MAY 1972 A HARCOURT BRACE JOVANOVICH PUBLICATION

ELECTRONIC TECHNICIAN/DEALER

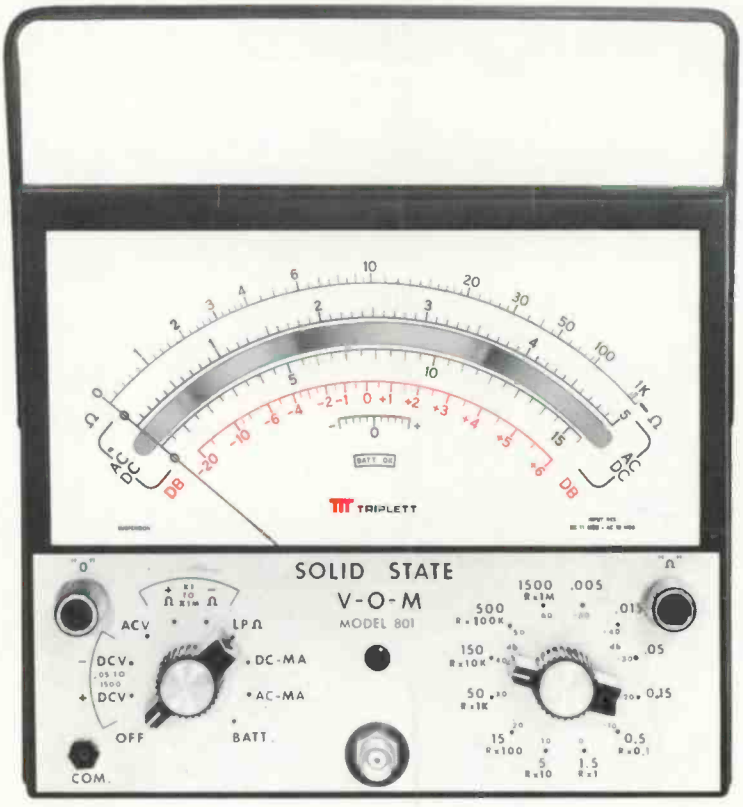
WORLD'S LARGEST TV-RADIO SERVICE & SALES CIRCULATION

Channel Master's Model 6124A Modular Color-TV Set

Commercial Audio Installations, Part III

Professional Antenna Installation Methods

If your problem is measuring μV, μA and milliohms in transistorized and integrated circuits . . . Solve it with Triplett's 801



Model 801
$210

1. Lower power ohms — 8 ranges with 35 mV power source and 1 ohm center scale.
2. High sensitivity —5 mV AC full scale at 10 megohm input impedance; 50 mV DC at 11 megohm input resistance.
3. Simplified scale — 8" meter with only 4 arcs for all 73 ranges.

It offers 73 measurement ranges including 8 low-power resistance ranges that apply only 35 mV to the device under test . . . does not activate or damage solid-state components. With full-scale readings as low as 50 mV DC and 5 mV AC, 5 μA DC and 100 Ohms (1 Ohm center-scale) — plus a 10 megohm input impedance on the AC scales and 11 megohm input resistance on DC — Triplett's Model 801 V-O-M is ideally suited to in-circuit testing. When you add 2% DC and 3% AC accuracy on the voltage ranges (current: 3% DC and 4% AC) and a 25 μA suspension-type meter with a nearly 7½" scale length, there's no doubt that the Model 801 has no equal among analog V-O-M's in terms of sensitivity and versatility. And there's an optional Leakage Adapter ($30) that measures leakage currents as low as 1 μA.

See the remarkable Model 801 V-O-M — priced at $210 — at your Triplett distributor. For more information—or for a free demonstration—call him or your Triplett sales representative right away. Triplett Corporation, Bluffton, Ohio 45817.

TRIPLETT

The World's most complete line of V-O-M's . . . choose the one that's just right for you

. . . for more details circle 138 on Reader Service Card

ELECTRONIC TECHNICIAN/DEALER

TEKFAX

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

GROUP 237

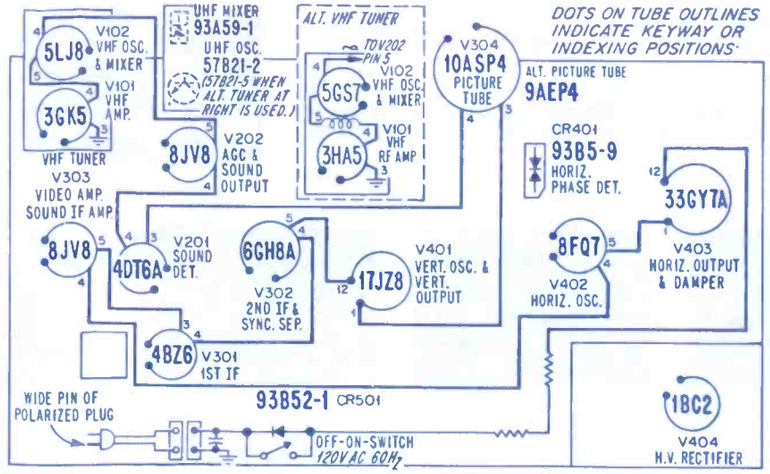
	SCHEMATIC NO.
ADMIRAL — TV Chassis TR2	1415
CHANNEL MASTER — Color-TV Chassis T5001 Series	1416
GENERAL ELECTRIC — Color-TV Chassis L-T2	1417
MOTOROLA — Color-TV Chassis TS-938 (Additional Information)	1419
ZENITH — Color-TV Chassis 14CC14Z	1418

1415

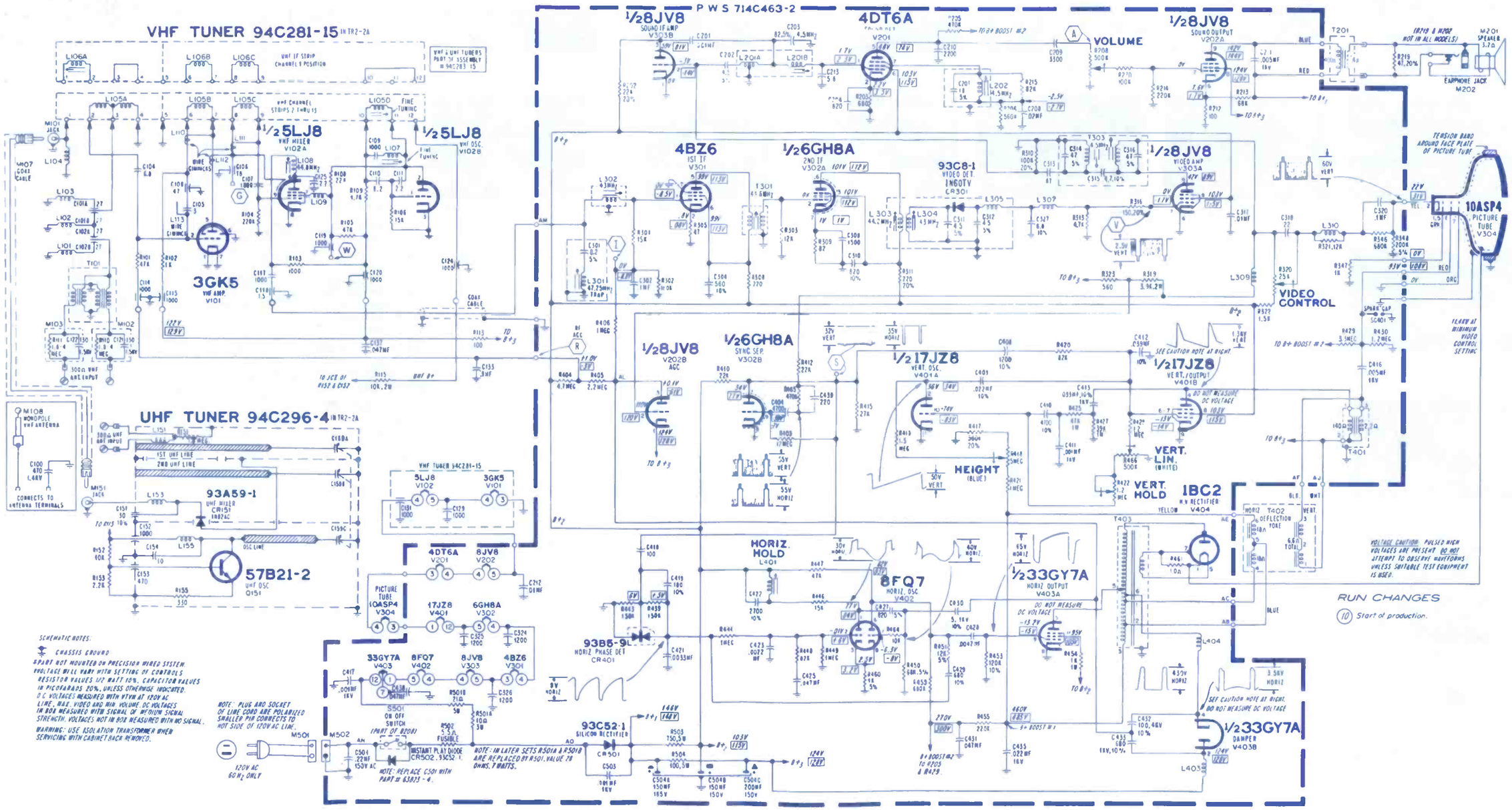
ADMIRAL

TV Chassis TR2

MAY • 1972



SYMBOL	DESCRIPTION	ADMIRAL PART NO.
R208	500K, volume control w/switch	75A148-2
R320	25K, video control w/switch	75A148-2
R418	height control	75A101-16
R422	1.2M, vert hold control	75A100-8
R466	vert lin control	75A101-17
R501	28Ω, 7w, late production	61A20-114
R502	5.5Ω, fuse type	61A48-1
C432	100pf, 4kv, cer disc	65A10-212
C504A	150 µf, 165v electrolytic	67A30-10
C504B	150 µf, 150v electrolytic	67A30-10
C504C	200 µf, 150v electrolytic	67A30-10
L202	quad coil	72A132-77
L303, 304	IF xformer	72A296-7
L309	video peak coil	73A5-20
L401	horiz lock coil	94A17-19
T201	audio output xformer	79A124-5
T303	sound takeoff xformer	72A185-5
T401	vert output xformer	79A139-4
T402	deflect yoke assembly	94A372-1
T403	horiz output xformer	79A138-11



1416
CHANNEL MASTER
Color-TV Chassis
T5001 Series

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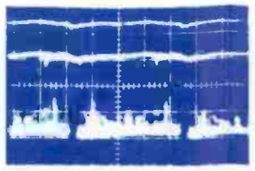
ELECTRONIC TECHNICIAN/DEALER TEKFAX

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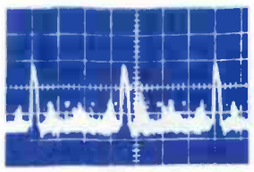
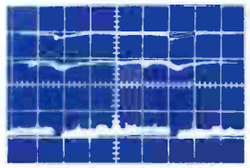
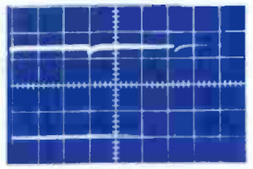

2. Horiz. Rate 14.8V P-P


3. Vert. Rate 2.0V P-P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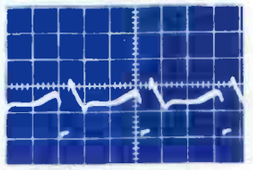
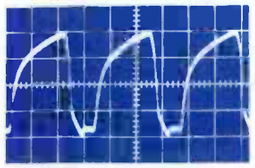

5. Horiz. Rate 11.5V P-P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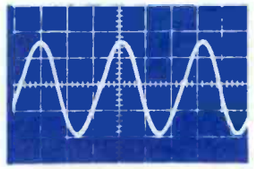
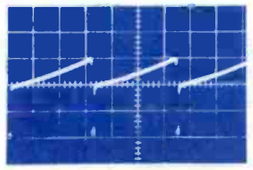

7. Horiz. Rate 180V P-P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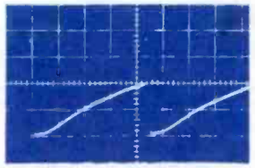
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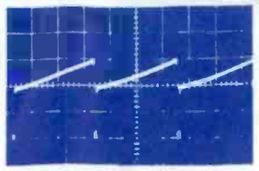
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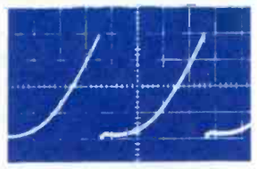
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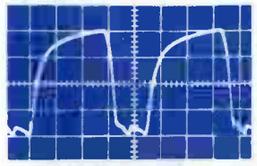
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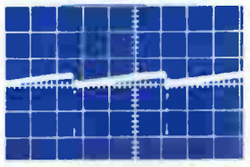
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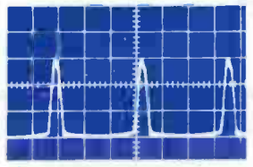
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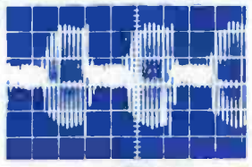
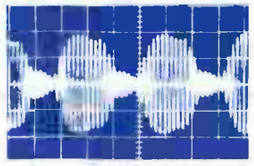
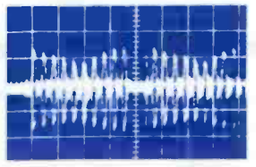
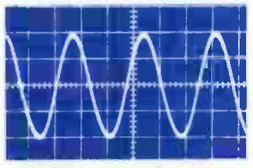
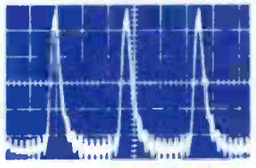

15. Horiz. Rate 2.4V P-P


*16. Horiz. Rate 6.8V P-P


*17. Horiz. Rate 6.8V P-P


18. Horiz. Rate 8.0V P-P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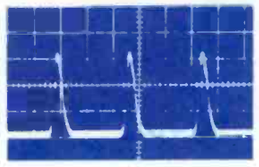
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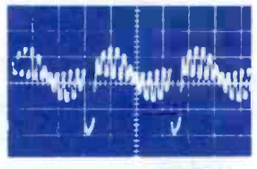
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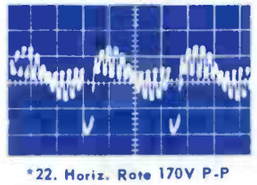
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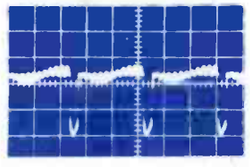
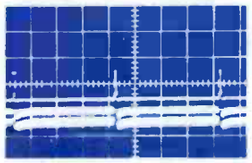

*23. Horiz. Rate 135V P-P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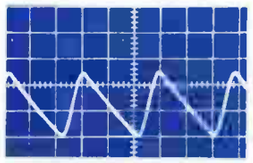
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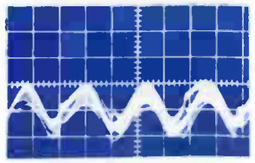
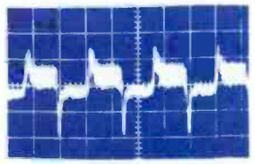
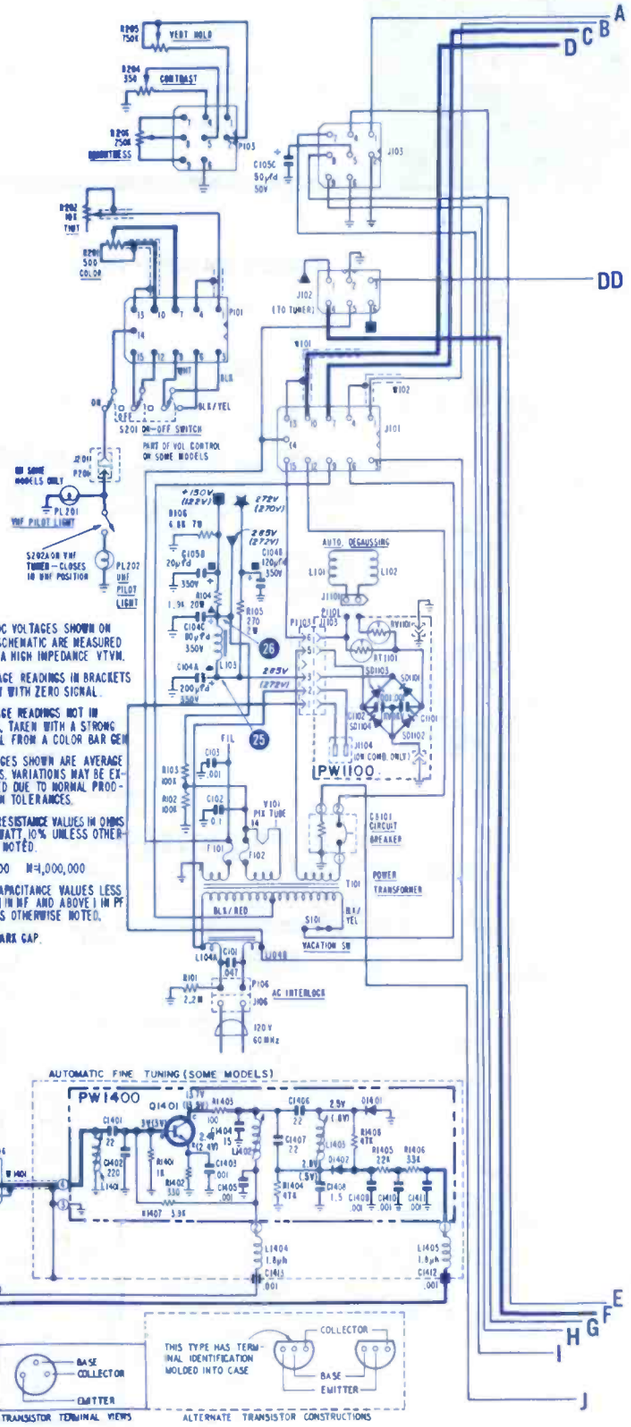
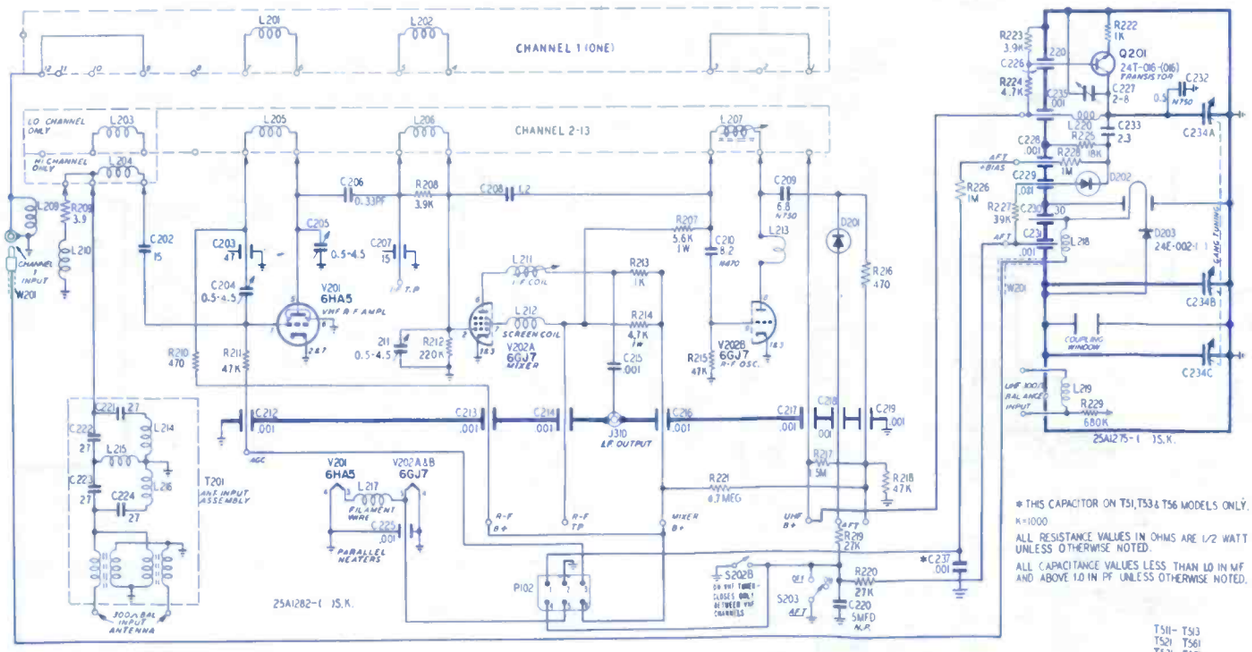

*26. Vert. Rate 0.4V P-P

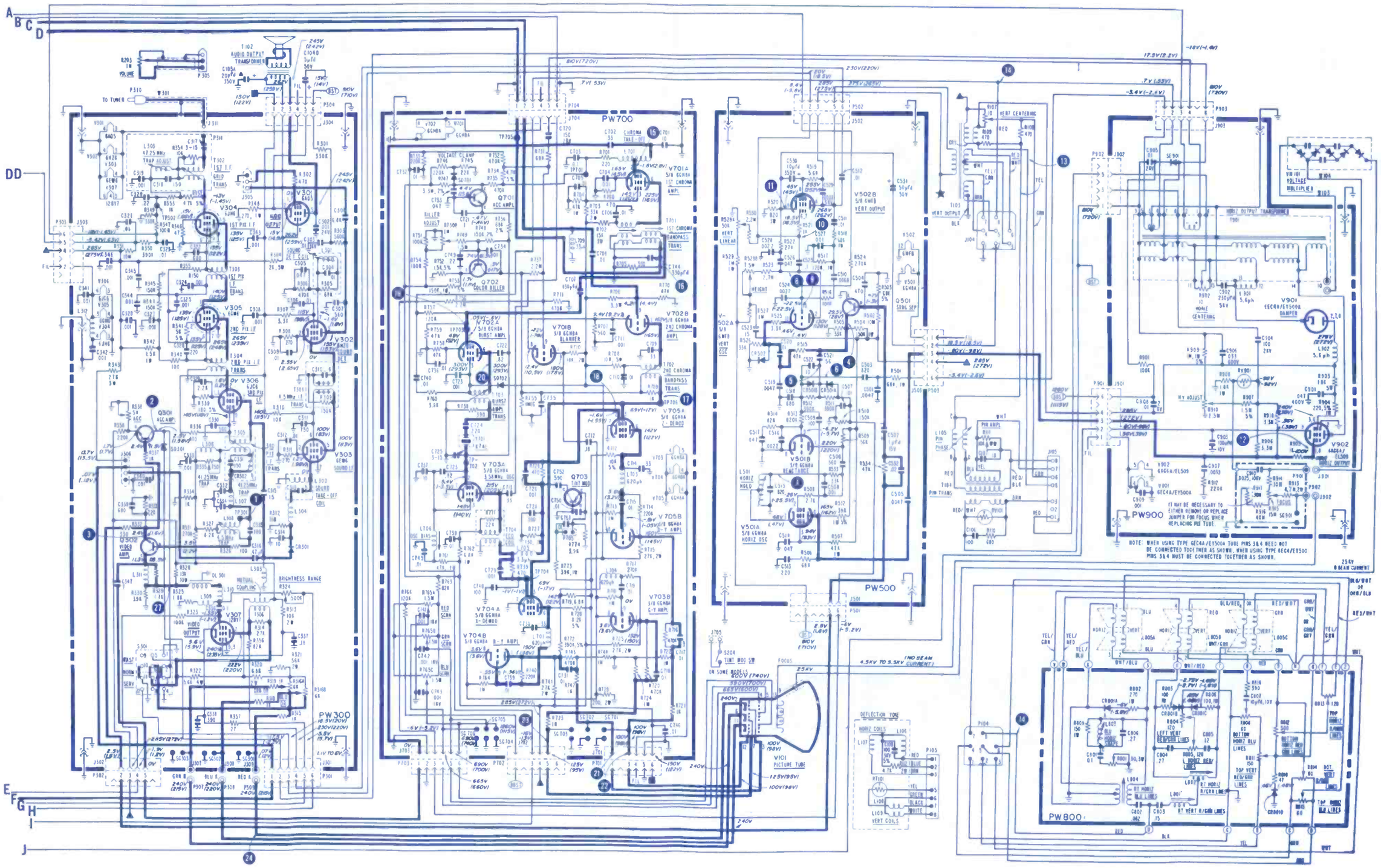

*27. Horiz. Rate 10.6V P-P





SYMBOL	DESCRIPTION	CHANNEL MASTER PART NO.
C104A	—200 µf, 350v, electrolytic	45X0536-001
C104B	—120 µf, 350v, electrolytic	45X0536-001
C104C	—80 µf, 350v, electrolytic	45X0536-001
C104D	—5 µf, 50v, electrolytic	45X0536-001
C105A	—20 µf, 350v, electrolytic	45X0539-001
C105B	—20 µf, 350v, electrolytic	45X0539-001
C105C	—50 µf, 50v, electrolytic	45X0539-001
R107	—10 Ω, vert centering	40X0608-001
R111	—10K, pin amp control	40X0577-004
R204	—350 Ω, contrast control	40X0594-003
R205	—750K, vert hold control	40X0585-048
R206	—250K, brite control	40X0585-063
R324	—500K, brite range control	40X0590-009
R335	—750 Ω, 41.25MHz trap control	40X0590-007
R338	—5K, AGC control	40X0590-008
R528A	—50K, vert lin control	40X0614-003
R528B	—7.5M, height control	40X0614-003
R730B	—1M, killer control	40X0614-004
R902	—10 Ω, horiz centering control	40X0619-001
R915	—15M, focus control	40X0618-001
R916	—40M, HV film	43X0451-004
L302	—sound takeoff coil	9A2697-001
L308	—coil, 4.5MHz trap	9A2565-000
L501	—coil, horiz osc	9A2708-001
T101	—power xformer	53X0445-002
T102	—audio output xformer	51X0249-001
T103	—vert output xformer	51X0248-001
	vert output xformer	38A4145-000
T701	—1st bandpass xformer	9A2661-003
T702	—2nd bandpass xformer	9A2709-001
T704	—ECO xformer	9A2660-002
T901	—horiz output xformer	53X0453-001
CB-101	—circuit breaker	2A0610-001
RV-101	—varistor (white dot or band)	43X0456-001
RV-901	—varistor (black & blue dot or bands)	43X0457-004
RV-1101	—varistor	43X0454-001
RT-101	—thermistor	43X0453-001
RT-1101	—thermistor	43X0455-002

CHANNEL MASTER
Color-TV Chassis
T5001 Series



1417
GENERAL ELECTRIC
Color-TV Chassis L-T2

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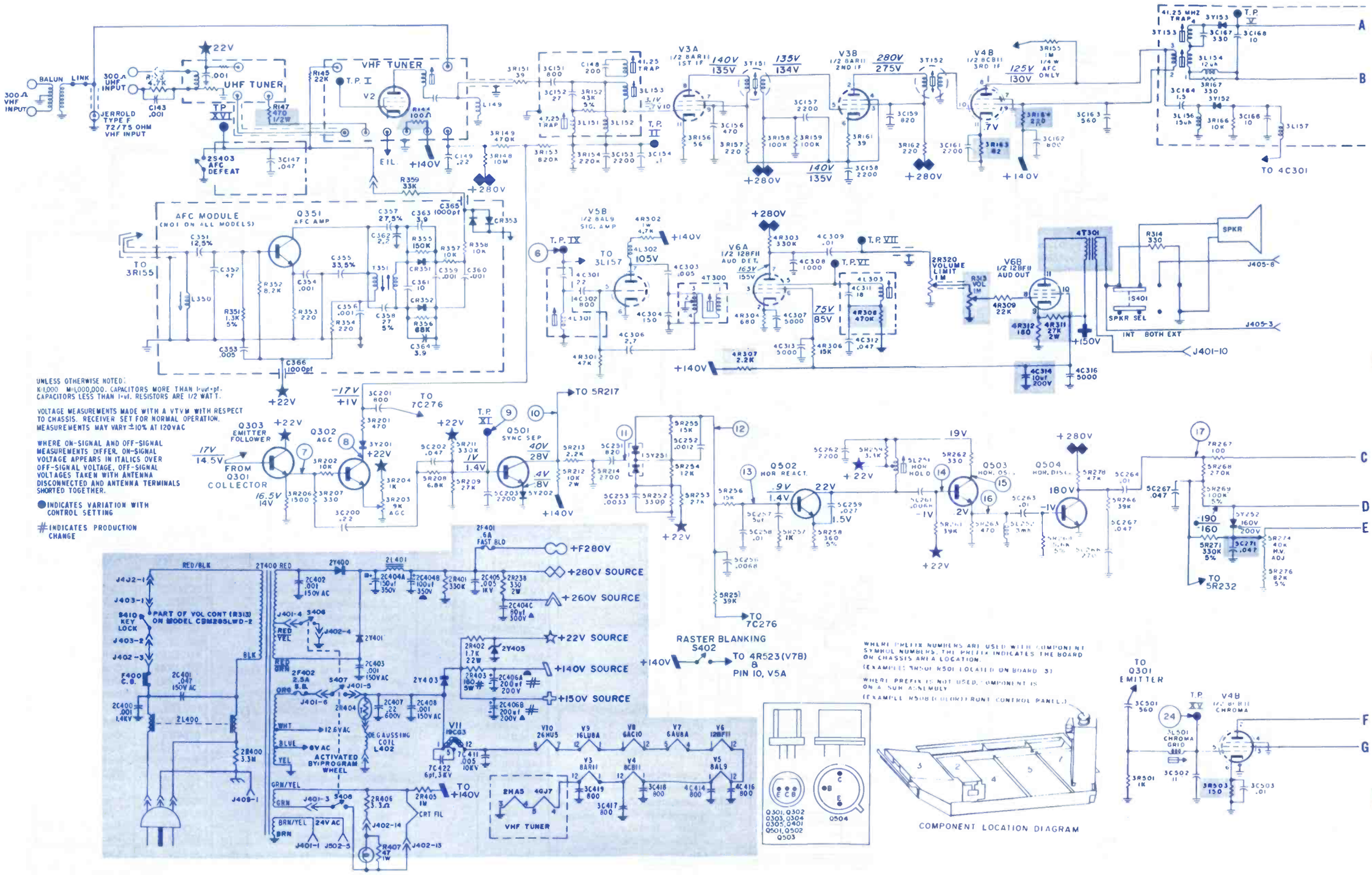
ELECTRONIC TECHNICIAN/DEALER TEKFAX

