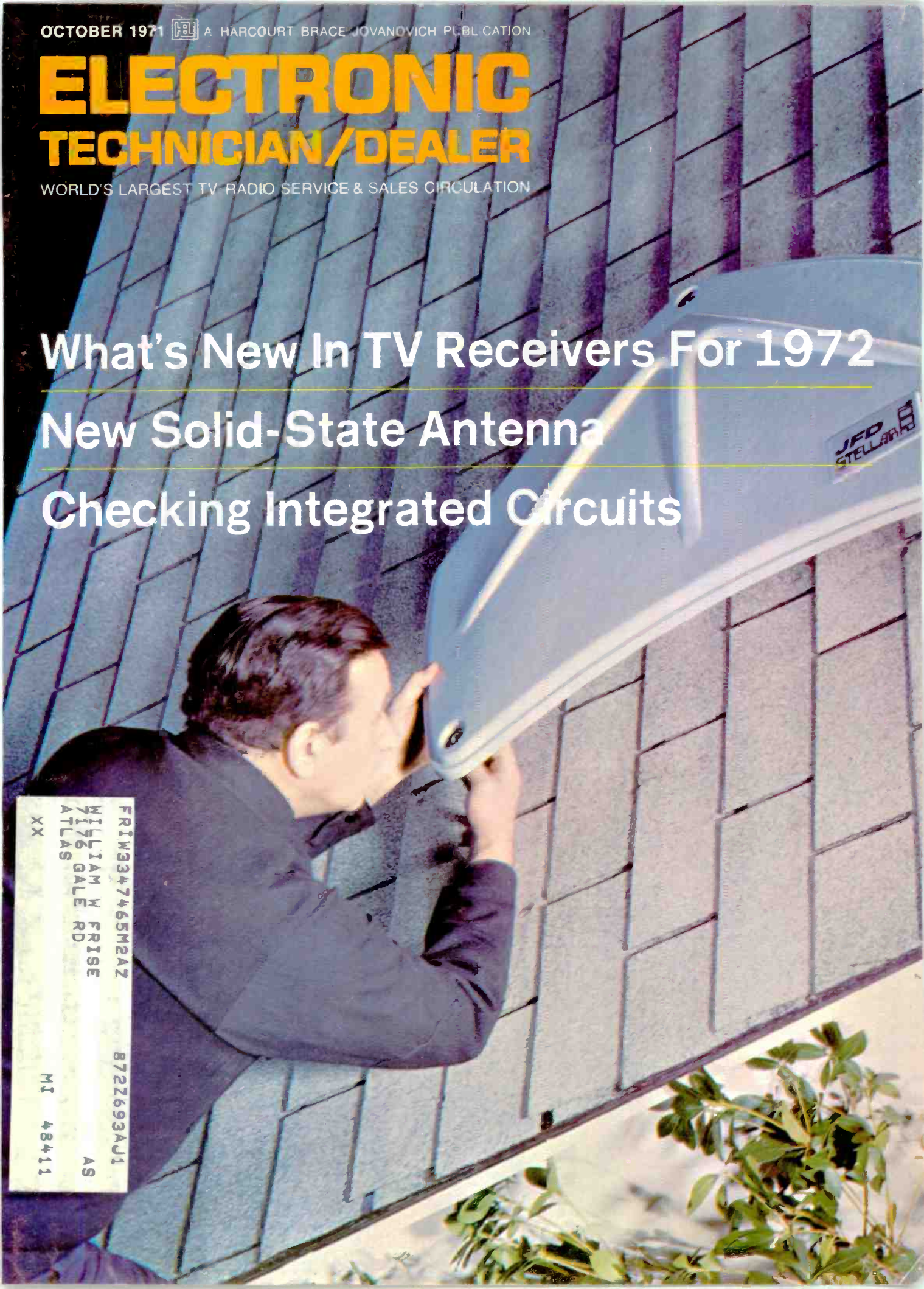


# ELECTRONIC TECHNICIAN/DEALER

WORLD'S LARGEST TV-RADIO SERVICE & SALES CIRCULATION

## What's New In TV Receivers For 1972 New Solid-State Antenna Checking Integrated Circuits

FRIW3347465M2AZ 8722693AU1  
WILLIAM W FRISE AS  
176 GALE RD  
ATLAS MI 48411  
XX



# THE ELECTRIC GIFTS

WITH GENERAL ELECTRIC TUBES



12 great gifts . . .  
calculated to  
please you

Save the gift point coupons you'll receive with each General Electric tube purchase from your participating distributor . . . and earn your great electric gifts.

- 1. GE Styling Comb, 282 Gift Points
- 2. GE Tape Recorder, 543 Gift Points
- 3. GE Marble Clock, 265 Gift Points
- 4. GE Youth Phono, 459 Gift Points
- 5. GE Portable Vacuum Cleaner, 564 Gift Points
- 6. GE Toast-R-Oven™, 608 Gift Points
- 7. GE Porta-Color® Television (reception simulated), 4331 Gift Points
- 8. Black & Decker® Drill Set, 412 Gift Points
- 9. Dremel Electric Shoe Polisher, 640 Gift Points
- 10. Brothers® Electric Pencil Sharpener, 260 Gift Points
- 11. Brothers® Calculator, 4728 Gift Points
- 12. Automatic Putting Set, 260 Gift Points

Tube Products Department, Owensboro, Ky.









