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Quasar's Super Module Color TV
NATESA/NESDA Convention Highlights
RCA Color TV 1977

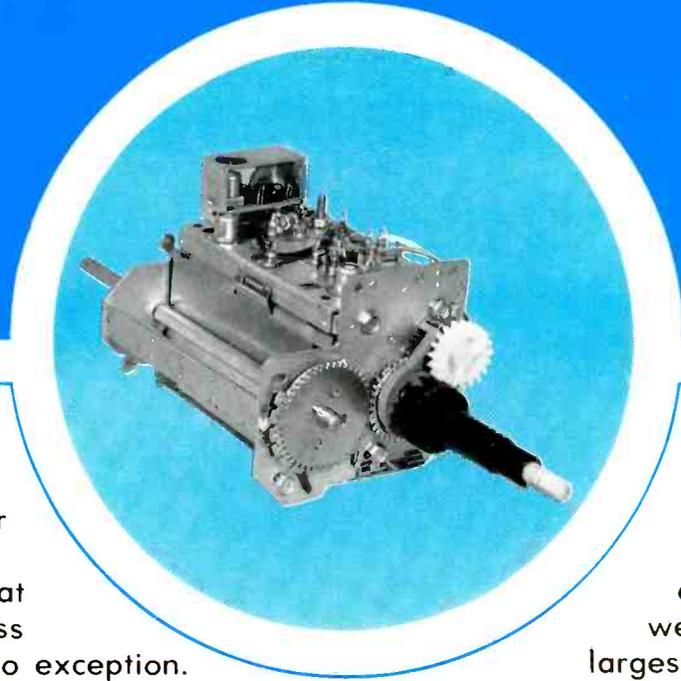
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EDITOR'S MEMO



Fact Or Fiction?

The following phone conversation, between Fred Fastfix of Fastfix TV Service in Bubbling Brook, U.S.A., and Charlie Pencilwhipper, warranty claim adjuster in the regional office of Brightscreen TV Manufacturing Company, is obviously fictional:

Fastfix: Charlie, this is Fred Fastfix, over at Bubbling Brook. I was going through yesterday's mail and found your letter and the bunch of rejected warranty service invoices you sent back. I've waited two months for payment of these invoices and now...

Pencilwhipper: Just a minute, Fred, I'll have to dig out the file. (Two minutes elapse)

Pencilwhipper: Okay, Fred (Shuffling of papers) I've found the file. What was it you need help with?

Fastfix: (Long sigh) Well, for openers, explain the rejection of invoice No. 486321. I don't understand the notation that it is a 'customer education call'.

Pencilwhipper: (Shuffling of papers) Hmmm...let's see...No. 486321. Oh yeh, according to your technician's description of the service rendered, he reprogrammed the pushbutton tuning system in a Model ZYX16...

Fastfix: That's right.

Pencilwhipper: Well, Fred, that's a customer education call.

Fastfix: A customer education call! I don't see how! The customer had just subscribed to CATV and the CATV installer didn't know how to program the tuning system to the channel used by the output of the CATV converter. The customer raised (expletive deleted) with the Rockbottom Discount, from whom she bought the set, and Rockbottom told us to handle it. The set was still in warranty.

Pencilwhipper: Fred, there's no provision in our warranty policy for such a call. Check page 201 in your Brightscreen service center manual. Besides, the tuner should have been programmed to the channel during the delivery/setup call. Didn't you deliver and set up the set for Rockbottom Discount?

Fastfix: Yes, but the customer hadn't yet subscribed to CATV at the time we delivered it.

Pencilwhipper: Well, Fred, as I see it, I'm afraid you'll have to collect for this service call from either Rockbottom, the CATV company or the customer. Okay?

Fastfix: (Long sigh) It seems I don't have any other choice. Okay, how about invoice No. 486294?

Pencilwhipper: (Shuffling of paper) Hmmm...486294...Here it is. Well, on this one it seems that your labor charge for removal and replacement of the defective picture tube doesn't agree with the labor rate you agreed on when you signed on as authorized service center...

Fastfix: (Expletive deleted), that was ten months ago! My costs have gone up 15% since then and I've had to increase my hourly labor rate. And besides, your flat-rate time for color CRT replacement just isn't realistic.

Pencilwhipper: I know what you mean. But you and the company agreed on a set of labor rates ten months ago and those rates have to apply until your annual reauthorization date, which, by the way, is scheduled for the 10th of next month. In the meantime, you'll have to resubmit this invoice at the current rate. What's the number of the next invoice you have a question about?

Fastfix: 486331

Pencilwhipper: (Shuffling of papers) Oh yeh, the computer back at Brightscreen kicked out this one because there is no record of the sale.

Fastfix: No record of the sale! (Expletive deleted), the model number, serial number, date of sale and dealer name and code are right there on the invoice, just like my technician copied them off the customer's copy of the warranty registration form. What more do you want?

Pencilwhipper: Well, Fred, somebody out there has goofed. Either the dealer didn't send in the orange copy to the Brightscreen office in Maintown, or else there is a mistake in the model number or serial number. I checked here for the green copy that we should have received, but couldn't find it. Call Rockbottom Discount and see if they sent in the orange copy. If they did, then there's probably a mistake in the model or serial number, and your tech will have to go back out to the customer's home and recheck the numbers on the set itself.

Fastfix: (Expletive deleted), that's the sixth time we've run into this in the past two months.

Pencilwhipper: Well, Fred, you'd better straighten this out with Rockbottom Discount. Just between you and me, we've leaned on them about this sort of thing, but you know they represent a lot of volume for Brightscreen in your area, so we don't like to get too tough with them. By the way, Fred, how's Titanic TV service doing now. You know, they did all of our warranty servicing there in the Bubbling Brook area until you took over. In fact, they received about 75% of their total volume from Brightscreen warranty servicing.

Fastfix: (Long pause) No, I didn't know that...well, they closed up about the time I took over your warranty servicing. Seems they just couldn't make it. Ended up bankrupt.

Pencilwhipper: Yeh, there's a lot of that going around. Too many servicers just aren't good business managers...Well, Fred, if there's nothing else I can help you with now, have a good day and I'll be seeing you the 10th of next month when we sit down to discuss your annual reauthorization.

Fastfix: Yeh, I've got some serious figuring to do between now and then. See yah!

As I said in the beginning, the preceding is fictional. Any similarity between the situations discussed in this phone conversation and those in real-life warranty servicing are purely coincidental. Of course, if anyone out there in the real-life world wants to challenge the preceding statement, please do so.

J.W. Phipps

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NOVEMBER 1976 • VOLUME 98 NUMBER 11

THE COVER: A photo of Jim Salyer's thriving automotive electronics sales/service business—Custom Electronics, Inc.—in Topeka, Kansas. (story on page 10)

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A "Successful Business Profile" which examines how Custom Electronics, Inc. of Topeka, Kansas, has combined car dealer and consumer sales and come up with a profit-producing mix that should work anywhere. By Grier Lowry & J. W. Phipps.

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An 'overview' analysis of the composition of this manufacturer's latest color TV line and the new and 'continued' chassis in it. By J. W. Phipps.

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A review of key activities and developments at this year's annual conventions of NESDA and NATESA. By Don W. Mason.

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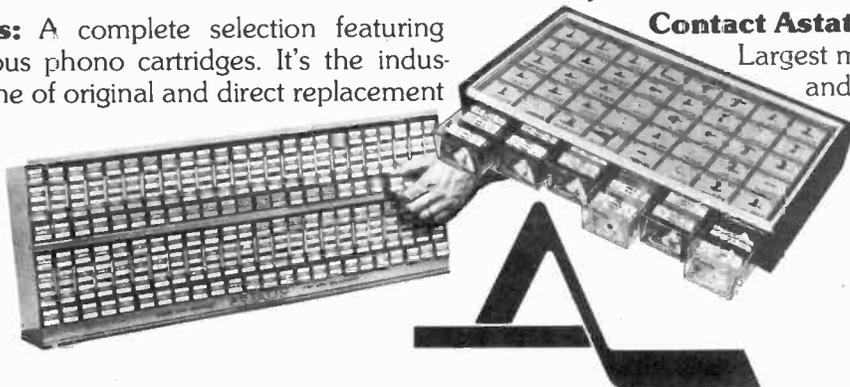
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NOVEMBER 1976, ELECTRONIC TECHNICIAN/DEALER / 3

When you think of receiving tubes, think of RCA and the man who's got them all.



NEWS OF THE INDUSTRY

The Trend Is Up For Color TV Sales

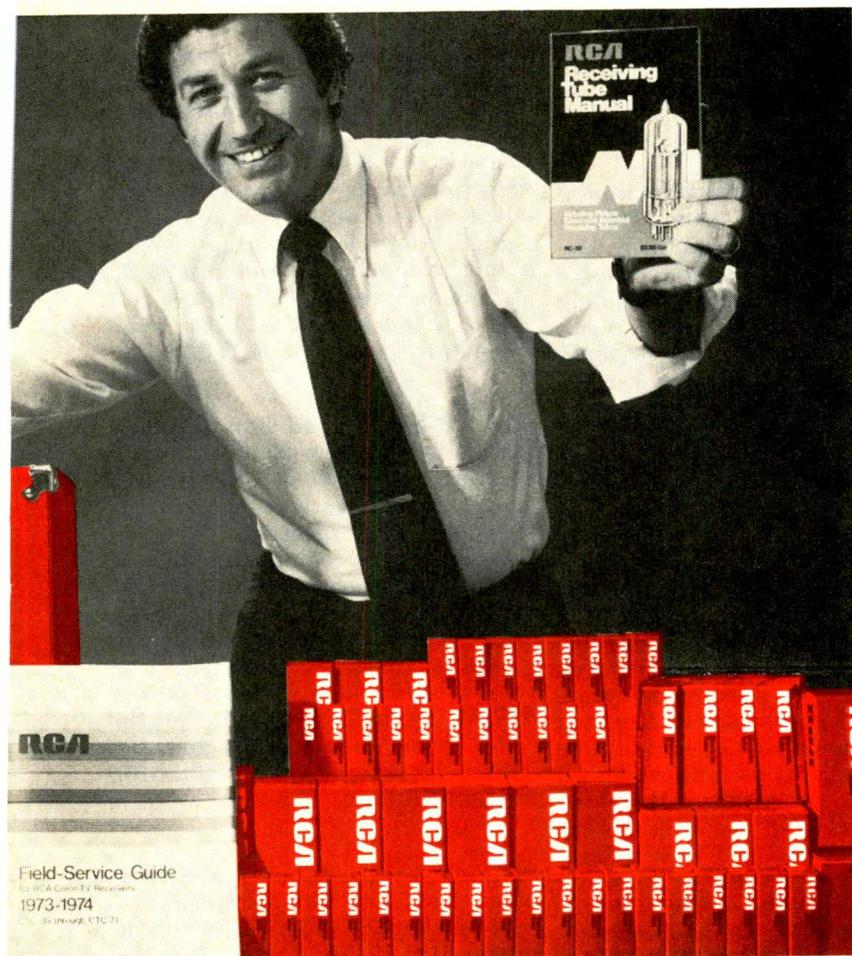
Figures from the Electronic Industries Association (EIA) on home entertainment product sales to dealers up through September 24th show that sales of color TV are up by 12.8% over the same period in 1975. In fact, sales of all home entertainment products through September 24th show an increase, except for black-and-white TV and component-type phonographs. Black-and-white TV sales are down by 1.8% and phonos are down 16%.

According to a prediction based on EIA figures in *TV Digest*, "color TV sales to dealers this year will probably total about 7½ million units, up about 16.5% over 1975. In the weeks remaining of this year, we see color sales running 17½ to 20% ahead of last year."

Products	Sales To Dealers (from EIA)		
	9 months 1976	9 months 1975	% change
Total TV	8,281,511	7,785,615	+ 6.4
Color TV	4,916,847	4,357,996	+ 12.8
Black & White TV	3,364,664	3,427,619	- 1.8
Total radio	28,114,420	23,964,086	+ 17.3
Portable radio	19,060,101	17,793,388	+ 7.1
AM radio only	5,192,330	4,937,079	+ 5.2
FM & FM-AM radio	13,867,771	12,856,309	+ 7.9
Car radio	9,054,319	6,170,698	+ 46.7
Component-type phono	1,993,157	2,373,617	- 16.0

CB Sales Reportedly Down, But GE Surveys Indicate 5½ Million Consumers Intend To Buy During Final Months Of '76

According to a report in *TV Digest*, "sales of 23-channel CB transceivers remain in a slump, with 'dump' prices and the variety of 23 to 40 channel conversion programs from



You name it and your RCA Distributor's got it. Glass tubes. Miniatures. Metal tubes. Novars. Compac-trons. Nuvistors. Nearly 1100 types — all of the highest quality standards — the same standards that have made RCA tubes the most widely used.

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Get your share of gifts — Tear 'n' Share '76. This RCA dealer awards program runs through November 30, 1976. Don't miss your share of the rewards for using RCA receiving tubes and color picture tubes. Ask for a Tear 'n' Share '76 Prize Book.

See your local RCA Distributor for all your tube needs. RCA Distributor and Special Products Division, Building 206-2, Cherry Hill, N.J. 08101.

RCA Receiving Tubes

set manufacturers having little apparent effect....no one we talked to is sure of the exact reasons for the slump, but two major factors cited were FCC handling of the 40-channel expansion decision and scare over sunspot activity."

However, according to the results of several consumer surveys conducted by General Electric just after the FCC announcement in July of the expansion to 40 channels, there are still plenty of people who will not wait for the new 40-channel sets to get on the market, and who will buy their CB units sometime before the end of the year. Based on the surveys' results, GE's audio electronics products department predicts that about 5½ million 23-channel sets will be sold in the last months of 1976—which would raise the total CB sales for the year to about 15 million units.

And on the subject of sunspots, an astrophysicist at the University of Chicago, Dr. Eugene Parker, was quoted in an article on CB in *Sports Illustrated* as saying that the threat of sunspots interfering with CB transmission is greatly exaggerated. Parker said, "CB'ers will get through this next sunspot activity period with no trouble at all."

Founder of Admiral To Head New TV Distribution Firm

The founder of the Admiral Corporation, Ross D. Siragusa, Sr., who left Admiral in 1974 when it merged with Rockwell International Corporation, has been named as chairman of a newly-formed R & A Distributing Corporation in Chicago.

The new firm will take over distribution operations for RCA television receivers and other products in the Chicago area. The RCA Distributing Corporation has discontinued its own distribution operation in that area. The R & A company will headquarter in Des Plaines, Illinois.

PC-77 To Be Showcase For New 40-channel CB

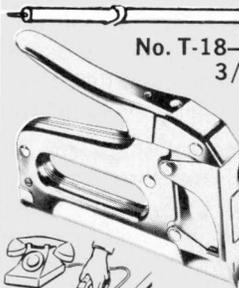
Because the 2nd Annual Personal Communications Show—PC-77—takes place just a month after the new 40-channel radios become available, show sponsors expect it to be a showcase for the new offerings. According to John Sodolski, VP, Communications Division, Electronic Industries Association, "The FCC will start certifying the new sets late this year, and 40 channel sets will be available shortly after the first of the year, making PC-77 the first place where buyers will be able to view a broad cross section of the industry's 40 channel offerings." So far, 62,000 sq. ft. of exhibit space has been contracted for by more than 225 companies for the show, to be staged in Las Vegas, February 15, 16, and 17. ■

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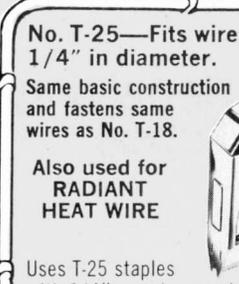
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Same basic construction and fastens same wires as No. T-18.

Also used for RADIANT HEAT WIRE

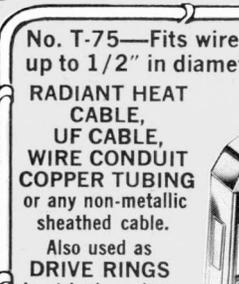
Uses T-25 staples with 1/4" round crown in 9/32", 3/8", 7/16" and 9/16" leg lengths.



NEW! Intermediate No. T-37—Fits wires and cables up to 5/16" in diameter. Same basic construction as Nos. T-18 & T-25.

Also used for CATV and DRIVE RINGS in stringing wires.

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

Also used as DRIVE RINGS in stringing wires.

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TECHNICAL LITERATURE

The latest Test Instrument catalog is now available from Heath/Schlumberger. The new catalog, 811-20, features 32-pages of the company's line of test instruments, including single and dual-trace oscilloscopes, low frequency, computing frequency counters, audio and function generators, power supplies, recorders, and other TV service equipment. Available free from *Heath/Schlumberger Instruments*, Benton Harbor, Michigan 49022.

CB Antennas, Mikes and Speaker Cables are featured in a new CB Wire & Cable catalog published by Belden Corporation's Electronic division. The 8-page illustrated booklet offers more than 60 products for use with fixed and mobile CB, amateur, and marine radio systems and for industrial/commercial land/mobile applications. Described are preterminated and bulk 50-ohm RG-58/U and RG-8/U type coaxial cable for transceiver to antenna hookups, and other products. Available free from Marketing Communications Manager, *Belden Corporation*, 2000 S. Batavia Avenue, Geneva, Ill. 60134.

The **1976 Semiconductor Replacement Guide and Catalog** is now available from GTE Sylvania. The 240-page publication cross references more than 119,000 industry part numbers to the company's ECG semiconductor line. Called Bulletin No. ECG 212G, the new guide includes outline drawings, circuit diagrams and technical descriptions of the various semiconductor devices. Available for \$2.95 from distributors or from *GTE Sylvania Advertising Service Center*, 70 Empire Dr., West Seneca, N.Y. 14224.

Wiring Termination products, such as terminals, disconnects, splices, wire joints, installation tools and wiring kits, are included in the newly revised catalog T-2 from Panduit Corp. The full-color, 28-page catalog contains complete information, specifications and illustrations of all the firm's terminating devices in color-coded chart form. Available free from *Panduit Corporation*, 17301 Ridgeland Avenue, Tinley Park, Illinois 60477.

National and International Standards are detailed in the latest

catalog from the American National Standards Institute. The new book lists more than 6000 American standards and some 4000 international standards and recommendations. Standards deal with dimensions, ratings, terminology and symbols, test methods, and performance and safety specifications for materials, equipment, components and products. Available free from *American National Standards Institute*, 1430 Broadway, New York, N.Y. 10018.

Cables Engineered For Safety is the title of a new 28-page, 2-color catalog on UL-listed, CSA-certified and OSHA-acceptable cables from Alpha Wire Corporation. The new catalog includes complete information on both shielded and unshielded cables, in gauges from No. 16 to No. 24, with up to 102 stranded conductors or pairs. Operating temperatures are up to 80°C or 105°C at voltages of 300 V or 600 V. It's available free. Ask for No. UL-1 from *Alpha Wire Corporation*, 711 Lidgerwood Avenue, Elizabeth, N.J. 07207.

Paging Receivers are described in the latest folder from Motorola. Product brochure RO-05-27 describes the firm's line of Metrx dual-function alert, tone-only paging receivers. Features, options and specifications are included. For free copy write: Barbara Bennett, Marketing Services, *Motorola Communications and Electronics, Inc.*, 1301 E. Algonquin Road, Schaumburg, Illinois 60196.

Digital Instruments and accessories are described fully, with prices in the latest booklet from Data Precision. The catalog lists and pictures the firm's line of digital multimeters and counter-timers. It's available free from *Data Precision Corp.*, Audubon Rd., Wakefield, Mass. 01880.

The new **Service Technician & Industrial Catalog** for 1976 is now available from GC Electronics. It contains pictures and descriptions for all products sold by the company, including: alignment tools, chemicals, antenna masts, mounts and hardware, replacement phono belts and idler/drive wheels, switches, microphones, test prods, headphones, tape accessories. The catalog has 336 pages and is available at *GC distributors*.

Base Loaded CB Antennas are described and compared in a new folder from Avanti Research. Emphasizing the importance of the antenna to good

CB performance, the brochure compares the quality differences between the firm's base loaded mobile antenna and others. Full-color cut-away photographs with call-out descriptions of each component illustrate and explain the importance of each feature to CB performance. Available free from *Avanti Research & Development*, 340 Steward Avenue, Addison, Illinois 60101.

A Guide to CB and Scanner Semiconductor Replacements is now available from General Electric. This first edition of the guide is designed for the technician now entering CB and scanner work. The guide covers the parts and devices contained in GE's new CB scanner semiconductor kits. Cross-referenced between original brand part numbers and GE replacement parts. Free from GE distributors, or Tube Products Dept., *General Electric Co.*, Owensboro, Ky. 42301.

Alarm and Security Equipment now available is described in the latest catalog from Mountain West Alarm Supply Company. The guide lists over 900 intrusion and fire alarm products, along with information on application, principle of operation and specifications, plus connection diagrams and pictures of typical installations. Available free from *Mountain West Alarm Supply Co.*, 4215 North 16th St., Phoenix, Arizona 85016.

CB Automotive and Appliance Noise Filters are described in the new selector guide from Cornell-Dubilier. Basic definitions and applications are presented plus descriptions of the complete CDE line of alternator/generator filters, co-axial feed-thrus, L-C tuned filters, appliance filters and low pass TV filters. Also described are the firm's heavy duty rotors for base station. Free from Mr. William Carlson, *Cornell-Dubilier*, 150 Avenue L, Newark, N.J. 07101.

Marine Antennas and Accessories are described in a new 12-page catalog from The Antenna Specialists. The booklet highlights the company's VHF (156-162 MHz) and CB (27 MHz) antennas. The VHF antennas described are built of marine white fiber glass that the firm claims will not fade or deteriorate when exposed to the ultraviolet of sunlight. VHF shore station antennas and a complete line of mounts and accessories are also described. Available free from *The Antenna Specialists Co.*, 12435 Euclid Avenue, Cleveland, Ohio 44106. ■

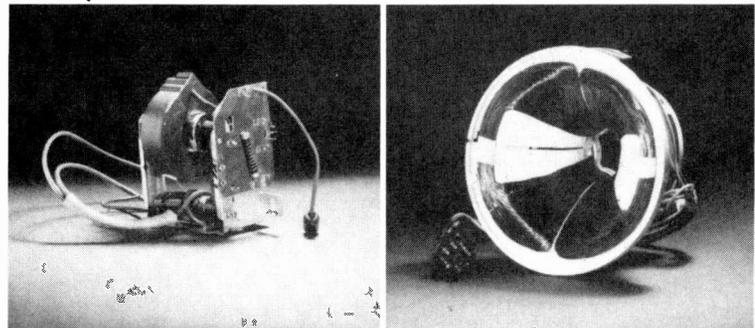


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\$250

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- RF wattmeter/dummy load
- DB meter
- SWR bridge

A built-in transmit mixer circuit converts a safe level of 27 MHz input signal down to approximately 1 MHz for scope display, allowing you to display the modulated RF signal on a 2 MHz scope!

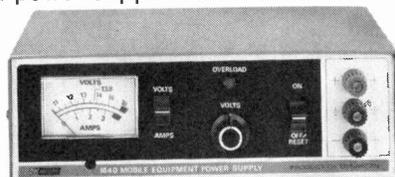
These instruments—which you should have, if you don't own them already, are all you need to get the maximum use from your CB Servicemaster. And the B&K CB Servicemaster is compatible with most oscilloscopes, frequency counters, signal generators and power supplies on the market today.



MODEL 1403A—3", 5 MHz Recurrent Sweep Oscilloscope

Checks CB modulation and provides viewing of 27MHz CB envelope when used with the Model 1040. Small, compact and inexpensive, it frees other scopes for more effective use.

Model 1403A \$209



MODEL 1640—Regulated Power Supply

Designed especially for CB and other mobile equipment, the 1640 eliminates changes in supply voltage due to load variations. A stable power supply is essential to precise testing of the transceivers. Less than 0.8% variation from zero to full load, 3 amps continuous, 5 amps surge. Adjustable to any output from 11 to 15 VDC. Suppressed zero scale for greater accuracy. Overload protected.

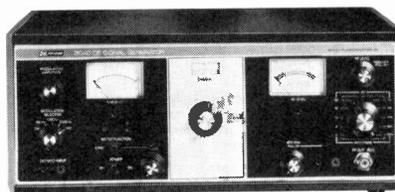
Model 1640 \$100



MODEL 1801—Digital Frequency Counter

To quickly determine the exact frequency of a CB channel, the 1801 automatically displays it for you in large, easy-to-read digits. You can tune oscillators precisely, conduct audio frequency analysis tests. Six digit display is updated five times per second. Accuracy guaranteed to 40MHz; 60MHz typical.

Model 1801 \$240



MODEL 2040—40 Channel CB Signal Generator

Covers all 40 authorized channels. AM and SSB and ten adjacent unassigned channels. Ultra-stable crystal-controlled, phase-locked-loop frequency generation. Has 5 ppm accuracy. Output attenuator and vernier provide calibrated outputs from 100,000 μ V to 0.1 μ V for receiver sensitivity measurements. Includes EIA standard noise test signal generator to check receiver noise suppression. Internal 400, 1000 and 2500 Hz modulating frequencies—can also be externally modulated. Internal protection against 5W RF input.

Model 2040 \$475

For additional information, contact your B&K-PRECISION distributor for our comprehensive brochure describing the operation of the Model 1040 CB Servicemaster and the CB Service Center—or write us for your free copy.

B&K PRECISION

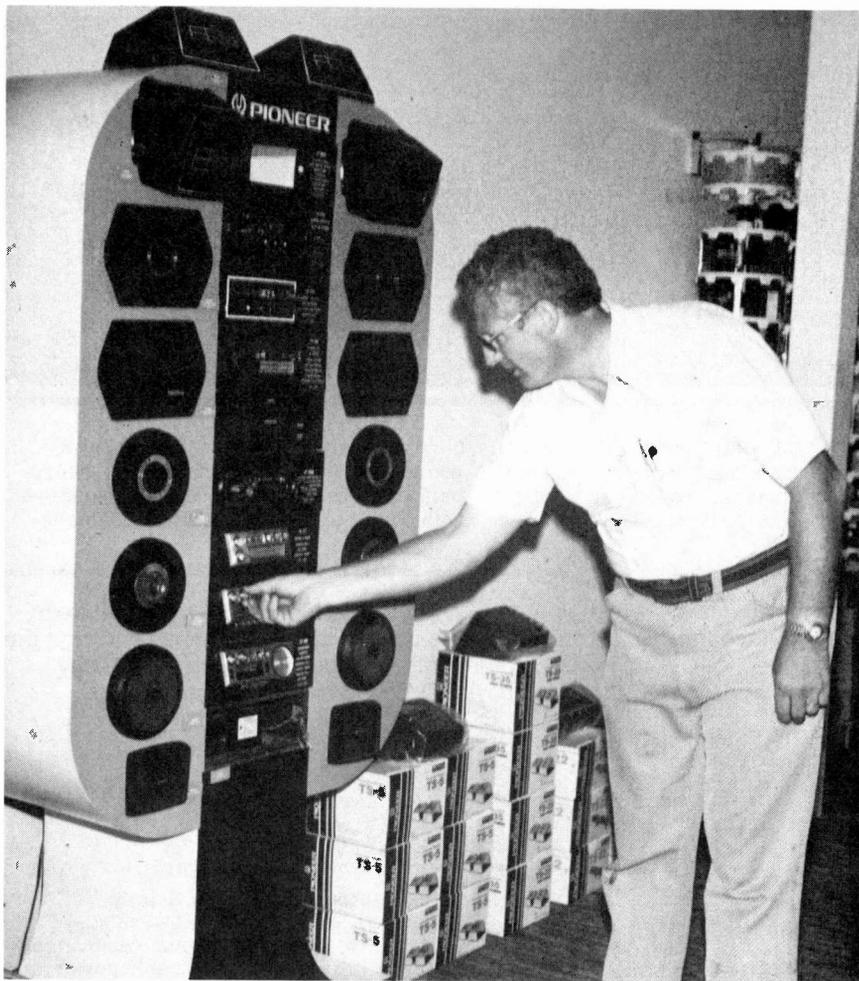
DYNASCAN CORPORATION
Makers of Cobra CB Equipment

6460 W. Cortland Avenue
Chicago, IL 60635 312/889-9087

In Canada: Atlas Electronics, Toronto

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

NOVEMBER 1976, ELECTRONIC TECHNICIAN/DEALER / 9



Optimizing 'volume'—whether sound or sales—seems to be a specialty of Jim Salyer, owner/operator of Custom Electronics, shown here adjusting the volume of an auto radio in one of the 'live' displays in the showroom of his \$170,000-a-year automotive electronics sales/service dealership in Topeka, Kansas.

How To Sell Auto Entertainment Electronic Products In Topeka. . . Or Anywhere Else

By Grier Lowry & J.W. Phipps

■ "If one of the five car dealers we do business with calls at 8:30 a.m. and says he needs a tape player installed by 10:30, we drop everything and concentrate on meeting his need as quickly as possible."

This ability and willingness to respond quickly, says Jim Salyer, owner/operator of Custom Electronics, Inc., Topeka, Kansas, is one reason he has been able to attract a steadily increasing volume

of car radio and tape player sales and installation business from car dealers in the Topeka area.

Salyer, who started Custom Electronics about 14 years ago, presently does about \$170,000 annual gross sales with just two employees—his son, Tim, and his daughter, Cathy.

Car radio and tape player sales and installation to car dealers on a 'wholesale' basis presently ac-

counts for roughly 70%, or \$119,000, of Salyer's total gross. Of the remaining \$51,000 annual gross, about \$34,000 (or 20% of total gross) comes from *retail* sales and installation of car radios to consumers, and about \$17,000 (or 10% of total gross) comes from *retail* sales and installation of CB.