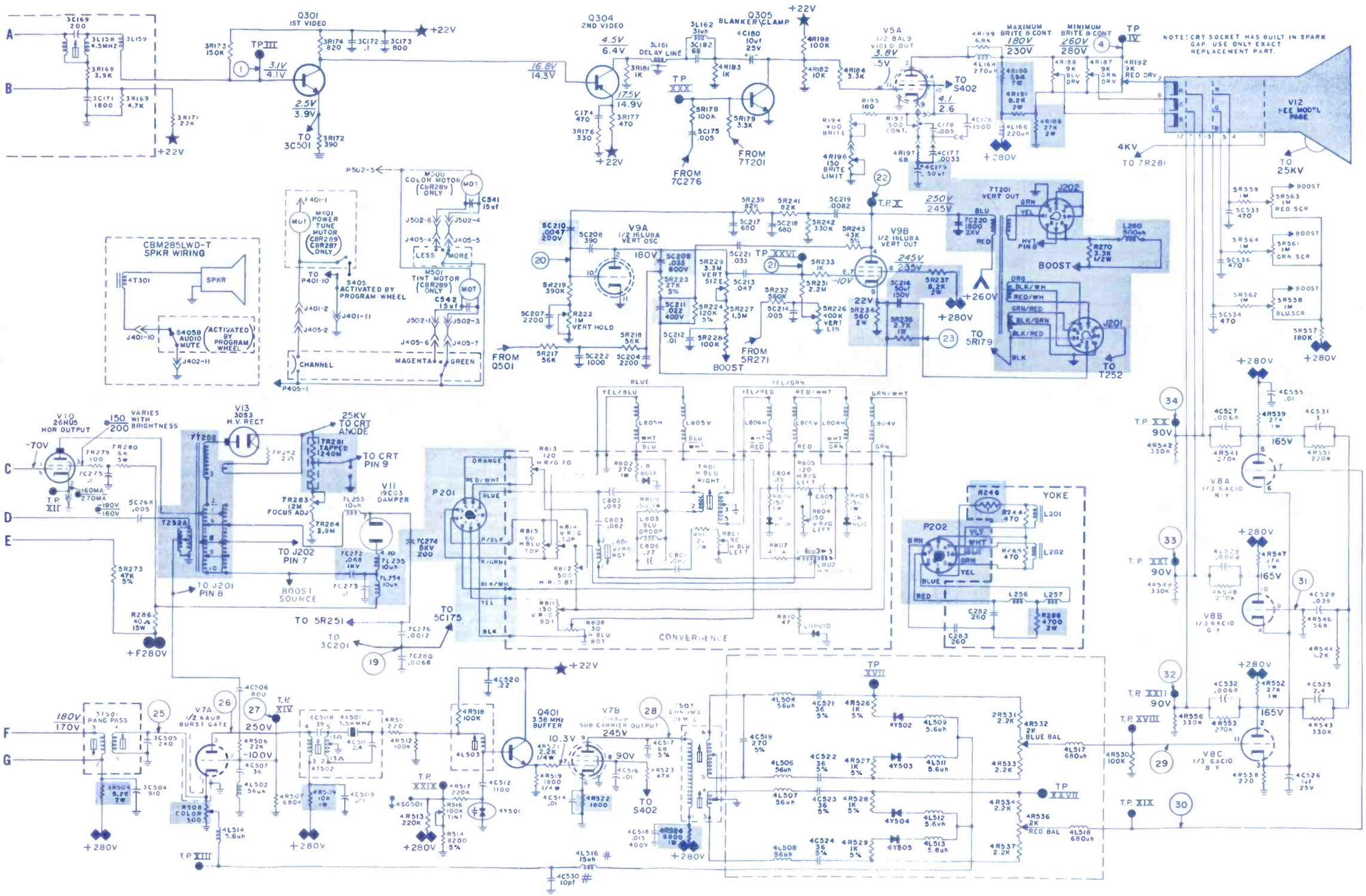
COMPLETE MANUFACTURERS' CIRCUIT DIAGRAMS AND TECHNICAL INFORMATION FOR 5 NEW SETS

SYMBOL	DESCRIPTION	GENERAL ELECTRIC PART NO.
R246	thermistor, 3.8Ω at 25°C	EU14X147
R281	240M, tapped at 40M, focus	EP14X33
R404	PTCR, 100Ω cold, 4K hot	EP39X4
R187	triple control, 9K green drive	EP49X49
R188	9K, blue drive	
R192	9K, red drive	
R196	150Ω, bright limit dual control	EP49X28 EP49X31
R226	330K, vert lin	
R229	3.3M, height	
R274	40K, hi voltage adjust	EP49X32
R283	focus 12M	EP49X73
R558	triple control, 1M, blue screen	EP49X33
R561	1M, green screen	
R563	1M, red screen	
C404A	150 µf, 350v	EP31X26
C404B	100 µf, 350v	
C404C	80 µf, 300v	
C406A	200 µf, 200v	EP31X27
C406B	200 µf, 200v	
Y256	rectifier, focus 3ma	EU57X32
Y501	varicap	EU30X87
L151	coil, 47.25MHz, trap w/core	EP36X13
L153	xformer, 1st IF	EP61X1
L157	coil, choke	EP36X7
L158	coil, 4.5MHz, trap	EP61X3
L161	delay line	EP36X12
L251	coil, horiz osc	EP35X2
L301	coil, audio take off	EP36X28
L303	coil, quad	EP36X30
L400	coil, line choke	EP36X57
L501	coil, chroma input	EPX36X24
T201	xformer, vert out	EP64X6



T252—xformer, horiz sweep (HVT) EP77X9
T300—xformer, audio interstage EP36X34
T301—xformer, audio output EP64X16
T351—xformer, AFC discriminator EU61X6
T400—xformer, power EP88X3
T501—xformer, chroma bandpass EP61X173
T502—xformer, crystal, filter EP61X174
T503—xformer, chroma, demodulator EP61X175
circuit breaker (F400) EP10X9
fuse, .6a, fast blow, F401 ..... EP10X12
fuse, 2.5a, slow blow, F402 ..... EP10X13
yoke, deflection EP76X2

GENERAL ELECTRIC
Color-TV Chassis
L-T2



1418

ZENITH

Color-TV Chassis
14CC14Z

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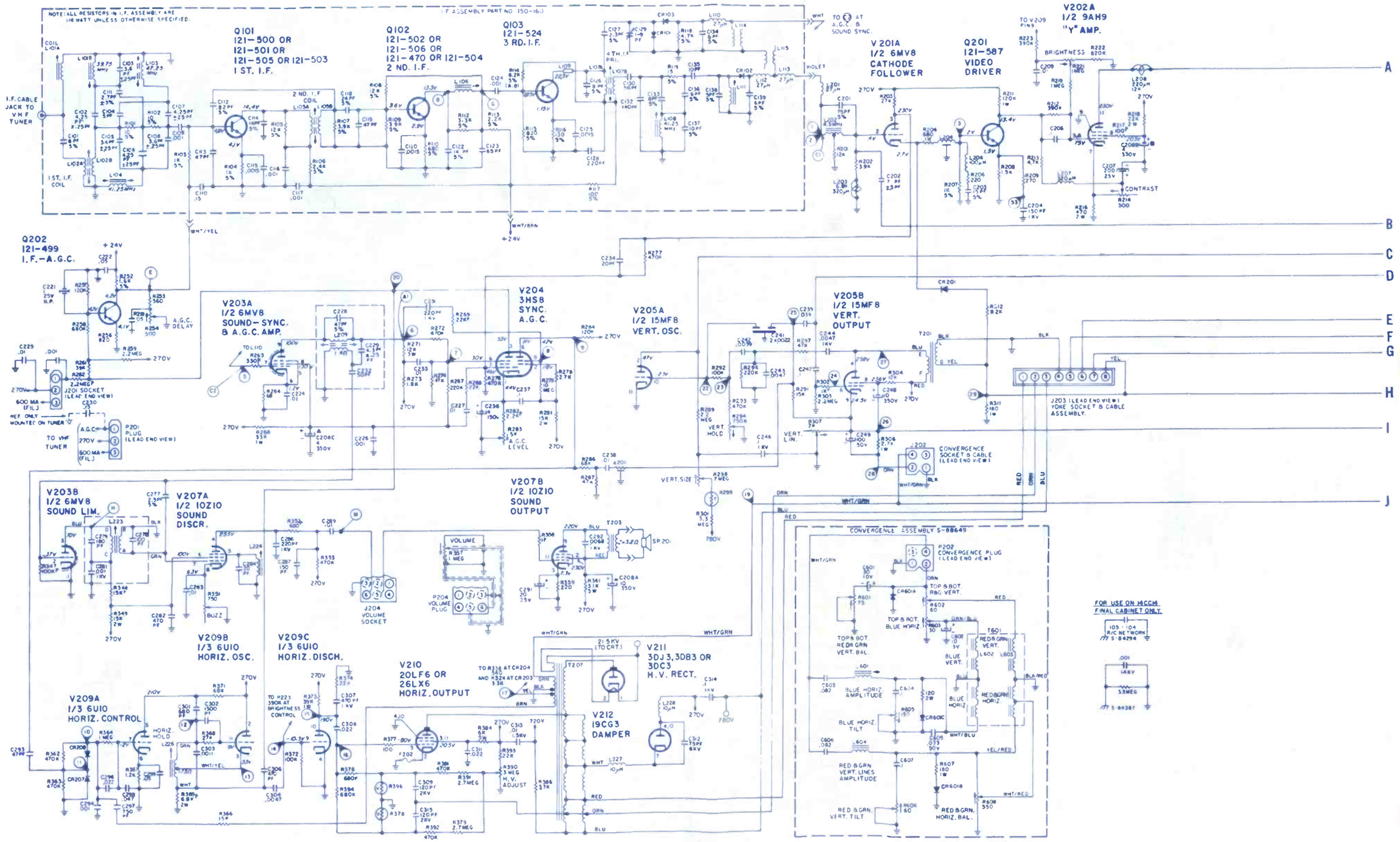
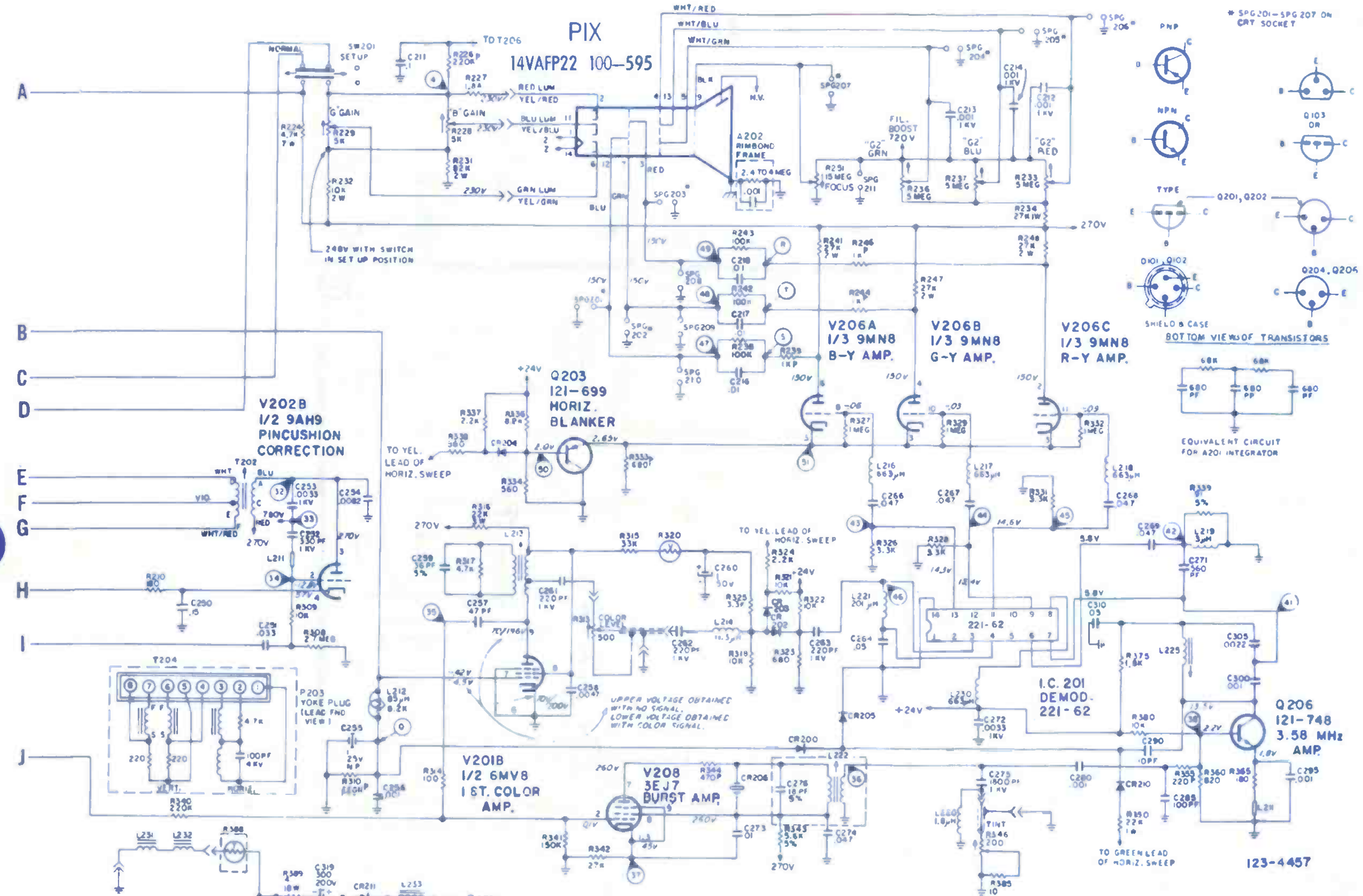
ELECTRONIC TECHNICIAN/DEALER TEKFAX

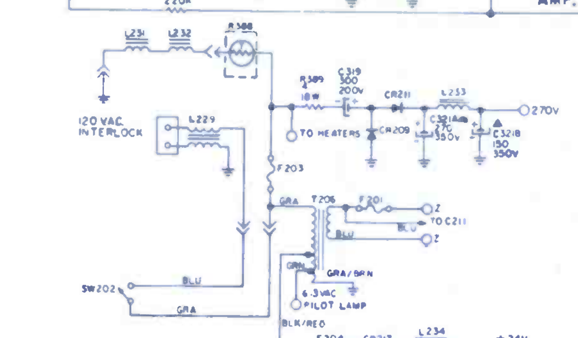
COMPLETE MANUFACTURERS' CIRCUIT DIAGRAMS AND TECHNICAL INFORMATION FOR 5 NEW SETS

SYMBOL DESCRIPTION	ZENITH PART NO.
C208A—10 μf electrolytic cap 350v C208B—4 μf electrolytic cap 350v C208C—4 μf electrolytic cap 350v C208D—200 μf electrolytic cap 35v	22-6312
C319—300 μf electrolytic cap 300v C321A—270 μf electrolytic cap 350v C321B—150 μf electrolytic cap 350v	22-5748 22-5746
R221—1M bright control	63-7974
R251—15M focus control	63-9013
R254—500 Ω, AGC delay control	63-8543
R283—5K, AGC level control	63-7976
R294—750K, vert hold control	63-7973
R298—7M, vert size control	63-6433
R299—thermistor	63-6824
R307—2K, vert line control	63-7983
R320—voltage dependent resistor	63-7143
R351—750 Ω, buzz control	63-6487
R378—voltage dependent resistor	63-7658
R388—thermistor	63-8687
R390—3M, HV control	63-8460
R396—voltage dependent resistor	63-7658
L103—47.25MHz trap coil assembly	20-1669
L204—delay line	S-80475
L209—sound take off coil	S-77414
L224—quad coil	S-80480
L226—horiz osc coil	S56877
L234—filter choke	95-2733
T201—vert output xformer	95-2924
T203—sound output xformer	95-2688
T204—deflect yoke	95-2781
T206—filament xformer	95-2944
T207—horiz sweep xformer	S-85571
A201—integrator unit	87-7
A202—R/C network	105-104
F201—heater fuse link 2½ in. min. loop of 24 lb AWG copper wire	91-2061
F202—.50a bel-fuse	136-84
F203—2.7a bel-fuse	136-76
F204—.35 bel-fuse	136-75
VHF Tuner used in Model C351066	175-1402

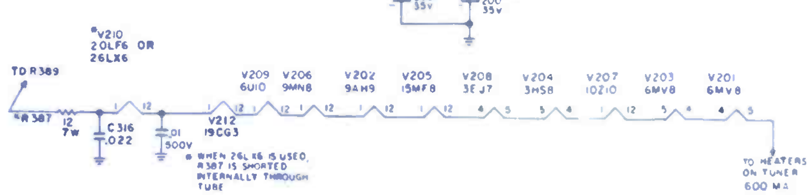


ZENITH
Color-TV Chassis
14CC14Z





TEST POINTS
- A1 SOUND-SYNC-A.G.C. AMP. OUTPUT
- B 2nd I.F. COLLECTOR
- 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.G.C. VOLTAGE
- R R-Y GRID OF CRT
- S B-Y GRID OF CRT
- T G-Y GRID OF CRT



INDICATES WAVEFORM MEASURED ACROSS POINTS INDICATED. OSCILLOSCOPE SHOULD NOT BE GROUNDED TO CHASSIS. REVERSING LEADS REVERSES WAVEFORM.

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.

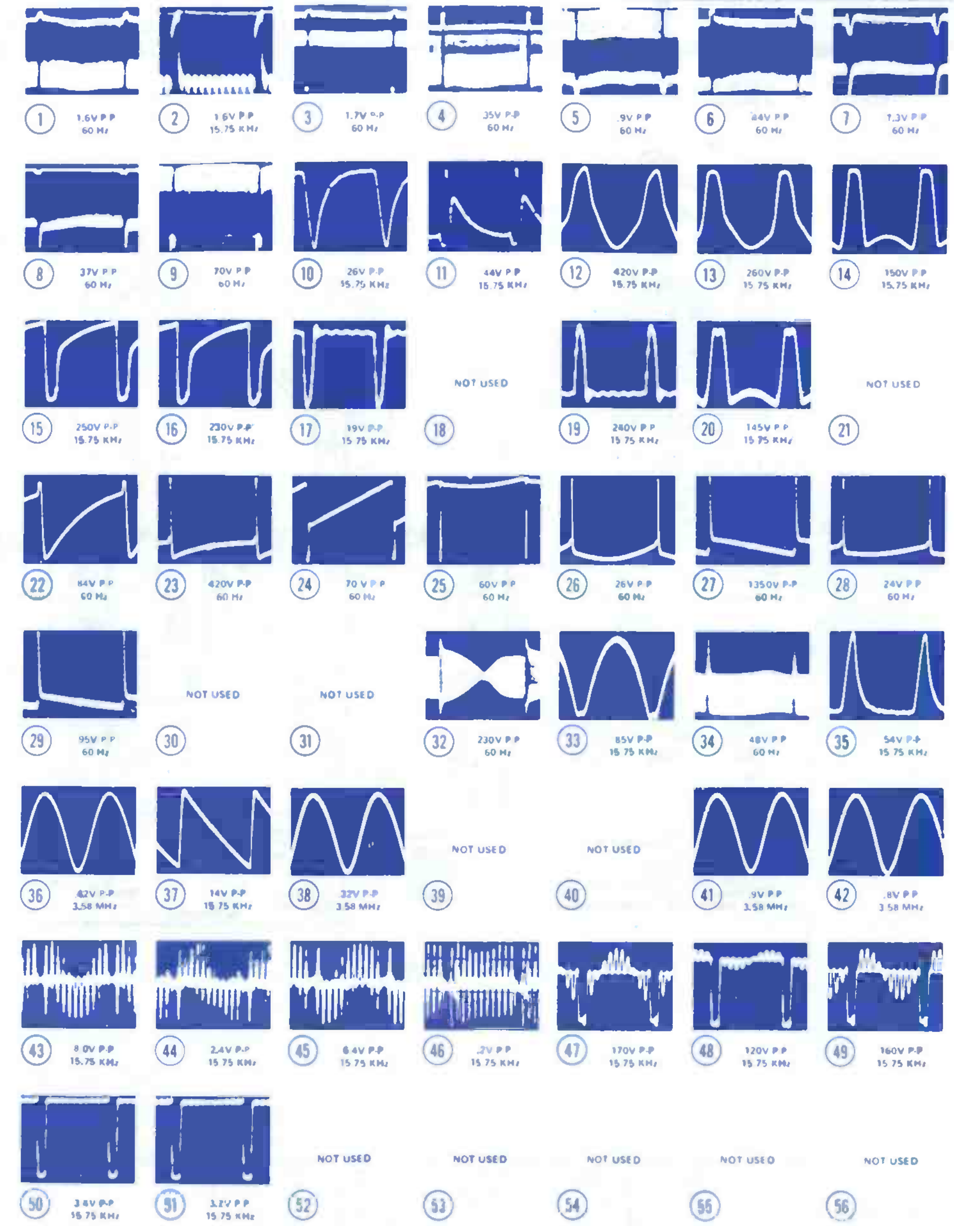
PF = PICOFARAD MHz = MEGAHERTZ μH = MICROHENRY

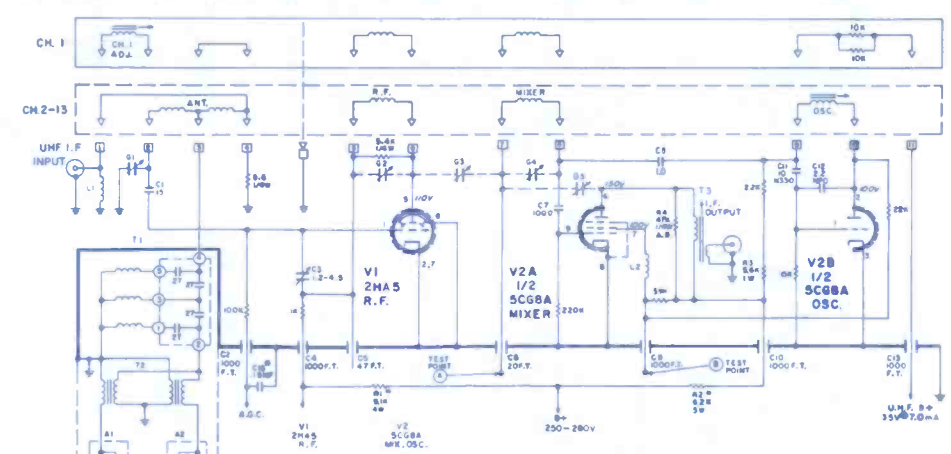
P INDICATES ± 20% MAY BE USED. ○— INDICATES VOLTAGE SOURCE

INDICATES CHASSIS GROUND →)— INDICATES CONNECTORS

(2) INDICATES WAVEFORM (SEE PAGE SHOWING WAVEFORMS) WAVEFORM MEASURED FROM POINT INDICATED TO CHASSIS GROUND.

INDICATES INSULATED BRACKET GROUND PLANE





TEST POINTS:

A. I.F. SIGNAL INPUT FOR ALIGNMENT ON MAIN CHASSIS I.F. STRIP WITH TUNER SET ON CHANNEL 13

B. V.H.F. R.F. BAND PASS OBSERVATION POINT

NOTES.

1. ALL RESISTORS ARE IN OHMS AND ARE 1/2 W ± 20% TOLERANCE UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITORS ARE IN PICOFARADS UNLESS OTHERWISE SPECIFIED.
3. VOLTAGE MEASUREMENTS MADE WITH A VTVM, WITH A 10K OHMS ISOLATION RESISTOR ON PROBE END, WITH TUNER SET ON CH. #10 AND NO ANTENNA SIGNAL INPUT.
4. G.M.V. DENOTES GUARANTEED MINIMUM VALUE
5. REPLACE TUBES ONLY WITH THE TYPE ORIGINALLY SUPPLIED BY ZENITH, WHICH IS STAMPED ON BACK OF TUNER
6. DENOTES CHASSIS

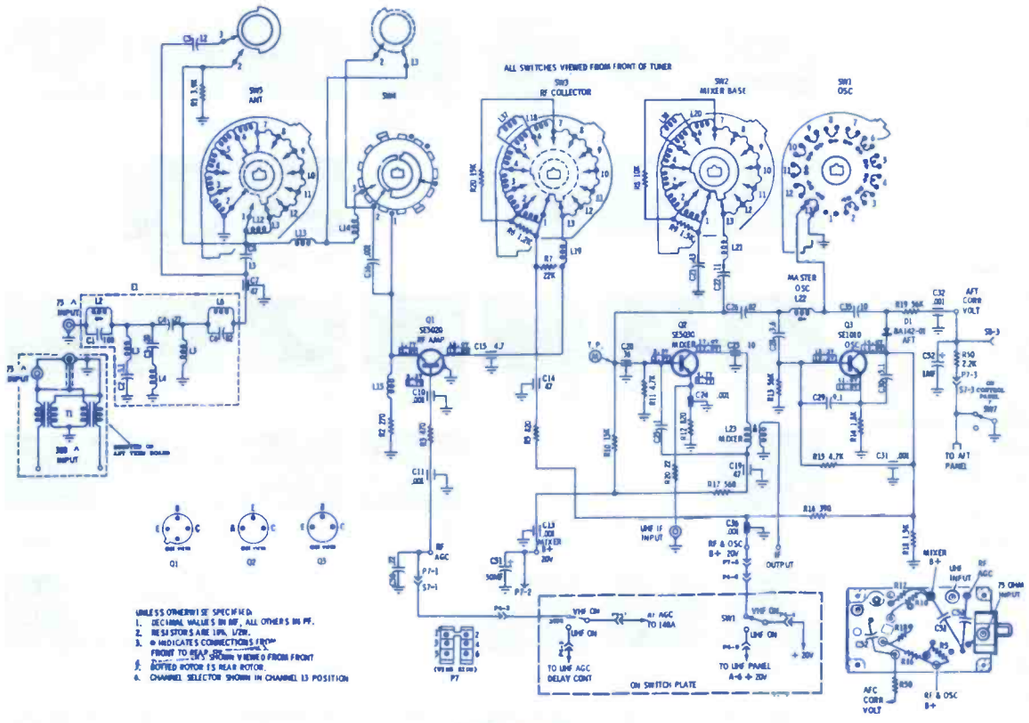
* THESE COMPONENTS ARE EXTERNAL TO TUNER AND ARE PART OF TUNER AND BRACKET ASSEMBLY

1419
MOTOROLA
Color-TV Chassis
TS-938 (Additional Information)

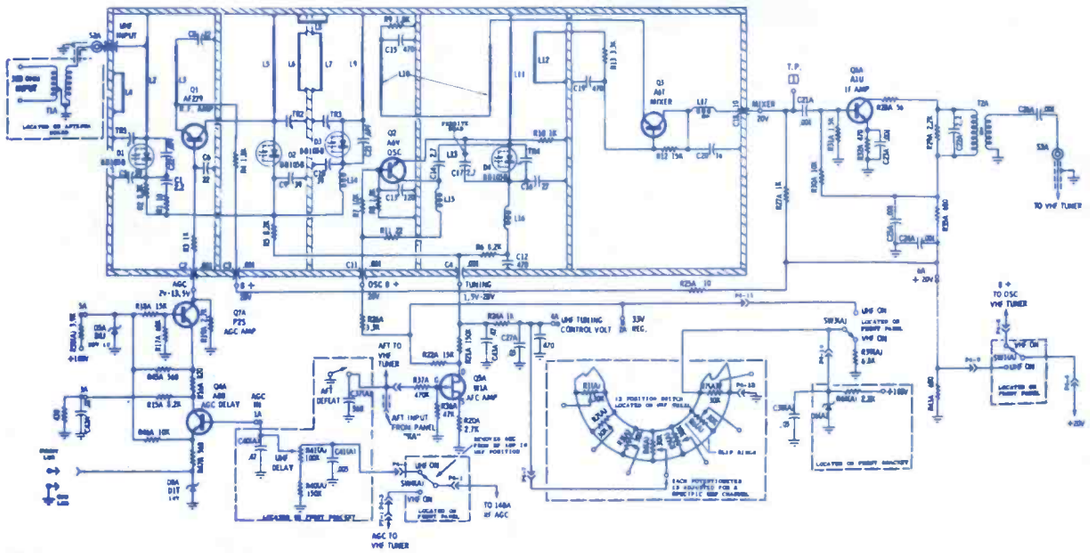
ELECTRONIC TECHNICIAN/DEALER **TEKFAX**

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

MAY • 1972



VHF Tuner



UHF Tuner

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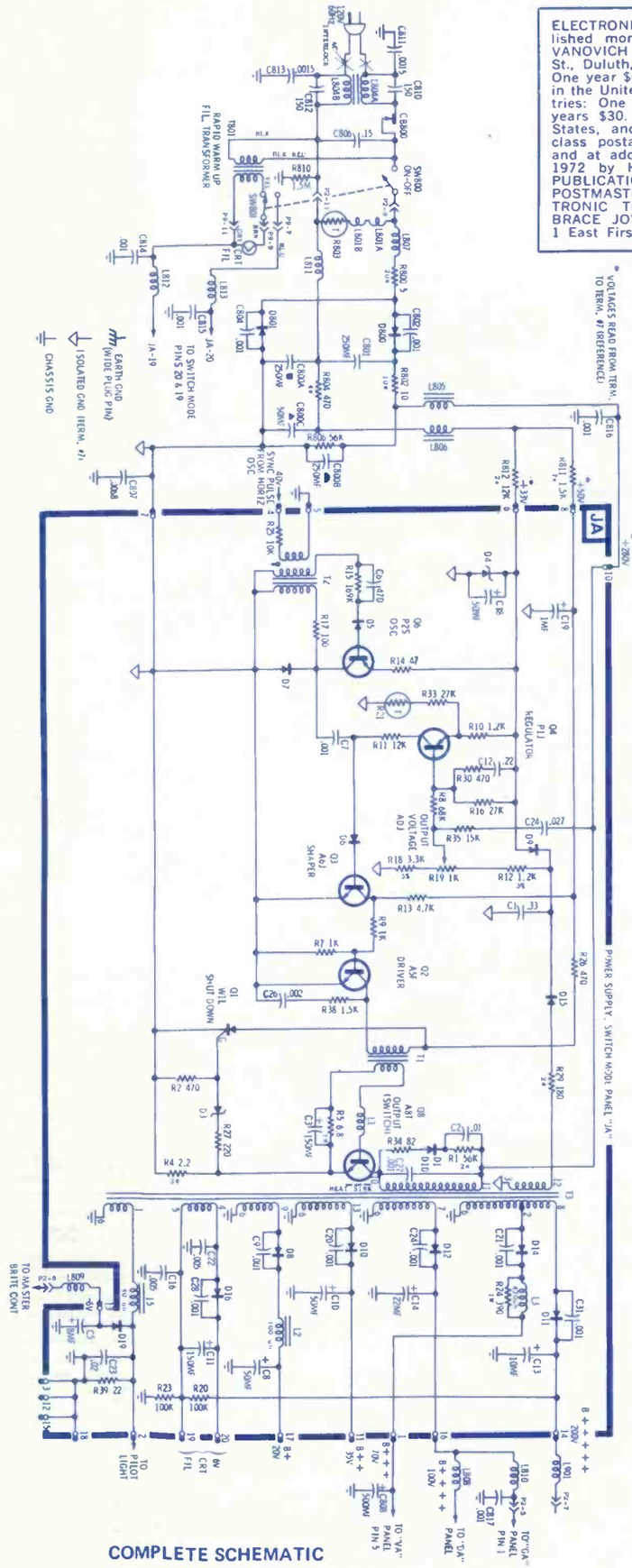
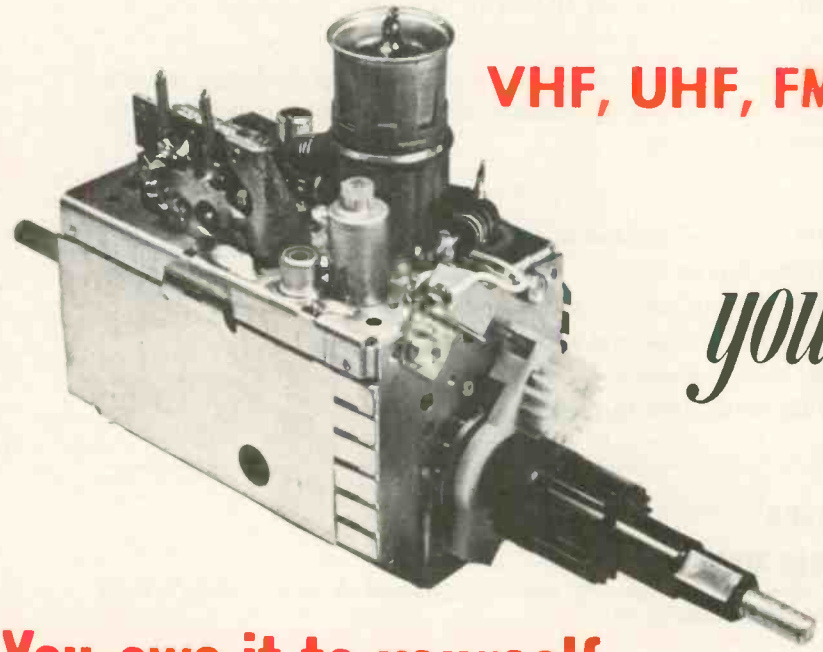


COMPLETE SCHEMATIC

TV TUNER SERVICE



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The TV reception scene on this month's cover is provided through the courtesy of Jerrold Electronics Corp. More concerning successful antenna installations is included in the article beginning on page 44.

