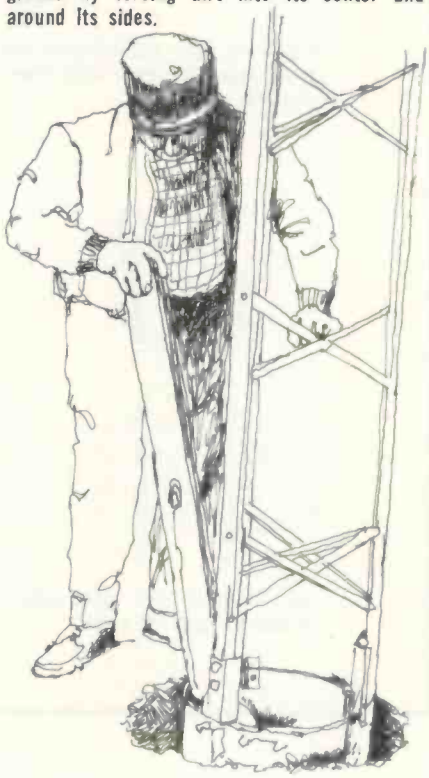


Fig. 4—A hole should be dug deep enough for just the top portion of the cylinder to extend above the ground.

Fig. 5—The cylindrical base is secured in the ground by forcing dirt into its center and around its sides.



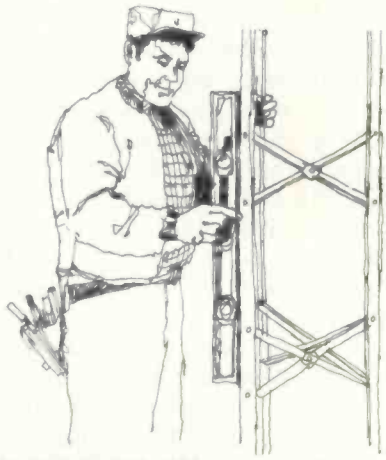


Fig. 6—A level should be used to make certain the tower is in a vertical position as the base is packed into the ground.

and along its sides (Fig. 5), taking care (with the use of a level) to make certain the tower remains vertical as the base is packed into final position (Fig. 6).

A self-supporting tower of any significant height should be mounted on a concrete base that has been poured at the site. This results in an installation that is significantly more

expensive, but which should also last for many years to come.

Fig. 7 shows a base that a technician can install with the use of some cement, long bolts and old lumber. Six boards are arranged in a rectangular pattern (as shown) corresponding to the location of the tower's legs. (Note that two boards are nailed together for each side of the triangle. This permits the boards to lay level against either the legs of the tower or the foundation under construction.) The ends of these boards are drilled to correspond with the mounting holes on the flanged legs of the tower. These holes serve as guides for holding the long bolts (preferably several feet in length and bent at their lower ends) in proper position as the cement hardens around them. Wooden forms are built around at least the upper portion of each hole in which the cement is to be poured, improving the appearance of the installation and assisting in making each concrete base equal in height. Each hole should be dug so that the concrete base is larger at the bottom than at the top. The triangular form for supporting the bolts must be kept horizontal as the cement hardens or the tower will not be vertical once it is bolted to its foundation.

Still a more sophisticated self-supporting tower base is shown in Fig. 8. In this installation a metal frame, resembling the tower itself, is placed in a layer of gravel. A wooden mold is then built to maintain the desired shape as the cement is poured and hardened. When leveling the structure, care must be taken to make certain that the legs of the frame are not lifted out of the gravel—the gravel permitting drainage of any moisture that might collect within the tubular structure. Once the concrete is cured, the wooden frame can be removed and the hole filled.

It is felt that the last two tower bases described are the best for a professional quality tower installation—though more expensive and difficult to install. However, they are not appropriate for roof-top installations. Ball-jointed bases (Fig. 9) are more practical for such installations since compensation can

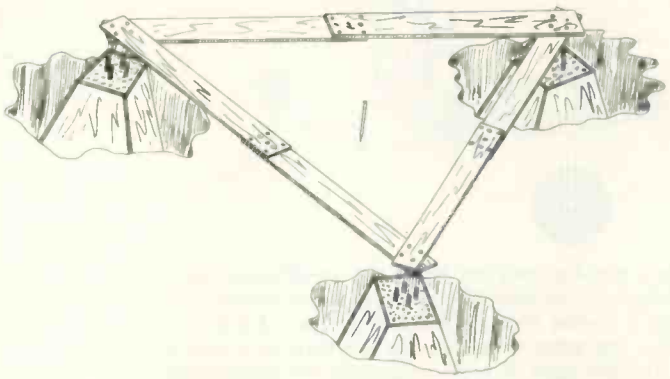


Fig. 7—Three concrete piers can be constructed to firmly support each leg of the tower.

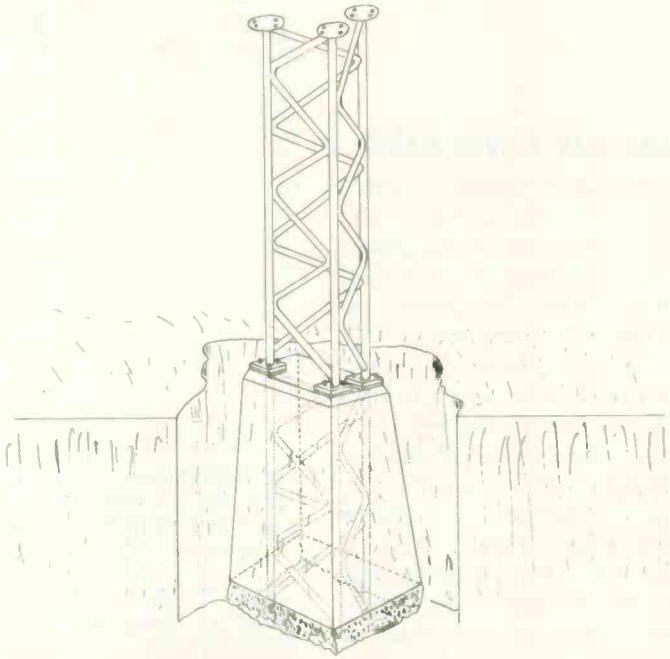


Fig. 8—A more sophisticated self-supporting-tower base contains a metal frame within the concrete pier.

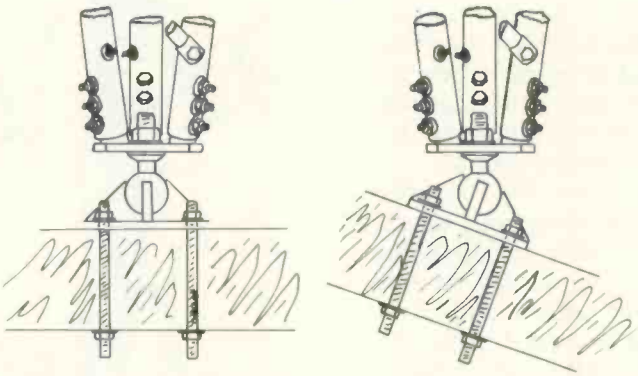


Fig. 9—Ball-jointed bases offer greater construction flexibility when securing a tower to a roof.

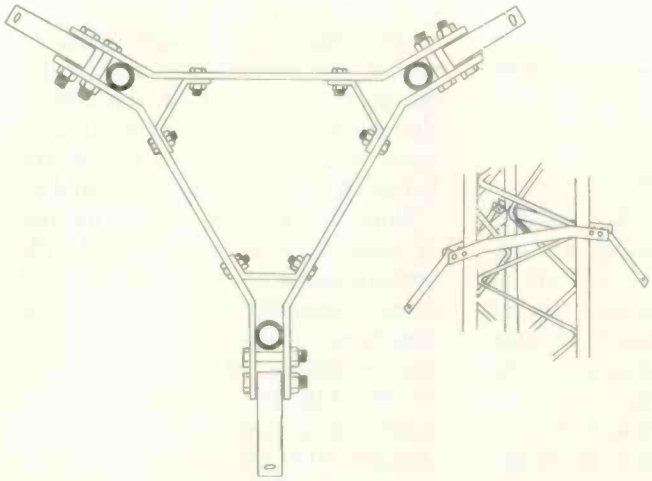


Fig. 10—Special brackets are supplied by the manufacturer for securing guy wires to the tower.

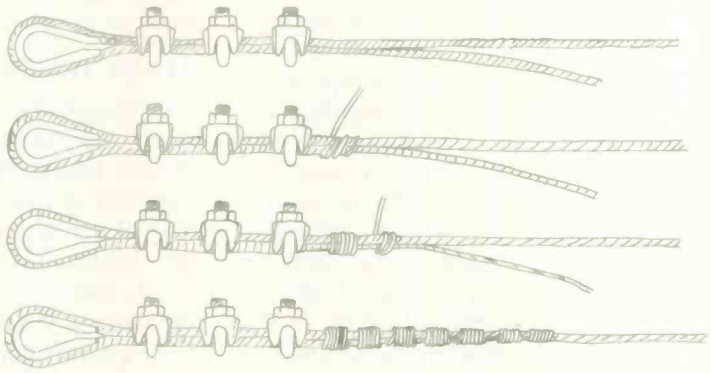


Fig. 12—Various steps in forming a permanent loop at the end of a guy wire.

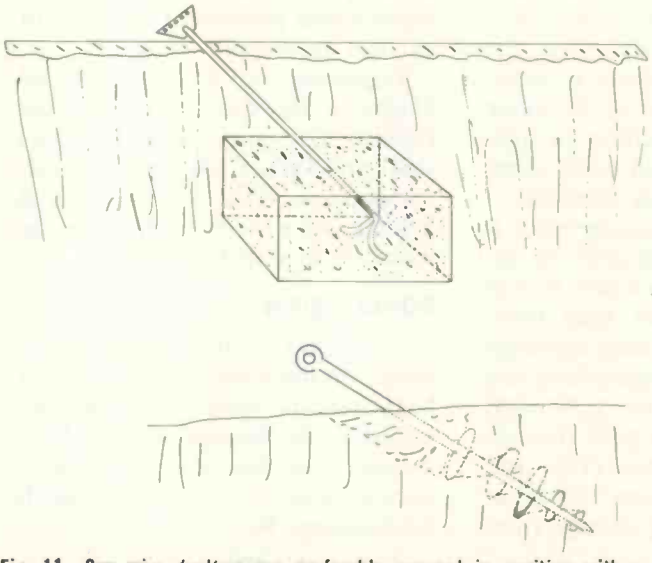


Fig. 11—Guy wire anchors are preferably secured in position with a concrete slab, formed several feet below the ground. However, they may also be secured with the use of an auger.

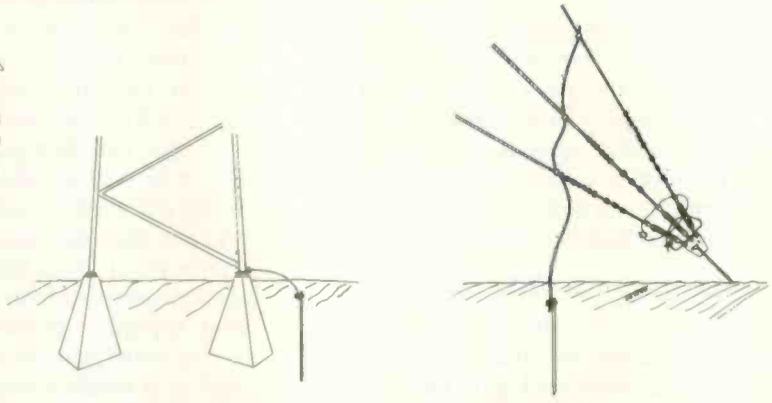


Fig. 13—The base of the tower and all guy wires should be grounded with a large gauge wire secured to a long metal stake driven some distance beneath the ground.

then be readily made for any slope of the roof. Such a base merely provides vertical support and any tipping of the tower will not result in any strain on the portion of the roof supporting the tower base. However, with such a base the tower, of course, requires the additional support of guy wires. Such wires are generally no problem since most roofs are not subject to traffic or vandalism.

INSTALLING GUY WIRES

As has been indicated a number of times earlier in the article, there are occasions when guy wires are required for successful tower installations—the number of guy wires required depending on the height and weight of the tower, the height and weight of the antenna, and the amount of wind normally encountered at the site of the tower. Tables, supplied by the manufacturer of the tower installed, will provide this necessary information.

Most towers require three guy wires at each of several elevations. These wires are secured to the tower with the use of special brackets (such as the one shown in Fig. 10) supplied by the tower manufacturer. (It is necessary that the same brand bracket be used since it will be designed with special curves that will enable it to fit around supporting braces included in the basic structure of the tower.)

The other end of the guy wire may be secured to an anchor that is either bolted to the roof of the building (for roof-top installations), secured (Fig. 11) in a concrete slab (the concrete having been cured in the hole some distance below ground), or augered into the ground (a practice that is less secure). The same anchor may be used to secure several guy wires descending from various tower elevations.

Since the guy wires are not always preformed to the desired length, it is frequently necessary to cut them and form the loops required at each end of the cable. After looping one end of cable around a thimble (Fig. 12), the cable is secured with a number of clamps—usually with three clamps spaced a distance

equivalent to six times the cable diameter. A little more than a foot of cable should remain free for wrapping.

This extra length of non-supporting cable (dead cable) should be unwound and the strands separated. Using a pliers, or tool supplied by the manufacturer, one strand of the cable should be wound at least six times around itself, the remaining strands of cable and the supporting cable. The process should then be repeated with a second strand of cable and continued until every strand has been wrapped around the cable—the excess length of each strand being removed with a wire cutter.

Turnbuckles should be used between the thimbles and anchors to remove any slack remaining in the guy wire. Once tightened, these turnbuckles should be secured by running a safety wire between the central portion of the turnbuckle and through the thimble.

GROUNDING THE TOWER

This article strongly advocates the use of concrete for securing the base of the tower and guy-line anchors. However, there is one unfortunate characteristic of concrete. It is not a good enough conductor of electricity to adequately dissipate lightning. The base of the antenna and all guy wires should be grounded (Fig. 13) with a large gauge wire (at least 6 gauge) secured to a long copper ground stake driven some distance beneath the ground.

OTHER TOWER TIPS

Although the article has covered many aspects of selecting and installing towers, there is such an assortment of towers currently on the market that it is not possible to supply bolt-by-bolt instructions. Instead, towers should be selected on the basis of the information that has been provided and then assembled according to the manufacturer's instructions.

In most instances the installation includes assembling the tower in a horizontal position, attaching the antenna and any necessary accessories, bolting two legs of the tower to its base and then pulling the tower to a vertical position—thus eliminating the need for any climbing.

There may be occasions when it is difficult to align the holes in adjacent segments of the tower to bolt them together. Rather than hammering bolts through such openings (and as a result damaging both the bolt and the protective galvanized surface), it is best to push through a gradual-taper reamer (Fig. 14) which will force the parts into alignment and prevent any damage from occurring with parts later rusting.

The type of brackets used to mount the antenna will differ with the style tower selected, the size of the antenna and the rotor, if any, used. Again, space does not permit listing all the combinations available.

Some installations require the use of more than one antenna—MATV systems frequently require the use of several antennas aligned in different directions. This generally requires the installation of a side-arm-mast mount (Fig. 15) for supporting the additional antennas at an adequate distance from the other antennas to prevent interference between them. As before, the variety of tower and antenna requirements that may be encountered prohibits the listing of all such accessories available.

Depending on the location and height of the tower installed, the Federal Communications Commission and Federal Aeronautics Administration may require special lighting and a striped pattern on the tower. If in doubt, investigate.

CONCLUSION

Expanding your business to include the installation of towers will help open the door to even greater business—the installation of MATV systems and two-way communications systems. It is a field well worth investigating. ■

Some of the information used in this article was supplied through the courtesy of Rohn Tower Mfg. Co.

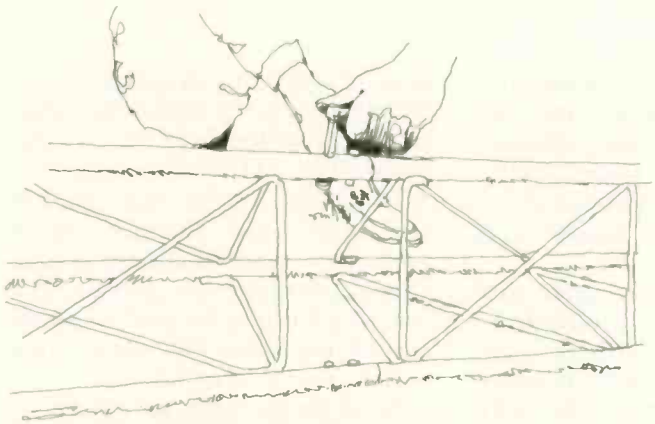


Fig. 14—The holes in adjacent segments of the tower should be aligned with a gradual-taper reamer before the bolts are inserted.