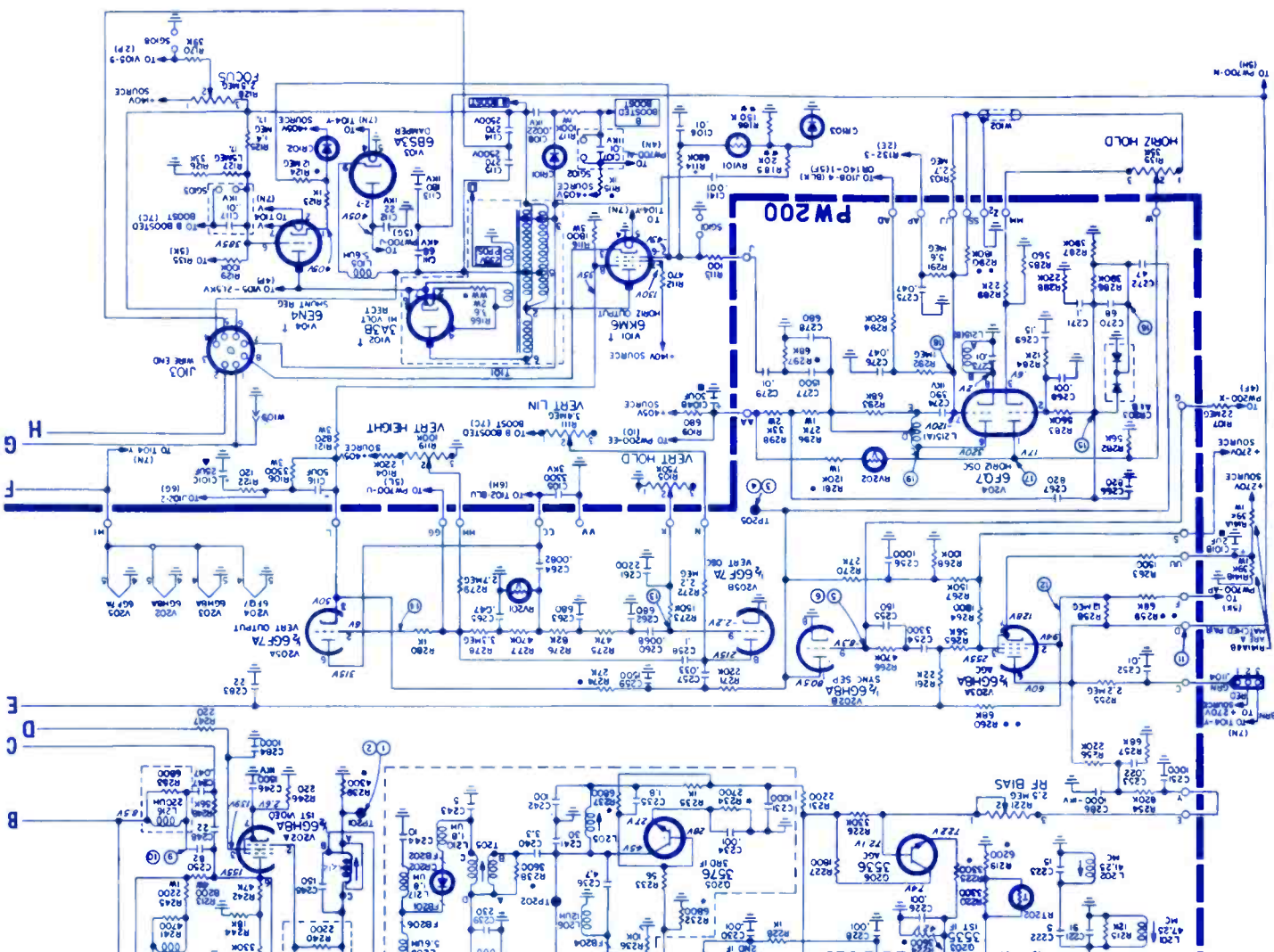
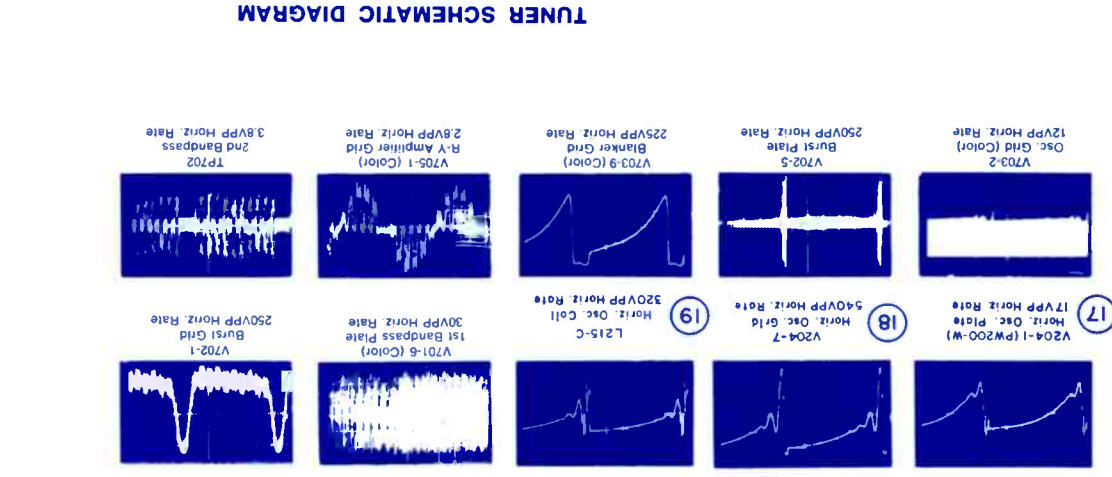