FEATURES

A HARCOURT BRACE JOVANOVICH PUBLICATION

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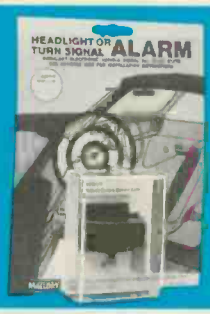

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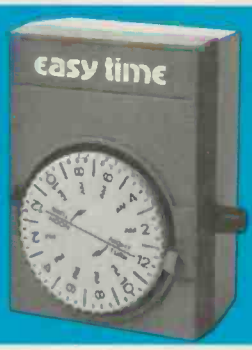

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STOP THE CLOCK!

Some of our readers have accused us of being somehow partly responsible for our galloping technology. They feel that on a few occasions this editorial column has actually helped encourage manufacturers to rush out wild new circuitry for consumer electronic products—circuitry which should actually be set baking for the next 10 years in a factory storeroom until all the "bugs" are exterminated. These electronic technicians would then have ample time to catch up with the technology and all servicing jobs would be "quick and simple."

Although we do admit that manufacturers do read this column, as evidenced by the giant reprinting job that Motorola recently did of the January editorial (note this month's editorial photo), we must realize that it is not technical publications such as ELECTRONIC TECHNICIAN/DEALER but rather competitive forces that are causing manufacturers to rush to the market with their latest developments in electronic circuitry. Some of these developments represent tremendous product improvement. And if one manufacturer waits too long to perfect a new circuit, then the potential customers turn to another manufacturer that has a more advanced product on the market.

These manufacturers serve a very fickle public that demands the most impressive products immediately without regard to future servicing. This becomes quite obvious when customers come into the shop with a relatively new piece of "junk" of unknown origin—either an imported or domestic product—and become indignant when they discover that you are unable to stretch between layers of components far enough to even reach the suspected defective component, let alone identify it for replacement or check it against a schematic. There is only one appropriate place for such garbage—it should be stripped off the shelves of the discount houses and other retailers and deposited where it belongs—in the trash cans out back!

But reputable manufacturers are concerned with serviceability. That is why you see modular circuitry being used to make solid-state servicing easier. That is why manufacturers are beginning to call upon the professional electronic service associations for suggested product changes that will offer even greater future serviceability.

As much as we might like to stop the clock and catch our breath, we find that we can't. Since dragging our feet won't help, and since our readers can always find service tips on the maintenance of old circuitry in back issues, current issues of ELECTRONIC TECHNICIAN/DEALER must be concerned with the task of preparing ourselves for tomorrow's rat race.

At the recent IEEE Show in New York City, I was able to observe and operate some products that represent what we will be encountering. Hewlett Packard exhibited for our use their new hand-held electronic calculator, the H-P 35, that uses but five IC's—three of which generate (rather than remember) to 10 significant figures the value of π, logarithms, trigonometric functions, plus other functions, for instantaneous calculations. All of these features, yet it sells for only $395.

By pressing a sequence of digits, I was able to digitally tune Heath's new AJ-1510 FM Stereo Tuner, a "computer tuner" now on the market that contains 55 IC's, 50 discrete transistors, 50 signal diodes and sells for $539.95 in kit form. (The July audio report is concerned with Magnavox's new AM/FM receiver which digitally displays the frequency to which it is tuned on either band. We have found this far more convenient and reliable than the conventional tuning dial.)

If our technology continues its present course, and if the FCC and various pressure groups permit, then I predict that the following technological advances will have occurred within the next 10 to 15 years:

• All dynamic components in consumer and commercial electronic circuitry, except for high-power applications, will be contained in some form of integrated circuitry. • The use of scopes and multimeters will generally be restricted to testing "older" consumer electronic products, since all new testing will be done with clips attached to a hand-held calculator. It will compare voltages and signal conditions with what is considered proper by an internal memory bank, the appropriate memory circuits being selected by the module under test, and the instrument indicating the condition of that module—specifying any defects present. • IF circuits will be self-adjusting for best alignment. • Three-dimensional color-TV hologram pictures will be the rage—the pictures resulting from interference patterns that form as laser light reflected off a liquid crystal display is combined with the light emitted directly from the laser. • Solid-state memory circuitry will assist in permitting the formation of far denser color-TV pictures that seem as sharp as photographs. • Although virtually all homes and apartments will contain MATV systems, which will permit the use of CCTV, the economical direct reception of satellite TV transmissions will result in the decline of CATV systems—two-way video communications being handled by the local telephone company.

There was a lot to learn as we switched from tube to transistor circuitry, but with the rapid development of economical, extremely sophisticated IC's, the hands of that clock have begun turning even faster. Although ELECTRONIC TECHNICIAN/DEALER will continue its efforts in remaining current with these transitions, only those open to strong technical publication support, manufacturer support and professional association support can ever hope to survive.

Phillips Dahlen

LETTERS

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

March Issue Pleasant Surprise

What a pleasant, unexpected surprise to receive my March issue of ET/D and see, right on the front cover in living color, "M.L." and "Babe" Finneburgh. We consider Mr. and Mrs. Finneburgh, Sr., to be "personal friends" of ours; but we are aware that there are literally thousands of other fortunate persons who also consider themselves as "personal friends" of these wonderful people. It is part of the magic surrounding "Babe" and "M.L." that they are indeed personal friends to countless numbers of people. They befriend—by way of their faith and praise and uncompromising loyalty—executives of the largest corporations as well as "little people" like us who have been privileged to observe the two of them displaying their own specialized, inspirational talent.

The two pages within that issue (pages 46 and 47), which you devote to capsulizing the highlights of some of M.L.'s achievements is accurately and tastefully done, but I would like to point out a couple of other significant contributions that he has made to help those engaged in the business of providing "independent" service.

Mr. M. L. Finneburgh, Sr., not only provided the spark for the creation of the "Superior Independent Service" (S.I.S.) campaigns at the NEA national convention in St. Louis (July 1970), he also contributed the bulk of the beginning funds, served as fund trustee and advertising manager, and donated the Finney Company to provide promotional materials for the most massive collective advertising campaign that Independent Service could muster. While doing this, he climbed out on the proverbial limb to personally call to task those giant manufacturing corporations that had elected to invade the field of all-brands electronic service. There are many of us who believe that without the unity of purpose created within the independent service industry by the magnificent efforts of M. L. Finneburgh, Sr., ServiceAmerica would not yet have made the decision to "close up shop" —and that the field of all-brands service would now or very soon be invaded by every major manufacturer in the country.

To the other activities you have noted, it should be added that M.L. was one of the few persons to actually participate in the very first formative session of the Electronics Industry Council (also in St. Louis in July 1970) and is a most active participant in the National Electronics Service Conferences.

He dynamically champions not only the cause of independent service and their once fractional and duplicative trade associations, but has also been an effective catalyst for increased cooperation and unity between these newly respected representatives of the more actively concerned members of the trade.

Anyone connected with the highest principles of "independent" (or *inter*-dependent) service can truthfully claim that M.L. is their personal friend. No better display of reciprocal friendship could be made by a service dealer than to join M.L. in becoming a member of either NATESA or NEA (or both) and by promoting increased unity and more effective representation of the industry by these national "self-service" associations.

Mr. Dahlen, your March issue of ET/D has paid a well-deserved tribute to two truly great and gracious "Friends of Service" and has again displayed to us that you and your "new" magazine are also deserving of recognition as a "Friend of Service." Thank you.

BOB AND ANITA HARRISON

Congratulations on Finneburgh Coverage

Congratulations on your wonderful editorial of Morris L. Finneburgh, Sr., and his lovely wife Frieda, in the March 1972 issue. To do justice to this wonderful couple would no doubt take up every page of one of your magazines. It is too bad that so many get your magazine and yet so few actually read it. This is one of those problems that we have no control over. We cannot force people to read.

I am not referring to just your publication, this is true with all publications. Electronic technicians are too busy trying to repair a challenging tough dog without proper compensation, thus they have no time to read articles that no doubt would help the tough dogs become just another routine repair job.

During the past two years, I have visited over a thousand shops up and down the east coast and have found that your last three paragraphs [*in the March article*] hits the nail on the head.

The wonderful offer that M.L. made available to all who joined NATESA or NEA—that these people would re-

continued on page 26

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LETTERS . . .

continued from page 24

ceive a $35.00 gift certificate at wholesale value, thus paying for a year's dues to either national, the first 500 NATESA and 500 NEA new members, a total of 1000—was appreciated by both headquarters.

This offer did not involve only $35,000.00, it also involved the cost of advertising, etc., which no doubt would be an additional $15,000.00. Thus we can say that the wonderful champion of independent service, Morris L. Finneburgh, Sr., has spent about $50,000.00 to help service technicians across the country get the great benefits derived from belonging to a national association.

Phil, keep up this wonderful work on your editorials, they are appreciated.

Letters: "You Cheat Em—I'll Service Em," by Tom Thomas, CET. Tom writes an interesting article, but never mentions what he gets for all the service he renders. I wonder if this is done without compensation. If so, he is just as guilty as the one he calls a cheat. If he charges for his services as he should, then I take my hat off to him. I do not agree with him concerning self-regulation.

LEO P. SHUMAVON
PRESIDENT OF NATESA

They Had It Coming to Them

I just received the March issue of ET/D and feel compelled to let you know that your front cover on this issue is the best ever!!!! I think it's great and is a wonderful tribute to a truly OUTSTANDING gentleman and his beautiful and gracious LADY. . . . Thanks to you and your fine staff for a really magnificent "expose" that was amply justified.

I would also again like to express my appreciation and gratitude to you and your staff for all the fine publicity that you gave us for the 1971 NATESA Convention in Hot Springs and for the many, many "plugs" that you are including in each issue on the joint NEA-NATESA Convention in New Orleans. I have been a subscriber to your fine publication since its inception and have always considered it as "the" magazine for professionals . . . but in the last few months, with all the fine editorials urging servicers (your readers) to join a professional association . . . just bears out that my choice was a good one . . . and now, even more so!

LEROY RAGSDALE
IMMEDIATE-PAST PRESIDENT, NATESA

In addition to these letters thanking us for our coverage of Morris and Frieda Finneburgh, we have received carbon copies of other letters directed to them, offering congratulations for the coverage received. We have also received letters requesting another copy of our March cover so that some of our readers can frame their own picture of this greatly admired couple. Ed.

Meeting X-Ray Hazard

Regarding the attached clipping on x-ray radiation, what do you recommend as a useful go/no-go instrument for telling our TV viewers that the hazard is at a minimum?

I think all your readers would also like to know.

A. I. MALTBY

In the newspaper clipping attached to the letter, it reported a Department of Health, Education and Welfare (HEW) announcement that customers need not worry about radiation emission from new TV sets. It quoted the HEW as saying that viewers of older TV sets, concerned about x-ray leakage, may call trained servicemen.

Upon receipt of this letter, we wrote the HEW and asked them what our readers might do in checking for this radiation. Their letter is as follows:

In response to your letter of October 8, 1971, to Mr. John Villforth, Director, Bureau of Radiological Health, I am pleased to provide the following information on actions that electronic technicians may take to assure that older TV receivers are not emitting excessive x radiation.

To detect radiation from a receiver, the technician may wish to purchase a multi-tube gm instrument such as those manufactured by Victoreen Instrument Co., Cleveland, Ohio, or by Wm. B. Johnson Associates, Montrose, N.J. These instruments sell for in excess of $500.00. The technician may wish instead to construct a single-tube instrument according to the enclosed Division of Electronic Product report. This should cost around $50.00 for parts.

Another most important instrument for technicians is a high-voltage probe, which can be used to measure CRT second-anode voltage. The high voltage of the receiver should be set no higher than that recommended by the TV-set manufacturer.

When rectifiers and shunt regulator tubes require replacement, they should be replaced with tubes which have radiation ratings. Examples of this are substituting 3A3C for 3A3, 1X2C for

continued on page 78

What do RCA SK series devices have that other replacements don't?

SOLID-STATE HARDWARE

- 10 sockets for transistors and IC's
- 15 heat sinks from TO-18 to TO-3 package styles

QUALITY PRODUCT

- Top-of-the-line quality
- Meet-or-beat specs
- 23 new types
- Now 120 SKs replace more than 46,000 devices

INFORMATION SUPPORT

- Accurate • Comprehensive
- New SK Replacement Guide
- New SK Wall Chart
- Transistor Tape/Slide Educational Shows
- Manuals

All three make up the RCA Solid-State System — a product and back-up approach to a replacement line of devices with the professional technician and service dealers' needs in mind. You put the elements together — and they work. Product is top-of-the-line. Literature is accurate and comprehensive, and hardware helps in your day-to-day servicing.

Remember, RCA's Solid-State System is based on premium product — more than 120 different devices (including 23 brand new ones) that can replace more than 46,000 units, both foreign and domestic. They cover the full range of replacement needs — from small signal types, integrated circuits, insulated gate and junction type FET's, to the newest silicon audio 100-watt output types.

Designed especially for replacement use, RCA SK units are backed by electrical characteristics that make them comparable to or better than original devices. There are no cast-offs or factory seconds.

All units and the types they replace are cross-referenced in the RCA Replacement Guide, SPG-202M. There's a Quick-Selection Wall Chart, too, 1L1367A, and new Audio-Visual service aids. These spell the industry's finest informational backup for replacements — all SK, all available from your RCA Distributor. See him today for your copies.

RCA Electronic Components | Harrison | N.J. 07029.

RCA Electronic Components

READERS' AID

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

Back Issues Requested

I would like to purchase one set of back issues of ELECTRONIC TECHNICIAN/DEALER magazine with TEKFAX schematics up to and including June, 1971. Please let me know your inclusive issue dates.

LAURENCE G. HOTCHKISS
2562 Mountain View Drive
Escondido, Calif. 92025

Service Publications Available

I have some old service publications which are fast vanishing from the haunts of man, and I would like to find a home for them with someone who can appreciate their worth. First, is a Rider's Abridged, volumes 1 to 5 in one book. I also have Rider's volumes VI, IX, XI, and XII. Roughly, the number of the volume indicates the years of radio models included. This starts with 1931 and works up to 1942. Second, I have volumes on RCA radios as follows: 1923-1928, 1931-1932, 1933, 1935, 1938 and 1940. Total 7. Third, I have the official GE manual covering 1930 to 1935. Lastly, I have a tungsol tube manual issued in 1948. This contains many forgotten tube types and their layouts. I will sell these reasonably.

HARRY L. MATSINGER
6134 Spruce St.
Philadelphia, Pa. 19139

Tekfax Requested

I am already in possession of Tekfax books of schematics 109 and 110. I would like to have the complete collection of these books and would appreciate if anyone interested in selling No. 101 through No. 108 would advise availability and cost.

EUSEBIO C. GARCIA
444 SW-10 St. (Apt 4)
Miami, Fla. 33130

I need the following Tekfax: January, 1969 through October, 1970. Please write fee desired.

GALEN D. MOHUNDRO
722 Berkshire
East Alton, Ill. 62024

Prints Available

I have quite a few Atwater Kent Prints from Model No. 9 through No. 4660 (hit and miss to models 936). These cover from 1928 to 1935. I am not in the resale print business, but if anyone needs one, please send $1.00 and a self-addressed stamped envelope and I will try to send the copy of the model needed.

HURSE E. JEFFERS
712 Hill Street
Kingston, Tenn. 37763

Equipment for Sale

I have several pieces of test equipment that range from a bias box to a sweep generator. For a price listing send a stamped self-addressed envelope.

GEORGE D. JENKINS
2323 B Woodson
Overland, Mo. 63114

Schematic Requested

I have in my possession an Atwater Kent radio, Model No. 33, Serial No. 209848. I require a manual and/or a schematic. I also would consider selling it for the right price.

MERYL S. THOMAS
Seal Island, (via) Clarks Harbour
Shelburne County
Nova Scotia, Canada

I need a schematic for a Spartan A. C. Receiver, Model No. 1476, type 1466 chassis, 115v—60Hz—200w, which was licensed under RCA patents. This was from the Sparks-Withington Co., Jackson, Mich., and to the best of my knowledge the company no longer exists.

BRAD HANQUIST
Perryville Senior High School
Electronics Dept.
Perryville, Mo. 63775

I'm in need of a schematic for a Model CC-25 intercom by the defunct Vocaline Co. of America.

RICHARD A. KERR, JR.
1714 Heritage Ave.
Placentia, Calif. 92670

I need a schematic for a Pioneer 250 horizontal sweep quant-alyst made by Doss Electronic Research, Inc., formerly of 820 Baltimore, Kansas City, Mo. It was produced about 1959.

FRANK R. SNYDER SR.
1434 Thomas
San Diego, Calif. 92109

With Sylvania's 3 lines of color tubes, you can meet it.

Customers' wallets come in different sizes.

Thick, thin and in-between.

With Sylvania's 3 complete families of replacement color picture tubes, you can be sure of having the right-priced tube for each one.

At the top end of the line, you've got the *color bright* 85® XR, the tube with our brightest phosphors and X-ray inhibiting glass.

And in the middle, you have the *color bright* 85® RE. This is the tube that brought color TV out of the dark ages. Its bright rare-earth phosphors still make it *the* tube to watch.

For economy, there is the *color screen* 85 family of replacement tubes. But, economy doesn't mean cheap construction. You can still give your customer features like Sylvania's Sharp-Spot electron gun and a rare-earth phosphor screen without breaking his budget.

When you sell Sylvania, you're selling from the broadest line in the industry. You'll have the tube to match the set.

And a price to match the wallet.

SYLVANIA
GENERAL TELEPHONE & ELECTRONICS

Every man has his price.

NEWS OF THE INDUSTRY

Second T Day Scheduled for June 15th

Approximately 850 technicians took the National Electronic Associations' certification test on March 15, 1972. Each commercial trade publication held a T-Day session and their help was appreciated by the entire industry. Most state and local trade associations also held T-Day sessions with many schools and universities cooperating.

Because of the many inquiries in response to recent publicity of the CET program, another test day, T-Day No. 2, has been designated for June 15th. To find out where you might take the test in your area, write to ISCET, 1309 W. Market St., Indianapolis, Ind. 46222, or phone 317-632-2469 for information.

This month we are providing the third in a series of questions—these representing the types of questions included in Part III of the CET examinations.

Section III
AC Circuits

1. At resonance, the impedance of a parallel-tuned tank circuit is very low. True/False
2. A series-resonant circuit can be used as a trap. True/False
3. Inductors have a self-resonant frequency lower than when normally used in circuit. True/False
4. An emitter bypass capacitor increases the low-frequency gain of an amplifier. True/False
5. A phase-shift network can be made from capacitors and resistors. True/False

Explanations

1. False The impedance at resonance is very high in a parallel-tuned tank circuit.
2. True Quite frequently a series-resonant circuit is used as a trap since the impedance is very low at resonance.
3. False Self-resonance with the distributed inductor capacitance would be higher. Any circuit capacitance would add to the distributed capacitance, and since $f \approx \frac{1}{\sqrt{LC}}$, when the capacitance (C) goes up, the resonant frequency (f) goes down.
4. You could argue for true or false on this one depending on how you define low frequency. It is true if the low frequency that you are thinking of makes the reactance of the capacitor (X_C) low; while if the low frequency that you are thinking of is actually higher, the resulting reactance of the capacitor (X_C) may be rather high. (This bad question was left in to generate thought and discussion. We always strive to eliminate ambiguous questions in the CET examination.)
5. True Since current and voltage are 90° out of phase in an RC circuit, several sections can be built for a particular desired phase shift.

NATESA Executive Council Finalizes Convention Plans

The NATESA Executive Council, meeting in Chicago on January 28th, finalized plans for the joint convention on August 10th through the 13th in New Orleans at the Jung Hotel, in cooperation with the NEA, ETA TSA of Louisiana and ISCET. A contract was drawn which provides for the distribution of responsibilities and prerogatives. Under this plan, the various associations will hold

continued on page 32

There's an Amperex replacement tube for any socket in any set you're likely to service...

TV, HiFi, FM or AM, House Radio, Car Radio, P.A. System or Tape Recorder. Imported or Domestic!

AMPEREX SUPPORTS THE INDEPENDENT SERVICE DEALER

Amperex®

TOMORROW'S THINKING IN TODAY'S PRODUCTS

A NORTH AMERICAN PHILIPS COMPANY

AMPEREX ELECTRONIC CORPORATION, DISTRIBUTOR SALES, HICKSVILLE, NEW YORK 11802

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NEWS . . .

continued from page 30

separate official sessions and will join together for meals, seminars and social functions. Nolan Boone will act as coordinator for NATESA, Roger Drost will be "on-site manager," and Vincent Lutz will produce a joint Year Book.

The NATESA Executive Council activated plans for a new NATESA award to be called, "The Cooperator Award." Its purpose is to recognize those companies that have been especially cooperative. There have been 13 companies nominated, subject to delegate approval. Many previous F.O.S. winners, as well as several new companies, have already been nominated. This plaque is not to be confused with the NATESA "Friends of Service Management Award," which has been held in abeyance the past two years because it began to lose value due to proliferation.

An F.O.S. Committee, with George Weiss, Chicago President, as chairman, was directed to study F.O.S. rules so that the F.O.S. can be reactivated, but with only a single winner possible each year. This will be a super award. Winners of Cooperator Awards will automatically be considered for the F.O.S. AWARD.

NATESA will host the next National Service Conference and Electronic Industry Council session in conjunction with its New Orleans Convention, upon approval of its House of Delegates.

TESA of Arkansas Holds 9th Convention

The Ninth Annual Convention of TESA of Arkansas was held on Sunday, March 26, 1972, at Paul's Lamplighter Restaurant in Little Rock, about 80 attending.

During the meeting 1972-73 officers were elected. These included: Lawrence Barger, president; Joe Hall, executive vice-president; Noah Gabbard, area vice-president; Walter Long, area vice-president; Bill Childs, area vice-president; Mary Kelly, secretary; Jolly Wilson, treasurer; Lowell Jones, sergeant of arms; Harold Pruett, Roger Penny, Doug Raley, Paul Boeckman, Maudie Burnett, directors; and LeRoy Ragsdale, NATESA delegate.

An Outstanding Award was presented to Mrs. Jolly Wilson by 1971 Convention Chairman Nolan Boone for her work on the 1971 NATESA Convention.

Licensing Bills Considered in New Jersey and Pennsylvania

We have learned from TSA NEWS of Delaware Valley that the Consumers Protection Bureau in Harrisburg will try to force upon radio and TV servicing dealers in Pennsylvania a licensing bill that is detrimental to the interest of our industry with no consideration for the many servicing problems confronted by the servicing dealer in his daily work. The publication indicates that this bill will only force the service dealer to increase his charges to the consuming public without any guarantees that the consumer will receive quality service by competent technicians.

In the same issue it was indicated that on January 25, 1972 representatives of TSA met with New Jersey state officials in Newark to discuss their proposed licensing bill. TSA's interest in this matter is to protect the interest of the TV servicing dealers. The state officials agreed that many of the suggestions made to them by TSA representatives should be incorporated into the licensing bill, and additional meetings will be held before completion of the bill.

RCA's TV Sweep Chanalyst checks every VHF channel.

And this complete system has other features you need to restore new-set performance.

- Concerned about CATV, CCTV, MATV? WR-514A checks all VHF channels for tuner malfunction
- Precision attenuator permits peak fringe area reception adjustment
- Versatile snap-on probe allows fast, accurate alignment technique
- One-year warranty on parts and labor . . . local replacement parts availability

Unit combines the functions of a sweep/marker generator, marker adder. RF, IF, video and special Chrom-Align sweep signals permit checking of VHF tuners and alignment of IF, video and color bandpass amplifiers. That's why we call the RCA WR-514A a complete system.

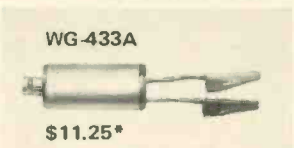
Yours for only $380* including RF output cable, three direct cables, connector adapter, VF/IF 75-ohm input head, and two direct termination units. Ask your distributor if he offers easy payment terms.

Together with the bonus accessories offered below, you will have just what you need for TV alignment procedures.

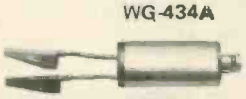
To get the special bonus offer, simply mail the WR-514A warranty card to RCA Test Equipment Headquarters, Harrison, N.J. 07029. Offer subject to withdrawal without notice. See your RCA Distributor for a demonstration of the RCA TV Sweep Chanalyst. Application Notes and other technical data are also available – on request.

*Optional Distributor Resale Price

Special bonus offer–3 accessories worth $42.25* free with purchase of an RCA WR-514A



WG-433A
$11.25*
MIXER-INPUT ADAPTER



WG-434A
$15.00*
VIDEO/CHROMA BANDPASS DETECTOR

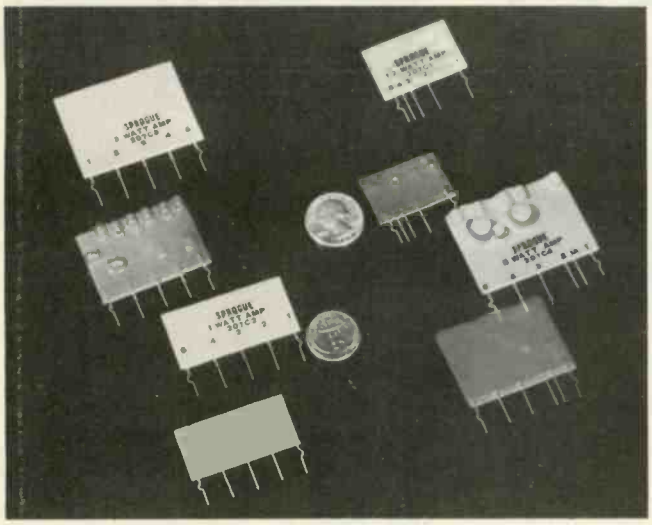
WG-435A
$16.00*
LINK/IF DETECTOR

RCA
Electronic Components

. . . for more details circle 143 on Reader Service Card

NEW AND NOTEWORTHY

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



AMPLIFIERS 700

Power output ranges from 1/2w to 5w

Available for the first time is a series of packaged miniature audio amplifiers ranging from ½w to 5w in power output. The power amplifiers are ceramic-based hybrid circuits. The ½w amplifier is 1½-in. by 1⅝-in. by ¼-in. thick. The 1w amplifier is only 1¼-in. by 2⅛-in. by ¼-in. thick, while the 3w and 5w units are 1⅞-in. by 2⅛-in. with thicknesses of ½-in. and ⅜-in., respectively. Total harmonic distortion of all amplifiers is less than 5% rms at rated output power. Frequency response is essentially flat from 60Hz to 15kHz in the case of the 5w unit, with a higher frequency cutoff in the case of the lower wattage designs. The thick-film Series 207C amplifiers are complete except for an output coupling capacitor. Reportedly no special heat-sinking is required other than mounting on a standard printed wiring board. Sprague Electric Co.

WIRELESS MICROPHONE 701

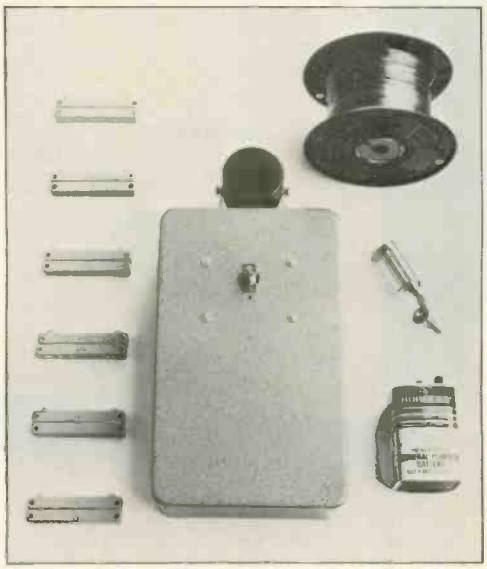
Permits communication over FM type equipment

Designated as Model DM-55, the Wireless FM Condenser Microphone permits communication over FM type receivers, tuners, portables or auto radios. Powered by a self-contained 9v battery, the unit contains a transistorized FM transmitter and sensitive built-in microphone. It is lightweight, measures 4¾-in. long by 1-in. sq, has a positive action ON/OFF switch and is styled in a black case with silver trim. The DM-55 has a tunable frequency range of 88 to 108MHz and is FCC type approved. Tuning tool, operating instructions and applicable FCC rules and regulations are supplied. Suggested user net price is $21.95. E-V/Game, Inc., division of Electro-Voice.

