

JANUARY 1973  A HARCOURT BRACE JOVANOVIICH PUBLICATION

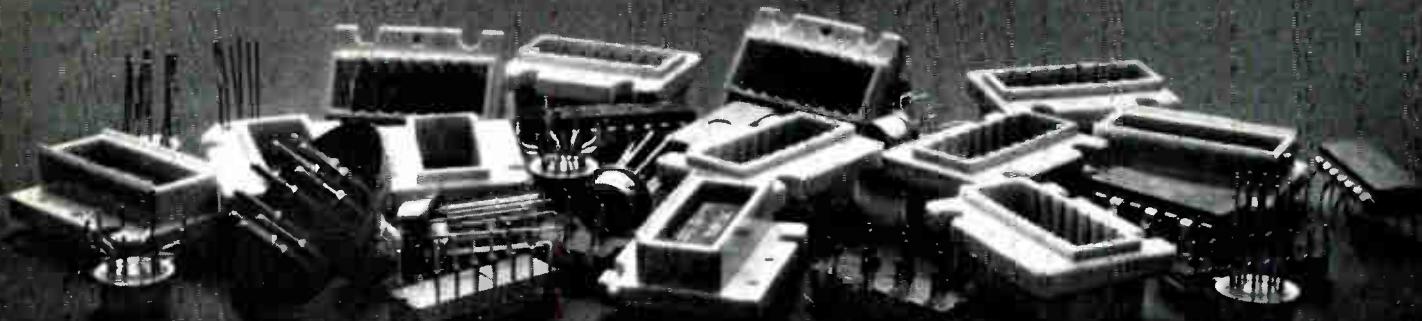
ELECTRONIC TECHNICIAN/DEALER

WORLD'S LARGEST TV-RADIO SERVICE & SALES CIRCULATION

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**Your Business Future
New Color-Picture Tube Replacement Technique
A Practical Application**



Our 28 ICs replace...

To Be Replaced	IC Replacement	To Be Replaced	IC Replacement
CA 2072	712	MC1302B	724
CA 2073	712	MC1302C	724
CA 2074	712	MC1302D	724
CA 2075	712	MC1302E	724
CA 2076	712	MC1302F	724
CA 2077	712	MC1302G	724
CA 2078	712	MC1302H	724
CA 2079	712	MC1302I	724
CA 2080	712	MC1302J	724
DM-11	710	MC1302K	724
DM-14	710	MC1302L	724
DM-24	710	MC1302M	724
DM-26	710	MC1302N	724
DM-30	710	MC1302P	724
EX4053	721	MC1302Q	724
FF274	722	MC1302R	724
FL274	722	MC1302S	724
GE-IC2	715	MC1302T	724
GE-IC3	712	MC1302U	724
GE-IC4	705A	MC1302V	724
GE-IC5	714	MC1302W	724
GE-IC6	713	MC1302X	724
	715	MC1302Y	724
		MC1302Z	724
		MC1303A	725
		MC1303B	718
		MC1303C	720
		MC1303D	720
		MC1303E	720
		MC1303F	720
		MC1303G	720
		MC1303H	722
		MC1303I	722
		MC1303J	704
		MC1303K	707
		MC1303L	713
		MC1303M	708
		MC1303N	713
		MC1303P	703A
		MFC6010	708
		N5111	708

and hundreds more.

Integrated circuits are still pretty new in TV and stereo equipment.

But Sylvania's ECG Semiconductor program really has those applications pinned down.

Today, just 28 of our ICs will replace over 300 type numbers.

We don't do it by magic, or by offering an "almost as good" replacement.

We do it by assigning our own part number to just one high quality IC that can be used to replace dozens of others.

And to make it easy for you,

we've put together a replacement guide that tells you which of our ICs to use where.

Your customer won't know that you're not carrying 300 different ICs.

All he'll know is that you fixed his set fast, and fixed it right.

The fact that you only needed 28 IC replacements is your secret.

And ours.

In servicing, that can be the secret of success.

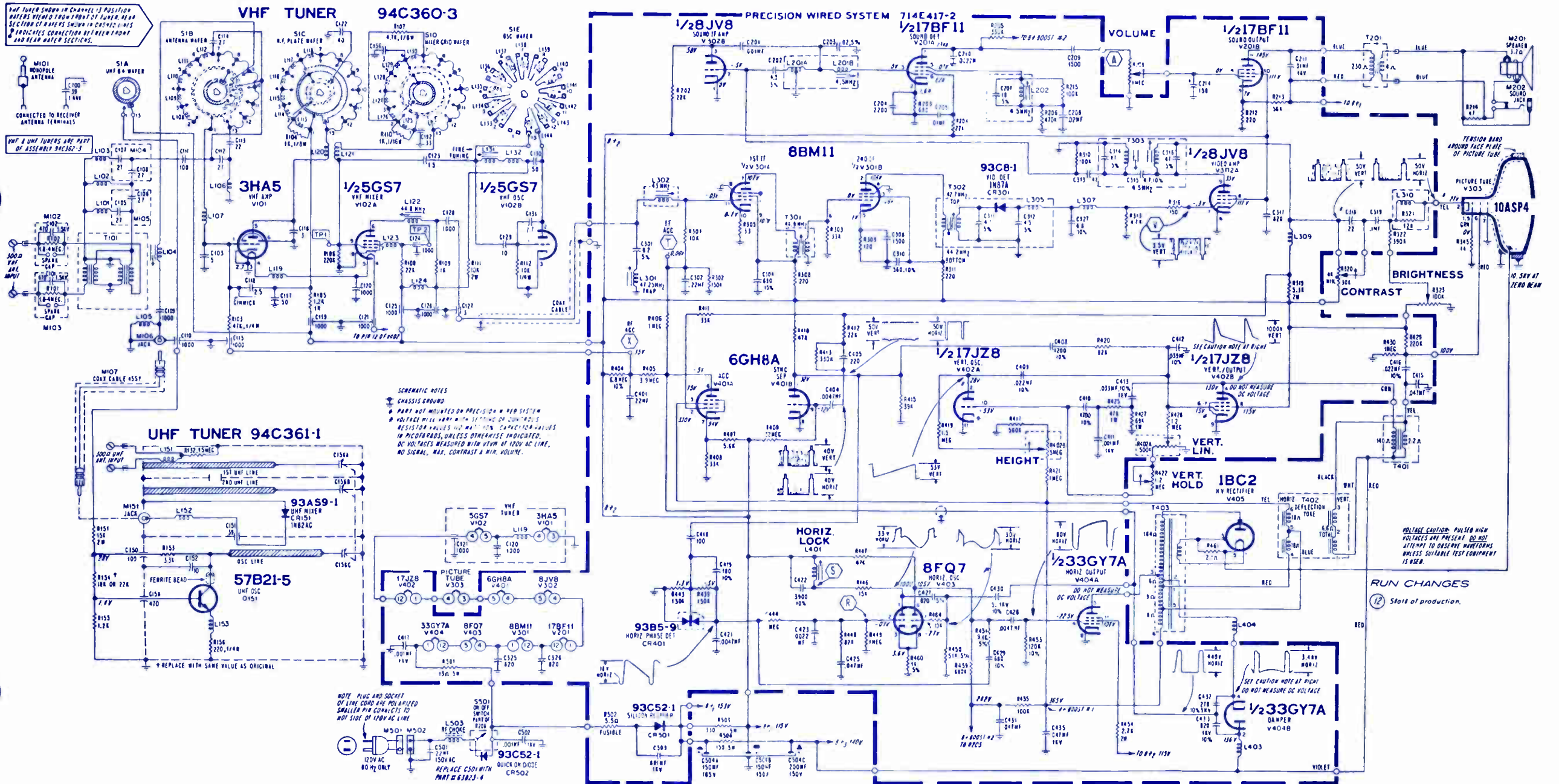
Sylvania Electronic Components,
Waltham, Mass. 02154.

GTE SYLVANIA

GROUP
245

AIRLINE	1452	SYLVANIA	1453
Color-TV Chassis 20K17-2A		Color-TV Chassis EO2-1, -2	
EMERSON	1451	EMERSON	1454
TV Chassis T2L2-1A		Color-TV Chassis 30M20	

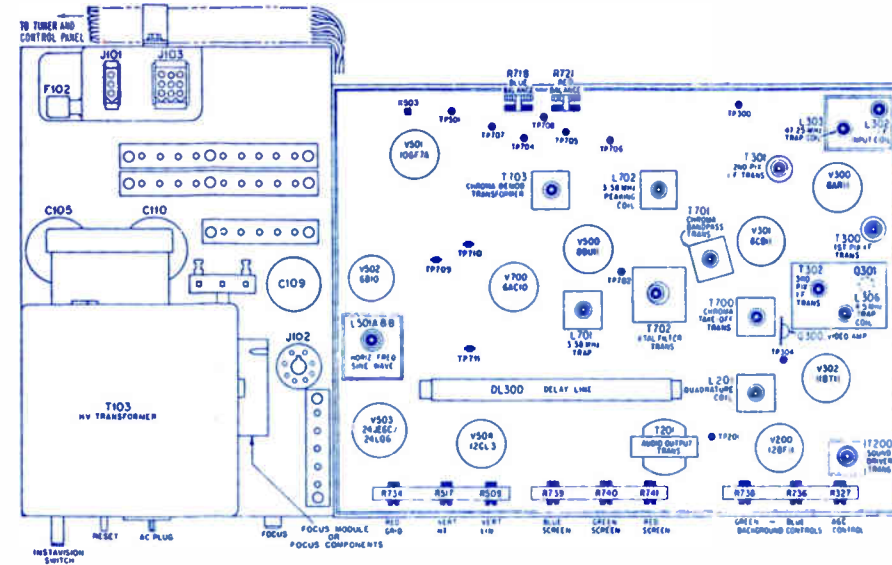
SYMBOL	DESCRIPTION	EMERSON PART NO.		EMERSON PART NO.	
R208	1M volume control	75A120-1	L201A	Sound IF & phase shift coil	72A301-2
R320	30K contrast control	75A121-3	L201B	quad coil (includes C207)	970383
R323	100K bright control	75A121-2	L401	horiz lock coil	94A17-17
R402A	500K, vert lin control		T201	audio output xformer	79A81-23
R402B	5M height control	75A95-6	T301	1st IF xformer	970384
R422	1.2M, vert hold	75A121-1	T302	2nd IF xformer	72A261-8
C504A	150µf, 165v		T303	sound take off & 4.5 MHz trap	72A185-5
C504B	150µf, 150v Electrolytic	970382	T401	vert output xformer	970385
C504C	200µf, 150v		T402	deflection yoke assembly	94A372-1
			T403	horiz output xformer	79A138-5

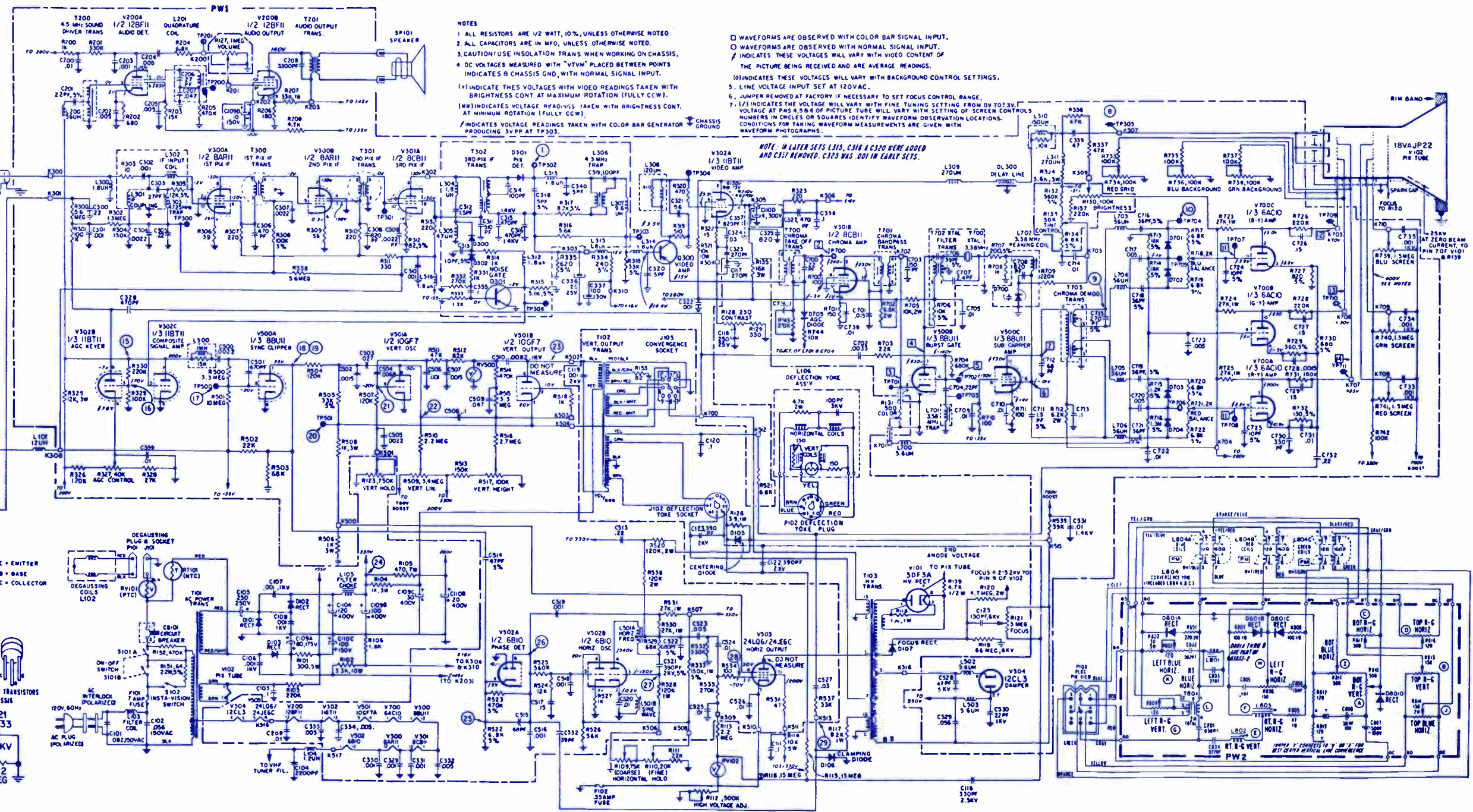
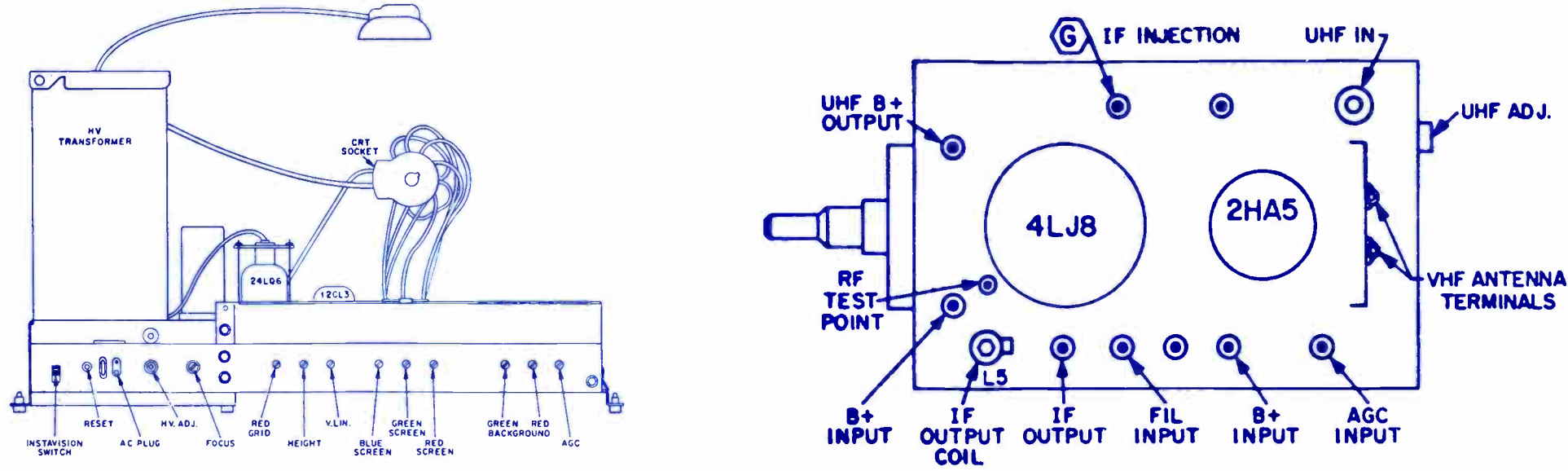


SYMBOL DESCRIPTION AIRLINE PART NO.

C110A, B, C, D—120µf/400v/20µf/400v/100µf/150v/4µf/300v, Electrolytic	87A75-1
RV102—VDR	61A46-13
RV500—VDR	61A65-1
R109—control, horiz. hold (coarse), 75K	75A161-1
R110—control, horiz. hold (fine), 20K	
R123—control, vert. hold, 750K	
R121—control, focus, 3M	75A157-13
R127, 5101—control, vol. w/on-off switch 1M	75A179-4
R128—control, contrast, 250Ω	
R130—control, bright, 100K	75A172-1
R131—control, color, 500Ω	75A180-1
R133—control, tint, 50K	75A181-2
R327—control, AGC, 40K	
R736—control, blue background 100K	75A155-7
R738—control, green background 100K	
R509—control, vert. lin, 3.4M	
R517—control, vert. height, 100K	75A155-8

R734—control, red background, 100K	94A379-4
L105—deflection yoke	72A366-1
L501A, B—coil, horiz. freq/sine wave	72A373-1
T101—x-former, power	80A116-2
T102—x-former, vert output	79A153-2
T103—x-former, high voltage	79A162-1
T200—x-former, 4.5MHz sound driver	72A361-1
T201—x-former, audio output	79A151-1
T300—x-former, 1st pix IF	72A359-1
T301—x-former, 2nd pix IF	72A358-2
T302—x-former, 3rd pix IF w/C314	72A365-1
T700—x-former, chroma take-off	72A368-1
T703—x-former, chroma demodulator	72A357-1
CB101—circuit breaker, dual (GA1-12423A)	84A17-10
F101—fuse, 7a (slow blow)	84A30-1
F102—fuse, .35a (chemical) (GA1-12423B)	84A28-B
R9451—tuner, UHF	94A451-1
R9457—tuner, VHF	94A437-1





NOTES

1. ALL RESISTORS ARE 1/2 WATT, 10%, UNLESS OTHERWISE NOTED.
2. ALL CAPACITORS ARE IN MFD, UNLESS OTHERWISE NOTED.
3. CAUTION: USE INSULATION TRANS WHEN WORKING ON CHASSIS.
4. DC VOLTAGES MEASURED WITH "VTVM" PLACED BETWEEN POINTS INDICATES B CHASSIS GND, WITH NORMAL SIGNAL INPUT.
5. (†) INDICATES THESE VOLTAGES WITH VIDEO READINGS TAKEN WITH BRIGHTNESS CONT. AT MAXIMUM ROTATION (FULLY CCW).
6. (††) INDICATES VOLTAGE READINGS TAKEN WITH BRIGHTNESS CONT. AT MINIMUM ROTATION (FULLY CCW).
7. (†††) INDICATES VOLTAGE READINGS TAKEN WITH COLOR BAR GENERATOR PRODUCING 3V PIP AT TP303.

□ WAVEFORMS ARE OBSERVED WITH COLOR BAR SIGNAL INPUT.
○ WAVEFORMS ARE OBSERVED WITH NORMAL SIGNAL INPUT.
/ INDICATES THESE VOLTAGES WILL VARY WITH VIDEO CONTENT OF THE PICTURE BEING RECEIVED AND ARE AVERAGE READINGS.
(0) INDICATES THESE VOLTAGES WILL VARY WITH BACKGROUND CONTROL SETTINGS.
5. LINE VOLTAGE INPUT SET AT 120VAC.
6. JUMPER REMOVED AT FACTORY IF NECESSARY TO SET FOCUS CONTROL RANGE.
7. (†) INDICATES THE VOLTAGE WILL VARY WITH FINE TUNING SETTING FROM 0V TO 1.5V. VOLTAGE AT PIN 4, 5, 6 OF PICTURE TUBE WILL VARY WITH SETTING OF SCREEN CONTROLS. NUMBERS IN CIRCLES OR SQUARES IDENTIFY WAVEFORM OBSERVATION LOCATIONS. CONDITIONS FOR TAKING WAVEFORM MEASUREMENTS ARE GIVEN WITH WAVEFORM PHOTOGRAPHS.

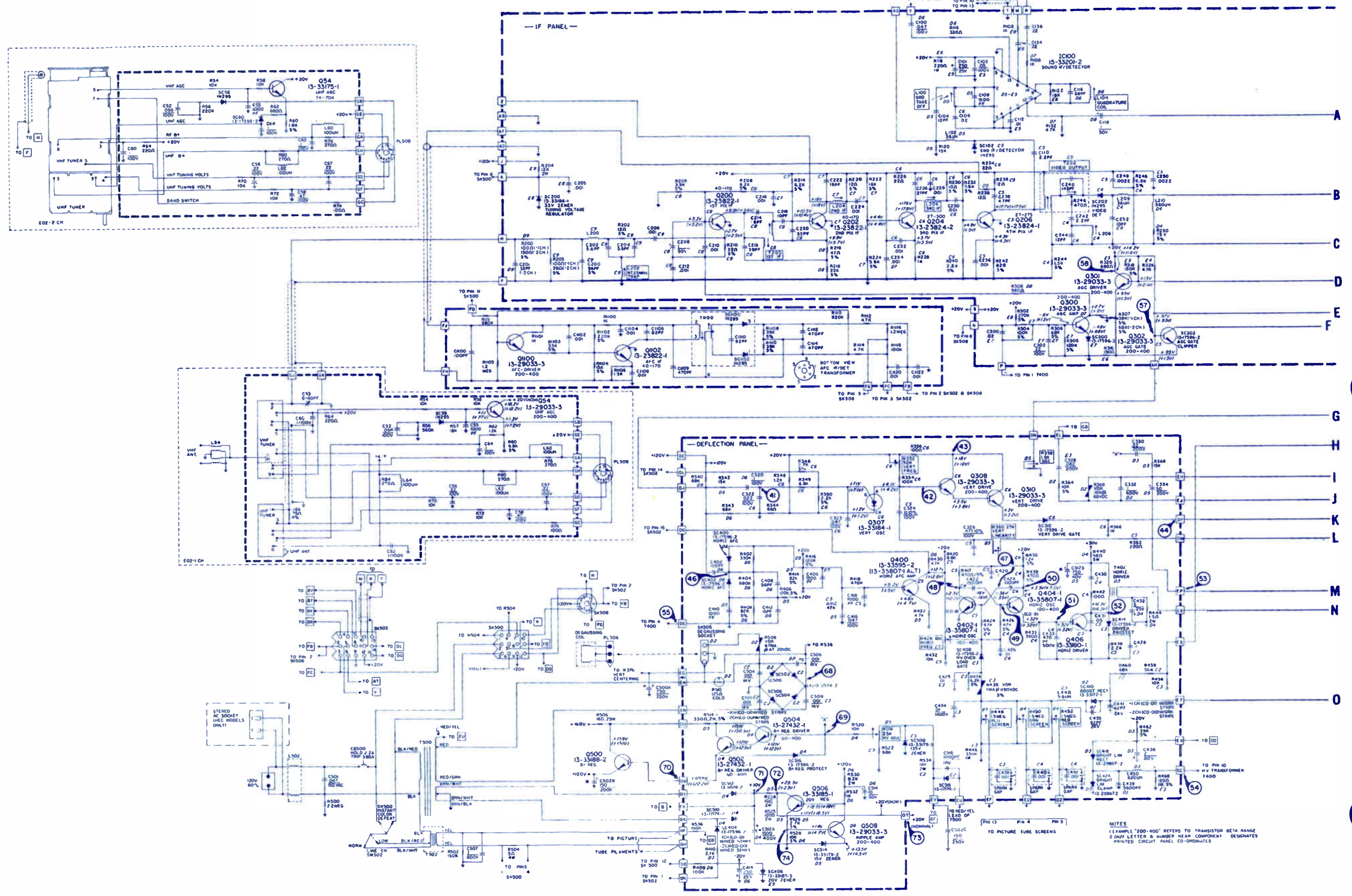
NOTE: IN LATER SETS L315, C316 & C320 WERE ADDED AND C317 REMOVED. C325 WAS .001 IN EARLY SETS.