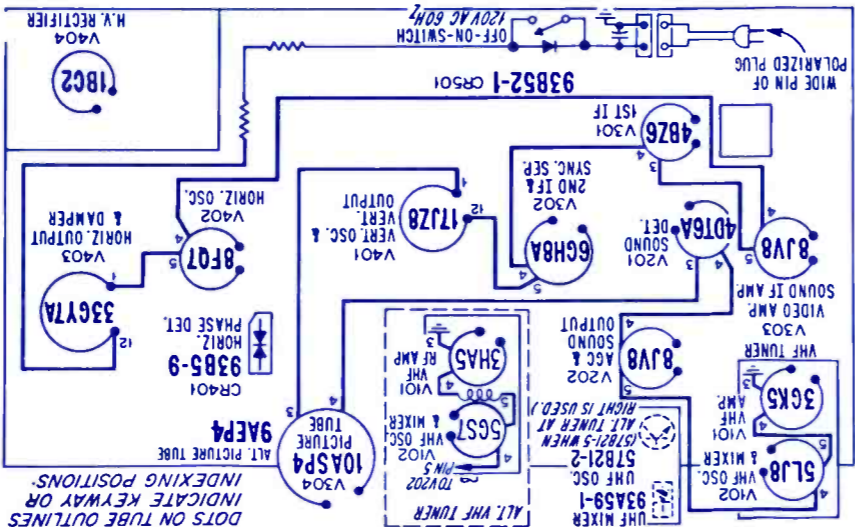




1 TP201 2nd Detector Rate  
 2 TP201 2nd Detector 2VP Horiz. Rate  
 3 V202-1 Sync Sep. Plate 64VP Vert. Rate  
 4 V202-1 Sync Sep. Plate 50VP Horiz. Rate  
 5 V202-9 Sync Sep. Grid 46VP Vert. Rate  
 6 V202-9 Sync Sep. Grid 46VP Horiz. Rate  
 7 PW200 KK 2nd Video Plate 79VP Horiz. Rate  
 8 PW200 KK 2nd Video Plate 79VP Vert. Rate  
 9 V203-9 2nd Video Grid 67VP Vert. Rate  
 10 V203-9 2nd Video Grid 67VP Horiz. Rate  
 11 PW200-D AGC Kenlin Pulse 640VP Horiz. Rate  
 12 V203-2 AGC Grid 41VP Horiz. Rate  
 13 V204-1 (PW200-W) Horiz. Osc. Plate 17VP Horiz. Rate  
 14 V204-7 Horiz. Osc. Grid 540VP Horiz. Rate  
 15 L215-C Horiz. Osc. Coil 320VP Horiz. Rate  
 16 V204-1 (PW200-W) 1st Bandpass Plate 250VP Horiz. Rate  
 17 V204-1 (PW200-W) Osc. Grid (Color) 12VP Horiz. Rate  
 18 V205-5 Burst Plate 250VP Horiz. Rate  
 19 V205-5 Burst Plate 225VP Horiz. Rate  
 20 V705-1 (Color) R-Y Amplifier Grid 28VP Horiz. Rate



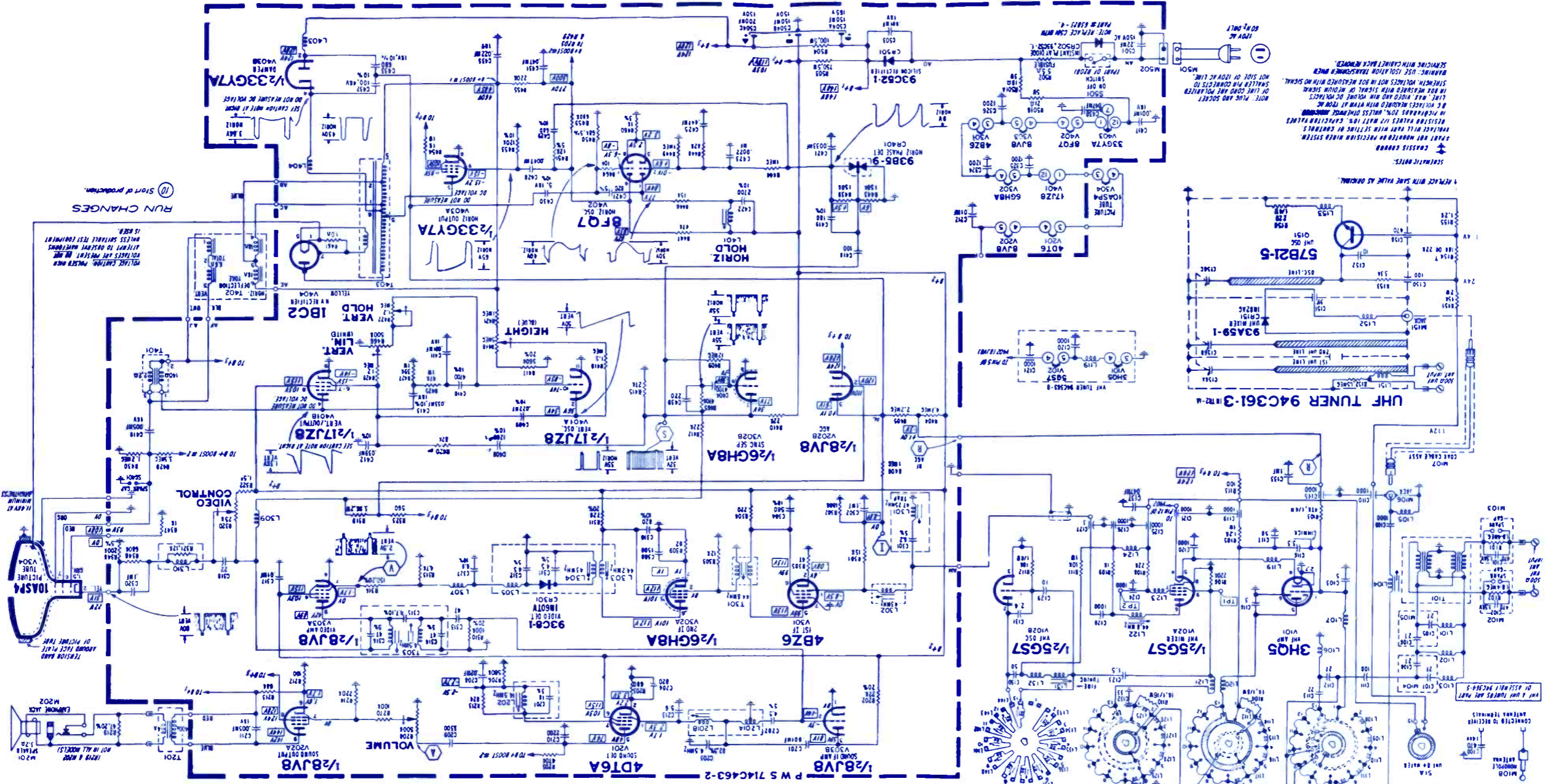
SCHEMATIC NO.	MODEL	CHASSIS
1380	ADMIRAL TR2	Sylvania Color TV Chassis D15-3-5
1384	MAGNAVOX	Zenith TV Chassis T946 Series
1383	ZENITH	Color TV Chassis 25C55
1381	RCA SALES CORPORATION	Color TV Chassis CTC50 Series