HOME BURGLAR ALARM KIT 702

Complete with full set of component parts

Each MW-880 burglar alarm kit includes complete application, installation and test instructions together with a full set of alarm parts. The instructions discuss how this system may best be used to provide needed protection. Carefully written installation and test procedures describe how to achieve a reliable and concealed system, how to test the system before and after installation, and how to operate and maintain the system in good working condition. The control circuit and battery are housed in a crinkle-finish box, 12-in. by 7½-in. by 3½-in. Any cutting of the closed circuit wire or entry of the protected openings will sound the alarm until turned OFF by the owner. Each kit includes an all solid-state alarm control, a loud siren, magnetic contacts for protecting six doors and windows, a shunt lock to permit the owner to enter the premises, plenty of wire, a battery, and instructions. Mountain West Alarm.



FOR MORE NEW PRODUCTS SEE PAGE 70

TEAR ALONG PERFORATED LINE

BLONDER-TONGUE LABORATORIES INCORPORATED
ONE JAKE BROWN ROAD, OLD BRIDGE, NEW JERSEY 08857 (201) 679-4010

BROADBAND DISTRIBUTION AMPLIFIER SELECTOR GUIDE

Frequency RANGE*	DESIGNATION	STOCK NO.	DESCRIPTION	LIST PRICE	OUTPUT CAPABILITY**	GAIN (typ.) Adjust from	MATCH (AVG. RETURN LOSS)	NOISE FIGURE (Avg. at Max. Gain)	MIN. INPUT FOR TASO GRADE 1 PICTURE (EXCELLENT)	NOISE FIGURE INCREASE per dB of GAIN REDUCTION	BAND PASS FLATNESS (FULL GAIN)	No. of SEMI-CONDUCTORS
UHF/VHF/FM	CUVB-54P	4615	Our best broadband UHF/VHF amplifier. For "on channel" distribution in large MATV systems. Handles twice as many sets as CUVB-35. Front panel switch controls regulated —21 VDC to output for MIGHTY-MITE UHF line extender in distribution system. Electronic overload protection. Three independent amplifying sections using twelve silicon transistors. Low-noise, high-output, and good return loss on all bands. Gain of each band and VHF band slope independently adjustable. Wide dynamic range for minimizing noise on weak channels in the presence of strong signals.	$345.00	LB/FM = 59dBmV(0.9v) ea. ch. HB = 54dBmV(0.5v) ea. ch. UHF = 54dBmV(0.5v) ea. ch.	LB/FM = 25dB to 45dB HB = 23dB to 45dB UHF = 18dB to 48dB	VHF INPUT = 16 dB RL VHF OUTPUT = 16 dB RL UHF INPUT = 14 dB RL UHF OUTPUT = 11.5dB RL	VHF/LB = 9.0dB VHF/HB = 7.0dB UHF = 9.0dB	VHF/LB = —4dBmV(600uv) VHF/HB = —6dBmV(500uv) UHF = —4dBmV(600uv)	VHF/LB/FM = 0.4dB VHF/HB = 0.6dB UHF = 0.6db	VHF = ±0.3dB UHF = ±0.6dB	24
	CUVB-35	4763	For small to medium size systems too large for our DA amplifiers, and not large enough for our CUVB-54P. UHF section has temperature compensated, wide-dynamic range gain control for excellent stability and low noise. VHF section has wide dynamic range gain controls and inductively coupled emitter feedback circuit for low distortion and good overload capabilities. Three gain controls (UHF, high band VHF, and low band VHF.)	$158.00	LB/FM = 52dBmV(0.4v) ea. ch. HB = 52dBmV ea. ch. UHF = 48dBmV(0.25v) ea. ch.	LB/FM = 17dB to 35dB HB = 15dB to 33dB UHF = 9dB to 39dB	INPUT = 14.3dB RL OUTPUT = 12.3dB RL	VHF = 6.8dB UHF = 9.0dB	VHF = —5dBmV(560uv) UHF = —4dBmV(600uv)	VHF = 0.2dB UHF = 0.6dB	VHF/LB = ±0.5dB VHF/HB = ±0.6dB UHF = ±0.6dB	12
	DA-1U/V-75	4620	Ideal for small (4-16 outlet) systems. Three transistors. Recommended for use in home or showroom where strong local and fringe signals exist. Because of its extremely good signal handling capability it may be cascaded for double gain. Patented ICEF circuit. Silicon transistors for low noise.	$ 52.40	LB/FM = 53.5dBmV(0.47v) ea. ch. HB = 52.0dBmV(0.40v) ea. ch. UHF = 42.5dBmV(0.14v) ea. ch.	LB/FM/MB = 13.5dB (fixed) HB = 12.0dB (fixed) UHF = 17.5dB (fixed)	VHF INPUT = 14dB RL VHF OUTPUT = 8dB RL UHF INPUT = 6dB RL UHF OUTPUT = 7dB RL	VHF = 6.3dB UHF = 7.0dB	VHF = —7.5dBmV(440uv) UHF = —6.5dBmV(480uv)		VHF = ±0.3dB UHF = ±1.0dB	7
VHF/FM	CVB-60	4637	Highest power VHF broadband amplifier. High-gain, 1 V per Ch. output; handles 4 times as many sets as CVB-45A. Separate high and low band amplifying sections for maximum output capability. Independently adjustable gain and band slope for each band to compensate for cable losses and differing signal strengths. Wide dynamic range for minimizing noise on weak channels in the presence of strong signals.	$320.00	LB/FM = 60dBmV(1.0v) ea. ch. HB = 60dBmV(1.0v) ea. ch.	LB/FM = 25dB to 45dB HB = 30dB to 52dB	INPUT = 15dB RL LB OUTPUT = 16dB RL HB OUTPUT = 9dB RL	LB/FM = 9dB HB = 7dB	LB/FM = —4dBmV(600uv) HB = —6dBmV(500uv)	LB/FM = 0.4db HB = 0.6dB	LB/FM = ±0.3dB HB = ±0.3dB	17
	CVB-45A	1268	For large VHF systems, handles twice as many sets as CVB-30A. Separate high and low band amplifiers with individual noise-figure-compensated gain controls (18 dB min. range). Wide dynamic range for minimizing noise on weak channels in the presence of strong signals. Accepts input from either a VHF Ch. 2-13 broadband antenna, or two separate VHF antennas Ch. 2-6 and Ch. 7-13 (switch selectable).	$206.00	LB/FM = 59dBmV(0.9v) ea. ch. HB = 54dBmV(0.5v) ea. ch.	LB/FM = 25dB to 45dB HB = 23dB to 45dB	INPUT = 15dB RL OUTPUT = 16dB RL	LB/FM = 9dB HB = 7dB	LB/FM = —4dBmV(600uv) HB = —6dBmV(500uv)	LB/FM = 0.4dB HB = 0.6dB	LB/FM = ±0.3dB HB = ±0.3dB	14
	CVB-30A	4733	Designed for medium size VHF systems. Separate high and low band gain controls (18 dB range). Extra wide dynamic range. Very low noise even at reduced gain settings. High output capability. Rated "Best Buy" by professional MATV installers.	$ 96.10	LB/FM = 52dBmV(0.4v) ea. ch. HB = 52dBmV ea. ch.	LB/FM = 17dB to 35dB HB = 15dB to 33dB	INPUT = 14dB RL OUTPUT = 13dB RL	LB/FM = 6.3dB HB = 7.2dB	LB/FM = —7.5dBmV(440uv) HB = —6.5dBmV(480uv)	LB/FM = 0.2dB HB = 0.2dB	LB = ±0.5dB HB = ±0.6dB	7
	DA-1V-75P	4556	Perfect for small (4-16 outlet) VHF only systems. Input and output connectors type F (mating BTF-591 supplied). Provides power for preamplifier; virtually overload proof!	$ 38.50	LB/FM = 53.5dBmV(0.47v) ea. ch. HB = 52.0dBmV(0.40v) ea. ch.	LB/FM/MB/HB = 13.0dB (fixed)	INPUT = 13dB RL OUTPUT = 8dB RL	LB/FM = 7.0dB HB = 7.5dB	LB/FM = —8.5dBmV(480uv) HB = —6.0dBmV(500uv)		LB/FM = ±0.5dB HB = ±0.8dB	5
UHF	CUB-50	4618	Top quality UHF amplifier especially suited as an add-on. For use in medium and large MATV systems as companion to CVB-45A eliminating the need for head-end UHF and VHF converters. Wide dynamic range for minimizing noise on weak channels in the presence of strong signals. Five separate stages of amplification permit high output with low noise. Gain control accessible on front panel. Features UHF/VHF multiplexer to permit use with VHF amplifiers without need for external mixing equipment.	$160.00	54dBmV(0.5v) ea. ch.	17dB to 47dB	INPUT = 14.0dB RL OUTPUT = 11.5dB RL	9.0dB	—4dBmV(600uv)	0.6dB	±0.6dB	12

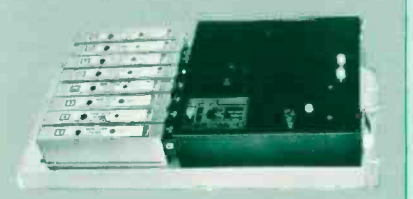
*VHF LB = 54-88 MHz, VHF HB = 174-216 MHz, FM = 88-108 MHz, UHF = 470-806 MHz
(Low Band) (High Band)

**3 Channels in LB
4 Channels in HB
3 Channels in UHF
} Present simultaneously with no perceptible distortion.

VARI-FLEX

MODULAR BROADBAND HEADEND SYSTEM

	LIST PRICES	STOCK NO.
Amplifier	$244.00	4577
Filter	$ 27.90	4576
Separator	$ 22.30	4578
Converter	$110.00	4590
Cover	$ 24.00	4579



VARI-FLEX DESCRIPTION

The perfect headend for medium to large MATV systems. Easily balances alternate channel signal levels, and amplifies TV and FM signals from broadband and/or single channel antennas. System consists of: an input separator (when broadband antenna is employed); up to 8 adjustable-level, single-channel input filters; dual-band VHF amplifier with regulated power supply, and mounting base; lockable cover; and mounting provisions for four, 4-way signal splitters. Provisions exist for single channel UHF converter modules in place of VHF input filters.

Bandpass filters isolate weak from strong signals and L-Pad type level controls reduce signals which may be 20 times stronger than weak ones. High output capability is designed for driving up to 150 outlets, and excellent amplifier back-match reduces reflections from the distribution system by 80%. Line voltage variations between 100-129 V AC are smoothed by a regulated DC power supply. True labor-saving plug-in design minimizes poor reliability of conventional, interconnecting cables.

For systems using adjacent channels, consult Blonder-Tongue Systems Engineering Department.

VARI-FLEX SYSTEM SPECIFICATIONS

AMPLIFIER

Output Capability	: LB/FM = +59dBmV (0.9v) HB = +54dBmV (0.5v)
Gain Adjustable from	: LB/FM = 25dB to 45 dB HB = 23dB to 45dB
Match (Avg. Return Loss)	: Input = 15dB RL Output = 16dB RL
Noise Figure (Avg. at Max. Gain)	: LB/FM = 9dB HB = 7dB
Min. Input for TASO Grade 1 Picture (Excellent)	: LB/FM = —4dBmV (600uv) HB = —6dBmV (500uv)
Noise Figure Increase per dB Gain Reduction	: LB/FM = 0.4dB HB = 0.6dB
Band Pass Flatness	HB = ±0.3dB : LB = ±0.3dB
Power Supply	: Regulated, compensates for line fluctuations from 100 vac to 129 vac

FILTER

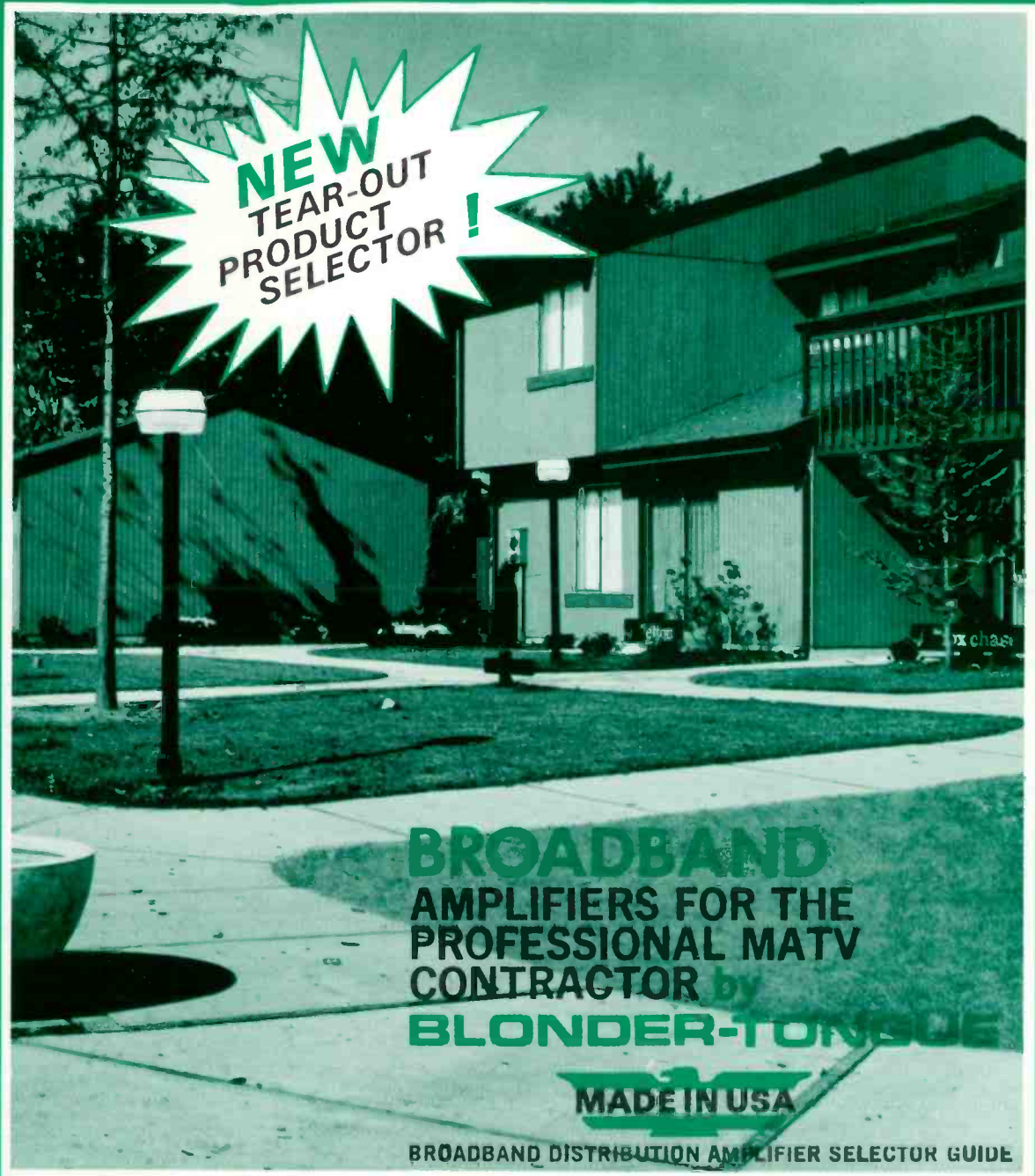
Selectivity	
TV Channels 2-13	: 20 dB down 9MHz from channel center
FM	: 20 dB down 6MHz from band edge
Return Loss	: 12dB RL (input)
Attenuation Range	: 4dB (min. loss) to 29dB
Bandpass	
TV Channels 2-13	: 6 MHz (±1.0dB Flatness)
FMA	: 88-108 MHz
FMB	: 84-108 MHz

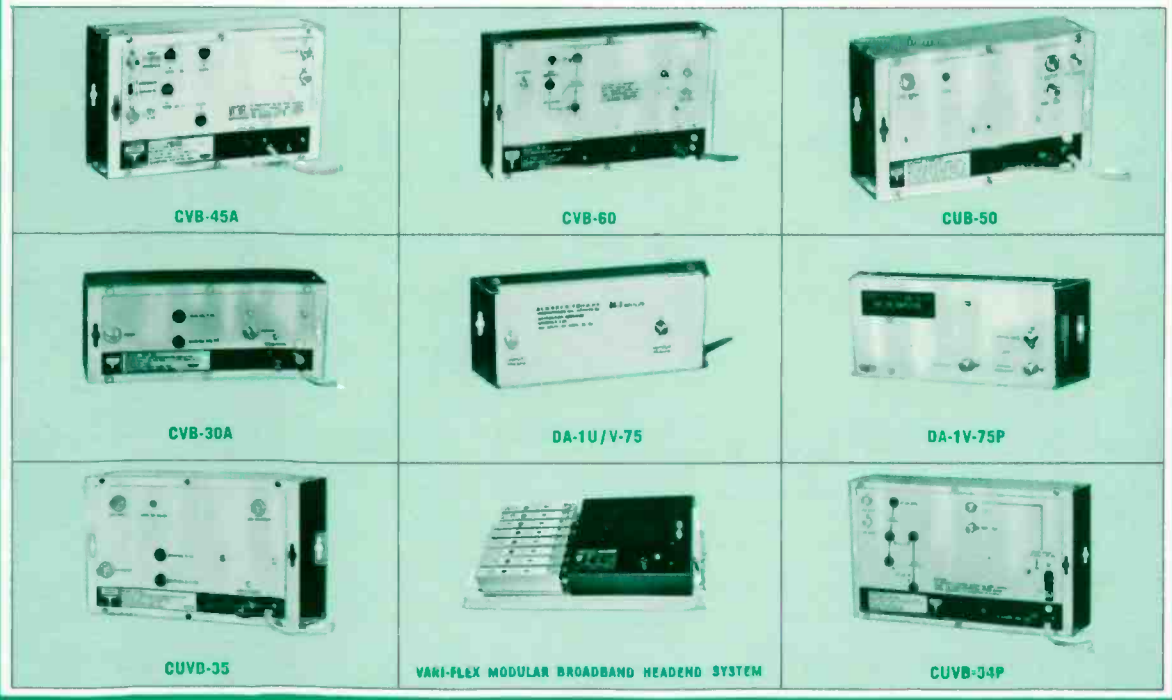
CONVERTER

All UHF to VHF Conversions except	: Channels: 22-25 to 7 25-28 to 8 28-31 to 9 31-34 to 10 34-37 to 11 37-40 to 12 40-43 to 13
Gain/Attenuation	: Adjustable from +36B to —22dB
Return Loss	: Input = 12dB RL Output = 8db RL
Selectivity	: 10dB down 6 MHz from band edge
Power Requirement:	: —21vdc (supplied from amplifier)

SEPARATOR

Impedance	: 75 ohms
Return Loss	: 18dB RL (input)
Insertion Loss	: 0.3dB
Isolation between outputs	: 20dB min.





RATING THE OUTPUT CAPABILITIES OF AN AMPLIFIER ACCORDING TO THE NUMBER OF TV CHANNELS IN A SYSTEM

The output capabilities specified on the Amplifier Selector Guide chart are for —46dB cross modulation products (invisible) with 3 channels in the VHF low band (LB), 4 channels in the VHF high band (HB), and 3 UHF channels*all present simultaneously. This rating is higher however, if fewer channels are used in the system or is lower if more channels are used. The chart below shows how to rate the output capability of each amplifier according to the exact number of channels in a system.

CUVB-35, CVB-30A, DA-1U/V-75, DA-1V-75, CUB-50				CUVB-54P, VARI-FLEX, CVB-60, CVB-45A					
No. of Channels AMPLIFIED		FOR CORRECT OUTPUT CAPABILITY RATING . . .		No. of Channels AMPLIFIED			FOR CORRECT OUTPUT CAPABILITY RATING . . .		
VHF		VHF		VHF			VHF		
LB&HB	UHF*	LB & HB	UHF*	LB	HB	UHF*	LB	HB	UHF*
2	2	add 7.8 dB	add 3.0 dB	2	2	2	add 3.0 dB	add 4.8 dB	add 3.0 dB
3	3	add 4.8 dB	0 dB	3	3	3	0 dB	add 1.8 dB	0 dB
4	4	add 3.0 dB	subtract 1.8 dB	4	4	4	subtract 1.8 dB	0 dB	subtract 1.8 dB
5	5	add 1.8 dB	subtract 3.0 dB	5	5	5	subtract 3.0 dB	subtract 1.2 dB	subtract 3.0 dB
6	6	add 0.8 dB	subtract 4.0 dB		6	6		subtract 2.2 dB	subtract 4.0 dB
7	7	0 dB	subtract 4.8 dB		7	7		subtract 3.0 dB	subtract 4.8 dB
8	8	subtract 0.6 dB	subtract 5.4 dB			8			subtract 5.4 dB
9	9	subtract 1.2 dB	subtract 6.0 dB			9			subtract 6.0 dB
10	10	subtract 1.7 dB	subtract 6.5 dB			10			subtract 6.5 dB
11	11	subtract 2.2 dB	subtract 7.0 dB			11			subtract 7.0 dB
12	12	subtract 2.6 dB	subtract 7.4 dB			12			subtract 7.4 dB

* where applicable

HOW TO USE THE CHART

Example 1.
The CUVB-35's rated output capability with 3 channels in the high band, 4 in the low band, and 3 UHF channels is given in the Amplifier Selector Guide as:

LB/FM = 52 dBmV each channel
HB = 52 dBmV each channel
UHF = 48 dBmV each channel

A particular system uses one low band channel, four high band channels, and two UHF channels. This amounts to 5 VHF channels and 2 UHF channels. Looking at the chart, it can be seen that the CUVB-35's VHF output capability is increased by 1.8 dB and its UHF capability is increased by 3 dB. The increased output capability rating is computed as follows:

LB/FM = 52 dBmV + 1.8 dB = 53.8 dBmV each channel
HB = 52 dBmV + 1.8 dB = 53.8 dBmV each channel
UHF = 48 dBmV + 3.0 dB = 51.0 dBmV each channel

Example 2.
The CVB-60's rated output capability with 3 channels in the low band and 4 channels in the high band is given as:

LB/FM = 60 dBmV each channel
HB = 60 dBmV each channel

In this example a system uses 4 low band channels and 3 high band channels. No UHF channels are used. It can be seen from the chart that the CVB-60's low band output capability rating is reduced by 1.8 dB and its high band rating is increased by 1.8 dB.

The new output ratings are determined as follows:

LB/FM = 60 dBmV — 1.8 dB = 58.2 dBmV each channel
HB = 60 dBmV + 1.8 dB = 61.8 dBmV each channel

MATCHING AN AMPLIFIER TO THE REQUIREMENTS OF A DISTRIBUTION SYSTEM

The prime consideration in any TV/FM distribution system is to supply enough signal to each TV set to produce an acceptable picture. Obviously, if sufficient signal is supplied to the TV set with the most signal-loss between it and the amplifier, all the other TV sets can be supplied with sufficient signal.

Total-system-loss is the amount of loss between the system's amplifier and the "worst case" signal tapoff. That is, the tapoff with the most loss between it and amplifier. Splitting losses, cable losses, and the thru-line losses of other tapoffs on the same cable run all contribute to the total-system-loss. After computing the total-system-loss, it is possible to determine the required output rating of the amplifier needed to drive the system.

It is standard practice in TV/FM system design to supply at least 0dBmV (1,000uv) to each TV tapoff in the system. Thus, if the total system loss is 50dB, we must have an amplifier capable of delivering at least 50dBmV on each channel in the system (50dBmV — 50db = 0dBmV). This is essentially how one determines what amplifier is needed for a particular system — by matching the total system loss to the amplifier's output capability. (See the chart above to find the exact output capability of each Blonder-Tongue distribution amplifier relative to the number of channels in a system).

There is an exception to the rule of matching the system's total loss to the amplifier's output capability. In some areas, considerably more than 0dBmV of signal is required on a channel to overcome a direct pickup problem. In these instances, the amount of signal (in dBmV) required to overcome local pickup is added to the total-system-loss.

The sum of the required signal level and the total-system-loss is the required output rating of the distribution amplifier. For example, in a certain area 20dBmV of signal is needed on channel 12 to overcome direct pickup. The total-system-loss at Ch. 12's frequency is 35dB. To find the output capability of the amplifier, simply add the minimum signal needed on channel 12 (20dBmV) to 35dB.

20dBmV + 35dB = 55dBmV

The distribution amplifier must have at least a 55dBmV output capability in the high band to properly drive the system.

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TEKLAB REPORT

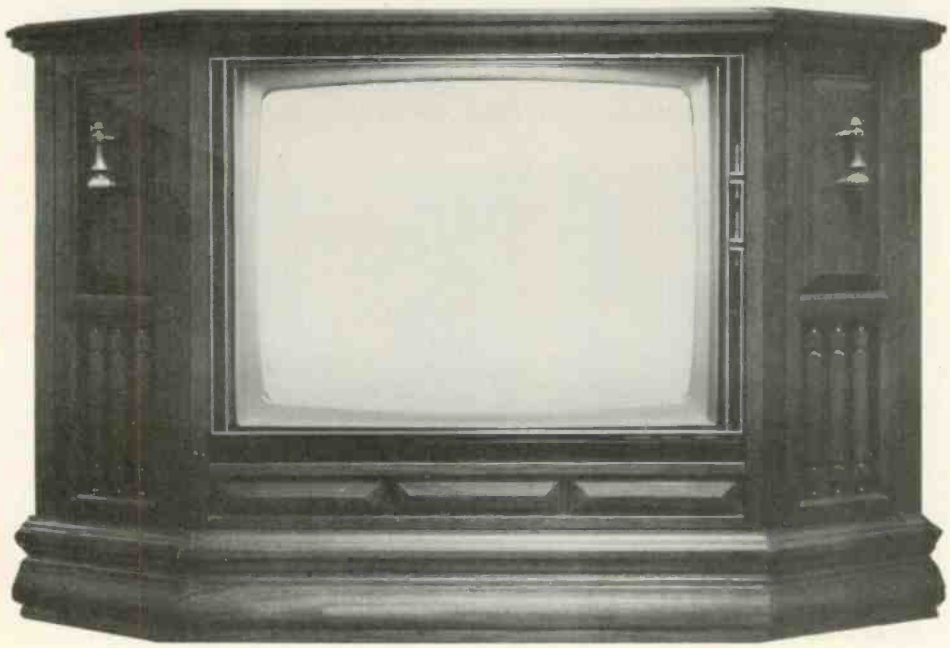
Channel Master's Model 6124A Modular Color-TV Set

by Joseph Zauhar

The modular design of this TV chassis can take the chore out of servicing and in most cases eliminate pulling the chassis for the shop

■ It is generally agreed that within the next few years most TV sets will be of modular design, and the color-TV set we are describing in this report is Channel Master's first modular chassis aimed to speed and simplify servicing of color-TV sets—in many cases eliminating the need for shop repair. This is the model 6124A color-TV set employing the hybrid T5001 series chassis.

Channel Master's Model 6124A color-TV set employing the hybrid T5001 series chassis.



After unpacking the set, we were quite impressed with the cabinet design, most of the customer controls being hidden behind a panel door which blends in with the Mediterranean cabinet; and when opened, the CHANNEL SELECTOR knobs, ON/OFF switch, VOLUME, AFT and AUTOMATIC TINT controls are within easy reach. The slide throttle type COLOR and TINT controls are exposed on the front panel along the right side of the picture tube mask. The BRIGHTNESS, VERTICAL HOLD and CONTRAST controls are partially hidden and located on the lower right of the picture tube mask. Another important feature for the service technician are the concealed casters, which simplify moving of the heavy console.

This newly designed "Integrid" chassis employs six plug-in modules, each with its own function; and the chassis is mounted on sliding rails for even easier access to the few components beneath. If it becomes necessary to remove the complete main chassis, this task is simplified by the employment of plug-in connectors to the tuners, controls and deflection yoke. These connectors cannot be interchanged because of the different socket shapes used.

The individual modules are easy

to pull or replace and are well secured. Guide pins, which are also ground points for the circuit board, are located on the main chassis. They guide the contact pins into the module contacts. The modules are secured with two spring locks on each end of the module and two wing type fasteners in the center of the board.

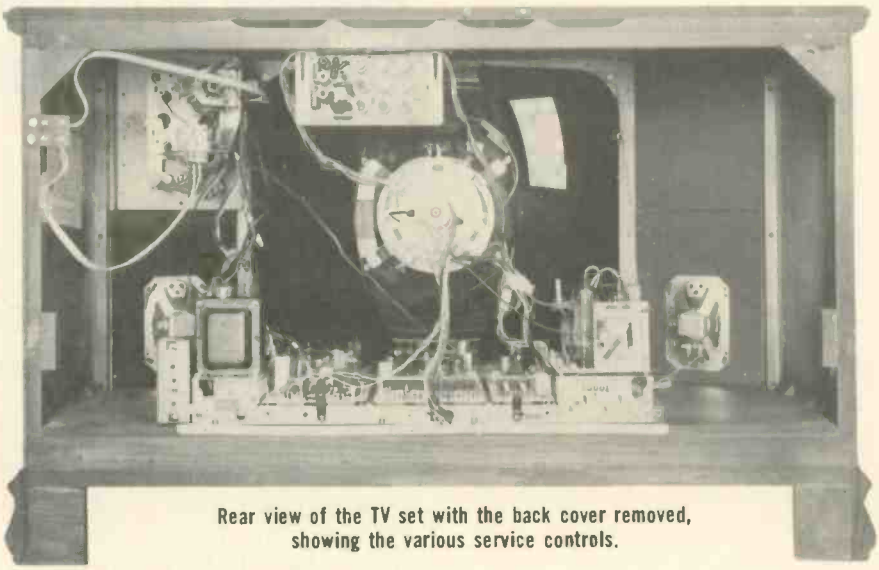
This color-TV chassis includes a number of automatic circuits: Tint, Chroma, Fine Tuning, Dynamic Correction, AGC, Degaussing and an Instant-On circuit. There are 19 tubes, plus the picture tube, 6 transistors, 9 silicon diodes, 12 selenium diodes and 2 crystal diodes employed in this color-TV chassis. The 25-in. (diagonally measured) screen of the black matrix picture tube is said to have a shadow mask constructed from die cast metal.

Most of the circuits employed in this chassis are already quite familiar to most service technicians. However, during our review some of the features and circuits may be followed in this month's Tekfax Schematic No. 1416.