Custom Electronics is located in the Highland Village Shopping Center, in the Southeast corner of Topeka, about five minutes from the center of this city of 125,000. (Salyer estimates that his total market area has a population of about 150,000.)

The facility covers 20 ft. x 140 ft. and includes a 20 ft. x 60 ft. showroom and a 20 ft. x 80 ft. drive-in shop area which accommodates up to four cars.

SPECIALIZATION AND CAREFUL BRAND SELECTION HAVE PAID OFF

"We started about 14 years ago selling, installing and servicing 4-track automotive stereo out of a former service station facility," says Salyer, "and although we presently stock CB and home stereo products, automotive stereo is still our specialty.

"At the time we started the business, other consumer electronic sales/service dealers in this area thought that anyone who believed that he could make a decent living by specializing in the sales and installation of music systems beneath car dashboards had to be out of his senses. But our sales have steadily increased, and we've had to move several times to larger and better facilities. I think the growth of our business has proved the old adage that 'it pays to specialize.'"

Salyer presently handles five brands of auto radio and automotive tape players, including Audiovox, Lear and Bowman.

"By specializing in two principal types of products—auto radio and automotive tape players—and limiting the number of brands to those which enable us to meet the feature, quality and pricing demands of our market, we're able to achieve economic and technical efficiencies which our more prolific competitors can't.

"For example," points out Salyer, "we're able to keep our



A partial view of Custom Electronics' 20 ft. x 80 ft. drive-in installation/service area, which can accommodate up to four cars. Fast, expert installation, priority treatment and the right combination of products are three key factors in the firm's success with car dealer sales and installations.



Completely operational, factory-designed displays of radios and speakers dominate one side of Custom Electronics' 20 ft. x 60 ft. showroom.

unit inventory investment at about \$40,000, with an average annual turnover rate of between three and four times. In fact, we turn over some of our tape player inventory an average of once every 30 days."

Expanding on the other benefits derived from specialization, Salyer explains: "The combination of specialization and careful selection of brands has also proved beneficial in the installation and service aspects of our operation. For example, our investment in replacement parts is now about \$6000. Although this is still a significant replacement parts investment in terms of the average \$1500 gross we receive each month from servicing, it would be considerably higher if we handled more types and brands of product.

"And, although we presently are relatively 'comfortable' with the rate of reimbursement we receive for warranty service labor, we, like most sales/service dealers, are very sensitive to the rate of failure

of the products we sell. We take this into consideration when we select a brand and we continue to monitor it closely after selection. If the in-warranty failure rate starts increasing, we're not bashful about changing brands. We don't want warranty servicing to take too big a chunk out of our installation and service capabilities and resources. When that happens, servicing becomes a profit-eating burden instead of a sales supporter and profit source.

"The typical in-warranty failure rate among the brands we now sell is about 2% of units sold. I consider that reasonable."

Specialization and careful brand selection also have enabled Custom Electronics to optimize servicing and installation proficiency. As Salyer explains: "With fewer types of products and fewer brands to deal with, my son, Tim, who handles much of the servicing and most of the installation work, has been able to develop and refine standardized installation proce-

dures for those brands and models which account for the bulk of our business. For example, he is able to install one popular model of Audiovox radio—complete with antenna, two in-door speakers and two rear-deck speakers—in about 20 minutes.

"And by selecting brands and models which—among other quality, design and price criteria—fit neatly into the original dash opening with a minimum of cutting, we not only save installation time, but also end up with a much more cosmetically appealing installation—and it also heads off trouble from car owners who later may decide to install a 'standard,' or 'OEM,' radio in place of the unit we have installed."

BALANCING ECONOMICS & QUALITY

Although the Salyers' seemed to have paid particular attention to factors and procedures aimed at reducing operating and overhead costs and improving productivity, they nevertheless have recognized

the need for weighing short term economic advantages against the possible effects they might have on the firms profits and image in the long term.

"What might appear at the time to be a logical method of cutting costs, in fact, in the long term, might create a problem that not only drains off profits but also destroys the quality image you've worked so hard to develop."

Salyer has put this knowledge into practice by carefully assessing, weighing and balancing during the brand selection process such factors as product cost, profit margin, ease-of-installation and reliability.

"Product performance and quality workmanship in installations are over-riding considerations in our operation," emphasizes Salyer. "For example, we feel that the FM band of the AM/FM radios we sell and install should have sufficient sensitivity to provide good reception from Kansas City, which is 60 miles from us.

"And we don't skimp on speakers either. The majority of our stereo sound installations are equipped with speakers with magnets ranging from 3 to 10 ounces. I recently purchased a large quantity of 5-1/4 inch speakers with 12-ounce magnets which, when placed in doors and combined with two 6 x 9 in-deck speakers with 4-or 5-ounce magnets, produce a quality of sound which our customers call 'tremendous.' When you put this kind of quality in an automotive stereo sound system which sells for less than \$200, you get a high volume of referral business, which, in turn, more than offsets the added costs of putting extra quality in your product. And if you buy right, the extra quality does not cut into your profit margin a significant amount nor does it force up your prices to the point where you are no longer competitive."

Another area in which quality pays off, says Salyer, are installation procedures which, although seemingly more time consuming and costly, actually aren't because they eliminate 'make goods', which not only are usually more costly than the preventive procedures, but also invariably detract from the 'quality' image of the business.

"Wrapping long runs of speaker wire in refrigeration duct tape to prevent chaffing, installing extra bracing behind radio and tape units to reduce the effects of vibration, routing and securing all wiring so it will not come loose and catch in the foot of the driver or passengers, and careful placement of door speakers so that they are not blocked by seats, are a few of the preventive procedures which are standard in our installations," says Salyer.

CAR DEALERS DEMAND & RECEIVE PRIORITY TREATMENT

"Some of the same ingredients that strengthen our position with the car dealers are important in selling retail buyers," Salyer said. "But because the car dealers represent the hard core of our volume, they get priority treatment.

"We not only drop everything else when one of our car dealers calls for an immediate installation, we also pick up the car and return it when the installation is completed. That's the kind of service car dealers demand, and you'd better be prepared to give it to them."

Salyer takes special pride in his success in attracting the business of car dealers. Five of the city's leading car dealers are in the Custom Electronics fold and furnish about all the business from that area the shop can comfortably absorb and yet continue to serve the retail trade efficiently. One Mercury dealer contributes a minimum of 50 sales per month, and it isn't unusual for the firm to install 600 car stereo units for dealers in a single month.

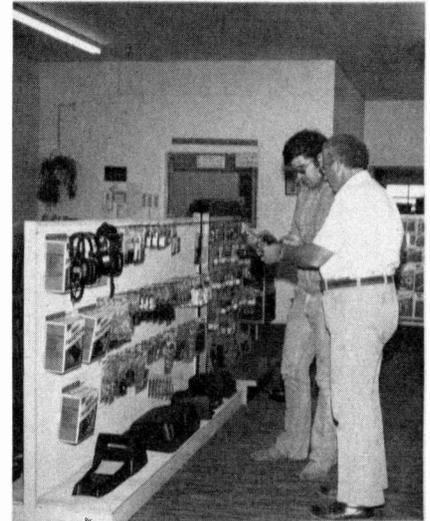
Custom Electronics is represented in the showrooms of three of the five leading car agencies with rack-type display fixtures which show five different units: an AM/FM radio, an AM/FM stereo radio, an AM/FM 8-track combo unit without pushbutton, and an AM/FM pushbutton radio with 8-track tape. The fifth opening in the display is left to the discretion of the dealer. Because Salyer also handles four brands of CB radio, some car dealers elect to fill the opening with a CB radio.

According to Salyer, these displays in the automobile showrooms are well worth the \$1000 investment he has in each. "They

make good silent salesmen," he said.

Salyer's business arrangement with car dealers is strictly verbal, with no written agreements involved.

Commenting on the profitability of his car dealer business, Salyer explains: "Because we effectively have to wholesale to our car dealers, our per-unit profit margin from such sales is less than that we receive from retail sales (typically about 30%), but the high



In addition to five brands of automotive radios and tape players, four brands of CB, and five principal brands of speakers, Custom Electronics also offers home stereo and a wide variety of related accessories.

volume offsets the lower margin."

Custom Electronics' attractiveness to car dealers is based not only on its ability to provide fast, expert installation of a variety of quality radios and tape players at prices which give the car dealers an opportunity for reasonable profit, but also because Custom Electronics assumes the burdens of inventory investment, showroom displays and warranty servicing. In fact, to "sweeten the pot," Salyer warrants his products and installation for the normal warranty period of the new car—12 months/12,000 miles, or whatever.

Salyer's typical installation charge to dealers is about \$25, but it does run higher, depending on the type of unit and car.

"Our average car dealer ticket runs between \$150 to \$200," Salyer said. "The best seller is a non-pushbutton AM/FM stereo radio with 8-track tape player. In-dash stereo outsells underdash

by a wide margin, though we still have a significant nucleus of underdash buyers. Eight-track tape players are preferred over cassettes."

Because it meets dealers' performance, price and cosmetic standards, one line, Audiovox, is given precedence in selling automobile agency buyers. According to Salyer, this line now enjoys wide acceptance among car buyers of the five agencies the firm serves.

RETAIL SALES: AN ESSENTIAL ELEMENT IN SALYER'S COST-PROFIT STRUCTURE

Although car dealer business demands, and receives, top priority in the day-to-day operation of Custom Electronics, Salyer nevertheless has not neglected the retailing aspect of his business—nor can he afford to. As he puts it, "Although the bulk of our total gross sales comes from car dealer business, retail sales, with its higher profit margins, is still an essential element in the cost-profit structure of our business—we can't do without it, nor do we really want to."

Dominating one side of Custom Electronic's well-arranged 20 ft. x 80 ft. showroom are two factory-designed product displays—one by Audiovox and the other by Pioneer—which, in addition to showing a wide variety of models in a minimum amount of space, also permit 'live' demonstration. One display exhibits 12 models and the other exhibits 50.

In selling on the floor, Salyer puts heavy emphasis on qualifying the customer. Is he or she interested in 8-track quad, cassette, straight AM/FM radio, or a combo unit with 8-track player? With, or without, pushbuttons?

"Price comes in early in the qualifying," said Salyer. "Patience in showing and demonstrating is the key.

"We find buyers extremely brand conscious in selecting speakers, and we have 'live' demonstration displays of lines such as Audiovox, Jensen, Metro, Pioneer and Lear Jet. Sometimes we must put them all through their paces, switching back and forth," he said.

Salyer's top aide on the selling floor is daughter Cathy, who feels that one of the most important

elements in making an effective demonstration is playing the type of music the buyer enjoys hearing.

"We keep five or six tapes of different types of music—rock, easy listening, country/western, golden oldies—handy to snap in and demonstrate the units," she said. "If you are half way perceptive, you can size up a buyer and key the music to his tastes. You can kill a sale by playing a 'Wings' tape for a Glenn Miller fan. For the young rock fan, you play the music loud. For the older, easy-listening type, you keep it low and well modulated.

"And it is surprising the number of car stereo buyers who are hard of hearing," she adds. "Only a small percentage will tell you they are hard of hearing and need the sound turned up, so you must look for facial expressions that indicate they aren't hearing the music well."

Quick, expert installation and service, if needed, are also emphasized in on-the-floor selling. The firm typically charges \$25 for installing underdash units and \$30 for in-dash units. However, installation charges vary according to number of speakers and make of automobile, with foreign brands running higher.

"What we like to do is get the customer out the door with the feeling that they have saved \$15 or \$20, even if we have to cut our profit to do it," Jim Salyer said. "The Kansas buyer who thinks he emerged from the transaction with a quality product and yet saved money is the one who will dispatch his friends to your operation."

MODEST BUT HIGHLY TARGETED ADVERTISING

Weighed against the volume of business he does, Salyer's advertising budget is not large. The principal reason for this is that the bulk of his volume comes from sales to car dealers, not direct from consumers.

However, because maintaining a certain volume of direct-to-consumer retail sales is essential to Salyer's cost-profit structure, he does invest in consumer advertising, but only on a scale proportional to the percentage of income he receives from retailing. Because his advertising budget must

therefore be relatively modest, he is particularly sensitive to its effectiveness.

Salyer presently employs a well-targeted mix of radio and newspaper advertising, plus a listing and display ad under "Automobile Radios & Stereo Systems—Retail" in the Yellow Pages.

About five spots are scheduled daily on a country/western music station for a month and then the focus is switched to a rock music station the next month.

The theme of his radio copy is simple, straightforward and *image oriented*, stressing the basics of quality in products and workmanship. The fact that the firm services and installs the products it sells is also played up strongly in radio advertising. Quick, expert installations are emphasized, as well as the fact that the shop is equipped to handle any repair problems. "We sell, we install, we repair, we make good," is the theme.

The main thrust in Salyer's newspaper advertising is a monthly special-priced deal, which is repeated several times during the month. A recent example was the offer of an AM/FM 8-track stereo model, regularly priced at \$119.95, for \$89.95. This type of promotion doesn't exactly produce streams of shoppers, according to Salyer, but it does boost the image of the firm for pricing competitively.

"We don't want a reputation for stocking only high-ticket goods," Salyer explains. "These special-priced offers in the newspaper help keep our pricing philosophy in perspective. *I feel it is important for any independent stereo dealer who is bucking the discount houses to defuse any notion the public might have that only higher-priced goods are stocked.*"

However, he is rigid on one score: Special-priced goods must perform satisfactorily and be reliable, name-brand products. He cited a recent instance when a discount firm promoted a \$69.95 car stereo special. Many of the buyers of these sets came to Custom Electronics to have them installed. When the buyers asked him for an assessment of the quality of the unit, Salyer said he told them,

continued on page 55



RCA Color 1977

By J. W. Phipps

An analysis of the new and updated carryover chassis in this manufacturer's 1977 model-year color TV line

RCA's initial 1977 model-year line of color TV receivers—referred to by RCA as its "A" line—consists of 59 models which, as shown in Table 1, employ a total of six basic designs of all-solid-state, modular chassis (CTC71, 72, 74, 76, 78 and 81) and offer a total of five different screen sizes (15, 17, 19, 21 and 25 inch) involving two basic designs of picture tubes, in-line and delta.

Of the six basic chassis designs used in RCA's "A" line, only one, the CTC78, is new. This chassis, which will be described later in this article, is a "complementary combination" of two discontinued XL-100 chassis, the CTC58 and the CTC68.

As is evident in Table 1, about three-fourths, or 45, of the 59 models in RCA's initial 1977 color TV line are equipped with updated versions of either the CTC74 or CTC81 ColorTrak chassis—a new six-module XL-100 series introduced by RCA late last year and described in the December 1975 issue of ET/D.

Three basic types of non-remote-controlled tuning systems

are offered in the "A" line: 1) manually operated systems equipped with switch-type VHF and 70-detent UHF tuners; 2) manually operated systems equipped with varactor-controlled VHF and UHF tuners; and 3) *Power Tuning*, a new motor-driven, varactor-controlled tuning system which provides 12 preset VHF and 8 preprogrammed UHF channels and is operated by pressing a single pushbutton on the front panel of the receiver. This new system will be described in detail in the December issue of ET/D.

Also offered in the "A" line are three basic types of remote-controlled tuning systems:

1) The *Direct Address* remote-control system introduced last year with the CTC74 and CTC81 ColorTrak chassis. Operated solely from a hand-held control unit which resembles the keyboard of a pocket-size electronic calculator, this system provides pushbutton remote selection of all 12 VHF and all 70 UHF channels, plus remote control of volume, color saturation, tint and on/off. It also provides on-screen display of the

channel number and the time of day.

2) The three-function, varactor-controlled VHF/UHF remote tuning system introduced last year in some CTC74 ColorTrak chassis. In addition to both 'local' and remote selection of 12 preset VHF and 8 preprogrammed UHF channels, this system also provides both 'local' and remote control of volume (up and down in 15 steps) and on/off.

3) A remote system which combines a mechanical-type VHF tuner and a varactor-controlled UHF tuner and which provides remote selection of 12 VHF and 8 preprogrammed UHF channels, plus remote control of volume and on/off. (This latter remote system is used in 17-inch receivers equipped with the carryover CTC72 chassis.)

THE CTC78

As noted previously, the CTC78 is the only new chassis among the six basic chassis designs employed in RCA's "A" line of color TV receivers.

This chassis, which is used in all "A" line 21-inch and some "A" line 25-inch receivers, is a "complimentary combination" of two nearly identical XL-100 chassis, the CTC58 and CTC68, both of which have now been dropped from RCA's color TV chassis lineup.

Equipped with the latest versions of the 'pre-ColorTrak' XL-100 family of ten modules, the CTC78 is electrically and physically a combination of the signal processing system and related modules and circuits of last year's CTC68 chassis, and the deflection system and related modules and circuits of the CTC58 chassis. A comparison of the rear views of the CTC78 and CTC58 chassis, shown respectively in Fig.'s 1A and 1B, substantiates the fact that the basic module complement and physical designs of these two chassis are, from a servicing point of view, almost identical.

The most significant difference between the basic design of the deflection circuitry in the CTC78 and that in the CTC58 is that the two pairs of discrete SCRs and diodes which perform the horizontal trace and retrace functions in the CTC58 are replaced in the

are listed in Table 2. (Presumably, as a result of discontinuance of the 'older' combination of MCK001A IF/AFT module and MCL001A Luminance/Sync module, the present 14 versions of each chassis eventually will be reduced to only the seven versions which result from the use of different tuning systems.)

Table 3 provides a complete listing of the module complement of the present versions of the CTC74 and CTC81 ColorTrak chassis. Note that in this cross reference of module-to-chassis versions, the modules are grouped into three principal categories: 1) 'Basic Modules', or those which are 'basic' to all "A" line ColorTrak chassis versions; 2) 'Remote Modules', or those which are added to the 'basic' module complement of chassis equipped with 'standard' three-function remote-control systems; and 3) 'Direct Address Modules', or those which are added to

the 'Basic' module complement of chassis equipped with RCA's *Direct Address* remote-control system.

The Need For And Use Of The New ColorTrak Modules

As noted previously, some versions of the "A" line CTC74 and

CTC81 ColorTrak chassis are equipped with a *combination* of the 'original' IF/AFT module (MCK001A) and Luminance/Sync module (MCL001A), while others are equipped with a *combination* of the new IF/AFT module MCK002A and Luminance/Sync module MCL002A.

Two service-related factors should be noted at this point in our discussion of these ColorTrak modules:

1) The module from one combination should *not* be substituted for the comparable module in the other combination. For example, the MCK001A IF/AFT module should *not* be used to replace the MCK002A IF/AFT module in a chassis originally equipped with the MCK002A/MCL002A combination.

2) One combination of modules should not be substituted for the other combination. For example, you should not attempt to replace an MCK001A/MCL001A module combination with an MCK002A/MCL002A combination.

The reasons that these modules and module combinations are *not interchangeable* are pointed out in the following analysis, which begins with a comparison of the two IF/AFT modules.

A comparison of the interfacing block diagram (Fig. 2A) and simplified schematic diagram (Fig. 2B) of the MCK001A IF/AFT module with comparable diagrams of the MCK002A IF/AFT module (Fig.'s 3A and 3B) reveals the following two principal reasons why one IF/AFT module cannot be substituted for the other and why each must be used only with its 'complementary' Luminance/Sync module:

1) *Different B+ voltage requirements*—Both IF/AFT modules receive their B+ operating voltage from a single connection to potentiometer R301, which, in addition to supplying B+ to the IF/AFT module, also furnishes 28 volts B+ to other 'signal processing' modules in the ColorTrak chassis.

IF/AFT module MCK001A is designed to operate from the full 28 volts supplied by R301.

However, IF/AFT module MCK002A is designed to operate from only 22 volts B+. Consequently, in ColorTrak chassis which are factory equipped with

TABLE 2
ColorTrak CHASSIS VERSIONS
SUFFIX DESIGNATION

	IF/AFT MODULE -- MCK001 -- MCK002	&	MCL002
			MCL001 -- MCL002
CTC74:			
Remote w/varactor VHF/UHF tuners	AJ		AD
Manual w/varactor VHF/UHF tuners	AK		AF
Direct Address remote w/varactor VHF/UHF tuners	AL		AH
Manual w/detent switch VHF/UHF tuners	N		AA
Manual w/detent switch VHF/UHF tuners	P		AB
Manual w/detent switch VHF/UHF tuners	R		AC
Remote w/varactor VHF/UHF tuners	T		AE
CTC81:			
Direct Address remote w/varactor VHF/UHF tuners	K		AB
Manual w/detent switch VHF/UHF tuners	C		P
Manual w/varactor VHF/UHF tuners	D		R
Manual w/varactor VHF/UHF tuners	E		T
Remote w/varactor VHF/UHF tuners	F		U
Power Tune w/varactor VHF/UHF tuners	H		W
Power Tune w/varactor VHF/UHF tuners	J		AA

TABLE 3
MODULE COMPLEMENT—RCA 1977 ("A" LINE) COLORTRAK CHASSIS (CTC74/81)

MODULE NUMBER	MODULE FUNCTION	CTC74AJ, T	CTC74AK, N, P, R	CTC74AL	CTC74AD, AE	CTC74AF, M, AB, AC	CTC74AH	CTC81K	CTC81C, D, E, H, J	CTC81F	CTC81AB	CTC81P, R, T, W, AA	CTC81U
BASIC MODULES:													
MCK 001A	IF/AFT	•	•	•			•	•	•				
MCK 002A	IF/AFT				•	•	•			•	•	•	
MCL 001A	LUMINANCE/SYNC	•	•	•			•	•	•				
MCL 002A	LUMINANCE/SYNC				•	•	•			•	•	•	
MCC 001A	CHROMA	•	•	•	•	•	•	•	•	•	•	•	•
MCD 001A	RGB DRIVER	•	•	•	•	•	•	•	•	•	•	•	•
MCH 001A	VERT/HORIZ OSC	•	•	•	•	•	•	•	•	•	•	•	•
MCH 002A	VERT/HORIZ OSC						•	•	•	•	•	•	•
MCS 001A	SOUND	•	•	•	•	•	•	•	•	•	•	•	•
REMOTE MODULES:													
MCX 001A	REMOTE POWER/CONTROL	•			•				•			•	
MCR 002A	DIGITAL MEMORY	•			•				•			•	
MCY 002A	REMOTE PREAMP	•			•				•			•	
DIRECT ADDRESS MODULES:													
MCP 001B	DAP POWER SUPPLY			•			•	•			•		
MCT 001A	COMMAND			•			•	•			•		
MCA 001B	CLOCK DISPLAY			•			•	•			•		
MCU 001A	UHF TUNING			•			•	•			•		
MCV 001A	VHF TUNING			•			•	•			•		
MCY 001A	REMOTE PREAMP			•			•	•			•		
MCZ 001B	REMOTE PREAMP			•			•	•			•		
MCF 001A	ULTRASONIC FILTER			•			•	•			•		
MCM 001A	MASTER INTERCONNECT			•			•	•			•		

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DUAL TRACE 5" SCOPE SYNC'S TO 35 MHz

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module MCK002A, a 91-ohm resistor has been inserted between the 28-volt B+ source and the input terminal of the MCK002A module, to drop the B+ to the required 22 volts.

2) *Different number and polarity of video outputs to Luminance/Sync module*—in the MCK001A IF/AFT module, the video and AGC functions are performed by discrete semiconductors, and there are two composite video outputs to the MCL001A Luminance/Sync module: one, for the luminance-processing section of the MCL001A module, is obtained directly from the emitter of NPN video buffer Q4 and consequently is *positive-going*, and the other, for the sync processing section of the MCL001A module, passes through an extra polarity-inverting stage (noise inverter Q5) and therefore is *negative-going*.

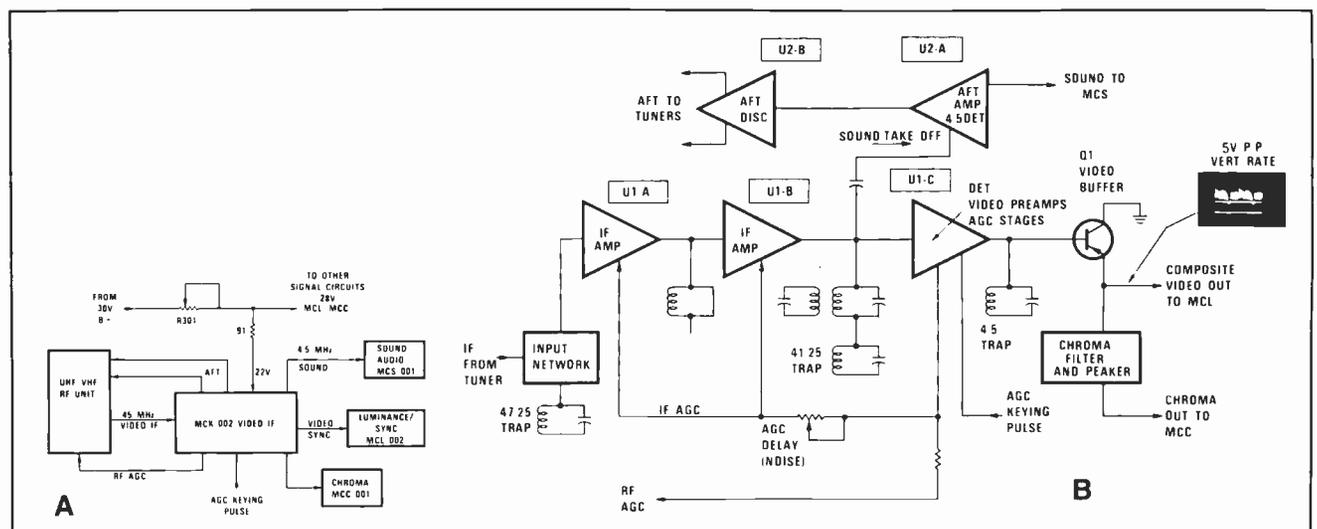
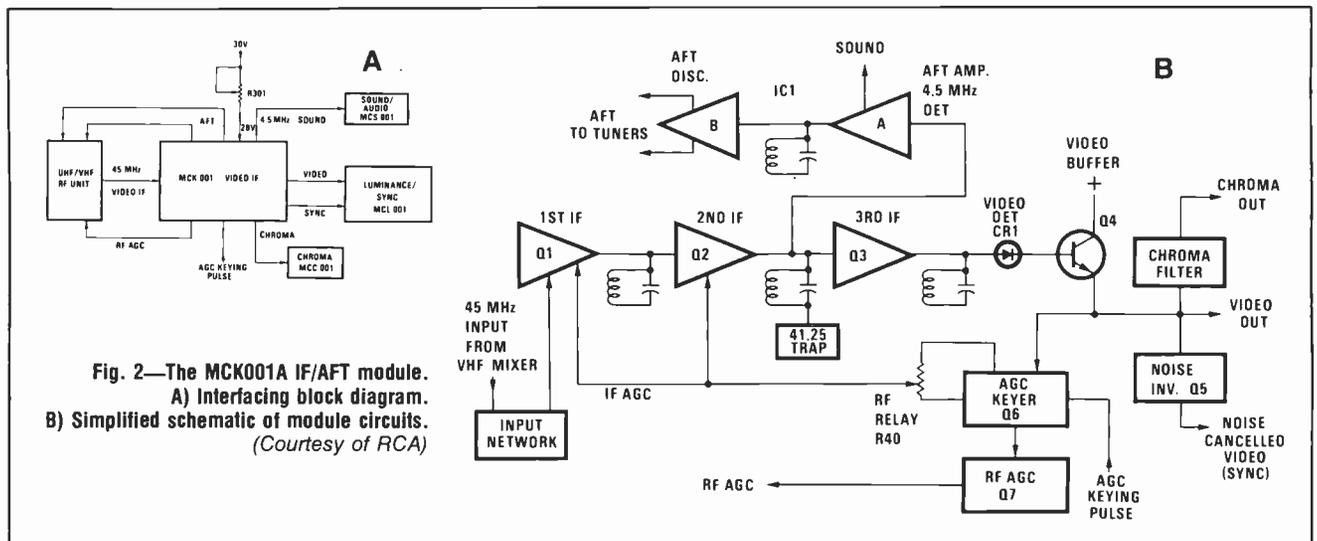
Consequently, 1) because the MCK002A IF/AFT module has

only *one* video output for application to the Luminance/Sync module, as opposed to two from the MCK001A, and 2) because the single video output of the MCK002A is *negative-going*, as opposed to the positive-going luminance-related output of the MCK001A, a new Luminance/Sync module capable of processing the *single, negative-going video output* of the MCK002A IF/AFT module was required—thus, the reason for the development of the MCL002A Luminance/Sync module and its use with only the MCK002A IF/AFT module, and, conversely, the reason for use of the MCK001A IF/AFT module with *only* the MCL001A Luminance/Sync module.

Fig.'s 4A and 4B illustrate how the two different Luminance/Sync modules interface with their respective 'complementary' IF/AFT modules and other related modules and chassis functions.

As illustrated in Fig. 5, the MCK002A IF/AFT module (top) is physically much smaller than the MCK001A IF/AFT module (bottom). This significant difference in size, plus a difference in the locations of the plastic guide-pin holes in the two modules and the presence of the module type-number of the module board, should preclude mistaking the MCK001A for the MCK002A.