SYMBOL	DESCRIPTION	SYLVANIA PART NO.
C502-elect.-3 section		41-35568-1
A-80/200v		
B-150/200v		
C-150/250v		
C512-elect.-2 section		41-33054-1
A-1500/40v		
B-750/40v		

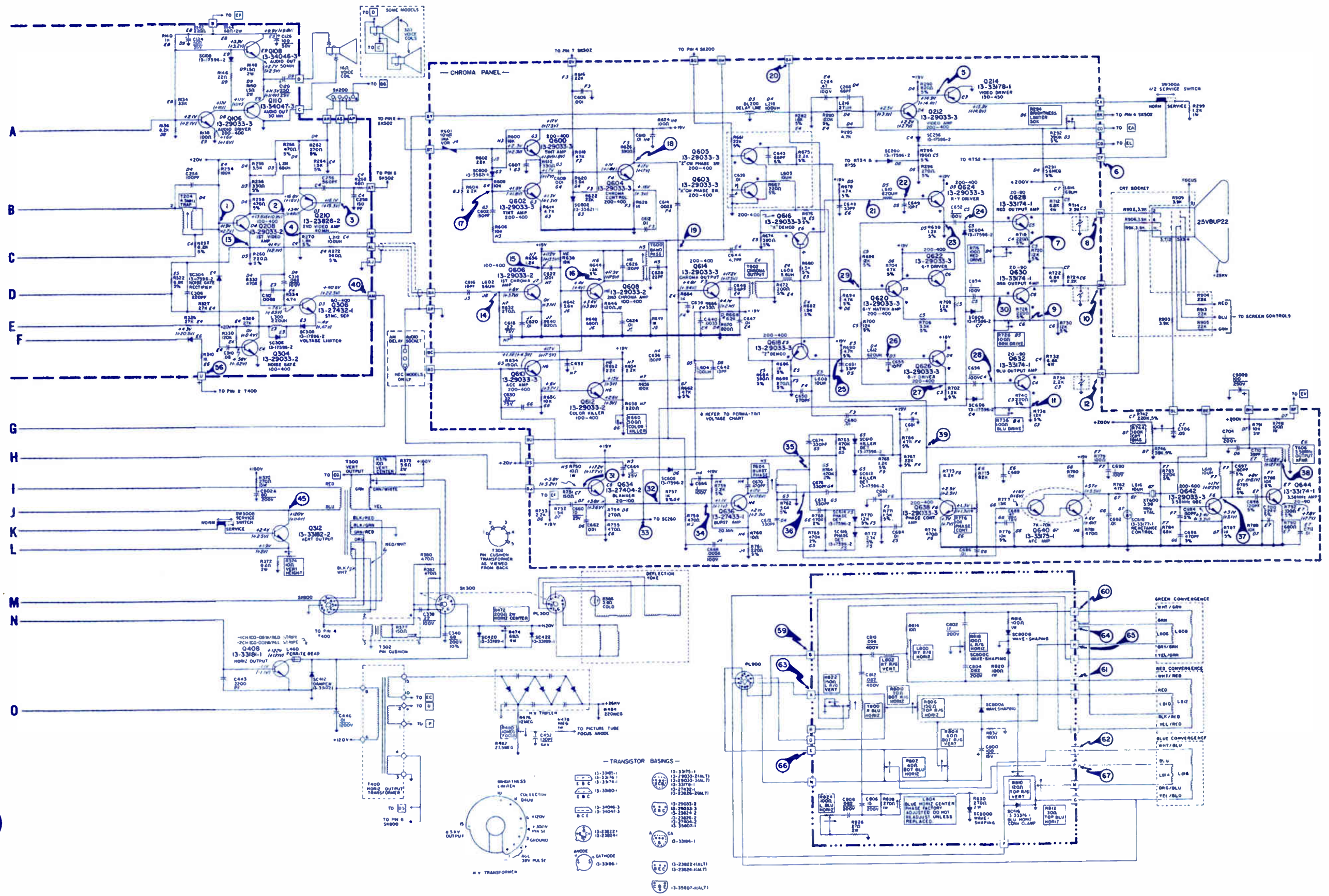
R508-VDR, 67 ma @ 20vdc	38-17072-2
R510-thermistor, n, cold	38-17071-4
L100-sound take-off	57-23832-2
L104-quadrature	50-33195-1
L200-link	50-23828-1
L202-47.25MHz trap	57-23827-6
L204-2nd IF	57-23832-4
L206-3rd IF	57-23832-5
R18-100K, volume	37-33097-2
R20-10K, color	37-33035-4

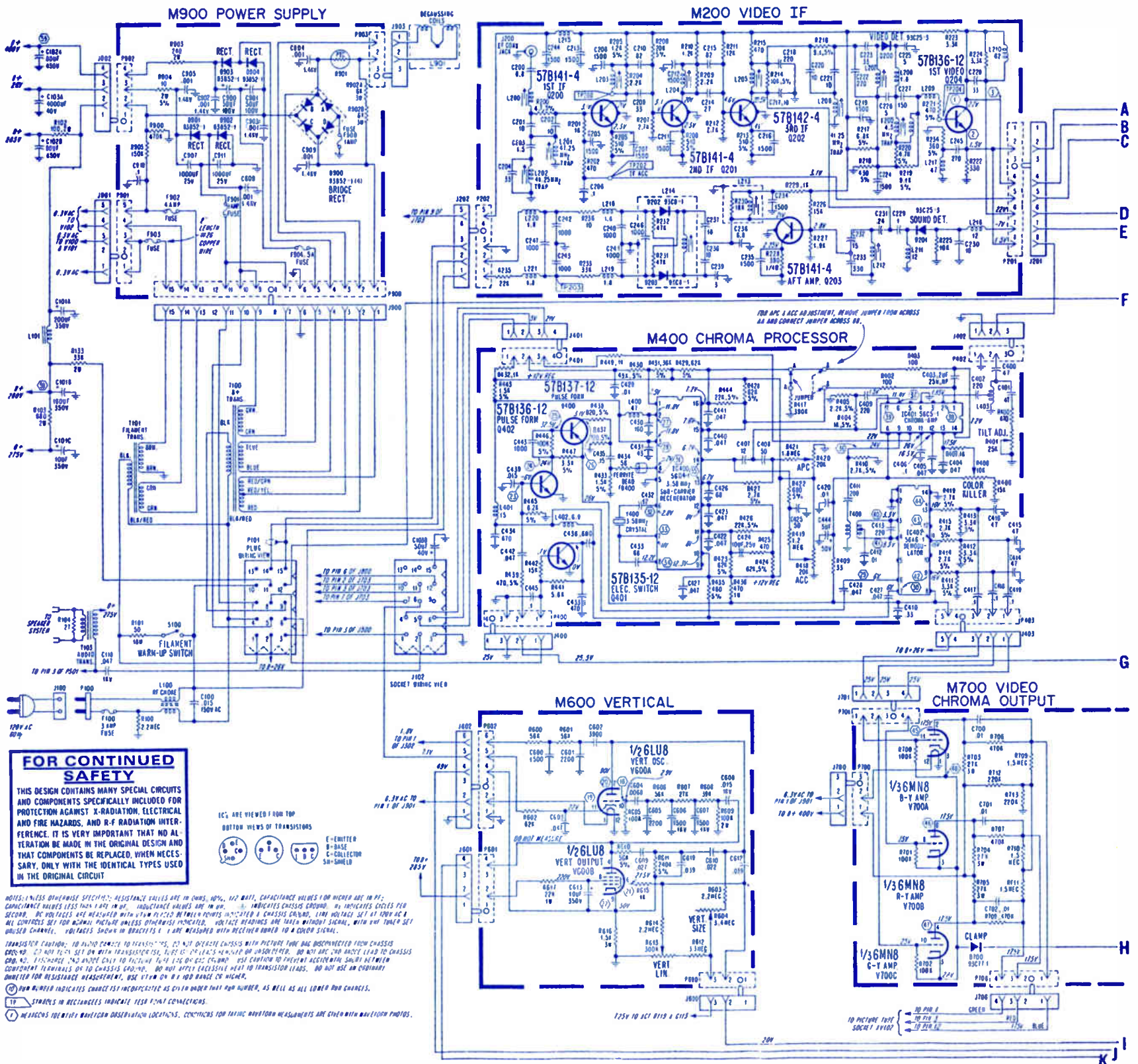
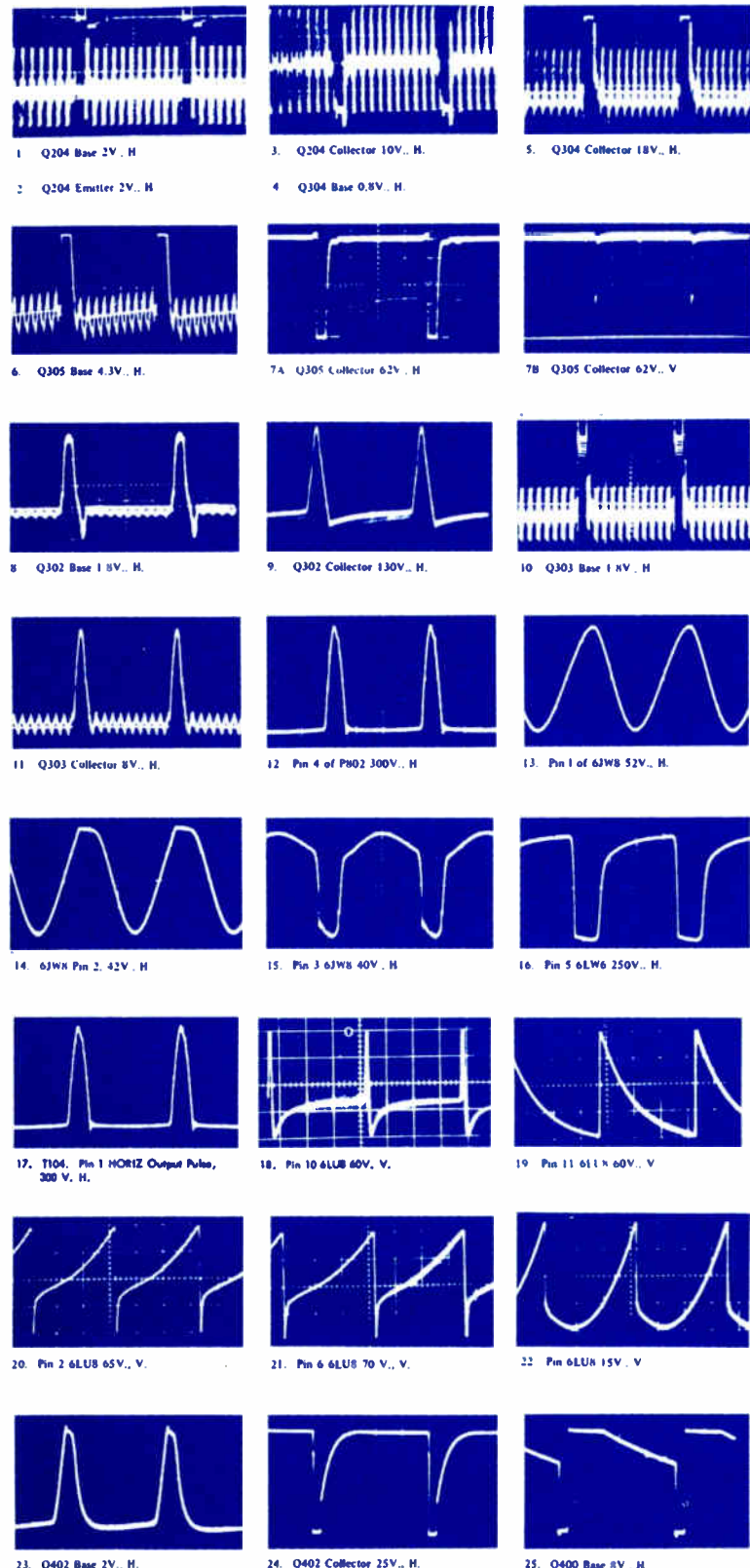
R22-10K, tint	37-33035-4
R24-2K, vert hold	37-33098-2
R26-200K, bright	37-33035-8
R28-2K, horiz hold	37-33098-2
R30-1K, contrast	37-33035-3
R32-20K, tone	37-33035-2
R34-500n, sharpness	37-33035-7
R294-50K, brightness limiter	37-33036-6
R352-50K, vert freq	37-23063-3
R360-25K, vert lin	part of R358



R374-10n, vert height	37-16021-26	T300-vert output	56-33088-2
R376-10n, vert cent	37-16021-26	T400-horiz output	50-33628-1
R428-10K, horiz freq	37-23063-4	T402-horiz drive	56-33038-1
R480-10M, focus	37-17320-7	T500-power	55-35577-1
R518-25K, HV adjust	part of R358	T600-bandpass	50-27405-1
R660-500n, color killer	part of R294	T602-chroma output	50-29658-1
R744-100K, CRT bias	part of R294	T604-burst phase	50-27406-2
R776-10K, phase control	37-23063-4	T605-3.58MHz output	50-33194-1
SC410-boost rectifier	13-33172-1	CB500-circuit breaker	29-33346-4
SC618-varactor, reactance cont.	13-33177-1	DL200-delay line	32-33673-1

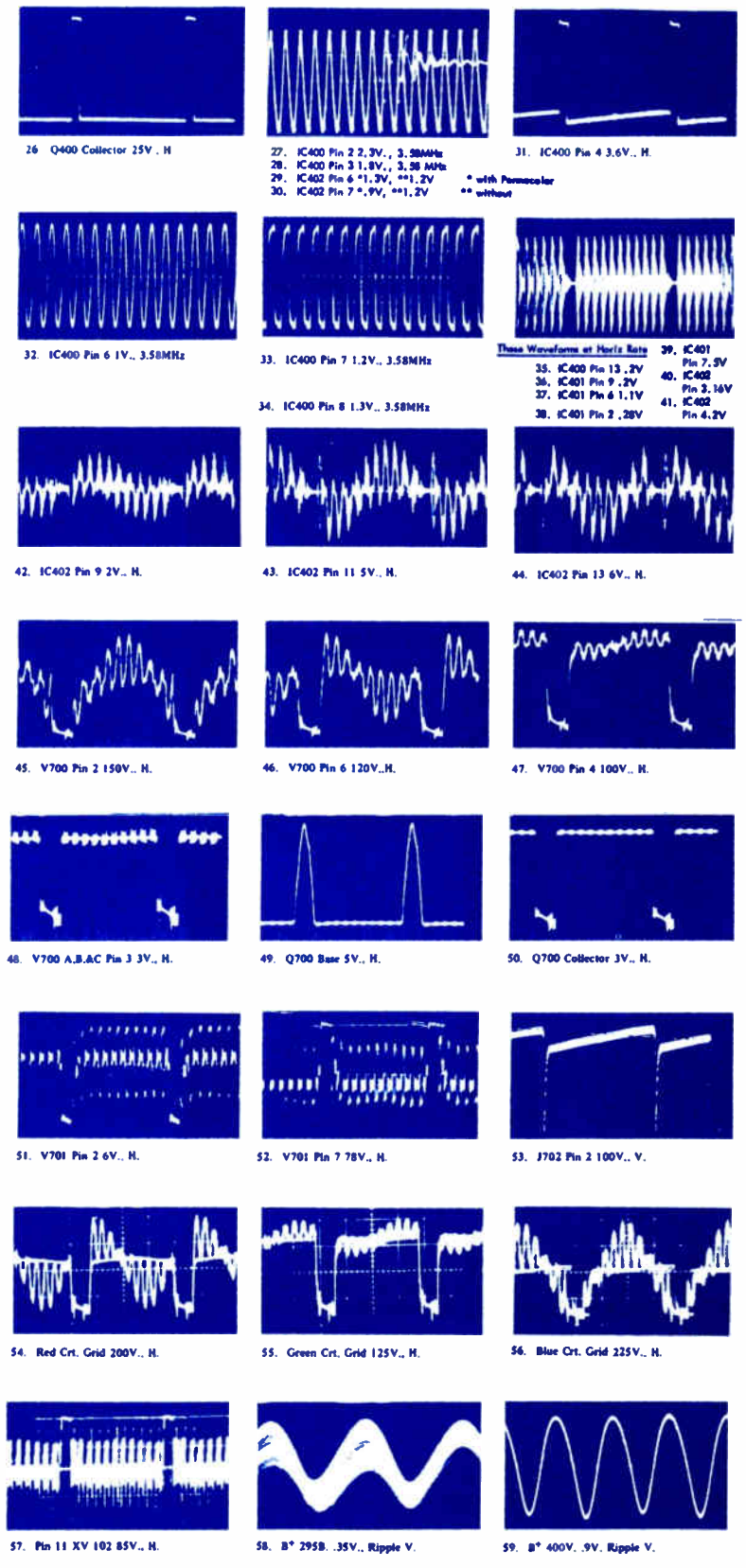
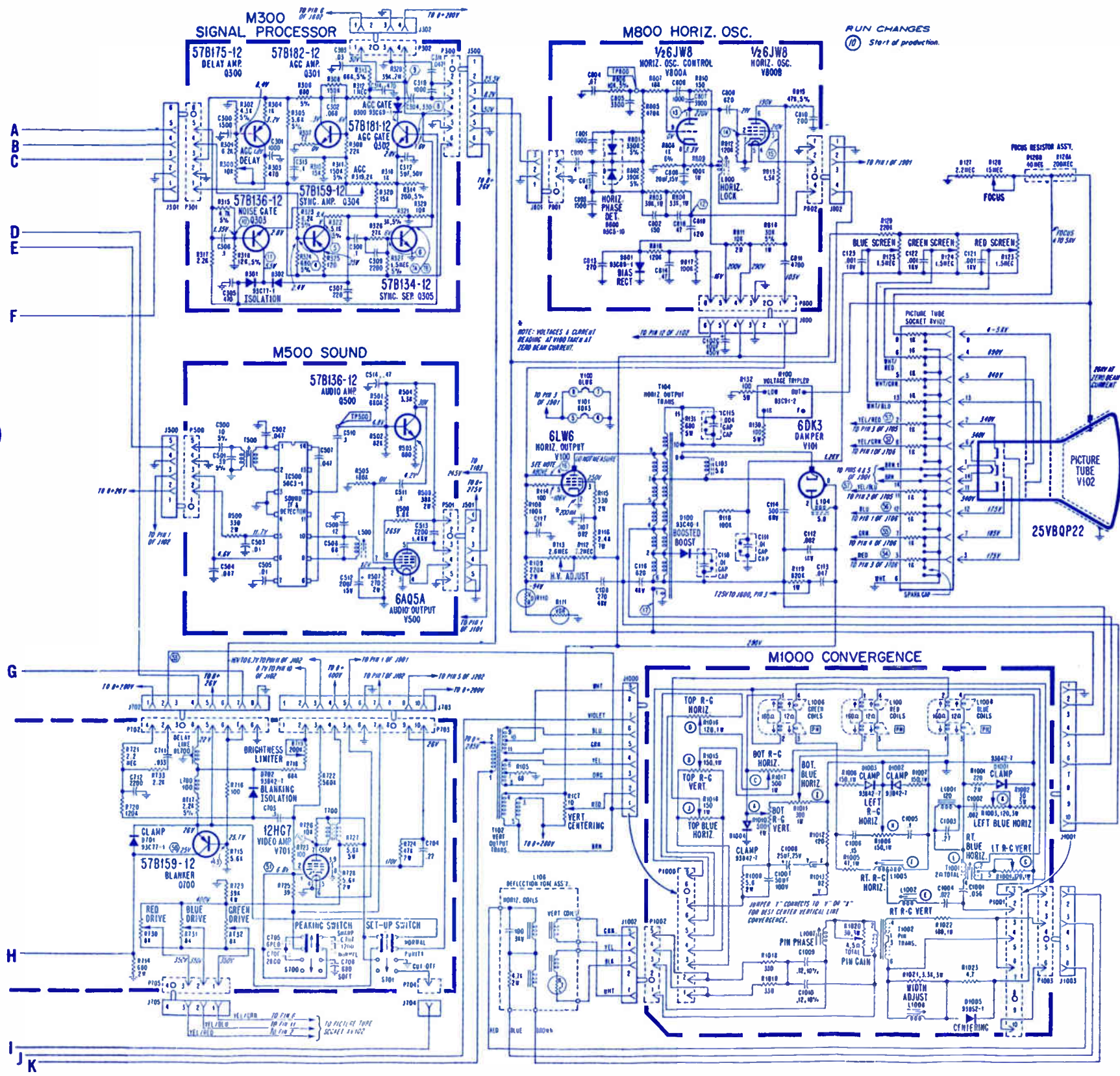
SYLVANIA
Color-TV Chassis
EO2-1, -2



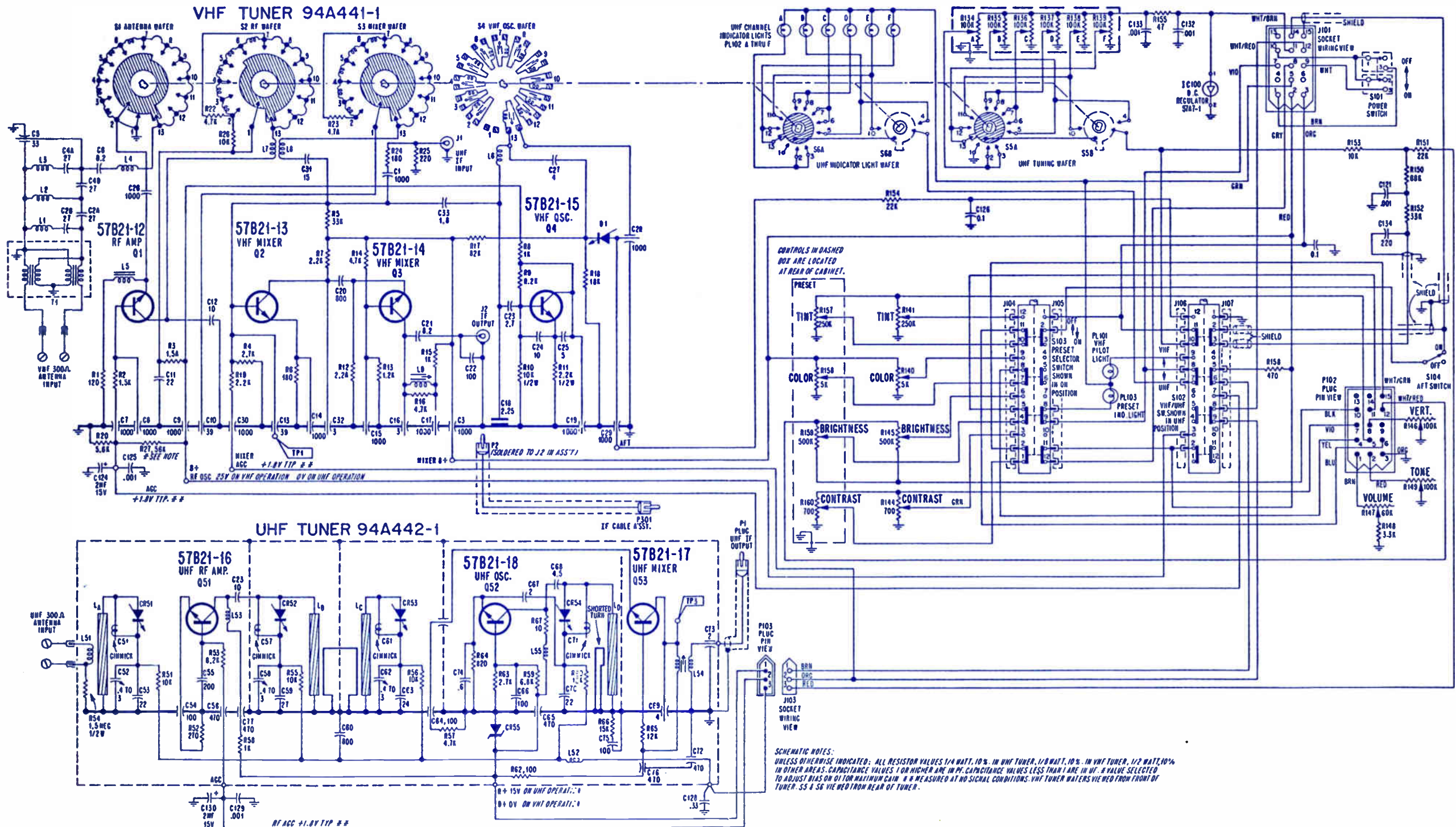


ADDITIONAL INFORMATION NEXT PAGE

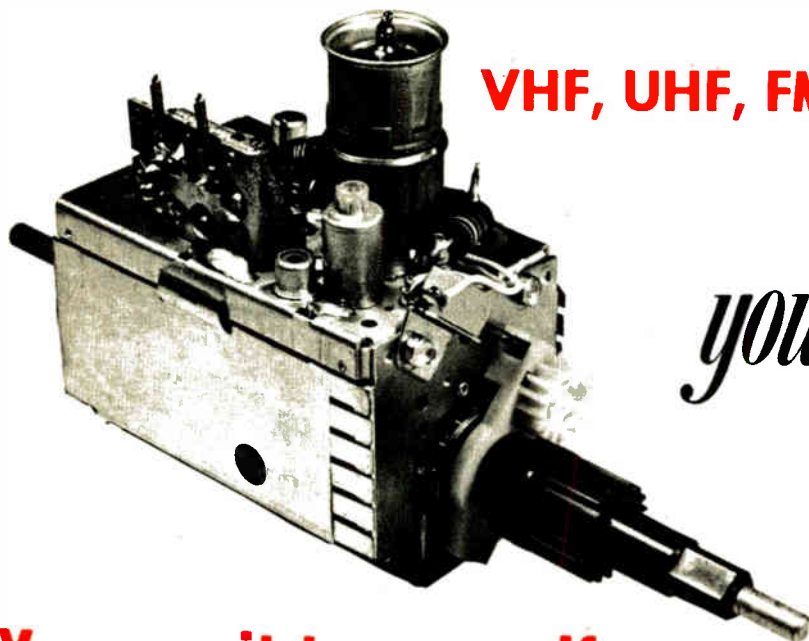
EMERSON
Color-TV Chassis
30M20



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WEST COAST—P. O. Box 41354—Sacramento, Calif. 95841	Tel. 916/482-6220
MOUNTAIN—P. O. Box 4145—Denver, Colo. 80204	Tel. 303/244-2819
SOUTHWEST—P. O. Box 7332—Longview, Tex. 75601	Tel. 214/753-4334
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- Antenna Coil Replacement Guide
- Multi-fit Replacement Tuner Shaft Guide

... for more details circle 126 on Reader Service Card

ELECTRONIC TECHNICIAN/DEALER

JANUARY 1973 • VOLUME 95 NUMBER 1

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This month's cover photo, supplied through the courtesy of Channel Master, shows the company's new "Foam Pack," molded foam picture-tube container—designed for lighter and easier handling of the tube. A news story concerning this container is included on page 34.