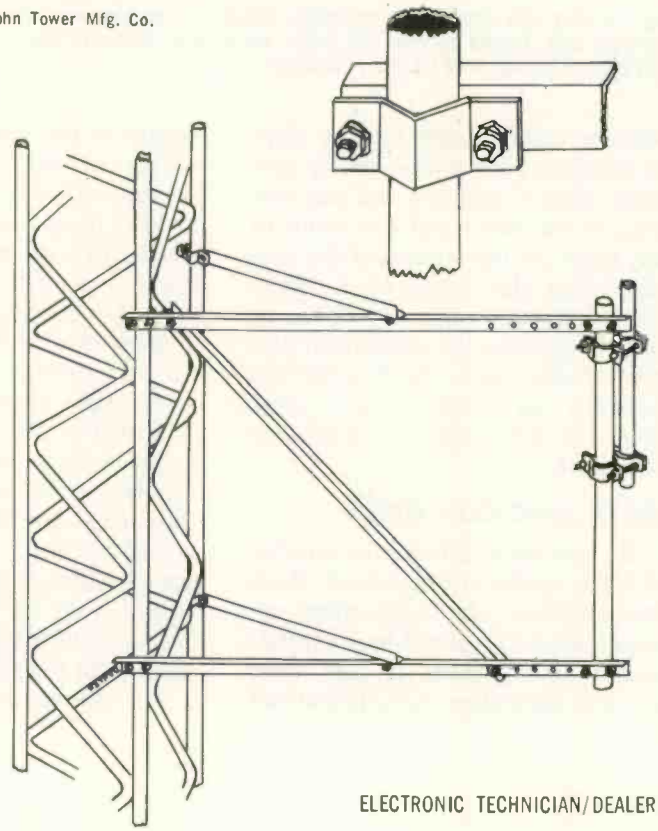
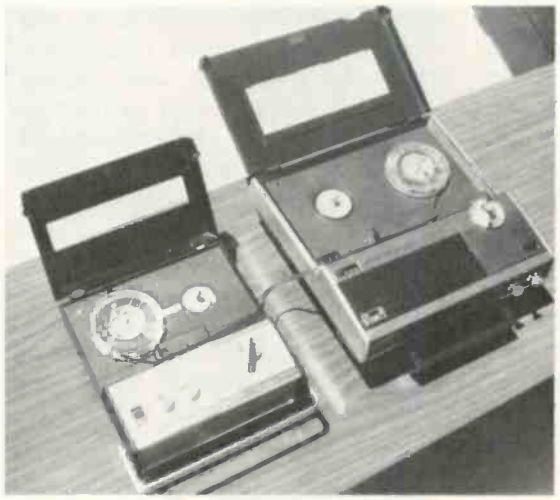


Fig. 15—Side-arm-mast mounts should be installed on the tower if it is to support more than one antenna.

Tape Recorder Speed Adjustments

by HOWARD PHILLIPS

This simple technique can be used to calibrate tape speed to an accuracy within ±1 percent without the use of special instruments



■ Today's TV technician is required to perform an ever-increasing amount of tape recorder maintenance as a result of the increasing popularity of combination stereo AM/FM-tape systems.

The accurate adjustment of the capstan speed of a tape recorder normally requires the use of special test equipment such as calibration tone tapes and frequency counters. However, special test equipment is *not required* for accurate adjustments if a second "standard" or well-calibrated tape recorder is available. The method described here allows highly accurate speed adjustments to be made with no test equipment other than the second recorder.

SPEED STANDARDS

The National Association of Broadcasters (NAB) has established primary and secondary standard magnetic tape speeds of 15 inches per second and 7.5 inches per second, respectively. In addition to these common speeds, many consumer-product tape recorders operate at capstan speeds of 3.75 inches per second and 1⅞ inches per second. The slower tape speeds minimize tape usage at the expense of decreased fidelity. Essentially, all consumer product recorders operate at 7.5, 3.75, or 1⅞ inches per second.

ALLOWABLE TAPE SPEED ERROR

Most good tape recorders are used to record and play back music as well as voice. The NAB has also established standard speed and speed tolerance ranges for turntables which are used in commercial recording and commercial broadcast work. These standards are given in Table 1.

The speed tolerance value of ±0.3% shown in Table 1 represents the practical limit of tape recorder calibration accuracy. That is, a consumer-product tape recorder speed adjustment accuracy of better than 0.3% absolutely is not justified since the commercially-recorded music to be taped may have speed distortion (due to turntable equipment) of as much as 0.3%. In actual practice, a speed adjustment of ±1 percent is more than adequate, since a speed distortion of ±1 percent is impossible to detect with the human ear.

SPEED CONTROL

Many of the consumer tape recording product manufacturers are using servo-system feedback speed control systems. These circuits are particularly well suited to solid-state technology. A less expensive type of speed control method used in some imported "economy" recorders involves the adjustment of the open-loop voltage used to power the recorder motor. In either case, the speed calibration requires only a simple screwdriver adjustment. Because delicate mechanical adjustments are normally not required, an accurate speed calibration job is reduced to the problem of accurate speed measurement. Accurate rela-

TABLE 1. STANDARD TURNTABLE SPEEDS

Average Speed	Maximum Speed Error
33⅓ RPM	±0.3%
45 RPM	±0.3%
78.26 RPM	±0.3%

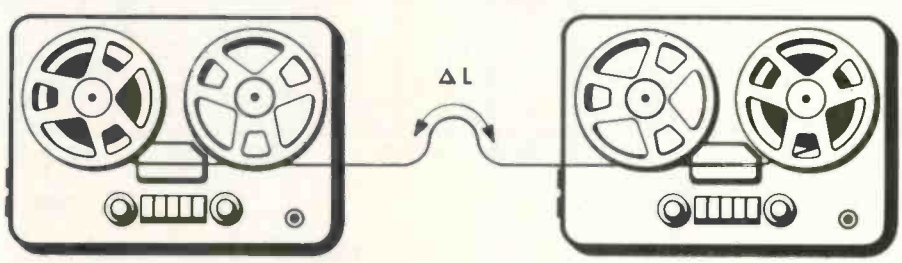


Fig. 1—Equipment setup for comparing the tape speed of one recorder to that of a "standard" recorder.

tive capstan speed measurements are easily made using the following calibration procedure with the accompanying graph of Fig. 1.

CALIBRATION METHOD

The simple setup for calibrating the speed of a tape recorder is shown in Fig. 1. Using this configuration, the difference in capstan speeds is indicated by the accumulation or depletion of the "slack" length of tape between the capstans of the two recorders.

In the case of cassette recorders, the configuration shown in Fig. 1 must be modified slightly. The tape cassette is not used in the calibration. Instead, a reel tape is passed from the "standard" recorder through the capstan of the recorder to be calibrated, then back to the take-up reel on the "standard" recorder.

Naturally, one of the recorders must be running at the proper speed. The speed of the other recorder can be adjusted so that the tape length, L, between the two capstans remains nearly constant. The adjustment error can be measured by measuring the time required for the length of tape between the capstans to change by a given amount. The *change*, $\triangle L$, is related to the speed adjustment error by:

$$\triangle L = \frac{E\,V\,T}{100}$$

Where $\triangle L$ is measured in inches, E is the speed adjustment error in percent, V is the tape speed in inches per second and T is the time in seconds required for the change ($\triangle L$) to take place.

By measuring the time, T, required for the length of tape between the capstans to change by six inches ($\triangle L = 6$ inches), Fig. 1 can be used to determine the speed adjustment error for the three most popular tape recorder speeds. If the calibrated recorder is operating at 7½ inches per second, a tracking error as small as ±1 percent can be measured in less than 1½ minutes. The measurement of larger tracking errors requires even shorter measurement times.

To calibrate recorders operating at non-standard speeds, the above equation may be used to establish the proper calibration curve, which can then be plotted on the graph of Fig. 2.

If the reference tape recorder is running at the proper speed, the only factors affecting the calibration accuracy are the measurement of $\triangle L$ and elapsed time. An electric clock with a second hand is adequate for the time measurement, and $\triangle L$ can be measured quite accurately by using the same power switch to supply power to the two recorders so that $\triangle L$ is determined at the end of a measurement interval after power is switched off on the recorders.

The calibration method described here is practical in the sense that no special pieces of test equipment, such as tone tapes and frequency counters, are required. This becomes an advantage in the case of cassette recorders since cassette tone tapes are not readily available for some recorder types. ■

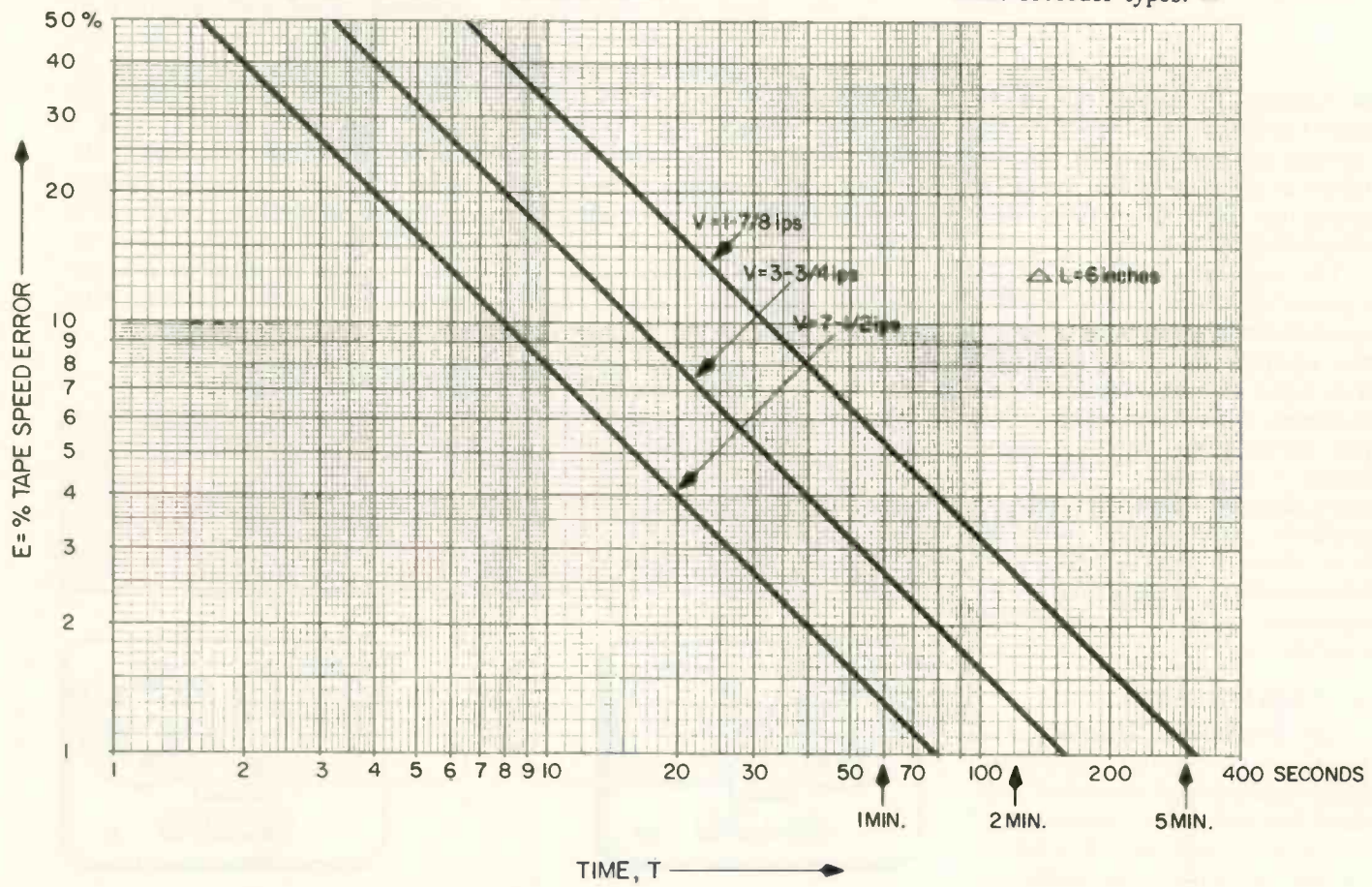


Fig. 2—Chart showing tape speed error vs time required for the length of tape between capstans to increase or decrease by 6 inches.

Servicing Solid-State Stereo

by NORMAN H. CROWHURST

Applying some principles of basic electronics can improve servicing techniques and prevent call backs

■ The advent of solid-state into stereo Hi-Fi equipment has been slow but sure. For the inexpensive radio market, transistors have offered such advantages as compactness, efficiency and low cost. However, their adoption in the Hi-Fi market required improved characteristics—high stability, reliability, low noise and low distortion.

While these potentials are inherent in the nature of transistors, it took a little longer to develop good circuits. One nice thing about transistors is that, as they can be made in both polarities, PNP and NPN, complementary symmetry — using both kinds together — enables circuit designs that were not possible with tubes.

POWER OUTPUT SECTIONS

One problem for Hi-Fi stereo has been the economic acquisition of adequate audio power. Tubes large enough to deliver up to 100w of audio power can get very hot, making ventilation a problem. Transistors, being much more efficient, can handle the situation better, once types capable of handling that much power became available.

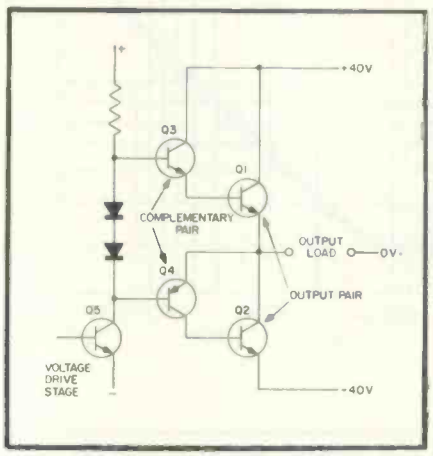


Fig. 1—Basic power-output circuit used in most Hi-Fi amplifiers.

Complementary symmetry circuits work well at low levels (relative to 100w), but so far designers have not been able to produce high-power transistors of opposite polarities but otherwise identical characteristics. Power, yes, but complementary types, no.

As a compromise, a pair of complementary symmetry transistors are used for the drive stage, which in turn is coupled to an identical pair of transistors (a pair designed for but one polarity) in the output stage. Fig. 1 shows one prevailing way of doing this, to which various elaborations have been added.

In its basic form, this circuit may use quite a variety of transistor types. The output pair, Q1 and Q2, are identical, high power-handling transistors, usually mounted to provide effective heat dissipation. The drive pair, transistors Q3 and Q4, use complementary symmetry and provide sufficient drive current for the bases of the output transistors.

The voltage drive transistor, Q5, must deliver sufficient current to swing transistors Q3 and Q4 in turn, one positive and one negative, from its average current; and it must also produce the whole voltage swing for the output. Thus, if the output stage power supply provides +40v and —40v, transistor Q5 must produce close to an 80v P-P signal swing.

The positive and negative supply voltage for transistor Q5 must be much more than the +40v and —40v used for the output stages, to provide the current as well as the voltage drive, although not much actual current is needed for this stage. Transistor Q5 must thus be a high-voltage transistor.

Transistors Q1 and Q2 must handle up to full output current (say 10a) at from 0v to 40v, and be capable of withstanding up to 80v when conducting no current. Similar ratings are required for transistors Q3 and Q4, but at the lower current (from 0.5a to 1a) required as the base drive for transistors Q1 and Q2.

STABILIZING OPERATION

The diodes between the bases of transistors Q3 and Q4 serve to provide a constant voltage drop, provided by their zener forward contact potential, that controls the quiescent condition of the circuit, matching the base-emitter drops in the tran-

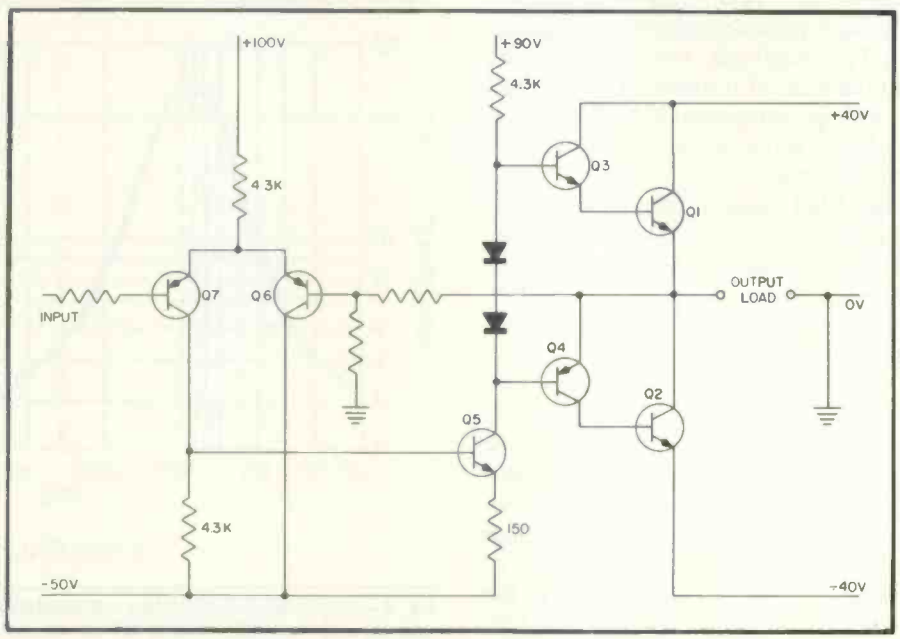


Fig. 2—Complete power section of a typical Hi-Fi amplifier.

sistors (Q3 and Q4). This enables the circuit to handle small signals as well as full power signals with maximum efficiency.

At full power, transistors Q1 and Q3 are conducting for half of the output wave, while transistors Q2

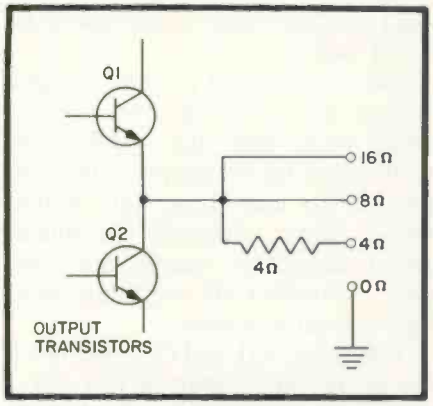


Fig. 3—Simple method of providing Hi-Fi amplifier with impedance matching.

and Q4 are conducting for the other half of the wave.