However, as evident in Fig. 6, the size of the MCL001A Luminance/Sync module (left) is about the same as that of the MCL002A Luminance/Sync module. Nevertheless, because the module type-numbers are also printed on these module boards and because the locations of the plastic guide-pin holes in these two modules are also different, there should be no difficulty in differentiating between the two versions. Also, because the IF/AFT and Luminance/Sync modules are in-



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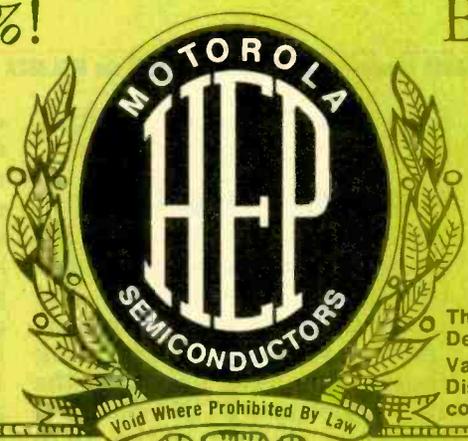
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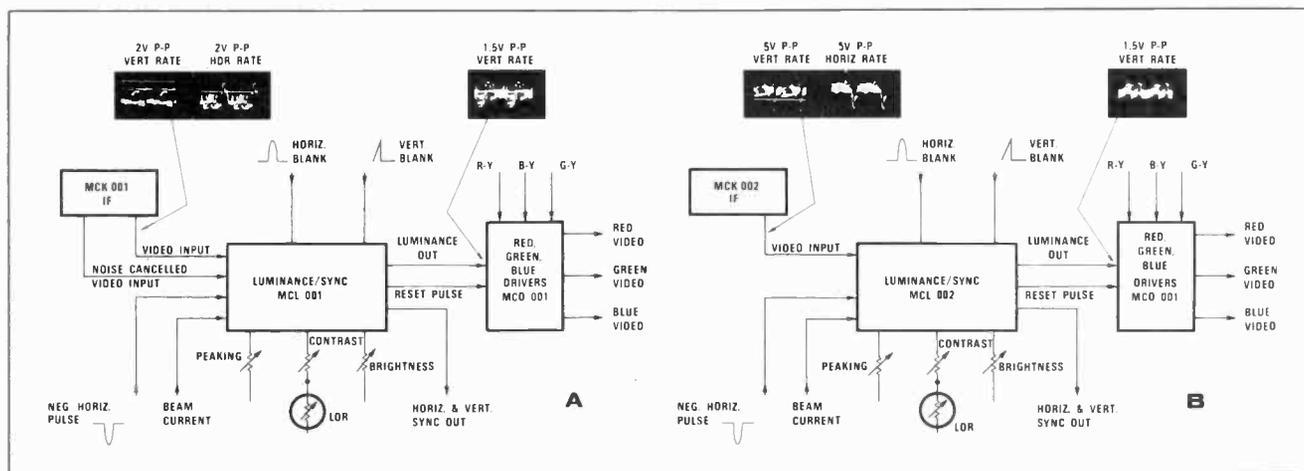
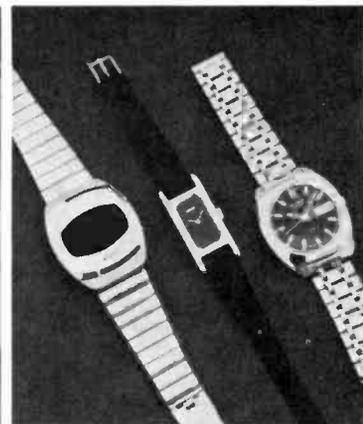


Fig. 4—Interfacing block diagram of A) the MCL001A Luminance/Sync module, and B) the MCL002A Luminance/Sync module. (Courtesy of RCA)

stalled in 'complementary' combinations during manufacture, the type of IF/AFT module in a particular chassis will serve as another clue to the type of Luminance/Sync module which should be used, and vice versa.

However, if, for example, the related module guide-pin on a chassis has been broken off and the wrong type of Luminance/Sync module is installed in the chassis, neither the module nor any other chassis circuitry will be dam-

aged—loss of sync and a 'negative' picture will be the only results.

Additional CTC81 Design Changes

Except for the previously described design changes relating to the use of new IF/AFT and Luminance/Sync modules in some "A" line runs of both ColorTrak chassis, the basic design of the 1977 model-year CTC74 chassis is the same as that of the 1976 model-year chassis.

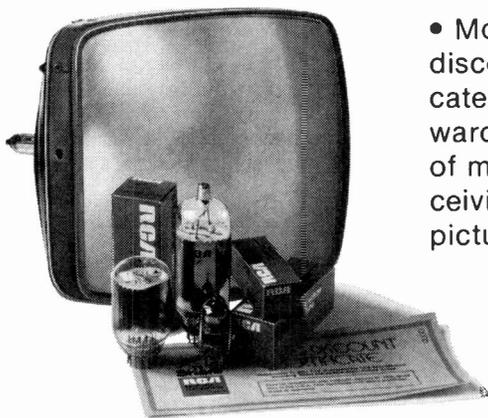
However, a few other design

changes have been incorporated in the basic design of the 1977 model-year CTC81. The most significant of these changes, from a servicer's point of view, is the *physical* redesign of the convergence-related assemblies. The dynamic convergence circuits and related adjustments—which in 1976 model-year CTC81 chassis are contained on a rectangular board mounted above the neck of the picture tube—in 1977 model-year versions of this chassis are

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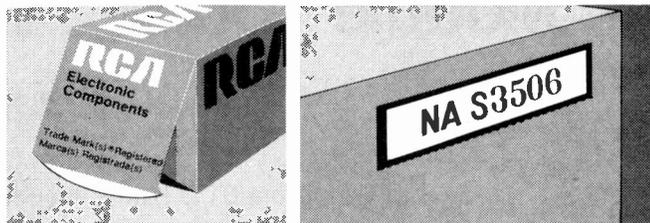
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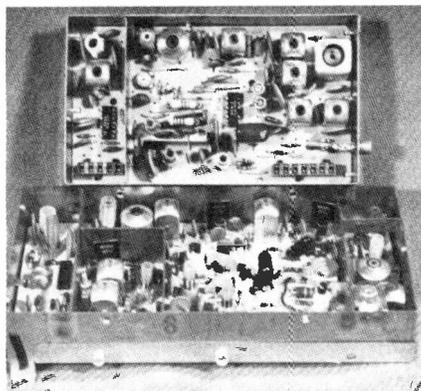


Fig. 5—IF/AFT modules MCK002A (top) and MCK001A (bottom). (Courtesy of RCA)

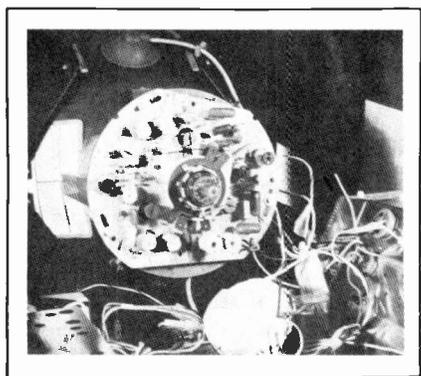


Fig. 7—The new convergence assembly employed in "A" line CTC81 ColorTrak chassis. (Courtesy of RCA)

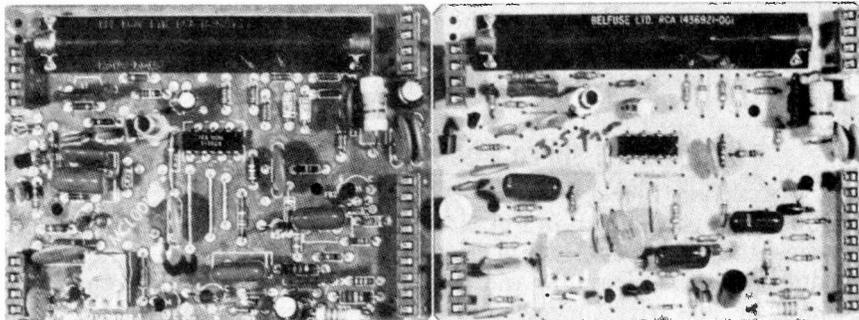


Fig. 6—Luminance/Sync modules MCL001A (left) and MCL002A (right). (Courtesy of RCA)

contained on a new circular-shaped board which is mounted on the neck of the picture tube, as shown in Fig. 7. In addition, the three static convergence coils are mounted on the 'picture tube' side of the new convergence board, and their adjustment knobs extend through holes in the board, for convenient adjustment from the 'service' side of the board. A new blue lateral assembly and a new deflection yoke housing also are employed in the 1977 model-year chassis.

This redesign of the CTC81 convergence-related assemblies is principally a *physical* change and, therefore, from a servicing point of

view, has not altered the electrical operation of the convergence system. The static and dynamic convergence adjustment procedures are basically the same as those of the original version of the CTC81.

The only other service-related changes in the design of the CTC81 are: 1) the employment of a *two*-position SERVICE switch (*in* for full raster, and *out* for display of the horizontal line used in adjustment of gray-scale tracking) and, 2) the elimination of the LDR DEFEAT switch, which in the previous CTC81 chassis design provides a means of defeating the light-dependent resistor (LDR) that

continued on page 54

Quasar's "Super Module" Color TV— Part 2

By Don W. Mason, ET/D Managing Editor

Analysis of the circuits in the TS-958 and TS-959 modularized color TV chassis

■ Quasar has introduced in its 1977 color TV line two new modularized chassis—the TS-958 and the TS-959—in which about 60 to 65% of the receiver circuits are mounted on one easily removed and repaired or replaced circuit board which Quasar calls a "Super Module". (Fig. 1) And, as pointed out in the introductory part of this series in the September issue, not only have Quasar engineers concentrated a significantly high percentage of the chassis circuitry on the Super Module, but they also have done it in a manner which makes it possible to use the *same* replacement Super Module in either chassis. However, the other modules in these two chassis are not interchangeable.

ON THE SUPER MODULE

A simplified block diagram of the TS-958 and TS-959 chassis is shown in Fig. 2. The bold solid line represents the Super Module. Note that the Super Module contains all audio and all video signal processing circuits with the exception of the tuners and the video output stages (the latter are contained on a separate circuit board mounted on the neck of the picture tube). Signal processing is accomplished by five ICs and eight transistors mounted on the Super Module.

Now let's take a look at the circuits.

Tuner-Video IF Coupling

The video IF signal from the tuners is coupled to the Super Module by a coax cable (Fig. 3). At the input (TP11), series absorption traps couple the signal to bandpass transformer T101.

The low frequency portion of the IF pass band is set by a 39.75 MHz (upper adjacent channel video carrier) crystal filter, X101, which is not adjustable. The upper frequency of the IF pass band is set by a 47.25 MHz (lower adjacent channel sound carrier) trap in which the inductance (L101) is fixed and a null pot (R101) is adjustable, to allow for setting the trap for maximum 47.25 MHz rejection. A 41.25 MHz trap (L103) attenuates the sound carrier, to prevent unde-

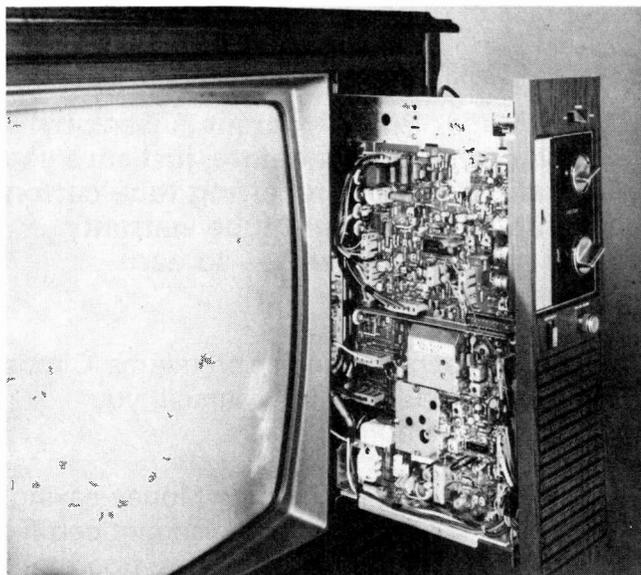


Fig. 1—The 1977 Quasar "Works in a Drawer" color TV, with the new "Super Module" that plugs in and performs most of the signal and picture functions.

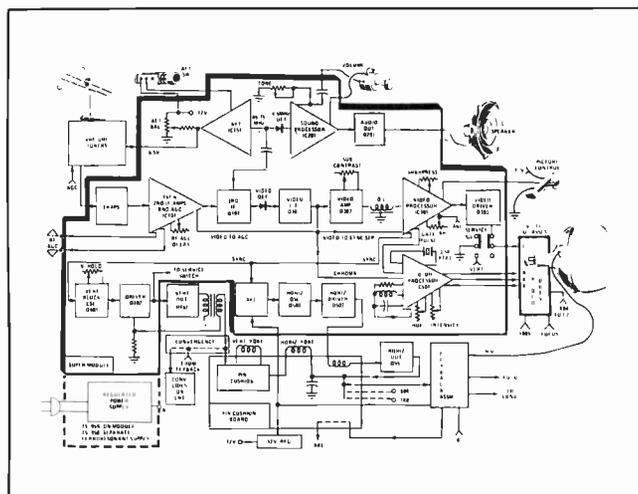


Fig. 2—Simplified block diagram of Quasar's two "Super Module" color TV chassis—the TS-958 and TS-959.

sirable beats in the picture and intercarrier buzz in the audio. A jumper lead located just above R129 in Fig. 3 can be cut if an increase in the 41.25 MHz trap attenuation is required.

The sound carrier cannot be attenuated to the same level as the 39.75 MHz picture trap or the 47.25 MHz sound trap because this could decrease the 4.5 MHz sound IF level below limiting and thus create noise in the audio signal. The signal is coupled to pin 3 of IC101 (Fig. 4) through T101, which, along with the input traps, establishes the IF curve skirt selectivity.

Video IF/AGC Noise Inverter

IC101 in Fig. 4 performs the functions of video IF amplification and noise-immune AGC voltage development. Composite video IF from the secondary of transformer T101 (Fig. 3) enters the IC at pin 3, is amplified by two video IF stages and leaves the IC at pins 1 and 16. The gain of both video IF stages in IC101 is controlled by "forward" AGC voltage, which is developed across R109 (pin 9) by an internal AGC amplifier and, after filtering, is applied to both video IFs via pin 12. As the strength of the received signal

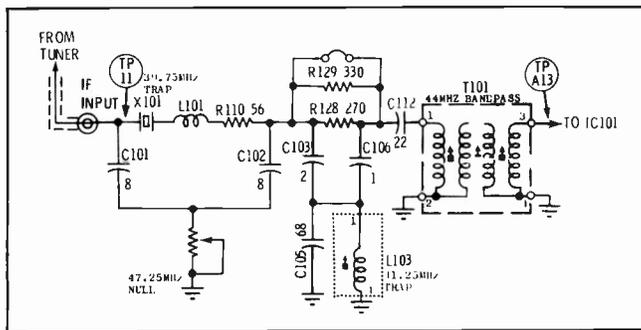


Fig. 3—Schematic drawing of Tuner/Video IF coupling circuit.

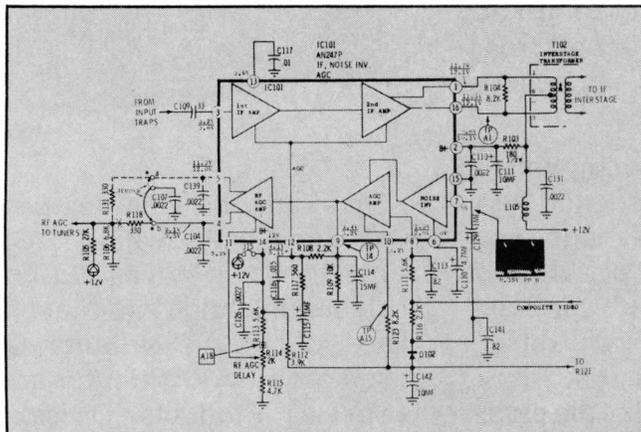


Fig. 4—Schematic drawing of integrated circuit for video IF/AGC/noise inverter processing and associated circuitry.

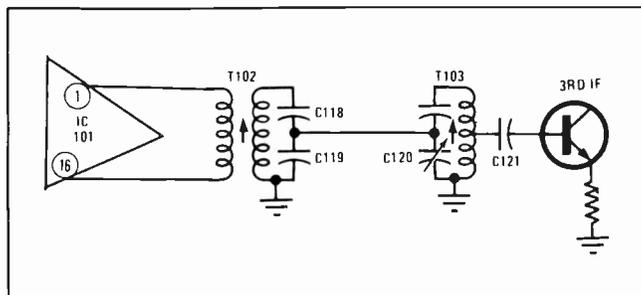


Fig. 5—Simplified drawing of transformer coupling circuit between IC101 and the 3rd IF stage.

increases, the amplitude of the sync pulses in the composite video applied to pin 8 increases proportionally, causing the conduction of the AGC amplifier to increase, which in, in turn, develops a more positive AGC voltage across R109 (pin 9).

When the amplified composite video signal leaves IC 101 at pins 1 and 16, it is transformer coupled to the 3rd video IF stage, Q101. A simplified version of the coupling network used is shown in Fig. 5. The junction of capacitors C118 and C119, in effect, center taps and tunes the secondary of the transformer, T102, to provide proper impedance matching to the 3rd video IF input. Another 3rd video IF input tuning component, C120, is variable so as to provide band pass, without the need to detune the other circuits, and to assure proper coupling.

The signal then is applied to the video detector through transformer coupling and to the automatic fine tuning (AFT) and sound sections through capacitive coupling (C135 and C201) (Fig. 6).

The inductive coupling of transformers L104 and T105 complete the IF band shaping. The IF response is maximized around 44 MHz by T105—and the 41.25

MHz sound carrier is attenuated by L104 in conjunction with R122.

Automatic Fine Tuning (AFT)

The AFT function is accomplished by another integrated circuit, IC151, and associated circuitry, (Fig. 7), all contained in a small shielded package mounted on the Super Module. IC 151 contains a 45.75 MHz carrier amplifier, a discriminator, an AFT amplifier and an electronic switch.

The video IF signal enters IC151 at pin 7, through capacitor coupling (C135) from the 3rd IF stage. The signal is amplified in the IC and, after inductive coupling through T152/T151, is applied between pins 9 and 11. Any shift in the video carrier develops a positive or negative DC voltage, depending on the direction of oscillator frequency change. The resultant discriminator output is direct coupled to the AFT amplifier in the IC, and its output at pin 13 is applied to both tuners.

AFT is defeated by putting the INSTA-MATIC and AFT switches in their OFF positions, which applies a fixed positive voltage to the AFT switch stage in IC 151, through pin 15. This voltage turns the AFT amplifier off, and no AFT correction voltage appears at pin 13.

Sound Processing

Another Super Module integrated circuit, IC 201, contains most of the stages for processing the sound signal. This IC includes: a sound IF/limiter, an FM detector, and two audio amplifier stages (pre-amp and driver). (Fig. 8).

Video and sound carriers from the collector of the third IF (Q101) are capacitive coupled (C201) to diode D201. As these signals beat in the diode, a 4.5 MHz FM sound IF signal, which contains the original audio modulation, is produced and applied through a tuned circuit to sound IF transformer T201. This transformer couples the sound IF to pins 1 and 2 of IC 201, where the signal is amplified in the IF amplifier/limiter and applied to the FM detector.

The phase of the sound signal is then shifted 90° by an external quad coil (LC 201) connected between pins 9 and 10 of the IC. This phase-shifted signal is also applied to the IC's FM detector. After detection and amplification, the sound signal leaves the IC at pin 8, and is coupled by C212 to the tone control and by C209 to the volume control. A capacitor (C210) couples the signal from the volume control to the IC's audio amplifier through pin 14. From pin 12, the amplifier output is direct coupled to the audio output transistor, Q201 (Fig. 9). The IC develops a forward bias for Q201, and the amplified audio signal appearing at the collector of Q201 is transformer coupled to the speaker. A diac (D210) across the primary of the transformer protects Q201 against any current transients that might be developed in the transformer.

Video Amps

IC301, mounted on the Super Module, provides for video amplification, peaking, sync separation, noise immunity, and video clamping at the black level. (Fig. 10).

The video signal, amplified and inverted by video amplifier transistor Q302 is coupled to pin 14 of the

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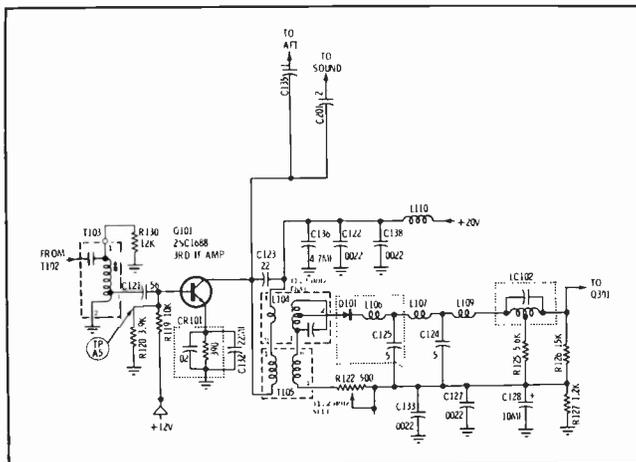
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video processing IC301 through a delay line (TD301) and capacitor C301. The signal passes through the video gain control of the IC to the video amplifier and after amplification leaves the IC at pin 12 to pass through a peaking (sharpness) circuit. When peaking control R321 is rotated in one direction, it rolls off the high frequencies and picture sharpness decreases. Adjustment in the opposite direction peaks the high frequencies and resolution is increased. After passing through the peaking circuit, the signal reenters the IC at pin 10 into the emitter follower which is an impedance matching stage, passes out through a capacity coupler and back through pin 8 into the IC's next video amplifier.



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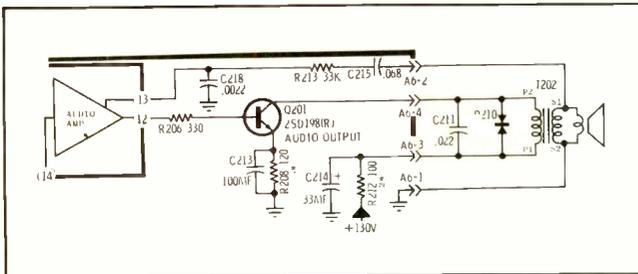


Fig. 9—Schematic drawing of the direct coupling used between the audio amp section of sound processing IC201 and the audio output transistor, Q201.

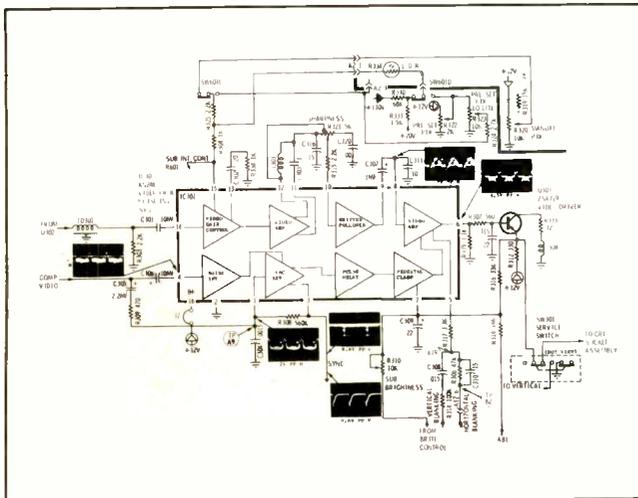


Fig. 10—Schematic diagram of IC301 and associated circuitry that provides video amplification, peaking, sync separation, noise immunity and video clamping at the black level.

thus, through the service switch to the emitter circuit of each video output transistor on the CRT socket assembly, which is described later in this article.

Sync Separator/Noise Inverter

Composite video with positive going sync enters IC 301 at pin 4 for the noise inverter section and pin 1 for the sync separation section. The noise inverter reacts to any noise exceeding sync level. Noise free sync signals to control sweep circuits are assured because negative going noise pulses at the inverter output applied to the sync separator stage cancel the positive going noise riding on the signal. Reverse bias developed across C305 holds the sync separator stage in cut

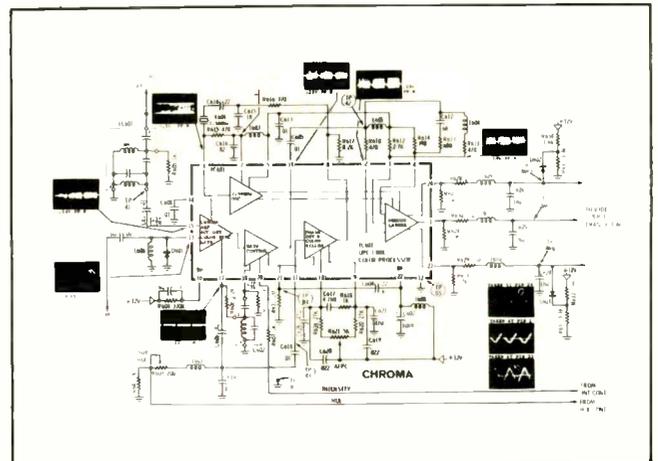


Fig. 11—Schematic diagram of the color processing integrated circuit IC601 and associated circuitry.

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Oscillator frequency is controlled by an AFC circuit that compares a pulse from the flyback transformer with a horizontal sync pulse originating at the TV station transmitter. If the pulses do not coincide, the AFC system develops a correction voltage to speed up or slow down the oscillator.

The oscillator circuit produces a square wave voltage at the collector of the oscillator Q501 (Fig. 13) which is coupled directly to driver transistor Q502, which then functions as a switch. The squared waves from the oscillator drive Q502 into saturation and cutoff. The driver stage then amplifies and shapes the square waves which are then coupled through transformer T502 to output transistor Q551 (Fig. 14).

The horizontal output stage also functions as a switch to produce a sawtooth current through the horizontal windings of the yoke which deflects the beams in a horizontal direction.

One end of the deflection yoke coils connects to ground through pincushion transformer T404, with coil L502, R425 and C416. Adjustment of the width coil varies the impedance between yoke coils and ground to control picture width. A slip-on connector is used to balance the DV voltage in the yoke windings and center the picture.

OFF THE SUPER MODULE

As has been noted, 60 to 65% of the circuits in Quasar's new TS-958 and TS-959 chassis are mounted on one circuit board called the "Super Module", which is interchangeable between the two chassis. The offboard circuits do differ between the two

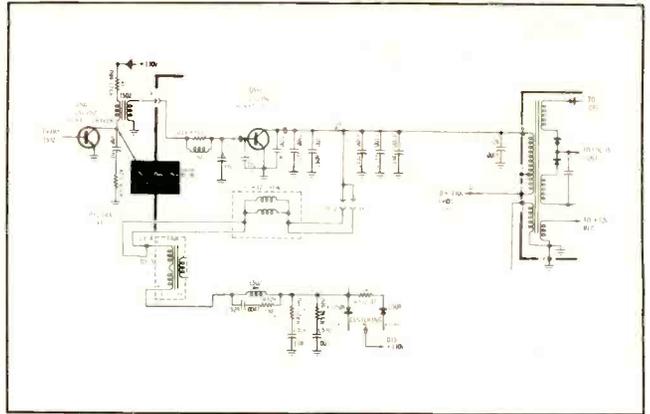


Fig. 14—A schematic drawing of the coupling circuit that couples the amplified square waves from horizontal driver Q502 through transformer T502 to horizontal output transistor Q551.

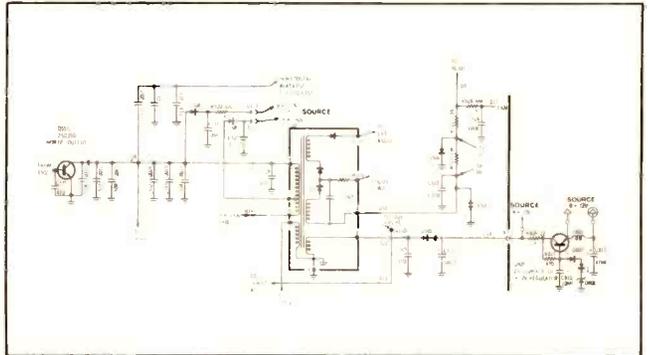


Fig. 15—Schematic diagram of the high voltage circuit, including the new "sealed-in-oil" horizontal output transformer.



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chassis and include: horizontal output/high voltage, 20/12 volt source, video output assembly, pincushion correction assembly, convergence circuits, and low voltage power supplies.

Horizontal Output/High Voltage

Quasar engineers have used a new approach to horizontal output transformers for television receivers in the TS-958 and TS-959 chassis. The new transformer, and high voltage and focus rectifiers (Fig. 15) are sealed in oil to dissipate heat and prevent high humidity problems. The transformer develops focus and high voltage for the CRT and provides pulses which are rectified and filtered to develop secondary voltages.

A magnetic field is generated during scan by current going through the transformer primary winding. The field collapses and generates a pulse voltage in all windings when the horizontal output transistor (Q551) turns off (retrace interval). A positive pulse also appears at the top of both high voltage windings and when these pulses add together they produce a high voltage pulse that forward biases diode D3 to charge CRT capacitance to about 29KV. The positive pulse turns on diode D2 and charges C1 for focus voltage.

The source voltage of 180V for Q306, Q307 and Q305, the three output transistors on the CRT socket board (covered later in this article) is produced when diode D506 is turned on by a positive pulse on the transformer primary, and charges capacitor C521. Another positive pulse of about +700V at the top of the primary winding turns on D504 and charges C516 to about +710V for the CRT G2 voltage.

Although high voltage circuitry in both the TS958 and TS959 chassis is essentially the same, an isolated winding is added to the flyback transformer in the TS959 chassis to produce CRT filament voltage.