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... for more details circle 122 on Reader Service Card

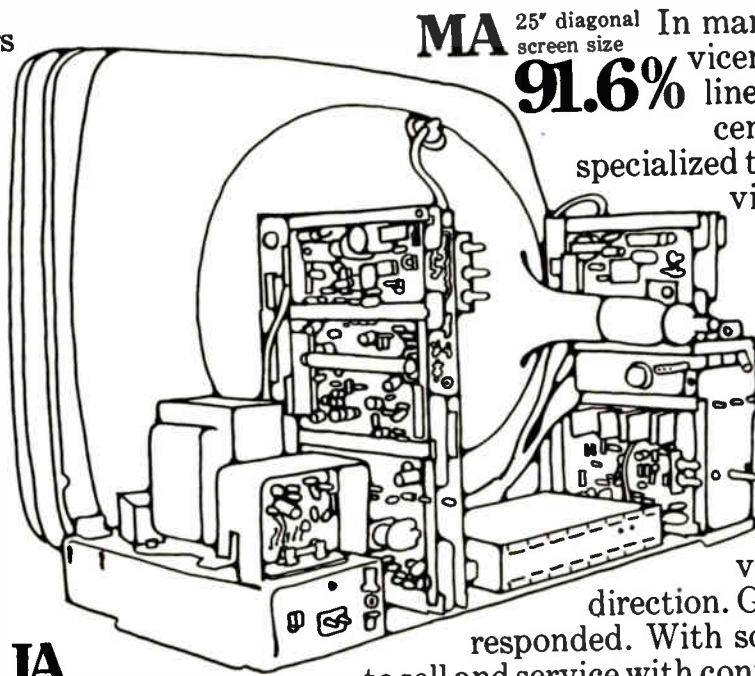
These solid state color systems are the most serviceable we've ever built. Because independent servicers helped us design them.

Independent servicers awarded us these serviceability ratings. Proof that foresight pays. The foresight of the television service industry in developing specific serviceability guidelines and urging TV manufacturers to use them. The foresight of General Electric in working side by side with independent servicers to create 100% solid state sets that are easy to service.

GE's new solid state sets are designed for maximum accessibility. With extensive use of visual aids. And plug-in modules and components. Example: 95% of the total components in GE's new solid state modular color console models can be removed for servicing without using a soldering iron. Solid state Porta Color® II models open like a book for ease of service.

Impressed? That's only half the story. To improve local parts availability we are expanding parts distribution through independent parts distributors.

We build every television as if we were going to use it ourselves.



MA 25" diagonal screen size

91.6%

In many states, TV servicers use direct phone lines to regional parts centers. We provide specialized training. Our Television Service News provides advance information servicers need to more easily service GE monochrome and color models.

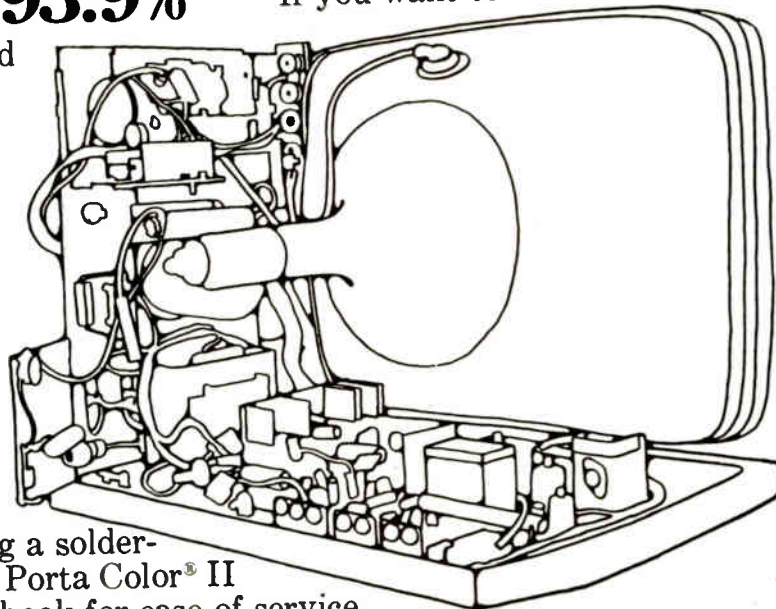
The service industry has provided foresight and direction. General Electric has responded. With solid state products to sell and service with confidence. To achieve our mutual goal of customer satisfaction.

JA

19" diagonal screen size

93.9%

If you want to know more about GE service, call collect or write "Dutch" Meyer, Television Receiver Products Department, Portsmouth, Virginia 23705. Phone (703) 484-3521.



GENERAL  ELECTRIC

The Other Person

Quite a number of favorable responses were received concerning last September's Crime Issue. In fact, some copies were sent by our readers to legislatures, judges and schools . . . also (of course)



concerned with the serious crime situation. However, we did receive one letter that was extremely critical of the editorial printed in that issue. That individual felt that the editorial was too much "pie in the sky," and out of touch with 20th Century reality . . . stating that there are many electronic technicians, service dealers, and reportedly even association leaders, that are not honest people. How—it was asked—can they deserve the honor, as independent business people, given them in that editorial?

Your editor is most definitely not an idealist who believes that we and the world about us are perfect. There definitely are some individuals who should be forced out of our industry for their failure to demonstrate high professional ethics. However, our publication is not intended for those "creeps."

ELECTRONIC TECHNICIAN/DEALER is published for the benefit of the many high-principled electronic technicians and service dealers—yes, and association leaders—that do serve our industry. We do not claim that there are not also others of lower moral character that read our publication. We simply do not intend to waste valuable space for their benefit . . . unless it's to show them that they could actually make more

money (and more easily in the long run) if they went about their work in an ethical manner. Thus the September editorial was intended for only you, the vast majority of our readers.

There is hardly an honest electronic technician or service dealer that cannot point to some shop down the street and say, "that character is an incompetent crook!" And chances are, the individual making such a statement will have made an accurate assessment of the situation.

There was once a time when we simply ignored the less-than-honest fellow electronic technician or service dealer. We didn't even care if there were—by some chance—even corrupt association leaders on a local, state or other level. We ignored them all, working as hard as we could to make an honest buck. "Stand behind your own reputation," was our model, "don't get involved in someone else's business."

It is really great to be independent. We have covered that subject so many times that by now some consider it a tired, overworked subject. (We won't argue that point.) However, times have changed. People move around a lot more these days. Many of those satisfied customers that we had last year have moved away. And in their place have come customers that have no reason to trust us. Why? Because they have legitimate gripes concerning the less-than-ethical treatment given them by the electronic technician or service dealer in the town that they just moved from. The set for which they were overcharged for services never performed, may have originally been a "hunk of junk" that no ethical business person should have ever sold them in the first place. And now they are mad at you for not rectifying the situation . . .

mad at you for being in the same business as those that had just swindled them.

We certainly do have a right to be proud of our profession—one of the few remaining forms of true Capitalism. However, let's not let self-pride get the best of us. There is dirt under the carpet. Tacking the carpet down won't hide it. We must sweep it away!

We must realize that although some consumer groups do tend to become grossly unfair, their activity is in response to an injustice that we have been guilty of ignoring. We must, therefore, work to set these consumer groups on the right path, just as we must work to rid our industry of this poison from within—a poison far more treacherous than anything devised by any servicing-oriented manufacturer.

There is only one way that we can do this and protect our own rights at the same time. And that is by being active in our own professional associations. Should we in doing so discover that there are a few individuals within our associations of the same kind as those who we must remove from our industry, then we should work just as hard to also get rid of this very small minority.

The quality of our industry depends on no one but **you!** Without **you** no government regulations, public pressure groups or dedicated association leaders have a chance of changing one darn thing.

Phillip Dahlen, C.E.T.

SERVICE

technicians know that Color TV repair demands more time and effort. That's why Sprague strives to simplify Color TV capacitor selection.

COLOR

TV capacitors by Sprague come in the exact ratings required to meet the exacting requirements of Color TV.

TV

service becomes more demanding as Color TV keeps expanding. That's why exact capacitor ratings are important. They help you to restore original set performance.

EASIER

selection of replacement capacitors for Color TV is assured when you look to the broad Sprague line. You'll get the capacitor you need—when you need it—every time.

Just off the press! See your Sprague Distributor for a free copy of our new 40-page K-111 Twist-Lok® and Print-Lok® Capacitor Replacement Manual, or write to: Sprague Products Company, 65 Marshall St., North Adams, Mass. 01247

THE BROAD-LINE PRODUCER OF ELECTRONIC PARTS



LETTERS

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

Certificate Won't Increase Income

One reads very much about CET [Certified Electronic Technicians] these days. Not only do you advocate it, two editors of RADIO ELECTRONICS passed the examination and proudly present their certificates. The impression that the average technician gets is that all he needs to better himself financially is to take the examination, pass the test and display the diploma on the wall.

It is very true that the highly qualified electronics technician is grossly underpaid. However, studying for and obtaining a certificate of proficiency will *not* increase his income. The very nature of his trade precludes it. The average customer knows little if anything about how his electronic component works. When faced with a malfunction, he will take it to a repairman who will repair it—he does not care about the diplomas hanging on the walls.

A parallel exists in the elevator installation and repair industry. An automatic elevator possesses some very sophisticated electrical and electronic circuitry. The skilled workman commands a wage far greater than the electronics technician. But he does not get this higher income because his employer loves him. No, he gets it because he is highly organized and does not hesitate to use the strike weapon.

In conclusion, I must mention one certificate which can increase the technician's income. The F.C.C. issues first and second class radio telephone licenses to persons passing a rather difficult examination. Since the number of such persons is limited, their incomes are higher. It's a simple law of economics, restrict the number of qualified men. This in turn creates a demand for them and consequently raises the price-wages.

MATT RUSK

Response to November Editorial

In response to your editorial in the November 1972 issue of ELECTRONIC TECHNICIAN/DEALER, I take issue to your thoughts that CATV is wrapped up in self profit with no regard to public interest.

A CATV company must enter the high density population areas in order to economically survive. Once the

high-density area is covered, then it is the company's duty to extend its cable operations to the low density areas as it can afford the expansion.

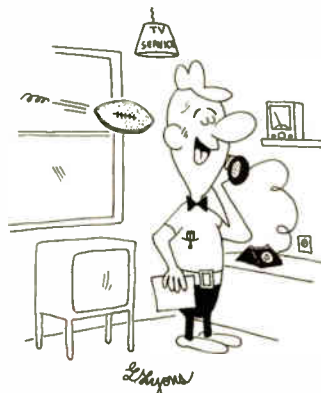
The whole idea of CATV is community service! To offer the population a wider choice of TV and FM radio programming than is possible over the air.

Our CATV divisions are built on this premise. Located in the central Catskills (which is a low-density area even in the villages), we are trying to extend our cable systems to the furthest extent of our franchise in order to serve every possible customer. We further plan to add a local channel on the cable with easy access, to stimulate communications in our communities. CATV can and does aid the communities they serve.

DAVID M. AMUNDSEN, PRESIDENT
PM DELAWARE, INC.

Speed of Light

The National Bureau of Standards has announced more precise measurements of the speed of light—the equivalent to the speed of radio waves in the vacuum of outer space. It is now said to be 299,792.4562 kilometers per second, plus or minus 1.1 meter per second. This is translated as 186,282.-3960 miles per second, plus or minus 3.6 ft per second. This new value is 100 times more accurate than the value accepted for the past 15 years.



"You can't miss my shop . . . it's right across from the football field!"



DIAL & CODER

Delta's Instant Emergency Telephone Warning System.

Dial & Coder guards you around-the-clock, signaling alarm for any emergency condition where a simple contact closure activates the system. Completely solid state, Dial & Coder utilizes the latest in discrete and integrated circuit technology to provide immediate remote signaling between any two telephones.

CHECK THESE FEATURES!

- Dial any phone number up to eight digits.
- Change numbers in ten seconds.
- Over 100 different code combinations allow multi-phone connections.
- Works with any direct contact switch.
- Unlimited applications. Use with intrusion detectors, fire & smoke detectors or a simple button control. Allows children, clerks, or physically handicapped to call for help.
- Automatic redialer when busy signal received.
- Microphone can be added for audio surveillance.
- Self-contained power supply. Once tripped, unit cannot be stopped.

This one's really priced right!

Made in U.S.A.

Write or Call today for free sales details!



DELTA PRODUCTS, INC.

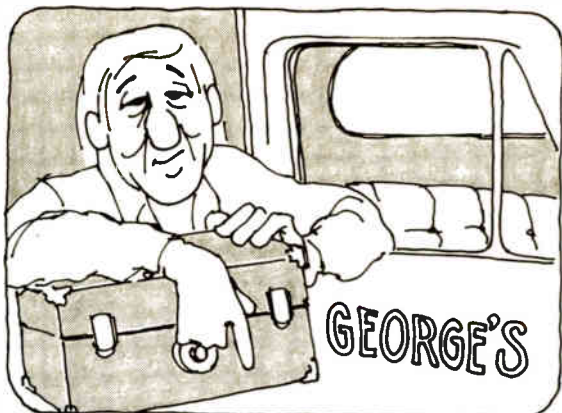
P.O. Box 1147, Grand Junction, Colo. 81501,
Dept. ETD, (303) 242-9000

Superior Products At Sensible Prices

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HOW DOES GEORGE DO IT?

#1 IN A SERIES



IN EVERY GROUP OF TECHNICIANS, THERE'S A "GEORGE" WHO ALWAYS SEEMS TO EARN A LITTLE MORE THAN THE REST OF US - SOMETIMES EVEN WITH SHORTER HOURS TO HELP EVERY TECHNICIAN MAKE THE MOST OF HIS TIME, HERE'S "HOW GEORGE DOES IT":



THAT TUNER'S SO DIRTY, IT LOOKS MORE LIKE A GUNKED-UP ENGINE. GUESS I'LL HAVE TO SEND IT TO A TUNER REPAIR SERVICE FOR ULTRASONIC CLEANING. NOT ONLY WILL MY CUSTOMERS WAIT, I'LL MAKE LESS PROFIT!



WHY SEND IT OUT? YOU CAN DO A TOTAL CLEANING JOB WITH CHEMTRONICS TUN-O-WASH, RIGHT HERE IN YOUR SHOP.

C'MON-- A CHEMICAL ULTRASONIC BATH?



JUST ABOUT! IT'S GOT THE ADVANTAGES WITHOUT THE DRAWBACKS! DISSOLVES GUNK AND CORROSION, BLASTS IT AWAY. WON'T DO A THING TO PLASTICS AND THERE'S NO CHANCE OF OPENING WEAK SOLDER JOINTS! TRY IT--JUST BOUGHT SOME AT THE DISTRIBUTOR'S.

HEY, IT REALLY WORKS! I CAN PUT THE TUNER BACK IN TOMORROW-- AND I GET ALL THE PROFITS!



NOW THAT YOU'VE CLEANED THE TUNER WITH TUN-O-WASH, SPRAY IT WITH THIS CAN OF TUN-O-FOAM. ITS SPECIAL SILICONE WON'T GUNK UP. HOW'S THAT FOR CALLBACK INSURANCE?

O.K. JUST SO I DON'T HAVE TO PAY YOU COMMISSION ON THE INSURANCE POLICY!

WHY LET GEORGE DO IT? MAKE MORE PROFITS IN LESS TIME YOURSELF WITH THE WORLD'S BEST-SELLING PROFESSIONAL CHEMICALS. TUN-O-WASH AND TUN-O-FOAM TWO OF CHEMTRONICS MANY WORK-SAVING PROBLEM SOLVERS.

FOR YOUR FREE PROBLEM SOLVING BROCHURE AND CATALOG WRITE TO:

CHEMTRONICS

INCORPORATED
1260 RALPH AVENUE BROOKLYN, N.Y. 11236
OUR BUSINESS IS IMPROVING YOURS

BOOK REVIEWS

PRACTICAL COLOR TV SERVICING TECHNIQUES by Robert Goodman, published by Tab Books, 372 pages, hardbound \$8.95, paperbound \$5.95.

There is no point in taking up all the space that would be required to give a complete description of this book. It is sufficient to say that it describes circuit function and maintenance for virtually every portion of a color-TV set encountered. These descriptions are thorough, concise and to the point.

The book also includes some basic solid-state circuit tests for those technicians not yet familiar with some of the newer solid-state color-TV sets, and colored pictures are used to illustrate some trouble symptoms.

We feel that this book would be of value to any electronic technician actively engaged in color-TV set servicing.

HOW TO INTERPRET TV WAVEFORMS by Forest H. Belt, published by Tab Books, 256 pages, hardbound \$7.95, paperbound \$4.95.

Even today a surprising number of seemingly qualified electronic technicians fail to understand the scope waveforms obtained from a TV set, and how they relate to circuit defects. We feel that this book has done an excellent job in helping such people.

The author has gone through virtually every stage of a TV set and photographed scope traces representing both properly and improperly functioning circuitry—explaining to the reader the trace observed. Thus virtually every page in the book contains a waveform, a description of the test point where the waveform was obtained, and then a detailed description of why the waveform reflects a proper or improper circuit condition. The publisher indicates that 250 waveform photos are included.

The book is very clearly written and an effort is made to maintain a good sequence of information. It is a *must* for even some of the moderately experienced TV electronic technicians.

MOVING?

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

RCA antennas- your answer for the 2 toughest questions you get.

1. "How do I get a better picture?"

2. "What does it cost?"

With RCA in your inventory, you'll never have to turn down a sale because you don't have the right image-improver. RCA has everything for every reception problem—a complete line of outdoor antennas, rotators, reception aids and hardware. Each RCA product is a precision engineered, top quality performer in its class. All carry the RCA name that your customers know they

can depend on. And the complete array of models gives you a full range of prices to bargain from, too.

Next time you get a tough question from a customer, make sure you have RCA on hand to answer it for you.

See your RCA Parts and Accessories distributor today, or contact RCA Parts and Accessories, Deptford, N.J.



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

READERS' AID

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

Telephone Answering Machine

I have a remote-control telephone answering machine which I would like to swap for an Electronic Frequency Counter, dc to 120MHz. The unit is in A-1 condition and the original price was around \$640. I would like the

frequency counter to be in the same condition.

ROBERT SCHROMBERG

6416 24th Ave.
Brooklyn, N.Y. 11204

Manuals Wanted

I want to buy Rider's Radio Trouble Shooters manuals, Volumes 1, 2 and 3 in good condition. I do not want the abridged version 1 through 5. I also want type 26, 27, 71A, 01A, 30, 99 and other antique tubes. I have many

new 6A7 tubes and older.

E. T. MONTGOMERY

1092 Willowbranch Ave.
Jacksonville, Fla. 32205

Part Wanted

I would like to buy a horizontal output transformer No. 1A27, 1002126 for a Curtis Mathes TV set about 12 years old.

JOHN STROUD

119 Lewis St.
Nashville, Tenn. 37210

I am in need of a horizontal output transformer for a Model 55-108, Run M18A01, manufactured by Television Manufacturers of America (TMA), produced in Wheeling, Ill. They are apparently out of business. Can anyone tell us how we can handle parts and warranties?

GEORGE BOETTCHER

Pelican Lake, Wisc. 54463

Part Needed

The tuning unit for a Mopar Model 23D (6BP) car radio (Bendix) used in a 1966 Plymouth Belvedere is needed. Tuner unit No. GIC2093402-0703 and coil assembly No. 2090131-0076 are needed, but will buy used radio if reasonable, in working condition or not.

STONEY KNOB TV SERVICE

Rt. 1 Box 72A
Weaverville, N.C. 28787

Test Equipment For Sale

I have a number of test instruments for sale, in good operating condition with original probes, cables and service manuals. Please write for listing and price.

W. D. SHEVTSCHUK

1 Lois Avenue
Clifton, N.J. 07014

Several pieces of test equipment for sale, all in good condition with less than 2 hrs of use. Will sell for the best offer. Please write for listing.

SADER BREITENFELDT

Tigerton, Wisc. 54486

Equipment Wanted

I would like to purchase a used picture tube rebuilding machine. Please send details of equipment and price.

RAYMOND SMITH

P.O. Box 732
Miami, Fla. 33155



Perma-Power Color Brite

**When the picture looks good,
you look good.**

When a color TV picture fades, or when the black-and-white is erased by a cathode-to-filament short, you can save the day, and the tube, by installing a Perma-Power Britener.

Boost models bring out lost sharpness and detail by providing increased filament voltage to increase electron emission. Full contrast and color quality return immediately.

Isolation models restore the black-and-white information that gives a color picture its quality, by isolating the short, thus restoring black-and-white video drive.

Short now . . . fade later? Handle

both jobs with a Color-Brite *Combination Isolation and Boost Britener*.

There are Perma-Power Color Brite models for both round tubes and rectangular tubes. In fact, Perma-Power has a Britener for just about every picture tube ever made! You'll look very good to your customer when you prolong the life of the expensive picture tube. Pick up a supply of Color-Brites from your Perma-Power distributor!



PERMA-POWER DIVISION
CHAMBERLAIN MANUFACTURING CORPORATION
5740 North Tripp, Chicago, Illinois 60646

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

Information Wanted

Service information wanted for a "Phone-Tender," telephone answering unit distributed by Answermatic, Inc., 1343 W. Valencia Dr., Fullerton, California 92633.

CHARLES KOCSANDY
8350 N.W. 31st Court
Miami, Fla. 33147

For Sale

I have for sale a Philco Precision Visual Alignment Generator for TV and FM, Model 7008, complete with instructions and service manual.

JOSEPH V. WAYMAN
Route 1
Jefferson, Ohio 44047

I have for sale Riders Perpetual Trouble Shooters manuals Volumes 1 through 22 with index from 1931 to 1951. RCA service notes from 1923 to 1951, less 1935. Make me an offer.

FRANCIS MURPHY
233 Flint Ridge Dr.
Gahanna, Ohio 43230

I have for sale a Hickok Model 580A tube tester.

DOMINIC DiSTADIO
5 Eyland Ave.
Succasunna, N. J. 07876

Schematic Wanted

I am in need of a circuit diagram for a Estey electronic organ, Model 805, manufactured by the Estey Musical Instrument Corp, Harmony, Pa.

In particular, I need to know what components are contained in the Sprague printed circuit No. 15-0026B.