This is how the circuit works when the amplifier is feeding its power into a resistance load—which is the test condition used by designers to develop such circuits.

INPUT DRIVE

Fig. 2 shows an input drive circuit used to complete the power amplifier design. Transistors Q6 and Q7 are a matched pair having typical values. Their high-value emitter resistor provides common coupling.

The feedback circuit connected to the base of transistor Q6 provides a voltage proportional to the output voltage, which in turn is injected into the emitter of transistor Q7. The signal fed through the input resistor to the base of transistor Q7 combines with this feedback voltage to produce a signal at the collector of transistor Q7, which in turn is amplified by transistor Q5.

A number of stereo Hi-Fi systems have been produced using variations of this relatively basic circuit for the power amplifier output section. As there are very few components beside the transistors, these are the components most likely to become defective, particularly the drive and output transistors, for reasons that we shall cover shortly. This has lead to even further circuit improvement.

MATCHING IMPEDANCES

The simple circuit of Fig. 2 is invariably either direct-coupled to the output load, as shown, or coupled through a capacitor only, to eliminate out-of-balance dc currents. Some circuits of this type provide for different load impedances by padding the output. Thus an output for 4Ω, 8Ω and 16Ω may be designed to deliver its maximum power into an 8Ω load. The 16Ω connection is the same as for 8Ω, although it may use a different terminal. The 4Ω connection uses an internal 4Ω resistor to provide 8Ω matching for the amplifier (Fig. 3).

Note that it delivers rated power only to an 8Ω load. It delivers only half that amount of power to the 4Ω and 16Ω loads. (For the 16Ω load, because it will take only half the signal current of an 8Ω load, the amplifier output delivers only half the signal current at the same signal voltage. For the 4Ω load, the amplifier output delivers the same power as to an 8Ω load, but half this power is absorbed in the internal resistor.)

Of course, there is nothing to stop an audiophile, who knows nothing about impedance but the name (which he will nonetheless quote quite "knowledgeably"), from connecting a 4Ω speaker, or even one of lower impedance, to the output terminals to give the most sound, which will be the 8Ω or 16Ω terminals. And when he does this, the output transistors can be seriously overloaded.

Alternatively, some speakers rated at 8Ω have an impedance characteristic where 8Ω is their average impedance rather than their minimum impedance (Fig. 4). If full signal power is applied at a frequency where the impedance happens to be much lower than 8Ω, the same thing can happen. The fact that most program signals contain a mixture of frequencies means this will not happen often, but it still can happen.

SEMICONDUCTOR REPLACEMENTS

It is important to replace any of these transistors or diodes with their exact equivalents. Another transistor with the same voltage and current ratings, but different current gain, will not suffice. Nor will one with the same current gain, but a different current or voltage rating.

Transistors Q6 and Q7 are a matched pair that might conceivably be replaced with a different matched pair, with adequate ratings, but that is about the only license for variation that can be safely taken in this circuit.

This arrangement works well with

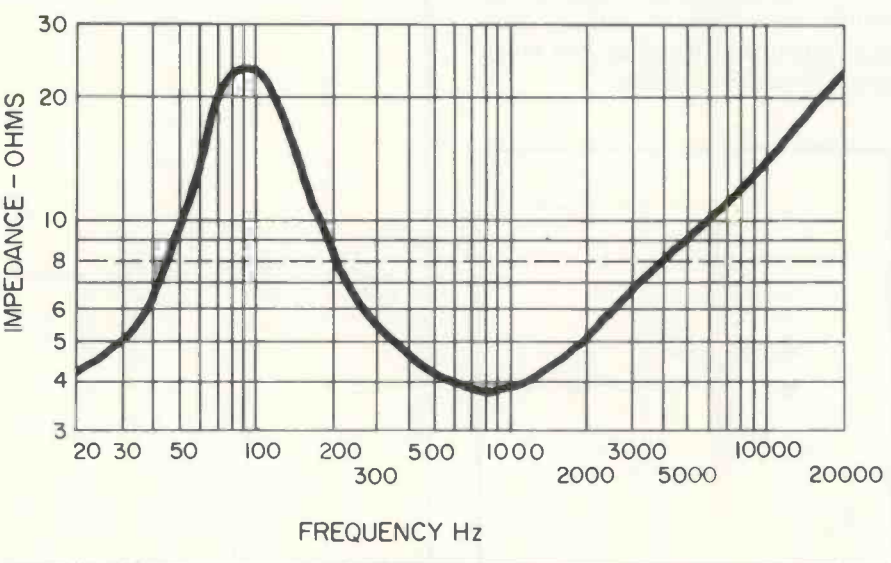


Fig. 4—Impedance characteristics representative of some speakers, rated at 8Ω, that may overload the amplifier. Note: This is not the standard interpretation for rated impedance as set by the EIA, but it is known to occur.

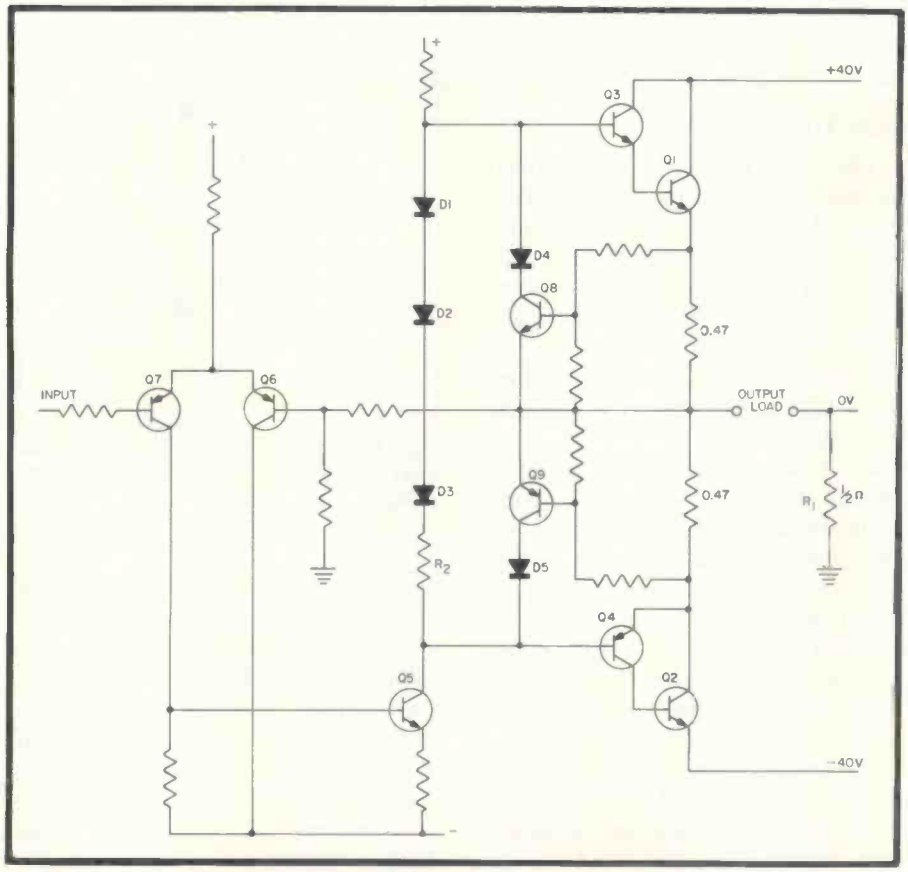


Fig. 5—One version of a common current-limiting circuit designed to protect the output of a Hi-Fi amplifier circuit from an over-current condition.

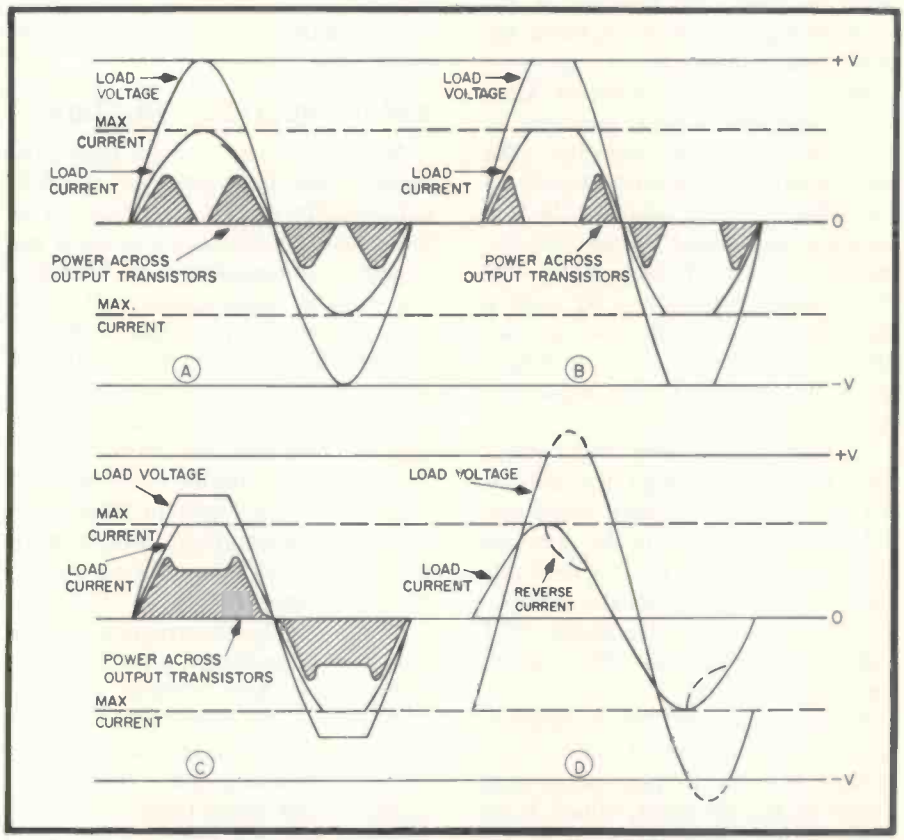


Fig. 6—Conditions that can occur in output circuits—(A) during normal output, (B) as the voltages and currents are limited together, (C) when clipping results from current limiting before the load voltage reaches its maximum, and (D) as peak voltages exceed the supply voltage.

a resistance load. It is also quite stable with any other load, such as the loudspeakers with which it normally works. But it can still cause other problems when the load impedance is not the "ideal" pure resistance.

CURRENT LIMITING

Different circuit protection features are required to handle problems caused by some conventional loads. Since the replacement of output transistors is costly, one step to prevent them from blowing under a heavy load is to limit their output current. This is commonly achieved by inserting a low-value resistance (e.g., ½Ω), that will absorb little of the full output power, in series with each transistor's output lead (Fig. 5). It (R1) will develop a voltage proportional to the output current.

This voltage is then applied, through suitable coupling, to the bases of protection transistors Q8 and Q9. These transistors are normally not conducting. Only if the voltage fed back to their base (as a result of a high-current voltage drop across resistor R1) exceeds their contact potential do they start conducting. The conducting transistors in turn reduce the current fed to the base of transistors Q1 and Q3 and transistors Q2 and Q4, limiting the resulting output signal current.

The diodes in series with the collectors of transistors Q8 and Q9 prevent the bypass circuit from operating in the opposite phase, and thus incorrectly limiting normal signals.

The voltage-controlling elements (D1, D2, D3 and R2) between the bases of transistors Q3 and Q4 will need changing because of the extra voltage drop across the 0.47Ω resistors; and this circuit shows an extra diode and resistor (D3 and R2) as compared to Fig. 2.

INTERPRETING READINGS

The whole circuit associated with transistors Q8 and Q9 and diodes D4 and D5 normally "floats" at signal voltage, with very little voltage difference between parts of the circuit. Thus, a scope or voltmeter probe applied to any point in this circuit, with the other side of the

instrument grounded, will read almost identical signal voltages. If it does not, something is wrong.

Because these elements do not normally have to withstand any appreciable voltage, failure can result from an accidental short-circuit or low-resistance connection to ground, which will cause some of these components to momentarily receive an abnormally high voltage, possibly the whole signal voltage.

So if any of these components have failed, you should try to determine the cause of failure. The cause (e.g., shorted speaker leads) may not still be present, and thus simple replacement may effect a cure. But unless you find what caused the failure, and take steps to ensure that it does not happen again, the fault may recur, which as any serviceman knows is bad business!

OTHER DANGERS

That takes care of excessive current and, from the safety viewpoint, is a definite improvement over the simpler circuits. But the circuit is still not completely safe against abuse, due to the peculiarities of output loads. It makes no protection against the development of voltages across the load that could be dangerous to the transistors.

Dangerous voltages associated with this kind of output fall into two categories (Fig. 6): Those that remain too low while the controlled current is flowing, and those that momentarily rise above the supply voltage.

The current control (added in Fig. 5) will prevent the output current from exceeding its maximum rating, but transistor power dissipation is a product of the current through the transistor and the voltage across it. If the impedance of the load is such that the maximum current is reached near the peak of the output signal voltage, the power drop across the transistor will be small (Fig. 6B), it having instead developed across the load.

But if the load impedance is low enough to hold the output voltage down when the current is limited, then the output transistor will have a larger voltage drop across it (Fig. 6C). Protecting against this possibility involves a more complicated circuit, which we will discuss fully in the next installment of this article.

REACTIVE KICKS

The other possibility results from the reactive nature of some speaker loads. With the ideal resistive load, used for test, the maximum voltage coincides with the maximum current (Fig. 6A, B and C). This happens at the waveform peaks, when the voltage drop across the output transistor (Q1 or Q2) momentarily falls close to zero.

But in a reactive load, voltage and current waveforms are not in phase —maximum voltage does not coincide with maximum current. If the load has a leading phase angle, then maximum load current may be reached when the load voltage has risen to the supply voltage [the transistor (Q1 or Q2) momentarily having 0v across it] and is still rising.

To correctly maintain the current waveform, the load voltage must continue to rise and an inductive kick, either from the voice coil or the coupling transformer, may provide this rise. As a result, the transistor momentarily receives a reverse voltage that it could never receive from its own power supply.

In normal use, transistors keep their collector-to-base junction in the non-conducting polarity (the base reverse biased with respect to the collector), and what conduction occurs is controlled by the base-to-emitter current. If the collector-to-base voltage is reversed by such a kick, the junction goes into its conducting mode and thus is no longer under the control of the input circuit.

Further, this uncontrolled current does not flow through the emitter circuit, as in its normal operation, but through the base to the previous (drive) transistor's (Q3 or Q4) circuit. This can result in the destruction of both of these transistors (Q1 and Q3, or Q2 and Q4), before control is regained.

Protection against this is relatively simple if an output auto transformer is used to provide correct matching for all loads, which is an improvement over the kind of arrangement represented in Fig. 3.

Two diodes are connected to a tap slightly higher up the winding than the one to which the transistors' output is connected (Fig. 7). When the output voltage approaches the supply voltage, these diodes reach it before the output junction does, and start to conduct, providing a safe path for this wrong-direction current. These diodes must have a reverse-voltage rating in excess of the double supply voltage (80v), and a forward-current rating capable of "discharging" the acoustic impedance effect that can cause the trouble.

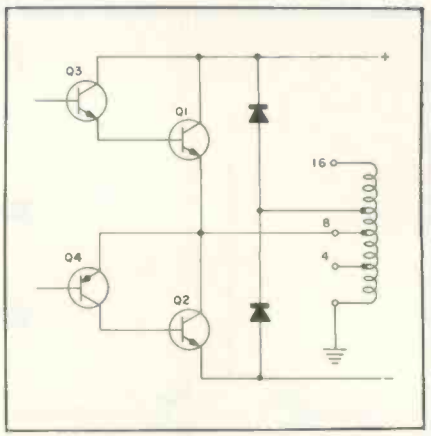


Fig. 7—Circuit protection against reactive kicks that can drive transistors into reverse voltage.

SUPPLY VOLTAGE VARIATION

With any circuit of this type it is possible that the supply voltage will occasionally exceed its rating for a few moments due to an accident on a power transmission line. Usually, the supply electrolytics will take care of this by providing a heavy leakage that prevents the amplifier's dc supply from rising dangerously.

But electrolytics will not sustain this over voltage for more than a few moments without blowing their seals. This will result in their consequent deterioration, which may not show up until months or maybe even years later.

If the supply electrolytics are allowed a voltage margin—a higher rating than their normal working voltage—as a precaution against this, then the dc voltage will be permitted to rise and some other component could suffer from the excess voltage. We will pursue these and other possibilities in the next article. ■

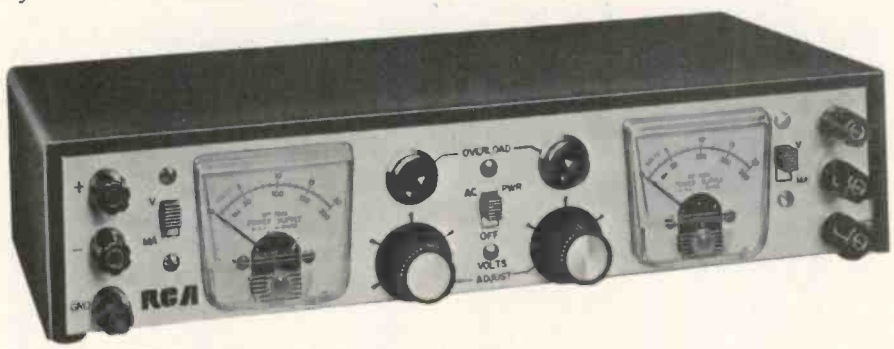
ET/D TEST LAB REPORT

RCA Model WP-702A Power Supply

WP-700A is a Single Unit

A constant voltage dc power source is a useful tool for the service bench, especially for solid-state servicing where variations in source voltage are undesirable

By PAUL DORWEILER



The RCA Model WP-702A (dual unit) solid-state, constant voltage dc power supply.
. . . for more details circle 900 on Reader Service Card

■ The RCA Model WP-702A, shown in the accompanying photo, is actually two Model WP-700A's combined in one cabinet. Since they have identical circuitry, operating data will be considered the same.