20/12 Volt Source

The +20 V source, used in the audio, vertical sweep and third video IF circuits, is developed during horizontal scan. A positive voltage from a flyback transformer winding forward biases diode D505 to charge capacitor C520, developing +20V. (Fig. 15)

The regulated +12 volt source is derived through transistor Q805, a series regulator. The +20V source is applied to Q805's collector and to zener diode D806 through resistor R813 and diode assembly D807. The zener diode clamps the voltage at +12.5 V, and then Q805, operating as a dynamic variable resistor, provides the regulated +12 V at its emitter. Filtration of the +12 V is provided through the base circuit of Q805, because a small base current is easier to filter. Capacitance used for base current filtering is the same as a much greater capacitance at the output (or emitter). The +12 volts source is used for most of the signal processing circuits, customer controls, and tuners.

Video Output Assembly

Because the 25 inch TS-959 consoles use a delta gun CRT, and the 19-inch TS-959 chassis uses an in-line gun CRT, their CRT socket board assemblies are not interchangeable. The video output assemblies

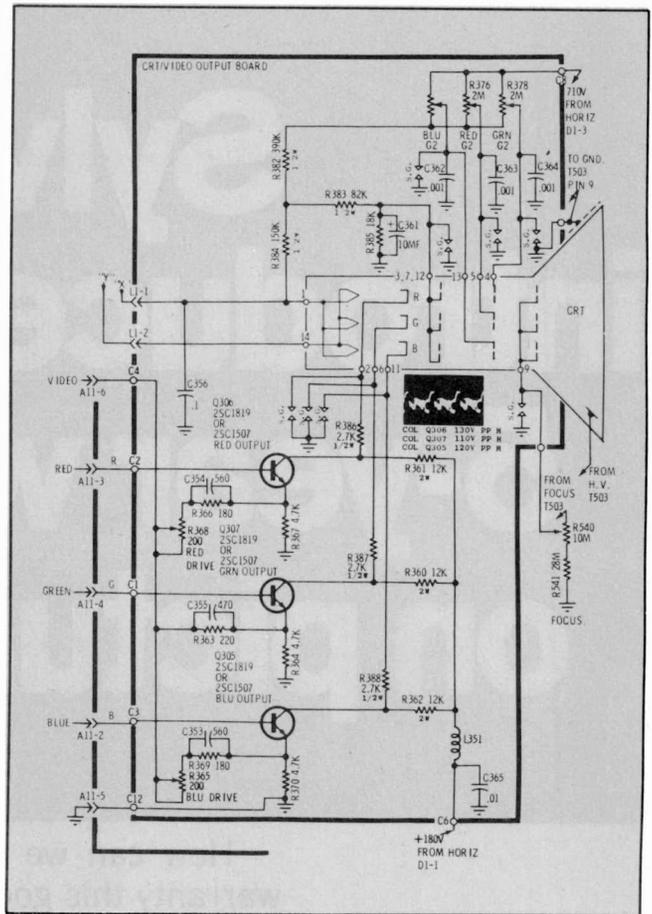


Fig. 16—Schematic drawing of the CRT/Video Output Board.

are part of Quasar's panel exchange program.

The pathway of the video signal to the CRT guns is from service switch SW301 through series drive controls to the emitters of the red and blue output transistors, Q306 and Q305, and through a fixed resistor to the emitter of the green output transistor Q307 (Fig. 16). The controls are adjusted for a white screen at high brightness because current through them is proportional to brightness. The color difference signals from color processor IC601 couple to the bases of the video output transistors. The collectors of the output transistors on the CRT socket board are DC coupled to their respective CRT guns. The +180V supply for the collector circuit comes from terminal C6.

The difference between the TS-958 and TS-959 chassis in the CRT socket board assemblies is in the filament supply. In the TS-958 (25-inch sets), the CRT filaments get their 6.3 volts from a winding on power transformer T801. A positive voltage from the G-2 controls to filament circuits provides heater to cathode breakdown protection.

In the TS-959 chassis (19-inch sets) the CRT filament operates from a winding on the flyback transformer and is referenced to +20 VDC to reduce the heater to cathode potential.

In both TS-958 and TS-959 chassis, the G-2 controls (red, blue and green) are individually connected to the +710 V supply at terminal C8. Proper adjustment of these controls along with adjustment of the drive control provides the desired black and white tracking. The service switch is used for this adjustment. G1

voltage of +710 V is common to all three beams.

Pincushion Correction Assembly

Transformer T404 on the pincushion correction board controls the length of each horizontal scan line and thus corrects side distortion in the raster in the following way.

A sawtooth voltage that comes from the vertical yoke circuit is shaped into a parabola wave shape (Fig. 17) by the charge/discharge action of capacitor C414. This parabola voltage is applied to the control winding of transformer T404 and produces current that saturates the core. Energy at the vertical rate is induced into the load winding, which is in series with the horizontal deflection current. Therefore this vertical rate energy loads the horizontal sweep system. Maximum saturation occurs at the top of the raster, decreases to minimum at screen center and then increases to maximum again as the beams scan to the bottom of the raster.

Meanwhile, top and bottom distortion of the raster is corrected as the saturable reactor transformer T403 (Fig. 18) controls vertical sweep. The primary winding of the transformer receives retrace pulses from the flyback transformer. The other winding is part of a tuned circuit connected in series with vertical deflection coils. The tuned circuit, rung by the transformer coupled horizontal pulses, provides resonant currents that modulate the vertical scan current to reduce vertical size at the corners of the raster. The result is straight horizontal scan lines at the top and bottom.

Convergence Circuits

Convergence Circuit boards for both the TS-958 and TS-959 chassis are mounted on the neck of the picture tube and are easily accessible to the technician through a drop-down cover that permits convergence adjustments without having to remove the entire back cover. The convergence circuits vary, however, according to the type of picture tube used.

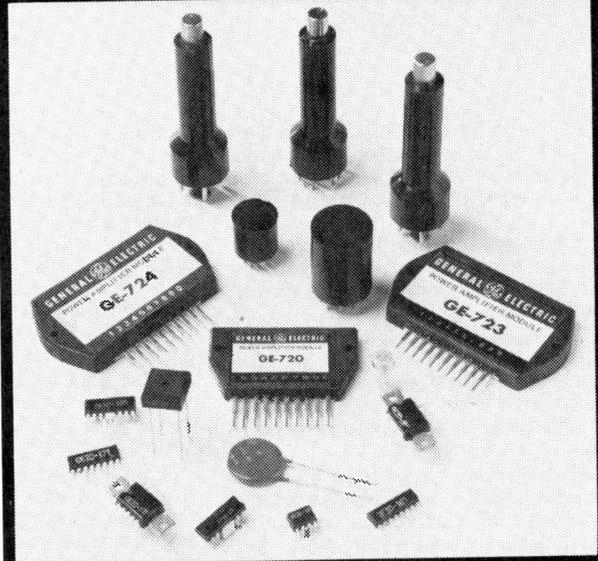
The TS-958 (25-inch sets), which uses a delta-gun-type picture tube, features a dynamic convergence circuit that is similar to the circuits used in most other delta-gun-type receivers. Horizontal and vertical sweep, applied to the circuitry, provides proper convergence coil currents to superimpose the red, blue and green beams at the edges of the screen. Vertical dynamic convergence circuitry, in series with the vertical deflection coils, shape the convergence coil current into a parabola. This provides correction at the top and bottom of the screen.

With the TS-959 chassis (19-inch sets), the in-line gun picture tube allows for a less dynamic, simpler, convergence circuit than with the delta-type tube.

Because the in-line picture tube has the green gun in the center of the deflection field, the green raster does not require dynamic correction and serves as a reference to adjust red and blue rasters. The red gun is to the right, and blue is to the left. The red beam travels farther to the left than the green beam, and the blue beam travels farther to the right than the green beam. Thus the red raster is enlarged at the left edge and blue is enlarged at the right edge. Permanent magnets for red and blue converge the beams

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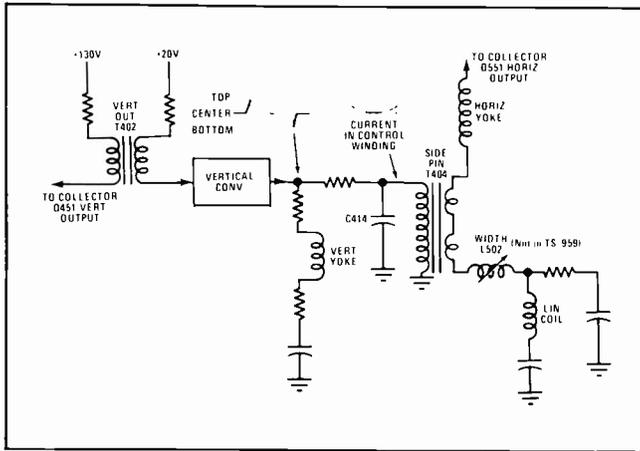


Fig. 17—A simplified drawing of the circuit in the pincushion correction assembly that shapes the sawtooth voltage from the vertical yoke circuit into a parabola wave shape.

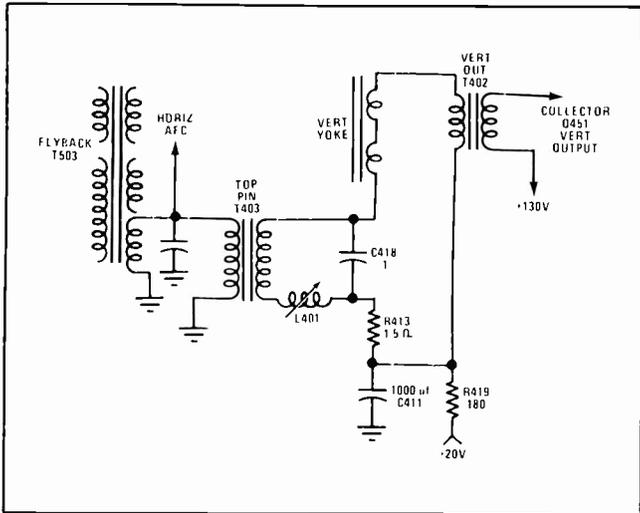


Fig. 18—A simplified drawing of the circuit in the pincushion correction assembly that includes saturable reactor transformer T403.

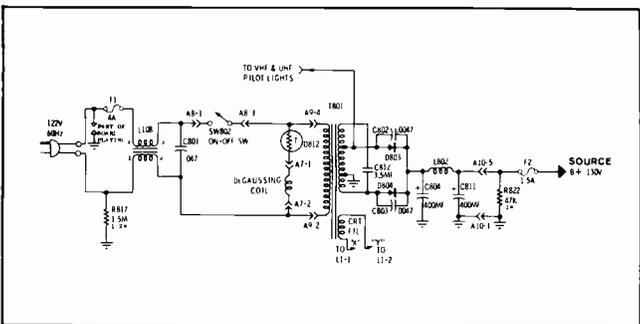


Fig. 19—The low voltage power supply for the TS-958 chassis.

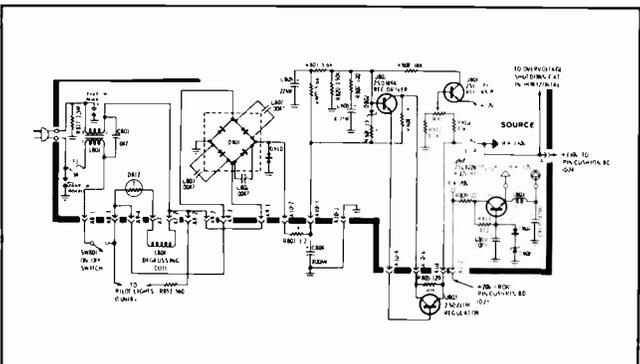


Fig. 20—The low voltage power supply for the TS-959 chassis.

with green at the center. Vertical and horizontal dynamic convergence circuitry provides proper convergence coil current waveshaping to superimpose the beams at the outer edges of the screen.

LOW VOLTAGE POWER SUPPLIES

In the TS-958

Low voltage is supplied for the TS-958 chassis by a ferro-resonant transformer power supply, (Fig. 19) contained on a small sub-assembly outboard of the Super Module. Its output of +130 VDC is applied to the super module through plug A10.

AC power is applied to the circuit through a fuse, line chokes and the on/off switch to a degaussing circuit, and the primary winding of the ferro-resonant transformer T801. The secondary winding and capacitor C812 form a resonant circuit that causes core saturation for input voltage exceeding 90 volts on peaks of each half cycle. The result is a relatively constant secondary voltage, regardless of the line voltage variations above approximately 90 volts. Load variations have little effect on the secondary voltage because changes in load current are compensated for by an opposing change in the saturation level of the core. Thus, the ferro-resonant transformer provides a regulated output voltage that is relatively independent of normal line and load variations.

Neon pilot lamps operate from the secondary winding and a separate secondary winding on T801 provides CRT filament voltage. Full wave rectification of the + secondary voltage is provided by diodes D803 and D804. Filtering for the +130V source is provided by capacitors C804 and C811, in conjunction with choke L802.

In the TS-959

A solid state regulatory circuit, mounted on the Super Module, provides the low voltage for the TS-959 chassis. (Fig. 20)

AC power is applied through a fuse, line chokes and the on/off switch to a full wave bridge rectifier, D801. Neon pilot lamps and the degaussing circuit connect to the AC input when the set is turned on. Rectified output voltage is regulated to compensate for normal line voltage and load variations.

Transistor Q803 functions as a dynamic variable resistance in parallel with resistor R805. Transistor Q801 samples B+ source voltage. Conduction of Q801 is controlled by voltage variations at its base because its emitter is connected to the regulated +12V supply. If the source voltage increases, Q801 increases conduction and its collector voltage decreases. This voltage reduction couples through base/emitter of transistor Q802 to the base of Q803 and that reduces the conduction of Q803. The internal resistance of Q803 increases to maintain the source voltage. The opposite action occurs if source loading increases, thus the result is a relatively constant 132V B+ source.

Circuit protection is provided by an input fuse (F1) and a spark gap at the AC input, by thyrector D810 at the bridge rectifier output, and by a 1.5 amp fuse (F2) at the output of regulator transistor Q803.

Horizontal, vertical and audio output stages operate from the +132V B+ source. ■

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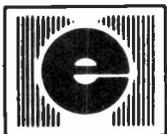
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The new Executive Council, elected at the NATESA convention at St. Charles, Illinois, includes: (front, left to right) Paul J. Kelly, Warwick, R.I., vice president; George J. Weiss, Chicago, president; (back, left to right) Richard Ebare, Essex Junction, Vt., treasurer; Leo E. Cloutier, Los Angeles, secretary general; and Frank J. Moch, executive director.



Everett Pershing, owner of Pershing TV & Radio, Burbank, California, is the newly elected president of NESDA.

Electronic Service Association Conventions—1976

A review of key activities and developments at this year's national conventions of NESDA and NATESA.

By Don W. Mason, ET/D Managing Editor

■ "Successful—both for activities and attendance" seemed to be the description of this year's annual conventions for both of the national electronic service associations, NESDA and NATESA. The National Electronic Service Dealers Association (NESDA) held its convention in San Antonio, August 13-17, and the National Alliance of Television and Electronic Service Associations (NATESA) met in convention at Pheasant Run Resort near St. Charles, Illinois, August 19-22.

IN SAN ANTONIO

The fourth annual NESDA convention was headquartered at the San Antonio Convention Center and the Palacio del Rio Hotel—and with over 600 persons in attendance—it was described by NESDA officials as "the largest

convention of service dealers ever held." Actually, it was three conventions in one, in that ISCET (International Society of Certified Electronic Technicians) and TEA (Texas Electronic Association) held their annual conventions jointly with NESDA.

Many Awards Were Given

As a result of the combined convention (NESDA/ISCET/TEA), the awards were many. Two persons—Dick Pavek and Miles Sterling—shared, as co-recipients, the NESDA "Man of the Year" award. Pavek, president of Tech Spray Company, Amarillo, was cited for work with NESDA and the Certified Electronic Technician (CET) program, and Sterling, owner of Electro TV, Garden Grove, California, was cited for his "vigorous efforts" on behalf of in-

dependent consumer electronic service dealers, and especially his efforts to gain passage of California's new warranty law.

Honors for "Technician of the Year" were awarded by ISCET to James E. Harris, CET, service manager of Tarpley's TV in Temple, Texas. Harris was selected for the award through industry-wide balloting conducted by the NESDA publication, *Service Shop*, and ISCET. He was cited for a "high degree of technical skill, devotion to his job, a willingness to share his knowledge with others, his association work and his civic involvement."

Other awards made during the convention included: *The Outstanding Officer* award, which was presented to LeRoy Ragsdale, last year's NESDA president; *The Outstanding Committee Chair-*

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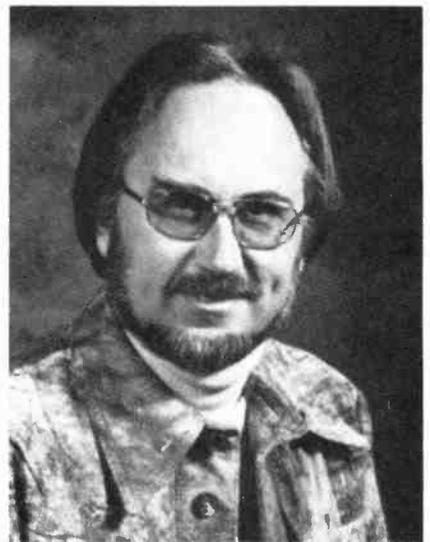
3 PROTECTED INSIDE AND OUT so you can be sure that your meter is working and not in the repair shop. Drop it from 10 feet, apply 1000 volts overload and even apply volts on ohms accidentally and Sencore digitals keep right on working.



Al Menegus, ET/D Publisher, tees off at the NESDA Open Golf Tourney at San Antonio. ET/D was sponsor of the event that kicked off the NESDA convention this year.



(left to right) Chuck Cummings, ET/D South/West District Sales Manager, and Ray Dempsey, Jim Newbrough and Jay Franklin, all of RCA, total golf scores at the end of the NESDA Golf Tourney.



Dick Pavek, president of Tech Spray Co., was named as co-recipient of the "Man of the Year" Award at the NESDA convention for his work with NESDA and the Certified Electronic Technician (CET) program.

man award, which was presented to Paul F. Dontje, chairman of the NESDA Business Management Committee; *The Hal Chase Memorial Award*, which was presented to John Cioni, president, Arizona State Electronics Association; and *The Jack Betz Memorial Award*, which this year went to Cliff Lum, past president of the Hawaii Electronic Service Dealer Association (HESDA).

New Officers Elected

The election of officers for the

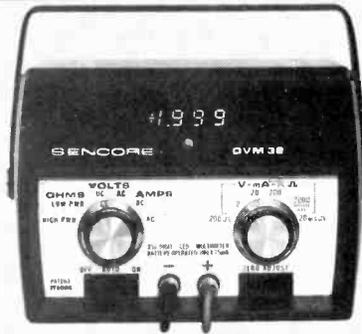
new year was a major activity at the NESDA convention, as it is with most association conventions. Delegates representing over 2,000 NESDA members nationwide elected Everett Pershing of Burbank, California as president, after what was described as "one of the most spirited convention campaigns NESDA has ever seen". The presidential candidates utilized posters, campaign buttons, stickers, dancing girls and even a musical group from Toledo, Ohio playing "Happy Days Are

Here Again."

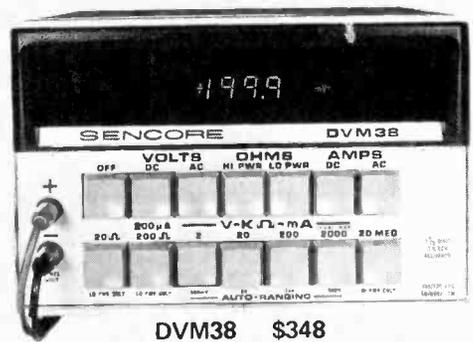
The new president is owner of Pershing Radio & TV, a sales and service firm he founded in 1935. Pershing served as NESDA senior vice president last year, and previously was vice president of Region 9, which includes California,



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.1% DCV accuracy,
AC operated, auto-ranging,
auto-zero, king-size pushbuttons



4 BATTERY SAVING FEATURES WHEN INSTRUMENT IS NOT IN USE so you can be sure that your meter will be ready the next time you need it. Push the button on the probe on the DVM35 and DVM36 and only then do you start drawing current from your battery. An automatic patented circuit does the same job for you automatically when you apply voltage to the DVM32. The DVM38 is AC operated.



5 100% MADE RIGHT LIFETIME GUARANTEE so you can be sure your meter was made right. If at any time you discover that a Sencore DVM was not made right, Sencore will make it right, parts and labor free of charge, for the lifetime of the product.

TEN DAY FREE TRIAL

6 10 DAY FREE TRIAL to be sure that Sencore digitals are all that we say they are. Simply march into your Sencore distributor and ask for a free trial or pay cash with a promise of a 10 day money back guarantee, if not 100% satisfied. Or, write Sencore, and we will see that our distributor contacts you.

Plus other "make sure" features such as - direct reading with no parallax error - no effect from magnetic fields such as motors & RF fields - lab accuracy with high resolution - auto-polarity auto-zeroing and auto-ranging on the DVM38 . . . and you can see why you can be sure more times, in more circuits, than with any other multimeter on the market today - and for less money than old fashioned analog meters.

SENCORE 3200 SENCORE DRIVE
SIOUX FALLS, S.D. 57107

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



Miles Sterling, owner of Electro TV, Garden Grove, California, was co-recipient of NESDA's "Man of the Year" Award, along with Pavek. He was cited for his effort on behalf of independent servicers and his role in the campaign for California's new Warranty Law.

Nevada, Arizona and Hawaii. He also served as chairman of the Electronics Hall of Fame in 1975-76, and has been active in California electronic association work for many years.

Other NESDA officers elected in San Antonio include: John



Brian Marohnic, Zenith national service manager, welcomes NESDA convention delegates to the Zenith-sponsored banquet at the San Antonio Convention Center.

McPherson, Mac's TV, Yorktown, Virginia, as secretary; Kurt Wertheim, of Kurt's Furniture, San Antonio, as senior vice president; and Jack Kelly, of Sage & Sand TV, Litchfield Park, Arizona, as treasurer. Last year's president Leroy Ragsdale of Fort Smith, Arkansas, will fill the position of immediate past president on the Executive Committee.

Regional vice presidents, also chosen at the convention, include: (1) Charles Yung, Jr., New Canaan, CT; (2) Warren Baker, Al-



On 'school day', the last day of the NESDA convention, chairman Paul Dontje, Arvada, Colorado, leads one of four separate concurrent Profitable Service Management classes at the Palacio del Rio Hotel in San Antonio.

bany, N.Y.; (3) Walter Cooke, Hampton, VA; (4) Herschel Lawhorn, Perry, GA; (5) Dave Garwacki, Toledo, OH; (6) George Simpson, Ft. Worth, TX; (7) Keith Knos, Liberal, KS; (8) Tom Thomas, Pueblo, CO; (9) Bill Lawler, Los Angeles; and (10) Bob Villont, Tacoma, WA.

New ISCET officers also were elected during the convention. They were: Charles Couch, chairman; Frank Grabiec, vice chairman, and George Sopocko, treasurer. Ron Crow, Ames, IA, con-

tinues as executive director.

Other Convention Events

The San Antonio convention began with the "kick-off golf tourney" sponsored by Electronic Technician/Dealer magazine on the Pecan Valley PGA course, hosted by ET/D Publisher Al Menegus and ET/D South/West District Manager Chuck Cummings. Other events such as luncheons, dinners and hospital-ity hours were sponsored by: GTE

Sylvania, Sony, Panasonic, Magnavox, Zenith, General Electric and RCA.

A number of technical seminars were held during the convention on subjects such as: "How To Fix CB Radios—Fast", "Scope Usage and Digital Logic," and Better Ways to Interpret Test Equipment Results." Business management sessions provided the finale on the last day of the convention with instruction by: John Sperry, Charley Yung, Paul Dontje, Ron Crow,

Jack Kelly, Bob Villmont, Dick Pavcek, Sharon Leightner, Jack Hopson, Carl Haupt, Miles Sterling and Dan Kelly.

Next Year

NESDA's 1977 convention is set for Orlando, Florida at the Sheraton Twin Towers, August 16-20. And a membership goal was set at this year's convention for the coming year for an increase to 600 dealer shops. Members are being

continued on page 54

Warranty legislation is major topic at both conventions

A newly enacted Warranty Law in California and an unsuccessful effort at warranty legislation in Rhode Island occupied important places on the agendas of both the NESDA convention and the NATESA convention.

At San Antonio, NESDA members attended a major seminar on California's newly enacted Warranty Law SB 568 presented by Miles Sterling and Jim Ballard of Garden Grove and San Jose, California, respectively. Sterling and Ballard had major roles in drafting and guiding the law through the California legislature. As described by Sterling, Warranty Law SB 568, which becomes effective January 1, 1977, "insures that independent repair shops, called upon to service an express warranty of a manufacturer, get fair compensation from the warranty manufacturer. Furthermore," Sterling related, "the law requires prompt *local* service so that it will be easier for the consumer to have his defective merchandise repaired."

As outlined during the seminar, the new law means that in California:

- Consumers are given the option of taking defective warranty merchandise to their local independent repair shop when a manufacturer's franchised repair and service facility is not provided in the area reasonably close to where the consumer goods are sold.

- The independent shop, when called upon to do warranty service and repair, will be paid the actual and reasonable cost of repair and a reasonable profit.

- Both the consumer and the independent service and repair facility are now given adequate legal remedies to enforce the rights granted by the act.

- As between the consumer and the independent servicers, the consumer cannot be "back-charged" by the independent for warranty service.

- The independent service person is given an independent cause of action against the manufacturer for warranty repair done within the provisions of the act, and treble damages plus attorney fees for willful and repeated violations of the bill, by the manufacturer.

The bill went through five amendments suggested in large measure by manufacturers and representatives. These changes provided that:

- All goods with a wholesale price of less than \$50 to the retailer would be excluded.

- The consumer must first seek out a manufacturer's franchised service and repair facility within a reasonably close area and next seek out the retail seller or other retail seller of the goods within the area before he engages the service of an independent shop.

- The distribution point was defined as the place of busi-

ness for mail-order outlets of such consumer goods.

- Service contracts may be negotiated for a one-year period regardless of price fluctuations, so that the manufacturer can know in advance its projected costs.

- Any legitimate reduction in the independent's service and repair costs, due to billing or paying practices of the warranty manufacturer, may be taken by the manufacturer in determining the warranty service and repair rates.

During the seminar, a panel of manufacturers discussed efforts at warranty legislation. One of the panel members, RCA vice president Arnold Valencia told the NESDA members "It is important that you try to cut your costs by increasing your efficiency. I realize, however, there is a limit to how much you can increase that efficiency. When you reach bottom costs, you have no choice. You have to raise your rates. But I warn you," Valencia said, "RCA will challenge you if you raise your charges for doing warranty work on our products. You'll have to justify any request for a price increase by substantiating your costs. Therefore, you better understand your costs."

Miles Sterling, in reporting on the seminar, described Valencia's statement as "the first open recognition by a major television manufacturer of the plight being suffered by service dealers in every state. Although RCA recognized the need for sound business practices in the industry," Sterling concluded, "the same sentiment was not echoed by the other manufacturers present."

In a report to the NATESA convention in Illinois, Paul F. Kelley, Warwick, R.I., described a two year campaign to get a warranty law passed for the State of Rhode Island. A bill which would have established the warranty law was passed in the Senate of the Rhode Island General Assembly for two years in a row but was tabled each time it got to the House Committee on the Judiciary. Kelley, who owns Kelley's TV Service in Warwick, outlined the many efforts by legislators, servicers, consumer groups, business owners, teachers and unions to get the warranty bills through the General Assembly in 1975 and 1976. His report indicated that pressure from manufacturers helped for two years in a row to kill the legislation when it got to the House. As Kelley pointed out, "The quality and quantity of support for this bill leaves no lingering doubt in our minds as to how passage was prevented. All of the supporters should be complimented for their sincere interest and effort. The opponents should be judged on the sincerity and honesty of their efforts—but they should be judged."

Kelley told NATESA members that his report was "meant to supplement the efforts of independent servicers to enact warranty legislation in their own state legislatures."

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...for more details circle 135 on Reader Service Card

TEST INSTRUMENT REPORT

Fluke's Model 8030A Compact DMM



For more information
about this test instrument,
Circle 137 on the
Reader Service Card
in this issue.

■ Fluke's newest compact-size, 3-½ digit multimeter, Model 8030A, is capable of measuring DC voltages from .1mV to 1100 volts; AC voltages (*true rms read-out*) from .1mV to 750 volts; AC (true rms) and DC current from .1µA to 1.9A; and resistance from .1 ohm to 1.9 megohms. (For related ranges, accuracies and other electrical characteristics, see the accompanying table of specifications.)

The functions and ranges of the Model 8030A are manually selected by pressing in (or releasing) the appropriate combination of pushbuttons among the ten on the front panel. The five pushbuttons on the left relate to 'function', and the five on the right relate to 'range'. Color coding is employed to improve the visual correlation

of function and range.

Input to the unit is through three jacks on the right-hand side of the case: The jack labeled "V-OHM" is used for voltage and resistance measurements, and the jack labeled "mA" is used exclusively for current measurements. (The "mA" jack has a built-in 2-amp input-protection fuse, which can be easily removed merely by pressing in on the spring loaded rim of the jack and turning it CCW.)

The digital readout of the 8030A is provided by .3-inch-high, red, light emitting diodes (LEDs).

The case of the unit has a built-in hood which, after loosening of one screw, can be slid forward about one inch to shade the display and make it more visible in extremely bright ambient light conditions.