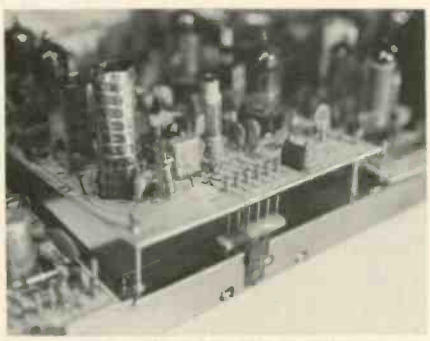
Power Supply

The power supply includes a

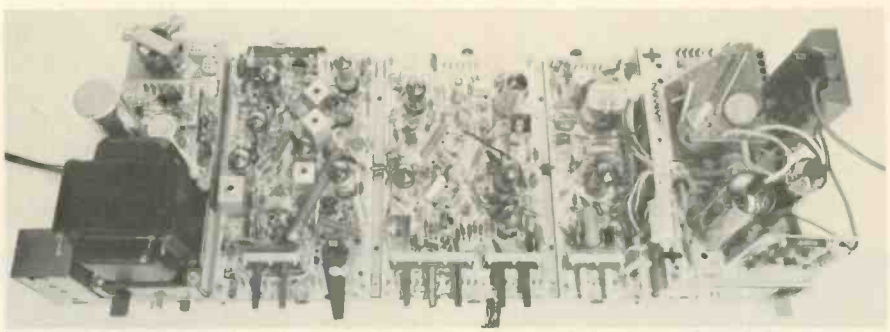
With the door open, the CHANNEL SELECTOR knobs, ON/OFF switch, VOLUME, AFT and AUTOMATIC TINT controls are exposed. Also, shown are the slide type COLOR and TINT controls.



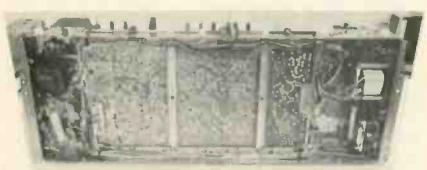
Rear view of the TV set with the back cover removed, showing the various service controls.



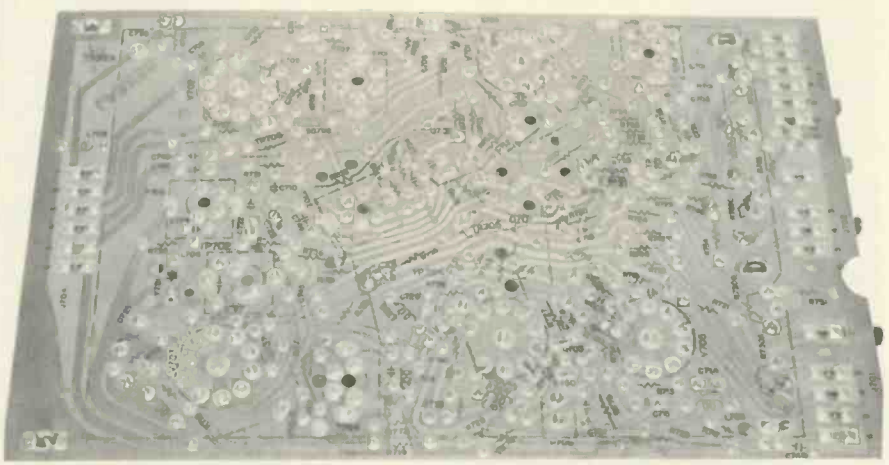
The panel is guided into the contact connectors by four ground pins mounted on the main chassis. The boards are secured with spring locks and wing retainers.



Top view of the new hybrid modular color-TV chassis. The chassis employs six snap-in boards.



Very few components are mounted under the main chassis frame.



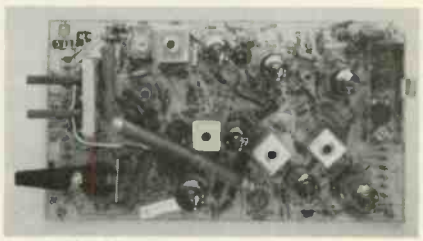
Shown is the etched-circuit side of the well road-mapped board with all components identified.

heavy power transformer which is bolted to the main chassis frame. The snap-in power supply module, PW1100, contains the bridge-type rectifier circuit, plus the thermistor and varistor for the automatic degaussing circuit. The two filament fuse wires are located across the terminals on top of the main chassis, eliminating the need to remove the chassis to replace the fusible wire.

This chassis is also protected by a dual purpose reset-type circuit breaker which is incorporated in the low-voltage power supply, half of the breaker being connected in series with the cathode circuit of the horizontal output tube to protect the horizontal output circuitry.

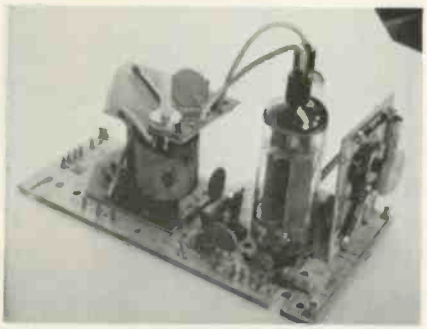
Picture IF and Sound Circuits

The picture (or video) IF and sound board (PW300) includes a three-stage high-gain IF amplifier and audio circuits. Two transistors are employed on this board—one being used as the AGC amplifier and the other a video amplifier which drives the 12BY7 video output tube. Also contained on the board are the green, blue and red cathode circuits which are connected to the picture tube cathodes with push-on type connectors to simplify board removal. A three-position slide switch is employed which can be placed in the RASTER, NORMAL or SERVICE position with the lever protruding through the back cover of the TV set. Also included are the BLUE and GREEN DRIVE, AGC and BRIGHTNESS controls.



Board PW300 contains the picture (or video) IF and sound circuits.

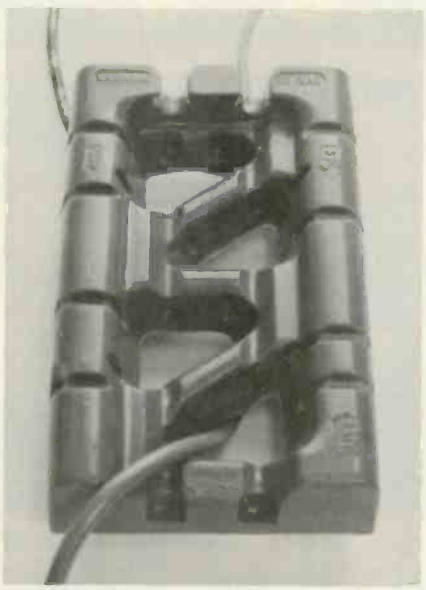
Shown at the left is the PW1400 automatic fine tuning board while at the right is the PW1100 snap-in power supply board.



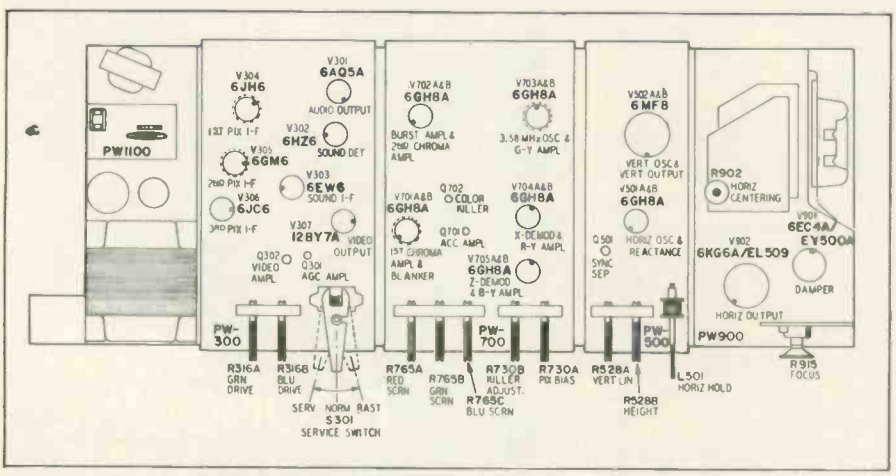
The horizontal output board (PW900) employs a fifth harmonic tuning system and eliminates the need for a high-voltage regulator tube.

Board PW700 contains the chroma circuitry, which employs three transistors and five 6GH8 tubes.

The PW500 board contains the deflection circuits.



A solid-state voltage multiplier circuit is used in the high-voltage rectifier unit.



Top view of the chassis showing the tube layout and rear chassis adjustments.
Courtesy of Channel Master.

Automatic Fine Tuning (AFT) Circuit

The PW1400 automatic fine tuning board is contained in a separate shielded chassis and mounted in the right rear of the main TV chassis. The AFT adjust coil can be adjusted with the back cover in place, although the adjustment is only made if the manually fine-tuned picture changes when the AFT switch is placed in the ON position. Use a standard .076-in. hex core wrench and turn it until the picture quality and color intensity are essentially the same as when the AFT switch is in the OFF position and the fine tuning control is properly set. Then check the AFT action on all local channels to be sure the adjustment satisfies any peculiar reception condition.

continued on page 77

Sliding Door

Swinging Door

Sales leader for 11 straight years.

Same Price

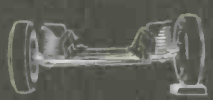
Only Ford vans have so many better ideas that make vans easier to drive, to service, to use.

Now you have a choice of conventional swinging doors or, at the same price, a new gliding side door for cargo handling in cramped alleys and beside loading docks. Three separate tracks, at top, bottom and center, give bridge-like support for solid, smooth one-hand operation, tight seal.

Shorter outside, easier to park. Compared to other makes with similar loadspace, Econolines have significantly less overall length for better maneuverability in city-delivery operations.

Easy, out-front servicing. Routine service points are right at hand under convenient outside hood: water, oil, battery, wider motor voltage regulator, and many others.

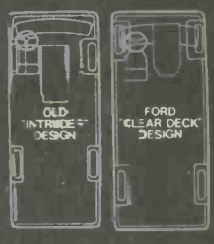
Strong, Twin-I-Beam Independent Front Suspension—Ford's exclusive design smooths the going for both load and driver. Two forged steel I-beam axles provide strength and durability; wide wheel stance means stability in cross winds.



Wider at top for built-ins. Body sides are more vertical, wider apart at top than other vans. Built-in units fit better.

Biggest payload. E-300 series offers 4,285-lb. payload capacity—biggest of any van.

Engine clear forward. In Ford's clear-deck design, engine is forward—all the way out of cargo area. Over 8½ ft. clear floor behind driver's seat...over 10 ft. in the SuperVan.



FORD ECONOLINE VANS

Ford

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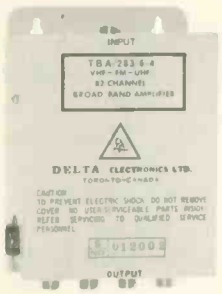
AMT

AT THE ANTENNA

AMT Series – Matching Transformer for single UHF channel, or 2-83.
MBT Series – Pre Amplifiers for single UHF channel, or 2-83.
AC Series – VHF–UHF couplers.
SI Series – Signal Injectors-single UHF channel to all-band down lead.

MBT



TBA

82 CHANNEL DISTRIBUTION AMPLIFIERS

TBA/283/6-4
6db Gain
Four Outputs - 75 ohm
Max. Input UHF + 27db
VHF + 20db

TBA/283/12
12db Gain
Single 75 ohm output.
Max. Input UHF + 32db
VHF + 32db

TBA/283/25
25db Gain
Separate UHF-VHF inputs
Max. Input UHF + 28db
VHF + 26db

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4x75/283

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TO-2/283

TO- SERIES

TO-2/283W

82 CHANNEL TAP-OFF's

Available for indoor or outdoor use with 1, 2, or 4 taps. Isolation values of 20, 15, or 10db.

82 CHANNEL WALL PLATES

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AT THE T.V. SET

MM-283
UHF-VHF Matching Transformer
75 ohm input
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Fig. 1—Typical field-strength meter.

Professional Antenna Installation Methods

by Bert Wolf

Despite the recent spate of electronic antennas, miniature antennas and unusual designs, there is really nothing radically new in the field of TV antennas. Log-periodics, Yagis and variations of these two basic designs still provide the most efficient, effective TV and FM reception.

■ The current upsurge in color-TV set sales has resulted in a corresponding increase in antenna sales. Since antenna business, properly handled, is exceptionally profitable, dealers who don't emphasize this aspect of their business are neglecting a very important revenue source.

There are two important aspects of installing TV antennas: quality and time. To be successful in the antenna business, your installations must be first class. They must bring in all channels sharp and clear. They must eliminate ghosts, snow, color problems and interference. They must be secure enough to provide many years of service. They must be neat and attractive.

Make antenna installations that meet these criteria and you'll enhance your reputation for quality. But you still may not do very well in terms of profit unless you can also do the job rapidly. Labor is a very big factor in an antenna installation. You should *always* sell up to the finest of materials, but labor is still a large proportion of the cost. Some two-man crews can manage only three or four installations a day. Others manage 10 or more.

Of course, installation time varies by area and conditions. If you have to spend a lot of time traveling, erect large towers, overcome difficult reception problems or snake lead-in through walls, you won't be able to handle too many jobs in a day. But under normal circumstances, a hard-working, efficient two-man crew should be able to handle an average of seven or eight installations a day.

This article is aimed at helping you to increase speed while maintaining quality.

Choosing the Antenna

Your customer generally depends upon you to recommend the right antenna to suit his needs. In a relatively short time, you should know the best types of antennas for most reception conditions in your selling area.

However, it is always a good idea

The author is manager of the Distribution Sales Div., Educational and Communications Div., Jerrold Electronics Corp.

to sell up. If there are UHF channels in the area, be sure to sell an 82 channel antenna even if the customer says he never watches UHF. He can never tell when they will telecast a local sports event that he is very eager to see. And an all-channel antenna is not much more expensive than a VHF-only antenna.

If there is a choice, try to sell up the most expensive antenna, rather than the cheapest the customer can get by with. Over the years of service, the difference in price is negligible.

If there is a distant channel with good programming, suggest a system that will bring it in. People are often willing to spend a lot of money to get blacked-out sporting events.

Tools Needed for Installing Antennas

Don't skimp on tools. A good assortment of quality tools more than pay for themselves in the time they save. Here's what you will need:

- A good field strength meter (see Fig. 1). Some antenna installers try to get away without such a meter, but this is false economy. If you know the area well, you won't need a meter for antenna selection. However, a field strength meter is a must for solving the reception problems you frequently encounter. It is a lot easier to eliminate interference if you know what frequency it is on and where it is coming from. A meter can also tell you if the problem is the antenna or the TV set, as well as pinpointing the need for a preamplifier.
- Normal hand tools such as screwdrivers, diagonal cutters and pliers.
- A ¼-in. and a ⅜-in. nut driver. These sizes fit almost all the nuts you will encounter on U-bolts, mounts and rotators.
- A good set of ratchet wrenches. Ratchet wrenches are considerably faster than open-end wrenches.
- A leather tool belt.
- A heavy hammer (to drive ground rods).
- A crimping tool (for coax connectors).
- A good compass and an air map of the area. These tools will insure precise antenna orientation.
- A level to make sure that the mast is straight.
- A staple gun for running transmission line.

You will also need the following items:

- Silicon grease for waterproofing coax connectors.
- Clear acrylic spray for protecting twin-lead connections.
- Roofing tar for sealing up holes around bolts, screws and standoffs.
- Caulking compound to use around coaxial cable where it enters the house. (You cannot use caulking compound around twin-lead, so be careful to drill entry holes upward and make sure they are under an overhang or a window sill.)

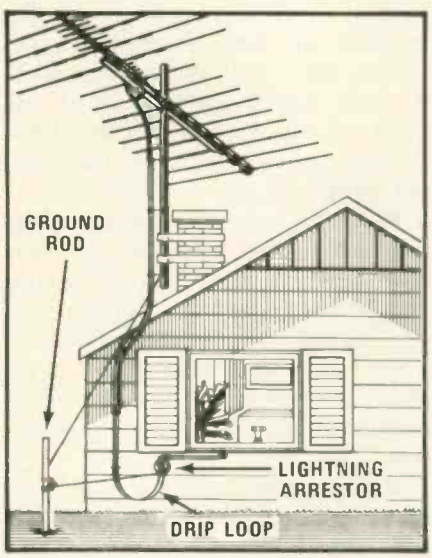

Fig. 2—A chimney-mount installation.

Locating the Antenna

Some antenna articles advocate "Walking the Roof" with a standard dipole attached to a field strength meter to find the right antenna location. This is not only dangerous, it is a waste of valuable time. Except for the rare circumstances where you are fighting for every microvolt of signal, your antenna location should be chosen with only one thought in mind: "Where can I make the fastest, most secure installation?" Signal considerations are secondary because you can almost always get enough signal anywhere on the roof.

Antenna height is another matter. If signals are weak or blocked by tall trees, hills or buildings, a little extra height can make a big difference.

In a good signal area, use a 5-ft. mast and don't worry about getting the very strongest signals you can. In a fringe area, however, you will probably have to go up 10 or 20 ft. Since this makes for a difficult installation, don't make this choice lightly.

Connect your field strength meter to a small antenna and probe various heights for signal strengths. If the difference between 10 ft. and 20 ft. is only a few decibels, you are much better off to use a larger antenna or stacked antennas instead of going up high. Whenever possible, try to keep your mast at 10 ft. or less.

If you are using separate UHF and VHF antennas, you have a choice of which to put on top. Generally speaking, you should put the antenna that has to pull in the weakest signals on top. If UHF signals are weak, and you are using a tall mast, it will probably pay you to probe various heights, since UHF signals are not always strongest at the greatest height.

Aiming the Antenna

Many, perhaps most, antenna installers take antenna orientation too lightly. It is a very important aspect of the installation—especially if you are using high-gain, highly directional antennas. An antenna positioned just a few degrees off can cause poor color or color fading from time to time.

Some installers just take a guess at the direction of the transmitting tower. They figure that they know the town pretty well, so they aim at a familiar landmark or by "feel." Needless to say, they often miss the mark. Others use walkie talkies—one on the roof and one at the TV set. This procedure is both inexact and time consuming.

The best way to aim an antenna is with a compass and an air map. You can buy air maps for under $1.00 at most local airports. They show the locations of the TV towers, plus all other tall structures, ridges and hills. The compass and air maps tell you precisely how to orientate the antenna.

If it is a rotor installation, the compass enables you to line the antenna up to point north. Aside from accuracy, this method also has the advantage of saving time. You aim

the antenna only once and then tighten it in place.

Mounting Techniques

Once you have chosen the antenna and determined the optimum height for it, your next problem is to decide what type of mount to use. Aside from towers (which we won't cover in this article), there are three basic types of mounts:

- Chimney mounts.
- Base and tripod mounts.
- Wall mounts.

Generally speaking, chimney mounts are the fastest and easiest to use (Fig. 2 shows a typical chimney-mount installation).

Here are a few tips on chimney mounts:

- Before you decide on a chimney mount, make sure the chimney is strong and in good shape. Many modern chimneys are false—not really made of brick. Attach an antenna to one of these and the chimney is liable to blow down with the antenna. And, of course, you may be liable for the damage. Even with a brick chimney you have to be careful. If it looks shaky or there are bricks missing, stay away from it. Customers are prone to blame you for the damage whether you caused it or not.
- Don't mount the straps too close together. For masts 10 ft or higher, you should leave at least 2½ ft between the top and bottom straps. For 5 ft masts, at least 2 ft of separation is required. If you can't separate the top and bottom straps by at least 2 ft, the chimney is too short to use.
- If you go to 10 ft or more above the top of the chimney, use a guy ring and guy wires, as shown in Fig. 3. Even with guy wires, don't try to go more than 19 ft above the chimney top, unless the antenna is unusually small, ice loading is no problem and high winds are very rare.
- Make sure the straps are absolutely straight, with no kinks. You can do this easily by lining each strap up with a row of bricks. If the strap is not straight, it will probably move under stress.
- Pull each strap tight, then line it up straight, pull it tight again and clamp it loosely in place. Then, before the straps are completely tightened, fasten the mast (with the antenna) in place.

Now comes an important step that many installers ignore. Use your level to be sure the mast is vertical. You can't really do a good job by eye, especially on a slant roof. Even a small deviation from vertical causes the weight of the antenna to apply torque to the mount. Besides, it looks unprofessional.

- Use the compass and air map to aim the antenna in the right direction and then tighten everything in place. Secure all bolts with your ratchet wrenches, making certain that everything is very solid. You should *not* be able to turn the antenna on the mast or the mast on the chimney mount.

Base and Tripod Mounts

Fig. 3 shows a typical base mount installation. A base mount has only one job—to hold the mast firmly at the bottom. Because base mounts hold masts only at one point, however, guy wires are a must. The rule is, use a set of guy wires for every 10 ft of mast.

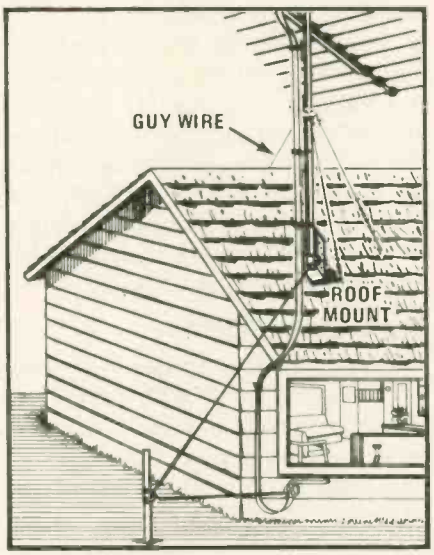

Fig. 3—Use a guy ring and guy wires for those higher antenna installations.

A base mount can be used anywhere on the roof, but you should try to position it so that all of the mounting screws bite into solid wood. You can usually find solid wood near the peak of the roof, which is an ideal spot for a base mount.

If you can't hit solid wood in a convenient mounting place, you have two alternatives:

- Fasten the base mount to a two-by-four long enough to pass over two rafters. Then, bolt the two-by-four to the rafters. You can locate the rafters easily by tapping and listening for a dull sound. If in doubt, drive a small test nail. Be sure to seal any holes made by test nails with roof tar.
- Use a 5-in. or 6-in. square of 1-in. or ¾-in. plywood inside the attic. This is a two-man job. The installer drives lag bolts through the mount and the roof; and the lag bolts pull the wood square up tight against the inside of the roof, making a very solid installation.

The first method is generally easier and faster, but you may have to use the second method for some installations. Many experienced installers carry precut lengths of two-by-four and squares of plywood in their trucks to save time on the job.

When you have got the base mount firmly anchored, put the antenna and mount in place. It is most efficient to preassemble the antenna, the mast, the guy ring and the guy wires on the ground. By the time you put the mast into the mount, everything should be ready to go.

Here is an important point: **Do not** insert the mast so deeply into the mount that it will make contact with the roof. Make sure that all of the weight of the assembly is carried by the base mount. Otherwise, the mast can easily damage the roof.

With the antenna/mast assembly attached to the base mount, your next step is to move the mast to an upright position. If it is a short mast, you can simply pick up the antenna. Then, while one man holds it in place, the other man can fasten the eye bolts and pull the guy wires taut.

If it is a tall mast, you will have to "walk" it up. First, install an eye bolt directly across from the antenna, as far away from it as you can go and still hit solid wood. Pull one guy wire through this eye bolt. Then, while one man pushes the mast up, the other takes up slack and helps by pulling on the guy wire. Once the mast is approximately vertical, pull the guy wire fairly taut and secure it in place.

Use turnbuckles on the remaining two guy wires. (Some installers use four guy wires, but three do the job just as well.) Get the antenna as upright as possible with the remaining two guy wires, and clamp them in place. Then, use your level to check on how vertical the mast is. Take up slack with the turnbuckles.

When you finish, the antenna should be pointing in the right direction, the mast should be vertical with no bows, everything should be secure, and the guy wires should be straight. Do not make the guy wires tight as a bowstring. A little slack will permit the mast to sway a little in the wind. Remember, mighty oaks are sometimes felled by high winds, but saplings generally just bend and snap back.

Tripod mounts are especially handy for short masts on roofs where you can't use a chimney mount. If the mast is only 5-ft high, you can use a tripod mount without guy wires. In fact, if the antenna is small and the tripod is big, you can use a tripod mount with a 19-ft mast without guy wires. For taller masts, tripod mounts are not too practical. If you are going to use guy wires anyhow, base mounts are less expensive, much easier to install and just as good as tripods.

Wall Mounts

Fig. 4 shows a typical wall mount. Wall mounts are very easy to use. You simply anchor them to the wall and fasten the mast in place. Of course, you must be certain that all mounting bolts bite into solid wood. If you can't hit wood, fasten each wall mount to a piece of wood (a two-by-four or ¾-in. plywood). Then fasten the wood to a stud or beam. Or, use a piece of plywood inside the attic, as described for base mounts.

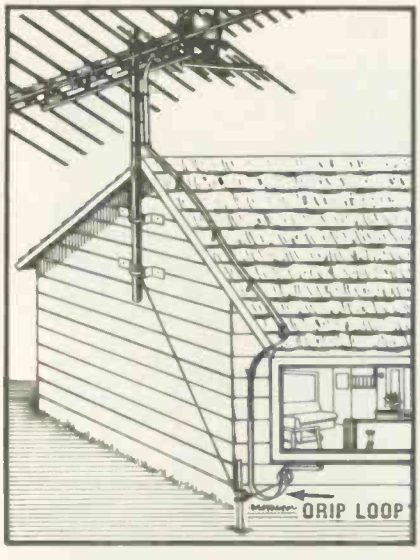

Fig. 4—Wall mounted antennas are easily installed.

Here are a few tips on using wall mounts:

- Make sure the wall mount bracket holds the mast far enough away from the wall to clear any overhang.
- Separate the wall mounts by at least 2 ft. The taller the mast, the more separation you should have.
- There is no practical way to use guy wires with a wall mount. Therefore you should restrict the mast height to 10 ft, if at all possible. If you have to go up as high as 15 ft, use a 20-ft mast with three wall brackets spaced 2 ft apart. In an installation such as this, there is a tremendous amount of torque on the wall brackets. If you don't hit beams with all of your mounting bolts, this torque may eventually split the faceplate of the house.

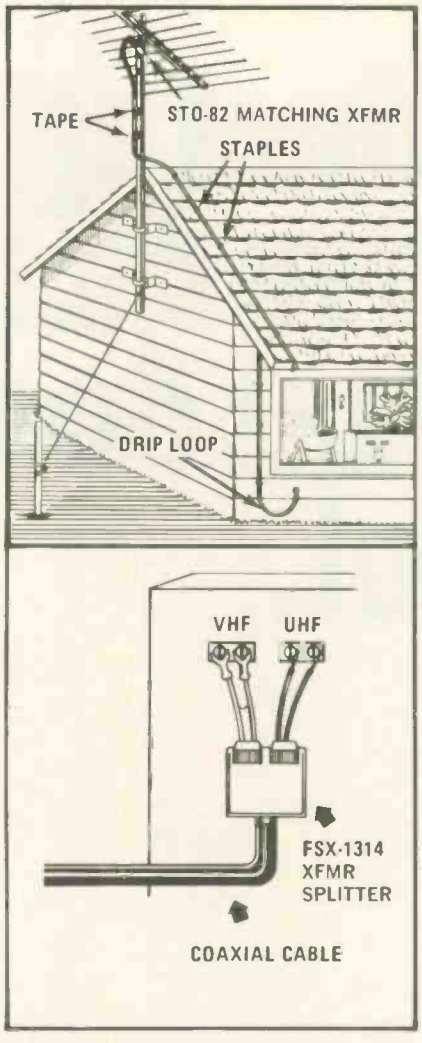

Fig. 5—Typical coax installation.

Guy Wires

There are three important aspects of installing guy wires. First, plan ahead. Do as much preassembly work on the ground as possible.

Second, use good quality guy wires. Vinyl-covered, aluminum-strand guy wire is light, strong and exceptionally easy to handle. Be careful not to allow kinks to develop.

Third, anchor the guy wires securely, using eye bolts or guy hooks. Make sure the eye bolts bite deeply into solid wood. Otherwise, the eye bolt will eventually pull away. Not only will the antenna fall, roof damage will result.

If it is a multiple guy-wire installation (that is, one set of guy wires at 10 ft and another set at 20 ft), you can use one eye bolt for two guy wires. However, if you can, you are better off to use a separate bolt for each guy wire.

Once the antenna and mast are firmly in place, use your roof tar liberally. Fill any test holes, and apply the tar around all bolts and screws that penetrate the roof.

Lead-In Wires

Transmission line is a very important part of any antenna installation. It is the transmission line that actually delivers signals to the TV set. And many reception problems are caused by poor quality transmission line or badly installed transmission line.

In selecting transmission line, you have to choose between coax and twinlead. Many top installers favor coaxial cable because it is shielded against interference pick-up and it is considerably easier to run. Twinlead, however, is often preferred in weak UHF signal areas, because good quality twinlead, well installed, causes less signal attenuation than coax at UHF frequencies.