SYMBOL	DESCRIPTION
R208	1M vol control w/switch
75A148.2	R200-30K video control w/switch
75A101.16	R418-height control
75A101.9	R422-1.2M vert hold control
60A28.97	R461-1n, WW
61A48.1	R507-.5n, fuse type
61A20-108	R503-.750n, Sw
65A10-212	C432-100pF, 4kv, cer disc (N1500)
67A30-10	C504A-150µF, 165V elect
67A30-10	C504B-150µF, 150V elect
67A30-10	C504C-200µF, 150V elect
72A132.77	L202-quad coil
72A296.4	L301-.47 25MHz trap
72A296.7	L303-.304-1F xformer
94A17.19	L401-horiz lock coil
79A124.5	T201-audio output xformer
72A132.76	T301-1st IF xformer
72A185.5	T303-sound takeoff xformer
79A139.4	T401-vert output xformer
94A372.1	T402-deflection yoke assembly
79A138.11	T403-horiz output xformer
94A363.6	UHF tuner
94A361.3	VHF tuner

ADIRAL PART NO.	DESCRIPTION
75A148.2	R208-1M vol control w/switch
75A101.16	R418-height control
75A101.9	R422-1.2M vert hold control
60A28.97	R461-1n, WW
61A48.1	R507-.5n, fuse type
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65A10-212	C432-100pF, 4kv, cer disc (N1500)
67A30-10	C504A-150µF, 165V elect
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94A372.1	T402-deflection yoke assembly
79A138.11	T403-horiz output xformer
94A363.6	UHF tuner
94A361.3	VHF tuner

**1380**  
ADMIRAL  
TV Chassis  
TR2  
OCTOBER • 1971



**CAUTIONS:**  
 1. DO NOT TOUCH THE CHASSIS OR CONTROL PANEL WITH WET HANDS.  
 2. DO NOT TOUCH THE CHASSIS OR CONTROL PANEL WITH METAL TOOLS.  
 3. DO NOT TOUCH THE CHASSIS OR CONTROL PANEL WITH ANY OTHER CONDUCTIVE OBJECTS.  
 4. DO NOT TOUCH THE CHASSIS OR CONTROL PANEL WITH ANY OTHER OBJECTS.  
 5. DO NOT TOUCH THE CHASSIS OR CONTROL PANEL WITH ANY OTHER OBJECTS.  
 6. DO NOT TOUCH THE CHASSIS OR CONTROL PANEL WITH ANY OTHER OBJECTS.  
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 9. DO NOT TOUCH THE CHASSIS OR CONTROL PANEL WITH ANY OTHER OBJECTS.  
 10. DO NOT TOUCH THE CHASSIS OR CONTROL PANEL WITH ANY OTHER OBJECTS.

**You can make more money selling  
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**And Olive Oyl will look just as beautiful.**

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And the beauty of the *color bright* 85XR is that its picture is in the same league as the more expensive "black surround" and "black matrix" color tubes.

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The profit will look beautiful in your cash register.

If that isn't beauty, what is?

**GTE SYLVANIA**



# ELECTRONIC TECHNICIAN/DEALER

OCTOBER 1971 • VOLUME 93 NUMBER 10

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This month's cover photo, courtesy of JFD Electronics Corp., illustrates one of many possible techniques for installing their Stellar 2001 Antenna. More details concerning this antenna are included in the article beginning on page 47.

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## If you need a high-sensitivity, hand-size V-O-M... Buy Triplet's 310-FET

1. Hand-size FET V-O-M with 10 megohm DC input resistance.
2. Low voltage range of 300 mV DC; X1 megohm range.
3. Single range switch; DC polarity-reversing switch.

With a 10 megohm input resistance and a 300 mV DC sensitivity, Triplet's handy little Model 310-FET can handle practically any electrical measurement you may need.

Seventeen ranges (plus 6 AC current ranges to 300 A with its optional clamp-on ammeter attachment), 3% DC and 4% AC

accuracy, a polarity-reversing switch and a rugged suspension-type meter to soak up the hard knocks make the 310-FET the most convenient and most capable hand-size V-O-M you can buy.

It's a real value at \$78, so see it right now at your local Triplet distributor. For more infor-

mation, or for a free demonstration, see him or your Triplet sales representative. Triplet Corporation, Bluffton, Ohio 45817.

**TRIPLETT**

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

... for more details circle 129 on Reader Service Card

## LETTERS

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

### Guest Author Article Gets Right to the Point

It is apparent that Jack Devinsky of RCA is very knowledgeable. His article "Solid State Replacement—Problem or Profit" gets right to the point.

However, I think something should be said about the serviceman who knowingly uses replacement parts that are not of prime quality. If the part fails, the serviceman gets a call-back and charges the customer again for his time. He mistakenly believes that this is profitable business.

In addition to Mr. Devinsky's highly relevant comments, the serviceman's reputation is at stake every time he makes a service call. "News travels fast," particularly between neighbors. Call-backs cost the serviceman a loss of many recommendations and potential customers. On the other hand, a satisfied customer is his best salesman.

SY WINUK  
MARKETING MANAGER  
ELECTRONICS DEVICES, INC.

### Receives Good Response

A couple of months ago you were kind enough to place an ad for me, as I have retired from my Television Sales & Service Shop and had some equipment for sale. The response has been very good, and I have sold most of my test equipment.

Thank you for the wonderful work you are doing for all of us TV men. Keep up the good work.

C. HAYES

### Cartoon Intriguing

On page 28 of the August 1971 issue of your magazine, you have published a cartoon with the title: "Everytime I change channels my neighbor's garage door goes up!"