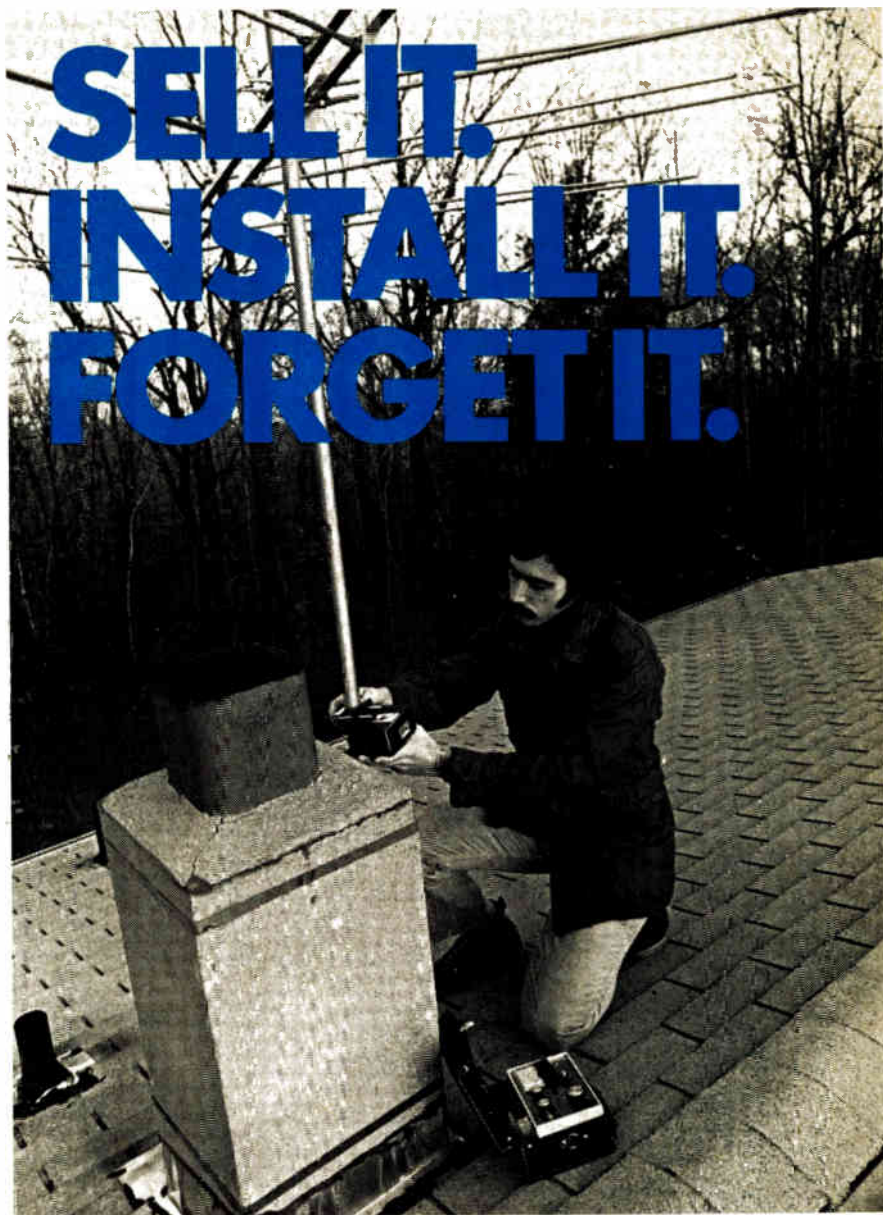
DALE H. SMITH
P.O. Box 415
Granite Falls, Wash. 98252

I would like to obtain a schematic and alignment information on a U.S. Navy Radio, Model RCH, built by E. H. Scott Radio Lab. I have for sale a RCA-WR69A Sweep Generator in original box with manual and cables.

PAUL W. CURTIS
12 N. E. 6th St.
Milton-Freewater, Ore. 97862

I need a schematic for a Stewart Warner all-wave radio, Model R-149 chassis. It is about 40 years old and the company is out of business.

MIKE CONROY
25 Bay State Rd.
Pittsfield, Mass. 01201



SELL IT. INSTALL IT. FORGET IT.

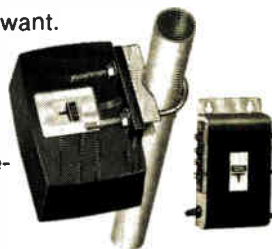
Call-backs are just what you and your customers' don't want. Once you install the B-T Horizon VHF two-set amplifier, you can forget it, because it's quality built to be reliable. It's the mast-mounted amplifier that thousands and thousands of TV installers have found "stays on the roof."

What makes Horizon so reliable? Solid-state, trouble-free circuitry. Four-way lightning and surge protection. Temperature compensation for all-weather reliability, and two individual amplifier circuits—one for Ch. 2-6 and the other for Ch. 7-13.

But the Horizon would not stay on the roof long if it didn't perform. And perform it does. It's back-matched for clearer color pictures. The patented ICEF circuit delivers wide dynamic range so that strong signals won't overload weak ones. It delivers more than ample gain for weak to medium signal areas for up to two TV sets.

And these are the reasons that made the Horizon one of the fastest and best sellers ever, and once it's sold, forget it. B-T has the industry's broadest line of home and MATV TV signal amplifiers—indoors and outdoors. Available from Blonder-Tongue distributors.

For solutions to your reception problems write:
Blonder-Tongue Systems Engineering Dept.
One Jake Brown Rd., Old Bridge, N.J. 08857.



BLONDER TONGUE

... for more details circle 103 on Reader Service Card

Plans Announced for Pilot JESUP Program

Although apprenticeship and other "entry" programs are doing a fairly good job of supplying current needs for service manpower, and it is generally felt that the EIA (Electronic Industries Assn.) and other groups are effectively updating vocational and college electronic technician instructors, there remains the problem of improving the effectiveness of upgrading training for the electronic technician. To solve this remaining problem, the NEA (National Electronic Assns.) conceived the idea of the JESUP program. JESUP stands for: Joint Electronics Service Upgrading Program.

It is felt that too many TV set and test instrument manufacturers are working independently in an effort to upgrade the technical competence of the electronic technician. This results in far too many seminars for most electronic technicians to attend, considerable duplication of effort, and some seminars that turn out to be sales meetings rather than training sessions.

The JESUP program is designed to solve these problems by coordinating the efforts of these groups, feeling that training can be accomplished more satisfactorily by having all manufacturers work together in conducting larger scale regional seminars that really contain some technical meat.

A single pilot session of the JESUP Program will be conducted at the Stouffer's Indianapolis Inn, 2820 N. Meridian St., Indianapolis, Ind. in March. There 200 electronic technicians will attend the two-day pilot session and have a chance to get first-hand technical information on 10 brands of new model TV receivers. They will also receive instruction in the latest general troubleshooting techniques. Both hands-on sessions with individual manufacturers and general lectures will be part of the two-day program. A \$10.00 registration fee will include the cost of two luncheons plus coffee breaks.

JESUP Pilot Training School Schedule Indianapolis, Ind.

March 19, 1973

8:00 a.m. **Student check-in**
8:30 **Orientation**
9:00 **General Session**
Examples of difficult service problems associated with feedback circuits (AGC, AFT, ACC). A session to show students the types of problems that electronic technicians find most difficult and the pitfalls that lead to sidetracks and time-consuming wasted troubleshooting efforts.

9:30 **General Session**
Hints on understanding the feedback circuits and systematic methods used to make these potential "tough dog" problems easy!
J. A. Wilson, CET
Professor: Kent State University
CET Exam author

10:00 **Special Sessions**
Students break into ten 20-man teams and are assigned to different manufacturers' training directors for one hour. (They will be shown how to apply the principles covered earlier to a specific chassis of a color-TV set.)

11:00 **Special Sessions**
Students switch to a different manufacturer training director.

12:00 **Noon Luncheon**
Included in registration fee.

1:00 p.m. **General Session**
TV Alignment: Why? Why not? How?
This session will explain alignment and show how it can be used as a troubleshooting aid. It will also demonstrate practical alignment techniques and most commonly encountered alignment problems.
Buzz Padgett, CET
Bench Technician, Wholesale TV, Indianapolis, Ind.
Les Nesvik, CET
Service Manager, Wholesale TV, Indianapolis, Ind.

2:00 **Special Sessions**
Students again break into ten 20-man teams and are assigned to their third manufacturer's training director for one hour. (Alignment procedures, as outlined for the previous session, will be applied by the students to different manufacturers' receivers. Students will participate in actual alignment, installing common troubles and using the symptoms to diagnose problems.)

3:00 **Coffee Break**
3:15 **Special Sessions**
Each team of students switch to a fourth manufacturer training director.

4:15 **General Session**
The Service Call
Problems encountered by electronic technicians working outside the shop, and the latest equipment and methods currently being used by working technicians today.

5:00 **Recess**
7:00 **Special Optional Session**
Extra session to refresh electronic technicians with less than four years of experience on basic theory, troubleshooting and customer relations problems.

March 20, 1973

8:00 a.m. **Reconvene**
Students have one hour to visit individual manufacturers' training setups for questions on the preceding day's subjects and to familiarize themselves with some of the differences in each receiver.
(Written quiz may also be given.)

9:00 **General Session**
Solid-State Troubleshooting Techniques
This session compares the latest tube and solid-state repair techniques, concentrating on step-by-step methods currently used by successful bench technicians. Special emphasis will be placed on procedures for overcoming difficult and time consuming repair problems.
O. C. Brown, CET
Shop Owner/Technician
Instructor, Ahrens Trade School, Louisville, Ky.

10:00 **Special Sessions**
Students return to their 20-man teams to be assisted by a fifth manufacturer's training director in applying the principles covered in the previous session.

11:00 **Special Session**
Students switch to a sixth manufacturer training director.

12:00 **Noon Luncheon**
Included in registration fee.

1:00 p.m. **General Session**
Horizontal Sweep, Pincushion and High Voltage
Many circuitry changes have occurred in this portion of the TV receiver since the advent of solid state. This session will compare the new with the old and will concentrate on showing the technicians as many service precautions and techniques as time will allow. Comparison of each manufacturers' circuitry will be made.
Frank Teskey, CET
Shop Owner/Technician
Instructor, R.E.T.S. Schools, Indianapolis, Ind.

2:00 p.m. **Special Sessions**
Each 20-man team is rotated to a seventh manufacturer training director for demonstrations of the most commonly encountered problems in the horizontal high-voltage circuits. Students will receive parts and service information on individual brands.

3:00 **Coffee Break**
3:15 Each 20-man team is rotated to an eighth manufacturer training director for additional information concerning the topics covered in the previous session.

4:15 **General Session**
Question and Answer session with quiz of students for evaluation purposes

4:45 **Closing Remarks**
Dick Glass, CET
JESUP Coordinator

5:00 **Adjournment for Students**
5:15 **Staff and observers evaluate session**
5:45 **End of JESUP first pilot program**

JESUP Committee Organization

Coordinator: Dick Glass, CET
Executive Vice President of NEA
1309 W. Market St.
Indianapolis, Ind. 46222 317-632-2469

Co-chairmen: Ron Crow, CET
Executive Director of ISCET
1306 Douglas
Ames, Iowa 50010 515-294-5060

Les Nesvik, CET
NEA Industrial Relations Committee Chairman
231 N. College Ave.
Indianapolis, Ind. 46204

Chief Instructor Supervisor: J. A. Wilson, CET
Box 3321
Warren, Ohio 44485 216-898-3319

Course Outline Committee: Ron Crow, Chairman

Charles Cave, CET
7902 Bardstown Rd.
Louisville, Ky. 40291

Objectives Evaluation Committee: Gene Koschella, EIA
2001 Eye St. N.W.
Washington, D.C. 20006

Charles Cave

Ron Crow

Cost Evaluation Committee: El Mueller, Chairman
EIA Service Committee
9401 W. Grand Blvd.
Franklin Park, Ill.

continued on page 32



Who said B & K couldn't improve the only complete Television Analyst?

Now there is a new model... the 1077-B, with solid state sweep drive.

The B & K Television Analyst has become standard equipment in repair shops everywhere. And for good reason. It's the quickest, simplest way to test every stage of any TV.

But even classic instruments have to keep up with the times. That's why we've added a solid state sweep drive in our latest model. It can check any new transistorized color set on the market today.

It's so easy, too. Because the unique B & K signal substitution technique eliminates the need for external scopes or wave-form interpretation.

Whether it's tubes or transistors, VHF or UHF, simply inject the appropriate test pattern or any other known signal. The new Model 1077-B, with its exclusive flying spot scanner, checks everything from the antenna terminals to the input of the picture tube.

Ask your distributor about the new Television Analyst. Only B & K makes it. And now B & K makes it even better.

Model 1077-B \$399.95



Product of DYNASCAN CORPORATION
1801 W. Belle Plaine, Chicago, Illinois 60613

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

Literature Committee:

J. A. Wilson

Manufacturer Personnel and Equipment:

Admiral Corp.—M. F. Whittenberg
903 Morrissey Dr.
Bloomington, Ill. 61701

General Electric Co.—Don Whitton
6330 Brookville Rd.
Indianapolis, Ind.

GET Sylvania—Jack Berquist, CET
700 Ellicott St.
Batavia, N.Y. 14020

The Magnavox Co.—Ray S. Guichard
1700 Magnavox Way
Fort Wayne, Ind. 46804

Motorola—El Mueller
9401 W. Grand Blvd.
Franklin Park, Ill.

Philco-Ford Corp.—Andrew Murnick, Jr.
Union Meeting Rd.
Blue Bell, Pa. 19422

RCA Consumer Electronics—Helb Horton
600 N. Sherman Dr.
Indianapolis, Ind. 46201

Zenith Corp.—Bill Grant
1900 N. Austin
Chicago, Ill. 60639

ISCET of Washington Is Now a Reality

A number of Certified Electronic Technicians have banded together to form an ISCET Chapter in the state of Washington with the blessing of the Washington State Electronics Council. They will thus be the second state group to receive an ISCET Charter, ISCET of Oregon having received its last summer. (We are quite certain that there will be many other state groups receiving their ISCET Charters before the end of the year.)

A meeting of interested parties was held Sunday, November 19, 1972 where the final ISCET of Washington



constitution was drafted. Those in attendance included (l to r in photo) Bob Raught, CET; Elmer Dubrovay, CET; Tom Long, CET; Carlyle Reynolds, CET; Don Reynolds, CET; Ron Meyer, CES/CET; and Al Wyman, CES/CET. Two other members represented by proxy included Eddie Huss, CES/CET and Don Swanson, CES/CET.

The temporary officers, which will hold office until the Spring Convention of WSEC, include Don Reynolds, CET, President; Tom Long, CET, Secretary/Treasurer; Elmer Dubrovay, CET, Delegate to the WSEC Board; and Ron Meyer, CES/CET, Alternate Delegate.

As has been indicated many times previously, to become a member of ISCET one must first pass the CET exam and then have one's character references approved. This month's issue includes questions representative of those found in Part VIII of the CET Exam.

Section VIII

Troubleshooting and Network Analysis

- Using a capacitor and a resistor, draw a low-pass filter.
- If the circuit in Fig. 1 is a Class A amplifier, the dc

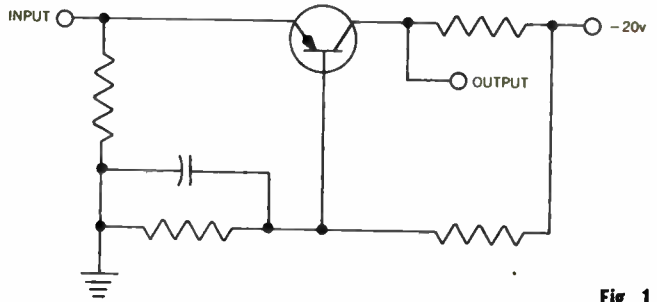


Fig. 1

- With the sine-wave voltage applied to Fig. 2, draw the
- output voltage E_{out} .

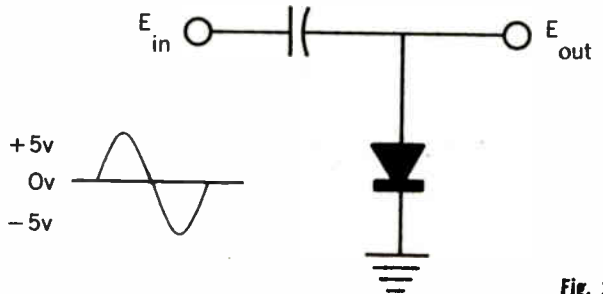


Fig. 2

- In Fig. 3, what voltage would be measured from A to B?

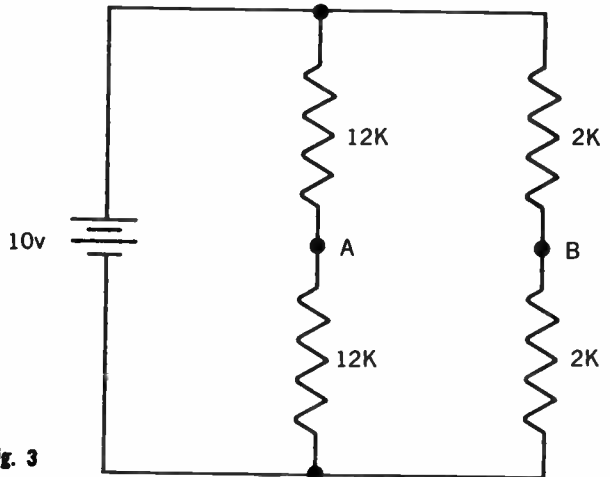


Fig. 3

- If the dc cathode voltage in a tube is made more positive, the tube's conduction will (increase/decrease).

Explanations

- You should have drawn something similar to Fig. 4. High frequencies are "bypassed" to ground. Therefore this is a low-pass filter.

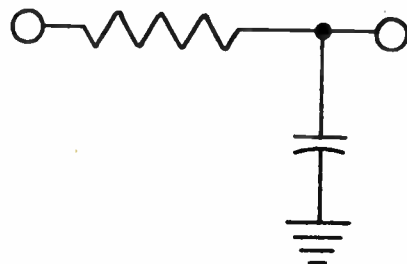


Fig. 4

continued on page 34

GTE Sylvania has the lines that lay it on the line.

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That makes Sylvania tubes easier to sell.

You can tell your customers the advantages of the top-line *color bright 85[®] XR*. You can show them where the savings come from in the economy *color screen 85* line. And you can tell them exactly what they're getting for their money in the middle-line *color bright 85[®] RE*.

The way we see it, if we lay it on the line with you, you can lay it on the line with your customers.

Instead of just handing them a line.



GTE SYLVANIA

	color bright 85 [®] XR	color bright 85 [®] RE	color screen 85
Sylvania rare earth red phosphors	yes	yes	yes
Other manufactured rare earth phosphors	no	no	yes
All sulfide phosphors	no	no	no
X-ray inhibiting glass	yes	no	no
New glass	yes	some	some
Reused glass	no	some	some
Regunned	no	no	some
Screen blemish specs	OEM	OEM	slightly wider than OEM
White field uniformity	OEM	slightly wider than OEM	slightly wider than "RE"
Cut off; purity currents; beam shield leakage	OEM	OEM	slightly wider than OEM

Lowest priced digital multimeter



**NEW HEATHKIT
2 1/2-Digit DMM
Kit IM-1202
\$79.95***

The Heathkit IM-1202 2 1/2-Digit Multimeter sets the new low price for a high performance DMM. It's an easy to assemble kit that pays you for your time — with accuracy, flexibility and features found on multimeters costing twice as much. 1% accuracy on DCV, 1 1/2% on ACV and AC-DC current, 2% on ohms. 29 selectable ranges measure voltage from 10 mV to 1000 V on DC in either polarity, 10 mV to 700 rms on AC; currents from 10 uA to 2 A, AC or DC; resistance from 1 ohm to 2 megohms. And the bright cold-cathode display puts parallax and meter-tapping misreadings out of the picture. Lighted indicators for overrange, positive and negative DC — plus a neat front-panel polarity switch make operation even easier. Internally, the IM-1202 is solid-state perfection — with a pseudo memory for clear, non-blinking display; a dependable ramp analog-to-digital converter with readout updated every 16 msec., and overload protection on all ranges. Everything's housed in a rugged aluminum case with handle, 3-wire line cord (no batteries needed) and universal banana jacks for the test leads supplied.

Kit IM-1202, 6 lbs. 79.95*

Lowest priced frequency counter

**NEW HEATHKIT 5-Digit 30 MHz
Counter**



**Kit
IB-1100
\$169.95***

We've broken the price barrier for frequency counters, too! The new Heathkit IB-1100 has 5-digit readout with 8 digit capability. Switch selection of kHz and MHz and a lighted overrange indicator. The all-solid-state circuitry features cold-cathode readout tubes; custom-designed time-base for accuracy better than ±3 ppm from 22° to 37° C.; diode-protected J-FET for improved triggering over inputs from 100 mV to 150 V rms. Input impedance is 1 megohm, shunted by 20 pF. Professional features include the compact aluminum case with diecast front panel, tinted viewing window, BNC input connector and bail feet. Most components mount on one large PC board — build it in two evenings.

Kit IB-1100, 6 lbs. 169.95*

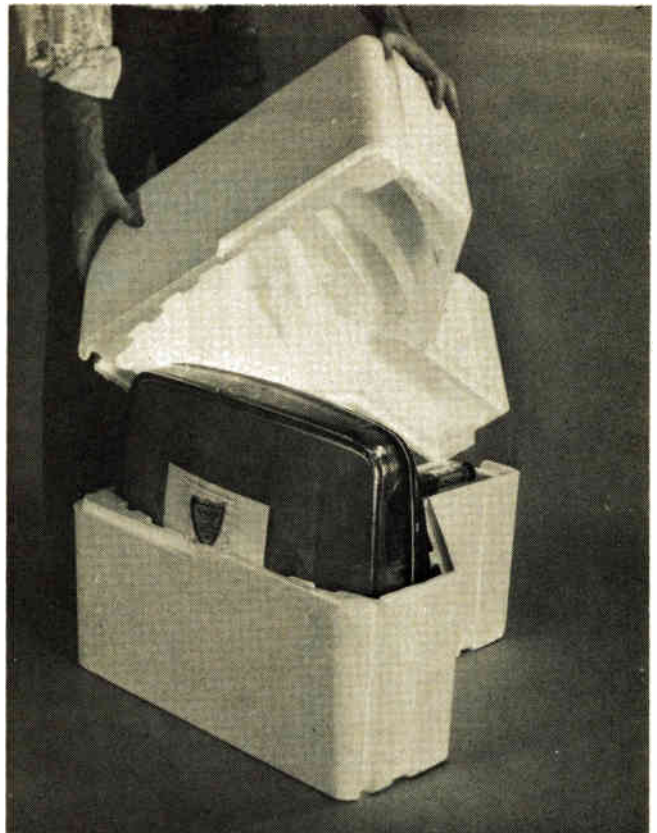
NEWS...

continued from page 32

- To take advantage of the most collector voltage, available, the transistor should be biased so that the collector voltage is about half the supply voltage or about 10v in Fig. 1.
- You should have drawn a sine-wave voltage with 10v pp amplitude, the most positive voltage being 0v.
- You would measure 0v between A and B. Each resistor will have a 5v drop across it. The potential difference between A and B is therefore 0v.
- Conduction will decrease because if the control grid voltage remains the same, the cathode going more positive increases the effective negative bias between cathode and grid.

Foam Pack CRT Carton Permits Easier Replacement

Channel Master is shipping many of its new replacement picture tubes in a rugged styrofoam package (note this month's cover photo and the photo below) for lighter,



easier handling by the electronic technician. This container is said to be 3 1/2 lb lighter than standard cartons, while requiring 40 percent less space. It reportedly comes with hand grips for easier carrying.

The manufacturer indicates that this carton has the added advantage of permitting the shipment of tubes on their sides, rather than face up, thus reducing the chance of particle damage and mask slippage; immunity to exposure to moisture; and the advantage of providing a place for immediately supporting the dud once it has been removed—the new tube resting within one half of the container and the dud resting within the other half.



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phone referral system. It operates 24 hours a day, 365 days of the year. When a customer calls 800-243-6000 asking for Panasonic service, he is referred to the nearest authorized independent service center. Yes, our nationwide network of authorized service centers is made up of men like you, independent service technicians. Panasonic depends on you. For in-warranty and out-of-warranty work. It adds up to more business for you. And, it's no wonder that you become more important to us.



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NEW AND NOTEWORTHY

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

INTRUSION DETECTOR 700

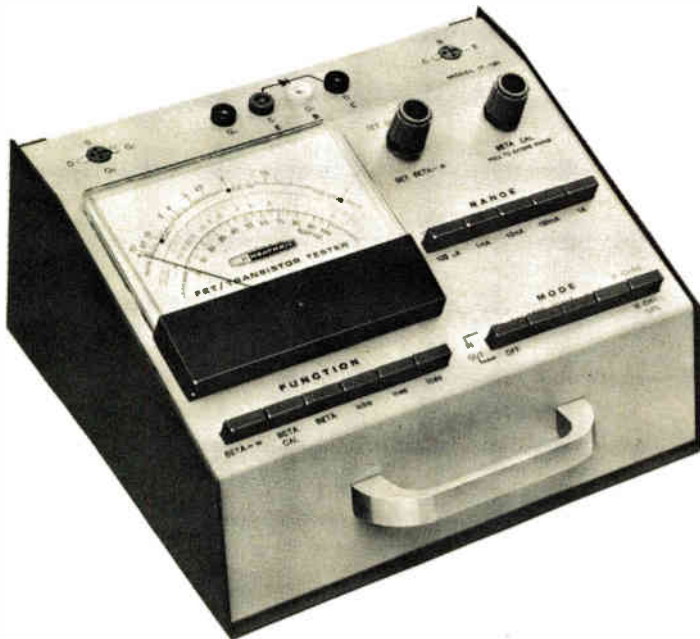
Insensitive to basic sources of false alarms

The Adviser V Intrusion Detector is said to have a unique signal processing technique making it insensitive to the basic sources of false alarms in other motion detectors.