No matter which type you select, use the best you can find. Cheap twinlead often cracks or breaks within a couple of years. Good

continued on page 76

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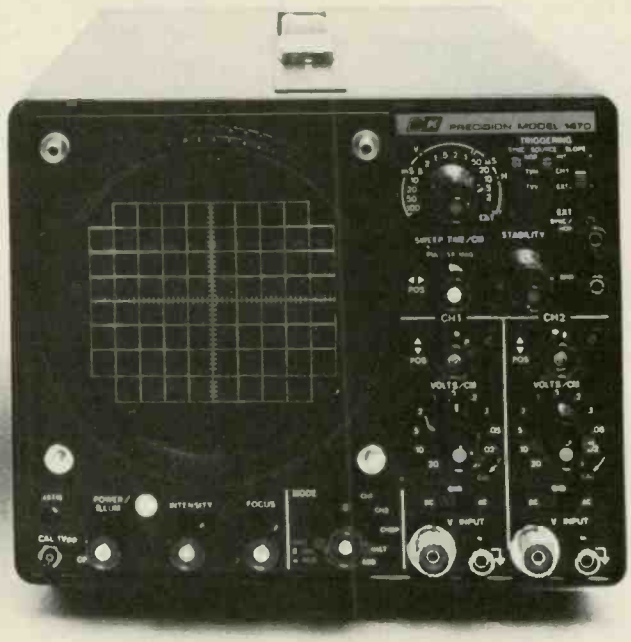

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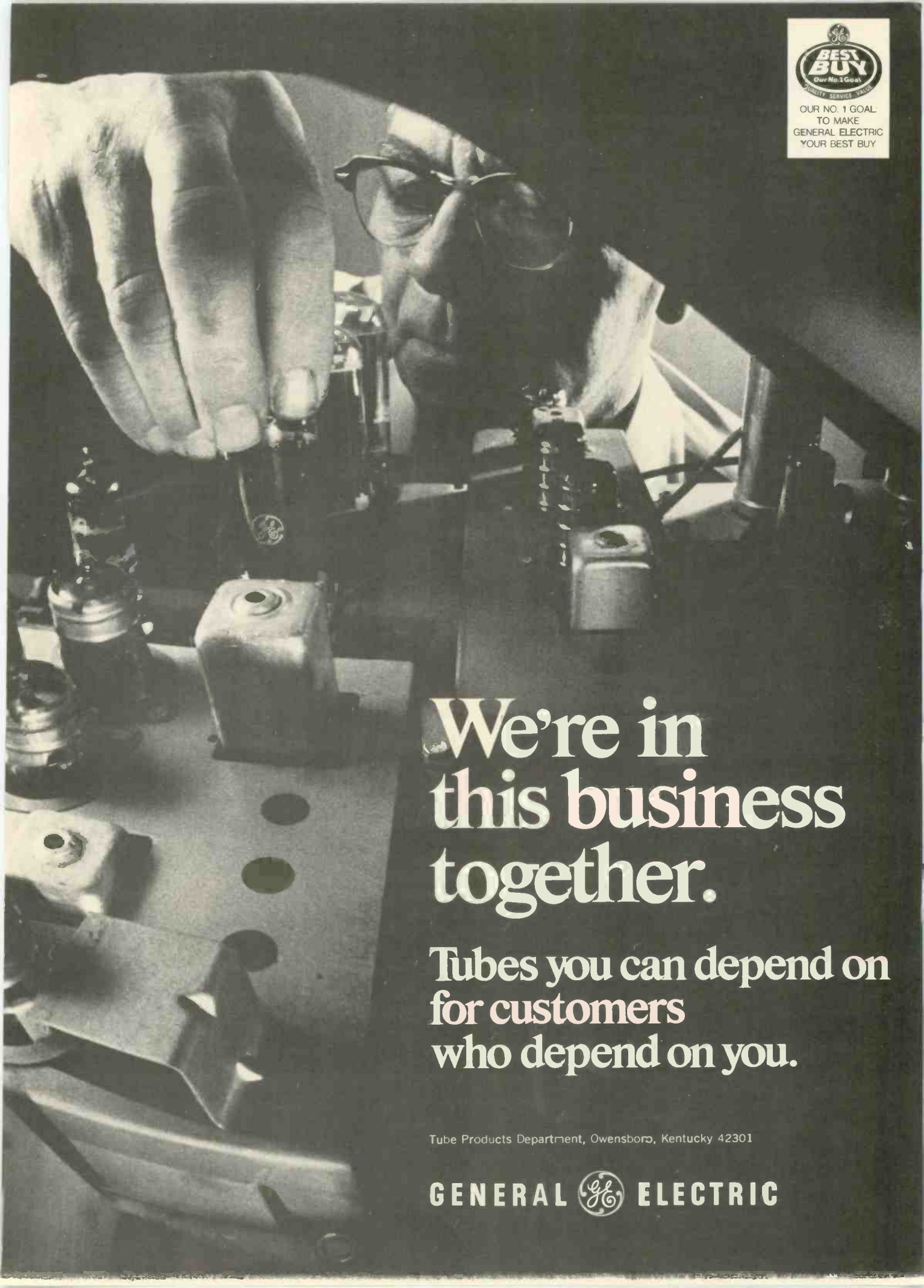
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Working with Commercial-Audio Equipment

by Jack Hobbs

Part III—Learn the various distribution methods employed in multi-speaker audio systems

■ Part II in this series appeared in the March 1972 issue of ELECTRONIC TECHNICIAN/DEALER. That article dealt with basic considerations involved in selecting amplifiers, speakers and microphones. The present article will concentrate on audio distribution principles—basic techniques used where electron-tube and solid-state amplifiers are employed.

General Considerations

Electron-tube amplifiers require the use of hefty, well-designed primary/secondary type output transformers. This is necessary for matching high-impedance electron-tube plate circuits to low-impedance speaker voice coils, for isolating the high dc B+ voltage from speaker voice coils and for a measure of stability. Where an unusually large number of speakers are required at different power levels, we find it convenient to use a "constant-voltage" distribution system—however, this becomes somewhat expensive. In many cases, traditional series, parallel and series/parallel direct-to-speaker methods can be used to advantage with transformerless solid-state amplifiers. The primary advantage of transformerless distribution is a reduction of installation costs by eliminating amplifier output and line-matching transformers. Additionally, with direct interstage-coupling employed in these solid-state circuits, the overall system operates at higher efficiency. You get more milliwatts-per-dollar to the speakers.

Low-Impedance Speaker Coupling

Commercial-type electron-tube and solid-state monaural amplifiers are available having output transformers which usually provide 4Ω, 8Ω and 16Ω speaker taps in addition to 25v and 70.7v constant-voltage taps. Low-impedance taps are normally used when the speaker lines are not too long, while high-impedance taps are normally employed on longer speaker lines to reduce line losses. In this case, line/speaker matching transformers are needed; and if the speakers are far apart, it is necessary to use a transformer at each speaker or small group of speakers.

When using series or parallel speaker connections, we have a somewhat limited choice in the number of speakers that can be employed on low-impedance taps. But with series-parallel connections, we can do very well with low-impedance taps on both output transformer and transformerless types. That is, if the speaker lines are not too long. There is one problem, of course, with series connected speaker groups. If one voice coil opens, all the speakers go dead.

Four 4Ω speakers are shown in Fig. 1 connected in series to the 16Ω tap of an output transformer secondary winding. Two 16Ω speakers connected in parallel to the 8Ω tap are shown in Fig. 2. And four 16Ω speakers are shown in Fig. 3 connected in parallel to the 4Ω output transformer secondary tap. This is about as far as we can go in these directions without complications. Though, of course, we can go to series/parallel connections and connect eight 8Ω speakers (four groups of two in series) to the 4Ω tap as shown in Fig. 4. (Or eight 16Ω speakers to the 8Ω tap.) And, as you can readily see without a schematic, 16 4Ω, 16 8Ω and 16 16Ω speakers can be connected to the 4Ω, 8Ω, and 16Ω taps, respectively, by placing four groups of four speakers in series/parallel.

It is assumed in these examples that you won't bother with mixing speakers of different impedances in parallel and series/parallel. It is not usually recommended in these cases, since it is seldom possible to get a proper impedance match. For example, if you employ one 8Ω and one 16Ω speaker in the parallel circuit shown in Fig. 2, you would have: $\frac{1}{R_T} = \frac{1}{8\Omega} + \frac{1}{16\Omega} = \frac{3}{16\Omega}$. $R_T = \frac{16\Omega}{3} = 5\frac{1}{3}\Omega$. You may not have any trouble with the two speakers connected to a 4Ω tap, but the 8Ω speaker will be drawing more power than the 16Ω speaker, and this must be considered. If you wanted a two-speaker arrangement to work that way—okay. But remember, if the same two speakers are connected in series, the effect is reversed. The 16Ω speaker will consume more power than the 8Ω speaker.

High-Impedance Speaker Coupling

With the higher-impedance output transformer taps we can use longer lines with less power loss to the speakers by employing line/speaker matching transformers at the speakers. We can also employ a larger number of speakers. Additionally, speakers can be arranged in groups that run at different power levels, without any headaches.

However, the high-impedance facility is normally offered only in electron-tube output-transformer type amplifiers with power output ratings of 10w or 20w—having 500Ω and 250Ω taps respectively. The 50w amplifier offers a 100Ω tap. Some higher powered amplifiers

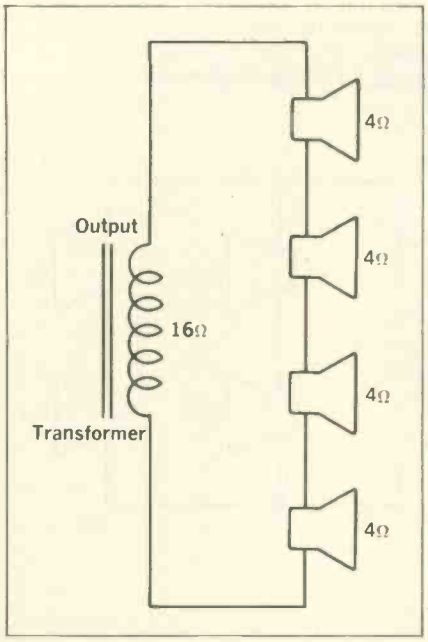


Fig. 1—Four 4Ω speakers are connected in series to match the 16Ω tap of an amplifier's output transformer secondary.

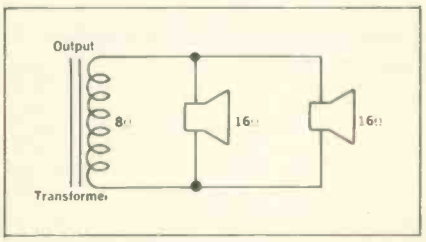


Fig. 2—Two 16Ω speakers are connected in parallel to match the 8Ω tap of an amplifier's output transformer secondary.

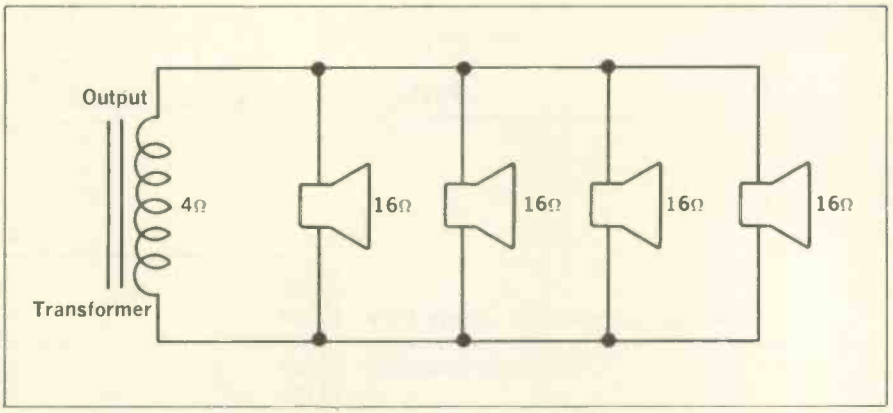


Fig. 3—Four 16Ω speakers are connected in parallel to match the 4Ω tap of an amplifier's output transformer secondary.

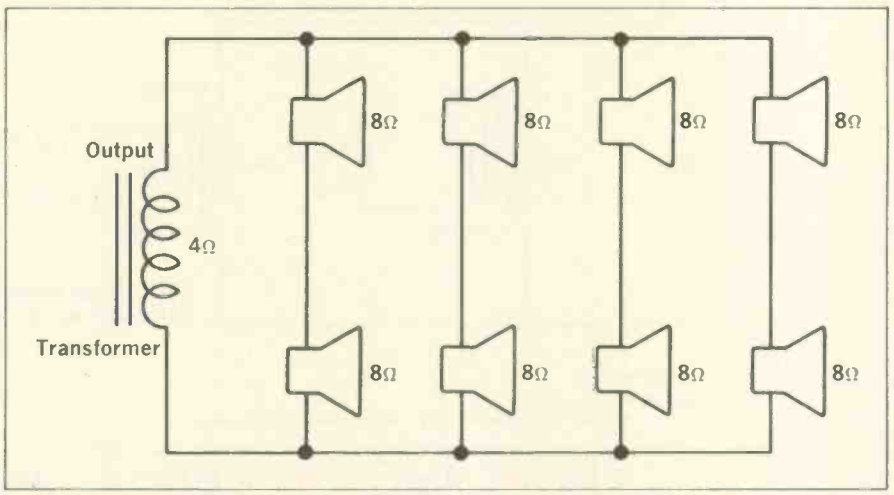


Fig. 4—Eight 8Ω speakers are connected in four groups of two to match the 4Ω tap of an amplifier's output transformer secondary.

offer a little flexibility here for matching 500/600Ω telephone lines, but the output levels required are generally low.

Two 16Ω speakers are shown in Fig. 5 connected in parallel to a 250Ω line through a matching transformer. In Fig. 6, four series/parallel 8Ω speakers are shown connected to a 500Ω line through a matching transformer. When one (or more than one speaker) is connected to a single matching transformer, it must be capable of handling the total power drawn by the speaker (or speakers). And when the speakers are separated by a considerable distance, one transformer is used for each speaker—as shown in Fig. 7.

In many installations we may need to run one or more speakers at different power levels. An example of a low-power, 8Ω speaker system will suffice to illustrate (Fig. 8)—although any reasonable number may be used —depending on the amplifier power provided. In this case, the amplifier is rated at 20w and is located quite some distance from the nearest speaker, and each speaker is separated a considerable distance. Two 2.5w, one 10w and five 1w speakers are needed. The 1w speakers are spread out over a large area. The maximum high-impedance tap on the output transformer is 250Ω.

The first step is to find the ratio between the total power (20w) and the speakers in each of the three groups. The ratio for each group is: $\frac{20w}{2.5w} = 8:1$ for the two 2.5w speakers; $\frac{20w}{10w} = 2:1$ for the one 10w speaker; $\frac{20w}{1w} = 20:1$ for the five 1w speakers. These ratios show the relationship between the line impedance and the total effective parallel transformer primary impedances so that a perfect match and maximum power transfer will take place between the line and individual speakers.

The second step is to determine the required matching transformer primary impedance for the three speaker groups. For the 2.5w speakers: 250Ω (line impedance) × 8 (ratio figure) = 2000Ω or 2K. For the 10w speaker: 250Ω × 2 = 500Ω. And for the five 1w speakers: 250Ω × 20 = 5000Ω or 5K. The total effective matching transformer primary impedance in parallel, according to ohm's reciprocals formula, equals precisely that of the 250Ω line. ($\frac{1}{R_T} = \frac{1}{2K} + \frac{1}{2K} + \frac{1}{500\Omega} + \frac{1}{5K} + \frac{1}{5K} + \frac{1}{5K} + \frac{1}{5K} + \frac{1}{5K} = \frac{5}{10{,}000\Omega} + \frac{5}{10{,}000\Omega} +$

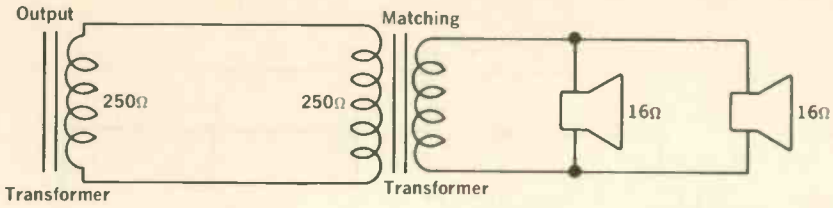
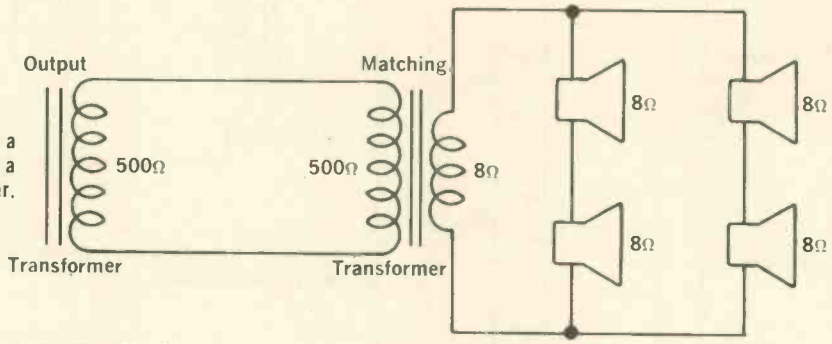


Fig. 5—Two 16Ω speakers are connected in parallel across a 250Ω line through a matching transformer.

Fig. 6—Four 8Ω speakers are connected in a series/parallel circuit to a 500Ω line through a matching transformer.



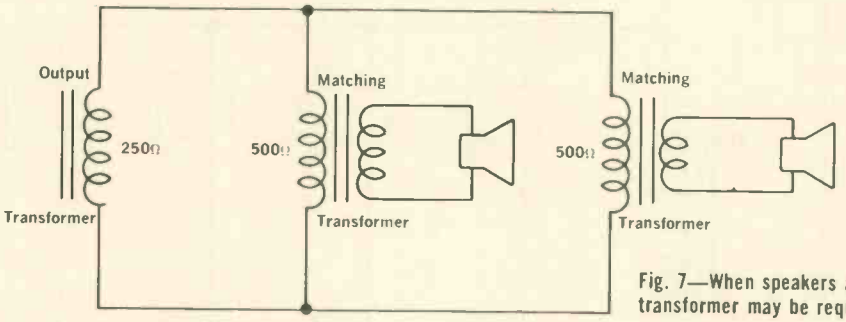


Fig. 7—When speakers are located some distance apart, a matching transformer may be required for each speaker.

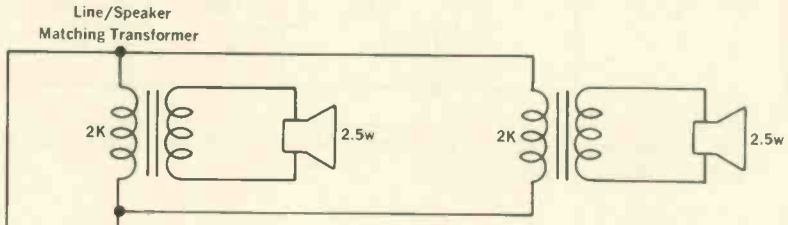
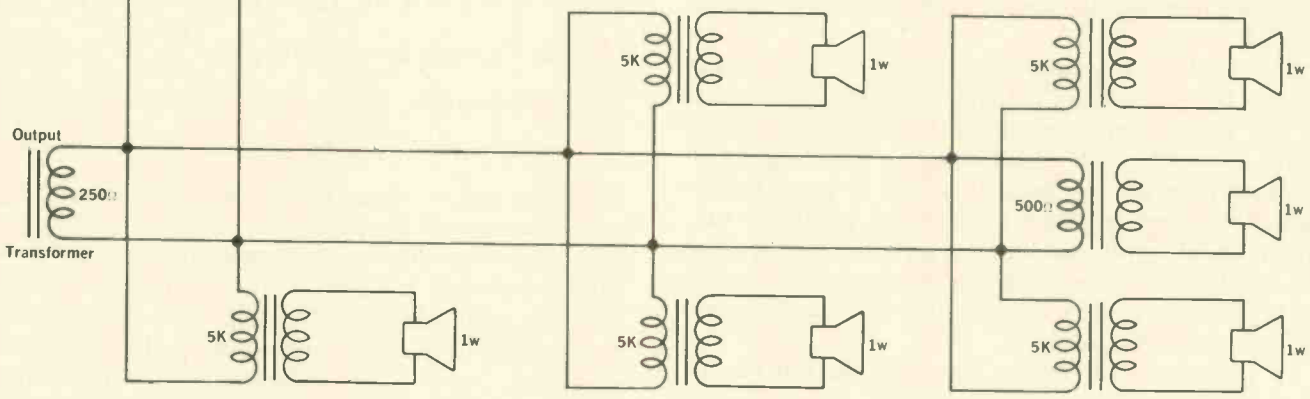


Fig. 8—An 8Ω speaker arrangement employing matching transformers on a 250Ω line.



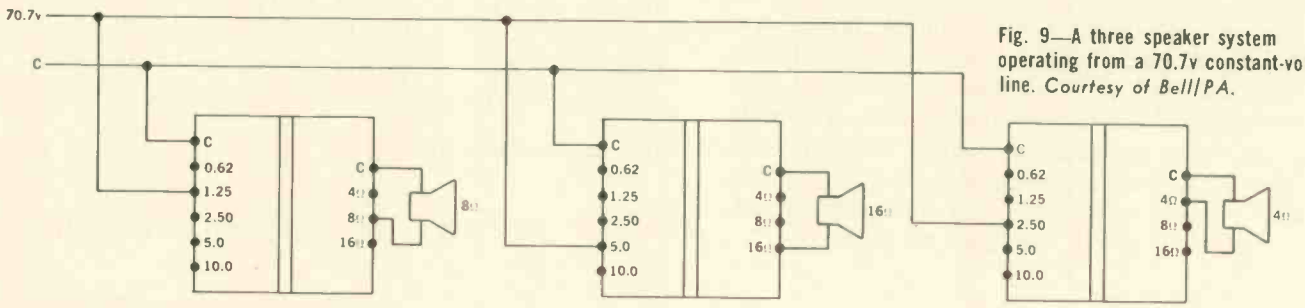


Fig. 9—A three speaker system operating from a 70.7v constant-voltage line. *Courtesy of Bell/PA.*

$$\frac{20}{10{,}000\Omega}+\frac{2}{10{,}000\Omega}+\frac{2}{10{,}000\Omega}+\frac{2}{10{,}000\Omega}+\frac{2}{10{,}000\Omega}+\frac{2}{10{,}000\Omega}=\frac{40}{10{,}000\Omega}\cdot R_T=\frac{10{,}000\Omega}{40}=250\Omega.$$

It is understood, of course, that the matching transformer secondary impedances selected should match the speaker voice-coil impedances. Line matching transformers, which are already attached to speakers by the manufacturers, have the proper secondary impedance to match the speaker voice coil.

Constant-Voltage Distribution

Some technicians have become confused about "constant-voltage" audio distribution systems. One erroneous idea is that this system "eliminates" the need for impedance matching. It does not, of course, since impedance matching is "built-in" and is automatic—just as automatic as the voltage in the so-called "constant-impedance" system just described for the 8Ω speaker system (Fig. 8). Another erroneous idea concerns "constant-voltage" itself. There is seldom 25v or 70.7v (or 141.4v in some older systems) of audio signal on the distribution line—except when a constant amplitude test signal drives the amplifier to its maximum rms power output. It does mean, however, that the primaries of each line/speaker transformer have the same voltage available to provide its individual speaker with the power that it requires—determined by: • the transformer's primary impedance and • a perfect impedance match between the transformer's secondary and the speaker voice coil. It is nothing more than a point of reference, a viewpoint —a convenience in eliminating some impedance-matching problems. (It is assumed here that the amplifier is designed to have proper output regulation.)

If the line/speaker transformer primary taps are marked in watts, all we do is select the tap that will provide the speaker with the necessary power and connect the transformer primary across the voltage distribution line.

If the line/speaker transformer primary is marked in ohms, use the equation $P=\frac{E^2}{Z}$, or you can use a voltage, ohms, wattage monograph to convert to watts.

Whether we use a 10w, 50w or 100w amplifier in the constant-voltage distribution system, the line signal voltages are the same (25v or 70.7v). And the experts tell us (if we have translated them correctly), that the system works best when the amplifier is loaded close to its maximum power rating—but not overloaded.

A three-speaker system designed from the 70.7v viewpoint is shown in Fig. 9. A 10w amplifier is used. (Note that the 8Ω speaker, rated at 2.5w, is being supplied with only 1.25w. Hence, there is enough reserve power to double the wattage on the 8Ω speaker or add an additional 1.25w speaker and not overload the amplifier. The power is doubled on the 8Ω speaker merely by moving the line to the 2.5w transformer tap.) This arrangement consists of one 4Ω speaker, supplied with 2.5w; one 8Ω speaker, supplied with 1.25w; and one 16Ω speaker supplied with 5w. Although in this system we are not too interested in transformer primary imped-

OUTPUT CONNECTIONS			
PIN	TRAN.	IMPEDANCE	VOLT
1	GND.	COMMON PIN 2-5, 8	
2	D	8 Ω	21.9V
3	D	8 Ω	21.9V
4	C	10.5 Ω	25 V
5	C	10.5 Ω	25 V
6	A	ISOLATED RETURN 70.7 V	
7	B	83.3 Ω	70.7 V
8	D	8 Ω	21.9 V

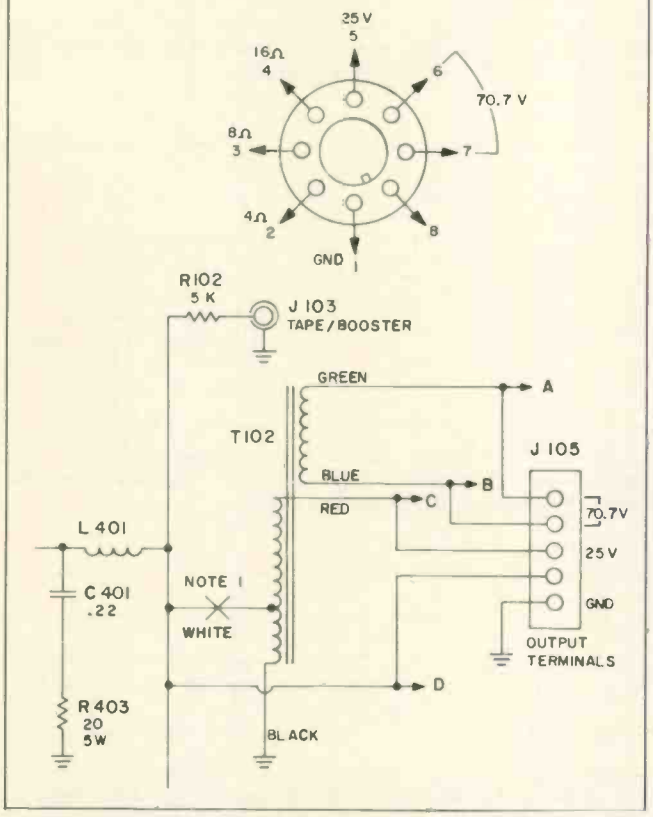


Fig. 10—Schematic of the autoformer output of a 100w University Sound solid-state amplifier.

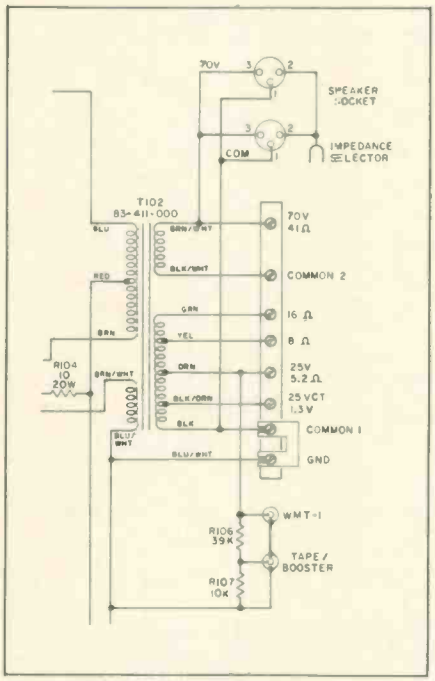


Fig. 11—Output transformer section of a 120w Bogen solid-state amplifier.

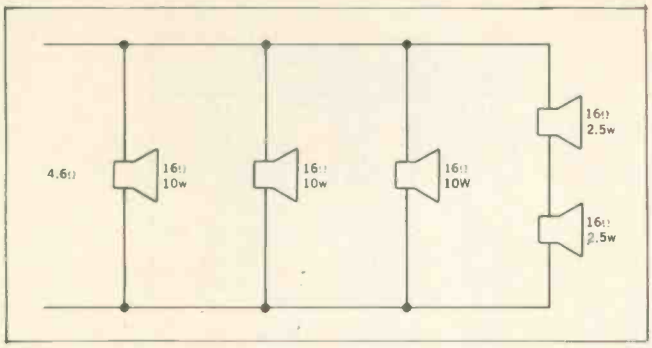


Fig. 12—Five 16Ω speakers arranged to place a 4.6Ω load across the output of a solid-state transformerless amplifier.

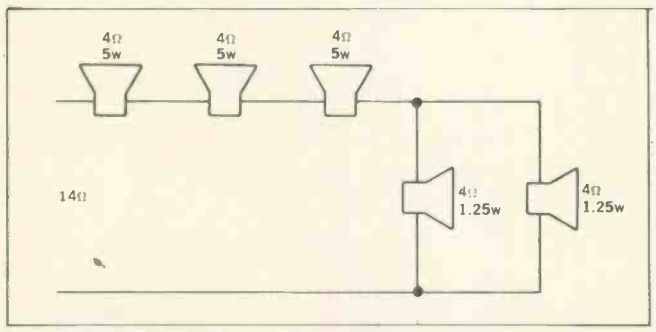


Fig. 13—Five 4Ω speakers arranged to place a 14Ω load across the output of a solid-state transformerless amplifier.

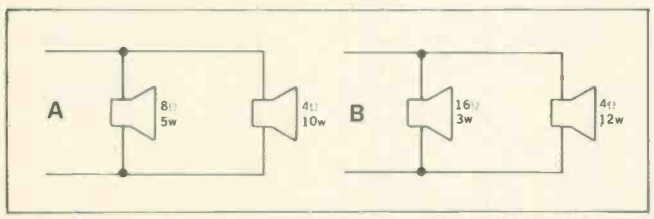


Fig. 14(A)—In this arrangement the 4Ω speaker will draw twice as much power as the 8Ω speaker. (B)—In this arrangement the 4Ω speaker will draw four times as much power as the 16Ω speaker.

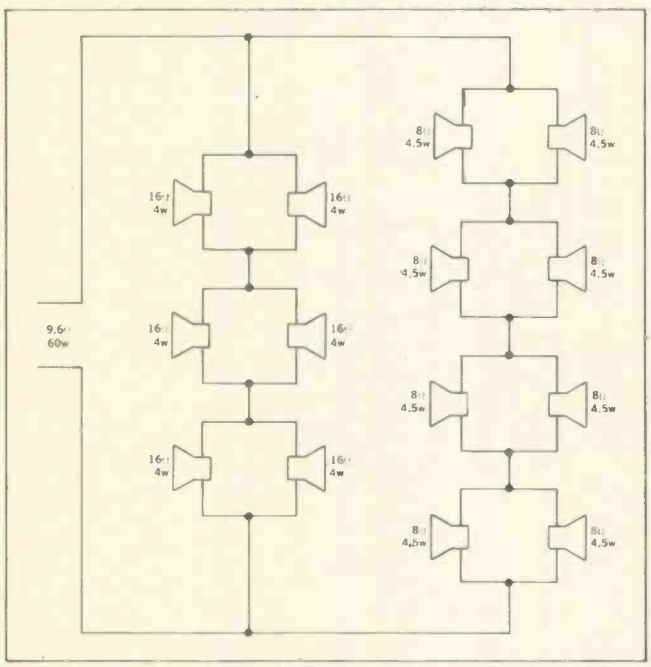


Fig. 15—An arrangement of 14 speakers which will place a 9.6Ω load across the output of a 60w solid-state transformerless amplifier.

ances, they are, according to equation $Z = \frac{E^2}{P}$: 2K, 4K and 1K, respectively.

Transformerless Distribution

In 1966 at a West Coast Convention of the Audio Engineering Society, a design engineer introduced a solid-state differential-type amplifier for stereo use which employed six transistors in three cascaded complementary-symmetry emitter-follower stages in the output section. The driver/amplifier circuitry employed transistors to the fullest advantage by using direct interstage and direct speaker coupling. Research in these directions has been going on now for some years and commercial-grade monaural and stereophonic amplifiers are now being manufactured which employ the aforementioned circuitry and other modern techniques to produce more reliable and higher-powered solid-state amplifiers, which can be used without output and line matching transformers in many modest-sized audio installations.