Included among the operating features of the 8030A are: 1) automatic indication of DC voltage and current polarity, which eliminates the need to reserve test lead connections, and 2) an automatic overrange indication (flashing "1999" display), which indicates that the quantity being measured exceeds the capability of the selected range.

One particularly unique feature of the 8030A is a separate test function (selected by pressing in the pushbutton with a diode symbol over it) which automatically applies 1mA of current to the junction of the semiconductor being tested and, if the test leads are connected so that the junction is forward biased, automatically displays the forward voltage drop (in millivolts) across the junction. If the test leads are connected across the junction in a manner which reverse biases it, a flashing "1999" readout is automatically displayed if the 'reverse' resistance of the junction exceeds 2k ohms (as it should unless the junction is shorted or 'leaky'). This test function can be used for both in-and out-of-circuit testing of semiconductor junctions.

Another feature of the 8030A which makes it especially useful

SPECIFICATIONS

Fluke Model 8030A Digital Multimeter

DC VOLTAGE

Ranges: $\pm 199.9\text{mV}$, $\pm 1.999\text{V}$, $\pm 19.99\text{V}$, $\pm 199.9\text{V}$, $\pm 1100\text{V}$
 Accuracy (1 year, 18°C to 28°C): $\pm(0.1\%$ of reading + 1 digit)
 Input Impedance: 10 M Ω , all ranges
 Maximum Input: 1100V DC or peak AC (10 seconds on 200mV, 2V ranges)

AC VOLTAGE (true rms)

Ranges: 199.9mV, 1.999V, 19.99V, 199.9V, 750V
 Accuracy (1 year, 18°C to 28°C, 5% of range to full range):
 All ranges (45Hz-1kHz): $\pm(0.5\%$ of reading + 2 digits)
 20V range and below:
 (45Hz-5kHz): $\pm(0.5\%$ of reading + 2 digits)
 (5kHz-10kHz): $\pm(2\%$ of reading + 3 digits)

Input Impedance: 10 M Ω in parallel with less than 200 pF
 Maximum Input: 750V rms or 1100V peak (10 seconds on 200mV, 2V ranges)

DC CURRENT

Ranges: $\pm 199.9\ \mu\text{A}$, $\pm 1.999\text{mA}$, $\pm 19.99\text{mA}$, $\pm 199.9\text{mA}$, $\pm 1999\text{mA}$
 Accuracy (1 year, 18°C to 28°C): $\pm(0.35\%$ of reading + 1 digit)
 Voltage Burden: 0.25V max., except 0.7V max. on 2000mA range
 Maximum Input: 2A rms (fuse protected)

AC CURRENT (true rms, AC + DC)

Ranges: 199.9 μA , 1.999mA, 19.99mA, 199.9mA, 1999mA
 Accuracy (1 year, 18°C to 28°C, 5% of range to full range):
 200mA range and below (45Hz to 5kHz): $\pm(1\%$

of reading + 2 digits)
 2000mA range (45Hz to 2kHz): $\pm(3\%$ of reading + 2 digits)
 Voltage Burden: 0.25V rms max., except 0.7V rms max. on 2000mA range
 Maximum Input: 2A rms (fuse protected)

RESISTANCE:

Ranges: 199.9 Ω , 1.999k Ω , 19.99k Ω , 199.9k Ω , 1999k Ω
 Accuracy (1 year, 18°C to 28°C): $\pm(0.4\%$ of reading + 1 digit).
 except 2000K range, $\pm(0.6\%$ reading + 1 digit)
 Voltage Across Unknown: 0.2V @ full range, all ranges
 Maximum Current Through Unknown: 1mA (on 200 Ω range)
 Maximum Input Voltage: 250V rms (5 seconds on 200 Ω , 2k Ω ranges)

DIODE TEST

Range: 0 to 2000mV @ 1mA test current
 Accuracy (1 year, 18°C to 28°C): $\pm(0.2\%$ of reading of + 1 digit)
 Maximum Input Voltage: 130V rms, 250V rms for 5 seconds

GENERAL

Power Requirements:
 Line: 100/115/230V, 48-66Hz, 8W maximum when using the appropriate battery charger/eliminator
 Battery: Rechargeable—NiCad pack (8 hour typical operation from full charge; recharge time 14 hours typically)
 Non-rechargeable—4 alkaline "C" cells provide 10-hour operation (typical)
 Size: 2.5" x 5.7" x 4.9"
 Weight: 2.5 pounds

for in-circuit testing is the fact that all resistance measuring ranges apply less than .2 volts across the component or circuit whose resistance is being measured. Because this applied voltage is below the level which forward biases semiconductor junctions (particularly silicon junctions), in-circuit resistance measurements can be made with the 8030A without the misleading effects caused by the parallel low resistances of forward-biased semiconductor junctions.

The 8030A can be powered from either the built-in battery pack or from a 115VAC source through the use of an optional battery charger/eliminator (Model A81-115).

Two battery pack options are available with the 8030A: 1) a re-

chargeable pack consisting of four NiCad "C" batteries, which typically provide 8 hours of operation and can be fully recharged in 14 hours by the battery charger/eliminator, and 2) a non-rechargeable pack consisting of four alkaline "C" batteries, which typically provide 10 hours of operation.

The state of the battery charge can be tested by setting up the 8030A for DC voltage measurement and then inserting the probe of the "V-OHM" jack test lead into the "Battery Test" jack on the bottom of the unit. A reading of less than 4.4 volts indicates that the batteries need recharging (or replaced if non-rechargeable batteries are being used).

The 'base' price of Fluke's Model 8030A Digital Multimeter is \$235.

T & T VALUE SALE

I.C.C., SYLVANIA, G.E.
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80% Off LIST

<input type="checkbox"/> 3A3 5 for \$5.35	<input type="checkbox"/> 6JC6 5 for \$5.95
<input type="checkbox"/> 3AT2 5 for \$5.20	<input type="checkbox"/> 6JE6 5 for 11.15
<input type="checkbox"/> 5GH8 5 for \$6.25	<input type="checkbox"/> 6JS6 5 for \$9.90
<input type="checkbox"/> 6BK4 5 for \$9.95	<input type="checkbox"/> 6JU8 5 for \$5.90
<input type="checkbox"/> 6CG3 5 for \$5.25	<input type="checkbox"/> 6KA8 5 for \$6.50
<input type="checkbox"/> 6CJ3 5 for \$5.00	<input type="checkbox"/> 6KE8 5 for \$4.15
<input type="checkbox"/> 6DW4 5 for \$5.00	<input type="checkbox"/> 6KT8 5 for \$7.25
<input type="checkbox"/> 6EH7 5 for \$5.10	<input type="checkbox"/> 6KZ8 5 for \$5.25
<input type="checkbox"/> 6EJ7 5 for \$4.75	<input type="checkbox"/> 6LB6 5 for 10.75
<input type="checkbox"/> 6FQ7 5 for \$4.05	<input type="checkbox"/> 6LO6 5 for 11.15
<input type="checkbox"/> 6GF7 5 for \$7.05	<input type="checkbox"/> 6F07 5 for \$4.05
<input type="checkbox"/> 6GH8 5 for \$4.20	<input type="checkbox"/> 12GN7 5 for \$7.40
<input type="checkbox"/> 6G15 5 for \$3.70	<input type="checkbox"/> 17JZ8 5 for \$4.75
<input type="checkbox"/> 6GU7 5 for \$5.55	<input type="checkbox"/> 23Z9 5 for \$6.35
<input type="checkbox"/> 6HA5 5 for \$5.10	<input type="checkbox"/> 33GY7 5 for \$8.05
<input type="checkbox"/> 6HQ5 5 for \$6.75	<input type="checkbox"/> 38HE7 5 for \$8.75
<input type="checkbox"/> 6HV5 5 for 11.80	<input type="checkbox"/> 38HK7 5 for \$9.55

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<input type="checkbox"/> 6CJ3 5 for \$6.75	<input type="checkbox"/> 17JZ8 5 for \$6.41
<input type="checkbox"/> 6FQ7 5 for \$5.47	<input type="checkbox"/> 21L8 5 for \$8.37
<input type="checkbox"/> 6GH8 5 for \$5.67	<input type="checkbox"/> 23Z9 5 for \$8.57
<input type="checkbox"/> 6HA5 5 for \$6.89	<input type="checkbox"/> 35LR6 5 for 13.84
<input type="checkbox"/> 6LB6 5 for 14.51	<input type="checkbox"/> 42KN6 5 for 12.36
<input type="checkbox"/> *SPECIAL—100 6GH8 tubes \$105.00*	

TRANSISTORS EQUIVALENT UP TO 95% OFF LIST MINIMUM 5

<input type="checkbox"/> SK 108	<input type="checkbox"/> ECG 124	ea. 30¢
<input type="checkbox"/> 3018 108	<input type="checkbox"/> 124 124	ea. 30¢
<input type="checkbox"/> 3021 128	<input type="checkbox"/> 128 128	ea. 30¢
<input type="checkbox"/> 3024 128	<input type="checkbox"/> 129 129	ea. 30¢
<input type="checkbox"/> 3025 129	<input type="checkbox"/> 152 152	ea. 70¢
<input type="checkbox"/> 3041 152	<input type="checkbox"/> 162 162	ea. 1.20
<input type="checkbox"/> 3079 162	<input type="checkbox"/> 157 157	ea. 60¢
<input type="checkbox"/> 3103 157	<input type="checkbox"/> 159 159	ea. 30¢
<input type="checkbox"/> 3114 159	<input type="checkbox"/> 165 165	ea. \$2.25
<input type="checkbox"/> 3115 165	<input type="checkbox"/> 123A 123A	ea. 30¢
<input type="checkbox"/> 3122 123A	<input type="checkbox"/> 123A 123A	ea. 30¢
<input type="checkbox"/> 3124 123A	<input type="checkbox"/> 161 161	ea. 30¢
<input type="checkbox"/> 3132 161	<input type="checkbox"/> 121-821-164-SK3133	ea. 1.00

IC'S EQUIVALENT TO ECG \$1.00 each Minimum 5

<input type="checkbox"/> 703 708 709 710 712
<input type="checkbox"/> 713 714 715 719 720
<input type="checkbox"/> 722 723 725 731 740
<input type="checkbox"/> 743 748 780 788 790

CB HARDWARE WIRE MINIMUM 10

<input type="checkbox"/> PL259 10 for \$3.90	<input type="checkbox"/> PL258 10 for \$4.90
<input type="checkbox"/> 3 ft. RG58U Cable 2PL259	ea. \$9.00
<input type="checkbox"/> 20 ft. RG58U Cable 2PL59	ea. \$1.69
<input type="checkbox"/> 20 ft. RG58U PL259 Spade lugs	ea. \$1.49
<input type="checkbox"/> 50 ft. RG58U 2PL259	ea. \$2.95
<input type="checkbox"/> 50 ft. RG8U	ea. \$7.95
<input type="checkbox"/> 100 ft. RG58U Cable 2PL259	ea. \$4.95
<input type="checkbox"/> CB Lightning Arrestors	ea. \$1.50
<input type="checkbox"/> 75 ft. 59U Cable	ea. \$1.95

YOKES

<input type="checkbox"/> Y130 Y94 Y105	<input type="checkbox"/> Y105 5 for \$25.00
<input type="checkbox"/> 95-2779 Y182/Y132	<input type="checkbox"/> Y137 ea. \$9.95
<input type="checkbox"/> Y153 Y147	<input type="checkbox"/> DY92C ea. \$9.95

DIODES, RECTIFIERS, EQUIVALENT

<input type="checkbox"/> 6500 PIV Color Focus Rect.	10 for \$5.00
<input type="checkbox"/> 2.5 amp 1000 PIV IR-170	100 for \$9.95
<input type="checkbox"/> Syl.—Zenith Tripler	ea. \$6.95

GENERAL

<input type="checkbox"/> 19" & 25" 21" Color	3 for \$11.95
<input type="checkbox"/> Boosters	
<input type="checkbox"/> 20 Ass't Belts (Dealer Price Net	\$7.00)
<input type="checkbox"/> 25 ft. Stereo Extension Cord	10 for \$14.95
<input type="checkbox"/> 60 minute Irish cassette tapes	12 for \$6.00
<input type="checkbox"/> 90 minute Norelco type boxed	10 for \$10.00
<input type="checkbox"/> 84 minute Irish 8-track tape	6 for \$6.00
<input type="checkbox"/> 40 minute Shamrock 8-track tape	7 for \$5.00
<input type="checkbox"/> 5 x 7 Speaker Kit	for \$2.95
<input type="checkbox"/> B&K Digital Meter #280	ea. \$85.00
<input type="checkbox"/> 72 ohm to 300 ohm matching transformers	10 for \$4.95
<input type="checkbox"/> 25 ft. Telephone extension cords	ea. \$1.50
<input type="checkbox"/> 1 pair Car Wedge Speakers	ea. 3.95

AUDIO - CARTRIDGES - NEEDLES EQUIV.

<input type="checkbox"/> Astatic—133, 142	ea. \$1.47
<input type="checkbox"/> BSR SC7M2	ea. \$1.95
<input type="checkbox"/> EV 28—\$1.49	5015 ea. \$2.50
<input type="checkbox"/> E 650 680	ea. \$1.95
<input type="checkbox"/> TETRAD—All Numbers	ea. \$1.95
<input type="checkbox"/> VARGO—TN4B, CN75	ea. \$1.50
<input type="checkbox"/> ZEN.—142-167, 142-168	ea. \$1.95
<input type="checkbox"/> N44, 75, N91, V15	ea. \$1.95
<input type="checkbox"/> N3—89¢	
<input type="checkbox"/> TETRAD Dia. Univ.	10 for \$5.90
<input type="checkbox"/> 500 ft. Speaker Wire	\$5.00
<input type="checkbox"/> BSR Deluxe Changer	\$24.95

Letters of credit & all checks placed on deposit with Manufacturers Hanover Trust Bank, N.Y.C.
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...for more details circle 130 on Reader Service Card

NEW PRODUCTS

Descriptions and specifications of the products included in this department are provided by the manufacturers. For additional information, circle the corresponding numbers on the Reader Service Card in this issue.

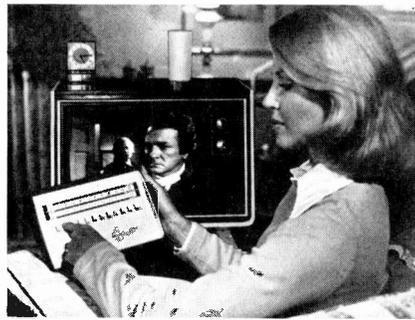


V.O.M. WITH FIFTY RANGES 138

A new addition to the drop-proof, burnout-proof series of V.O.M.'s has been announced by the Triplet Corporation. The new meter, Model 60-NA, features an extended range selection for more accurate measurements. Ranges include VDC from 0 to 1000 which may be measured in 16 full-scale increments; VAC from 0 to 1000 in 10 increments; and DC current from 0 to 1000mA in 10 increments. The meter includes a large 4½ inch mirrored scale meter to eliminate parallax, a DC accuracy of $\pm 1\frac{1}{2}\%$ of full scale value, AC accuracy of $\pm 3\%$, plus a multiplier switch that permits more readings to be taken at the upper portion of the meter scale. Five resistance ranges from X1 to X100K are provided plus a -20 dB to 52dB range. AC current readings from 0 to 300 amps can be obtained by using an adaptor. Priced at \$130.

ALL-CHANNEL TV REMOTE CONTROL 139

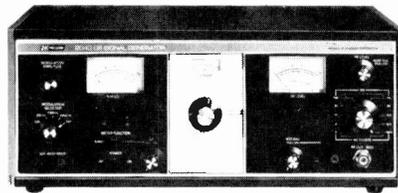
A remote control capable of selecting all TV channels, UHF as well as VHF, is available now from Jerrold Electronics. Called the Model TRC-82, the new control is of solid-state construction and provides direct-access channel changes, fine tuning and remote on-off control. It consists of two units, an all-channel converter and a control unit, inter-connected by a 25-foot, plug-in, control cord. Installation is made without removing back of the



TV set. Channel changes are accomplished through use of a varactor-diode oscillator, so that frequency is changed by changing varactor bias voltage. Thus there is no need for a mechanical-type tuner. List price is \$124.50

CB SIGNAL GENERATOR 140

A new CB signal generator, Model 2040, that covers fifty channels, including the 40 authorized CB channels, has just been introduced by B & K- Precision. Frequency calibration and stability are accurate to ± 5 ppm (.0005%) after a short 15 minute warmup. Phase-locked loop circuitry, referenced to a high accuracy crystal, and a regulated power supply are features of Model 2040. A microvolt output meter and calibrated attenuators provide output measurements down to $0.1 \mu\text{V}$ and up to $100,000 \mu\text{V}$. A vernier control provides an additional adjustment range of +2dB to -10 dB of level selected. Double shielding prevents



signal radiation leakage from affecting output level calibration. An internal protection feature protects the generator from RF power if transceiver under test is accidentally keyed. Priced at \$475.

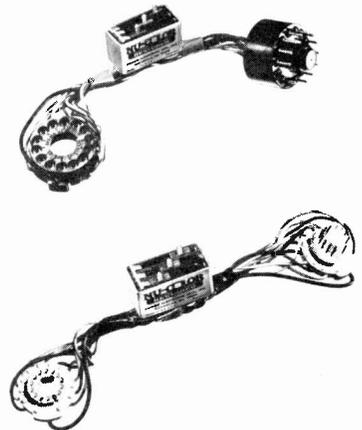
COLOR PICTURE RESTORER 141

A device which plugs in between the socket and base of a color picture tube and which reportedly restores the performance of weak color picture tubes and enhances the performance of new color receivers has been introduced by Oneida Electronic Manufacturing, Inc.

Called the NU-COLOR Picture Tube Restorer, the device consists of a picture tube socket and base, between which is connected a 'black box' with

three slide-type controls which provide individual adjustment of the three guns of a color picture tube.

Although no information was available at press time which clearly described how the device restores and enhances picture tube performance, the available literature did state that

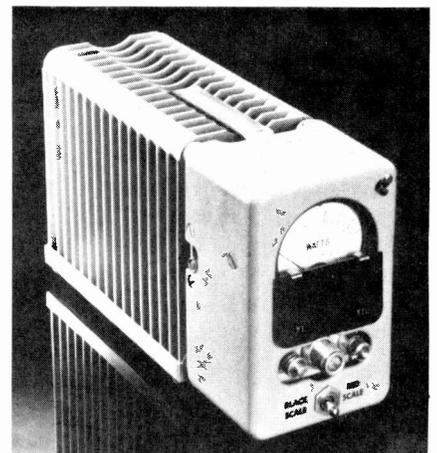


the NU-COLOR picture tube restorer "should not, in any way, be confused with brighteners..."

The NU-COLOR Picture Tube Restorer is available in versions designed for use with 70° and 90° deflection color picture tubes. Retail price is \$24.95.

TERMINATION WATTMETER 142

A new four-range absorption wattmeter covering two-way communications frequencies from 25 to 512 MHz from as low as 5 watts full scale through 15, 50 and 150 watts has been introduced by Bird Electronic Corporation. This new wattmeter is designed for limited-budget service shops, but still, according to the company, has features of costlier instruments such as $\pm 5\%$ accuracy and an integral 150 watt RF termination, within the specified bands. The meter has squared scales for easy downscale reading and its housing can be detached from the load for operational convenience. It is portable and weighs



8 pounds. Maximum VSWR is 1.1 at its 50 ohm female N input connector. Priced at \$249.

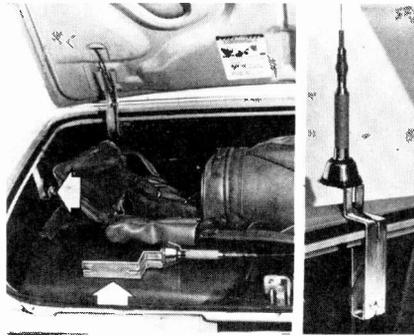
COAX CABLE STRIPPER 143

A new coax cable stripper that quickly trims coax cable without nicks or scratches is now available in 5 sizes from Utility Tool Corporation. The five models will trim cables from RG-8-U to RG-59-U for connectors PL-259 and "F". Features replaceable blades.



CB ANTENNA TRUNK MOUNT 144

A new, quick-disconnect trunk mount for CB antennas is now available from RMS Electronics. Called the "Hide-It", the new mount, with an-

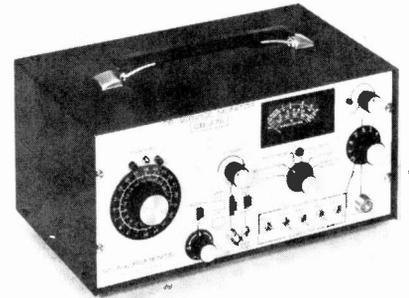


tenna attached, can be placed almost anywhere in the automobile trunk. Without unscrewing the antenna, the mount detaches quickly for storing and does not interfere with tire, jack or luggage. An adjustable bracket fits most cars and most CB antennas. It is chrome finished and comes complete with self-adhering rubber strip to protect the car's finish. Is priced at \$11.95.

CB SERVICE MONITOR 145

A new portable service monitor for trouble shooting and aligning CB transceivers has been introduced by McGraw-Edison. With the new monitor, Model CB-27-E, all 40 CB frequencies can be checked and offset from mid-channel frequencies, measured by the front panel meter, and calibrated against internal frequency

standard by zero-beating with the built-in speaker. Additional channels in the 27 MHz spectrum can be added if assigned. It features phase-locked loop circuitry, and an incremental tuning range of ± 5 kHz is provided for simulated SSB tests. The Model CB-27-E monitor is Nicad battery



powered, so it is portable for checking equipment while still in the vehicle. Priced at \$495.

RF NOISE DETECTOR 146

An RF noise detector that will find radio frequency interference caused by automobile or truck engines is now available from Channel Master. Called the Sleuth, the new device is a 25 inch long rod that is pointed at suspected noise sources such as generators, alternators, voltage reg-

Performance where it counts

for CB... and beyond

These two new wattmeters from VIZ not only let you take advantage of the current CB boom, but also provide exceptional testing capabilities for ham, fm, vhf... even uhf.

Dummy-load rf wattmeter

- Broadband (1.9 MHz to 512 MHz)
- Easy to operate and read
- VSWR less than 1.15 at 500 MHz

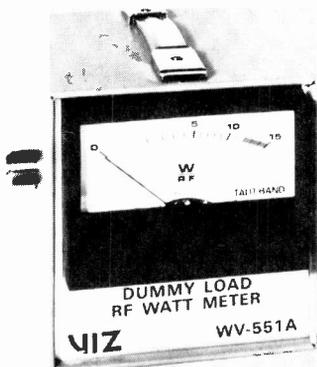
Thru-line rf wattmeter

- Frequency range 20 MHz to 230 MHz
- Power range 100W or 20W (reflected power 20W or 5W)
- VSWR less than 1.15

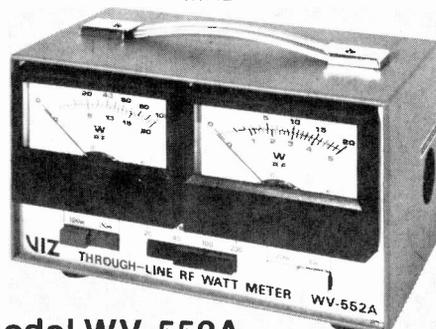
See them at your VIZ distributor

VIZ Test Instruments Group of VIZ Mfg. Co.

335 E. Price St. Phila. PA. 19144



Model WV-551A \$60.00



Model WV-552A \$150.00

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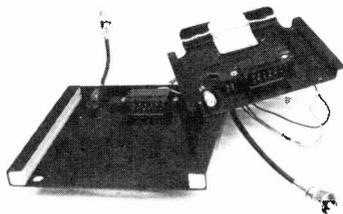
...for more details circle 113 on Reader Service Card



ulators, etc. A 17 foot length of coax cable on one end of the rod is attached to the CB transceiver or car radio antenna terminal. When the rod locates the "noise" source, the user hears the noise on his radio. The Sleuth is constructed of non-conductive PVC tubing and the coax cable is fitted with a PL-259 type connector. Priced at \$16.95.

CAR RADIO AND TAPE PLAYER SLIDE MOUNT 147

Three new slide mounts for two-way radios and tape players are now available from Southcom, Inc. Model MB-3 features a heavy-duty steel bracket, with plastic slides and is designed for two-way radio installation. Six wires going through connectors allow connection of power, external speaker and PA speaker wires. Connection is automatic when bracket is engaged. Fea-



tures a coax connector for antenna cable connection. It is priced at \$19.95. Model MB-2 does not include the coax connector and is priced at \$14.50. And Model MB-1 does not include plugs or wiring and is priced at \$7.25.



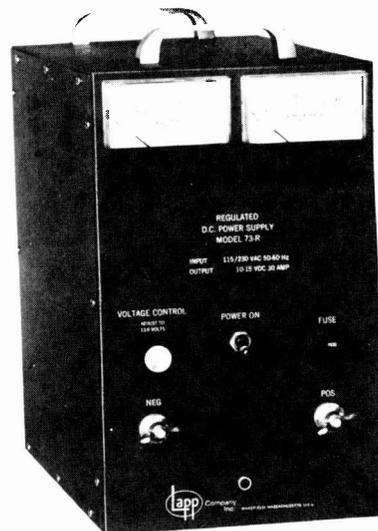
23-CHANNEL CB TRANSCIVER 148

Two new 23-channel mobile CB transceivers with phase-lock loop cir-

cuits have been introduced by RCA. Even though there'll be 40 channels available in 1977, RCA spokesmen say they "believe most CB activity will remain on 23 channels for a long time, and in many areas of the country, 23 channels are sufficient for normal operation." Model 14T300 includes an RF gain control for greater sensitivity, and a switchable automatic noise limiter. It sells for \$174.95. Model 14T301 contains a Delta Tune switch for off-frequency signals and a Noise Blank switch to reduce pulse type noise effects. It also has a switchable ANL circuit to automatically limit other noises. It sells for \$189.95.

REGULATED DC POWER SUPPLY 149

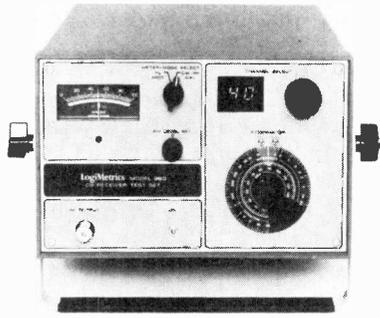
A new regulated power supply for the testing of two-way radio equipment has been introduced by the Lapp Company. Called the Model 73-R, it features 115-230 VAC input, voltage limiting, current limiting, short cir-



cuit protection, over voltage protection, 3½ in. meters and wing nut terminals. With the 73-R power supply there is no deterioration of performance when the unit is subjected to an RF field. The unit is adjustable between 10 and 15 volts at 30 amps output. Priced at \$268.

CB TEST SET 150

The CB Test Set, Model 980, has now been updated by LogiMetrics to handle all 40 CB channels. The new test set has a fully levelled RF output, with a large L.E.D. for displaying channels selected by a rotary switch. Output channels are derived from a single crystal-controlled synthesizer. The output attenuator is continuously adjustable from 0.03 microvolt to 20 millivolts, calibrated both in voltage and dBm, with an accuracy of ±1 dB.



Leakage level from the box is less than 0.1 microvolt. Priced at \$1,195.

CB COIL CORDS AND COAX CABLE 151

A new 5-wire, 6-foot coil cord replacement and a two-foot coaxial cable connector have been added to the Mura CB accessory line. The coil cord features 5 color-coded wires for relay or electronic switching, and is priced at \$2.95. The coax cable connector has PL-259 connector at each end to connect a CB transceiver to an antenna test meter. It is priced at \$3.95.

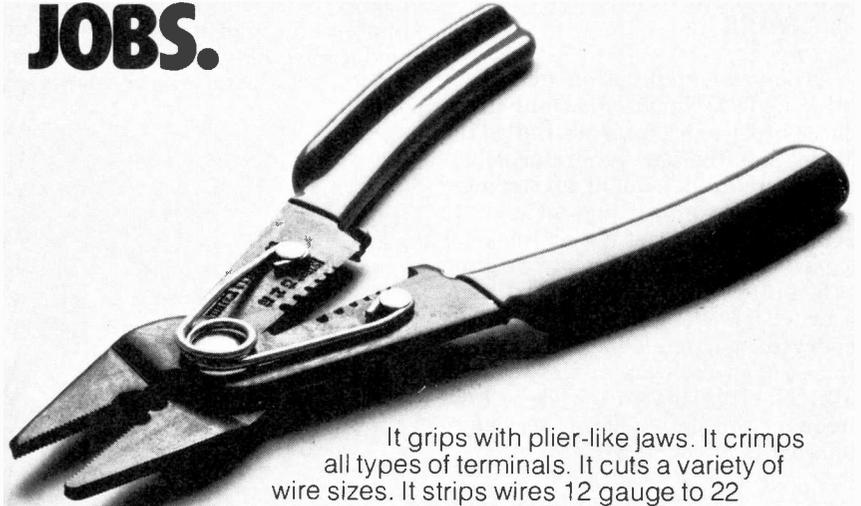


RECTIFIER FUSES 152

A new series of 3AB rectifier fuses, designed to protect silicon controlled rectifiers and similar solid state devices, is now available from *Littelfuse, Inc.* The fuses, measuring 1½ in. long x ½ in. in diameter, are extremely fast-acting, providing a very high degree of current limitation and restriction of thermal-energy let-through under fault or short-circuit conditions. They



MULTI-PURPOSE TOOL DOES 4 ELECTRICAL JOBS.