One of the first things we noticed about the unit when it arrived is relatively basic, but we felt it was important enough to mention the careful way it was packed. As you well know, things do tend to arrive damaged somehow and there's nothing more frustrating than to wait for a piece of equipment only to have it arrive half smashed. But this unit was well protected by a heavy layer of foam padding all around and looks like it would be able to withstand most of the knocks it might get during shipping.

The next point on the agenda which is of interest, especially when today's technician needs less clutter and more bench room, is the size and weight of this unit. The WP-700A single power supply weighs only 2lb while the WP-702A dual unit is 3lb, 10oz. The 700A is 4in. x 6½ in. x 3in.; the 702A is the same except longer of course—it measures 12in. long. So much for physical dimensions.

We put the power supply on the bench and looked over the controls which seemed to be pretty much self-explanatory. There are three output terminals; minus dc, positive dc and ground. These three terminals provide for either a "floating" ground connection or a choice of negative or positive ground depending on how you connect your external load. The ground terminal is connected to the ac power line ground through the three-wire power cord. In most applications you will probably want either negative or positive ground so it is simply a matter of connecting that particular terminal to the ground terminal with a short jumper wire. The diagram in Fig. 1 shows the various connections.

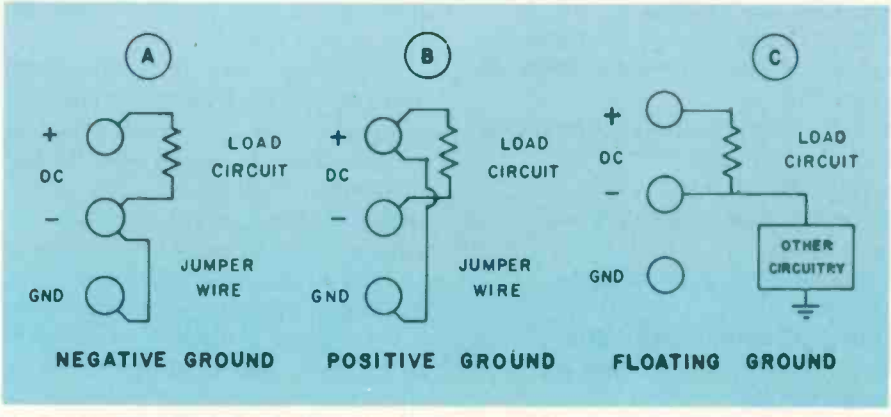


Fig. 1—The power output terminals provide for any one of three ground connections depending on what is required of the external load.

FLOATING GROUND

In some applications such as bridge circuits, no ground connection is made and the entire circuit is "floated." Some transistorized units such as radios and communications equipment are also using "floating" type grounds and must be serviced with power supplies providing this feature.

OPERATING NOTES

The Model 700A circuit is designed so it can be used across a dead short without damage to the supply. A circuit which automatically limits the overload current to 200mA is provided for this purpose. The complete schematic is shown in Fig. 2. The output voltage is variable from zero to 20v by means of the VOLTS ADJUST knob on the

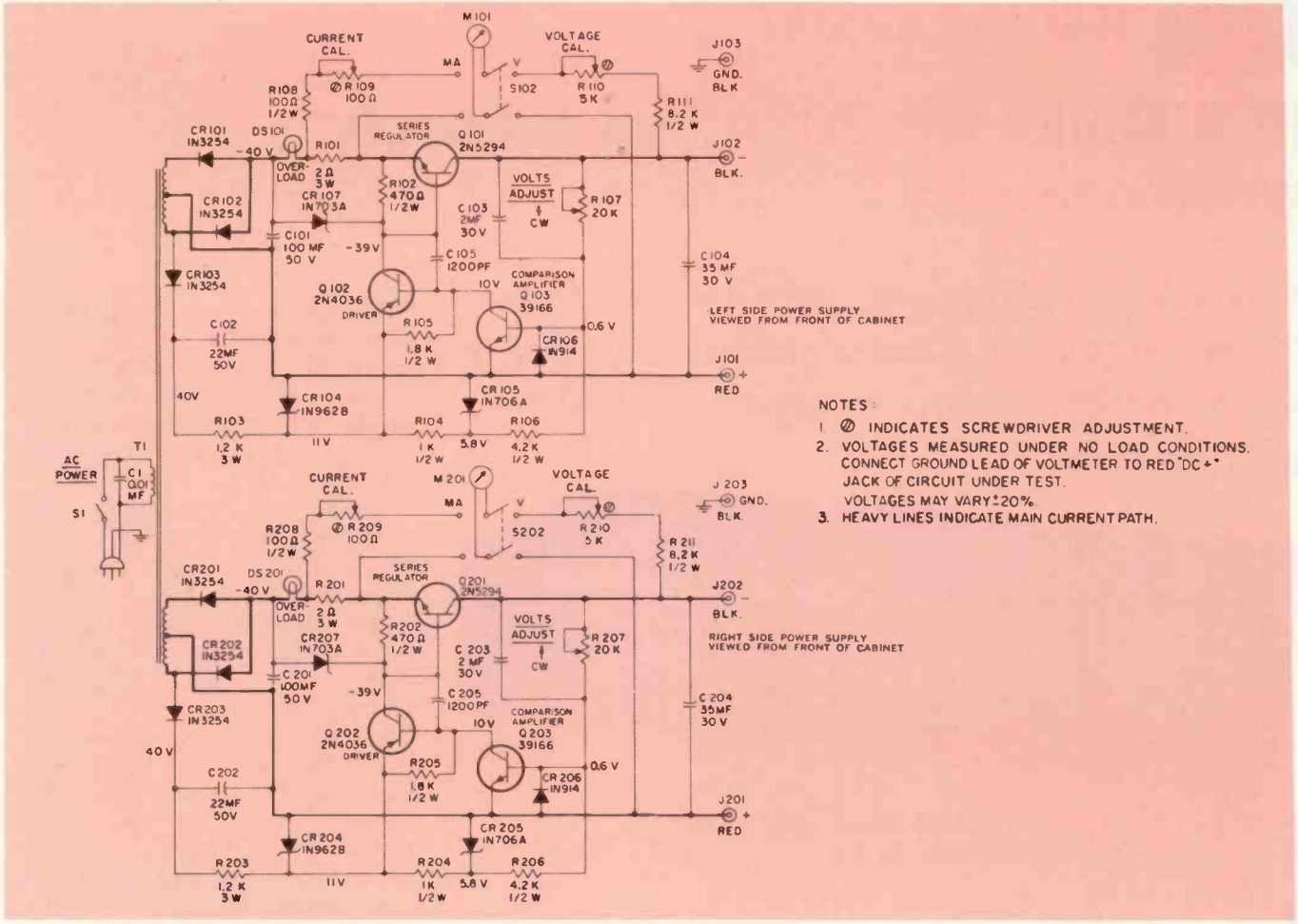


Fig. 2—Complete schematic diagram showing the WP-702A dual power supply.

front panel. A slide switch on the front panel is provided to select either voltage or current readings on the meter. The top scale of the meter is voltage while the lower scale is in mA selected with panel switch.

When using a variable power supply for transistor servicing, it is best to have the voltage level control turned to minimum. It's the safest way to prevent an embarrassing situation caused by ruining an additional transistor or two in a customer's cherished radio. In the case of the RCA WP series, simply turn the VOLTS ADJUST control to its maximum counterclockwise position. Set the meter switch to indicate volts; then connect your external load to the output terminals depending on the required type of ground you need.

Depending too on what you think is wrong with the transistor equipment you are working on, it may be that you would want to set the proper voltage on the meter switch to the current scale before turning the load on. This would especially help if you suspect a short in the unit being serviced. The WP-700A supply is limited to 200mA as we said, and anything over this will cause the overload indicator to glow. Actually, it will start to glow

continued on page 82

SPECIFICATIONS

Output voltage	**0 to 20 volts at 0 to 200mA**
Input voltage	**105 to 135v ac, 50-60Hz**
Line regulation	**less than 30mV change in output voltage for power line variation of 105-135 volts ac**
Load regulation	**less than 50mV voltage change for 200mA load change**
Ripple	**less than 500μV rms**
Meter functions	**0-20v and 0-200mA selected with panel switch**
Controls	**continuously variable voltage adjustment**
Output terminals	**DC plus, DC minus and GND**
Short circuit protection	**external short circuit load will not damage supply**
Overload indicator	**panel lamp glows when current level nears 200mA rating**

ET/D TEST LAB REPORT

High Frequency Engineering Co.'s Model 500 RF Voltmeter

By PHILLIP DAHLEN

Handy instrument for measuring signal strength in MATV systems, or other moderately strong RF signals

■ Have you ever tried purchasing a low-cost RF meter for MATV use? Most electronic supply catalogs list very few such instruments. However, we recently received one such instrument (Fig. 1), High Frequency Engineering Co.'s Model 500, that does the job quite well.

Although the instrument is not designed for measuring RF signals of less than 0dB strength, we found it quite adequate for measuring the signal obtained from the ET/D lab antenna—all of the local TV station towers are near enough to be easily seen from the roof where our antenna is mounted—and a 5dB signal was indicated.

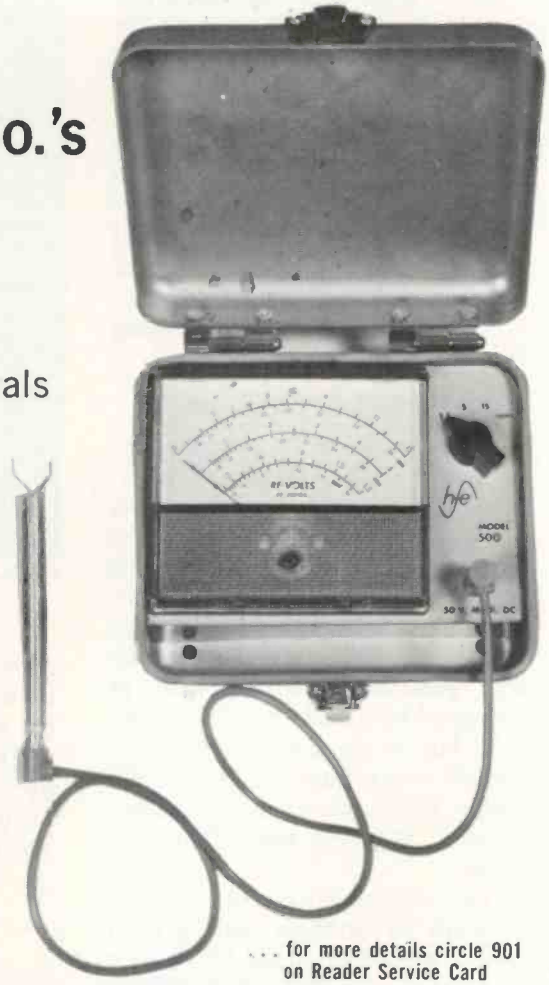
Despite the instrument's lack of sensitivity for most conventional antenna installations, it is quite adequate for the amplified signals transmitted through MATV cables and outlets. This meter has the advantage of extreme portability, operating entirely from the RF signal measured without a need for even batteries. The handy probe can be easily plugged into most conventional 300Ω antenna-system outlets. However, we discovered that a little extra care must be taken when unplugging the probe from the outlet. The probe that we were using fell apart when pulled by its handle from an outlet.

HOW THE INSTRUMENT WORKS

Upon removing the instrument from its case, it became apparent that very few components are required for its operation (Fig. 2). The diagram in Fig. 3 is the result of our tracing these components on the printed-circuit board. Most of the resistors were wire wound, though we were not certain of the exact construction of one resistive component.

We found that the basic instrument functions as a dc voltmeter designed to measure the dc voltages developed in its probe. Never attempt to use this instrument without its detachable probe since it is then insensitive to RF voltages and could be damaged by excessive dc volt-

Fig. 1—High Frequency Engineering Co.'s Model 500 RF Voltmeter.



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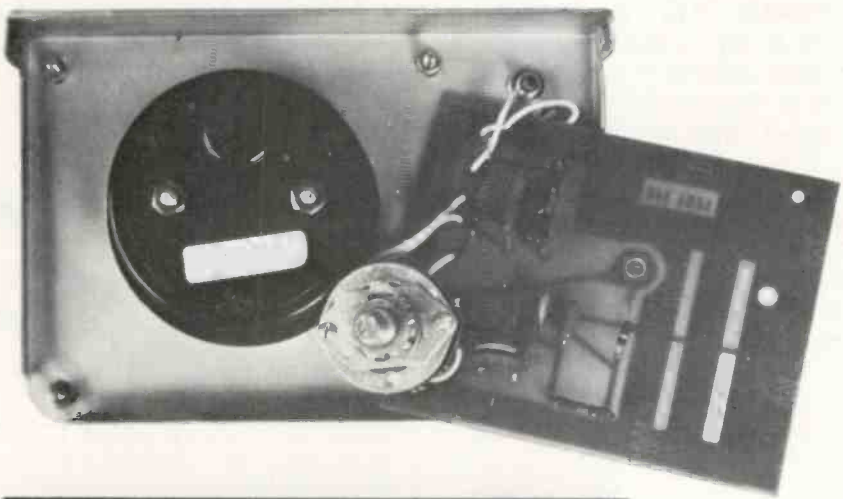


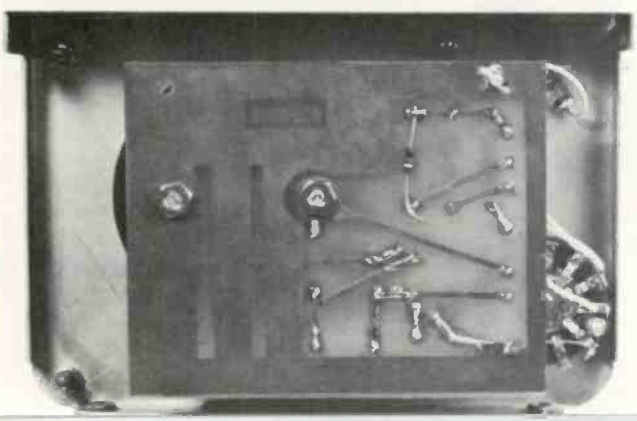


Fig. 2—Front and back view of printed circuit board containing major assortment of instrument components.

ages applied directly to the meter.

As a result of several measurements we had already guessed the probe's construction (Fig. 4) by the time it fell apart (a plastic plug forced into the end of a metal tube is all that is used to support the input prongs). RF signals pass through the first capacitor and are changed to a dc voltage proportional to the RF voltage with the use of two diodes. A 47K resistor and second capacitor are used for filtering this dc voltage.

INSTRUMENT OPERATION

In order to test the probe, we connected it to a signal generator, varied the output signal between 30Hz and 2MHz, and adjusted the generator's output voltage so that it remained 15v P-P over this entire frequency range. The dotted line in Fig. 5 shows the resulting dc current generated by the probe, as measured by an ammeter, while the solid line in the same graph shows the RF voltages indicated by the RF meter (with the ammeter disconnected) over the same frequency range.

The instrument is designed to measure RF voltages ranging from 0dB to more than 36dB (15v) over a frequency range of 0.02MHz to 200MHz. The measurements graphed in Fig. 5 indicate that the instrument accurately measures RF signals at frequencies of 0.02MHz and higher. The instrument's poor sensitivity at 60Hz is a desirable feature since it will not respond to the hum induced by power lines.

The ammeter used in our analysis of the probe displayed even greater sensitivity than the instrument meter, though on higher scales the ammeter loaded the probe to the extent that the dc current varied with frequency when the signal was less than 2MHz.

When the ammeter was connected, use of the probe resulted in a noticeable load on the signal generator; while without the ammeter, use of the instrument alone resulted in no significant signal load.

CONCLUSION

Electronically, the instrument functioned well. Its 0.02MHz to 200MHz frequency range includes virtually the entire VHF band, but not the UHF channels.

The instrument measures about 3 by 5½ by 6½ in., weighs 2lb, and the probe fits in the instrument cabinet for easy carrying. Price $75. ■

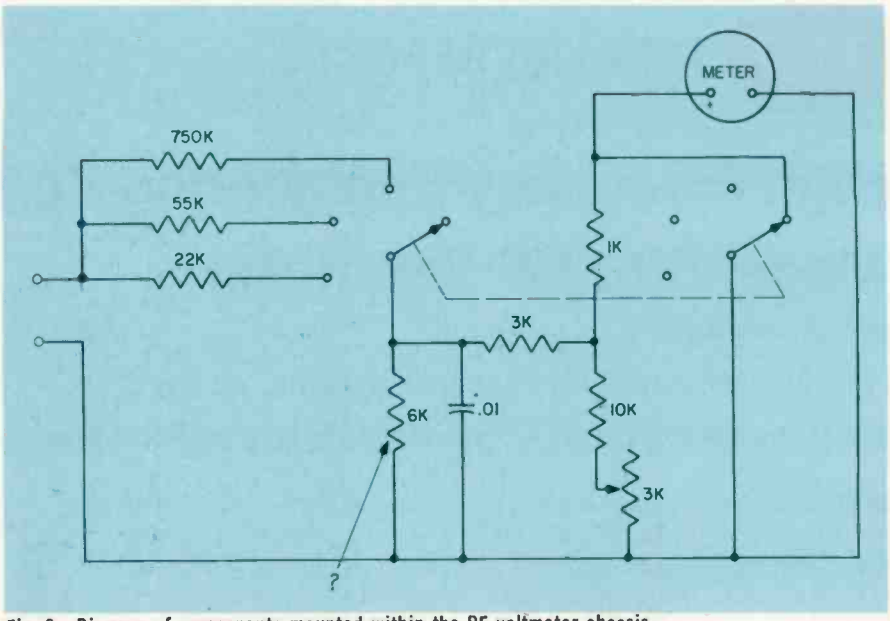


Fig. 3—Diagram of components mounted within the RF voltmeter chassis.