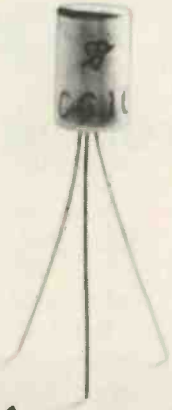
One line of solid-state commercial-type monaural audio amplifiers is available with or without output transformers. And the output transformer used in this line is an "autoformer" instead of a double-wound conventional type. The output load-impedance and voltage taps vary with different models. One 100w autoformer model (Fig. 10) has 4Ω, 8Ω, 16Ω and 25v and 70.7v connections. A similar model in this line does not use an autoformer—the output is taken from terminal 2 (Point D) on J105 as shown in the schematic. No octal socket is provided on the transformerless model. The output impedance on the 100w transformerless model of this type is 8Ω. It is 4Ω on the 60w, 8Ω on the 35w and 16Ω on the 20w amplifiers. It is said that the 8Ω output amplifiers can work satisfactorily into loads from 4Ω to 10Ω and that the 16Ω output can handle loads between 14Ω and 20Ω. The output transformer section of a more conventional type 100w solid-state amplifier is shown in Fig. 11.

It is obvious by now what our main problem will be when working with transformerless type solid-state amplifiers. It will mean a little pencil work. And there is always the square/square roots/reciprocals tables. Let us look briefly at the problem of employing speakers of similar impedances running at different wattage levels.

Refer to the five-speaker arrangement shown in Fig. 12. All of these speakers have a 16Ω impedance. Three are connected in parallel across the output while two are series/parallel connected. The arrangement totals about 4.6Ω. If we use a 35w amplifier, we could run the three parallel speakers at 10w each and the two in series/parallel at 2.5w each. (Five 4Ω speakers can also be arranged as shown in Fig. 13 to place a 14Ω load across the output of a 20w transformerless amplifier.)

These effects can also be approximated by using speakers of different impedances. For example, in the arrangement shown in Fig. 14A, the 4Ω speaker will draw twice as much power as the 8Ω speaker. By substituting a 16Ω speaker for the 8Ω speaker, the 4Ω speaker will draw four times as much power as the other speaker (Fig. 14B). The reverse effect, as previously mentioned, will take place when the two speakers are connected in series.

continued on page 80



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HB34	102A
HB35	102A
HB36	102A
HB75	102A
HB75C	102A
HB77	102A
HB77B	102A
HB77C	102A
HB156	102A
HB156C	102A
HB171	102A
HB172	102A
HB175	102A
HB176	102A
HB178	102A
HB186	102A
HB187	102A
HB263	102A
HB270	102A

To Be Replaced	ECG Replacement
MA393L	102A
MA393G	102A
MA393R	102A
MA815	102A
MA881	102A
MA882	102A
MA883	102A
MA884	102A
MA885	102A
MA886	102A
MA887	102A
MA888	102A
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GRIME GETTER. Our TUN-O-BRITE has a controlled polishing action that powers stubborn dirt out of hard-to-reach contacts. It's also good for unfreezing telescopic antennas, locks, motor shafts and more.

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Many servicemen buy three—one for shop; one, home; one garage.

THE HOUR SAVER. Take SUPER FROST AID, for example. It helps find intermittents in minutes instead of hours. But servicemen have also used it as: a portable small-fire extinguisher, blister-preventer (used on minor burns immediately), heatsink before soldering...and even chewing-gum remover (cold makes gum brittle).

PUSHBUTTON PEACE & QUIET. One spray of SUPER TROL AID or CONTACT KLEEN quiets noisy pots, switches and relays. Some servicemen make a lot of money "curing" noisy transistor radios, balky dimmers, antenna rotors...ever thermostats. Not to mention tape recorders, CB sets, marine radios...

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Selecting That Partner

by Ernest W. Fair

Damon and Pythias established themselves in all history as the ideal combination of friends and partners. History hints that their collaboration came about through mere chance. The truth, without a doubt, was that their undying loyalty to each other came from careful selection on the part of each man.

■ A lasting and successful partnership in the electronic servicing industry requires of each individual a great deal more than knowledge of business details. The author has made a study of what it takes to make a good partner in the service business as well as the contributing causes which lead to the disruption of new partnerships. This has brought up a number of factors which stand out as being well worth the consideration of every reader before he enters into partnership with another electronic technician.

Avoid the business thief who enters into partnership with us as a means of building a reputation for getting established in our area and then after a few years—when all of our old customers have been developed into a friendship—leaves the partnership to establish a business of his own nearby.

The law books are full of case histories involving damage suits between former partners in business based on this very condition. By such a maneuver, a zealous individual can very seriously damage an electronic service business that we have taken years to build up.

We, of course, want an ambitious individual as our partner. He will be of much greater value than the man who has no plans for the future. But the wise electronic technician can protect himself from the business thief by clauses in the partnership contract which prohibit such a step by either partner (usually for five years and within the business area where the firm is now established).

Techniques and technical knowledge of our prospective partner should be on a par with or better than our own or we will have a source of friction developing within a very short period of time. When the new partner is "green" to the business, an equal partnership cannot exist. And where his experience and skills are far beyond our own, we will have to take a back seat to him sooner or later.

Another reason for this point is to assure the harmonious operation of the business. Disputes over small matters can lead to big quarrels and trouble in any partnership. When both individuals have similar views on what it takes to get the job done, this very big cause of friction will be removed at the start.

He should have a type of personality that can handle the customers that we have built up in our established business. Good work and good service naturally build a business, but the personality of the owner himself always has a great deal to do with sustained profits. Not every electronic technician has the right personality to operate an electronic service center in any given community. The man who can manage the most successful business in one area may be a big flop in another area.

Sufficient resources to hold up his end of the partnership are essential for peace and harmony in the future and may very well determine whether or not the business can survive a period of adversity.

Entering into partnership with an individual who is without financial reserves or who is so heavily in debt that there is little chance of his accumulating any out of the profits of the business will mean that we may have to carry the entire load during such a period, or if and when a necessary improvement or expansion arises in the future, in order to hold our place in competition.

No matter how skilled or how fine a personality the prospective partner may have, if he lacks resources of any kind whatsoever, we are entering into a partnership which may not survive the future and which could very well drag the business itself down to bankruptcy.

Compatible political, religious and similar beliefs in partners will prove an asset well worth looking into when selecting a partner. This does not mean that he must go to the same church as we do or belong to the same political party. But it does mean that if we are politically conservative it is best that he should also be conservative. And it means that if we are devoutly religious, we are asking for trouble by entering into partnership with someone who has little or no religion of any kind.

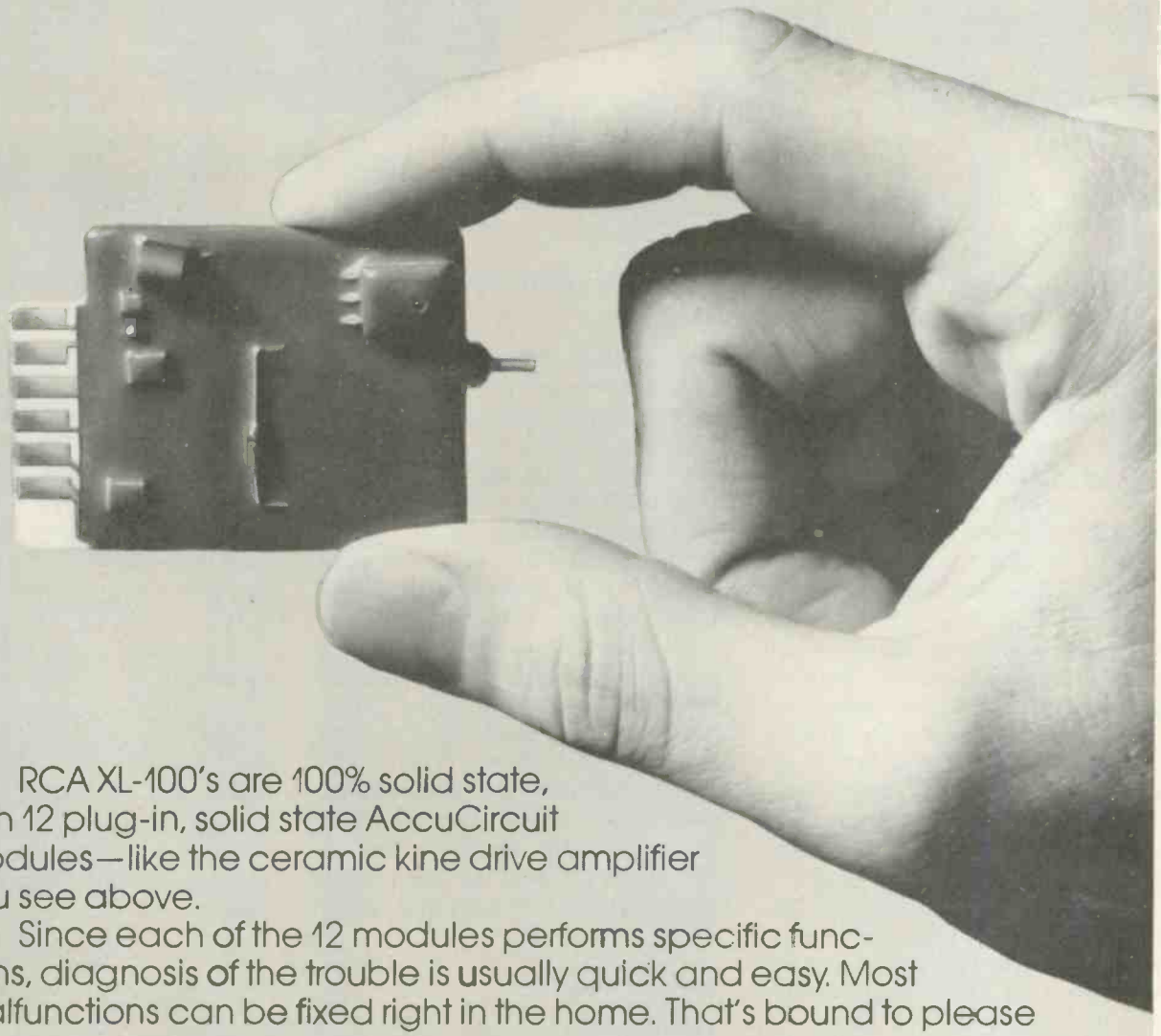
We may consider ourselves a master at handling such situations, **but** in most cases we are fooling ourselves. Beliefs of this nature are deep set in all of us. Where they are lacking completely in a partner, sooner or later a wide gulf of friction will develop and it will lead to troublesome differences on many other subjects of even a business nature.

What the trade thinks of him is of vast importance to our future business welfare. This means what fellow dealers and electronic suppliers, as well, think about our prospective partner. We must always remember that a partnership is viewed by others from the prospective of the weakest man in that partnership, seldom the strongest. And we can well bear in mind that the credit rating of the weakest partner will soon determine the credit rating that our suppliers will give the partnership.

What other dealers and electronic suppliers think of the man we are considering as a partner is, therefore, of great importance. It will pay us to make a very thorough and quiet check-up among these people

continued on page 78

Why RCA XL-100's can be a quick fix:



RCA XL-100's are 100% solid state, with 12 plug-in, solid state AccuCircuit modules—like the ceramic kine drive amplifier you see above.

Since each of the 12 modules performs specific functions, diagnosis of the trouble is usually quick and easy. Most malfunctions can be fixed right in the home. That's bound to please your customer.

So when it comes to servicing RCA solid state color, XL-100's let you make more house calls—in a lot less time!

And you won't waste so much time hauling sets back and forth to the shop.

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RCA XL-100. It's already got a great reputation.

It could even add to yours.

RCA XL-100 100% Solid State AccuColor

TEST INSTRUMENT REPORT

B & K's Model 1465 Triggered-Sweep Scope with Cali-Brain

B & K's Model 1465 Triggered-Sweep Scope with Cali-Brain. For more details, circle 900 on the Reader Service Card.

by Phillip Dahlen

New scope design simplifies making peak-to-peak voltage measurements

■ Although many of this scope's features are the same as those of the B & K Model 1460 Triggered-Sweep Scope currently being used in our lab and described in our March 1971 Test Instrument Report (page 56), this new instrument contains a number of additional helpful features well deserving another report.

Modern servicing techniques occasionally require that the electronic technician make precise peak-to-peak voltage measurements of waveforms associated with circuitry under test. While initially this would seem like a relatively simple measurement, such is not always the case. With some of the more complex waveforms spread across a scope's CRT, it is not always quickly apparent at what points the maximum positive and maximum negative voltages occur. After being certain that the waveform is not subject to any tilt conditions, one peak point must be aligned with one horizontal scope gradient and the other peak point must be compared with one or two other horizontal scope gradients somewhere else on the scope's graticule scale.

Such problems are virtually eliminated with the Cali-Brain. After obtaining the desired conventional waveform on this scope, one need only pull the VERTICAL POSITION control knob to activate the Cali-Brain. This switches OFF the scope's horizontal trace and the entire waveform appears as but a single vertical line. If the initial waveform was observed on the .1v, .2v, 1v, 2v, 10v, 20v, 100v or 200v vertical scale, this vertical trace would automatically appear along the left vertical gradient—the currently used full-scale voltage range appearing in digital form above this gradient. However, if instead the initial waveform was observed on the .5v, 5v or 50v vertical scale, the resulting vertical trace would automatically appear along the right vertical gradient—the currently used full-scale voltage range appearing in digital form above this gradient.

Assume that you were observing a relatively large and complex waveform on the .1v scale and wanted to make a quick peak-to-peak voltage measurement. You would merely pull the VERTICAL POSITION control knob and the waveform would instantly become a vertical line running along the left vertical gradient, a ".100 volts full scale" reading appearing above that gradient. With your hand still on the VERTICAL POSITION control, you would then rotate the control so that the bottom edge of this vertical line was centered at "0." You might then happen to note that the top edge of the vertical line extended to say three markings below the "1"—having observed a 0.85v p-p signal.

Since some of the manufacturer's specifications for the Model 1465 Triggered-Sweep Scope with Cali-Brain differ slightly from those for the Model 1460 Triggered-Sweep Scope, and since some of our readers may not have ready access to our March 1971 issue, we are including some of the new specifications. ■

Vertical Amplifier

DC frequency response:	DC to 10MHz (—3dB)
AC frequency response:	2Hz to 10MHz (—3dB)
Risetime:	35ns
Overshoot:	3%
Input resistance:	1M (approximate)
Input capacity:	35pf (approximate)
Tilt:	5% or less
Maximum input voltage:	300vdc + ac peak or 600v p-p

Sweep Circuit

Sweep system:	Triggered and automatic
Sweep time:	1 μs/cm to 20ms/cm, 10 ranges, each providing fine adjustment
Sweep magnification:	×5 for each range

Triggering

Type:	Internal, line frequency and external (2v p-p or higher)
Trace slope:	Positive or negative
Range:	20Hz to 10MHz, minimum 10mm of deflection
TV synchronization:	Sync separator circuit extracts horizontal and vertical sync pulses.

The time machine

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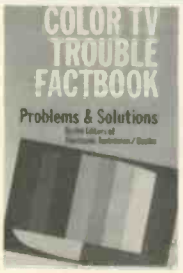

Here's a complete guide to color TV troubles and solutions, arranged by make and model, a low-cost, all-in-one reference handbook every TV service technician should own. The information it contains may easily save you hours of time repairing a "tough-dog" color TV. Included are details concerning repetitive troubles, field-factory changes, new and unusual circuits and descriptions of how they work, special adjustment procedures and other such pertinent service information. The content is arranged by brand names, covering every major make of color TV receiver produced in the past several years. Models and chassis covered are arranged in alpha-numerical order. 176-pps. Hardbound.

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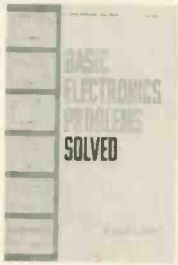
Basic Electronics Problems Solved



Here are easy step-by-step solutions to basic electronics problems in a convenient one-stop source dealing with both solid-state and tube-type circuits. The content not only presents a detailed explanation of each point, but also provides many actual examples on how to work out problems. Then, to firmly fix the information in your mind, there are numerous example problems for you to solve; answers to these are included in one Appendix, and worked out solutions in another. Covers DC circuits, AC circuits, powers of ten, semiconductors, power supplies, and receiver circuits. A final chapter shows how to use a slide rule to speed calculations. 192 pps., over 100 illus. Hardbound.

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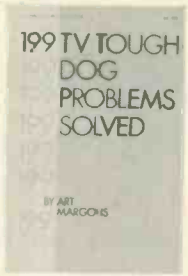
199 TV Tough-Dog Problems Solved



Here is a master collection of actual case-history solutions—answers to the most challenging tough-dog TV problems on both color and B & W sets—covering all popular makes from Admiral to Zenith. This new book is organized so that you can quickly find the solution to particular problems—toughies that required the best efforts of top technicians to solve. To enable you to find information relative to a particular problem in a specific set, a cross-reference of troubles by brand name and chassis is included. The content is organized into trouble symptom sections. Several different circuits are included; thus, the information provided will apply to similar circuits in other models. 256 pps., 199 illus. Hardbound.

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Philco Color TV Service Manual

An all-in-one service guide for Philco color sets, with 12 complete schematic diagrams for chassis 15M90/91 to 20QT88. Here in one manual is complete service data for all the color models produced by Philco and Philco Ford (thru 1970), from the all-tube to the latest hybrid solid-state chassis, including the small-screen portable Model T5062WA. The unique 36-page foldout section contains 12 complete schematic diagrams, representing all the chassis covered. The profusely illustrated text delves into each section (video, chroma, vertical, horizontal, etc.), and points out specific problems based on the author's extensive experience. Included are complete alignment and setup instructions, detailed in step-by-step form. 160 pps., plus 36-page schematic foldout section. Long-life vinyl cover.

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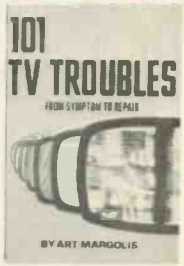
101 TV Troubles: From Symptom to Repair



An invaluable "cause and cure" guide to the practical, easy solution for virtually any TV trouble—color or B&W. All you do is analyze what you see and hear, look up the symptoms in the book, and follow the clear and simple steps to a speedy trouble cure. To show how and why certain troubles occur in specific types of circuits, schematics and other illustrations are included for every major manufacturer—Admiral to Zenith. TV troubles are broken down into five basic categories: Brightness, Contrast, Sweep, Color, and Sound. Each category lists specific troubles relating to that symptom. For example, under "Contrast" are 22 causes of actual picture problems. With the categorized trouble list and index, you can quickly and easily find the exact symptom—and the trouble cure—for virtually any TV circuit defect you might encounter. 224 pps. Hardbound.

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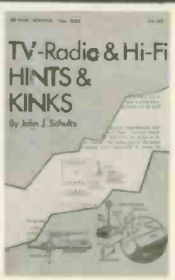
TV, Radio, Hi-Fi Hints & Kinks



If you want to get the best performance out of consumer electronics equipment, you'll find this to be the most informative and useful handbook ever published. Over 150 ideas suggest ways to customize and add accessories to any equipment setup—how to connect single and multiple accessory speakers, how to add remote controls to TV's, radios, hi-fi systems, how to connect microphones, etc. Also includes many tips on hi-fi equipment, CB and 2-way radio equipment, antenna systems, remote monitoring techniques, intercoms, a wireless baby sitter, telephone amplifier, moisture, fire and other alarm accessories for any existing amplifier. 256 pps., over 150 illustrations. Hardbound.

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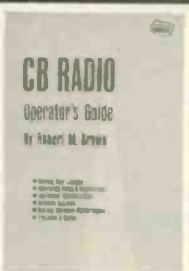
CB Radio Operator's Guide



An all-in-one handbook on Citizens Band radio, and how to make the best use of available equipment. Tells you everything you must know to get on the air, with complete details on what you can and can't do right down to the "nitty gritty" rules and regulations! What's more, you receive expert advice on the type of equipment to buy, and how to get the best performance out of your "system." The information contained in this book will save you time and money in short order! With this one book, you can become an expert on CB Radio, and how to use the service most successfully. You'll learn about antenna systems, including how they are used in CB. 224 pps. Hardbound.

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COLORFAX

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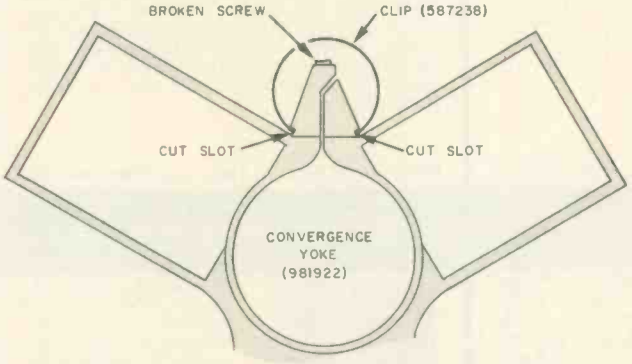
EMERSON

Color-TV Models 35P03,35P04—Repairing Convergence Yoke

Many Part No. 981922 convergence yokes have been replaced because of a broken plastic screw on the yoke

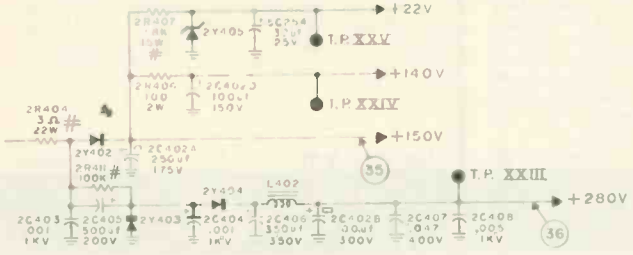


clamp. A spring clip, Part No. 587238, is now available so that these yokes may be repaired as shown in the illustration.

GENERAL ELECTRIC

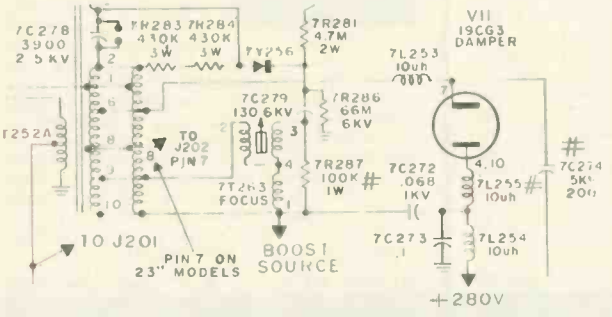
Color-TV Chassis C1/L1—Troubleshooting Guide

Symptoms of no raster or sound can be caused by an open resistor (2R406 or 2R404). In early production



models replace the 2Ω, 10w resistor with a 2Ω, 15w resistor, Part No. EP14X9. In later production models, replace the 3Ω, 15w resistor with a 3Ω, 22w resistor, Part No. EP14X24.

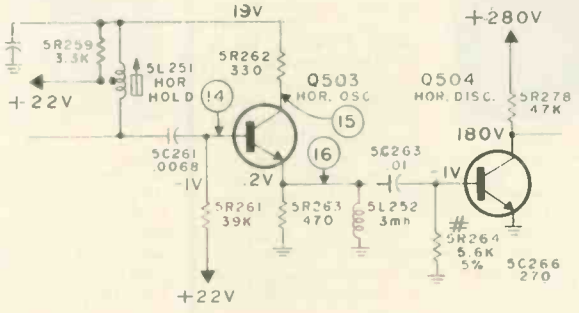
A no raster problem can be caused by an open resistor 2R407. The chassis will then not have the 22v B+ source voltage, which causes the horizontal output tube



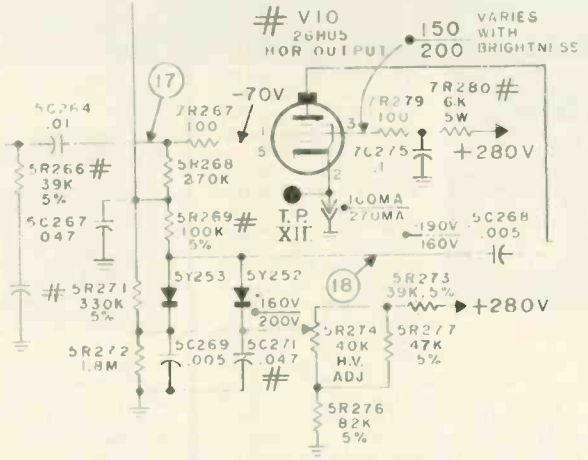
26HU5 to run hot, and the circuit breaker to trip. This same condition can also be caused by a shorted or low resistance zener diode 2Y405.

No raster or sound troubles can be caused by an open filament in damper tube 19CG3 and open coil 7L254. When the damper tube is replaced, the TV set will have sound but no raster until coil 7L254 is replaced.

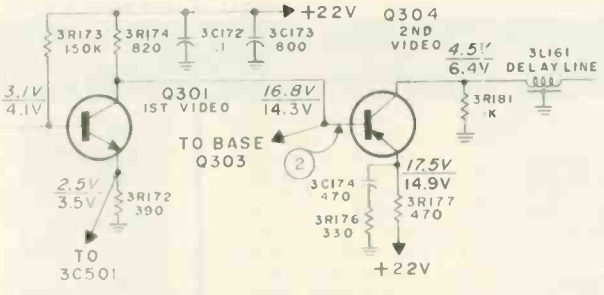
Other no raster symptoms can be caused by a shorted horizontal oscillator transistor, Q503, or a shorted hori-



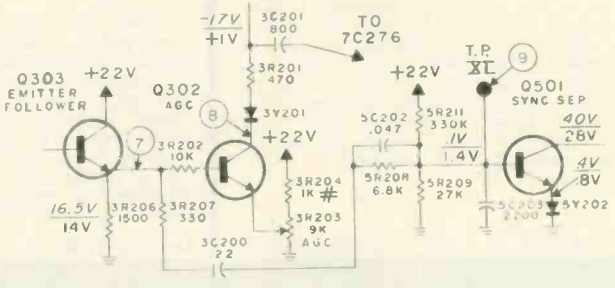
zontal discharge transistor, Q504. The shorted transistors will cause the 26HU5 tube to run hot and the circuit breaker will trip.



A dim raster condition can be caused by a shorted capacitor, 5C271. Replace this capacitor with one having a 400v rating, Part No. EP25X4 or equivalent.

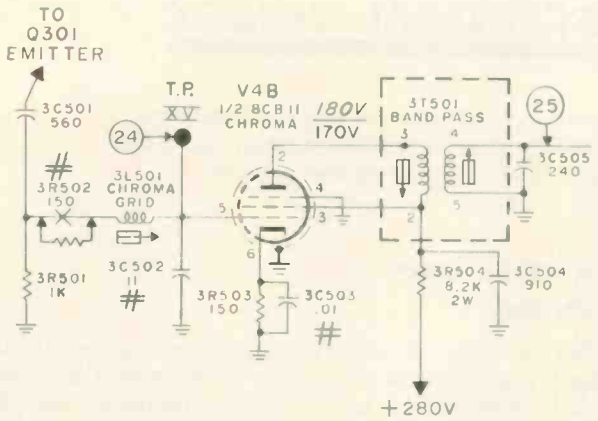


Intermittent video problems can be caused by an intermittent second video transistor, Q304.



No AGC conditions could be caused by an open diode, 3Y201; while loss of horizontal or vertical sync can be caused by a shorted diode, 5Y202.

Intermittent or no color conditions can be caused by a



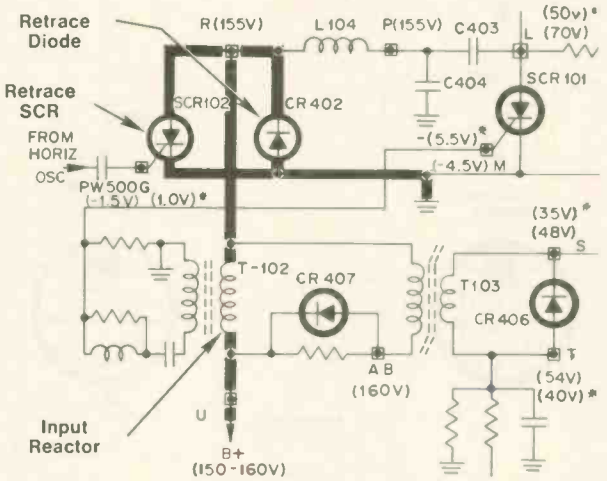
burned resistor 3R504. The lead of the resistor shorts to the bandpass transformer can.

RCA SALES CORPORATION

Color-TV Chassis CTC40,44,47—Servicing SCR Sweep Systems

A poor, but common troubleshooting technique is the practice of jumpering the circuit breaker to locate B+ shorts—often making a difficult service job out of a relatively simple one because of additional component failures. Locating the induced problems usually requires more involved troubleshooting techniques than finding the original one.

One example of this can become quite evident when servicing the SCR sweep system. In the event the retrace SCR (SCR 102) or retrace diode (CR 402) fails (shorts), the 155v supply is connected to ground through the input reactor (T102) primary winding. Consequently, the circuit breaker will trip—the normal protective action. If circuit



action is defeated for only a short time (4-8 sec) either by holding the breaker "in" or by jumpering, the input reactor will be overloaded, resulting in the possibility of shorted turns.

Now, after the original defective component (shorted retrace SCR or retrace diode) is replaced, a new induced symptom of "no high voltage, circuit breaker holds" will be evident. Additional servicing time will be required to find that the trace SCR has no gate pulse because the input reactor has shorted primary turns.

Also, damage to the filter choke and/or power transformer can be expected if the chassis is operated for any length of time with the circuit breaker jumpered. Current instruments utilizing such chassis as the CTC46, CTC49 and CTC54 have a fuse in series with the circuit breaker for protection in the event that breaker action is defeated.

TECHNICAL DIGEST

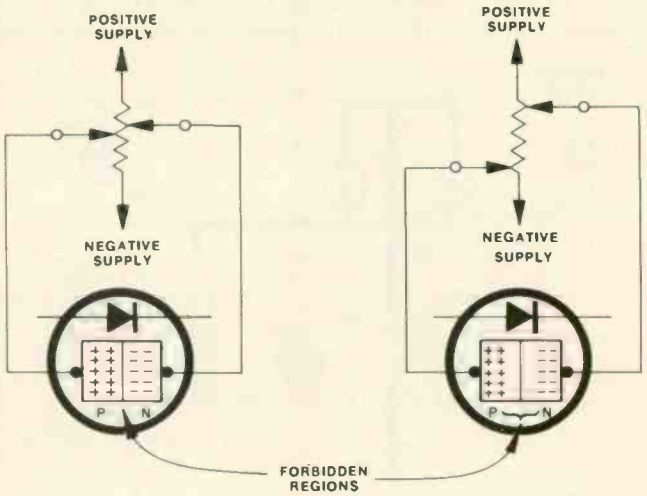
The material used in this section is selected from information supplied through the cooperation of the respective manufacturers or their agencies.

RCA SALES CORP.

Varactor Diodes

The technique of using a vacuum tube as a variable reactance was well known many years before the advent of TV. Numerous examples of this technique may be found in earlier TV receivers; e.g., reactance controlled horizontal oscillators and reference oscillators. The use of a diode instead of a reactance tube allows a simpler circuit with the advantages of solid-state design. To understand how a varactor diode functions, it is necessary to consider the conditions which exist at its P-N junction with various applied voltages. If the diode is forward biased, current flows, the impedance is very low, and any capacitance which may exist across the junction is effectively short-circuited. Thus the varactor is operated reverse biased.