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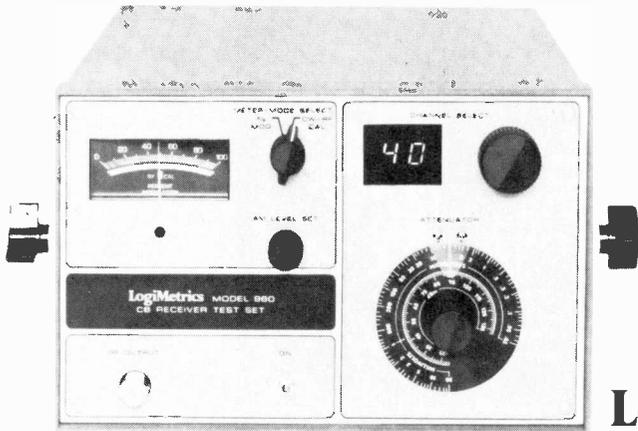
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NEW 40 Channel CB Receiver Test Set

Reduces test time up to 40%

Improves accuracy, too. Has fully synthesized channels. Internally leveled. Self-calibrating. Single rotary knob for 40 channels. Continuous rotary attenuator calibrated in absolute microvolts and dBm. Full transmitted power absorption. Write or call today for complete details.

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RF Signal Generators, Frequency Synthesizers, Traveling Wave Tube Amplifiers

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are available in 16 different ratings from 1 through 30 amperes, and are rated at 250 volts (1-10 amps) and 65 volts (12-30 amps.) They'll carry 110% of rating, for a minimum of four hours.

IC SWEEP/FUNCTION GENERATOR

153

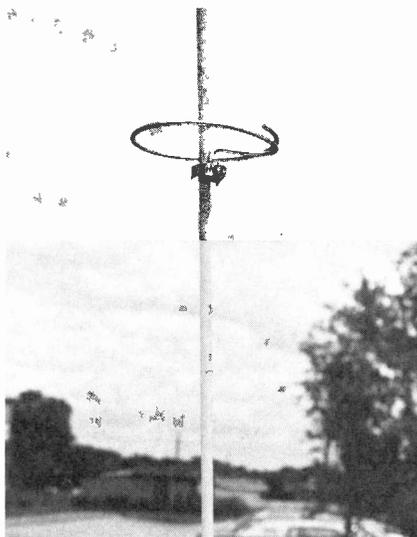
A new sweep/function generator utilizing IC technology is being introduced by Eico Instruments. Called the Model 390, the new generator generates discrete sine, square, and triangle waveforms over a range of .2Hz to 200kHz. A choice of either linear or logarithmic sweep with slow, medium or fast rates is available "at the flick of a switch." Model 390 is said to handle everything from checking the response of an audio amplifier to driving digital circuits, and with a low-frequency triangle output, servo systems. It is priced at \$169.95.



CB ANTENNA BOOSTER

154

A new antenna booster for CB transceivers that is designed to increase the efficiency of mobile antennas by balancing signals warped by improper ground plane has been introduced by *Astro Enterprises*. Called the Astro-Loop, the new booster is eas-



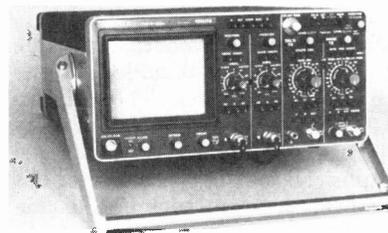
ily attached to metal and fiberglass CB mobile antennas. Manufacturer says the Astro-Loop reduces static to a

minimum, allows greater selectivity for the squelch control, helps control over-modulation and distortion between CB transceivers at close range, and noticeably reduces excessive noise without interfering with signal output strength. It is priced at \$3.95.

150MHz PORTABLE OSCILLOSCOPE

155

A new, portable, dual trace oscilloscope that features an on-screen display of both main and delayed timebase in the alternate mode, has been introduced by *Phillips Test & Measuring Instruments, Inc.* The alternate timebase display feature of



this new 150MHz oscilloscope enables both the main timebase with the intensified zone and the delayed timebase expansion of both traces to be viewed on the screen at the same

The 5 SECOND TUNER RESTORER



**CLEANS!
LUBRICATES!
POLISHES!**

Spray TUN-O-POWER on tuner contacts, rotate the tuner and *within 5 seconds* you get beautiful color pictures on all channels. It's a minor miracle!

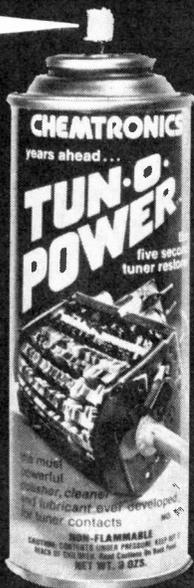
TUN-O-POWER is the most powerful polisher and lubricant ever developed. It works so well, you use a lot less. You can spray twice as many tuners with TUN-O-POWER as you can with an ordinary cleaner/lubricant.

What's more, TUN-O-POWER lubricant lasts for months longer than ordinary sprays. Detent action stays smooth as silk so you never have to worry about callbacks.

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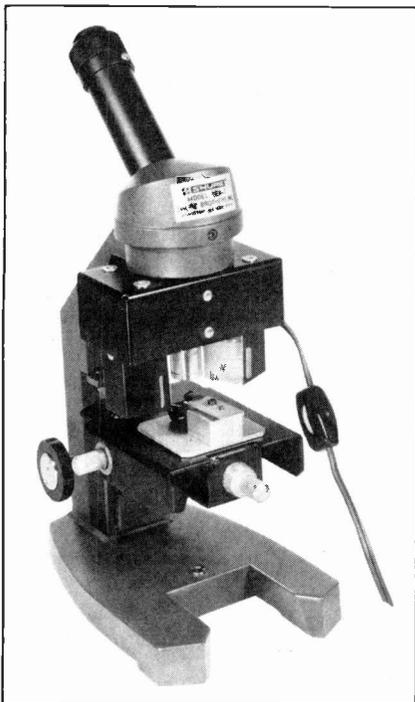
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time. Front panel trace separation controls allow easy alignment of the resulting four trace display for convenient viewing. Called the PM3265E, the scope also features 5mV sensitivity to the full 150MHz bandwidth and a maximum sweep speed of 2 nS per div. Priced at \$2,750, including probes.

STYLUS EVALUATION KIT

156

A stylus evaluation kit that should make high fidelity dealer inspections of customers' styli more precise and effective has been announced by *Shure Brothers, Inc.* The kit includes a new, easy-to-operate laboratory microscope, a stylus locating device which makes it possible to quickly and accurately center the stylus under the



microscope, and an illustrated manual containing photos of good and worn styli, to which the consumer may compare the appearance of his stylus. User net price is \$150.

PORTABLE RESISTANCE SELECTOR

157

A new resistor selector, called the Ohm-Ranger, that has just been introduced by the *Ohmite Company*, has an extremely wide range of resistance values, from 1 to 11, 111, and 110 ohms in single ohm increments. With accuracy assured by half-watt 1% tolerance resistors, the unit is said to be ideal for use in labs, schools and by service technicians. Features include positive slide switch operation along with compact 4 inch by 6 inch by 1 inch size and a weight of only 1½ ounces. The Ohm-Ranger has a rugged

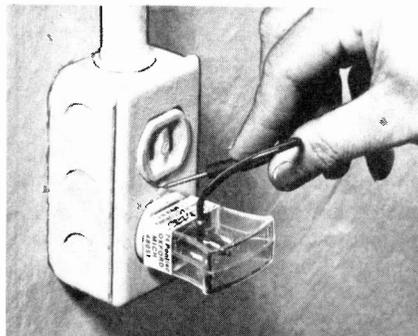


metal case, four rubber feet for non-slip bench use, and screw-type binding posts. It is priced at \$58 in quantities of from 1 to 4.

GROUND TESTER

158

A new device for checking the ground on 3-wire outlets, 2 or 3-wire equipment and tools, ⅜-wire adapters and 2-wire outlets is being introduced by *Butrick Manufacturing*. The Model 317 ground tester is simply plugged

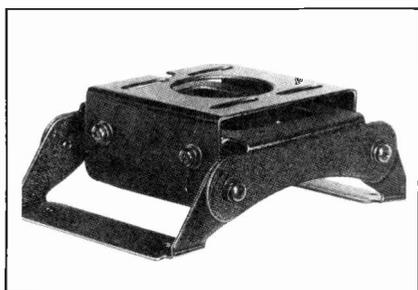


into any outlet and the ground probe is applied to the outlet or tool to be tested. Three lights in the unit indicate the condition of the ground. A total of 10 tests can be performed with 29 different indications. Priced at \$8, postpaid.

CB TRANSCEIVER MOUNTING BRACKET

159

A universal-type mounting bracket for CB radios that allows the user to select any number of mounting positions has been introduced by *Mura*



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METAL CAN ELECTROLYTIC CAPACITORS

Cap. MFD	Voltage	Each	3 for Many
200-250-50	200	1.49	4.00
100-47-47	380	1.49	4.00
100-100	380	1.49	4.00
50/30	150	.58	1.80

AXIAL LEADS		CONDENSERS	
50	150	.58	1.80
20	200	.58	1.80
1	50	.32	.75
5	25	.30	.75
100	25	.30	.75

COLOR YOKES			
TD7 429	TD7 531	each	3 for
(Fit most Japanese Sets)		7.00	20.00
ZENITH 6-89750-19V		9.50	25.00
UNIVERSAL 90°			
(Fit most 25 & 19 In. Sets)		8.00	20.00
CONVERGENCE YOKE ASSY.			
(With dynamic panel-90° used on 19 & 25 In. Sets)		12.00	30.00
CONVERGENCE YOKE			
(Coils only)		3.50	9.00

B/W YOKES 110°			
Equivalent to	each	3 for	
Y-130 Y94 Y105	5.50	15.00	
114° (Replace most Japanese Sets)		5.50	15.00

SUPER BAG SPECIALS			
Bag of		each	
10-TV CHANNEL SELECTOR			1.00
KNOBBS			1.00
20-LINEARITY KNOBS (Volume contrast, etc.)			1.00
20-RADIO & TV FUNCTION KNOBS			1.00
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3-45 R.P.M. ADAPTERS (Garrard, BSR, VM)			1.00
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4-DIFFERENT B/W FLY BACK TRANSFORMERS			4.50
40-NON INDUCTIVE RESISTORS (2 to 7 watts)			1.49
40-WIRE WOUND RESISTORS			1.49
50-RESISTORS (mixed values & wattage)			1.00
20-ELECTROLYTIC CAPS FOR TRANSISTOR WORK (mixed values)			1.00
20-SILICON DIODES SIMILAR 1N34/1N46/1N48/1N60 & many more			1.00
20-GERMANIUM DIODES SIMILAR 1N34/1N198/1N128			1.00
20-1N82 UHF DIODES			1.00
10-TOP HAT SILICON RECT. 1 amp. 1000 P.I.V.			1.00
20-PLOT LIGHT SOCKETS			1.00
DIF. SHAPES			1.00
10-GLOBAR DISC 120 ohms (used on degauss circuits)			4.50
10-CIRCUIT BREAKERS 3.75 amp. RL-34858			4.50
10-VOLUME CONTROLS 1-meg-Push-Pull Switch			4.50
10-VOLUME CONTROLS 1 meg Tab Mount on & off switch (Nylon shaft)			4.50
10-VOLUME CONTROLS 500K ohms with switch			4.50
10-UHF ANTENNA LOOPS			3.00
10-455 KC I.F. TRANSF.			3.00
PRINTED CIRCUIT			3.00
2-RECHARGEABLE NICKEL CADMIUM BATTERIES SIZE "AA" (with charger)			3.00
10-AUDIO OUTPUT TRANSF. for 50C5, 50B5, etc.			4.50
10-H.V. COLOR ANODE CONNECTOR LEAD (3 in. cup)			4.50
10-H.V. COLOR ANODE CONN. LEADS (1½ in. cup)			4.00

TUNERS			
UNIVERSAL TUNERS COMPLETE WITH TUBES 5G87 & 3HA5		6.50	
VHF TUNER WITH 6LJ8 & 6HA5 TUBES (will replace Admiral, Emerson, Olympic)		6.50	
SOLID STATE COMBO TUNERS (VHF, UHF used on Sears, Sanyo, etc.)		9.95	

SPEAKERS			
GRUNDIG 050-001	each	2 for	
8" Double cone 8 ohms	4.00	7.00	
GRUNDIG 050-030			
4" tweeter 8 ohms	3.00	5.00	
ROUND 2½" 16 ohms	.70	1.00	

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HYTRON & TUNG SOL TUBES SPECIAL					
.79c each (Individual boxed)					
1L4	6GV5	1S5	6HL8	1T5	6HU6
2CV5	6JH8	2DV4	6X4	2D24	8BH8
3AV6	8CM7	3BA6	8CN7	3BE6	8EM5
3BZ6	9EA8	3EA5	9KX6	3EH7	9U8
3EJ7	10C8	354	10DE7	48C5	10EG7
4BN6	10G8	4DT6	12A6	4HA7	12AF3
4JC6	12A27	4JD6	12B4	5BW8	12BK5
5C08	12CN5	5CZ5	12DQ6	5X8	12DV8
6AG5	12DW8	6AQ8	12DZ6	6BH6	12FZ6
6BX7	12FK6	6C9	12FM6	6CF6	12JN8
6CK4	12SN7	6CL8	14B8	6CM7	15EW6
6DE6	18FW6	6DR7	20E27	6DT8	25AX4
6DY7	25EH5	6EA5	50DX6	6EB8	60FX5
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THE CB PROFIT GENERATOR



Hickok introduces the first low-cost RF generator designed specifically for 40 channel CB service.

Model 256 \$199.

Here's every signal you need to service CBs with easy precision tuning over all 40 CB channels. Four additional bands cover 100 kHz to 16 MHz to cover any IF. A counter output gives exact frequency monitoring for precision control. Calibrated RF attenuator output provides stable signals from under 1 microvolt to over 100,000 microvolts. An internal modulator gives a 1 kHz, 0-100% tone, and there are provisions for 20 Hz to 10 kHz external modulation. It's all the RF Generator you need, so why pay more? See your Hickok distributor for more information or contact us directly.

Part of the

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the full line of professional CB service instruments.

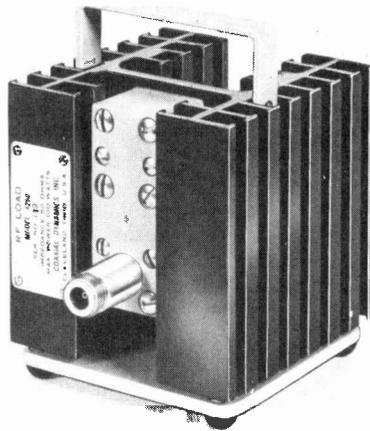
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INSTRUMENTATION & CONTROLS DIVISION
THE HICKOK ELECTRICAL INSTRUMENT CO.
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(216) 541-8060 • TWX 810-421-8286

Corporation. Named the CBB-9, the new bracket allows for such mounting positions as under the dash, on the transmission hump and a number of others. It also features an acoustical opening on the bracket which allows units with bottom-loaded speakers the convenience of unaffected sound. List price is \$7.95.

DUMMY ANTENNA LOAD 160

A new dry load, produced by *Coaxial Dynamics*, serves as a dummy antenna or load for the maintenance of radio frequency transmitters with average power outputs up to 100 watts. Called the model 4250, the new load is



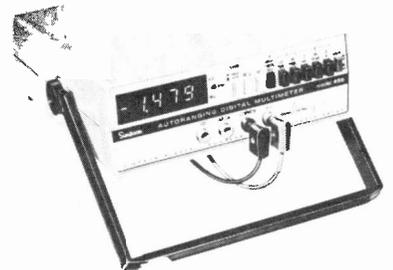
non-radiating and will not interfere with other operating systems. It is designed for laboratory use, on the production line, or service bench where RF from DC through 512 MHz must be terminated.

GUTTER MOUNT CB ANTENNAS 161

Two new rain gutter mount antennas that have shortened, center-



loaded whips to provide low-clearance protection have been introduced by *Antenna Specialists*. Model M-488 is a dual gutter mount CB antenna with adjustable screw-on clamp mounts that permit the user to fasten antenna securely on a car's rain gutter without drilling holes. Model M-489 (shown here) is a temporary rain gutter mount antenna that is built so user can put himself on the air in seconds. Price for M-488 is \$32; and for the M-489, \$15.50.



AUTORANGING DIGITAL MULTIMETER

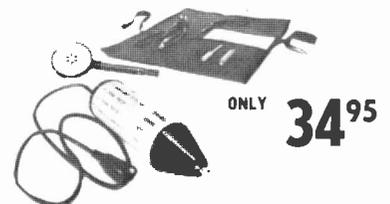
162

A new 3½ digit digital multimeter introduced by Simpson Electric Co. automatically selects the proper measuring range and reads out the reading on 0.43 inch 7-segment LEDs.

SAVE TIME & MONEY! THOUSANDS DO! USE

SERVISSET E-C ELECTRIC CIRCUIT ANALYZER

Test all equipment, CB, Radio, TV, from complete systems to stages, components. Great for professionals, students, anyone.



ONLY **34⁹⁵**

SPECIFICATIONS

RF/AF Signal Tracer, RF/AF Signal Injector, AC and DC Voltage Indicators 0/60/550/20,000 volts, DC Polarity Indicator 60/550/20,000 volts, Lo Ohms: 0-5, Hi Ohms: 0-500K-20 megohms, Tests Condensers, .00025-12mfd, Tests Resistors 2 ohms-20 megohms, Capacitor sub ranges .01-.1 and 4-40 mfd, Resistance sub ranges 50-500, 5K-25K, 100K-1 meg.

28-Page Manual

SERVISSET CT-1

16⁹⁵



Featuring a power supply for both AC and DC test voltages, the CT-1 tests for condenser leakage and shorts, and for high resistance continuity. Reforms and polarizes electrolytic and tantalum condensers under test. Range: .00025 to 1000 mfd. Sensitivity 200 megohms. For 117 VAC, 60 Hz. (50 W.V.D.C.)

30-Day Money-Back Guarantee
C.O.D. \$2 Dep. Free Cat. with New Products.

LEL Inc.

PO Box 386, Nutting Lake, MA 01865

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A HOLD button locks the range in use for repeated measurements. Called the Model 465, the new multimeter provides 0.1% accuracy on DC voltage ranges and is overload protected. It features five functions, including 10 amp AC and DC current ranges, plus separate low and standard power resistance ranges, and measures voltages from 100 microvolts, resistance from 0.1 ohms. Model 465A for AC line operation is priced at \$295, and Model 465D operates either on AC or battery, and is priced at \$332.

CABLE STRIPPING TOOL 163

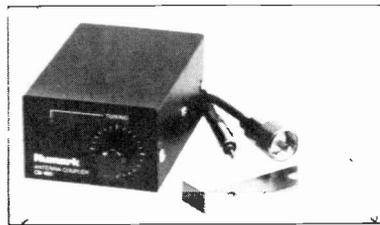
A new tool for stripping both solid and foam dielectric coaxial cable has



been introduced by the *Utility Tool Corporation*. Three models of the stripper are available to handle RG-58/U, RG-59/U, and RG-6/U cables. The manufacturer says the tool does everything except comb the braid and fold it back over the jacket. Replacement blades are available.

CB ANTENNA ELIMINATOR 164

A new device that will allow a regular AM car radio antenna to be used as a CB antenna has been introduced by *Numark Electronics*. Called the Model CB-160, the antenna eliminator mounts under the dash, and when in-



stalled allows the car owner to tune the existing car antenna for minimum SWR for CB use. The coupler works with either windshield or external car radio antennas—and is expected to reduce CB antenna theft and vandalism.

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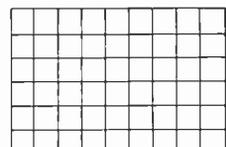
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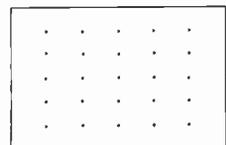
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able from *AE Corporation*. The outputs from the front panel are: one TTL compatible square wave, one triangle wave 4 Vpp, and a switch selectable square, sine or triangular wave output with a 0 to 20 Vpp capability. The frequency range covers 1 Hz to 1MHz with 200 PPM/°C stability; sine wave distortion is less than 2% with 1 Hz to 100 KHz. Price is \$89.95 assembled, but \$59.95 in kit form.

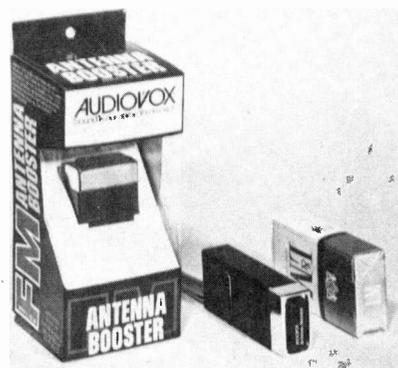
CB POWER METER & VSWR BRIDGE

166

A new power meter and voltage standing wave ratio bridge for CB radios has been introduced by *Antenna, Inc.* The meter, manufactured by Bird Electronics and marketed by Antenna, Inc., measures RF output



power up to 10 watts and does not require a perfect impedance match for accurate readings. It will read within + 5% regardless of the input-output impedance match. Resale price is \$88.



FM ANTENNA BOOSTER

167

A tiny, new FM antenna booster for autos, boats, trucks and campers that intensifies weak FM signals as far as 20 miles has been introduced by the *Audiovox Corporation*. Quickly installed, the Model AB-50 can be mounted with a single or dual mounting with a special bracket that is included. The booster comes with a black vinyl and jewel-like finish and solid state construction. An illustrated on/off switch cuts off the booster in strong signal areas, or for AM reception. List price is \$24.95. ■

RCA

continued from page 21

serves as the 'sampling' device for the system which maintains a constant luminance-color ratio by automatically adjusting contrast and color saturation in accordance with changes in ambient lighting. In "A" line CTC81 chassis, this system is continuously operational whenever the receiver is on.

NEXT MONTH: Analysis of RCA's *Power Tuning* system. ■

ESA CONVENTIONS

continued from page 42

asked to sponsor a free 6 month's membership for prospective new members. Also, paid membership solicitors, working on a commission basis, will work to increase NESDA's membership

AND THEN—AT PHEASANT RUN

The attendance at NATESA's 1976 convention at Pheasant Run Resort, just outside St. Charles, Illinois, exceeded that of the past two conventions by about 20%. This increase in attendance was achieved, according to NATESA spokesmen, "despite current economic conditions and some confusion over dues which were set at the 1975 convention at \$100 but were subsequently reset by Executive Council action at \$60."

Another major issue acted upon was the proposed change of NATESA from 'alliance' to 'association'. Members voted to form a committee which will study the proposed change, which will not change either the acronym NATESA, or the logo. The change is felt necessary to cope with a loss of membership through the present system of 'affiliated' locals.

New Officers Elected

NATESA's new president for 1976-77 is George J. Weiss of Chicago. Also elected were: Paul J. Kelley, Warwick, R.I., vice president; Leo Edmond Cloutier, Los Angeles, Calif., secretary general; and Richard Ebare, Essex Junction, Vt., treasurer. Frank J. Moch was renamed executive director.

Industry Awards Presented

The convention members approved for the Executive Council Cooperation Awards the sponsors of conventions luncheons, dinners and hospitality hours—GTE-Syl-

vania, Magnavox, Zenith, GE RCA, Howard Sams, Sony and Quasar. Zenith Radio Corporation received the 1976 NATESA *Friends of Service Management Award*.

The 1977 NATESA convention will also be in the Chicago area, with the exact location to be announced later. August 25 through 28 are the tentative dates. ■

AUTO ENTERTAINMENT

continued from page 13

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status which independent sales/service dealers need to sell more effectively against the so-called 'discounted prices' of mass merchandisers.

Higher volume not only means better 'quantity discounts' from better suppliers—which, in turn, lowers unit costs and puts the independent sales/service dealer in a more competitive pricing posture—but it also means a better bargaining position in warranty labor, parts procurement and other negotiations with product suppliers—which, in turn, might result in product suppliers picking up a more equitable share of the cost of after-the-sale support of their products—or suppliers might be 'encouraged' to make it less expensive for independents to provide the support essential to the marketing of their products.

Given a competitive pricing posture and the ability to provide expert installation, service and other essential after-sale support of product, independent sales/service dealers are unbeatable in the marketplace—as Jim Salyer and company have been proving

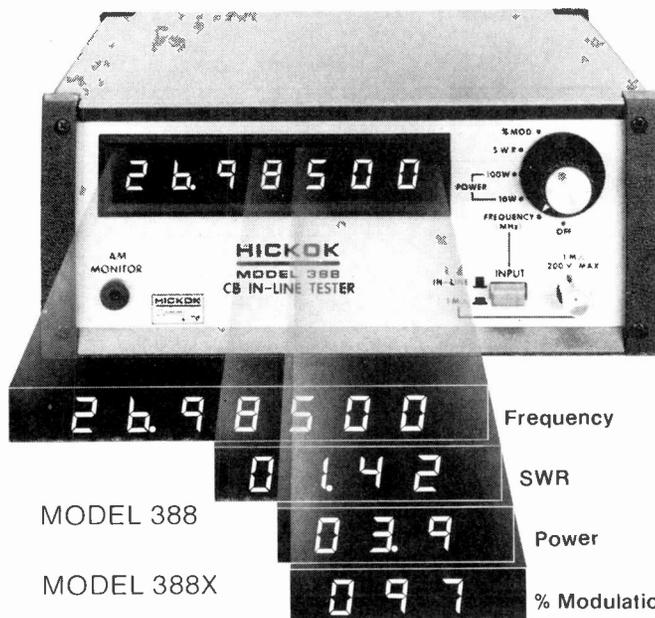
for the past 14 years. ■

STATEMENT REQUIRED BY THE ACT OF OCTOBER 23, 1962 (39 U.S. Code, 4369) SHOWING THE OWNERSHIP, MANAGEMENT AND CIRCULATION OF ELECTRONIC TECHNICIAN/DEALER published monthly by Harcourt Brace Jovanovich, Inc. 757 Third Avenue, New York, New York 10017, for November 1976.

1. The names and addresses of the publisher, Alfred A. Menegus, 757 Third Avenue, New York, New York 10017; Editor, J.W. Phipps, 1 East First Street, Duluth, Minnesota 55802; Managing Editor, Donald W. Mason, 1 East First Street, Duluth, Minnesota 55802.

2. The owner is: Harcourt Brace Jovanovich, Inc., 757 Third Avenue, New York, New York 10017. Holders of One Per Cent (1.0%) or more of the outstanding shares of Harcourt Brace Jovanovich, Inc. as of August 16, 1976; Cede & Co., % The Depository Trust Co., Box 7547, Church Street Station, New York, New York 10249; Comptroller of the State of N.Y. in Trust for the Common Retirement Fund, % Director of the Retirement Accounts, Governor Alfred E. Smith Building, Albany, New York 12225; Cudd & Co., % The Chase Manhattan Bank, P.O. Box 1500, Church Street Station, New York, New York 10008; Katherine Brace Cummings, % Ernst, Cane, Berner & Gitlin, 7 West 51st Street, New York, New York 10019; First National City Bank A-C, Ellen Knowles Harcourt, William I. Jovanovich & Peter J. Ryan as Trustees, u/v/a dates 5/23/66, P.O. Box 2781, Grand Central Station, New York, New York 10017; C.A. England & Co., P.O. Box 1368, Church Street Station, New York, New York 10008; Mrs. Thekla E. Johnson, 19 Hewitt Avenue, Bronxville, New York 10708; Walter J. Johnson, 19 Hewitt Avenue, Bronxville, New York 10708; William Jovanovich, P.O. Box 295, Briarcliff Manor, New York 10510; Lazard Freres & Co., One Rockefeller Plaza, New York, New York 10020; Lynn & Co., % Morgan Guaranty Trust Co. of New York, P.O. Box 2010 Church Street Station, New York, New York 10008; O'Neill & Co., Box 11028, Church Street Station, New York, New York 10007; Saxon & Co., 1632 Chestnut Street, Philadelphia, Pennsylvania 19103; Shaw & Co., % Morgan Guaranty Trust Co. of New York, P.O. Box 491, Church Street Station, New York, New York 10008; Sigler & Co., % Manufacturers Hanover Trust Company, 40 Wall Street, New York, New York 10015; Joseph C. Sindelar, 1900 N. Narragansett Avenue, Chicago, Illinois 60639; Robert J. Sindelar, 80 Colonia Miramonte, Scottsdale, Arizona 85253; Stawis & Co., % Morgan Guaranty Trust Co. of New York, P.O. Box 1479; Church Street Station, New York, New York 10008.

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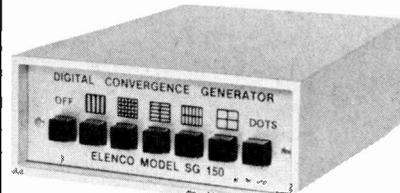
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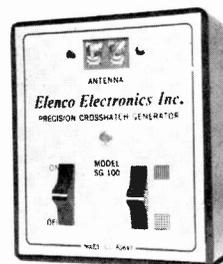
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10 ROCK SOLID PATTERNS
ALL IC COUNTDOWN CIRCUITS
QUARTZ CRYSTAL OSCILLATORS
2 FULL YEARS' WARRANTY



MODEL SG-150 \$75⁹⁵



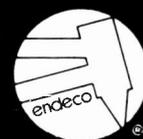
MODEL SG-100

ONLY \$59⁹⁵

2 Patterns: 20 x 16 Crosshatch, 320 Dots, weight only 17 oz.

WRITE OR CALL FOR DETAILS
ELENCO ELECTRONICS INC.
1928 Raymond Dr., Northbrook, IL 60062
(312) 564-0919

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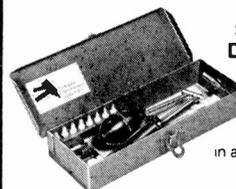
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SOLDERING IRONS

Pencil style. Safety light. Two heats — 20w and 40w. 6 tips. Unbreakable handle. 2 and 3 wire neoprene cords.