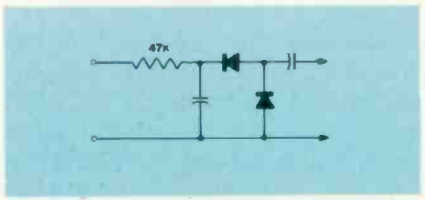


Fig. 4—Diagram of components mounted within the instrument's probe.

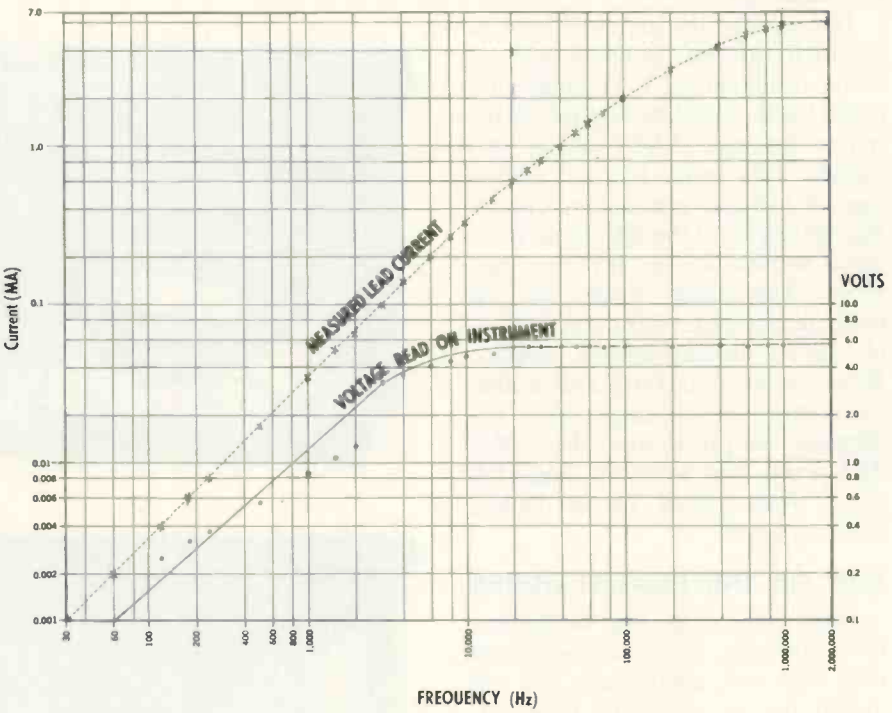
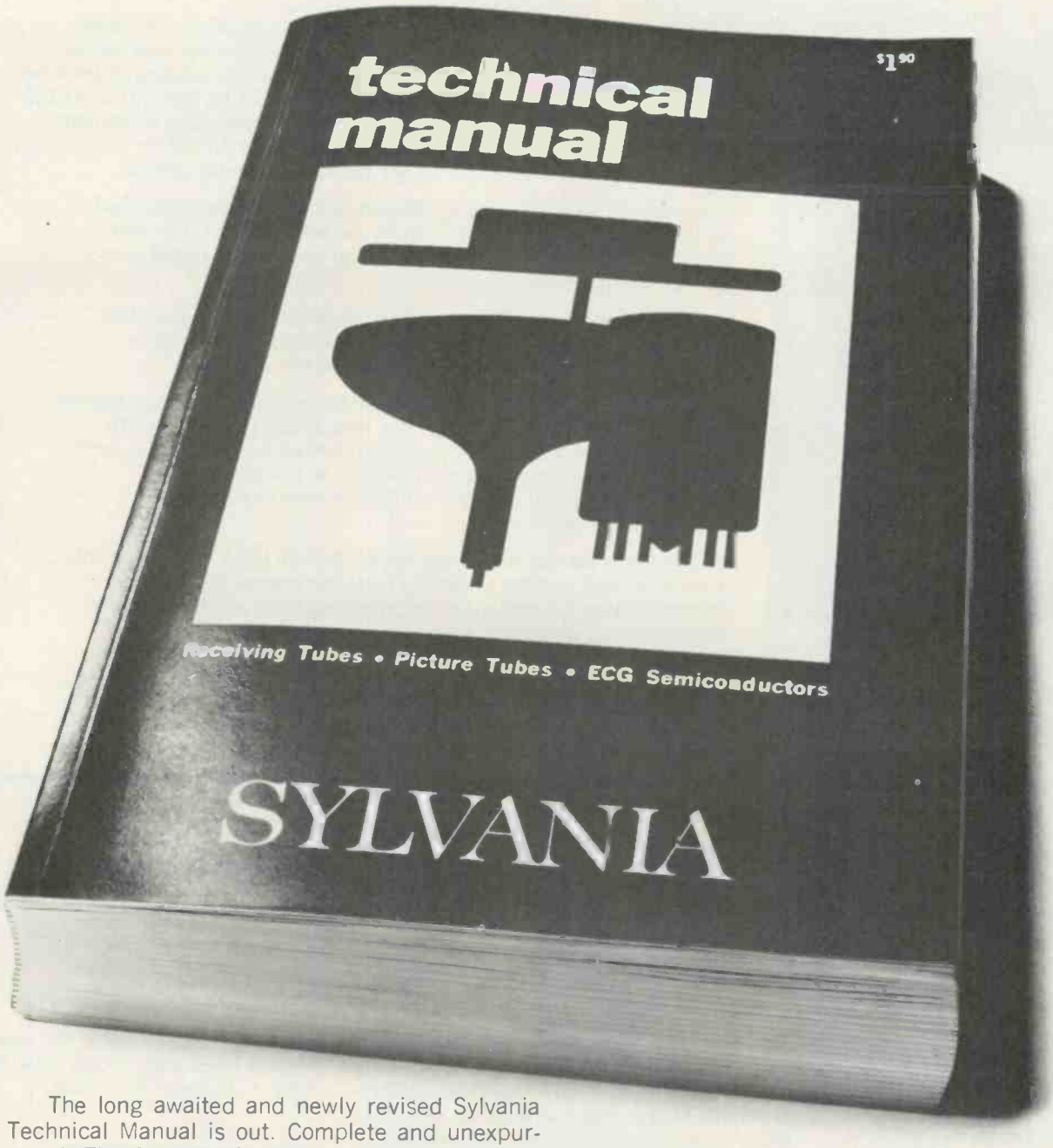


Fig. 5—Probe currents and instrument RF voltage measurements plotted against signal frequency.



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SYLVANIA
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PUBLISHER'S MEMO

This month we're doing something different with our regular monthly New Products section. Many of our readers are aware that each spring, for many years, our industry has held its annual manufacturers, distributors and reps convention, now known as NATIONAL ELECTRONICS WEEK (NEW). This show gives the manufacturers the opportunity to introduce their latest equipment and parts to their sales force who will be passing along this information to you during future sales contacts.

This year the show returned to Chicago and the attendance reached an all-time high. The enthusiasm of everyone who attended indicated that the servicing industry could expect an exceptionally good sales outlook for the remainder of 1970.

It's unfortunate that time-wise and geographically you, our readers, are unable to attend gatherings such as this, especially since you are the people responsible for the growth of our industry.

In order to bring a portion of the NEW Show to you, the following new products were introduced for the first time at this year's show. We must apologize for any of the manufacturers in attendance who were unable to release material to us in time to be included in this section. Those will be covered in future months in our regular New Products section.

The products are "keyed" to the Reader Service Card provided in this June issue, and you can be assured that your request for further information on these products will receive priority answers from the respective manufacturers.

Scotty Wallace

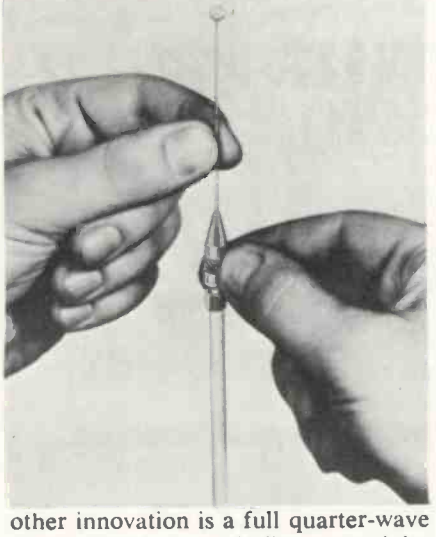
ET/D NEW PRODUCTS Special Coverage of Products Introduced at NEW

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

Antennas and Accessories

CB ANTENNA 700

A tuning tip that can be adjusted by the user for minimum SWR is one of the features in a line of fiber glass citizens' radio antennas announced. The tuning tip adjusts with a twist, requiring no tools or cutting. A special fiber glass material which the manufacturer calls "Armorweave" is used in the antennas. It contains more glass fibers, woven in multi-directions, to resist blows that would shatter conventional fiber glass materials and is reportedly actually stronger than brass, aluminum and even many steels. The fiber glass material used on the antennas is white and reportedly will not fade or deteriorate. Adding to the appearance is the newly designed spring mounting hardware which blends with the slim tapered antenna for a smooth, uncluttered look. The mounting hardware is made from triple chrome plated brass. Included in the new line is a center loaded whip, with quarter-wave performance characteristics in 38in. Another innovation is a full quarter-wave antenna with a quick-disconnect joint that overcomes low obstructions such as garage doors. There are also base loaded types and models with "Quick Grip." Antenna Specialists.



VHF/FM BROADBAND AMPLIFIER 701

Introduced is the CVB-60, a solid-state, indoor, broadband VHF/FM amplifier for use in large MATV systems. It has two independent amplifying sections: one for TV channels two to six plus FM and similar section for TV channels seven to thirteen. Each amplifier section has a gain and a tilt control. The gain controls are used to set and balance the signal levels. The tilt controls compensate for the effects of frequency-dependent cable losses. The unit is supplied with the response of both bands aligned flat. The unit reportedly can provide up to 2v (+66dBmv) output on three high-band channels without perceptible interference. A test —30dB jack permits monitoring of output signal levels.

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Covers all 1965 models for: Admiral, Airline, Andrea, Coronado, Curtis Mathes, Dumont, Electrohome, Emerson, Firestone, General Electric, Magnavox, Motorola, Muntz, Olympic, Packard-Bell, Philco, RCA Victor, Sears-Silvertone, Setchell-Carlson, Sylvania, Truetone, Westinghouse, and Zenith . . . plus all color sets 1960-1965, at no extra cost!
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CONTENTS 1966 MODELS
Covers all 1966 color and B & W models of: Admiral, Airline, Andrea, Coronado, Curtis Mathes, Dumont, Emerson, General Electric, Hoffman, Magnavox, Motorola, Olympic, Packard-Bell, Philco, RCA Victor, Sears-Silvertone, Setchell-Carlson, Sonora, Sylvania, Truetone, Westinghouse, and Zenith.
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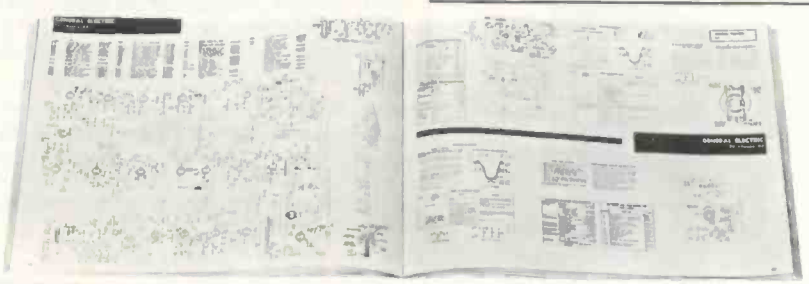

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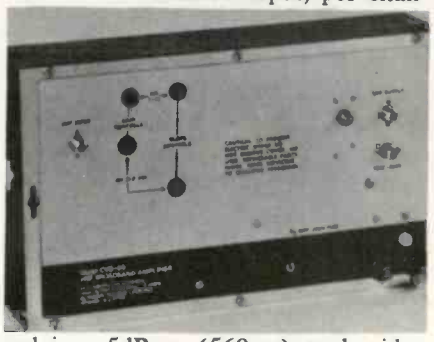
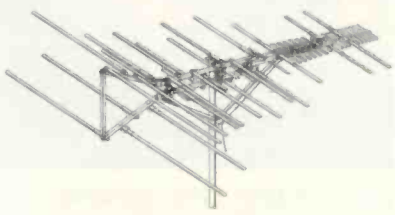
Typical specifications: Gain is 45dB channels 2-6 and FM, 53dB channels 7-13. Bandpass is 54-108 and 174-216 MHz ±0.5dB. Gain control range is 20dB channels 2-6 and FM, 22dB channels 7-13. Tilt control range is 4dB 54-88MHz, 174-216MHz. Noise figure is 9dB channels 2-6, 8dB channels 7-13. Minimum input, per channel is —5dBmv (560μv) each video carrier, for TASO Grade 1 (excellent) picture. Maximum output is 1v per channel up to 63dB gain at UHF. Input return loss is 54-108MHz, 174-216MHz, 15dB return loss; (1.42 VSWR). Output return loss is 54-108 MHz, 16dB return loss (1.37VSWR) and 174-216MHz, 9dB return loss (2.12VSWR). Impedance is 75Ω in all terminals. Semi-conductors—9 silicon transistors, 7 silicon diodes. Blonder-Tongue.



ANTENNA 702

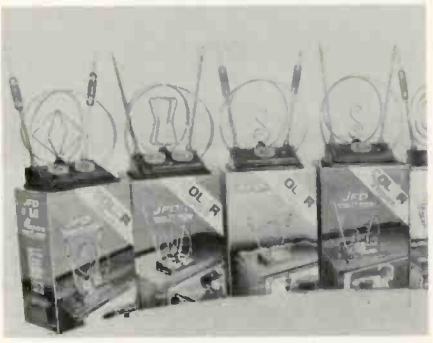
Introduced are the "70 Series" Color Spectrum antennas. Square twin booms support the frequency dependently spaced multiple driven VHF elements and frequency phasing elements of the antenna. The twin boom section of the antennas are flared into a delta configuration for improved signal absorption and transfer into the drive system. The configuration also sharpens reception patterns for ghost rejection. Element function is multiplied through the use of high band phasing elements and colinear directors on the antenna's single boom front ends. The front ends also carry the multiple drive UHF section on the all channel VHF-UHF-FM models. The UHF section ties directly into the twin drive booms of the VHF section for signal transfer with reportedly no loss of UHF or VHF signal strength and the drive system is killer stubbed to prevent UHF ghosting from spurious UHF signals. The wide range of models available provide the proper combination of VHF and UHF antenna strengths to meet every combination of signal strengths. The high gains, sharp patterns, and high front-to-back ratios made possible by the patented Frequency Dependent principle are applied to the multiple flared boom delta configuration. Elements are sleeved and seated in backed-up sure-lock and aligning brackets of high tensile strength aluminum. Insulators are of poly. Antennas mount to mast with twin U-bolt assemblies and the larger models are supported with full 1in. round boom supports. Gold Corodized inside and out for lasting corrosion protection. Finney.



INDOOR ANTENNAS 703

Introduced is an all-new indoor antenna line. The antennas will be featured in national advertising both in print and broadcast. The entire line has received the Good Housekeeping consumer guaranty seal. The antenna rod assemblies are electro-polished chromated brass, conversion coated and lifetime lubricated with tarnish-proof

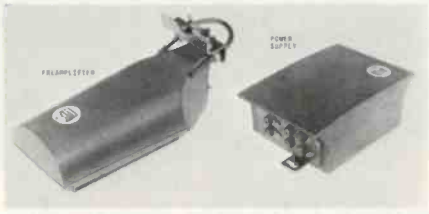
lubricant. The elements are built to OEM specs to insure trouble-free operation. Utilizing universal ball pivot joints, the elements can be oriented



in almost any direction for maximum signal pickup. The marbleized pedestal bases employ a grained walnut colored inlay, trimmed in gold—and are tilt-resistant. A 14-position switch with self-cleaning design and nickel plated contact prevents corrosion. The tuning knobs are sculptured in gold speckled clear plastic. The knob is assembled to the control shaft by machine press fit for positive non-slip grip. One of the most important aspects of the line is the "pre-lith" full-color carton. Each antenna carton identifies itself by means of its own individual color and can serve as their own display. JFD.

ANTENNA PREAMPLIFIER 704

Announced is the 4000 series "Powermate-Plus" Preamplifiers for antenna or mast mounting including super-



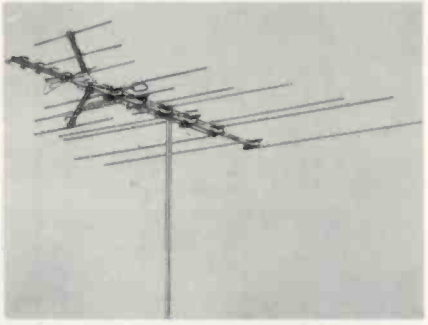
gain and super overload versions in both 300 and 75Ω models. These high-gain, low-noise units, reportedly improve picture quality in locations of normally poor TV reception. Designed especially for master antenna television (MATV) and home distribution systems, the units are easy to install on antenna masts in conjunction with mating indoor-mounting power supplies. Each device is housed in a functional, decorator-styled unbreakable plastic cover that also forms a natural watershed with electrical connections located on the dry underside of the outdoor preamplifier.