The conditions within the varactor diode when it is reverse biased is shown in the illustration. When a positive voltage is supplied to the "N" or cathode material and a negative bias is applied to the "P" or anode material, the current carriers are attracted away from the junction, forming what is called a "forbidden region." Stated simply,



this forbidden region is that portion of the semiconductor material on each side of the junction wherein "free electrons" and "holes" cannot exist, and therefore the material in this area is essentially an insulator.

As the reverse voltage is increased, the size of the forbidden region also increases. In effect the thickness of the insulating material has been increased by the additional reverse bias. Since the regions of the semiconductor material in which current carriers can exist exhibit the properties of conductors, the requirements of a capacitor (two conductors separated by a dielectric) are fulfilled by the reverse-biased diode. Further, the "thickness" of the dielectric, and hence the amount of capacitance, may be controlled by changing the applied voltage. Thus, the reverse-biased diode can be used as a variable reactor, or varactor.

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-CONTENTS-

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NEW PRODUCTS

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

PLUG-IN BRIDGE RECTIFIER 703

Has ratings of 1.5a

Designated the BRPI.500 series, this single-phase bridge rectifier has a rating of 1.5a and utilizes a standard JEDEC eight-pin octal base. Reliability is enhanced by the use of non-cavity fully glassivated diode elements with all diode-to-diode interconnections being welded. Rectifier Components Corp.

DUAL TRACE SCOPE 704

Provides complete dual trace and X-Y capability

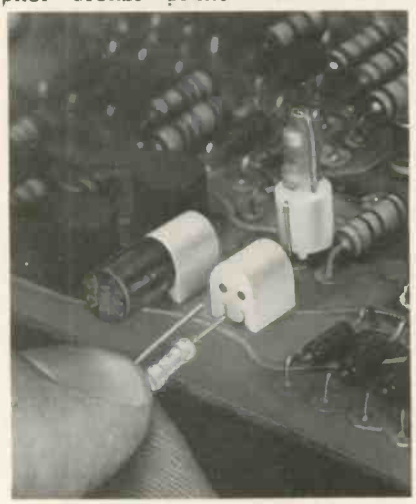
A solid-state dual trace, triggered sweep dc to 15MHz scope is the kit version of the scope described in detail in our September, 1971 Test Instrument Report. Designated the IO-105, this kit provides complete dual-trace and X-Y capability. Two separate inputs can be individually displayed in Channel 1 or Channel 2

modes. Both input channels are balanced for less than 5% phase shift to 50kHz. Versatile triggering facilities are included in the kit. Switch selected ac or dc coupling permits triggering at a given point on the signal or at a pre-selected dc level. Automatic triggering at the crossover point is available at a flip of a switch. Positive or negative slope triggering is also switch selectable. Internal, external and line inputs are provided. An 18-position time base switch in a 1, 2, 5 sequence gives sweep rates from 100ms/cm to 0.2μs/cm. Separate vernier control with calibrated position allows continuous control between settings. A five-times magnifier permits detailed trace viewing. Other features include a rear panel sweep gate output delivering a 3.5v pulse in sync with the sweep for special applications; TTL-compatible external blanking input; 8 by 10 cm rectangular flat-face CRT with standard camera mount on bezel; and removable side panels for easy accessibility. Price: $399.95. Heath Co.

PLUG-IN FUSEHOLDER 705

For PC board mounting and easy fuse removal

The Series 281007 rectangular shaped, sub-miniature fuseholder, 0.260-in. high by 0.244-in. wide by 0.276-in. deep, is made to accommodate both microfuses and picofuses. The low profile fuseholder is molded of white acetal resin and is rated to 5a maximum at 125v ac. It has two 0.047-in. by 0.020-in. thick silver plated phosphor bronze printed circuit board



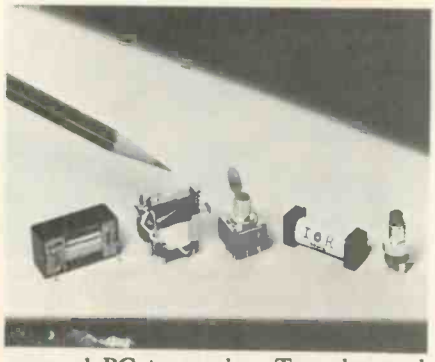
terminals, which extend 0.177 in. from the base of the horizontal mounted fuseholder. The fuseholder, when mounted near the edge of the printed circuit board, permits the technician to reach the fuse for easy removal and assembly without having to disturb other electronic components on the board. Littelfuse, Inc.

SWITCHES AND RELAYS 706

For PC board and low voltage applications

The switch line consists of eight subminiature toggle switches and two subminiature push-button switches. The 11 new relays are subminiature types intended for PC board and other low voltage applications. A choice of three popular coil voltages are offered

in the 3a contact rated open-frame type, and on both the 1a and 5a



covered PC type relay. Two dry-reed relays are also included. International Rectifier Corp.

TRANS-VERTER 707

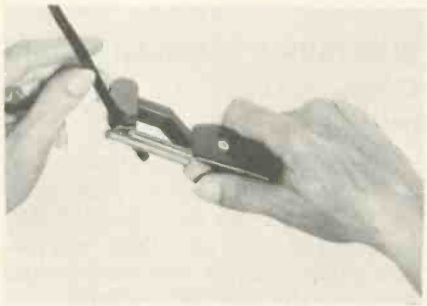
Converts 220v ac power to 110v ac power

The Trans-verter Model No. 50-123 has been developed to convert European and other foreign 220v ac power to 110v ac standard U.S. power. This 8 lb weight unit is the answer for the many people who would like to operate their 110v ac appliances while overseas. Suggested retail price: $24.50. Terado Corp.

COAXIAL-CABLE STRIPPER 708

Self-contained, requiring no external power supplies

The TW-6 stripper is used for slitting as well as for circumference-cutting on all types of cables up to 5/8-in. diameter, a special fixture at the end of the stripper having two slots into which the cable is positioned. One of these slots provides circumference cutting, while the other provides a slitting action. This tool is said to be



self-contained, requiring no external transformers or power supplies. Two models are offered. One has a fixed operating temperature of 1700°F (for use on high-temperature insulations only). The other model features a solid-state temperature control adjustable from 100° to 1700°F. It is used on the full range of available insulation materials. Jensen Tools and Alloys.

MIXER/POWER AMPLIFIER 709

Provides 75w rms power from either ac or dc power source

Designated Model 1607A, a new five channel mixer/power amplifier provides 75w rms power from either

an ac or dc power source. It incorporates a new low noise mixing circuit and switchable input gain, a built-in test oscillator which furnishes convenient system level adjustments, 5 mixing inputs with controls, plus a visual overload indicator and circuit breaker

continued on next page

NEW PRODUCTS...

continued from page 71

to provide full amplifier protection at all times. One reportedly new feature in package amplifiers is the 1607A's externally available 600Ω line level link between the mixer/line amplifier and the power amplifier input. This link may be used either unbalanced or balanced with optional plug-in transformers. Altec.

CLEANER 710

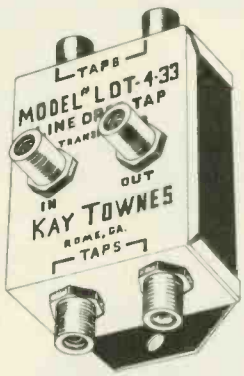
Has fast penetrating action

The LPS No. 1 cleaner reportedly has fast penetrating action, purity, a slow evaporation rate and covers the product sprayed with a corrosion resistant coat. The cleaner is available in 2, 7 and 16 oz. aerosol cans. LPS Research Labs., Inc.

LINE DROP TAPS 711

Low loss ac/dc passive units

Line drop taps, Model LDT, with one, two, and four outputs, are avail-

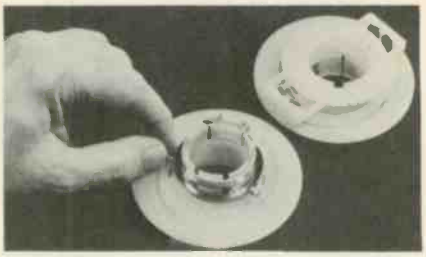


able in 14 variations. These are transformer low-loss ac/dc passive units, backmatched so that it is not necessary to terminate unused taps. Kay-Townes, Inc.

BLUE LATERAL AND PURITY ASSEMBLY 712

Registers blue, red and green CRT beams

A new single-unit, blue lateral and purity assembly is a replacement for similar assemblies on any size rectangular color picture tube having a triangular dot pattern. The Miller 7605 assembly registers blue, red, and



green beams. An outer wheel moves opposing magnets to provide adjustment up to ½-in. minimum for blue beam lateral convergence. Purity correction is accomplished by individual adjustment of the two purity rings. J. W. Miller Co.

SOLID-TUBE 713

Replacement for high voltage vacuum tube rectifiers

The R-3DB3 is a new solid-state "Solid-Tube" designed to replace high-voltage, vacuum-tube rectifiers in color-TV sets. The tube reportedly starts instantly, runs cool and helps prevent circuit as well as socket damage. It also makes the filament winding of the fly-back transformer unnecessary.

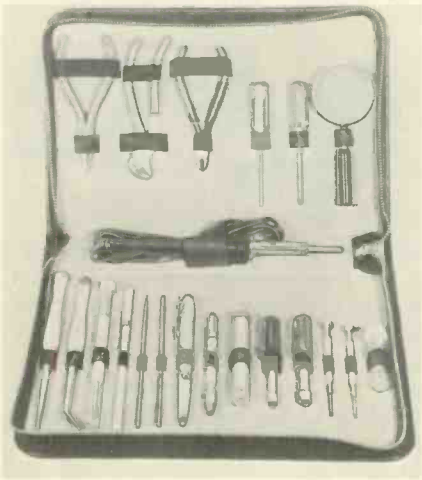
Maximum ratings of the R-3DB3 for pulse rectifier service are: peak inverse voltage—45,000v, peak repetitive forward current—110ma, average forward current—5ma, voltage drop @ 5ma—50v. Electronic Devices, Inc.

ELECTRONIC SERVICE TOOL SET 714

Compact for easy portability

Set Model K-600 is a 20-piece tool set which includes major tools essential for the service and repair of electronic equipment. A leather zippered case engineered for maximum protection of each tool helps ensure long-lasting performance. The case is compact for easy portability, is 11-in. long and 6-in. wide. Weight, including tools is 2 lb. The kit includes: 1 chain nose

plier, 1 groovegrip plier, 1 diagonal cutting plier, 1 standard screwdriver, 1 Phillips screwdriver, 1 round magnifier, 1 soldering iron, 1 bent nose tweezer, 1 straight nose tweezer, 1 solder aid, 1 alignment tool, 2 needle files, 1 contact pen-type burnisher, 1



package of 12 burnisher blades, 1 pin vise, 1 solder core, 1 nut driver 3/16-in., 1 nut driver ¼-in. and 2 miniature screwdrivers. Price $29.90. Jonard Industries Corp.

PANEL METER 715

Available in both pivot and jewel band

The 2000 series panel meter line provides the user with a functional styling concept to fit any equipment design. The meter line is available in both pivot and jewel or taut band. The mechanisms have treated "Alnico 5" magnets which reportedly provide excellent shielding from magnetic effects. Other special features of the 2000 series include a flattened scale arc and knife edge pointer for improved readability, wrap-around case providing superior protection against dust and moisture contamination and a zero corrector accessible through the half bezel, eliminating the need for a separate zero corrector hole in the panel in bezel mounted installations. Quick cover removal combined with

easy scale change and installation permits the changing of user's scale plates quickly and inexpensively. On front panel installations, scale changes can be accomplished without removing the meter from the panel. Weston Instrument.

MOUNTING PADS 716

Molded from either nylon or polypropylene

Injection molded from either nylon or polypropylene, the mounting pads are designed for transistors, diodes and multi-lead integrated circuits. They are also said to offer protection from thermal damage to device chip or junction and provide mechanical support, thus alleviating problems of dry joints caused by lead movement during the solder freeze period. Jermyn.

DEALER SHOWCASE

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

SOLID-STATE INVERTER 717

For operation of 117v ac equipment from 12v dc storage battery power

A new portable solid-state inverter has reportedly been designed for the operation of 117v, 60Hz ac equipment

from 12v dc storage battery power. This new inverter, Model 12U-S2A, has an output capacity of 275w continuous and 300w intermittent while maintaining a stable frequency of 60Hz with varying load or input voltage. The inverter is said to be well filtered and comes complete with battery cables ready for operation at a user net price of $139.50. ATR Electronics Inc.

LOUDSPEAKER 718

Has frequency range of 25Hz to 20kHz

The Model 11 is a multicellular coaxial loudspeaker featuring a high energy 1¾ lb Syntox-6 magnet and special foam "Flexair" suspension. Distortion is said to be minimal due to compression driven mid-ranges and

tweeters. The unit has a through bore horn tweeter in a 6 cell cluster, a balance control on 30-in. cable for easy mounting and a black matte finish. The speaker is said to be 12 in. in diameter, have a power rating of 25w, a frequency range of 25Hz to 20kHz and an impedance of 8Ω. Shipping weight is 14 lb. Price: $69.00. Jensen Sound Laboratories.

8-TRACK TAPE DECK 719

Includes a three-way tape eject system

Features of the Model TC-228 tape deck are said to include a three-way eject system with the capability of automatically ejecting the tape after the complete run of the tape, which in turn shuts OFF the recorder. It can be programmed to eject the tape after each run of each program, or after the total run of all programs, or manually, whichever the operator chooses. If none of the eject buttons are depressed, the tape will play continuously. The eject system is also operable in the record mode. The unit also features automatic total mechanism shut OFF. Features of the record mode include manual record control and VU meters, fast forward, pause control

with lock—which stops the tape without cancelling the mode of operation, program indicator lights, auxiliary inputs, front panel microphone jacks, line outputs, stereo headphone monitor jack, record interlock, non-magnetizing record head and a walnut cabinet. Price: $169.95. Sony Superscope, Inc.

VHF/FM MARINE TRANSCEIVER 720

Transmitter power rated at 15 to 25w

The Model MT-15 is a six-channel transmit, 12-channel receive VHF/FM transceiver. The radio's transmitter power is rated at 15 to 25w. Transmitter frequency range measures from 156MHz to 158MHz, which enables the unit to deliver a 15 to 30 mile signal on any 6 of the 38 marine radio service channels. Manufacturing specifications of the MT-15 call for a 0.001% accuracy for the transmitted signal. There are 12 channels in the receiver which enable the operator to monitor a group of frequencies on which he does not normally transmit. The weather receiver crystal and transmit and receive crystals for the emergency channel (156.8MHz) and the intership safety channel (156.3) are factory installed and included in the transceiver's list price. The set measures 2¼-in. by 5½-in. by 7½-in. and features a vinyl clad steel cabinet

complete with mobile mounting bracket, built-in, waterproof speaker and push-to-talk mike. The built-in power supply operates on 13.6v dc with optional convertor for 32 or 28v systems. The front panel features controls for transmit or receive channel selection, power, volume and receive squelch, plus a low-power switch for in-port transmissions. Price: $259.00. Regency Electronics Inc.

STEREO HEADPHONE 721

Frequency range is 20Hz to 20kHz

The Model 10R201 headphone weighs only 12 oz and has a 10 ft curled cable. Its frequency range is 20Hz to 20kHz. As an added convenience, it offers individual VOLUME

controls on each speaker, and a heavily padded headband. Suggested retail price is under $30.00. RCA Parts and Accessories.

MINIATURE SCREWDRIVER SET

Torque-amplifier handle provides better grip, reach and torque 722

The mini-driver set M-60 contains five drivers for slotted head screws, with tips ranging from 0.040-in. to 0.100-in. in width. With an overall length of 2⅛-in., each driver has a blade length of ⅞-in. and a handle measuring ⅜-in. by 1¼-in., plus one size 00 Phillips type driver and a piggyback torque-amplifier handle which

fits over the handles of any of the six mini-drivers—providing better grip, reach and torque. The pouch for the

set has a separate pocket for the torque-amplifier handle, a snap-close compartment for the drivers and measures about 3½-in. by 3¼-in. Handles of all mini-drivers are of clear, durable, color-coded plastic for instant identification. Xcelite, Inc.

CABLE JUMPERS 723

Used in attaching TV sets to MATV system tap-offs

Two new 6 ft. jumper cables designed for use in attaching TV sets to

MATV system tap-offs are designated by model numbers CAD-6MF and CAD-6FF. They use tightly shielded coaxial cable with low loss on all UHF and VHF channels. The CAD-6MF has an auto-type plug and an F fitting end. Both jumper cables use white polyvinyl-chloride insulating jackets and both come with male fittings factory assembled, The CAD-6MF lists for $3.50 and the CAD-6FF lists for $3.15. Jerrold Electronics Corp.

TWO-WAY CB RADIO 724

Provides over 60dB sideband suppression

The Sidetalk 23 is an all solid-state two-way radio with the maximum allowed power of 15w PEP, plus full control of the 23 upper side bands, 23 lower side bands or the 23 conventional AM channels. The transceiver has an adjustable SQUELCH plus a FINE TUNING control of each channel, so that any off channel crystal can be adjusted right on frequency for both receive and transmit. A noise blanker circuit with front control switch is useful when heavy city traffic creates higher than normal noise interference. Features include a crystal-lattice filter that provides proper bandpass with over 60dB suppression of unwanted sidebands. The AM receiver section uses dual conversion with ceramic filtering for better than 70dB image rejection. New high-powered, RF-output transistors are used for both final and driver stages according to specifica-

tions, so that reliable operation can be counted on even under the most severe operating conditions. The unit operates from 12v dc for mobile use or with a companion regulated power supply for 117v ac base operation. Pathcom, Inc.

ANTENNAS . . .

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quality coax can last 10 or 20 years —longer than the antenna.

Use standoffs to keep twinlead away from all surfaces outdoors. Use 3½-in. mast clamping standoffs and 3½-in. wood-screw standoffs if the house is made of wood or brick. For houses with aluminum siding, 7-in. standoffs are recommended to keep the twinlead away from the metal. Also use 7-in. standoffs to keep twinlead away from metal gutters and drain pipes.

Indoors, you really should use standoffs, too, but they are just too ugly to be practical. Therefore, installers generally staple the twinlead along the baseboards. Use as few staples as possible, try to hide the twinlead in closets and under rugs, and be sure that staples do not contact the conductors inside the twinlead.

If you are using coaxial cable, fewer restrictions apply. You can tape coaxial cable directly to the mast and staple it to the roof (use a staple gun with rounded crown staples for speed). Staples should be inserted with enough depth to hold the coax securely in place. (Fig. 5 shows a typical coax installation.)

You can run coax anywhere, alongside wires, inside pipes, next to metal—anywhere. There are only three cautions:

- Do not crush coax. This causes a mismatch, resulting in signal attenuation and smears.
- Do not bend coax too sharply or it will collapse, causing the same types of problems as crushed coax.
- Terminate coaxial cable carefully. One loose strand in a connector can cause a short, ruining reception.

Whichever lead-in wire you use, fasten it securely to the antenna. Use spade lugs to attach twinlead to the antenna terminals. Tighten the terminals firmly and then spray with acrylic for weatherproofing. Be sure to take the twinlead through the antenna strain relief so that there is no pull on the antenna connection.

Coaxial cable requires a matching transformer. The matching transformer generally slips right onto the antenna. Protect the connection with acrylic spray.

Before fastening the coax to the matching transformer, coat both the male and female connectors with silicon grease. Then, use a weatherboot to keep moisture out. This makes a very solid, secure connection, which you should point to with pride when you show the completed installation to your customer.

If the installation includes a rotor, be sure to leave enough slack in the downlead to permit a full 360° turn of the rotor.

Grounding

Every antenna installation must be grounded. According to the National Electrical Code, you must take the mast and the mount directly to ground with no splices or connec-

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TEKLAB . . .

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Chroma Circuits

The chroma circuits are contained on the PW700 chroma board. This board should help to reduce your tube inventory because all tubes employed on the board are type 6GH8's. There are also three transistors employed—one in each of the following circuits: ACC amplifier, color killer, and tint modulator circuits. The RED, GREEN and BLUE SCREEN, COLOR KILLER and PICTURE TUBE BIAS controls are also mounted on this board.

Deflection Circuits

The PW500 deflection board contains the vertical oscillator and output, transistorized sync separator, horizontal oscillator and reactance circuits. The HORIZONTAL HOLD, VERTICAL LINEARITY and HEIGHT controls are also mounted on this board.

High-Voltage System

The high-voltage circuits are contained on board PW900, which includes the focus board, P159. With the exception of the high-voltage multiplier, which is bolted to the main chassis and connected with push-on connectors, the complete circuit can be pulled for service. This chassis uses a fifth harmonic horizontal output circuit and a solid-state-high-voltage rectifier.

The relatively low impedance of the high-voltage circuitry eliminates the need for a regulator tube—it being controlled with the use of varistor feedback. This system reportedly has high reliability without X-radiation and stabilizes the high voltage at greater brightness levels and with a lower beam current than third harmonic systems.

The high-voltage rectifier used in this chassis is of solid-state design, incorporating a multiplier circuit configuration. Pulses from the horizontal output transformer (approximately 8.33kv) are coupled to the multiplier unit. These pulses cause the capacitors within the unit to charge in such a manner that their voltage become "stacked" to provide the tripling action, producing the required 25kv. Essentially, the tripling action requires four or five pulses to be completed. ■

ANTENNAS . . .

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tions along the way. Also, ground wires must be heavy copper, aluminum or copper clad steel. Generally speaking, aluminum is favored by most installers because it is light, inexpensive, corrosion resistant and easy to handle.

You can use either a cold water pipe (hot water pipes will not do) or a ground rod as a ground electrode. In practice, installers almost always use ground rods, which should be driven at least 3 ft into the ground.

If you are using coaxial cable, all you really have to do is connect the mast to the ground rod. If it is a twinlead installation, you should also ground the twinlead, using a lightning arrestor, as shown in Fig. 2, 3 and 4.

If you plan ahead and work intelligently, you can make excellent installations in a remarkably short time. Invest in good tools and good materials and you will soon establish a reputation as the antenna expert in your area. ■

PARTNER . . .

continued from page 57

in our industry before we sign the partnership papers.

Such a check-up can often reveal information concerning an individual about which we were not even aware at the time—information that can be of such a nature as to preclude the advisability of taking this man under consideration as a partner. It is far better to discover these things before the papers are signed than afterwards.

His past reputation in the community should be investigated very thoroughly for we must bear in mind that the reputation of our firm will be no better than that of this partner in the future. A man who is known for sharp practices, cutting corners, underhanded techniques, etc., carries that reputation with him even when he enters into partnership with a businessman who is the direct opposite. And he drags down the good business reputation of his partner no matter how forceful an individual the latter may be.

The fine reputation that we build up over many years will mean little to our customers if we enter into a partnership with a man devoid of such a reputation. Our customers immediately assume that they have been wrong about us and that we were that type of businessman all along or have decided to become one, otherwise we would have never entered into partnership with such an individual.

Each of the foregoing factors should be checked as carefully as the business ability of the man that we are considering as a business partner. They can make or break that partnership and do so before we will be able to realize what is happening. ■

LETTERS . . .

continued from page 26

1X2B, and 6BK4C for 6BK4. The manufacturer's tube fact sheet or receiver tube replacement manual may provide this information for the technician.

Technicians should also be careful to replace the picture tubes, when necessary, with tubes having radiation ratings equal or better than the original picture tube.

The high-voltage metal shielding should always be secured properly after servicing the high-voltage section.

We believe these suggestions will allow a technician to properly assure minimal x-radiation emission from older receivers.

ROBERT L. ELDER, SC.D
FOR DIRECTOR
DIVISION OF ELECTRONIC PRODUCTS
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TECHNICAL LITERATURE

Cross-Reference and Transistor Data Book

The Semiconductor Cross Reference and Transistor Data Book is a 64-page volume which has been revised and lists information on diodes, zeners, capacitors, rectifiers and SCRs. It includes more than 4000 new transistor listings. Complete specifications, electrical characteristics and outline drawings are given for the line of silicon and germanium transistors. An applications-oriented table permits the user to locate the description which fits his requirements, and determine the proper transistor. A removable wall chart lists products by applications, including AF stages, RF stages, TV deflection stages, and three other categories. Each major heading is divided into subheadings to facilitate use. Semiconductor Div., International Rectifier Corp.: 233 Kansas St., El Segundo, Calif. 90245.

Coil Cross-Reference Directory

Replacement Guide No. 172 is a comprehensive and authoritative coil replacement guide for all known domestic and foreign color- and B/W-TV sets, home and car radios. Over 22,000 replacement coils for 327 manufacturers names are listed. J. W. Miller Co., 19070 S. Reyes Ave., Compton, Calif. 90221.

Tape Editing Booklet

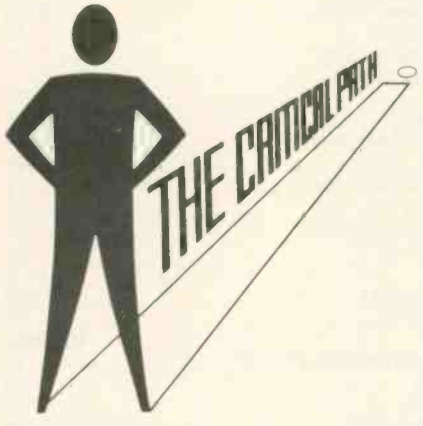
A new 24-page booklet, entitled Tape Editing, covers such topics as the latest tape splicing materials, where to cut the tape, establishing a tape-marking point, sound recognition, cutting within sound, the Editall tape repair and splicing system and other areas involved in the techniques of tape editing. Price is $1.00 per copy. Elpa Marketing Industries, Inc., New Hyde Park, New York, N.Y. 11040.

Electronic Chemicals Catalog

Products described in this catalog of Electronic Chemicals include: tuner sprays, circuit coolers, insulating sprays, contact and control sprays, lubricants, tape head and record cleaners/accessories, cartridge tape head cleaners and conditioners, electronic glues and cements, solder and spray paints. This 12-page catalog has complete descriptions, general and unusual applications, illustrations, tables and pricing for all products. Chemtronics, Inc., 1260 Ralph Ave., Brooklyn, N.Y. 11236.

Digital V-O-M Bulletin

A 2-page, 2-color data sheet describes a small, lightweight portable 2¾ digital V-O-M, Model 6028, which is said to feature 100% overrange, out-of-range and reverse polarity indications. The sheet gives the complete dc volts, ac volts, resistance dc current, and ac current ranges, and indicates price and accessories available. Triplett Corp., Marketing Dept., Bluffton, Ohio, 45817.



1972 New Orleans convention theme

Come join us for four great conventions at the Jung Hotel in New Orleans, La. on August 9-13, 1972. Contact Nolar Boone, 5522 West 12th, Little Rock, Ark. 72204 (501-666-1686) concerning the National Alliance of Television Service Associations; Roger Drost, 502 Pecan St., Sulphur, La. 70663 (318-527-9041) concerning the Electronic Technicians Association of Lousiana; and Dick Glass, 1309 West Market, Indianapolis, Ind. 46222 (317-632-2469) concerning both the National Electronic Associations and the International Society of Certified Electronic Technicians. Besides these conventions, there is the Electronic Industry Council, the National Service Conference, service training seminars, and business courses.

COMMERCIAL AUDIO . . .

continued from page 54

When working with these arrangements, you may find it more convenient to "see" the groups as symmetrical equivalent circuits. They may look less confusing. As shown in Fig. 15, there are 14 speakers represented in two groups: six 16Ω and eight 8Ω speakers. The total impedance comes out to exactly 9.6Ω. Each speaker in the 16Ω group can run at 4w—a total of 24w. And each speaker in the 8Ω group can run at 4.5w—a total of 36w. Hence, a 60w amplifier would be in order.

It is possible to work out almost any speaker combination to match a transformerless amplifier's output impedance and fit a desired installation—except possibly where a very large number of speakers running at different wattage levels are employed (usually beyond a total of 18 or 20 speakers). Once again, the manufacturer of high-quality audio products can and is usually glad to help you. Available literature has various speaker combinations worked out in advance. Chances are, you will find one that fits the installation you have in mind—with only slight variations necessary. ■

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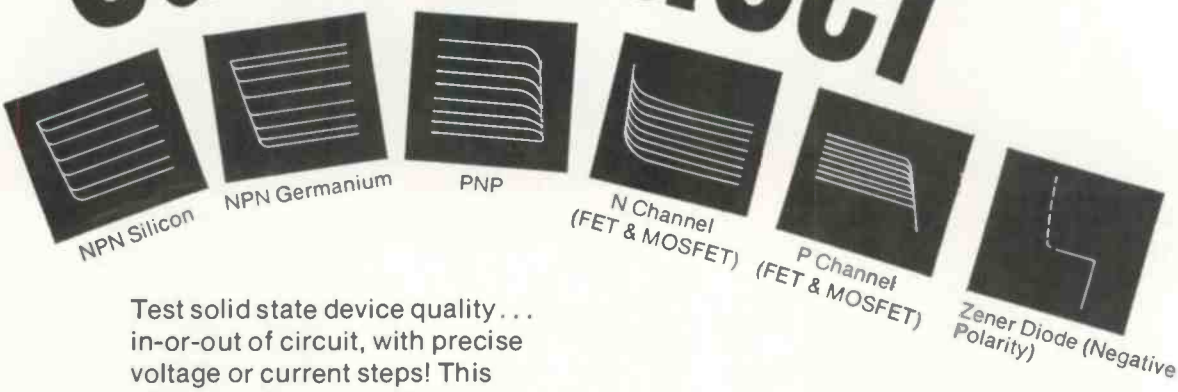

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23VAWP22
23VAXP22
23VAYP22
23VAZP22
23VBAP22
23VBCP22
23VBDP22
23VBEP22
23VBGP22
23VBHP22
23VBJP22
23VBRP22
23VBTP22
25ABP22
25ADP22
25AEP22
25AFP22
25AGP22
25AJP22
25ANP22
25AP22
25AP22A
25AP22A/ 25XP22
25AQP22
25ASP22
25AWP22
25AXP22
25AZP22
25BAP22
25BCP22
25BDP22
25BFP22
25BGP22
25BHP22
25BJP22
25BMP22
25BP22
25BP22A
25BP22A/ 25YP22
25BRP22
25BSP22
25BVP22
25BWP22
25BXP22
25BZP22
25CBP22
25CP22
25CP22A
25FP22
25FP22A
25GP22
25GP22A
25RP22
25SP22
25VP22
25WP22
25XP22
25XP22/ 25AP22A
25YP22
25YP22/ 25BP22A
25ZP22

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