This cartoon is particularly intriguing to me since I am responsible for writing the FCC regulations under which the radio controls for garage door openers operate. As a matter of fact, we have recently revised the rules to require more suppression of spurious emissions from the receivers used with these controls.

I would very much like to have a copy of the full-size drawing from which this cartoon was prepared. I would also like your permission to use

this cartoon in talks on interference control which I deliver from time to time.

HERMAN GARLAN  
Chief, RF Devices Branch  
Federal Communications Commission

### Information on Precise

I noted your call for help in the May issue for information on oscilloscopes manufactured by Precise.

The Book "Encyclopedia on Cathode-Ray Oscilloscopes and Their Uses," Rider & Uslan, second edition, 1959, John F. Rider Publisher, Inc., New York, pages 23 to 142 contains a schematic for the Model 300B scope, and pages 23 to 143 contain a schematic for the Model 308 scope. (Library of Congress Card No. 59-15917.)

WILLIAM J. UTTERBACK

### Safety First!

I am what might be considered a new subscriber to your magazine. However, I have worked in electronics for 17 years in my Naval career. I have seen personnel injured by low voltage, household voltage (personal experience added), high voltage, and what I consider super-high voltage (anything over 2kv and add me in again). I have seen injuries caused by electrical power ranging from direct current to that in the Gigahertz range. The results of these injuries range from busted knuckles to (I am sad to say) blindness and even death.

Perhaps 17 years as a U.S. Navy technician, working on everything from radios to high-power radar, sonar and communications transmitters, does not make me "the old man of electronics"; but, it does give me enough experience to recognize the absence of critical safety information and the presence of very dangerous safety violations in the field of electronics. That is why I am so very surprised that such a valuable and important magazine as ELECTRONIC TECHNICIAN/DEALER could skip so lightly over these items.

First, we'll take the absence of critical safety information. Maybe common sense should cover this area. However, there are those who would peer through their dark glasses and disagree or others who would shake their wrist stubs in anger and anguish at this suggestion.

The microwave oven can and has caused blindness and has produced cripples. If, for instance, there is damage to the door seal, this is not a mere hazardous situation. It is a downright

dangerous burn and eye hazard. Don't beat around the bush. Spell it out. The pin in the perforated door. A definite burn hazard, but also another source of eye hazard. An oversize hole because of a playful ice pick or nail, another eye hazard.

All of this tells the story. There is a need for periodic radiation tests of these ovens. If the consumer is made aware of all the hazards, he may not buy the product. But for everyone that you lose, you gain many more that may want you to do the extraneous radiation checks. You may also save someone's sight.

The door interlocks present another problem area. Fool proof? Don't bet on it. They can and have been defeated. Defeated by technicians as well as the user. A Chicago suburbanite is missing both hands because of this. He was a regular worker at one of the large plants that have microwave ovens for worker use. He was working in a cold storage room, handling frozen food products. His hands became very cold, so he defeated the door interlocks on one of the ovens and got a quick hand warmup. A few hours later, his hands were swollen twice their normal size. After gangrene set in, the doctors were not sure they could save his life, much less his hands. To get the straight dope on what can happen by defeating the door interlocks, ask him. Gigahertz doesn't play silly games.

Now we will cover the other safety violations. Perhaps I am a nit picker, but the August issue shows a young lady working on what must be assumed to be a hot TV set. Just what could happen to her with a wristwatch on her wrist, a ring on her finger and that nice dangle pendant around her neck? That pendant hangs neatly into the circuits. Let's hope that if she or any other technician that follows such practices can withstand the load longer than the fuse can.

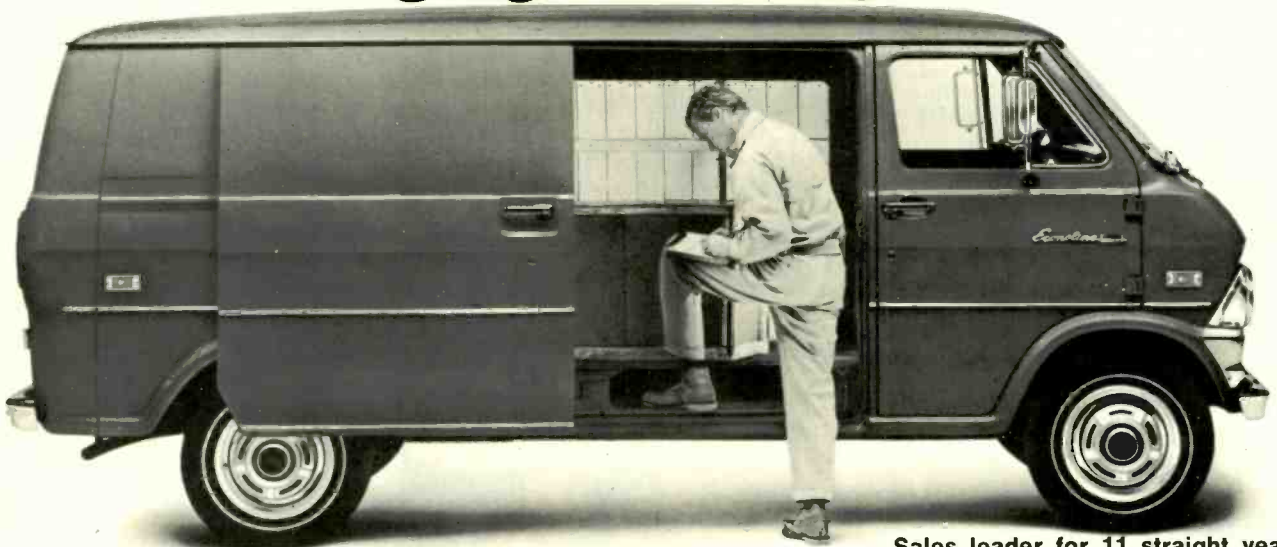
The technician wearing his wristwatch on the cover of the July issue is also asking for trouble. Any metal object that is normally worn on the human body and makes contact with it, is a potential death trap for anyone working in electronics or electricity. I saw a young man lose a finger because of his strict adherence to a marriage vow that he would never remove his wedding ring. It was only 6v dc from the positive battery post to the grounded metal battery box.