Shown is the 300Ω Model 4283-S, an all-channel super version of 4283, that offers higher gain and overload, for VHF-TV, FM and UHF-TV amplification. This model also has two separate outputs from the power supply for two home TV receivers.

All Powermate Preamplifiers reportedly offer flat frequency response over their range, low power use, tuneable FM Trap where applicable, lightning protection, universal mounting and a model for every conceivable need. Jerrold.

TV/FM ANTENNAS 705

Announced is a new line of TV/FM outdoor antennas. The permacolor antennas feature solidly riveted, permanent connections between the elements and the feed lines. The line

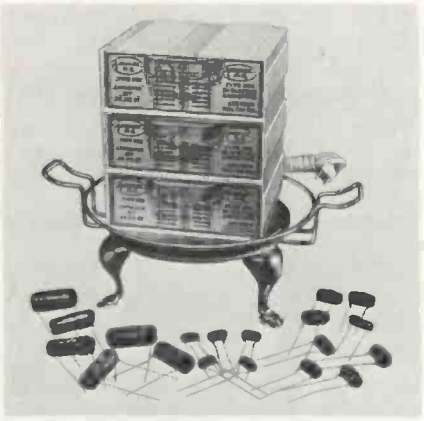


includes a full range of UHF-VHF-FM combinations, as well as VHF-FM models, for application in virtually every reception area from metropolitan to deep fringe. The combination models feature an improved UHF corner reflector which also augments VHF reception plus a wide-band, bow-tie UHF dipole. Snap-off elements are provided on most models for adjusting the antenna to local FM and UHF reception requirements. The insulator design concept provides a much larger support area for the element; the polypropylene insulators support the blue vinyl-clad elements over a 5½ in. span. When fully opened, opposite insulators lock together to form a rigid, trusslike structure for greater strength. The Model 4BG23, shown in photo, is one of the new models introduced. RCA.

Components

CAPACITOR KIT 706

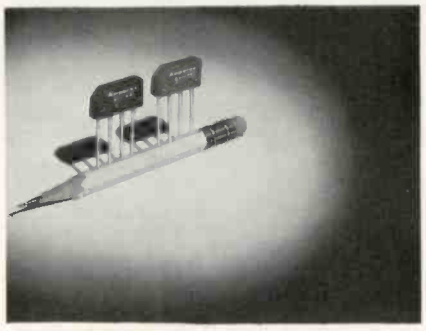
Announced is a combination kit and premium of special interest to service replacement dealers. Offered is a bypass capacitor kit that includes an assortment of popular value dipped Mylar/paper capacitors packaged in a series of three interlocking plastic drawers. Included is an attractive Queen Anne Styled Gourmet electric trivet. The capacitors featured in the kit are dipped radial lead types for bypass applications in radio, TV sets and Hi Fi equipment. The kit, AK-115ET, includes an assortment of 115 capacitors, all rated at 600v in the more popular capacitance ratings. The unique "Top Drawer" plastic drawers feature grooves on both sides as well as top and bottom for interlocking drawers horizontally or ver-



tically. The special premium offer is attractively priced at a suggested resale price to service dealers of only $24.95. Aerovox.

BRIDGE RECTIFIERS 707

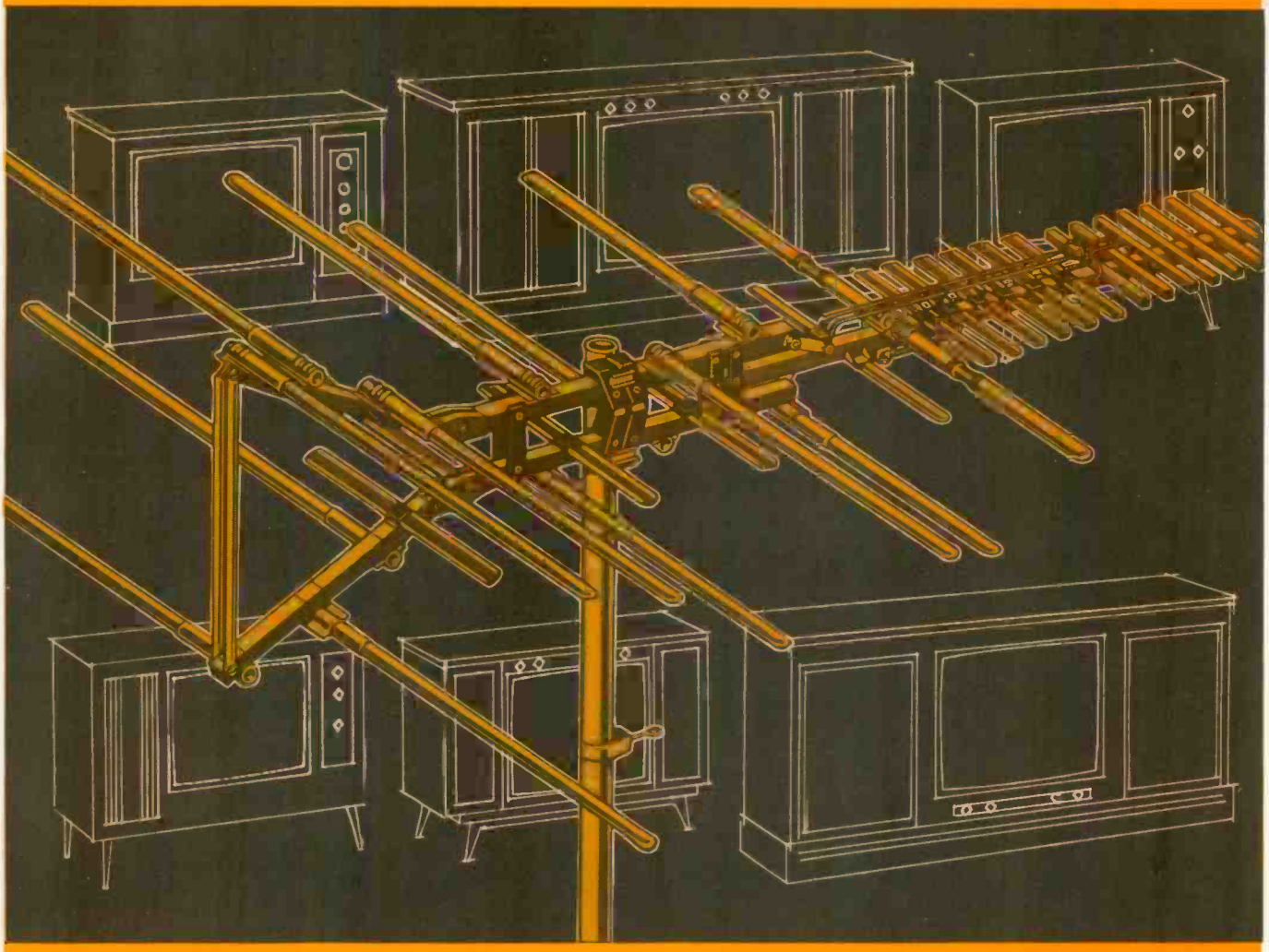
Two bridge rectifiers, Types BY164 and BY179, both of which have increased input and output ratings at lower cost is introduced. The BY164 provides 1.2a output at 54v into an R/L load; the BY179 is specified at 1.0a output at 255v into an R/L load. The rectifiers are plastic-encapsulated assemblies comprised of four silicon double-diffused diodes. The BY164 is primarily intended for use in the power supplies of transistorized equipment operating at frequencies up to 400Hz; the BY179 for use in off-the-line power supplies at line frequencies



up to 400Hz. The advantages provided by bridge rectifiers over half-wave, single diode rectifiers are: significantly reduced hum, lower filter requirements, lower associated-component cost (lower transformer cost due to higher efficiency and/or elimination of the transformer, when output voltages equal to the line voltage are required . . . or when phono motor overwind is the power source). They also offer an important advantage over full-wave, two-diode rectifiers because they do not require a center tap on the transformer. Price in thousand lot orders, BY164, $0.51. BY179, $0.56. Amperex.

continued on next page

the set choice is yours...



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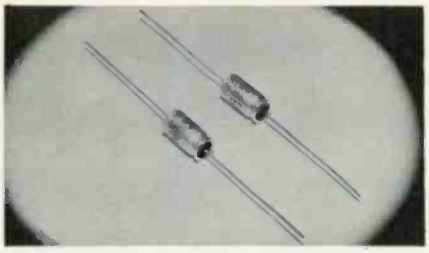
CAPACITOR RE-PLACE CENTER 708

Introduced is a Capacitor Re-Place Center available to all distributors. This simple, yet complete, point of purchase display allows the parts distributor—with minimum investment and inventory—to satisfy all his capacitor demands. Cornell-Dubilier.

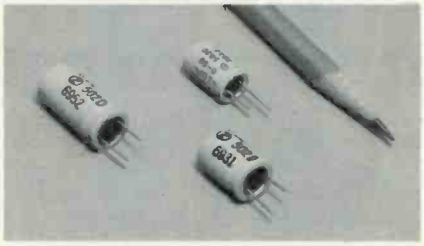
SUB-MINIATURE ELECTROLYTICS 709

Introduced is the Type NLW line of sub-miniature, metal cased, aluminum electrolytic capacitors. Because of the material and production methods used, it is now possible to increase capacitance per case size. This also provides existing ratings in smaller case sizes than previously available. Reportedly, the material and production methods also increased the stability of the NLW line. The operating temperature range has been increased from —40°C to +85°C to —40°C to +105°C (—40°F to +221°F). The line is stocked in depth with capacitance values from 1 to 1000μf, in voltage ratings from 3 to 150vdcw. Cornell-Dubilier.



MINIATURE ELECTROLYTIC CAPACITORS 710

Introduced are type 502D Verti-Lytic single-ended aluminum electrolytic capacitors. These capacitors possess the physical and electrical characteristics of axial-lead type 500D miniature metal-case electrolytic capacitors. While the mechanical and electrical characteristics make them of special interest in industrial applications, their cost makes them attractive to those requiring a capacitor with good operating life characteristics for use in "personal" radios, auto radios, portable tape recorders, and similar applications in the field of entertainment electronics. The capacitors reportedly display excellent stability of capacitance, equivalent series resistance and low leakage current. Welds at all critical anode and cathode terminations, a construction technique, assure freedom from open circuits even when operated in the millivolt or microvolt range. With capacitance value ranging from 1 to 330μf, voltages from a working voltage of 3 to 50 vdc, these capacitors have metal cases and are furnished with a thermoplastic insulating sleeve. Sprague.



Microphones

MICROPHONE BOOM STAND 711

Introduced is the Model BS-36W boom stand which is applicable with

any standard microphone and is specially designed for use in the educational, industrial and entertainment fields where the constant change of stage requirements demands minimum

visual interference and complete mobility. The microphone stand features a triangular base, black wrinkle finish and rubber casters. Its vertical height adjusts from four to seven feet. The horizontal boom is 62in. long and an optional attachment extending its length to 93in. is available. All tubular sections are chrome plated, and a gyromatic swivel at the end of the boom allows appropriate directional flexibility for the microphone. Atlas Sound.

MICROPHONE 712

Introduced is a series of public address dispatcher-type dynamic microphones including one to be introduced for citizen band applications. The Mod-

el 751 is one of the three introduced which is a 150Ω impedance dynamic unit reportedly having 300 to 3500Hz frequency response, which is essentially voice range and thus effectively cancels out many unwanted background noises that fall outside the unit's frequency range. Finely adjusted leaftype switches are wired for relay operation. The microphone comes with a 20ft. cable and complete specification sheet. Housed in a rugged die-cast metal case, the models include a front touch-to-talk switch bar and locking on-off switch. The element (cartridge), front screen and switches can be easily replaced. List price $75. Conrac.

Misc

AUDIBLE ALARM 713

Introduced is a device which emits a shrill pulsating sound when triggered by detector actuation. The Audible Alarm Model 9PA features positive detector lock, automatic 15 second delay after turn on and measures 2¼ x 3 x 2in. All solid-state components with temperature range of 0°C to +70°C. Sound output 70-75dB. Battery operated, weight 4oz. The

unit may be mounted local or remote to the detector. Applications are position alarms, burglar, fire, pool, proximity, power failure, medical electronics, communications, computers, etc. Detector functions may be micro, magnetic, FET or photoelectric switch, heat sensor, float switch or relay contacts. Price is $36. Astro Design.

STEREO TURNTABLE 714

Introduced is the Model 600 four-speed automatic turntable. Features

offered include: a cuing and pause control, counter balanced low-mass

continued on next page

tubular aluminum pickup arm, adjustable anti-skate compensation, and full size heavy cast turntable. Price is $74.50. BSR.

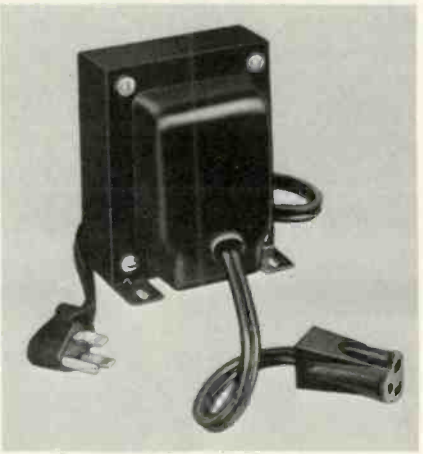
INTRUSION ALARM 715

Announced is an ultrasonic motion detection system called the DeltAlert. The unit reportedly detects any motion or intrusion and is being used as

both an anti-burglary device and as a convenience item. Utilizing the sonar principle, the unit operates at an ultrasonic frequency of 35kHz, and will monitor an area 15-30ft., depending on environmental conditions such as shape of the area. The receiving and transmitting elements of the unit are both electrically and acoustically coupled, and has been designed to yield a relatively broad band characteristic, forcing oscillation to occur at a point of maximum acoustical sensitivity. The coupling network provides self-biasing, but eliminates amplitude modulation effects caused by objects moving in the external acoustical field of the unit. The system provides a variable built-in timer for activation of lights, bells, etc., and a variable sensitivity control which provides for resetting the unit for individual conditions. Easily installed, the system plugs into any wall outlet and no rewiring is necessary. Power requirements are minimal at 11-130v, 60Hzac. The 10⅜ x 3¼ x 3¼ in. unit comes in a handsomely styled walnut finish to blend with any decor, and is priced at $59.95 complete. Delta Products.

TRANSFORMER 716

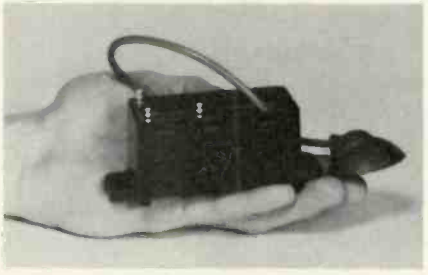
A series of step-down auto-transformers is announced. Called the GSD Series, these components are available in 10 sizes to handle continuous duty power requirements from 75va to 2kva, 230v 50/60Hz to 115v, single phase. The transformers have NEMA standard three-wire plugs, cords and receptacles, with the third conductor and the transformer case always grounded. Mainly for the electronic and electrical industries, the auto-



transformers are used in laboratories, industrial equipment, servicing electronic apparatus, and in the home for appliances and power tools. Their primary application is to step-down line voltage from 230v to 115v safely. Essex.

HV MULTIPLIER 717

Development of a solid-state device that substantially reduces the chance of radiation or fire in color television is announced. The device, called a high voltage multiplier, is designed to



replace the high voltage tube section and peripheral tube components used in color sets. The solid-state assembly, constructed of diodes and capacitors in an epoxy enclosure that could fit into a child's hand, provides voltage to the picture tube without high voltage rectifier and shunt regulator tubes. Sylvania.

CHILLING SPRAY 718

Introduced is a product called Blue Frost, which is a multipurpose chilling spray. The spray is claimed by the manufacturer to be the ultimate in trouble shooting and chill testing sprays that have been designed for electronic use. The spray can be used to test entire assemblies for cold weather and high altitude operation. The special formula used permits a spray that is colder and lasts longer, and also can be effectively used to mate or release tight fitting metal parts. The

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spray is available in 8 and 20oz. sizes and is packaged in distinctive blue aer-

osol cans. Both sizes are packaged twelve to a case. Tech Spray.

Speakers

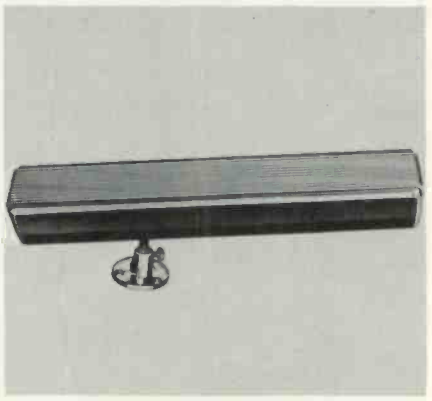
SPEAKER SYSTEM 719

A top-of-the-line speaker system, Model 2395, is introduced. The system features a 15in. high-compliance, cloth-roll suspension woofer with a 4½lb magnet structure and 2in. voice coil, plus a tuned port for bass response down to 20Hz. A die-cast, horn-loaded compression-type midrange speaker reportedly delivers response from 1000 to 8000Hz; and a wide-dispersion dome radiator VHF tweeter carries the overall frequency response to well beyond the range of audibility. The system has electrical crossovers at 1000 and 8000Hz. Two level controls on the rear of the enclosure permit adjustment of midrange and tweeter volume. Impedance, 8Ω. Power handling capacity is 50w, 100w peak. The 29½ x 20¼ x 14in.

enclosure is of ¾in. hardwood construction with a walnut veneer finish and sculptured moldings. A flush-grooves satin black base is included for floor use. Price is $149.95. Allied.