The system consists of a control unit and up to 20 unobtrusive transceivers which provide single or multiple area protection of up to 20,000 sq ft. Transceivers, which contain both the transmitting and receiving transducers, are connected to the control unit by a single cable which may reportedly be up to 1500 ft. long. The detector is said to be compatible with all standard alarm and central station monitoring devices. Tampering or cutting of wires reportedly causes an alarm. Up to 4 hr of standby power, without loss of detection, in the event of a power failure is provided by self-charging batteries. Advisor Security.



**FOR MORE
NEW PRODUCTS
SEE PAGE 58**



FET TESTER 701

Measures leakage down to $1\mu\text{a}$ and collector currents to 1a

Introduced is the Model IT-121 FET Tester for checking transistors, diodes, FETs, SCRs, triacs and unijunction transistors, in or out of circuit. Five current ranges reportedly measure current leakage as low as $1\mu\text{a}$ and collector currents as high as 1a. Gain (dc Beta), transconductance (GM), and leakage values are read directly on a large meter face. The tester has color-coded pushbutton range selection, battery testing circuit and 3-in. leads. Heath Company.

COAX STRIPPER/CUTTER 702

Designed for use with RG59U coaxial cable

A coax stripper/cutter, No. 590, is designed specifically for use with the popular RG59U coaxial cable. Featured is a three-position selector lever. With the lever in Position 1, the hardened and ground blades reportedly cut cleanly through the jacket, shielding and dielectric without fraying, to expose the conductor. Position 2 removes the jacket and shielding, while Position 3 strips the jacket off without damage to the shielding, or dielectric. With the selector lever disengaged, the entire coax cable can be cut neatly to length. Handles have cushion grips for user comfort and to lessen fatigue. Xcelite.



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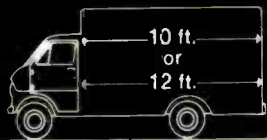
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TEKLAB REPORT

Emerson's 30M20 Modular Color-TV Chassis

by Joseph Zauhar

The extensive use of modules and the manner in which components are mounted to the main chassis make this receiver ideal for servicing

■ Most of the manufacturers of new color-TV sets introduced this year are using modular-type chassis, or have them in advanced stages of pre-assembly-line development. These chassis are aimed at making servicing easier through the use of modular circuit-board substitution techniques.

One new modular chassis that has been added to Emerson's color-TV line makes optimum use of the best currently available characteristics of integrated circuits, transistors and tubes—all three. The resulting circuitry is contained on nine plug-in printed-circuit boards, with the exception of the horizontal-output and damper stages (and power supplies).

The Emerson Model 25CC93S, employing a 30M20 color-TV chassis, that we received for review includes quite a number of new interesting features. The chassis is mounted on rails and can be pulled out approximately 5 in. by removing two hold-down screws—thus making component and module replacement easier.

Modules mounted to the main chassis are secured with wing-type fasteners, and they can be released with a quarter turn—using a tool provided with the TV set.

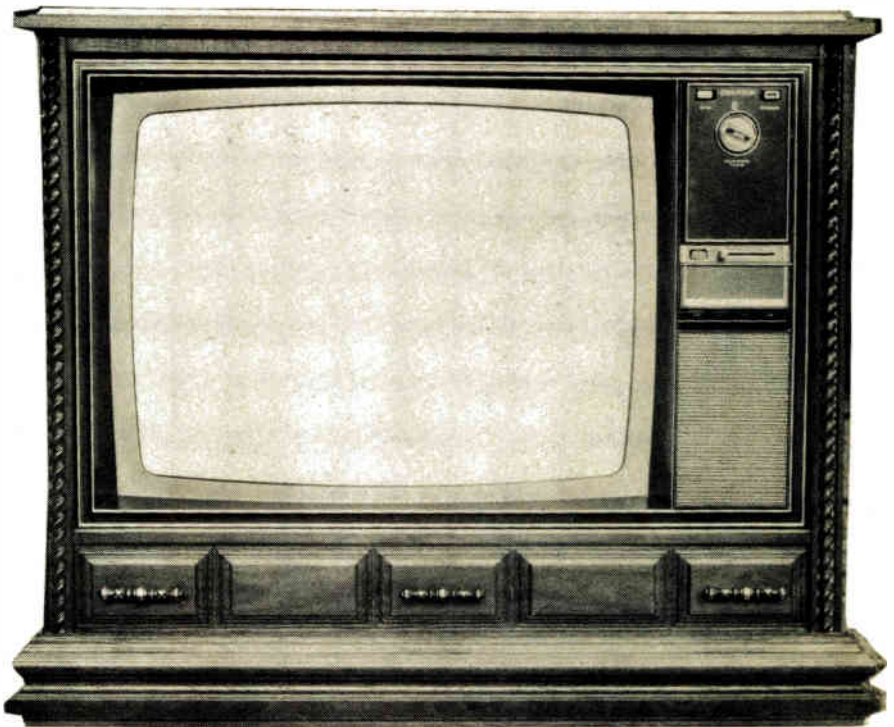
All wire connections to the modules are made on the top edges with push-on-type connectors. The boards are clearly roadmapped

along the top surface, showing the various tie points and component locations.

This chassis employs three new electron tubes—a 6DK3 damper, a 6LW6 horizontal-output and a 6MN8 color-difference amplifier. These new tubes will be included in the M20 service kit, which will reportedly be made available to permit electronic technicians to trouble-

shoot, service and restore the chassis more rapidly. The balance of the tubes—a 6JW8, 12HG7, 6LU8 and 6AQ5—are not part of the service kit.

The convergence board module is mounted around the neck of the picture tube. In addition to the conventional CONVERGENCE controls, this assembly also contains a pin-cushioning circuit, a width adjustment



Emerson's Model 25CC93S Color-TV set employing the 30M20 chassis.

coil and a picture centering diode.

Some of the important new circuits for this chassis can be studied with the use of this month's Tekfax Schematic No. 1454.

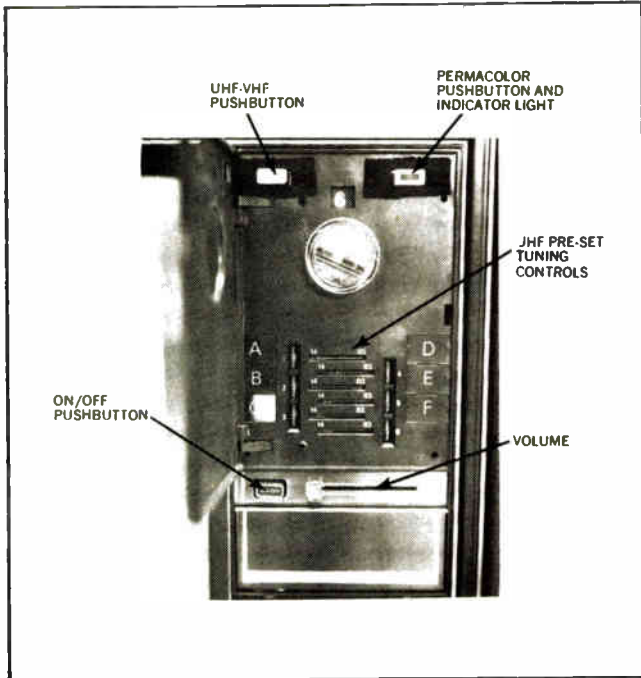
UHF/VHF Tuner

When viewing this TV set from the front, we noted that it has only one channel selector knob, which is used in conjunction with a UHF/VHF pushbutton switch. This tuning

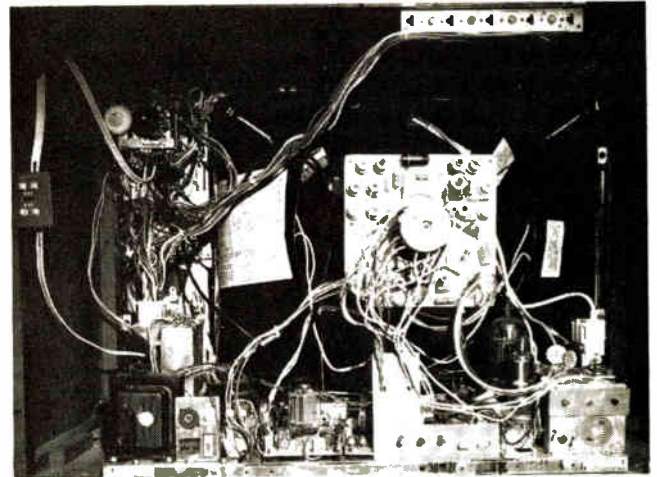
system is somewhat different from any that we have encountered before.

The 12 position VHF tuner is paired with a varactor UHF tuner that includes an RF amplifier. The varactor UHF tuner output is connected to the cascaded VHF tuner mixer, and for this reason there is not an extra channel position on the VHF tuner for UHF reception. Upon pressing the UHF/VHF

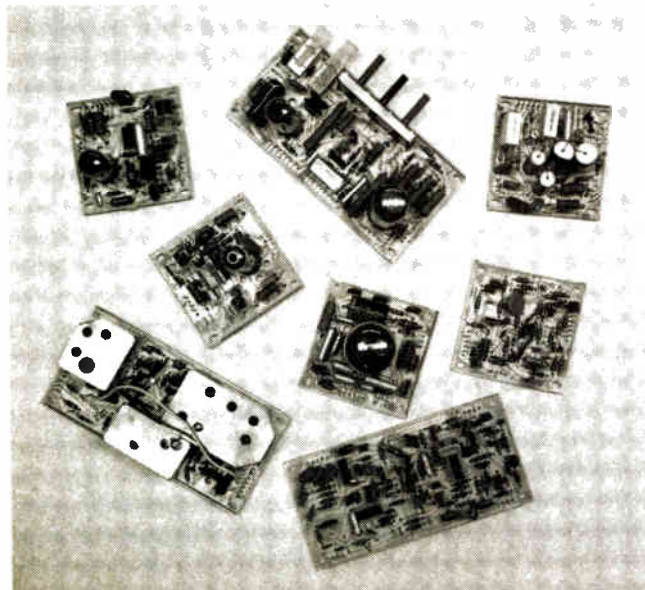
switch inward, B+ is removed from the VHF tuner's RF and oscillator stages and applied to the UHF tuner—the VHF tuner mixer stage remaining biased. The VHF channel selector shaft is continually mechanically connected to a switch for selecting any one of six dc control voltages. Each time the VHF channel selector knob is rotated two positions (over a range of two VHF channels), a different UHF dial



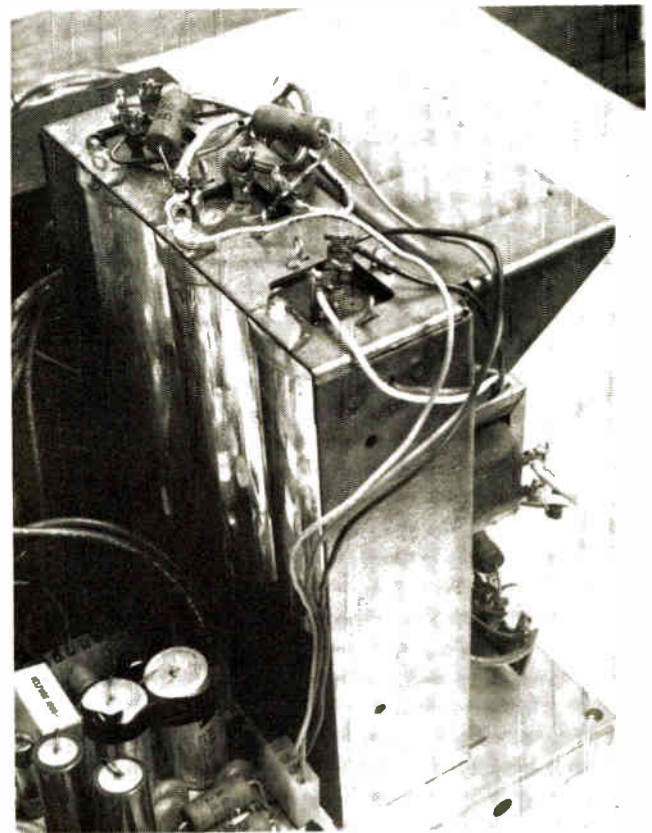
The M20 chassis utilizes a 12-position VHF tuner and a varactor UHF tuner. There are six thumb knob adjustments which provide for tuning six UHF channels.



Rear view of the color-TV set showing the service adjustments and the Permacolor adjustments at the top right of the cabinet.



Most of the circuits are contained on nine plug-in modules. (The convergence module is not shown.)



The filter capacitors are grouped and wired at the top to simplify removal, if required.

light is appropriately illuminated.

Behind the control panel door there are six thumb knob adjustments just below the selector knob. Each thumb knob is located next to an illuminated UHF channel pilot light, indicating which thumb knob is in use for channel selection. Turning a thumb knob adjusts a precision potentiometer, thus varying the voltage supplied to varactor diodes so that their resulting capacitance

will tune the UHF tuner to the desired channel.

Permacolor Circuits

Another pushbutton switch located on the control panel activates the Permacolor circuits. This feature is intended to provide the customer with a good color picture with minimum adjustments. When depressed, illuminating the pushbutton, the BRIGHTNESS, CONTRAST, COLOR and

TINT controls are transferred to a bank of preset potentiometers that are adjusted from the rear of the TV set.

Power Supply

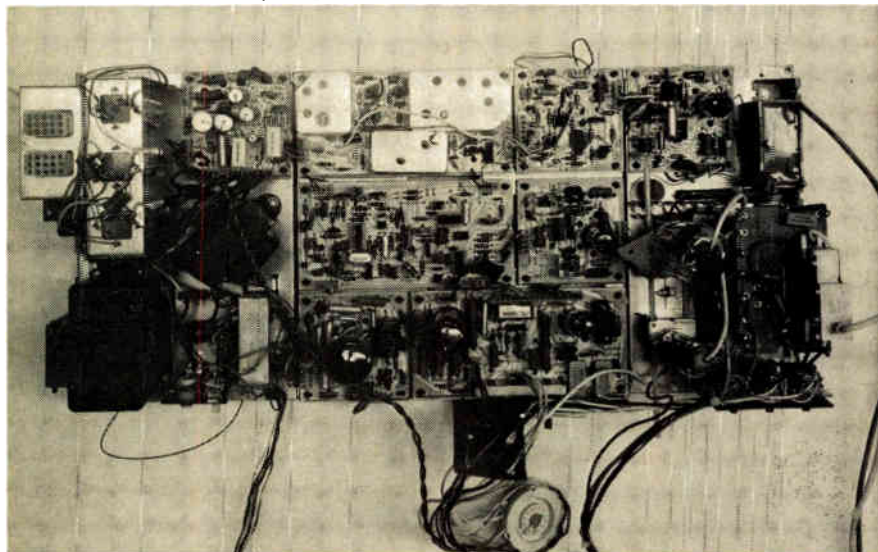
The power supply module contains three separate power supplies to provide 400v and 310v, plus a 26v source for operating the solid-state circuitry. Two 6.3v ac filament voltage supplies are provided by an independent filament transformer, T101. The 6.3v ac supply for the picture tube is established on a B+ dc level provided by voltage divider resistors R905 and R900 to the 295v B+ line. The filament supply lines are protected by fuses F903—a 2-in. length of No. 26 copper wire—and F902—a 4 amp pigtail-type fuse. Fuse F900 and F901 are plug-in fuses protecting the 25v and 28v supplies. A 3a fuse (F100) is used in the ac line.

Chroma Processing Circuits

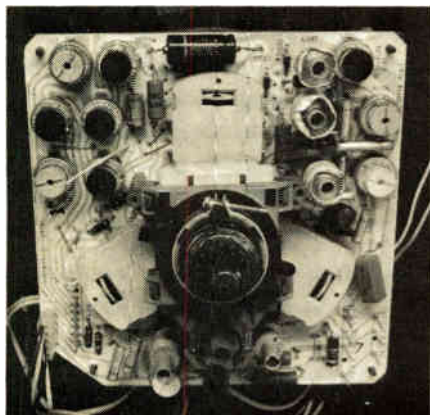
The chroma processing module employs three transistors and three integrated circuits. Pulse-forming transistors (Q400 and Q402) shape the $10\mu\text{s}$ normal retrace blanking pulse and narrow it down to a $4.5\mu\text{s}$ pulse. The Colormaster transistor, Q401, is switched ON or OFF by the COLOR MASTER control, altering the demodulation angle to widen the flesh tone range. This transistor serves as a switching device to connect capacitor C436 (680pf) to ground. When the PERMACOLOR (ATC) switch is OFF, capacitor C436 is connected in series with a 470pf capacitor, C433, which is returned to ground. When the PERMACOLOR (ATC) switch is turned ON, capacitor C436 is grounded directly through transistor Q401. This capacitor is connected in series with a 480Ω resistor, R435, to Terminal No. 10 of integrated circuit IC400.

The 3.58MHz subcarrier regenerator integrated circuit (IC400) is a plug-in type containing six stages. These stages include the automatic chroma control (ACC), automatic phase control (APC), a 3.58MHz oscillator, a 3.58MHz output stage, a horizontal keyer and a 12v shunt regulator circuit.

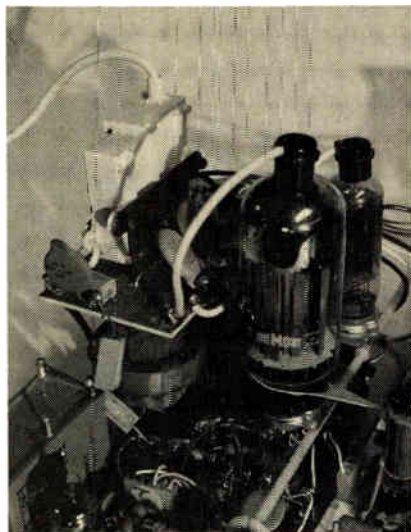
The second plug-in integrated circuit is the chroma amplifier



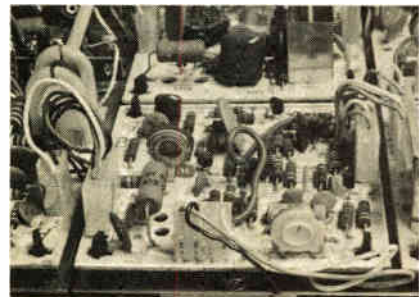
Top view of the new 30M20 color-TV chassis employing plug-in modules plus other features to make servicing easier.



The convergence module is mounted on the neck of the picture tube. It includes the convergence controls, pin-cushion circuit, width adjustments and a picture centering diode.



The high-voltage circuit uses a voltage tripler—a solid-state device requiring a horizontal pulse of slightly more than 8kv to provide a high voltage of 25kv.



The connecting wires to the modules are secured on top with push-on-type connectors

(IC401) which employs four stages to accomplish its three functions. These functions are to amplify the color signal, to provide color killer action and to respond to ACC detector control, providing constant color level with changes in broadcast characteristics.

The third integrated circuit (IC402) employs nine stages containing the demodulation circuits. This module also contains four thumb adjustable ACC, APC, COLOR KILLER and TILT (tilt of the chroma IF bandpass) controls. Video information is fed into this module and its output contains the R-Y, B-Y and G-Y signals that are coupled into the video chroma output module, containing the 6MN8 color-difference amplifiers.

The COLOR control (chroma dc gain) changes the dc potential at Terminal No. 10 of the chroma amplifier integrated circuit, IC401. In a similar manner the TINT control changes the hue by varying the potential applied to Terminal No. 1 of the sub-carrier regenerator integrated circuit IC400. These controls operate in a different manner than many earlier chassis since they supply a dc bias control voltage to the integrated circuits and consequently none of the controls need handle ac signals—thus eliminating control noise that might generate interference.

Horizontal Output System

Two tubes are used in the horizontal output system. They consist

of a 6LW6 for the horizontal output stage and a 6DK3 provides the damping action.

Because of the low horizontal output transformer pulse (slightly over 8kv) permitted with the employment of a solid-state tripler, the possibility of X-radiation in the high-voltage circuitry is eliminated. The horizontal output transformer is therefore not in a shielded compartment. We found that the high-voltage transformer could therefore be mounted for simplified removal if required.

The positive pulse from the fly-back is distributed throughout the chassis, providing a signal source for the keying, blanking and bias circuits. At the time the pulse returns to zero, damper-tube conduction takes place, keeping the pulse from going negative and removing unwanted oscillations or ringing. It is during this time interval that the first half field of horizontal trace is swept. At the same time, capacitor C113 is charging to the boost level. The voltage developed damper conduction is added to the B+ supply, developing B+ boost. The boost voltage is then doubled by boost diode D100 and associated components (capacitors C110, C111 and resistor R113) to provide supply voltage for the picture-tube SCREEN GRID controls.

The focus voltage on this chassis is derived from a divider network made up of resistors R127, R128 (FOCUS control) and the focus module, consisting of resistors R126A

and R126B. This network is in parallel with the second anode voltage and merely "taps off" a portion of the high voltage to provide the desired focus voltage.

Bias Rectifier

A pulse voltage from Terminal 1 of the high-voltage transformer (T104) is applied to a capacitor divider network consisting of capacitors C818 and C813. This divider reduces the peak-to-peak voltage of the horizontal pulse to the desired value. Since the horizontal pulse has a negative and positive voltage component, diode D801 is connected across C813 so that it will conduct only on the positive portion of the pulse. When the negative portion of the pulse arrives at the diode, it is back biased into non-conduction. The resulting negative dc voltage is applied to one side of the BRIGHTNESS control (R145), biasing the second video amplifier (12HG7) and picture tube at cut-off or no brightness.

Audio Module

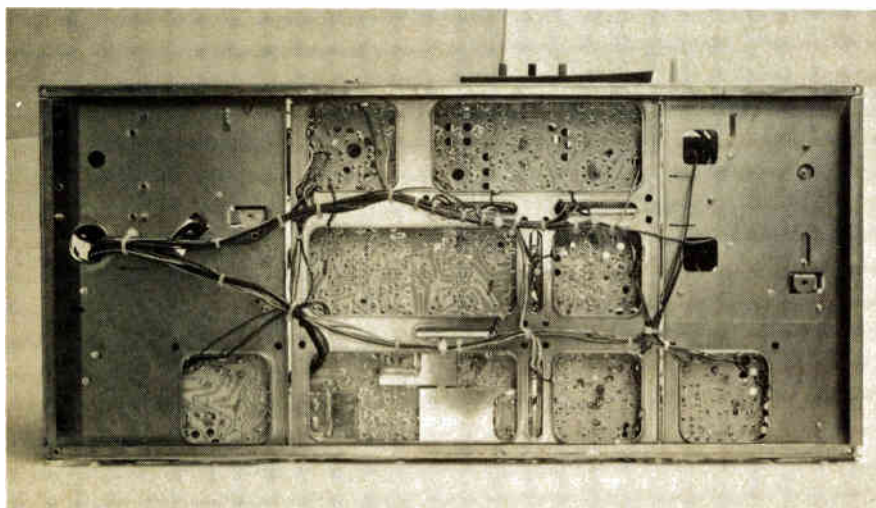
This module contains the sound IF and detector (IC500), a transistorized audio amplifier (Q500) and a 6AQ5 audio output tube. The IC is mounted in a socket making replacement easier if required. The VOLUME control on the front panel of the TV set controls the volume by changing the dc potential applied to Terminal 6 of the sound IF and detector IC.

Summary

We felt that it was obvious that the chassis is designed to make servicing easier. Not only simplified by the extensive use of modules, but in the manner which the components are mounted on the main chassis.

The filter capacitors are grouped and mounted with the wire connections on the top side. All wire harnesses are connected by employing plug-in connectors. The high-voltage wire terminals are on the top for easy access, and the high-voltage transformer can be removed from the main chassis simply by removing one screw.