I could tell you many stories, all true, but my letter is already excessively long. Therefore, I will make a suggestion. Start a "Safety Tips" column in your magazine. When you run out of tips, start over again. Safety,

*continued on page 26*



## Now Ford gives you a choice of swinging or sliding doors.



Sales leader for 11 straight years.

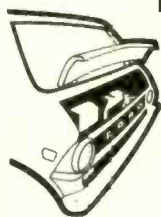
**Only Ford vans have so many better ideas that make vans easier to drive, to service, to use.**

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



**Shorter outside, easier to park.** Compared to other makes with similar loadspace, Econoline Vans have significantly less overall length. This means easier parking and better maneuverability in city-delivery operations—time saved on every trip.

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



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

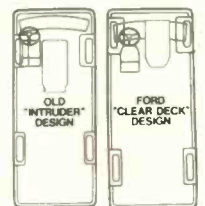
**Big payloads.** Three series in two

**Easy, out-front servicing.** Routine service points are right at hand under hood: water, oil, battery, wiper motor, voltage regulator, plus many others.



lengths offer maximum payload capacity of over two tons.

**Engine clear forward.** In Ford's clear-deck design, engine is forward—all the way out of cargo area. Over 8½ ft. clear floor space behind driver's seat... over 10 ft. in the SuperVan. Driver can easily step from seat into rear cargo area.



# FORD ECONOLINE VANS



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

# Pick a present with RCA...

When you purchase RCA entertainment receiving and picture tubes from your participating RCA Distributor



## 15 gifts for you and your family

1. Bulova Digital Electric Alarm Clock
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3. Mighty Tonka Crane
4. Paint by the Number Set
5. Tiny Tonka Cars

6. Baby's Busy Box
7. Mirro-Matic Buffet Server-Fryer
8. Drag Stripper Boys Bike  
(Not Shown)
- Tiny Town Doctor Set

- Tiny Town Nurse Set
- Dip-A-Flower Maker
- Easel Peg Chest
- Skittle Pins
- Atlas Train Set
- Mini Miss Girls Drag Stripper Bike

Play Santa Claus with your choice of 15 name-brand high quality gifts for yourself, your home, your children, just in time for the holiday gift-giving season!

See your participating RCA tube distributor for full details.  
RCA/Electronic Components/Harrison, N. J. 07029



# RCA



## Influencing the Consumer Market



One topic seemed to be prevalent during both the National Service Conference and the NATESA Convention in Hot Springs, Ark. It concerned the problem of maintaining an

adequate parts inventory, schematic library and skilled staff to service all consumer electronic products.

The average successful shop must be able to service a well-rounded assortment of consumer electronic products—B/W and color-TV sets; AM, FM and SW receivers; two-way communications equipment; antenna systems; audio amplifiers; phonographs; tape recorders; intrusion alarm systems; microwave ovens, etc. However, this is a long list of sophisticated products. And when you multiply this list by the number of manufacturers, the resulting numbers indicate an impossible situation. It simply results in too much responsibility for any one shop to handle.

Then, too, there are the "cheapies," those low-priced radios and TV sets that are sold in some dime stores, drug stores and discount stores. They are priced low to sell and may initially work very well. However, in cutting costs the manufacturer generally doesn't bother with schematic diagrams, circuit descriptions, parts lists or those other details that makes servicing feasible. Either you take a chance, close your eyes and start digging in, or you refuse to service these low-grade products.

As a result of these pressures, it is becoming increasingly common for electronic technicians to refuse to service anything unless it represents one of the brands that they or their shop sells.

By restricting one's work to a few well designed name brands, it is still possible to handle a complete product line without having to resort to excessive inventories and other servicing problems that reduce efficiency and resulting profits. Some shops are now specializing to the point that each electronic technician handles but one brand and type of product. Thus he can become so familiar with what he services that he needn't even bother to look up a schematic. It then becomes almost instinctive that this fault is caused by that component. And the dollars come in even easier.

There are quite a few manufacturers that are very concerned that their products be serviced as efficiently as possible. Many of these manufacturers express this concern by attending the National Service Conference (described briefly in this month's news). Many of these same manufacturers, plus a few additional ones, also show this concern by loaning us consumer electronic products to be studied in the ELECTRONIC TECHNICIAN/DEALER lab and later described to you. Not only do they advertise in our publication, they also go to the effort of supplying us with service data, which we pass on to you.

In addition to the efforts that we have had the opportunity to directly observe, many of these manufacturers go to the expense of sending their technical literature directly to you. They even go

out on the road and offer evening seminars on electronic servicing in your area or promote regional training centers, which are maintained at a considerable expense to them. Some trade associations are now even planning the construction of training centers to help facilitate these training activities (again note this month's news section).

It is only reasonable to assume that the manufacturers interested enough in their products to work directly with you or through a trade publication to see that their products are serviced efficiently, are also the manufacturers that tend to listen to your complaints and suggestions, modifying product circuitry to make servicing as efficient as possible. If it is therefore more efficient and profitable to service their product lines, and if you are going to have a policy of servicing what you sell, then these represent the product lines from which you should select what you are going to sell to the public. It makes absolutely no sense to sell additional brands if they represent products that you will be less able to service—resulting in lower long-term profits and poorer customer relations!

Through bad personal service experiences, by word-of-mouth and even through some forms of advertising, the public is gradually waking up to the fact that the consumer electronic products that they purchase must eventually be serviced. A customer may save a few dollars by buying from someone other than a service dealer, but what value is this savings if the product cannot be used for any length of time! There is

*continued on page 26*

*continued from page 25*



## New Heathkit Dual Trace DC-15 MHz Scope... \$399.95\*

Build the Heathkit IO-105 dual trace scope and give your shop a new degree of sophistication for a lot less than you'd pay for a comparable wired unit. The big 5" (8x10 cm flatface) CRT provides separate signal display in channel 1 or channel 2 modes, direct comparison display in alternate and chopped modes, x-y mode for presentation of signals as a function of each other. Has triggered time base with 18 calibrated rates, 0.2 us/cm — 100 ms/cm in 1, 2, 5 sequence, ±3%; x5 sweep magnification. Compare the price, compare the specs — then order your Heathkit IO-105 today.