SOUND COLUMNS 720

A series of sound mini-columns engineered for low level music background and paging systems is intro-



duced. This series features an all-nylon shockproof construction—three ceramic magnet wide range speakers —quick clip-on polarized line terminals—patented ball-type swivel mounting with die cast support base permits vertical, horizontal and diagonal orientation—continuously variable thumb-type impedance selector. American Geloso.

STEREO SPEAKERS 721

A deluxe stereo speaker system that doubles as hassocks is introduced. The space-saving system, called the Hassock Deluxe Stereo Speaker System, is designed to help relieve the over-

furniture look. The system consists of two hassocks each containing heavy-duty, high efficiency, 12in. bass woofer and 1000Hz exponential treble horn encased in an acoustically-sealed enclosure. The attractive hardwood cabinets have rich walnut grain finish and vinyl covered top so they can be safely used either as a hassock or extra seat. Decorator rollers enable the units to be easily moved around the room. Each unit measures 17½ H, 18¾ W and 17½in. D. Price is $199.90 (includes two hassocks). Magnavox.

CRT BRIGHTENERS 722

Two-in-one color picture tube brighteners having isolation and isolation-with-boost is introduced. A switch setting on the brightener se-

lects the operation mode: normal for isolation, or boost for isolation with boost. The brighteners feature an

oversized transformer for long life and cooler operation. Model CR-300 for 70deg and CR-350 for 90deg picture tubes. Price is $7.45 each. Telematic.

Test Instruments

RF GENERATOR 723

Introduced is a Model E-200D solid-state RF signal generator with the following manufacturer's specifications: Frequency range—100kHz to 54MHz in 5 fundamental bands; 132MHz to 216MHz in 2 harmonic bands. Accuracy—±1.5 percent of highest frequency on any range used; with crystal calibrator, accuracy of better than 0.1 percent is obtainable. Output—(calibrated into 50Ω load) 100,000μv maximum. Open circuit, uncalibrated output. Output level calibration accuracy—±1dB of nominal to 54MHz. Attenuator system—6 individually shielded step attenuators with a total capability of —96dB; outputs as low as 106dB below 100,000μv can be obtained. Fine output level control with calibrated meter provides additional —10dB to +2dB output level indication (0dB = 100,000μv into 50Ω). Modulation—400Hz nominal external modulation sensitivity, approximately 1v RMS for 50 percent modulation. Crystal calibration system—1MHz and 100kHz; 100kHz output is calibrated against the 1MHz crystal oscillator. Accuracy—±0.05 percent. Built-in detector, amplifier and speaker system provided for calibration function. Dimensions: 12¾ x 7¼ x 8in. deep. Weight—14 lbs. Price net $159.95. B&K.

SINE/SQUARE WAVE GENERATOR 724

Announced is the Precision Solid-State Model 310B Sine/Square Wave Generator with the following manufacturer's specifications: Sine Wave: Frequency range—20Hz to 2.0MHz in 5 decade ranges; 20-200Hz; 200Hz to 2kHz; 2kHz to 20kHz; 20kHz to 200kHz; 200kHz to 2MHz. Output—0-8v RMS into high-impedance loads; 0-7v RMS into 600Ω; ±1dB to 1 MHz; ±2dB to 2MHz. Distortion—0.1 percent typical; 0.25 percent maximum. Square Wave: Frequency ranges—20Hz to 200kHz in 4 ranges: 20-200Hz; 200Hz to 2kHz; 2kHz to 20kHz; 20kHz to 200kHz. Rise time—less than 200nsec at 20kHz. Symmetry—balanced within 5% or less. Frequency calibration accuracy—±2%, 100Hz to 2MHz; ±2% below 100Hz. Attenuators (both sine and square wave outputs)—Step: total of 56dB (6 switches). Accuracy—±5% when terminated in 600Ω load. Continuously variable control—adjusts output from maximum down to less than 0.25μv (used with step attenuators). Dimensions—12¾ x 7¼ x 8in. deep. Weight—10 lbs. Net price $119.95. B&K.

SOLID-STATE FET/VOM 725

Introduced is the Model 176 Solid-State FET/VOM shown in photo. This universal meter reportedly includes: Total solid-state with FET's for complete stability. Battery operated and compact for complete portability. DC volts—8 ranges, accuracy ±2 percent full scale, input impedance 11M. AC volts—8 ranges, RMS and P-P on same scale, accuracy 3 percent full scale, input impedance 10M. Ohm meter—7 ranges, accuracy ±3deg scale arc. DC current—six selective ranges, accuracy ±2 percent full scale. Measures audio level at any impedance from —10dB to +66dB.

Fuse and diode protected against accidental overloads. 4½in. high sensitivity meter. BNC connector. RF accessory probe extends frequency range to 250MHz. High voltage accessory probe extends voltage range to 60kv with input impedance greater than 1000M. Price $99.95. B&K.

TUBE TESTER 726

A solid-state tube tester Model 607 is introduced with reportedly the following features: Exclusive multiple-pin lock pushbutton switches (10)—open any and all pins in tube under test—all tubes now can be tested for shorts; positively detect all shorts regardless of pin connections; eliminate

all false shorts. Reset button clears all lockouts. Tube testing speed doubled by (1) exclusive shape-coded symbols that match controls to chart, and (2) minimum number of settings—maximum of four and in some instances, only three are required. Checks tubes accurately—under simulated load conditions. Exclusive grid leakage and gas tests. Simplified heater voltage setting. Power "ON" indicator. Superior load and plate voltage capability. Tests newest tube types—plus all old types used in TV and radio. Nuvistors, Novars, Magnovals, new 10-pin tubes and 12-pin Compactrons. Shape-coded symbols match control to chart. The chart includes a holder for fast, easy display. Unit has a black attache-type case. Size: 13¼ x 9½ x 4 in. deep. Net price $114.95. B&K.

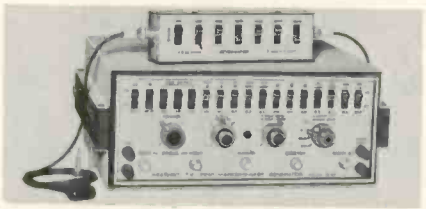
FIELD STRENGTH METER 727

Introduced is the Model FSM-3, a high quality, low cost, small size field strength meter. The meter features high accuracy, lightweight, sharp tuning and a battery saving circuit. Self-contained metal carrying case with handle and cover. Regulated power supply; taut band meter; temperature tested 0°F to 130°F; ± 1.5dB accuracy; uses one nine-volt or eight pen-

light batteries. Size: 3in. D x 7in. L x 4in. W. Blonder-Tongue.

POST-MARKER/SWEEP GENERATOR 728

Introduced is the Model IG-57A solid-state Post-Marker/Sweep Generator. The unit now includes the reportedly following features: New video sweep modulation. External attenuator with seven shielded switches for up to 70dB attenuation. Produces all the most used alignment frequencies for TV IF, color bandpass, FM IF and VHF channels four & ten. Comprehensive manual with a liberally illustrated application section covers alignment of color and B/W TV and FM IF. Post-injection marker circuitry. Fifteen crystal-accurate markers. Three sweep oscillators cover the five most-used frequency ranges. Saturable reactor circuitry for dependable, linear sweep signals. 400Hz modulation of all markers for trap alignment. Hi-Z trace amplifier extends your scope sensitivity—provides up to 8dB gain for weak signals. Phase control matches unit to any scope. Switchable retrace blanking for easy phase control adjustment. Trace reverse function for proper market sequence. Two variable DC bias supplies for positive or negative bias. Quick-disconnect BNC connectors. Complete with four coaxial cables, four test leads and demodulation probe. New circuitry provides sweep-modulated picture carriers . . . not only at 45.75

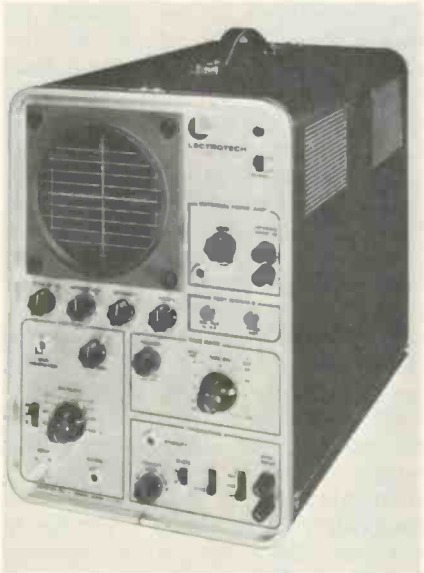


MHz for the tuner mixer input, but also 67.25MHz for the antenna terminal input. The external attenuator enables you to set bandwidth accurately in seconds. 15 Crystal-Controlled Markers . . . 4 for color bandpass, 1 for FM IF, 8 for TV IF frequencies from 39.75 to 47.25MHz . . . plus markers for channels 4 & 10 picture and sound carriers. Three Sweep Oscillators . . . in Colpitts circuits produce 5 ranges using harmonics . . . for color bandpass, FM IF, Video IF bandpass, VHF channels 4 & 10. Compact Size . . . Convenient Controls. The new unit measures 13⅝ W by 5½ H by 12in. D. Kit form . . . $135. Assembled form . . . $199. Heath Kit.

729 OSCILLOSCOPE/VECTORSCOPE

Introduced is the Model TO-50, a high performance, wide band, triggered-sweep oscilloscope at a moderate price. The features offered make this oscilloscope a highly essential test instrument for the TV service field, industrial applications such as production testing, communications, engineering and other areas requiring a stable, calibrated oscilloscope display. The oscilloscope includes the following manufacturer's specifications: Vertical Amplifier: Bandwidth—dc to 10MHz min. Rise time—35nsec. Sensitivity—.02v/div. to 50v/div. in 2-5 step sequence plus continuously variable control. Input impedance—1M ±1% shunted by 30pf BNC connector. Horizontal Sweep: Type—Miller Integrator. Sweep speeds—.02sec/per div. to .1μsec/per div. in 1-2 step se-

quence plus continuously variable control. With 5x magnifier sweep speed increases to .2μsec/per div. Magnifier—5x magnifier provides magnifications at all sweep speeds. Triggering: Source—internal, external and line. Type—automatic or amplitude selection with preset stability. Slope—+ or —. TV sync—normal vertical or horizontal provides positive sync on composite video signals. External Horizontal Amplifier: Bandwidth—dc to .5MHz. Sensitivity—.5v/per div. Input impedance—100K shunted by 30pf. Line sweep—continuously variable in phase over 150deg. Compatible with all generators for sweep alignment display. Test signals: Calibrate —1v P-P line frequency square wave.



Probe test—fast rise square wave for probe adjustment. Cathode Ray Tube: Display area—8 x 10 cm. Blanking—dc coupled. Size—5in. Power Requirements: Voltage—105-125v, 60Hz. Power—65w. Mechanical: Size—14⅛ in. H x 10¼in. W x 16½in. D. Weight—23lbs. Net price—$339.50. Lectrotech.

OSCILLOSCOPE 730

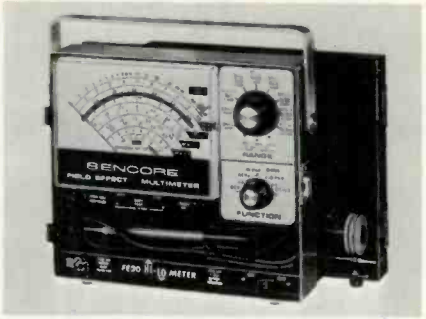
A high-performance, all solid-state oscilloscope, containing many new features especially desirable in industrial and servicing use, is announced. This 5in. oscilloscope, Type WO-505A, offers features such as a flat-face cathode-ray tube, return-trace blanking circuits, illuminated graph screen and camera mounting studs. The scope has an exceptionally high gain of 15mv P-P per inch on the high-sensitivity range of the vertical amplifier. In addition, the frequency response of the vertical amplifier is reportedly flat within, ±1dB from dc to 5MHz, and is usable up to 8MHz. The horizontal sweep frequency is adjustable up to 1MHz in six ranges, permitting lock-in of signals up to 10MHz. The level of sync signal applied to the sweep oscillator is adjustable, so that synchronization is stable throughout the sweep range. Pre-set

television vertical (V) and horizontal (H) sweep positions are provided for convenient television receiver servicing. The vertical input attenuator and the illuminated graph screen are calibrated directly in volts so that the scope can be used as a visual voltmeter. An internal calibrated voltage source is provided. Direct connection to the vertical deflection plates of the cathode-ray tube, through internal capacitors, can be made by using the terminals on the back of the case. Power requirements for operation of the unit are an ac voltage between 105-130v with a frequency of 50-60Hz with a regulated power supply. The unit measures 11⅜in. high, 15½in. deep, 9in. wide and weighs 25lb. The unit comes complete with a WG-400A direct/low capacitance probe and cable, alligator clip, clip insulator and instruction book. The optional user price of the 5in. Solid-State Oscilloscope is $298.50 each. RCA.

MULTIMETER 731

Announced is a new concept in multimeters called the Hi-Lo meter Model FE20. The ohms section is powered with a conventional 1.5v "C" cell battery for checking conductivity of transistors, diodes and rectifiers, enabling the user to check front to back ratios. With a flip of the function switch to LO ohms, the ohms section is powered by less than a tenth of a volt, which is below the conductivity point of solid-state devices. Resistances reportedly can then be measured in-circuit for true values without solid-state device conducting and causing erroneous results. Other features include a tenth of a volt full scale for more accurate measurements of transistor bias voltages and a high voltage range to 30kv. A special low voltage probe with isolation resistor is also provided to prevent circuit loading of high frequency circuits. Low current

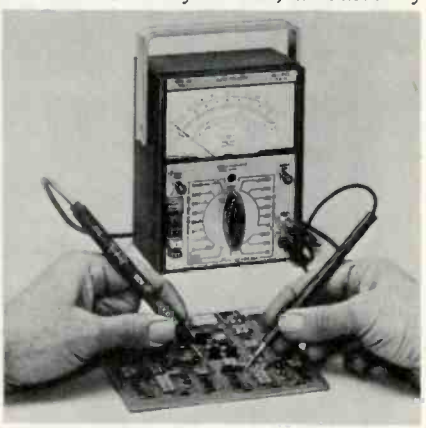
drain of 4ma and the use of larger "C" cells makes the battery life nearly shelf life and presents a truly portable meter, requiring no external pow-



er. Cover automatically shuts unit off when closed to prevent draining of batteries when not in use. Lower voltages provide more protection for the critical solid-state devices being produced. Both Hi and Lo ohms are read on the same scale to avoid confusion. Reported accuracy is 1.5 percent on dc and 3 percent on ac. Nine dc ranges, three high voltage ranges, nine ac ranges, seven resistance ranges with only 12Ω center scale and 1000M maximum, nine dc current ranges up to 1a, coupled with 15M dc input and 10M ac input. Price $129.50. Sencore.

SOLID-STATE VOM 732

A portable, battery-operated solid-state Volt-Ohm-Milliammeter Model 602 is introduced. The meter features an Auto Polarity circuit, actuated by

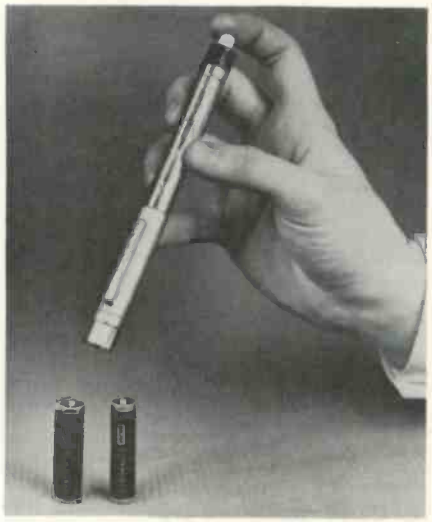


functional pushbutton switches which eliminate the need for checking current and voltage polarity during measurement, saving time for the user. It also eliminates the need for switching test leads. The instrument reportedly has high sensitivity and high input resistance, 0.3v full scale ac and dc at a constant 11M on dc and 10M on ac. Only two voltage scales are used for all 24 ac-dc current and voltage ranges, making the meter easy to read. The meter uses the same amplifier for all functions, ac and dc volts, current and resistance measurements. The amplifier also reportedly incorporates a high degree of feedback resulting in linear ac and dc meter tracking scales down to 1 percent of scale. Because of the feedback, any changes in the meter moving coil resistance caused by temperature are automatically compensated. The Auto Polarity feature is easy to use. To determine what polarity is being measured, the plus or minus pushbutton switches on the left side of the panel of the tester are operated. If a positive voltage is applied to input, the meter will give an "Up" scale reading. If the positive marked pushbutton is depressed, the reading remains the same. If the negative marked pushbutton is depressed, the indication falls to below zero. The reverse is true for negative polarity. Unlike conventional VOM's where the test leads have to be reversed to change polarity, the Model 602 reverses the battery when reverse polarity is needed. When in Auto Polarity the tester's indicator is not adjusted for zero as in conventional units. The meter is adjusted for zero null, permitting the user to make a zero adjust from an angle and parallax of the pointer can be neglected—another time-saving feature. Of simplified design, measurements are made with a single selector switch knob controlling all ranges and functions. The dc volts ranges are: 0.3, 1, 3, 10, 30, 100, 300, 1000. Accuracy is 3 percent and input resistance is 11M. The ac volts ranges are: 0.3, 1, 3, 10, 30, 100, 300, 1000. Accuracy is 3 percent and input resistance is 10M. Frequency range is 50Hz to 50kHz. Frequency Compensation: on all ranges except 300 and 1000v. The ohmmeter ranges: RX1, RX10, RX100, RX1K, RX10K, RX1M. Accuracy is 3 percent of dvc arc. Measurement range is 0.2 to 1000M. The VOM is provided with a handsome case design, using a brushed aluminum front panel with etched black range markings. The case is constructed of black molded high impact plastic. Outside dimensions of the meter are: 3 3/16 x 5⅛ x 6½ in. Weight is 2½ lb. with batteries. The tester uses two types of batteries, a "D" cell for resistance measurements and two nine volt batteries for the amplifier circuit. The net price of the VOM is $100. Triplett.