DESOLDERING IRONS

Pencil style. Safety light. Some operate at 40w, idle at 20w. 8 tip sizes. 2 and 3 wire neoprene cords.



SOLDERING & DESOLDERING KITS

Everything needed to solder or desolder or both. All in a handy lifetime metal box with hasp

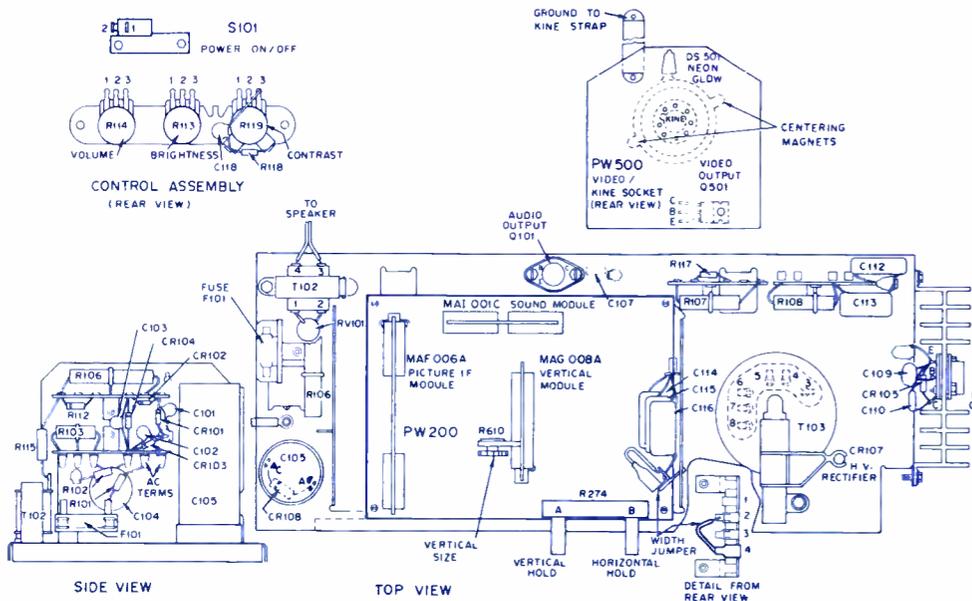
See your distributor or write ...

Enterprise Development Corp.

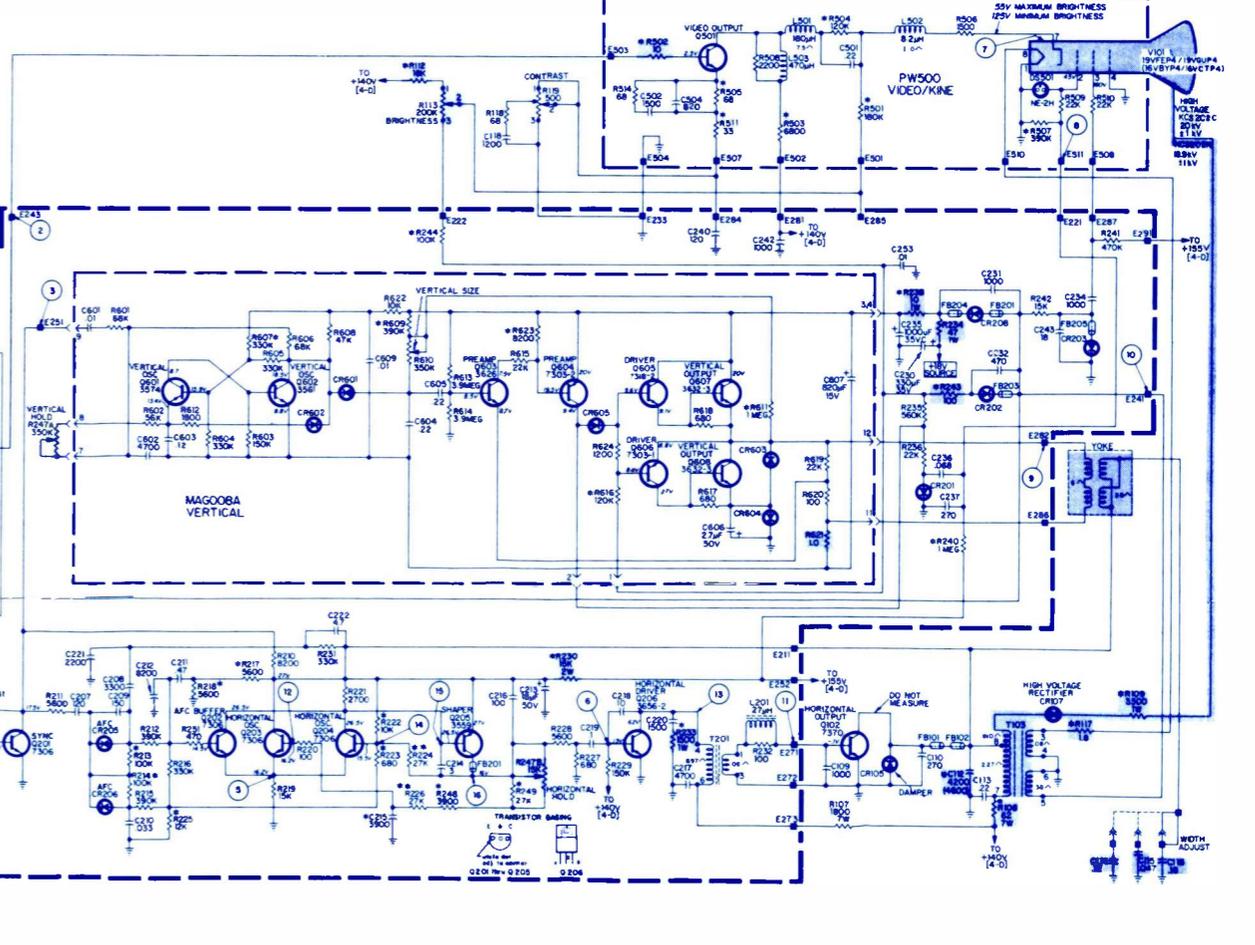
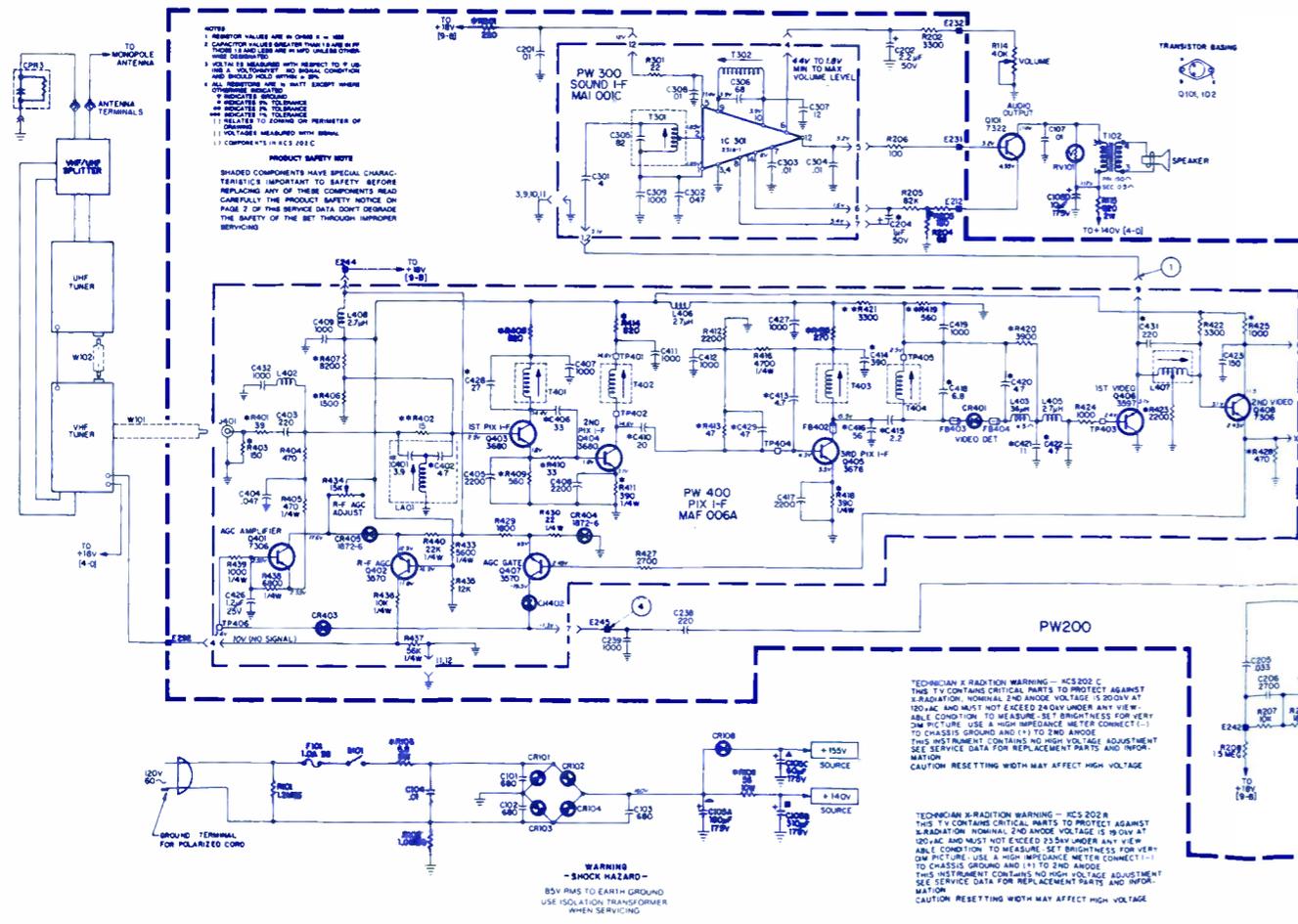
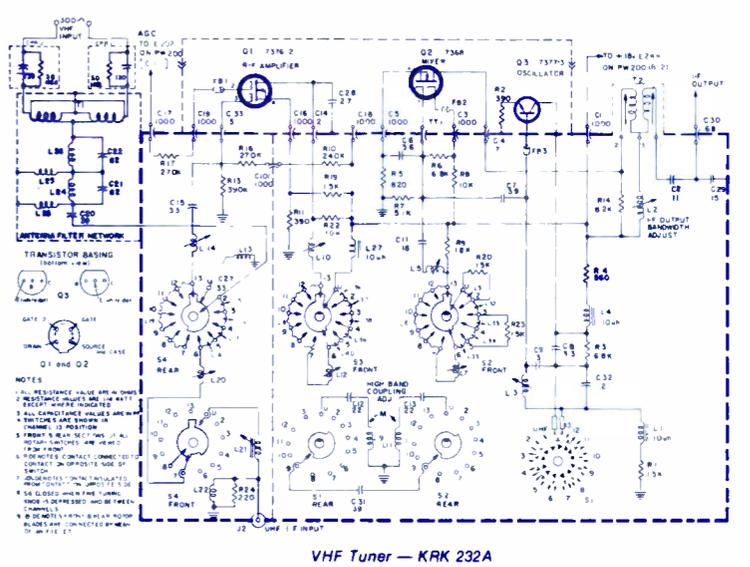
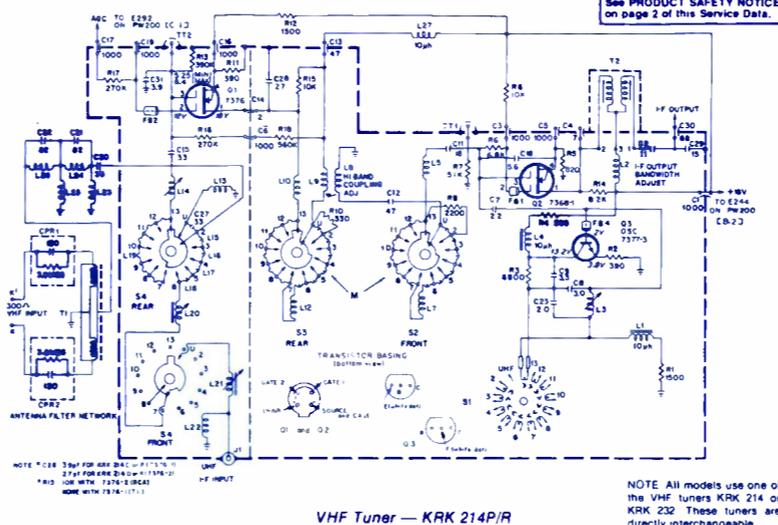
5127 E. 65th St. • Indianapolis IN 46220
PHONE (317) 251-1231

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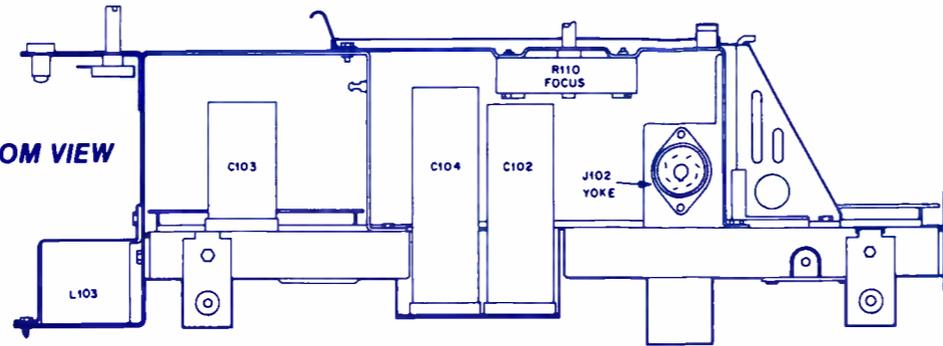
CHASSIS LAYOUT



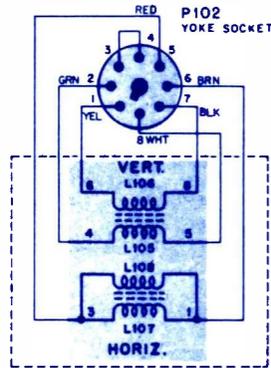
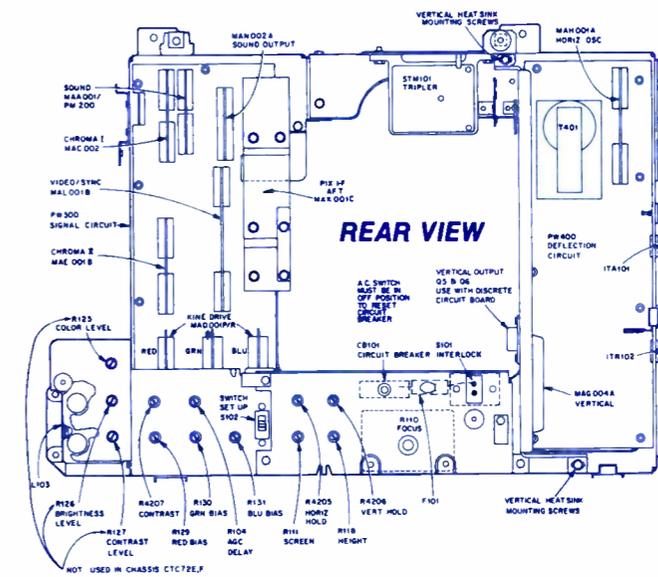
VHF TUNER SCHEMATICS



BOTTOM VIEW



CHASSIS LAYOUT



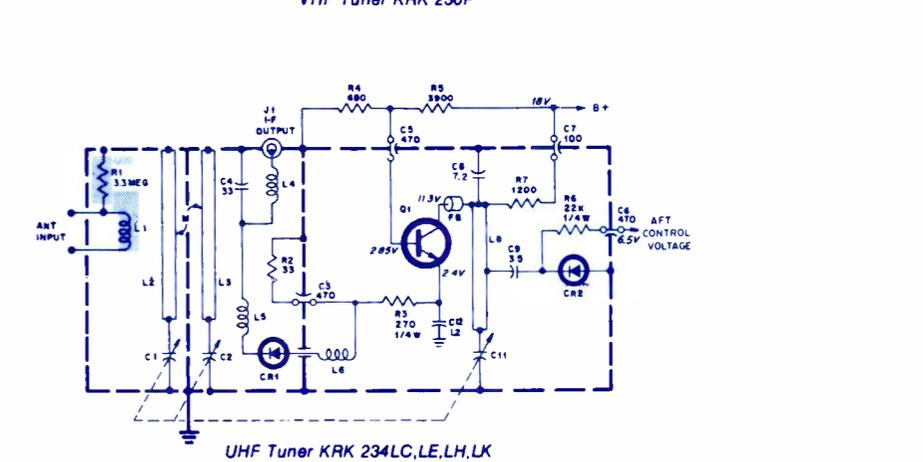
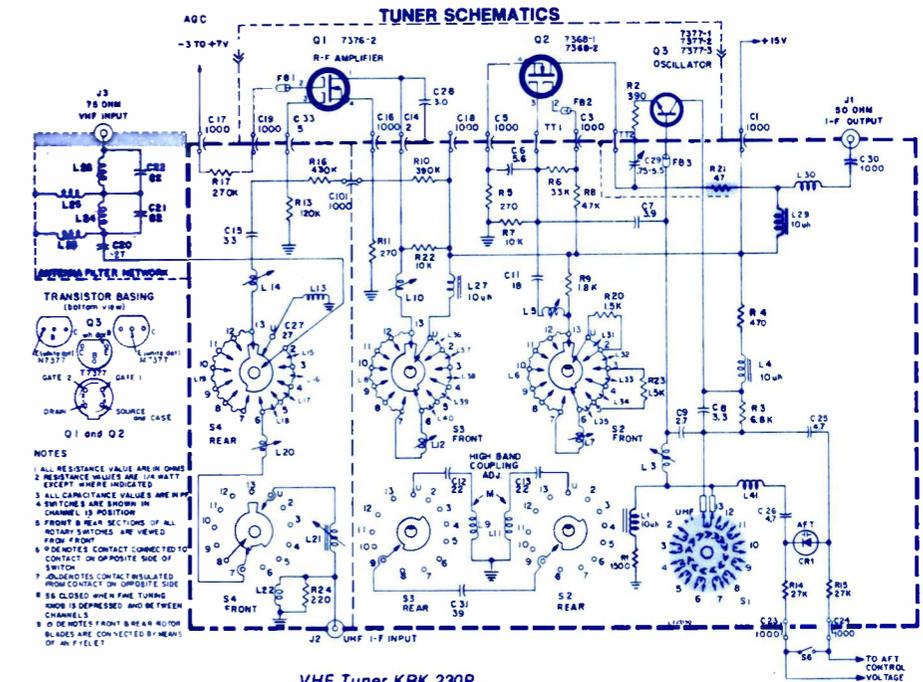
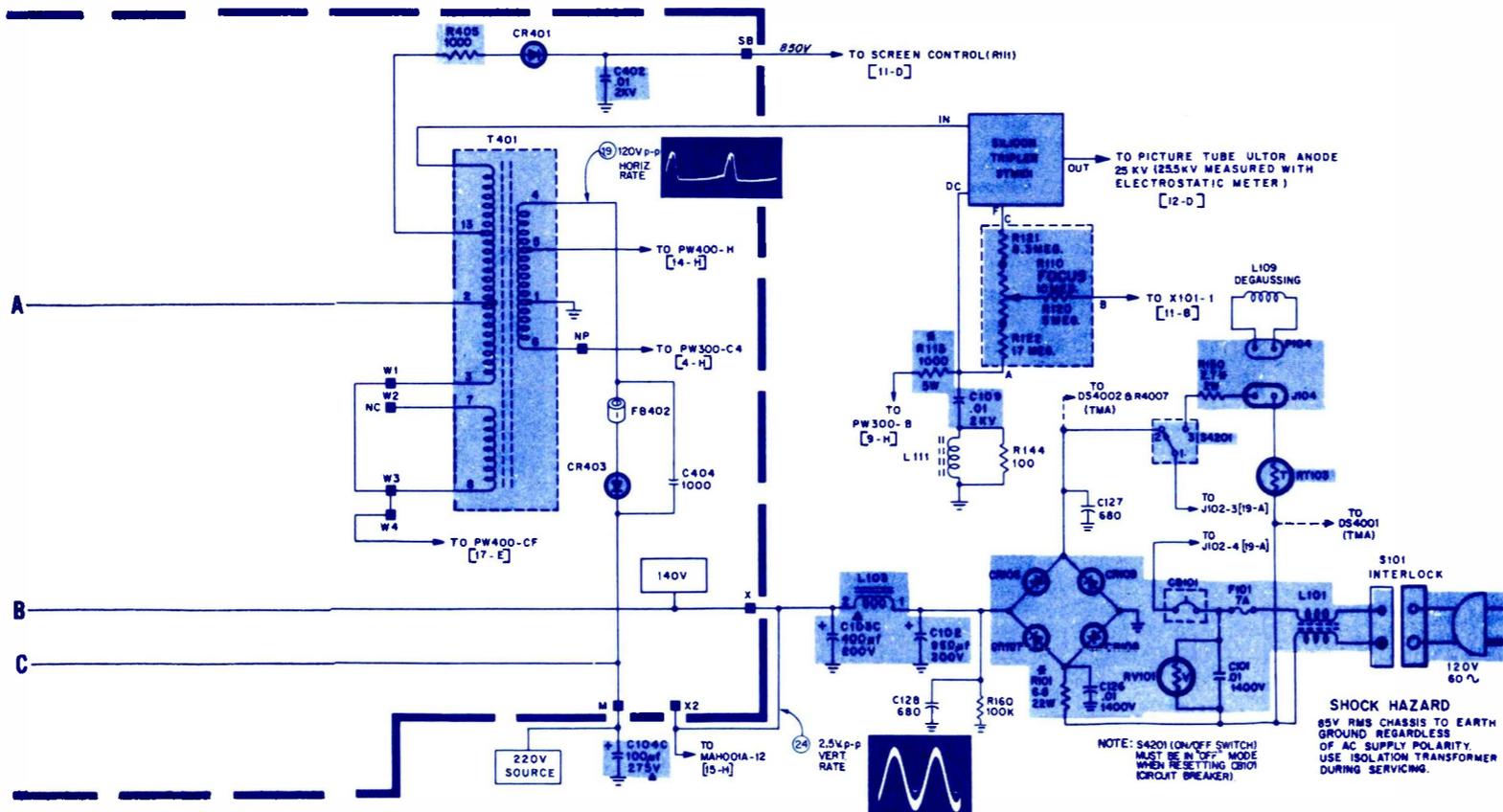
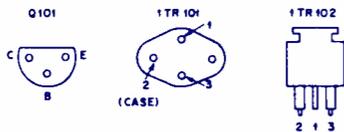
NOTES:

- 1 RESISTANCE VALUES ARE IN OHMS K=1000
- 2 CAPACITANCE VALUES 10 AND ABOVE ARE IN μ F, LESS THAN 1.0 ARE IN μ F, UNLESS OTHERWISE SPECIFIED
- 3 # INDICATES 5% TOLERANCE
- 4 ## INDICATES 2% TOLERANCE
- 5 VOLTAGES ARE MEASURED TO CHASSIS GROUND WITH A "VOLTOHMYST" (NO SIGNAL APPLIED) AND SHOULD HOLD WITHIN 20% AT RATED SUPPLY VOLTAGE. VOLTAGES SHOULD HAVE A POSITIVE POTENTIAL UNLESS OTHERWISE SPECIFIED.
- 6 WAVEFORMS TAKEN WITH COLOR BAR (DOT - BAR) GENERATOR SIGNAL APPLIED AT 100% MODULATION.

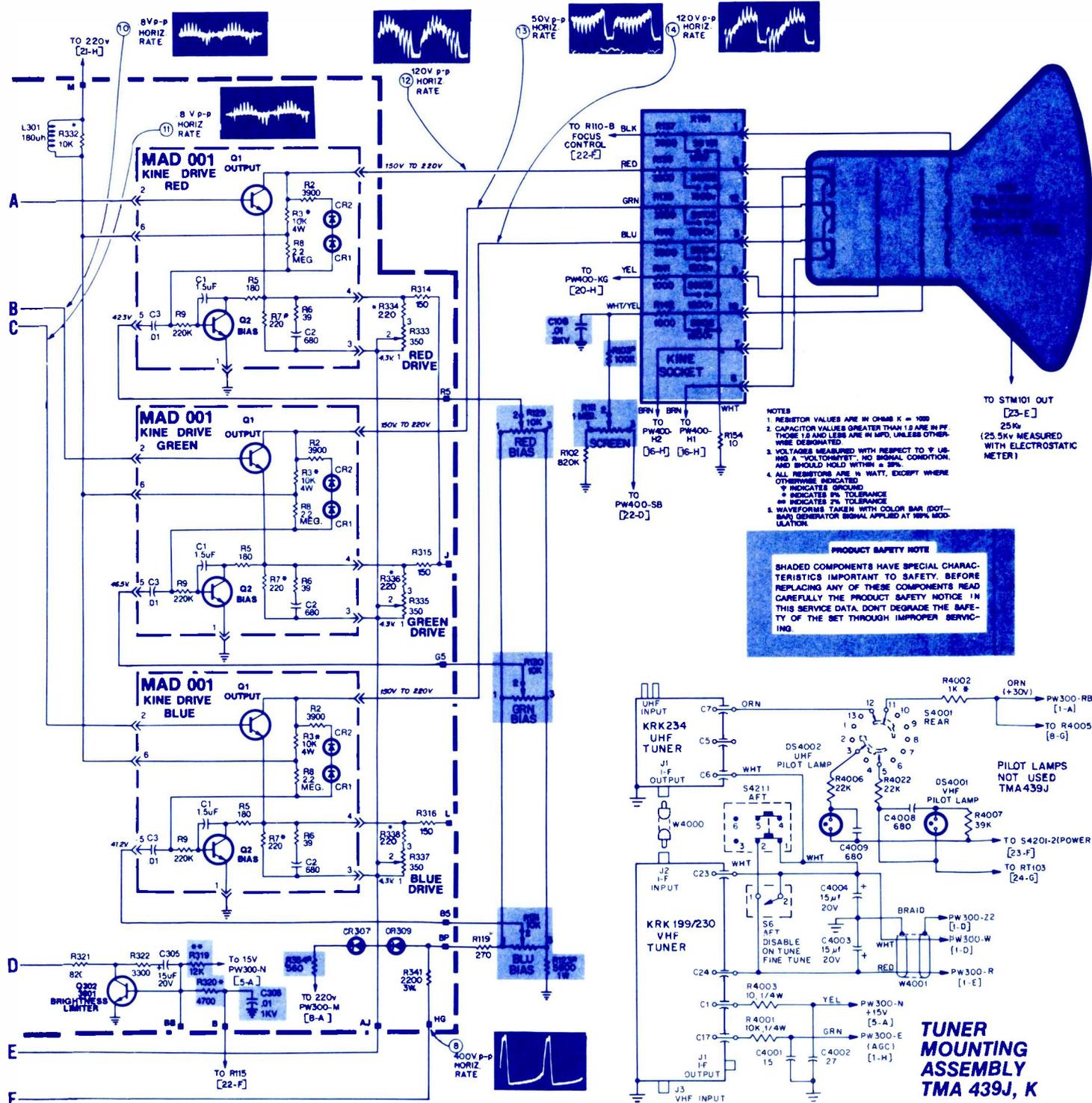
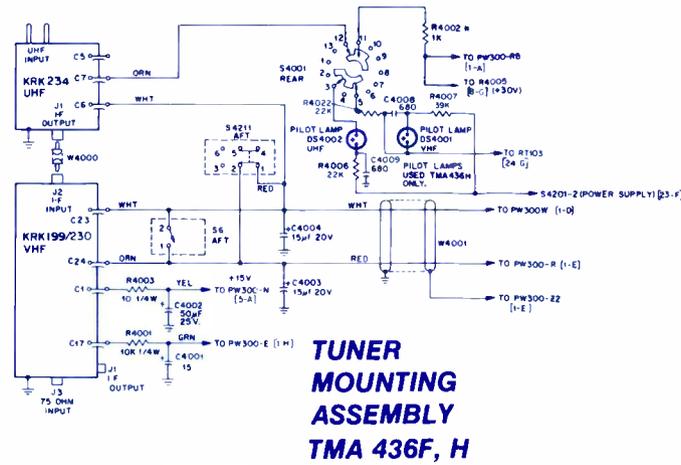
[] RELATES TO ZONING ON PERIMETER OF DRAWINGS.
7↑ SEE TMA DRAWING (PAGE 8,9) FOR PLUG & SOCKET DESIGNATION.

PRODUCT SAFETY NOTE
SHADED COMPONENTS HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS READ CAREFULLY THE PRODUCT SAFETY NOTICE IN THIS SERVICE DATA. DON'T DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING.