Kit IO-105, 35 lbs., mailable ..... 399.95\*

**IO-105 SPECIFICATIONS — VERTICAL — Accuracy:** ±3%. **Input impedance:** 1 megohm shunted by 35 pF. **Maximum input voltage:** 600 VDC. **Sensitivity:** AC or DC, 0.05 V/cm. **Frequency response:** DC to 15 MHz, 3 dB with 4 cm deflection. **Vertical windows:** 2 minimum. **Rise time:** 24 ns. **Overshoot:** Less than 10%. **Attenuator:** 9 positions in a 1, 2, 5 sequence. **0.05 V/cm to 20 V/cm, ±3%. Variable gain (uncalibrated) thru entire range. Vertical display in sweep mode:** Channel 1, Channel 2, Channel 1 & 2 alternately; or Channel 1 & Channel 2 chopped (50 kHz). **HORIZONTAL — Time base:** Triggered with 18 calibrated rates, 0.2 us/cm to 100 ms/cm in a 1, 2, 5 sequence, ±3%. Continuously variable (uncalibrated) within the same range. **Sweep magnifier:** x5 (time base accuracy is ±5% when the magnifier is being used). **External horizontal input:** 750 millivolts/cm (uncalibrated & not adjustable). **100 K ohm minimum input impedance, DC to 100 kHz. X-Y MODE — Sensitivity:** 0.05 V/cm to 20 V/cm, ±3%. **Frequency response:** —3 dB @ 100 kHz (Channel 2). **Phase shift between channels:** ±5° or less from DC to 50 kHz within graticule limits. **TRIGGERING — Delay:** Approx. 600 ns. **Auto:** Zero crossing ±½ cm of zero crossing. **Norm:** Within viewing area. **Source:** Channel 1, Channel 2, or Channels 1 & 2. **Polarity:** + or — slope. **Coupling:** AC or DC. **Sensitivity:** Internal, ½ cm; external, 100 mV minimum, 7 V max. **GENERAL — Blanking in:** TTL compatible (Logic 0-blank). **Gate out:** 3.5 volts minimum. **Input connections:** Vertical, coaxial & BNC; horizontal, binding post; external trigger, binding post on ¾" center with ground. **CRT accelerating potential:** 2200 VDC regulated. **CRT type:** 8x10 cm, rectangular, flatface, D14-107GA. **Retrace suppression:** DC coupled unblanking of the CRT. **Graticule:** 8 cm x 10 cm grid, edge lighted. **Power requirements:** 105-125 or 210-250 VAC, 50/60 Hz, 60 watts. **Warm-up time:** CRT heating time, approx. 30 seconds; for full calibration, approx. 15 minutes. **Overall dimensions:** 10¾" W x 12¾" H x 15" D. **Note:** Specifications measured at 25° C with 120 VAC line voltage.

plenty of money to be made through local advertising programs promoting the security and satisfaction that a customer can have in buying from a service dealer that is ready and able to personally stand behind the product he sells, providing efficient service when needed!

And when you select the brands that you will sell as a service dealer, you needn't be concerned that you have not included some nationally advertised brands that feature full-page ads in the newsstand publications. These advertisements will actually help you, for they will convince the customer that he or she must have that new TV set, microwave oven, etc., with all the special features advertised. They will have done the big job for you, and all you need do is show the customer that the products that you sell have all of these features—these special features having merely been given different brand names—and that you can provide them with all this in the brand that you are selling—plus providing the extra advantage of assuring them **dependable service!** You will have no problem in switching them to the brands that you have learned are best for you (and therefore best for them), those produced by manufacturers that show they care about servicing, either through direct contact with you or the information they provide you through **ELECTRONIC TECHNICIAN/DEALER.**

*Phillip Waller*

## LETTERS TO THE EDITOR

*continued from page 22*

especially in the electronics field, cannot be pushed too hard. It is very hard to explain to a wife or mother why their technician is no longer among us.

**WILLIAM FELSCHER  
ETCS USN**

*We would appreciate hearing comments from others concerning this important subject. Ed.*

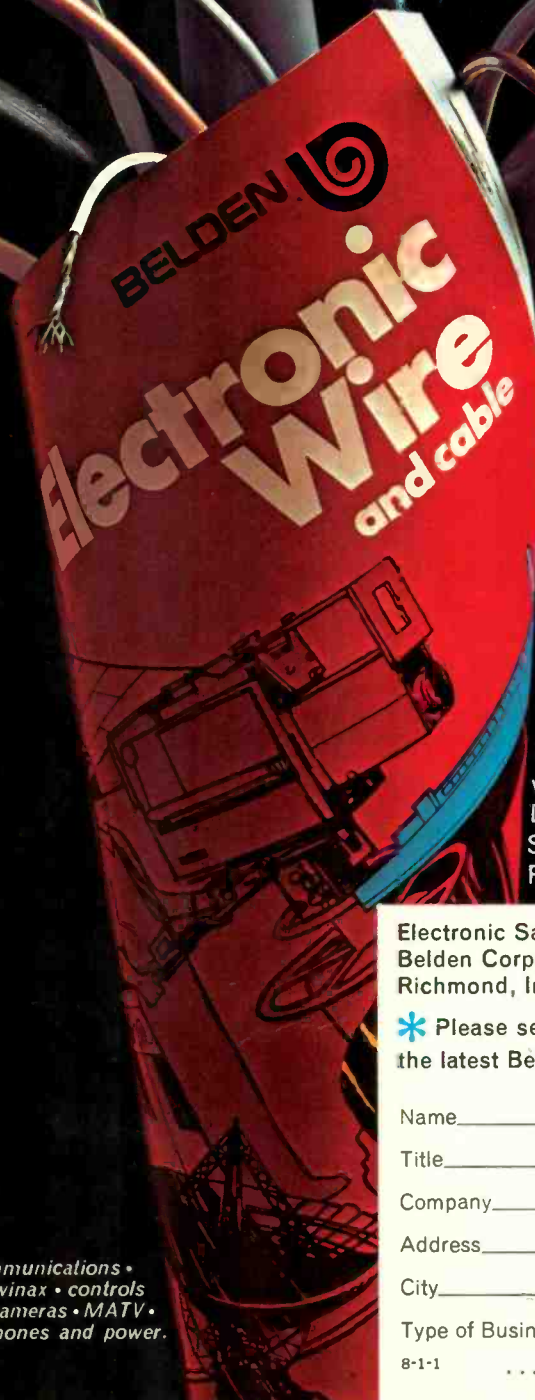
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8-1-1 ... for more details circle 102 on Reader Service Card