Tools

FLASHLIGHT 733

An ultra-thin flashlight with a high intensity beam for close inspection and general lighting use is introduced. Functional in design and ideal for doctors, nurses and other professional people, it uses two alkaline batteries for longer and more dependable service. Of high quality chrome and polished aluminum construction, it has a



two-way push-button switch and handy pocket clip. Price $4.50 with batteries. Mallory.

SOLDERING CENTER 734

Introduced is the three-foot "Soldering Center" floor merchandiser. These compact display units display the complete line of colorful, impulse gen-

erating packages of soldering tools, solder and accessories. The steel and hardboard displays are cost free to the distributor with the purchase of a varied assortment of full-profit, fast-moving products. The merchandise and displays are drop-shipped, freight paid, direct from the factory. Weller.

HAND TOOLS 735

A wide variety of hand tools for electronic and radio/TV service and assembly work is introduced. Billed as "TV/Radio/Hi Fi Fix-It Tools" are two 20in. long, ¼in. and 5/16 in. hex, hollow shaft, color-coded nut-drivers; two Series "99" interchangeable, 7/16 and ½in. external hex nut-driver shanks for removing inverted

Palnuts and miniature 4in. long close cutting, diagonal pliers. Also included are two reversible ratcheting plastic handles, one regular and the other Tee-shaped which will accept over 60

nutdriver, screwdriver and special purpose Series "99" interchangeable shafts and blades. Also offered are eleven new Tee-handle Allen hex type screwdrivers, in hex sizes from .050in. thru 9/64in. A 14-piece, ¼in. square drive socket wrench set in a sturdy molded plastic case is also introduced. This contains nine 6-point sockets (3/16in. thru ½in.), two 10-point sockets (¼in. and 5/16in.), 4½in. reversible ratchet handle, 2in. extension and a 5¾in. spinner extension. In addition, a 20-piece midget reversible ratchet offset screwdriver set (shown in photo) consisting of twelve Allen hex type driver bits from .05in. thru 5/16in., three bits in ¼, 3/16 and ⅜in. sizes for slotted screws, #1 and #2 Phillips bits, a ¼ hex to ¼in. square adapter bit, 5¾in. spinner extension, and a 3¾in. midget ratchet offset handle, are all in a molded plastic case. A five-piece screwdriver kit with 3¾in. midget ratchet offset handle, 3/16 and ¼in. bits for slotted screws, and #1 and #2 Phillips bits are packaged in a pocket-size, see-thru plastic case. Xcelite.

TV Receivers

B/W TV RECEIVER 736

Introduced is a 12in. (diagonal measure) Model 6305 Solid-State

Portable B/W television receiver. The unit performs on 12vdc or 120vac power, features instant picture and sound when used in ac mode, and comes with detachable contrast screen for daylight viewing. Set has front-mounted VHF/UHF tuner, off/on volume, contrast, brightness and vertical hold controls and front-mounted speaker. Other features include built-in VHF telescopic dipole antenna, UHF rotable loop antenna and external connections for either system. Includes earphone or tape recorder jack and 8Ω dc socket for battery accessory. Removable printed circuit boards facilitate maintenance. Dimensions are 15½in. W by 12⅛in. H by 12in. D. Weight is 18lbs less batteries. Suggested list price is $154.95. Craig.

STUDIO CONTROL CONSOLE 737

A complete console for TV origination in educational TV (ETV) and Cable TV (CATV) systems is introduced. The heart of the console is a unique switcher-fader/special effects

generator which provides switching, fading, special effects and full IEA sync. It can be used to select any of six camera inputs, fade in, fade out, super-impose, lap dissolve or any of eleven different wipes. The compact console is suitable for studio or remote operation. It includes six five-inch monitors and an audio mixer, all factory prewired to the switcher-fader. Any of six camera inputs can be previewed and special effects can be set up and then switched to the console output. The complete TVS-6M console lists for $6350. The unit is also available as part of a complete origination studio, including the console, two five-inch viewfinder cameras with rear controlled zoom lenses, two tripods with dollies, two microphones, intercom headphones and 25ft interconnecting cables. Designated Model ST-300, the package is completely prewired for studio or mobile van use. It lists for $9950. GBC.

Two-Way Radios

FM TWO-WAY RADIO 738

Reportedly the smallest, lightest, highest "performance-to-size" designed all solid-state, 4w, personal portable, FM two-way radio, Model Series HC-400 is introduced. The radio has high

performance receiver and transmitter specifications for the 450-512MHz frequency range, available in three battery-powered versions, field adjustable continuous tone squelch option and numerous accessory and power

combinations. The basic unit measures (HWD) 7.5 x 2.78 x 1.3in. or 28 cubic in. in size. It is available with one or two channels and with noise squelch. The unit weighs 28oz with batteries. The batteries provide the unit with a 5-5-90 percent duty cycle (5 percent transmit, 5 percent receive, 90 percent standby) on a minimum of eight hours per charge. Controls adjacent to the antenna port on the top of each transceiver model include: Power ON/OFF, VOLUME, SQUELCH and Accessory Jacks for lapel microphone, earpiece speaker and multichannel select switch. A low profile, "Push-To-Talk" transmit switch on the side of the unit provides rapid thumb actuation for voice communications and tone disable. The unit employs 20 silicon transistors. Ten are used in the transmitter and 10 in the receiver. 15 diodes are used including 2 Zener regulators. Four dual-in-line Integrated Circuits are used, 3 in the receiver and one in the transmitter. Hallicrafters.

CB TRANSCEIVER 739

Introduced is a hand-held transceiver Model 13-778, a precision three-channel unit that delivers six watts input power on both upper and lower

sidebands and three watts input on AM. Deluxe features include dual transmitters, separate speaker and mike, SSB clarifier and AM delta tuning. Plug-in accessory jacks allow external power source and earphone use. Complete with earphone and batteries, the unit has a retail price of $229.95. Midland.

ET/D Magazine Holds Drawing at NEW Show

Three door prizes were given away May 13th at ELECTRONIC TECHNICIAN/DEALER's NEW Show hospitality suite. First prize at the drawing was an RCA color-TV set won by Mrs. Ida Wollman, secretary-treasurer of Injectorall Electronics Corp. B. Frankenstein, president of Telematric, won an RCA all-band portable radio as second prize; while A. M. Effron, manager of General Electric's A&SP, won an RCA portable tape recorder as third prize.

Everyone registered for the show was invited to our suite, where beverages were served and everyone had an opportunity to rest their tired feet and visit.

ET/D NEWS OF THE INDUSTRY

Networks Plan Tests To Improve Color Uniformity in TV Sets

Better color uniformity on home color TV sets may be achieved through the use of Vertical Interval Reference signals transmitted from TV stations, if the expectations of the Broadcast Television Committee of the Electronic Industries Assn. are born out. The committee, chaired by Bernard D. Loughlin, vice-president of research at Hazeltin Corp., is planning preliminary field tests of VIR signals in the near future. Upon completion of the tests, an EIA engineering report will be issued and made available to all interested persons.

VIR signals will provide broadcast stations with a constant color reference to confirm, before the signal is broadcast, that the chrominance-to-luminance ratio is correct and that the color burst represents a proper reference for both the phase and amplitude of the chrominance signal.

Several variations of the VIR signal will be tried during these preliminary tests. The signal contains chrominance, luminance and black level references, and is proposed for Line 20 during the vertical interval just before the start of picture information. Tests will start with the signal on both fields, although some tests with the signal on one field only are also planned.

Engineering departments of the broadcasting networks have actively participated in efforts of the EIA broadcast committee to develop the signal format and plans for field tests, according to Loughlin. Present planning calls for local on-air tests in the New York City area to be run before early June, with network tests scheduled for completion early in July.

The EIA broadcast committee is also considering the broader question of whether any changes in TV broadcast signal specifications are appropriate in order to assure better color uniformity. Such considerations involve items beyond the VIR signal and some of the additional considerations include: The advisability of tightening up tolerances on sync and burst timing specifications, and the possible need to update specifications regarding gamma, primaries and reference white.

International Rectifier Announced Summer Promotion at New Show

International Rectifier announced a special summer promotion May 9th at this year's New Show held in Chicago. Its IRJJ650 Universal Selenium Focus Rectifier, which can reportedly replace all focus rectifiers currently used in color TV sets, had been chosen for this promotion. Also included were three of IR's Universal Silicon Rectifiers—the R210, R250 and R350. All three are 1000v components with ratings of 2, 2.5 and 3.5 amp, respectively.

Consumer Electronics Off Year-To-Date Pace

Distributor sales to dealers were generally off the 1968 pace bringing year-to-date sales slightly behind the 1968 figures, the Electronic Industries Assn.'s Marketing Services Dept. reported.

Distributor sales of color television sets to dealers were down 20.3 percent during November as compared with sales during the same month the year before. In November, 456,531 sets were sold to dealers compared with 572,778

the same month last year, EIA reported. Color TV sales to dealers were 5,025,133 sets for the year to date, 1.1 percent behind the record-breaking 5,080,315 sets sold in the same period in 1968.

Monochrome TV sales in November, totaling 414,857 sets, were down 17.7 percent from the 504,199 sets sold the same month last year. Total TV sales to dealers on a year-to-date basis, were down 4.9 percent; 9,564,196 in 1969 to 10,054,022 sets the first eleven months of 1968.

Total phonograph sales decreased 15.4 percent in November over the same month a year ago and are now behind on a year-to-date basis by 2.9 percent.

Total radio sales to dealers declined in all categories and are now running 7.7 percent behind on a year-to-date basis as reported by EIA.

Sylvania Price Increase on Tubes

The Electronic Tube Division of Sylvania Electric Products, Inc., today announced slight increases in the price of receiving tubes sold to manufacturers of entertainment products, effective Feb. 1. The increases range from 2 to 10 percent, averaging 5 percent on the company's more than 400 types of receiving tubes sold to manufacturers of original equipment.

In addition, Sylvania announced increases of 8 percent on selected industrial type receiving tubes.

William T. Buschmann, Vice-President—Marketing for Sylvania Electronic Components, said the increases were made necessary due to rising material, labor, and tranportation costs.

GBC Develops TV Motion Detector

A new type of motion detector which senses movement of an image on a TV screen is developed for security systems by GBC Closed Circuit TV Corp.

Called the model VS-101 Video Sensor, the new device is expected to find wide application in CCTV security systems.

Until now, guards had to watch monitors constantly in security systems. Using Video Sensors, they only have to watch the monitor when something is actually happening on the screen.

The Video Sensor utilizes two tiny sensing units which stick to the front of the monitor. They can be positioned to monitor the entire area, or to concentrate only on a sensitive spot—such as a safe or a file cabinet. Any movement of light in the area of the TV monitor under surveillance causes a warning lamp to light. This alerts the guard to watch the monitor closely.

In addition to lighting the warning lamp, the movement also closes a relay in the Video Sensor. This relay can be used to ring an alarm bell or siren.

Alternatively, the relay can be used to activate an automatic telephone dialer, a video tape recorder or a movie camera.

In addition to security systems, the Video Sensor can be used in a number of other applications. For example, it can be utilized to sound a warning when gauges reach a critical level and to insure that any closed circuit TV observer doesn't miss action on the monitor screen.

The Video Sensor can detect as little as 25 lux at 100 lux, over an area as small as 5m/mφ. Minimum detection speed is 1/30 of a second, operating at 100 lux and 200 lux.

One external output is provided, and the relay capacity is 0.7a per contact at 100 vdc. The unit measures 7.6 x 3.3 x 7.3 in. and weighs less than 4½ lb.

ET/D CATALOGS & BULLETINS

Servicing Booklets 400

Two fully illustrated booklets which explain how to use chemicals to make servicing of electronic equipment easier and more efficient is introduced. The first booklet is entitled "Tun-O-Foam Tech Tips." It explains how to use the tuner lubricant/cleaner, to restore corroded tube sockets, unfreeze coils, lubricate controls and as a heat sink for power transistors. The second booklet is called "How to Speed Servicing with Tun-O-Wash." It explains how to use this aerosol cleaner/degreaser to restore erratic spindles, idler wheels, motors, rubber drive wheels, gears, tight seal controls, relays, switches, picture tube anodes and PC boards encrusted with flux. Chemtronics.

UHF/VHF Coaxial Cable 401

A Data Sheet C-DC-469 describes the use of UHF/VHF 82-channel coaxial cable for home color television reception. The cable is claimed to be the lowest loss RG59U cable on the market. It is 100 percent shielded, utilizing an aluminum foil/polyester shield over a polyethylene dielectric. The aluminum foil Mylar shield helps to eliminate moisture. Four stranded tinned copper drain wires surround the shield to insure complete conductivity and increase electrical efficiency. The cable is available in top grade black vinyl jacket for all-weather exterior installations and in white vinyl for interior installations. It utilizes standard 59/U "F" fittings. Two 75Ω display-packaged kits, one for UHF and VHF reception and the other for UHF or VHF reception, are available also. Columbia.

Component Selector 402

A 120-page Component Selector is announced. This edition is the third to follow the introduction of the SPRINT program; a system of product standardization to meet industry's demand for passive components. The system reportedly provides a condensed standard product line that covers 98 percent of industry requirements. The Selector contains listings of all these standard stocked items along with extensive engineering information. New lines of standard stocked items are also included. Cornell-Dubilier.

TESTLAB REPORT

continued from page 58

faintly as it approaches the 200mA mark and will glow brighter as the current goes up. As soon as the current reaches 200mA, the voltage in the supply will decrease. The dual version of this power supply is the WP-702A and operates the same as the WP-700A. However, it naturally has two of everything and provides for operating two separate loads simultaneously. In addition, the two sections can be series connected to provide a higher supply voltage. The current limit stays at 200mA. If you had a dual Model WP-702A and wanted a 35vdc output, simply connect the negative of one section to the positive terminal of the other section and the load in series with the remaining series connection. The manufacturer also recommends that a diode be connected across the negative to positive terminals on each supply to protect it from possible damage. The diagram in Fig. 3 shows these connections. The price of these units is $48 for the WP-700A and $87 for the dual power supply WP-702A. ■

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128	129	130	131	132	133	134	135	136
137	138	139	140	141	142	143	144	145
146	147	148	149	150	151	152	153	154

TEST INSTRUMENTS

900	901	902	903	904	905	906	907	908

NEW PRODUCTS

700	701	702	703	704	705	706	707	708
709	710	711	712	713	714	715	716	717
718	719	720	721	722	723	724	725	726
727	728	729	730	731	732	733	734	735

CATALOGS & BULLETINS

400	401	402	403	404	405	406	407	408
409	410	411	412	413	414	415	416	417

Note: Inquiries serviced until August 22, 1970.

(Please type or print) 6/70

Name .....

Position .....

Company .....

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City .....

State ..... Zip Code .....

Please describe your type of business.

.....

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110	111	112	113	114	115	116	117	118
119	120	121	122	123	124	125	126	127
128	129	130	131	132	133	134	135	136
137	138	139	140	141	142	143	144	145
146	147	148	149	150	151	152	153	154

TEST INSTRUMENTS

900	901	902	903	904	905	906	907	908

NEW PRODUCTS

700	701	702	703	704	705	706	707	708
709	710	711	712	713	714	715	716	717
718	719	720	721	722	723	724	725	726
727	728	729	730	731	732	733	734	735

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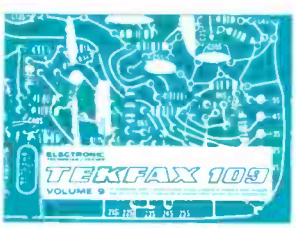

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   - ☐ Industrial electronics service firm
   - ☐ Manufacturer
   - ☐ Other (please describe)

2. Title: (please check one)
   - ☐ Owner, manager, buyer, other executive
   - ☐ Service manager
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the heavy duty tuner spray with built-in polishing action!

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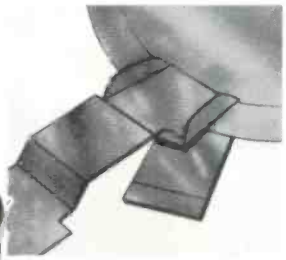
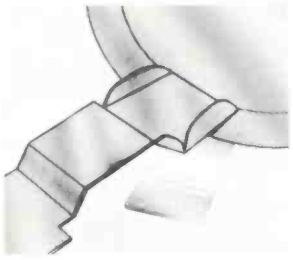
BT-16 16 oz. $3.49

SEE THE DIFFERENCE

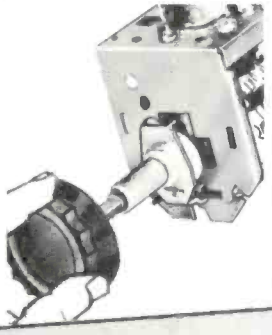


This tuner contact has been sprayed with an ordinary tuner cleaner. It looks clean, but close examination would reveal minute areas with corrosion and dirt.



This tuner contact has been sprayed with new TUN-O-BRITE, with its built-in brighteners. It is not only clean, it has been polished shiny. There is absolutely no dirt or corrosion left to spread. What's more, the contact is protected by a film of ultra-long-lasting lubricant.

FEEL THE DIFFERENCE



The extra heavy duty lubricant used in TUN-O-BRITE makes any tuner slide from channel to channel smoothly. Your customer will feel the difference immediately. When he sees bright, clear pictures on every channel and feels how smoothly the channels change, he'll know you've done something almost miraculous to his tuner.

SAVE $4.78

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