You will likely agree that features such as these can shorten your servicing time. ■



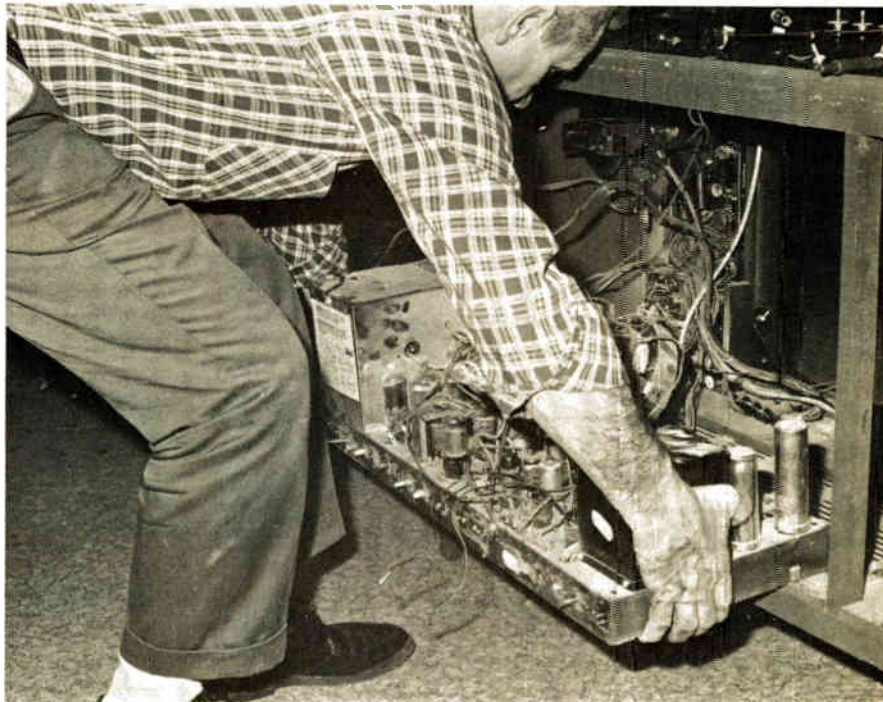
There are no components located under the chassis, but provisions are made for access to the components on the modules.

New Color-Picture Tube Replacement Technique

Replacing the 23EG a new way, with a better tube that costs less, and in less time



By 12:00 the electronic technician has removed the dud picture from the chassis—the first step required whichever procedure is selected for replacing the defective 23EG tube.



A1—Before installing the 25A tube, the chassis must first be removed and the TV set placed face down.

■ The 23EG is one of the most commonly encountered color-picture tubes in older TV sets, and today it accounts for about 10 percent of all color tube replacements.

The electronic technician faced with the replacement of this particular tube has three choices available to him:

(1) He can replace the defective 23EG with another 23EG. This is hardly ever done any more, since the 23EG, an old type originally adapted from a black-and-white bulb, is known as an unreliable type with a short life. Furthermore, it is a sulphide tube, and does not measure up to modern standards of brightness.

(2) The defective 23EG can be replaced with the reliable 25A. This is a rather popular procedure. How-

ever, to do so the installer must purchase a separate conversion hardware kit, consisting of a metal band and mounting brackets, and attach it to the tube before it can be installed.

(3) Probably the newest and best alternative is to replace it with a 25EG, a designation created by Channel Master. This consists of a 25A, using rare-earth phosphors, with all mounting hardware already attached to the tube at the factory. About 25 minutes are saved by installing the 25EG instead of the 25A, as well as the cost of the conversion kit.

The sequential photos shown in the balance of the article compare the steps required to make a replacement with the 25A, versus the 25EG. *continued . . .*

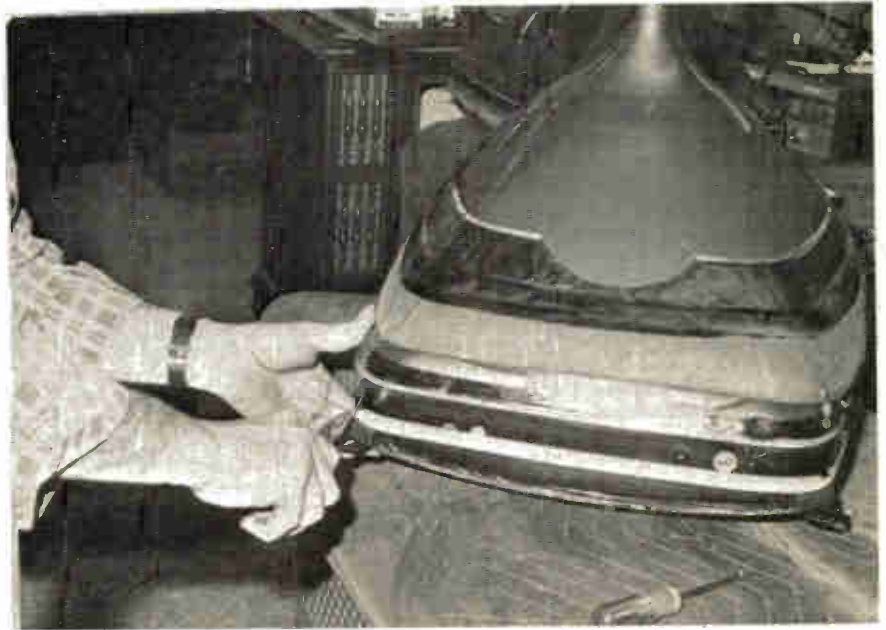


A2—The electronic technician must then study the mounting instructions for the conversion hardware kit.



A3—The mounting band and four brackets are placed on the 25A tube.

A4—The beam shield is mounted on the 25A tube, and the springs are stretched with effort to fit the larger tube.



A5—The 25A tube is mounted through the rear of the cabinet.





A6—The electronic technician manually adjusts all four mounting lugs on the band and lines them up with the mounting brackets.



A7—The chassis is replaced.



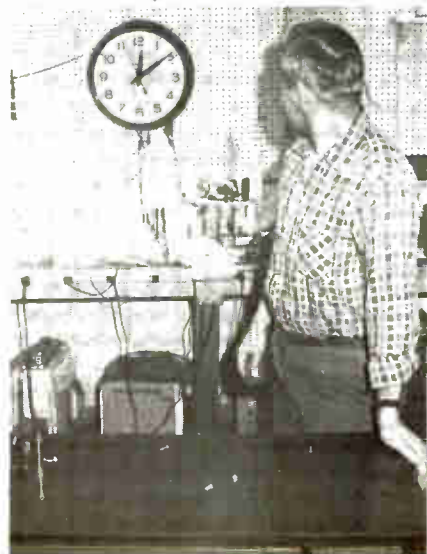
A8—The electronic technician is ready to set up the 25A tube. Total elapsed time—35 minutes.



EG1—With the other technique, the first step is to remove the 25EG tube, complete with mounting brackets, from its carton.



EG2—The beam shield is then cut and fitted over the 25EG. It goes on easily with spring-mounted loops. (The "Speed Fit" replacement for Zenith tubes includes a preassembled beam shield, a de-gaussing coil and adhesion pads already placed in position for the yoke.)



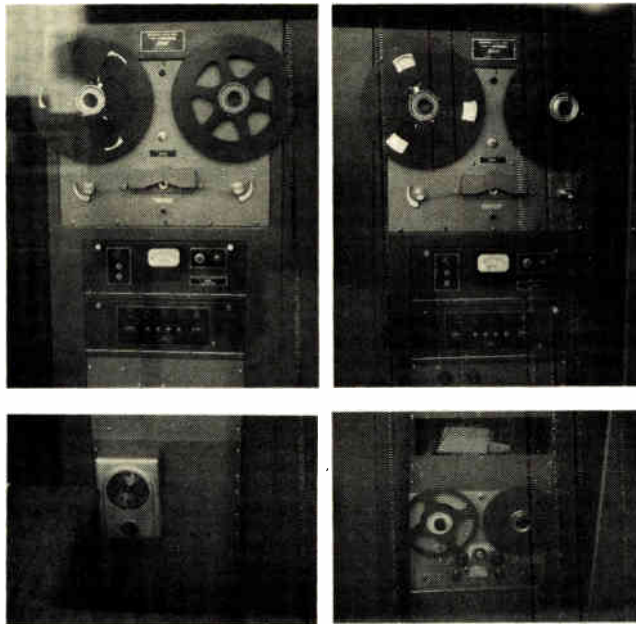
EG3—On most TV sets, the 25EG tube is mounted from the front of the cabinet, far left.

EG4—The molding is then replaced around the 25EG tube and the installer is ready to set up the tube. Total elapsed time—9 minutes.

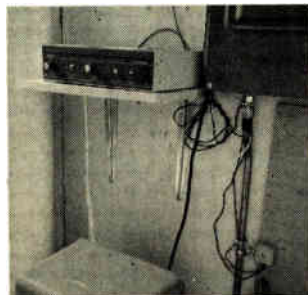
A Practical Application

by Phillip Dahlen

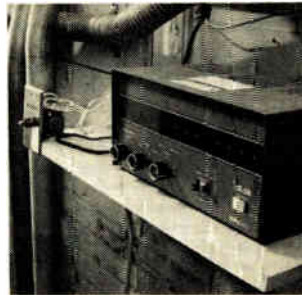
One of the best commercial audio systems in town is located right in our own buildings



The two large tape decks in the Muzak center contain 8-hr. reels of audio tape. A timing signal recorded upon the tape controls the 13½ minute playing interval. After a 1½ minute pause, the tape deck automatically continues playing the music. The smaller tape deck below was programmed to insert appropriate music at more frequent intervals as the recent holiday season approached. (These tape decks were photographed through the front window of the Muzak center.)



The main audio amplifier, located in the First Street building behind one of several large racks of telephone switching equipment, is connected through a leased telephone line to the Muzak center. A 70.7v-balanced-line distribution system is used for driving the speakers in each building.



A second audio amplifier in the Second Street Building is connected through a leased telephone line to the amplifier in the First Street building. The external control to the left is typical of those located in various parts of both buildings for regional AUDIO-LEVEL control.

■ Last year we ran a series of four technical articles by Jack Hobbs, former Managing Editor of *ELECTRONIC TECHNICIAN/DEALER*, that was concerned with the successful installation of commercial audio systems. These articles—printed in the January, March, May, and August 1972 issues—told of the need for background music systems, how they can be used in restaurants for easier communications, and their importance as a source of future revenue. Hints were also included concerning the spacing of speakers, proper speaker wattages, power distribution and quality of components used.

Although restaurants, schools, grocery stores and even hospitals are considered a natural for background music systems having paging facilities, office buildings may too frequently be overlooked as another revenue source. And what better example of a successful application than the two buildings that we occupy in Duluth, Minn. (Our corporation owns the larger building at 1 East First Street and leases another building several blocks west on Second Street. This, of course, is in addition to the office building that it owns in New York City and the offices leased in many other parts of the country.)

The system used in our buildings is provided by Muzak Corp., a Teletypewriter Co. (Muzak is NOT a generic name!) The music is shipped to their Duluth facilities on large reels of 8-hr magnetic tape. There it is automatically played for 13½ minute intervals with a 1½ minute pause between intervals. This is not just "any old music" that they are play-



A microphone at the switchboard permits our company operator to page people simultaneously in both buildings.

ing, but selections that are said to be scientifically selected for best employee performance, using what they call a stimulus progression—the selections progressing from the least to the most stimulating. The level of this music is to be kept low so that one senses its presence rather than really listening to it, and there is no vocal music played.

Muzak literature tells of

one study in which this music reportedly reduced employee absenteeism from 7.35 percent to 5.6 percent, reducing clerical errors from 8.1 percent to 5.7 percent—they later leveling off at 6.1 percent.

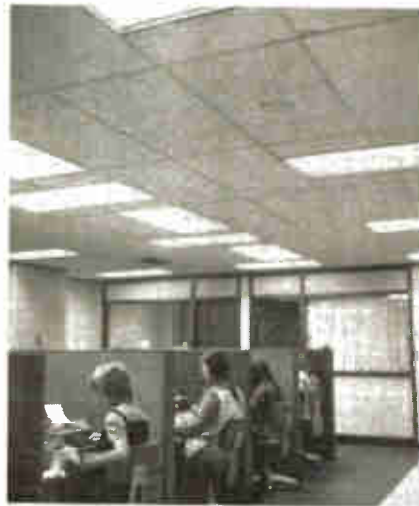
This music is transmitted to our First Street building at a -3db level on a leased telephone line, and then passed through a 75w audio amplifier located in a first-floor room

containing company automatic telephone switching equipment. Messages are added through a microphone located at the company telephone operator's desk. Once mixed, the signal is applied to not only the 49 speakers in this building, but again returned to a -3db level for transmission through another leased telephone line to the other building on

continued on page 67



Maximum volume is required in our first-floor computer room—used primarily for maintaining current subscription lists—to permit one to hear the music and announcements over the noise of the equipment. (Note the speakers in the ceiling above the computers.)



A relatively high noise level must also be overcome in the first-floor area in which subscription information is key punched for the computer. (This department is so large that it handles outside publications, in addition to all of our own.)



Lower music levels are required for the second-floor area behind the switchboard and executive offices, used for the manual processing of circulation information.



Lower music levels also serve the fourth-floor Production Department (in the foreground), the Directory Department (in the background), and the artists (in many of the perimeter offices). (The camera was positioned adjacent to the desk of the ELECTRONIC TECHNICIAN/DEALER Production Manager, not shown.)



A pair of speakers serve the company dining area at the rear of the fourth floor.



One of several speakers serving the Direct Mail Department (background) and Stock Room.

Basic Digital Circuitry

by Phillip Dahlen

Part III—

Obtaining the counting interval

■ The first of the two previous articles in this series was concerned with modifying the applied signal so that it would properly trigger the first flip-flop circuit in Heath's IB-101 Frequency Counter (page 56 of November issue), while the second explained how flip-flop circuits—designed to count only between zero and one—can be combined for counting to ten (page 45 of the December issue). This, the third article in the series, is kind of a break from the detail in the previous articles—particularly the last one. It is merely concerned with the signal generated by the crystal oscillator, and the use of decade counters to produce signals for switching ON and OFF the frequency-counter circuitry at appropriate intervals. This circuitry (Fig. 1)—the clock and divider chain—were originally shown in the lower left of the

complete schematic in Fig. 7, page 58 of the November issue. It is also shown in Fig. 2 of this month's article.

Gates A and B (each a quarter of the circuitry in IC25) each contain two inputs—Pins 1 and 2 for Gate A and Pins 12 and 13 for Gate B. With one of each pair of inputs grounded, these gates function as inverter amplifiers (Pins 2 and 12 being grounded).

Some of the output signals from Gate D (Pin 14)—Fig. 6—is applied to the 1MHz crystal, which oscillates at its resonant frequency and, along with resistor R9 and capacitors C6 and C7, tunes the feedback signal—Fig. 3—applied to the input of Gate A (Pin 1). Gate A inverts, amplifies and clips the applied signal, its output—Fig. 4—being differentiated by capacitor C8 together with resistor R11

—Fig. 5—before being applied to the input of Gate D. This second gate in turn inverts, amplifies and clips the applied signal, its output (Pin 14)—Fig. 6—being fed to the first decade counter in the divider chain (IC 1) in addition to being the

source of the feedback signal.

Although the waveforms in Fig. 3 through 6 accurately represent the signals present in the clock oscillator, they may generate some confusion concerning the actual phase relationship between these

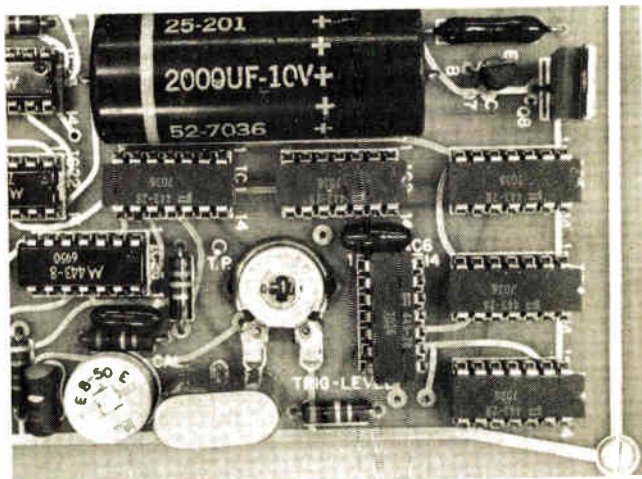


Fig. 1—The clock and divider chain in Heath's IB-101 Frequency Counter.

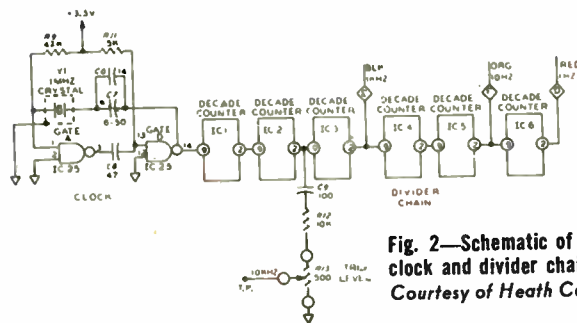


Fig. 2—Schematic of the clock and divider chain. Courtesy of Heath Co.

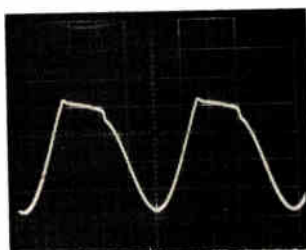


Fig. 3—Feedback signal applied to Gate A.

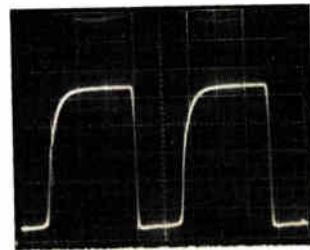


Fig. 4—Output signal from Gate A.

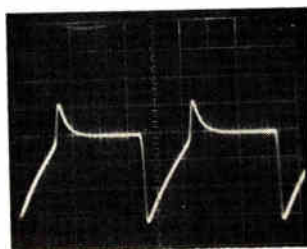


Fig. 5—Differentiated signal applied to Gate D.

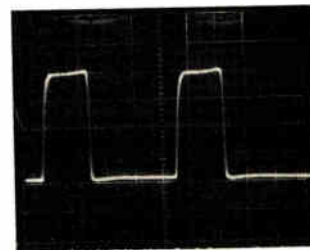


Fig. 6—Output signal from Gate D used to excite crystal (Y1) and drive divider chain.

signals. These waveforms could have also accurately indicated phase relationships if we had applied an external sync input to the Telequipment D67 scope used—thus synchronizing the scope to but one signal as we produced these waveforms. However, when ob-

serving but one trace at a time, it is still rather difficult to compare the phase relationships of these waveforms when you have only the scope gradient as a reference. It is much simpler to instead use the dual-trace feature of this scope.

Fig. 7 contains a composite photo of the same type used in the two pre-

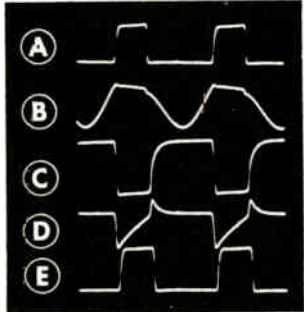


Fig. 7—Composite photo showing phase relationship of signals present in oscillator circuit.

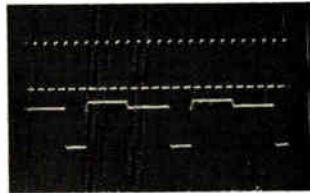


Fig. 8—Clock signal applied to decade counter IC 1 (upper trace) and the resulting output signal (lower trace).

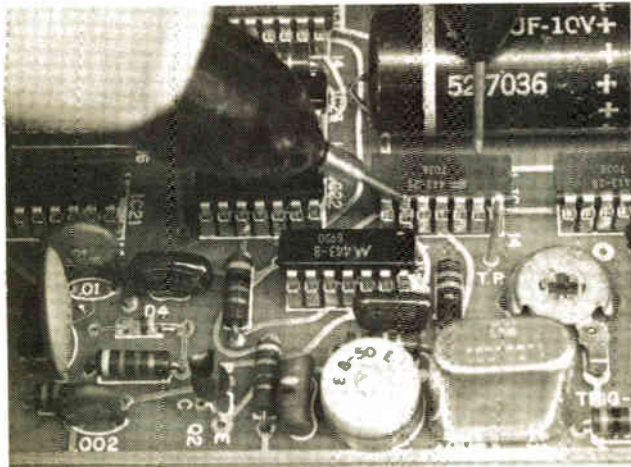


Fig. 9—A pair of scope probes are applied to integrated circuit IC 1 for sampling the 1MHz and 100kHz signals present.

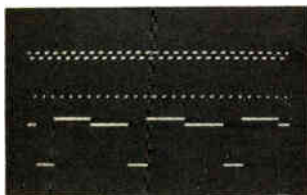


Fig. 10—Applied 100kHz signal from previous decade counter and resulting 10kHz signal.

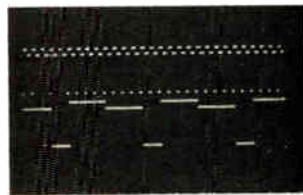


Fig. 11—Applied 10kHz signal from previous decade counter and resulting 1kHz signal.

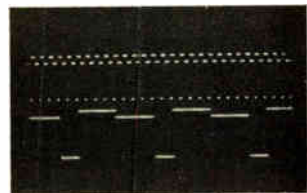


Fig. 12—Applied 1kHz signal from previous decade counter and resulting 100Hz signal.

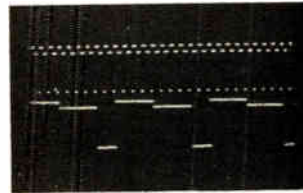


Fig. 13—Applied 100Hz signal from previous decade counter and resulting 10Hz signal.

vious articles. Waveform A represents the Gate D output signal, as fed to the scope's Input 1 (no effort was made to see that the gain of Inputs 1 and 2 were the same); Waveform B, the signal applied to the input of Gate A, as fed to the scope's Input 2; Waveform C, the Gate A output signal, as fed to the scope's Input 2; Waveform D, the Gate D input signal, as fed to the scope's Input 2; and Waveform E, the Gate D output signal, as fed to the scope's Input 2. This photo thus shows the interrelationship of the signals in the oscillator or clock circuit.

The 1MHz signal from the clock circuit is fed to the divider chain to produce 1kHz, 10Hz and 1Hz signals for precisely regulating the frequency counter's counting circuitry. More details concerning the use of these signals will be included in the next article. At this point, we are only interested in observing the frequency of the 1MHz clock signal being divided by 10 in each decade counter of the divider chain.

Fig. 8 shows 25 cycles of the 1MHz signal from the clock (upper trace) and 2½ of the resulting cycles (lower trace) produced by the output of the first decade counter (IC1). Had we observed 30 input cycles, we would have observed three complete output cycles. (In Fig. 9 we see the scope probes positioned for obtaining this pair of signals.)

Fig. 10 shows 28 cycles of the signal from the first decade counter (IC 1) and nearly three complete resulting cycles of the signal output from the second decade counter (IC 2).

Fig. 11 in the same

manner shows the applied signal (upper trace) and resulting signal from the third decade counter (IC 3).

Fig. 12 shows the 1kHz signal applied to the input of the fourth decade counter (IC 4) and the 100Hz signal resulting at its output; Fig. 13 shows the 100Hz signal applied to the input of the fifth decade counter (IC 5) and the 10Hz signal resulting at its output; and Fig. 14 shows the 10Hz signal applied to the input of the sixth decade counter (IC 6) and the 1Hz signal resulting at its output. Although each pair of waveforms looks nearly identical to the other, this is due only to the fact that the scope sweep frequency was changed for each photograph. Thus the bottom waveform in Fig. 12 shows the same signal as the top waveform shown in Fig. 13; and the bottom waveform in Fig. 13 shows the same signal as the top waveform shown in Fig. 14.

Unlike the decade counters described in the previous article, these decade counters have merely a single output which provides a pulse for the next circuit each time 10 pulses are received. Since we are merely interested in producing output pulses at predetermined frequencies, rather than counting to some number and then repeating the count, there is no need for inhibiting or resetting these counters. ■

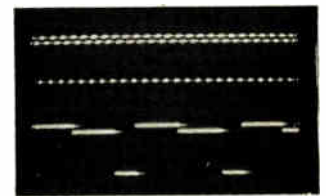


Fig. 14—Applied 10Hz signal from previous decade counter and resulting 1Hz signal.

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A brand-new picture-symptom service guide for solving every TV trouble, both color and black-and-white. You simply compare the symptoms you see and hear with those pictured or described and you'll be able to pinpoint any trouble to a specific circuit and component in short order. In the first chapter, each trouble symptom is pictured and described to help you identify the probable cause. From there you are referred to one of the remaining 19 chapters dealing with specific troubles in each section of the receiver, explaining how to further analyze existing symptoms and pinpoint troubles. Individual component tests are suggested, too, everything from flybacks to transistors. 256 pps., 225 illus. Hardbound.

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How to Use Color TV Test Instruments



Here's an opportunity to close whatever gaps there are in your ability to use modern, up-to-date equipment designed specifically to save you time and money. You'll quickly grasp the author's common-sense approach to using the right instruments, thereby getting the most out of your investment in test gear. You'll improve your ability to use an oscilloscope, color bar generator, alignment generators, vectorscope, TV Analyst and sine, square-wave generators. The author also has included a description of his "cure tracer." With this simple scope attachment, you can readily assess the condition of diodes, transistors—even ICs—in or out of the circuit. 256 pps., over 230 illus. Hardbound.