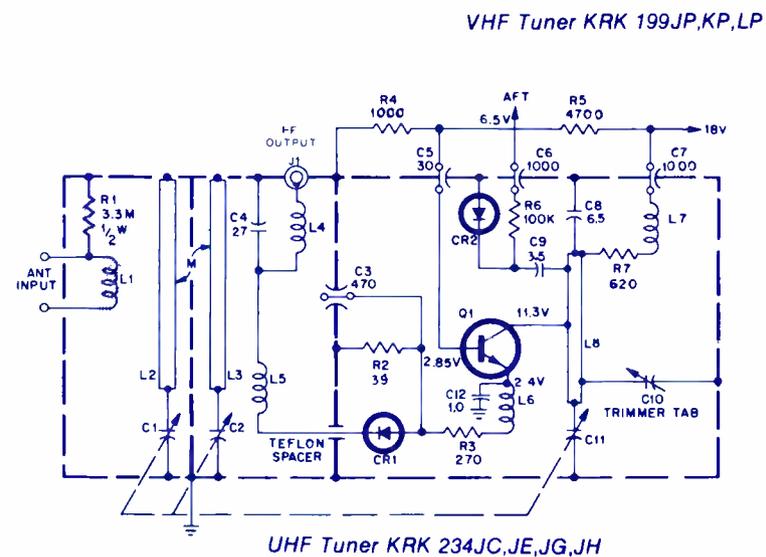
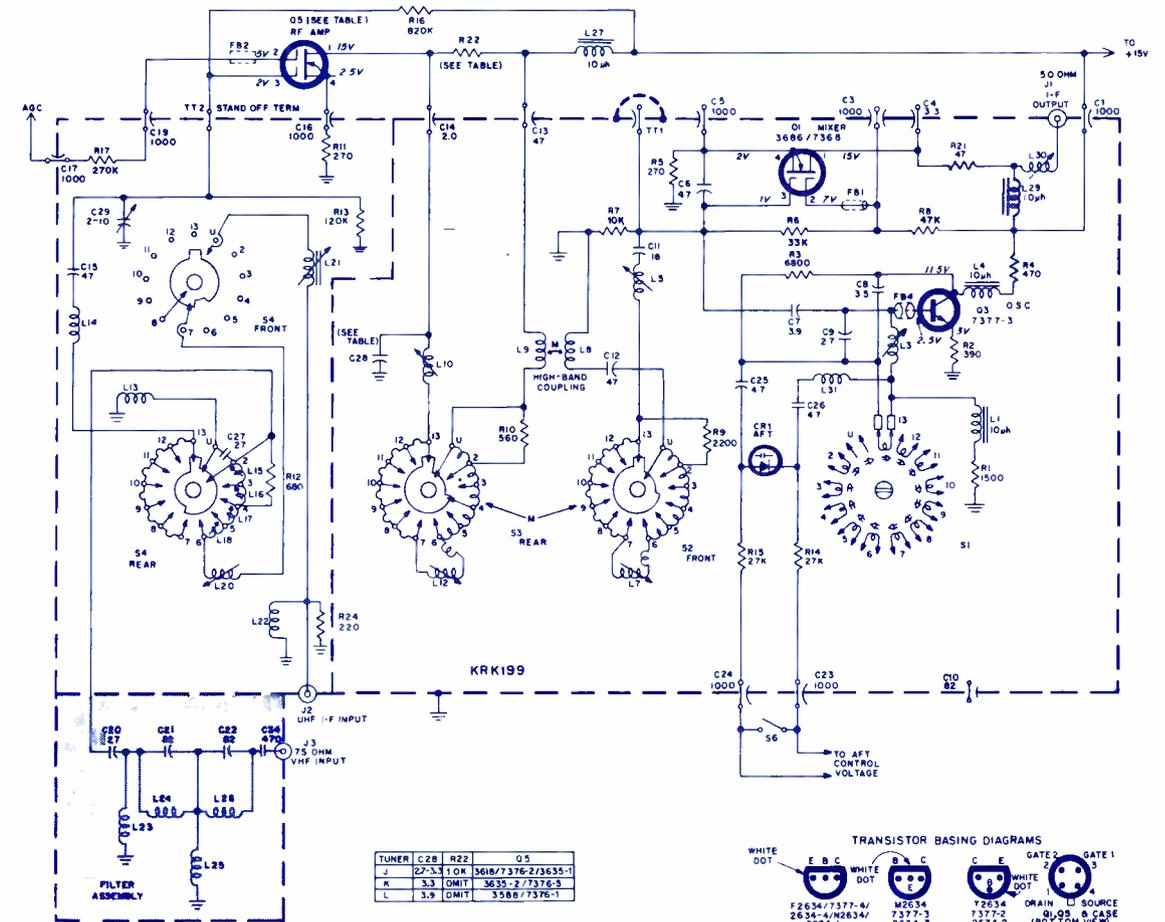
SERVICE TECHNICIAN WARNING
X-RADIATION PRECAUTION
THIS PRODUCT CONTAINS CRITICAL ELECTRICAL AND MECHANICAL PARTS ESSENTIAL FOR X-RADIATION PROTECTION. SEE SERVICE DATA FOR SPECIFIED REPLACEMENT PARTS. NOMINAL 250V ANODE VOLTAGE IS 24 kV AT 120 VAC LINE AND MUST NOT EXCEED 27.5 kV UNDER ANY OPERATING CONDITIONS. THIS INSTRUMENT CONTAINS NO HIGH VOLTAGE ADJUSTMENT. SEE SERVICE DATA FOR OTHER SERVICE ADJUSTMENTS.



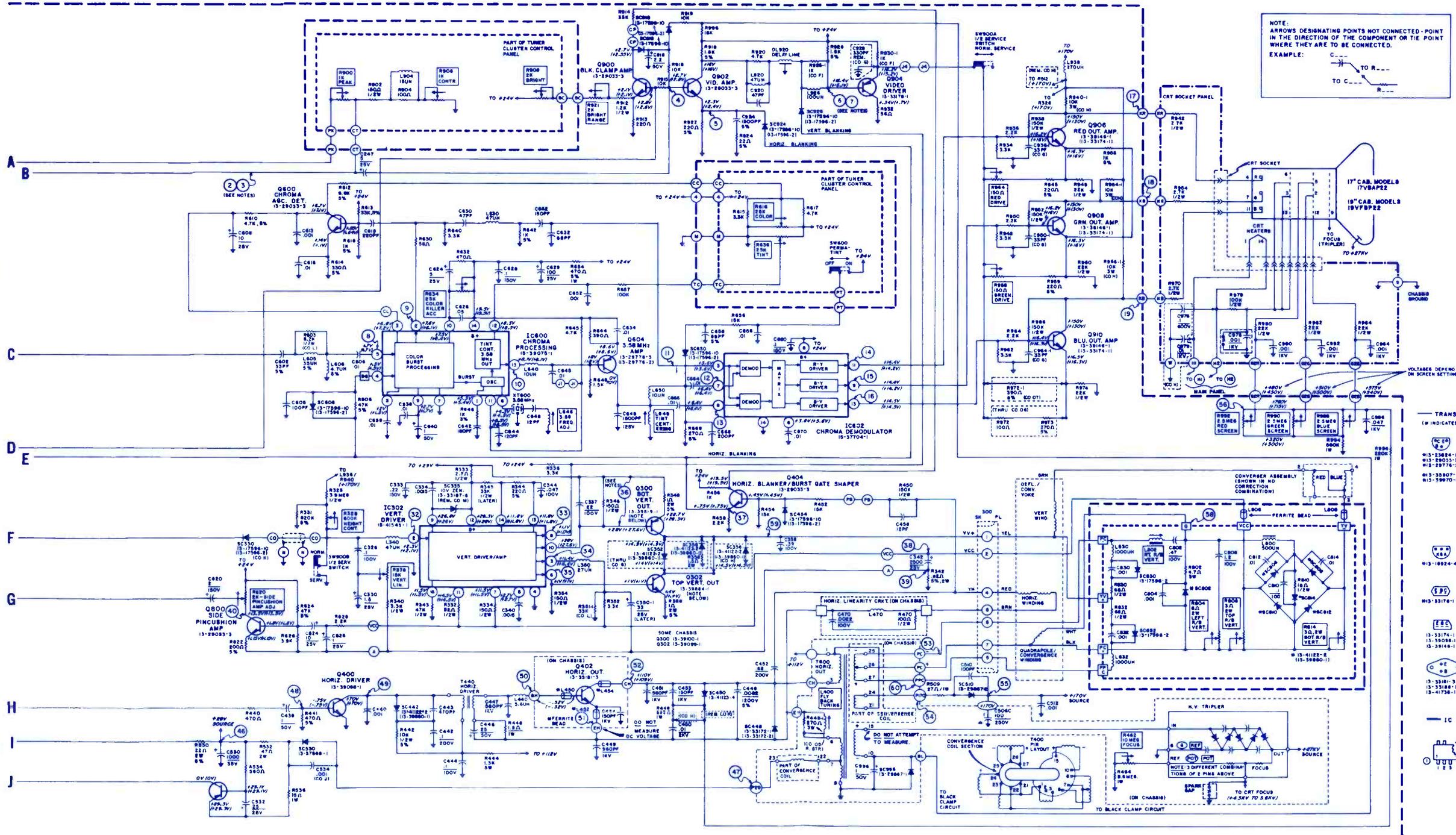
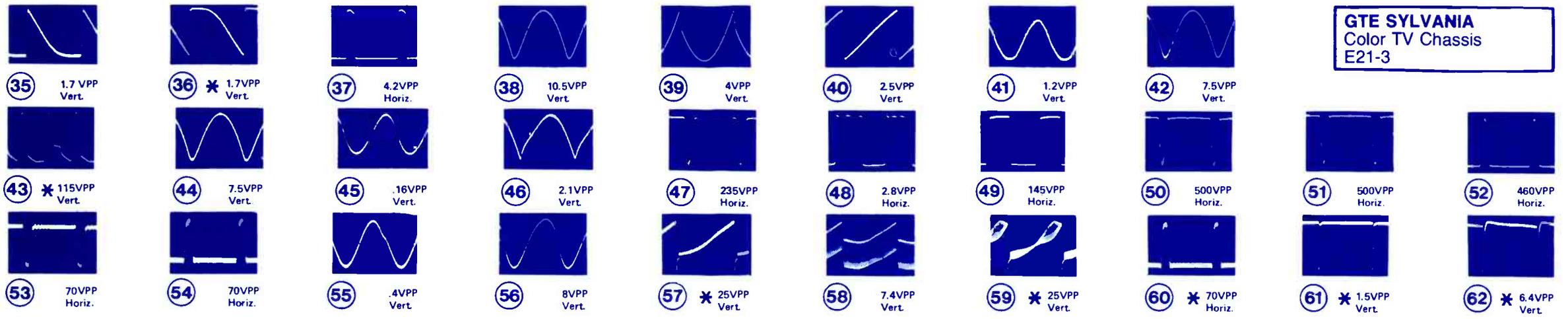
(CONTINUED ON NEXT PAGE)



TUNER SCHEMATICS



GTE SYLVANIA
Color TV Chassis
E21-3



NOTE: ARROWS DESIGNATING POINTS NOT CONNECTED - POINT IN THE DIRECTION OF THE COMPONENT OR THE POINT WHERE THEY ARE TO BE CONNECTED.
EXAMPLE:
C --- TO R ---
 |
 +--- TO C ---

- TRANSISTOR BASINGS**
(W INDICATES ALTERNATE BASINGS)
- Q100 13-29033-1
 - Q101 13-29033-2
 - Q102 13-29033-3
 - Q103 13-29033-4
 - Q104 13-29033-5
 - Q105 13-29033-6
 - Q106 13-29033-7
 - Q107 13-29033-8
 - Q108 13-29033-9
 - Q109 13-29033-10
 - Q110 13-29033-11
 - Q111 13-29033-12
 - Q112 13-29033-13
 - Q113 13-29033-14
 - Q114 13-29033-15
 - Q115 13-29033-16
 - Q116 13-29033-17
 - Q117 13-29033-18
 - Q118 13-29033-19
 - Q119 13-29033-20
 - Q120 13-29033-21
 - Q121 13-29033-22
 - Q122 13-29033-23
 - Q123 13-29033-24
 - Q124 13-29033-25
 - Q125 13-29033-26
 - Q126 13-29033-27
 - Q127 13-29033-28
 - Q128 13-29033-29
 - Q129 13-29033-30
 - Q130 13-29033-31
 - Q131 13-29033-32
 - Q132 13-29033-33
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 - Q135 13-29033-36
 - Q136 13-29033-37
 - Q137 13-29033-38
 - Q138 13-29033-39
 - Q139 13-29033-40
 - Q140 13-29033-41
 - Q141 13-29033-42
 - Q142 13-29033-43
 - Q143 13-29033-44
 - Q144 13-29033-45
 - Q145 13-29033-46
 - Q146 13-29033-47
 - Q147 13-29033-48
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 - Q164 13-29033-65
 - Q165 13-29033-66
 - Q166 13-29033-67
 - Q167 13-29033-68
 - Q168 13-29033-69
 - Q169 13-29033-70
 - Q170 13-29033-71
 - Q171 13-29033-72
 - Q172 13-29033-73
 - Q173 13-29033-74
 - Q174 13-29033-75
 - Q175 13-29033-76
 - Q176 13-29033-77
 - Q177 13-29033-78
 - Q178 13-29033-79
 - Q179 13-29033-80
 - Q180 13-29033-81
 - Q181 13-29033-82
 - Q182 13-29033-83
 - Q183 13-29033-84
 - Q184 13-29033-85
 - Q185 13-29033-86
 - Q186 13-29033-87
 - Q187 13-29033-88
 - Q188 13-29033-89
 - Q189 13-29033-90
 - Q190 13-29033-91
 - Q191 13-29033-92
 - Q192 13-29033-93
 - Q193 13-29033-94
 - Q194 13-29033-95
 - Q195 13-29033-96
 - Q196 13-29033-97
 - Q197 13-29033-98
 - Q198 13-29033-99
 - Q199 13-29033-100
- IC KEY (TOP VIEW)**
-

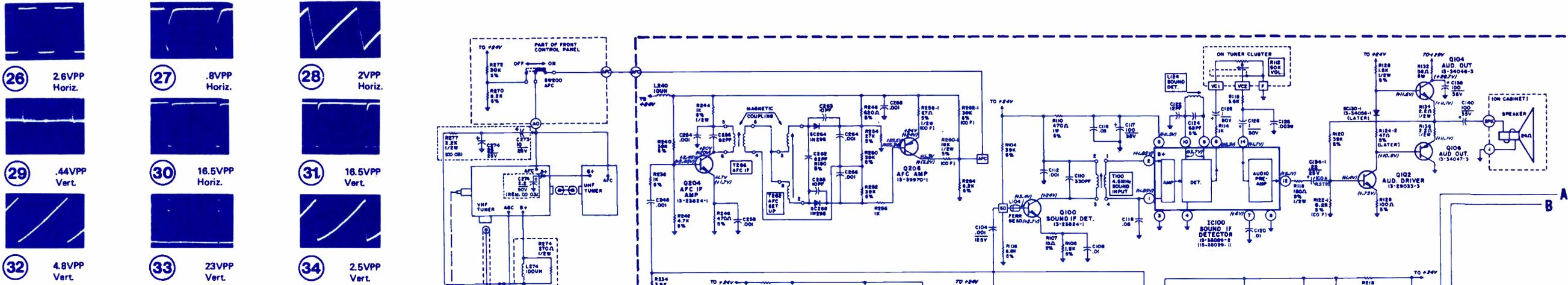
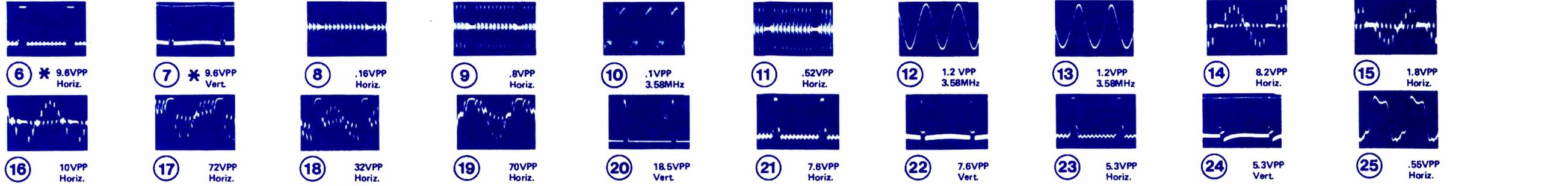
1667

GTE SYLVANIA
Color TV Chassis
E21-3

ELECTRONIC TECHNICIAN/DEALER **TEKFAK**

NOVEMBER • 1976

COMPLETE MANUFACTURERS' CIRCUIT DIAGRAMS AND TECHNICAL INFORMATION FOR 4 NEW SETS



IC VOLTAGE CHART (ALL IN VOLTS)

PIN NO.	IC100	IC200	IC202	IC300	IC302	IC400	IC600	IC802
1	(+1.85)	+16.7 (+16.5)	+7.0 (+6.8)	+1.4 (+1.4)	+1.7 (+1.7)	+3.1 (+3.4)	+5.5 (+5.4)	
2	(+1.85)	+12.3 (+11.5)	+8.3 (+8.3)	+4.0 (+4.0)	+2.3 (+2.1)	+0.4 (+3*)	+7.6 (+8.1)	
3	(0)	+2 (+1.9)	+8.3 (+8.3)	+4.2 (+4.2)	+11.4 (+11.4)	+1.8 (+1.8)	+6.8 (+7.2)	+3.8 (+3.6)
4	(0)	+2.6 (+2.5)	+4.2 (+4.5)	+1.5 (+1.5)	0	+11 (+9.6)	+5 (+5)	+3.6 (+3.6)
5	(+11.5)	+4.7 (+4.2)	+17.2 (+17.6)	+2.9 (+5*)	+2.7 (+2.7)	-2.5 (-1.2)	+7 (+7)	
6	(0)	+2.6 (+2.5)	+17.2 (+17.6)	0	+1 (+1)	+16.4 (+16.8)	+2 (+1.8)	+6.4 (+6.4)
7	(+6)	0 (0)	+4.0 (+4.0)	+2.35 (+2.3)	+11.5 (+11.5)	+5.2 (+5.0)	0 (0)	+6.4 (+6.4)
8	(+5.3)	+16.3 (+17.1)	0 (0)	+6.4 (+6.4)	+1.1 (+1.0)	+7.5 (+7.5)	+4.3 (+4.5)	+24 (+24)
9	(+3.7)			+4 (+4)	+26.4 (+26)	+5.3 (+5)	+2.7 (+1.7)	+14.4 (+14.2)
10	(+3.7)			+0.4 (+2.6)	+28 (+27.8)	0 (0)	+7.5 (+8.4)	
11				+20 (+3.6)	+14.5 (+14.5)	+10.2 (+10.5)	+8.5 (+8.5)	+14.4 (+14.2)
12	(+5.1)			+8 (+8)	+28.3 (+28)	+18.6 (+18.6)	+8.5 (+8.5)	
13	(+5.8)			+1.4 (+4.1)	+11.8 (+11.8)	+18.2 (+18.5)	+8.1 (+8.1)	+14.5 (+14.3)
14	(+1.7)			+3.6 (+1.8)	+11.8 (+11.8)	+3.3 (+3.3)	+9.5 (+9.5)	0 (0)
15				+0.2 (+0.1)	+1.4 (+1.4)			
16				+1.5 (+1.5)	+20 (+20)			

*Voltage Fluctuates at No Signal Condition.

GROUP
291

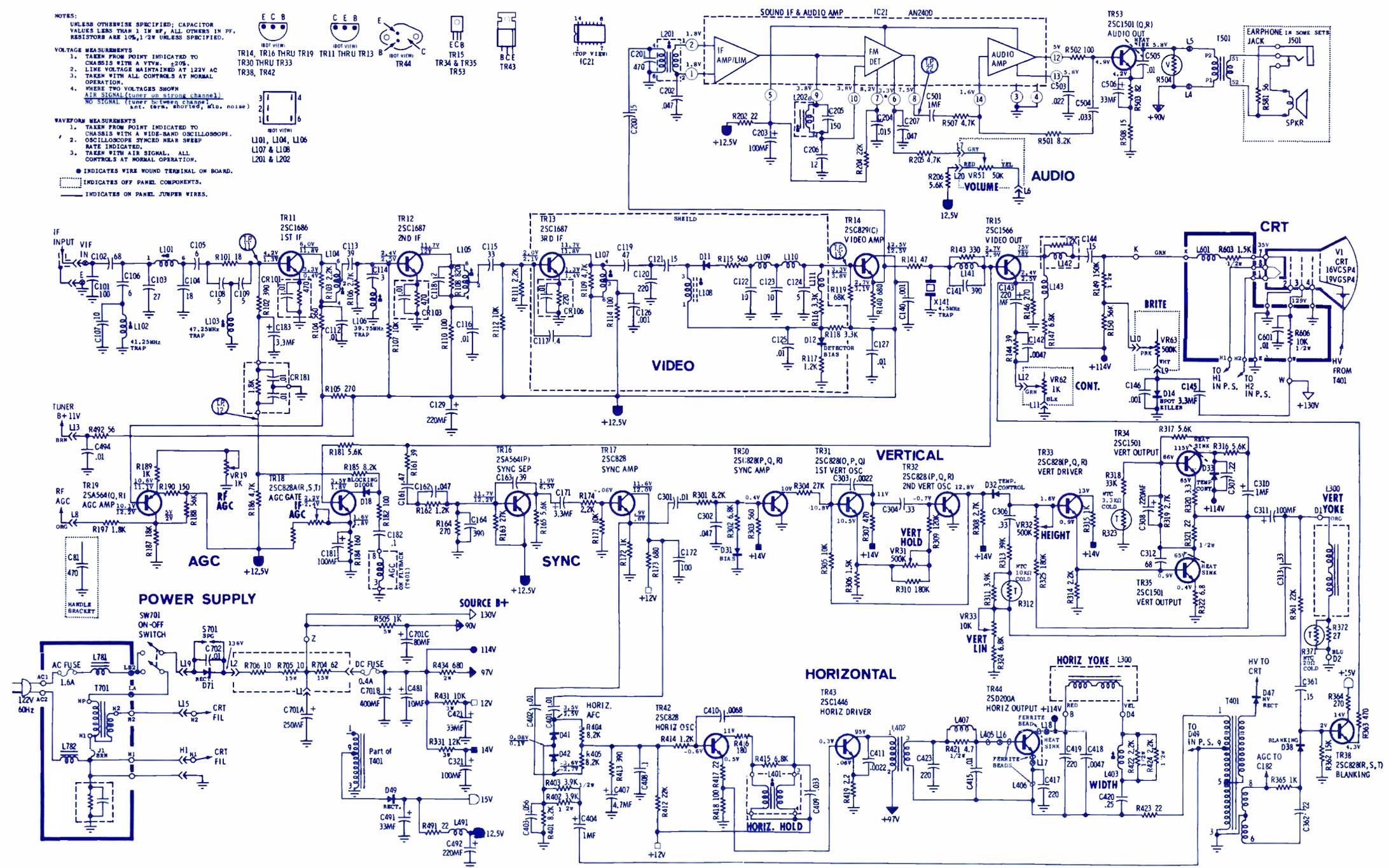
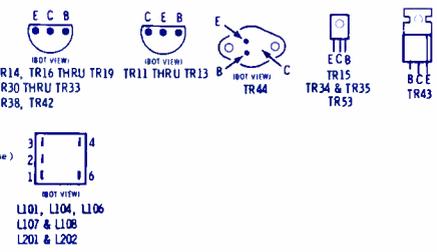
	SCHMATIC NO.	SCHMATIC NO.
GTE SYLVANIA Color TV Chassis E21-31667	RCA Color TV Chassis CTC72 Series (E, F)
QUASAR B/W TV Chassis TS-4851666	RCA B/W TV Chassis KCS202C, R

NOTES:
UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES LESS THAN 1 μF, ALL OTHERS IN P.P. RESISTORS ARE 1/2W UNLESS SPECIFIED.

VOLTAGE MEASUREMENTS
1. TAKEN FROM POINT INDICATED TO CHASSIS WITH A VTVM. ±20% LINE VOLTAGE MAINTAINED AT 122V AC
2. TAKEN WITH ALL CONTROLS AT NORMAL OPERATION.
3. WHERE TWO VOLTAGES SHOWN AIR SIGNAL (tuner on strong channel) NO SIGNAL (tuner on weak channel) ant. term. shorted, sig. noise

WAVEFORM MEASUREMENTS
1. TAKEN FROM POINT INDICATED TO CHASSIS WITH A WIDE-BAND OSCILLOSCOPE.
2. OSCILLOSCOPE SYNCED NEAR SWEEP RATE INDICATED.
3. TAKEN WITH AIR SIGNAL. ALL CONTROLS AT NORMAL OPERATION.

● INDICATES WIRE WOUND TERMINAL ON BOARD.
□ INDICATES OFF PANEL COMPONENTS.
— INDICATES ON PANEL JUMPER WIRES.



Suddenly, you're the most versatile shop in town.

With this little 25-pound test jig, you can adapt to over 10,000 color sets, 59 different brands. Delta 70° and 90° tube, hybrid, transistor, SCR sweep. Anode voltages to 30kV and more. Regular 4.5kV and 7.1kV focus voltages.

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precision in-line chassis, including RCA, Magnavox, Admiral and Sears. (We're the first test-jig manufacturer to offer a kit like this.)

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and you're in business. See it now, at your Sylvania distributor.

GTE Sylvania, Electronic Components Group, 100 First Avenue, Waltham, Massachusetts 02154.

The Sylvania CK3000



Simply the most versatile test jig you can buy.

GTE SYLVANIA

Our 630-PLK won't die of shock.

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Does everything you'd expect of a high-quality general purpose V-O-M. An exclusive, patented, transistorized switching circuit gives the Triplett Model 630-PLK virtually fail-proof protection against overloads. That makes it very popular with teachers and students, and with professionals where constant switching invites overload errors.

Look at these features:

1. Burnout-proof solid-state overload protection; suspension movement; 2% DC accuracy.
2. Single range switch minimizes error; DC polarity-reversing switch.
3. 4 ohmmeter ranges with a 4.4 ohms center scale.

Want all this, but with laboratory accuracy? Then consider the Triplett Model 630-APLK. Exactly the same ranges and protection circuit plus 1½% DC accuracy, a mirrored scale, and a rugged suspension-type meter. Priced at **\$136.**

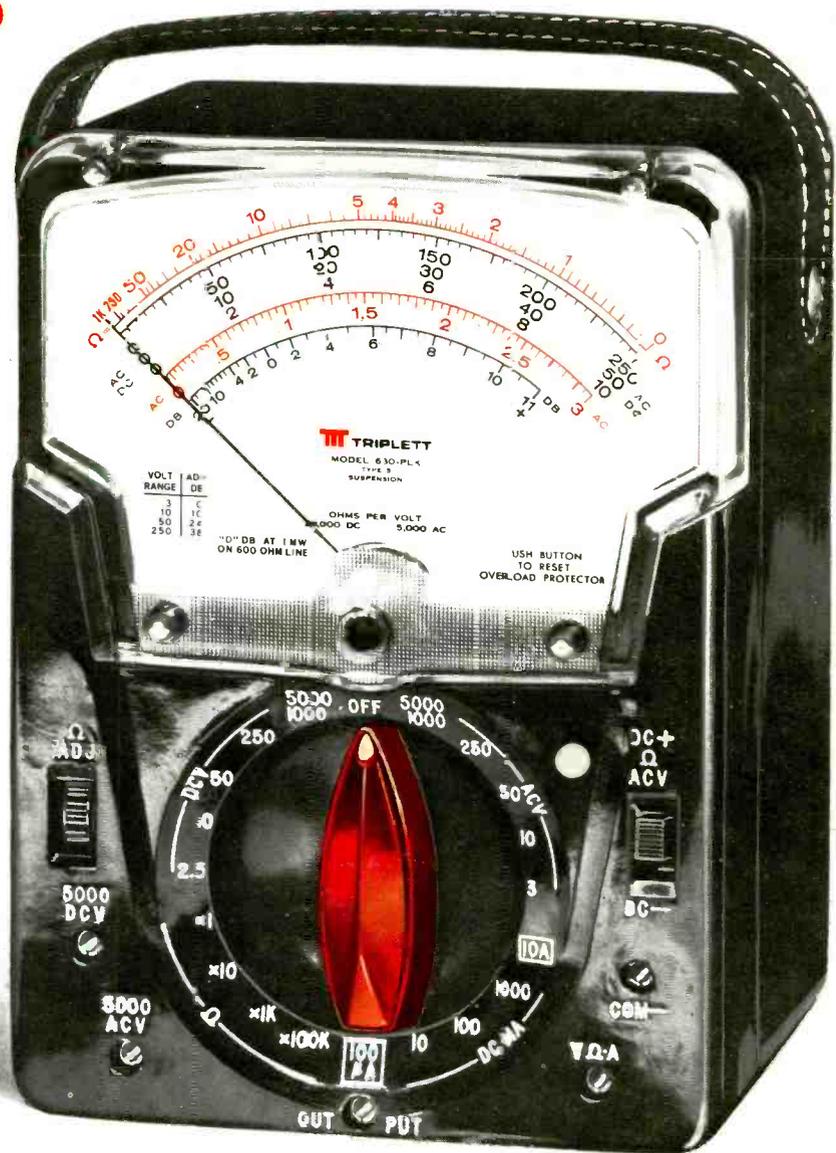
If you don't need overload protection,

take a look at Triplett's Model 630-PL at only **\$82**, or the 630-APL (with 1½% accuracy, mirrored scale, and suspension-type meter) at **\$90.**

See them for yourself. Ask the Triplett distributor or sales representative to give you a free demonstration of the tester that fits your needs. You'll be

glad you did. So, do it today. Triplett Corporation, Bluffton, Ohio 45817.

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ALL YOU'LL EVER NEED IN V-O-M's.



Triplett. The easy readers.

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