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Basic Electronics Problems Solved



Here are easy step-by-step solutions to many 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, semiconductor, 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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Jack Darr's Service Clinic No. 2



Here's more of the Jack Darr wisdom (and wit!) in book form—a valuable collection of timely service hints and trouble solutions covering color and monochrome TV, radio, stereo, phono, recorders, CB gear, etc. Discusses the "engineering" servicing approach, efficiency, and how a technician may condition his thinking to produce more in a given time period. Like the first volume, the content was selected on the basis of usefulness to the average technician, covering a wide range of electronics devices. Each of the 10 chapters covers a general category of interest, and in each the subject matter is arranged in logical order to enable you to find what you need quickly. Provides a wealth of information. 176 pps., numerous illus. Hardbound.

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Modern Radio Repair Techniques



Up-to-date service data on all types of modern radio receivers, including AM, FM, stereo, auto and multiband—plus complete 36-page foldout schematics for 12 popular brand-name sets. Reveals many simple shortcuts to making radio repair a profitable side or main line of business. Material is presented so that seasoned technicians can gain from the numerous troubleshooting tips, and beginners, with a few hours study, can begin to turn out profitable work in a short time. Includes shortcut methods of troubleshooting, plus general test techniques. Covers receiver circuits and fundamentals of circuit operation. 260 pps., 170 illus. Hardbound.

List Price \$7.95 • Order No. 580

199 Electronic Test & Alignment Techniques



Here's a brand-new quick-reference guide of 199 tests that will help you troubleshoot virtually any electronic device found in the average home—AM and FM radios, TV receivers, antenna systems, intercoms, electronic organs, garage door openers, auto ignition systems, and many others. You'll learn how to check out home intercom systems and electronically-controlled garage door openers. With this book, it'll be a breeze for you to tackle almost any electronic repair job. You'll learn how to analyze the results of each step you take and how to come to the right conclusion. A concise, easy-to-use source of troubleshooting information. 224 pps., 130 illus. Hardbound.

List Price \$7.95 • Order No. 593

AN EXTRAORDINARY OFFER.

... for more details circle 105 on Reader Service Card



Your Business Future: To Invest, or Not to Invest

by Raymond E. Herzog

The outlook for TV sales and service is good for those in the TV business. To some others, our national economic future may not be so promising. Your decision: invest in your business now, or not invest (and possibly miss a good profit).

Question: "Would you invest \$500 in your business for a predicted return of, say, \$1200?" . . . if the chances for the return were good, you'd most likely hasten to say, "Yes."

Such an investment in business is quite possible for such items as: increased advertising, added help, further education or training, or new equipment.

After all, the outlook for TV sales and service is good. And your own thoughts on television, business in general, and the economy, are fairly optimistic. (If they weren't, you probably would not have read past the first line of this article.)

So then, anxious to invest in this promising future, you have one remaining decision—just *how favorable* must this fine tomorrow be to get your \$500 today?

Well, if the chances for good times were more than $\frac{50}{100}$, there'd be little doubt as to what to do for a return of more than twice an input; most assuredly, you'd invest.

But just a moment! All that talk of good times ahead has some opposing thoughts from the fellow down the street (who is not in the TV business). He's saying that things may not be so good. And since he too is part of our overall economy, his views should also be considered.

This then makes the investment decision difficult when the probability of a favorable future decreases. Let's say, for instance, considering both the optimistic and the pessimistic thoughts, that the probability for a favorable future is only $\frac{40}{100}$. That is an *estimated probability*.

. . . now, if the chances for a gain were only $\frac{40}{100}$ —or let's even drop down to $\frac{35}{100}$, what would you say about investing \$500?

- that return of \$1200 looks tempting,
—but—
- if business/economy is poor, the \$500 will be lost;
—and consider this—
- if there were no investment and the business/economy was good, you'd stand to gain, say, \$100 just riding the times,
—whereas—
- with no investment and a poor business/economy, there'd be no loss.

The decision is yours: invest, or not invest.

These figures and estimated probability are hypothetical values; they'll be used in this article to exemplify a decision-making technique that permits an easy way to answer the question, "Invest, or not invest."

That technique is known as the *indifference probabilities method*. This tongue twister is harder to pronounce than it is to use. After we've studied this technique (using the hypothetical values), you'll readily be able to apply it with figures and facts for your own situation.

Indifference Probabilities

Given two conditions for two alternatives, it is possible to determine the relative probabilities of those conditions for which it would make *no* difference which alternative were selected. These relative probabilities are known as the indifference probabilities. They, in turn, establish a basis for selecting the better alternative when an estimated probability exists for each condition: that is, *if the estimated probability for a given condition is greater than the indifference probability, the alternative to select is the one giving the better outcome.*

That mouthful of definitions can be better under-

stood with our example. We have two conditions: a good business/economy—let's call it condition (x); and a bad business/economy—refer to it as condition (y). We also have two alternatives: (a) invest \$500; or (b) do not invest anything.

For condition (x) there exists one, and only one, probability for which it would not matter whether we selected alternative (a) or (b). Likewise, for condition (y) there exists just one probability for which it makes no difference as to which alternative is used. These "one-and-only" probabilities are the indifference probabilities.

It is easy to determine the indifference probabilities with two simple steps. First, the conditions and alternatives are listed in a matrix, as in Table I. The outcomes from the various combinations of conditions and alternatives are then placed in their proper places. In our example, with a condition of a good business future and an alternative to invest the \$500, the predicted outcome is a \$1200 return (identified as block A₁). By contrast, if the business future is bad, the \$500 investment would be lost (block A₂). For the condition of a good future and the alternative of no investment, we had assumed an expected small gain of \$100 (block B₁). Finally, for a bad business future and no investment, there would be neither a gain nor a loss (block B₂).

Table I—Condition/Alternative Matrix.

	CONDITION (x) good business future	CONDITION (y) bad business future
ALTERNATIVE (a) invest	\$1200 A ₁	-\$500 A ₂
ALTERNATIVE (b) do not invest	\$100 B ₁	\$0 B ₂

Having filled in the matrix, the second step is to use these values in the following formulas to get the indifference probabilities for each condition:

- indifference probability = $\frac{(B_2 - A_2)}{(A_1 - A_2 + B_2 - B_1)}$
for condition (x).
- indifference probability = $\frac{(A_1 - B_1)}{(A_1 - A_2 + B_2 - B_1)}$
for condition (y).

Using the values from Table I in these formulas, we get:

- indifference probability = $\frac{\$0 - (-\$500)}{\$1200 - (-\$500) + \$0 - \$100} = \frac{31}{100}$ for condition (x)

- indifference probability = $\frac{\$1200 - \$100}{\$1200 - (-\$500) + \$0 - \$100} = \frac{69}{100}$ for condition (y)

It might be noted in passing that the sum of the in-

difference probabilities must equal one (1). This can serve as a check in the mathematics.

The Answer: Invest or Not Invest

With the indifference probabilities calculated, it only remains to compare them with the estimated probabilities. You'll recall that we had assumed an estimated probability of 35 chances out of 100 that the business/economy would be good. From this, it is quite obvious that the chances for a bad business/economy would be $\frac{65}{100}$.

By now, you might already realize what the answer is. But to be sure of fully understanding how the estimated probabilities and the indifference probabilities relate to each other, and how the decision is reached, they can be listed as follows:

	CONDITION (x) good business future	CONDITION (y) bad business future
Indifference Probabilities	$\frac{31}{100}$	$\frac{69}{100}$
Estimated Probabilities	$\frac{35}{100}$	$\frac{65}{100}$

As we've previously said, if the estimated probability for a given condition is *greater* than the indifference probability, then the alternative to select is the one giving the better outcome.

In our case, the $\frac{35}{100}$ estimate probability is greater than its corresponding indifference probability of $\frac{31}{100}$

—thus, the alternative to select is the one giving the better outcome for the condition (x) represented by these probabilities.

From Table I, the better outcome is with the alternative that gives a gain of \$1200. And what does this tell us?

... invest!

Not only does the indifference probabilities method help in making a decision, it also shows just how critical the various factors are in affecting the outcome. In our example, the decision was determined by a close margin. Most likely, without any method for deciding, a situation with factors as critical as those in our example could be quite difficult to decide upon.

Now, consider *your* case. If you've wondered whether to make an investment, but don't know how to arrive at a decision, try this difference probabilities method. You'll probably be surprised at the results! ■

Reference consulted:
Bennion, Edward C. "Capital Budgeting and Game Theory."
Harvard Business Review (November-December 1956), pages 115-123.

TEST INSTRUMENT REPORT

Leader's Model LDM-850 Digital Multimeter

by Phillip Dahlen

Permits locking in digital
measurements for later reference

■ It would appear as if our monthly Test Instrument Report has almost become a monthly report on digital multimeters, with so many such instruments having been recently introduced by various manufacturers. This has resulted from the fact that technological developments now permit the economical production of digital instruments designed for quicker, more precise measurements of circuit conditions—thus making your job quicker so that you can service more sets per hour and thereby increase your profits.

Leader's Model LDM-850 solid-state digital multimeter has an interesting feature that permits you to maintain your last measurement on the digital readout—thus assisting absent-minded people, such as me, as they check measurements against schematics.

Other interesting features include a LAMP TEST position of the function switch to check the digital display lamps, automatic polarity reversal, over-range lamp indication, and dual power supplies for both field and in-shop testing.

The manufacturer indicates that the instrument measures circuit conditions at a sampling rate of 200 times per second, and that the maximum input voltage is 1kv dc or 350v ac, or 100v dc on the ohms scale.

Additional manufacturer specifications include the following:



Leader's Model LDM-850 Digital Multimeter. For more details, circle 900 on the Reader Service Card.

		Voltage		Sensitivity	Input Impedance
	Range	Accuracy			
DC	0.2v	±1.0%	Rdg. ±1 Dig.	100μv	10M
	2v	±1.0%	Rdg. ±1 Dig.	1mv	10M
	20v	±1.0%	Rdg. ±1 Dig.	10mv	10M
	200v	±1.5%	Rdg. ±1 Dig.	100mv	10M
	1000v	±2.0%	Rdg. ±1 Dig.	1v	10M
AC	0.2v	±1.5%	Rdg. ±1 Dig.	100μv	10M
	2v	±1.5%	Rdg. ±1 Dig.	1mv	10M
	20v	±1.5%	Rdg. ±1 Dig.	10mv	10M
	200v	±2.0%	Rdg. ±1 Dig.	100mv	10M
	350v	±2.5%	Rdg. ±1 Dig.	1v	10M

		Current		Internal Resistance	Max. Input Current
	Range	Accuracy			
DC	0.2ma	±1.5%	Rdg. ±1 Dig.	1K	5ma
	2ma	±1.5%	Rdg. ±1 Dig.	1K	5ma
	20ma	±1.5%	Rdg. ±1 Dig.	100Ω	50ma
	200ma	±2.0%	Rdg. ±1 Dig.	10Ω	300ma
	1000ma	±2.5%	Rdg. ±1 Dig.	1Ω	2.5a
AC	0.2ma	±2.0%	Rdg. ±1 Dig.	1K	5ma
	2ma	±2.0%	Rdg. ±1 Dig.	1K	5ma
	20ma	±2.0%	Rdg. ±1 Dig.	100Ω	50ma
	200ma	±2.5%	Rdg. ±1 Dig.	10Ω	300ma
	1000ma	±3.0%	Rdg. ±1 Dig.	1Ω	2.5a

		Resistance		Sensitivity	Current
	Range	Accuracy			
Ohms	0.2K	±1.5%	Rdg. ±1 Dig.	0.1Ω	1ma
	2K	±1.5%	Rdg. ±1 Dig.	1Ω	1ma
	20K	±1.5%	Rdg. ±1 Dig.	10Ω	100μa
	200K	±2.0%	Rdg. ±1 Dig.	100Ω	10μa
	2000K	±3.5%	Rdg. ±1 Dig.	1K	1μa

Size: 10 in. W by 7¾ in. D by 3¼ in. H.
Weight: 10 lb.

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.

Amplifier Models SS4000/VS4000/VS6025/VS6060—Audio Output Bias Adjustments

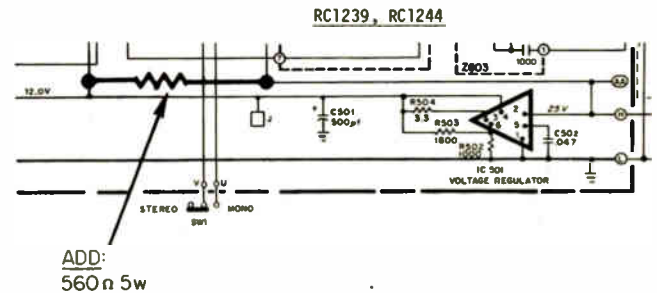
When servicing the AF block, and if any transistor or other related components require replacement, it is imperative that the BIAS controls be reset. Misadjustment of these four controls (two per channel) can result in repetitive component failures. Balanced operation of each channel may be obtained by the following procedures: (Refer to partial schematic shown.)

Remove power to the amplifier and connect a 0-to-50ma milliammeter in series between the positive (red) lead

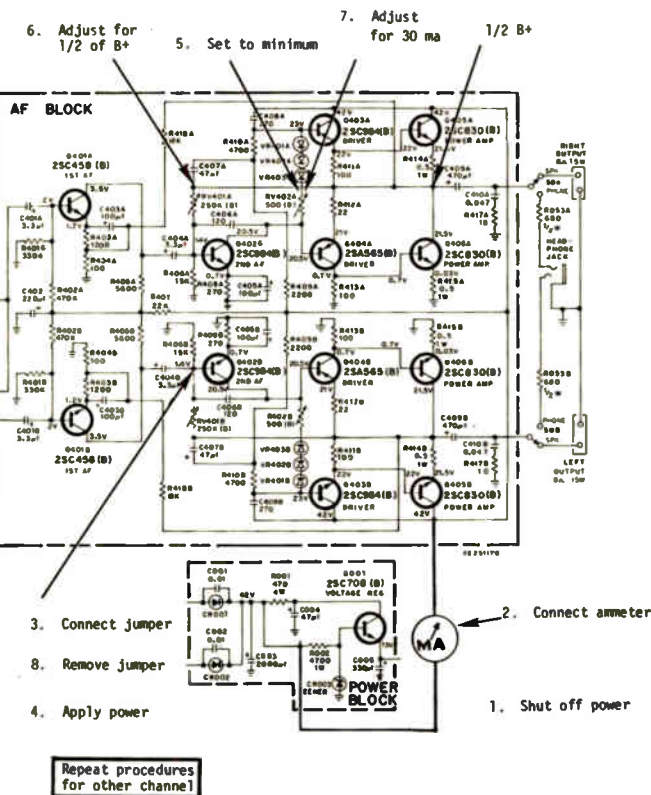
for a 30ma indication on the milliammeter and remove the jumper used to short the base of transistor Q402B to ground.

TV Combination Models Using an RC1238/RC1239/RC1244 Radio Chassis—Voltage-Regulator IC

The modification shown in the accompanying schematic was made during the production of these chassis to optimize the reliability of the voltage-regulator IC. In the event



it is necessary to replace the voltage-regulator IC in one of these chassis, this modification should be included.



from the 42v supply and the AF board. Then connect a jumper from the base of transistor Q402B to ground (short out R406B) to turn OFF the channel not being adjusted. Apply power to the instrument and set variable resistor RV402A to minimum. Measure the B+ (nominally 42v) and adjust RV401A for half of the measured voltage at the junction of C409A and R414A (collector of transistor Q406A). Adjust RV402A for a 30ma indication on the milliammeter and remove the jumper used between the base of transistor Q402B and ground.

The bias setup is now complete for one channel. Leave the milliammeter connected for adjustment of the other channel.

Remove power from the amplifier and connect a jumper from the base of transistor Q402A to ground (short out R406A). Then apply power to the amplifier and set variable resistor RV402B to minimum. Adjust resistor RV401B for 21v (1/2 of the supply voltage at the junction of C409B and R414B, collector of Q406B). Adjust RV402B

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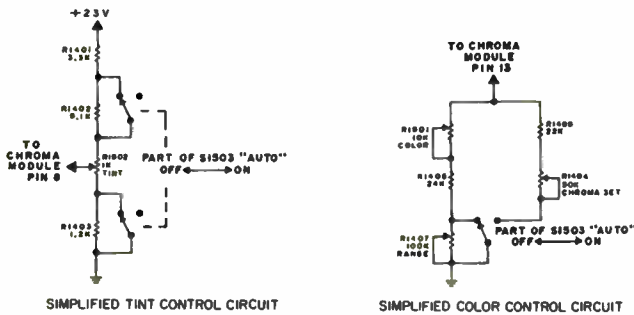
COLORFAX

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

GENERAL ELECTRIC

Color-TV Chassis MA—Advanced One-Touch Color Systems

The improved one touch control circuit has two switch positions, MANUAL and AUTOMATIC, as in previous receivers. The AUTOMATIC position in the MA chassis, however, limits the ranges of the TINT and COLOR controls so that the customer always gets a reasonably good color picture when he pushes the AUTO button regardless of where the controls may have been set in the MANUAL position. In the AUTOMATIC position two resistors, R1402 and R1403, are connected in series with the TINT control, R1902. This reduces the effective range of the TINT control to about 40°. Resistors R1402 and R1403 are so proportioned that the



average dc level is maintained as it was in the MANUAL position. This keeps the average tint level the same. In the chroma gain circuit resistor R1407 is connected in series with the COLOR control, R1901, to reduce the chroma gain range variation. At the same time, a shunting resistance, R1404, maintains the same average dc level as in MANUAL position. Both R1404 and R1407 are adjustable so that the desired gain characteristic may be obtained. In MANUAL position, resistors R1407, R1402 and R1403 are shorted out while R1404 is open circuited.

In addition, the customer still has the ability to "trim" adjust the COLOR and TINT controls even when in the AUTO position. Thus he can adjust color and tint in either MANUAL or AUTO, although in AUTO the ranges are limited. As in the past, the AFC is defeated in the manual position. The AUTO position also switches on a neon indicator behind the AUTO button.

MAGNAVOX

Color-TV Chassis T952—Low Brightness Symptoms

When troubleshooting a T952 chassis for symptoms of low brightness, it is suggested that you check the value of resistor R132 located in the cathode circuit of the picture tube. The original resistor—6.8K, 2w—may have changed in value, and some cases have been reported where the resistance has dropped as low as 3K. As a replacement, you should use Magnavox Part No. 230193-6829, or equivalent, which is a 6.8K, 3w, glass-body resistor.

Some cases have been reported where an aging picture tube was replaced, but the brightness was still not completely restored to normal. Resistor R132 should be checked and replaced in these cases.

This chassis employs a beam-limiting circuit (transistor Q25 and associated circuitry) which provides safety pro-

tection for the picture tube, horizontal-output transformer and tube, by sensing the cathode current in the horizontal-output tube and adjusting the picture-tube bias to maintain this current within proper limits. Obviously this circuit will effect brightness, however, you are cautioned to not make any circuit or component value changes in this circuit in an attempt to correct for low brightness.

Color-TV Chassis T979—Bright Horizontal Line Moving Vertically

An intermittent condition is reported consisting of a bright horizontal line that appears to move vertically through the bottom third of the screen. A condition of vertical jitter may also be apparent and in some cases the condition appears to be corrected by tapping or moving certain components on the "D" panel. Further investigation indicates that this condition may be caused by a contaminate, such as solder flux, in the "D" panel plug-in socket—at pins 5, 6 and 7 in particular.

If you encounter this condition, it is suggested that both the male pins and the female connectors on the "D" panel be cleaned using an approved cleaner which will not react with the PC board or adjacent components. The inside of the female connectors should be cleaned with this solvent, using an applicator such as a toothpick, and then thoroughly dried.

Color-TV Models IT5052 and IT5054—UHF Tuner Transistor Failure

In cases of transistor failure in the UHF tuner on these models, check to see if there is a ground strap connected from the upper right side of the tuner mounting assembly to the picture tube shield. This ground strap was employed in only a small quantity of these models and you are requested to remove the strap on those models you service. It is suspected that a momentary arcing in the picture tube could result in sufficient conduction through this strap to damage the UHF transistor. The tuner assembly is grounded by other means and removal of this strap will not affect set operation.

Color-TV Chassis T979—White Balance Adjustment

The procedure listed in the company's T979 chassis Service Manual (7339) neglects to mention that it may be necessary in strong signal areas to switch to an unused channel or disconnect the antenna when making white balance adjustments. It is possible under strong signal conditions to have sufficient conduction in the IF stages to cause the luminance amplifier collector voltage to decrease, resulting in an incorrect white balance set-up. Removing the signal eliminates this possibility.

Color-TV Chassis T958/T962—Failure of Capacitor C529

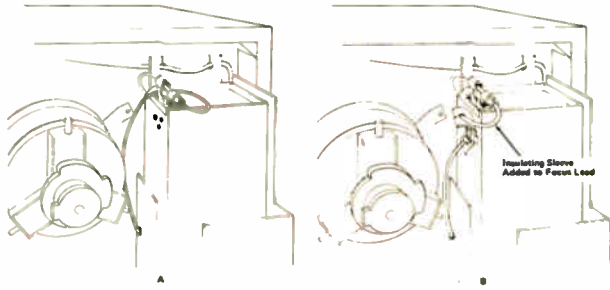
There have been reports of no high-voltage resulting from failure of capacitor C529, located in the horizontal oscillator circuit. In all cases checked, it was found that the capacitor had shorted. The capacitor used in production is a silver mica, 680pf rated at 500v, Part No. 250364-350. This is the correct replacement part that should be used. The company's diagram incorrectly identifies C529 as 200v.

Color-TV Chassis T939—Focus Rectifier Lead Dress Modification

The T939 Color-TV chassis used in both consumer and hotel/motel product lines marketed during 1969 should be inspected for focus-rectifier lead-dress whenever any service is performed.

On some versions of this chassis the focus-rectifier socket

is mounted on top of the high-voltage cage. Illustration A shows improper dressing of the focus-rectifier lead, which



could cause arcing between the lead and the high-voltage cage and/or deflection-yoke bracket.

Illustration B shows the recommended method for eliminating this possibility, using materials available without charge from Magnavox. Order Kit No. 171282-1 containing instructions and materials for five modifications from your Magnavox district.

Color-TV Chassis T936/956/957—Snivets on UHF Channels

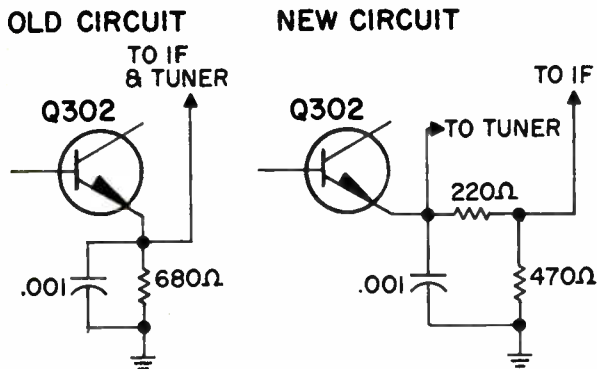
A condition of snivets on the left side of the screen on UHF channels may be caused by a leaky diode, D102. This diode is located in the horizontal-output section and is in series with the center arm of the HIGH-VOLTAGE ADJUSTMENT control. Replacement with a Magnavox Part No. 530088-1004 diode will correct this condition.

SYLVANIA

Color-TV Chassis D14, D15 and D16, Early Chassis Without Video Buffer Stage—Intermittent Loss of Horizontal Sync When Changing Channels

When all checks of the horizontal and sync circuits show normal operation, and advancing the AGC to the point just before overload corrects the horizontal problem but results in vertical jitter, several modifications can be made to boost the sync level and eliminate these problems.

Change the emitter resistor to the first IF transistor, Q200, from 15K to 8.2K. In many cases this resistor has already been changed in production. Then modify the AGC amplifier circuitry as shown in the diagram below.



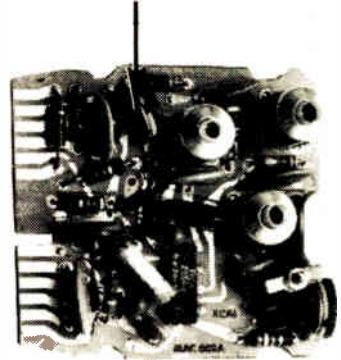
Also change resistor R334 in base circuit of transistor Q308 from 470K to 390K. Any lower value than this will affect horizontal phasing and could cause excessive horizontal jitter on weak stations. Change capacitor C304, the AGC filter, to approximately twice its original value. Too much capacity will cause airplane flutter and increase effects of co-channel interference.

RCA SALES CORP.

Color-TV Chassis CTC46, 54, 59—Zero Color-Level Control

The function of the ZERO COLOR-LEVEL control (R9 on the Chroma 1, MAC 002A Module) is to optimize customer color control tracking. Control R9 is set during production, and unless inadvertently misadjusted during servicing, or the MAC module is replaced, it should not require further adjustment.

**ADJUST
R9
FOR NO COLOR**



In the event normal color saturation is not obtained at normal mid-range setting of the customer COLOR control, R9 may require adjustment as follows: Tune in a color program with the ACCUMATIC switch in the OFF position, then turn customer COLOR control to minimum and adjust R9 so that the color is just gone from the picture.

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ADHESIVE 703

Four different formulas bond most materials

A five-pack selection of the manufacturer's permanent-bond Instant-Weld alpha Cyanoacrylate adhesive is available. The powerful, single com-

ponent adhesive is said to have a tensile strength of up to 5000 lb/in. in each drop. Four different formulas are



available to provide users with the one best suited for the types of materials they want to bond. Each type is con-

veniently packed in 2g tubes totalling up to 760 one-drop applications. Oneida Mfg., Inc.

INSTRUMENT ENCLOSURES 704

Front-loading case designed to accept existing instruments

This front-loading case is designed to be used as a customized enclosure for existing instruments, allowing standard panel size instruments and circuit board racks to be slipped easily into place through the front of the case. The sides and trim of the case



are said to be composed of decorative anodized aluminum shapes with top and bottom panels of quality aluminum sheets painted with non-glare paint. Extrusions are uniquely designed to allow fabrication of the cases in five different heights, using standard component parts. This production standardization method produces, at the most economical cost, a strong, secure case with completely concealed fastenings. Basic case heights available are: 5 1/4 in., 7 in., 8 3/4 in., 10 1/2 in. and 12 1/4 in. All cases have the EIA standard 19 in. front panel and 20 in. inside depth. Shorter or longer depths available with minimum lead time. Buckeye Stamp- ing Co.

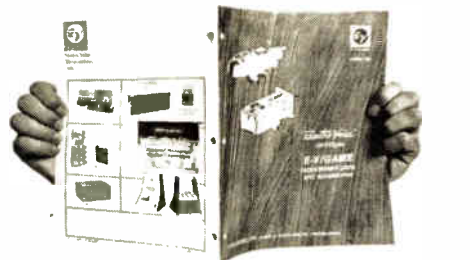
Required reading for any one about to repair a turntable or recorder.

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MICROPHONES • HI-FI ACCESSORIES

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FIELD STRENGTH METER 705

Accuracy of $\pm 1.5\text{dB}$ over entire frequency range

An all new VHF/FM/UHF Field Strength Meter, the Model FSM-2, is said to have an accuracy of $\pm 1.5\text{dB}$ over its entire frequency range, which extends from 54 to 216MHz and from 470 to 890MHz. Readings as little as $10\mu\text{V}$, or as high as 3v can reportedly be taken with this instrument. Front-panel switches select average or peak

readings, UHF or VHF scales and 120v ac or battery operation. The all-transistor superheterodyne circuitry reportedly results in up to 50% longer battery life, while a wide range regulated power supply requires no adjustment as batteries age. The meter movement is a taut-band wide-scale 1ma unit. The meter comes equipped



with a removable dust cover with safety lock which, when closed, automatically turns the instrument OFF. The input connection is made through a Type F connector mounted on the front panel. A 300-75Ω UHF/VHF balun is provided as an accessory at no additional cost. Optional accessories include a low-frequency converter for the 5 to 54MHz band, a carrying handle kit and cover. Blonder-Tongue Laboratories.

SOLID-TUBE FOCUS RECTIFIER 706
Replacement for vacuum tubes in color-TV sets

A solid-state focus rectifier has been designed for direct, plug-in replacement of vacuum tubes 2AV2, 2BA2 and 1V2 in color-TV receivers. The R-2AV2 Solid-Tube eliminates a potential source of X-radiation, runs cool and reportedly outlasts the vacuum tubes it replaces. Peak inverse voltage of the unit is 9kv, peak repetitive forward current is 100ma, average forward current is 5ma. Voltage drop at 5ma is 20v. Electronic Devices Inc.



MATV AMPLIFIER 707
Single channel 6v output amplifier

A single channel 6v output MATV amplifier, Model THPM-S, is used to provide signal to very large MATV distribution systems in apartments, hospitals and hotels. A single channel unit is available for each of the VHF-TV channels, although the typical MATV head end uses one channel amplifier for each channel carried by

the system. A front panel AGC setting provides an adjustable range of output



levels from 2v to 6v with a range of usable input levels between +8dBmV and +37dBmV. The AGC circuit reportedly maintains the output level constant within 1dB with input variations of up to 20dB. Triple tuned in-

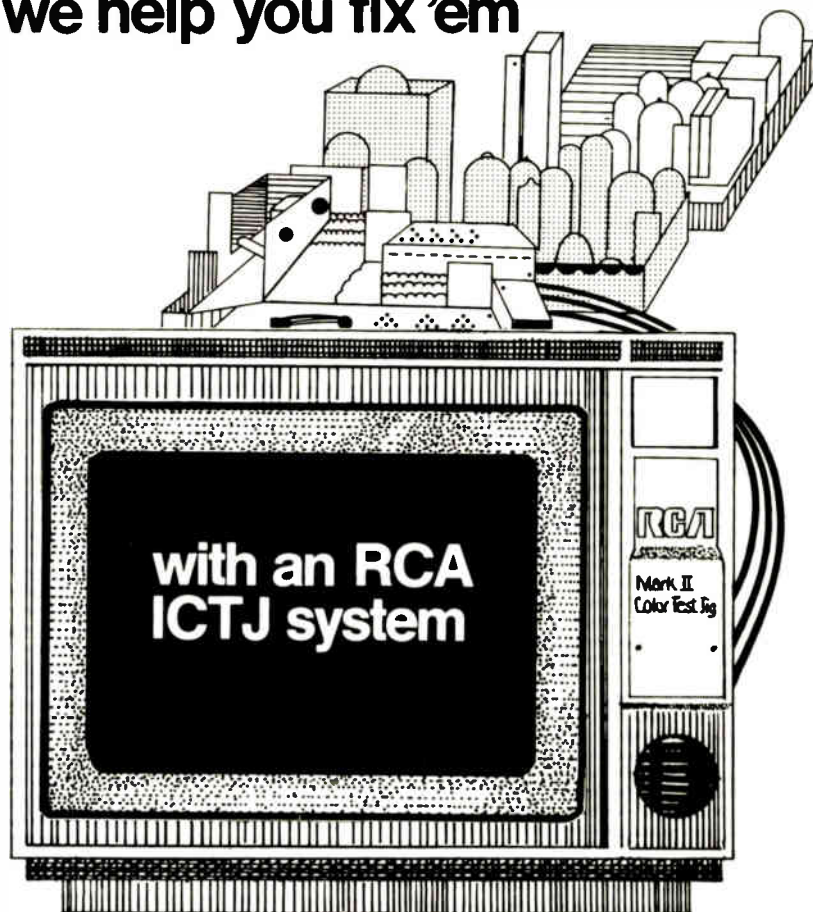
put circuits and double tuned output bandpass filters are said to provide skirt selectivity greater than 26dB at the next non-adjacent channel edge. Each amplifier includes a self-contained power supply and takes only 1¾ in. of vertical rack space. Jerrold Electronics Corp.

SOLID-STATE CURVE TRACER 708
Checks solid-state devices in or out of circuit

The Model LTC-905 Curve Tracer is designed for testing solid-state devices in or out of the circuit. The in-

continued on next page

As fast as you get 'em we help you fix 'em



Sound like the TV serviceman's dream? It is. RCA's Industry Compatible Test Jig is a complete testing system that lets you service more than 90% of all color TV console chassis on the market—and updates you as new ones come along.

Here's how: The RCA ICTJ system includes the test jig itself (in bench or portable models), plus a handy cross-reference manual that specifies the right adaptors for each set. Choose from more than 100 adaptors and cables available (optional extra) to meet your needs. But most important, as the new models need service, you'll be kept up to date with new inserts for the manual and any necessary new adaptors will be made available. So whatever's coming, you'll be ready.

See your RCA Parts and Accessories distributor today for full information.

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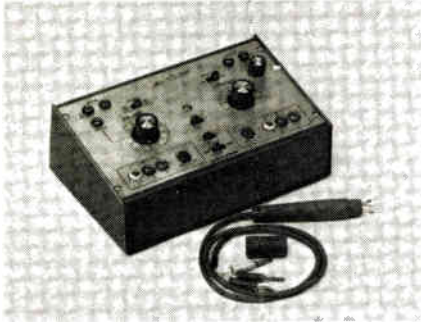
... for more details circle 128 on Reader Service Card



NEW PRODUCTS...

continued from page 53

strument reportedly features an exclusive, variable, horizontal length adjustment to 100v of sweep. This helps place the entire horizontal trace on the scope face and enables use of the instrument with all oscilloscopes. The unit is said to check for opens,



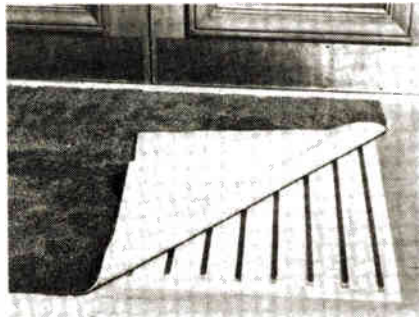
shorts and leakages with a sweep frequency of 120Hz and a sweep voltage selectable from 10 to 100v. The test capability of this solid-state curve tracer reportedly includes such devices as transistors, unijunction transistors, triacs, SCR's, zener diodes, signal diodes, rectifier diodes, FET's and MOSFET's—both depletion and enhancement model types. Accessories

include a special in-circuit probe, two sets of leads for external checking, plus horizontal and vertical scope leads. Leader Instruments Corp.

FLOOR MAT SWITCHES 709

Designed to actuate any alarm equipment

A floor-mat switch has been designed for alarm use. Called Secur-Step, it is available in both individual mat and long length matting form. It is also designed to actuate any alarm equipment. Because of its thin construction, the unit can reportedly be



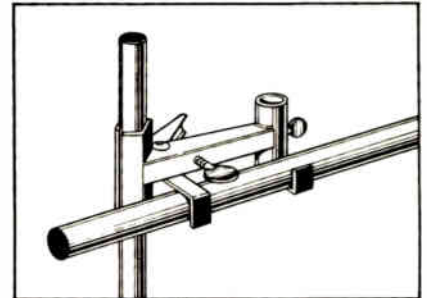
used in front of doors, windows, stairs or under rugs, carpets or other coverings without bulge. The mats are manufactured in two sizes—one for gen-

eral use, the other specifically designed for use on stairs, measuring 30 in wide and 5 ft and 25 ft in length, but can be cut to fit any length required. All units are heat sealed between sheets of flexible plastic for long life. Recora Co.

ANTENNA ROTATOR REPAIR TOOL 710

Keeps antenna on roof while repairing rotator

The Model 5245, Tenna-Clamp Rotator and Antenna Repair Mount is said to be easily mounted and clamped with one hand. With this tool it is now possible to keep an antenna in position on the roof, while the rotator is removed for repair or locked in place. First, the tool is attached to the antenna mast below the rotator and locked in place. Next, the antenna

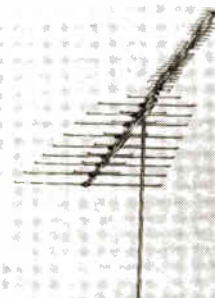


and mast is removed from the rotator, then placed in the tool's receiver flange and locked in place. The rotator is then removed for repair or replacement while the antenna remains on the roof where it is supported indefinitely, if necessary. The Finney Co.

ANTENNA 711

60 active elements for extreme fringe areas

An all-channel antenna with 60 active elements for extreme fringe areas is called the "CDX1150." It is designed with a patented flip-eze boom extension and cradle mount, making the extra-long 15.5 ft boom easy to handle. Also, for quick installation, it is folded and secured with one bolt. The cradle mount adds extra strength and stability, providing a low profile for high wind resistance to protect antenna installation. Other features include new UHF High-Q design and extra heavy all-weather insulators. It also reportedly provides

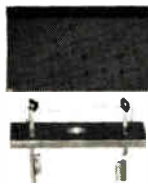


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Wire Type Competitive Fuse

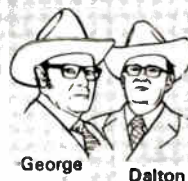
If there's any doubt about which replacement fuse to install in your customer's TV set... install the only fuses used in original television sets... BEL-FUSES. It's what's inside that makes BEL-FUSES safe for expensive sets... a *chemical*. Never substitute a wire type fuse. Here's why. Break open an Oneida BEL-FUSE. Now do the same with the one that *looks* like ours. Light a match to each. Result? The chemical in the BEL-FUSE blows *instantly*. And you'll burn your fingers before the other one blows. This same safety protects the circuitry in TV sets. So specify Oneida BEL-FUSES.

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George Dalton

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... for more details circle 123 on Reader Service Card

UHF performance previously requiring specially cut Yagi antennas. The weather insulators are said to withstand temperatures -80°F to $+190^{\circ}\text{F}$. Antennacraft Co.

MATV DISTRIBUTION AMPLIFIER

Delivers 7dB gain at each of the four 75Ω outputs **712**

An indoor-mounted distribution amplifier, Model PC4712, is designed to boost and distribute VHF/FM signals to one or four TV or FM receivers or wall outlets. The silicon overlay transistor circuit design reportedly delivers

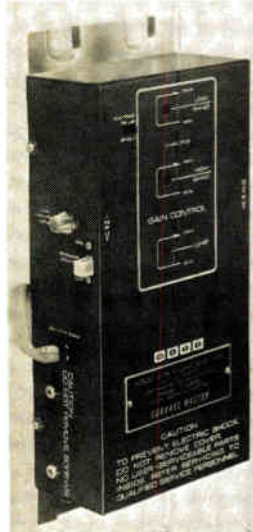


7dB gain at each of the four 75Ω outputs. The amplifier and power supply are integrated into a single coral and ebony decor-styled perforated steel cabinet. JFD.

MATV DISTRIBUTION AMPLIFIER

Provides 30 to 32dB gain for signal distribution **713**

A new 30dB MATV distribution amplifier, Model 7330B, is designed for medium size MATV systems. The UHF / VHF / FM amplifier features all new circuitry which the manufacturer claims provides new highs in performance and reliability. It provides a gain of 30 to 32dB for signal distribution. The amplifier is an all-channel unit using an independent UHF amplifying section and separate first stage amplifying sections for low-band and high-band VHF, with a common two-stage output circuit. The design is said to provide stable performance even in the presence of voltage variations, temperature changes and lighting static discharges. Channel Master.



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DEALER SHOWCASE

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

AUTO STEREO CONVERTER

*Sounds enjoyed in auto can
be heard in the living room* **714**

Introduced is the Model 12R1000 home converter, including the 12R500 speaker shown, which can accommodate car stereo players when they are equipped with the optional "Quick Release" mounting bracket. The unit is engineered specifically to complement



all of the company's car stereo players, and the enclosure features a distributed port reflex design internally damped to optimize the realism of the reproduced sound. Their decorator designed cabinetry features a walnut finished styling with a black grill trimmed in chrome. RCA Parts and Accessories.

SLIDE RULE CALCULATOR 715

*Low cost unit with
scientific notation*

The Model SR-10 is reportedly the first electronic slide rule calculator with scientific notation priced at only



slightly more than standard hand-held units. The calculator performs the standard four functions — addition, subtraction, multiplication and division — as well as calculation of reciprocals. It also features true credit balance; that is, negative numbers are indicated by a negative sign and their correct value. The bright red 12-character light-emitting-diode (LED) display is clearly visible in either hand-held or desk-top operation. The characters consist of a multipurpose symbol, an 8-digit mantissa, an exponent sign, and a 2-digit exponent. The key-

board consists of 10 digit keys, a decimal key and 12 function keys. Three nickel-cadmium fast-charge batteries reportedly provide 5 to 7 hrs of continuous use before recharging. The unit measures 6.3 by 3.1 by 0.75 to 1.5 in. Texas Instruments.

FM TWO-WAY RADIO

716

*Plug-in modular design
allows future upgrading*

A new solid-state FM two-way mobile radio, called MASTR II, is designed with built-in capabilities for



adding future options. Plug-in modules makes it easy and economical to upgrade the system as future needs develop. The totally enclosed unit locks into a separate mounting frame with concealed sliding bolt action, providing greater security than swing-arm locking designs. Top and bottom drip-proof covers remain in place when the unit is removed from the frame, giving complete circuit protection during transit and servicing. The unit is said to take trunk temperatures ranging from -40°F to 158°F. Other features include a single-conversion receiver, squelch tail elimination, and positive/negative ground capability with no converters. General Electric.

PA SPEAKER

717

*Response range from
25Hz to 20kHz*

A three-way, dual-enclosure speaker, Model LS50, is designed for extended deep bass response. Two separate cabinets are featured—one for the 12-in. acoustically suspended woofer and one for the mid-range and tweeter — which is said to minimize acoustic feedback by making

it possible to direct the higher frequencies. Response ranges are reportedly from deep bass to 25Hz to tweeter highs at 20kHz. The system is said



to produce 48w rms of sound through three speakers for bass, mid-range and treble. The cabinet is finished in oiled walnut with black grille cloth. Bogen.

TELEPHONE INTERCOM 718

Designed for the small and medium telephone intercom system

Designed for small and medium size telephone intercom installations is the Select-Talk Model ST-20 solid-state pushbutton communication system.



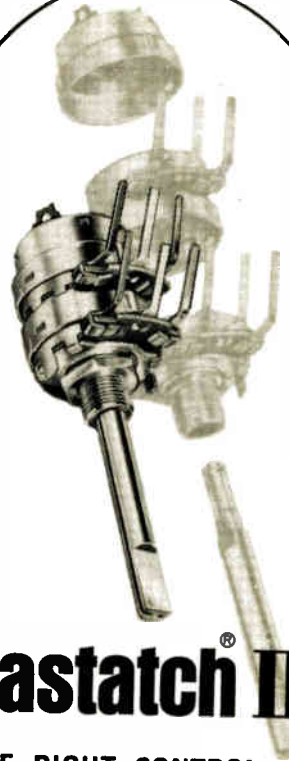
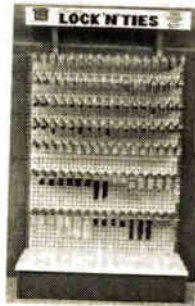
The unit is said to be a selective tone calling, full trunkage system capable of up to nine simultaneous conversations on 19 phones in all-master, master-to-remote or intermix installations. It reportedly features automatic

reset of pushbuttons and anti-side tone circuitry for clear, crisp voice quality. Other features are said to include a light beige and charcoal brown decorator styled high impact housing and self cleaning isostat pushbutton switches for no-maintenance dependability. A number of accessory items are provided for the expanded function of the basic system. Fanon/Courier Corp.

ELECTRONIC HARDWARE 719

Packaged in hang-up plastic tubes

A new line of merchandising, incorporating new products, packaging and displays is introduced. The first line called "Lock 'N' Ties" consists of cable clamps, ties and solderless terminals. New are the nylon screws, washers and spacers. The product is packaged in hang-up plastic tubes and carry the list price and merchandised on a display, but each item can be purchased individually. Workman.



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TECHNICAL LITERATURE

Alarm Equipment

A new 80-page alarm-equipment catalog, designated the M-73, describes over 400 intrusion and fire alarm products. The equipment offered ranges from relatively simple kits to the latest ultrasonic, radar and infrared intrusion detectors. Products are described in some detail regarding applications, principle of operation, and specifications, to allow skilled technicians to make the right choices. The catalog also features eight-pages of "Application Notes" for alarm equipment. Mountain West Alarm Supply Co., 4215 N. 16th St., Phoenix, Ariz. 85016.

Switch and Component Catalog

The comprehensive 135-page catalog, No. 72F, includes over 90 pages devoted to 45 categories of switches—including toggle, push, rotary, trigger and power tool, micro limit and snap-action, illuminated, selector, miniature and military types. Circuitry, electrical

ratings, terminal configurations and dimensions are furnished, as well as engineering and descriptive information. The fully illustrated catalog also covers such related items as relays, transformers, terminal blocks, wire, pilot lights, counters and test equipment. LCOMP—St. Louis, Inc., 2605 S. Hanley Rd., St. Louis, Mo. 63144.

Marine Electronic Equipment Catalog

A full line of marine electronic equipment for navigation, communications and safety is featured in a new 16-page catalog. Two dozen radars, radio telephones, radio direction finders, loud hailer, loran receivers and fathometer depth sounders are pictured and described in detail. Raytheon Marine Products, 676 Island Pond Rd., Manchester, N.H. 03103.

Security Systems

A 12-page short-form catalog and mailer is available describing the vital features of five security systems and 37 accessories. Since it is only 3½ in. by 6 in. and weighs only ¼ oz, it is ideal for mass mailing in statement envelopes. EICO Electronic Instrument Co., Inc., 283 Malta St., Brooklyn, N.Y. 11207.

Tools

A 96-page catalog, No. 572, "Tools for Electronic Assembly and Precision Mechanics," is of particular interest to electronic technicians working on fine assemblies. Over 1900 individual items are offered and described in the catalog. Another important feature of the catalog is the inclusion of four pages of technical data on tool selection. Jensen Tools and Alloys, 4117 N. 44th St., Phoenix, Ariz. 85018.

Stylus Care Guidebook

A free booklet entitled "A Visit to the Small World of a Stylus," is published to help owners of stereo systems understand the critical role of the stylus. Since the stylus in a phono cartridge acts as the source of sound in a stereo system, it deserves more than haphazard care and replacement. Even with the best of attention, however, the diamond stylus will eventually wear out, weakening this vital link in the sound component chain. Dealers who would like a reasonable quantity of this booklet for selected mailings and in-store distribution can write Shure Brothers Inc., 222 Hartrey Ave., Evanston, Ill. 60204.

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PRACTICAL APPLICATION...

continued from page 47

Second Street. Although it would have been more economical to have merely supplied both buildings with direct lines from the Muzak center, this would not have permitted the use of a common paging system for both buildings.

In the Second Street building a 10w amplifier is used to supply the combined audio signal to a system of 28 speakers.

It is hoped that the photographs in this article help demonstrate more vividly the flexibility of audio systems

and their great market potential. They may also give a little more insight as to the facilities in which ELECTRONIC TECHNICIAN/DEALER is prepared, for it is in these buildings that our electronics lab, editorial offices, plus the Art, Production, Circulation and Direct-Mail Departments, are located—the publisher having his office in our New York City building and the magazine being printed and mailed out of our plant in Dansville, N. Y. ■



In many parts of our second building there are no false ceilings, thus requiring the use of dish-pan-type speaker enclosures.



These speakers have also been installed to serve a large portion of the second building still reserved for future expansion of our rapidly growing company.



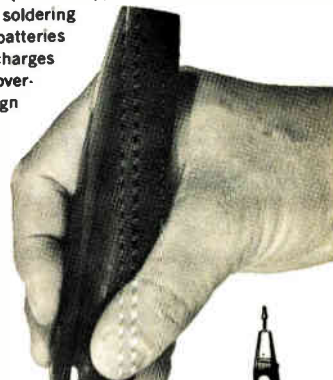
One of the conference rooms in our second building contains a speaker that can be independently controlled for the desired sound level.



Speakers along the length of this fifth-floor hallway (which is very similar to the third-floor hallway not shown) provide music and information to the editorial offices along each side. (The editorial reception area is at the far end of the hall, while the electronics lab and editorial offices for ELECTRONIC TECHNICIAN/DEALER—one of the 41 publications produced by the Publications Div. of Harcourt Brace Jovanovich, Inc.—are to the right, near the far end of the hall.)

New Cordless SOLDERING IRON greatest advance in soldering since electricity

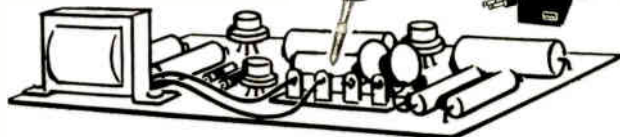
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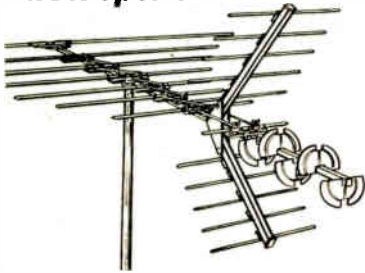
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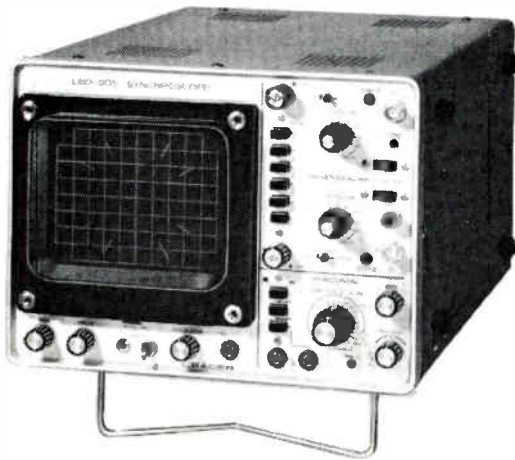
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