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### Needs Schematic

I need a Schematic and Service Manual for an Atwater Kent radio Model 32, serial no. 62177, of 1920 or 30 vintage. I will be glad to pay the cost for the manual and schematic.

JOHN L. TUCKER

Box 247  
Hometown, West Virginia 25109

### Needs Schematic

I need a schematic for an Atwater Kent, Model 46. If anyone has or knows where I can obtain one, I will pay for all postage to have a copy mailed to me.

RAY PITTS

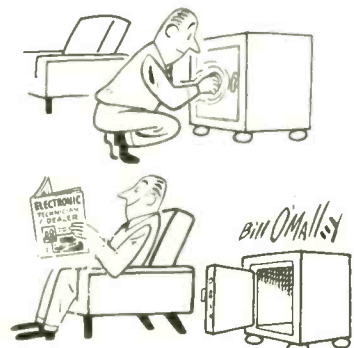
Route #4, Box 463  
Dalton, Georgia 30720

### Knobs Needed

I need a set of knobs for a Pilot TV37 television set. These have the design of ship's wheel on them. I would also be interested in any parts or information on this set, especially a 3KP4 picture tube. I am also interested in pre-1930 radios, parts, tubes, and literature.

ALVIN HECKARD

Heckard's TV  
RD 1, Box 88  
Lewistown, Pa. 17044





# NEWS OF THE INDUSTRY

## Manufacturers Meet to Discuss Technicians' Self-Regulation

During the National Service Conference and NATESA Convention in Hot Springs, Ark., executives of a number of major TV-set manufacturers participated in a discussion with interested electronic technicians concerned with the feasibility of a self-regulation program. (*Tentative details of this program were described at length in the news item, "Industry Works to Develop Voluntary Self-Regulation," on page 28 of our September issue.*) These discussions were lead by Charles Couch, Jr. CET, chairman of the Industry Wide Investigative "Self-Regulation" Committee.

When discussing the need for self-regulation, it was pointed out that it is estimated that \$92 million in electronic servicing is conducted in Florida each year—10 percent of that being fraudulent. With the current public excitement over consumer protection, there are occasionally exposes that have been challenged by reputable electronic trade associations. As an example, members of the NEA and NATESA have given much publicity to a suit that has been filed against a Miami TV station, which reportedly uncovered a dishonest service dealer and presented its findings to the public. It is claimed that these findings were not justified and the conclusions of a radio engineer not experienced in servicing TV sets. The proposed honor society would make its own evaluation of such incidents and have the necessary budget to either support or prosecute—depending on its findings.

Mr. Couch concluded his introductory presentation to the group by indicating that those involved should agree on a uniform method of promotion and publicity. "If done right," he said, "broadcasters, manufacturers and consumer groups would be happy to support this society and its activities."

During the following discussion period, one manufacturer asked what the inference would be to the general public concerning those that decided not to join the society. There are many legal questions that must be answered to keep out of trouble.

Since membership in the society is to be voluntary, a leader of one regional servicing association asked what would happen once a person that joined the society violated its code. How would you punish, rather than merely expel the man? Once expelled, wouldn't he continue to operate as before? Could a negative report be turned over to the news media?

Not personally knowing of some other very important national societies—such as the Gem Society—one manufacturer wondered if the public would realize the importance of this new society.

Another manufacturer expressed concern in that it cannot legally support one small society as opposed to those outside the society. This would constitute restraint of trade. This manufacturer felt that what was needed was help from the outside—maybe the federal government—to make it effective.

In indicating what the society could do, one technician told of an unethical service dealer that moved a branch operation into his town. Soon he and other technicians were hearing reports of unethical service. They checked with the Better Business Bureau in the dealer's home town and learned more sordid details of his operation. Upon finding a local customer willing to complain of fraud, they offered to examine her TV set and provide supporting evidence (they were not legally able to file suit, while she could). Upon the successful completion of the case in court, the unethical service dealer moved out of town.

Caution was expressed that the society not be formed merely for the protection of its members at the expense of others. One association executive indicated that the society should also be influenced by outside consumers so that it can fairly deal with members and non-members alike when investigating their service activity.

It was felt that in addition to a technician's code of ethics (*something resembling the one in last month's news item*), a code of ethics should be formulated for the service dealer. It should be beyond the requirements for the electronic technician and include requirements for an adequate reference library of schematics, adequate test instruments, etc.

The manufacturers present expressed concern in upgrading the quality of electronic servicing, and for this they may offer financial support. However, they did not wish to become involved in such a manner that they would be treating non-cooperating electronic technicians unfairly. That would be immoral and illegal.

It was again indicated at this informal get-together that the members of the Industry Wide Investigative "Self-Regulation" Committee are open to suggestions concerning the design of an emblem, the wording of a code of ethics for electronic technicians belonging to the society, the wording of a code of ethics for service dealers belonging to the society, ways of promoting the society to the public, ways of obtaining financial and moral support from manufacturers and the government, and ways of giving the society effective teeth. (*Your comments are again welcome. Please address your letters as suggested in the September news story.*)

## FCC Proposes Regulating Cameras, Cartridges, Videoplayers

Rules have been proposed by the FCC to limit the amount of RF radiation permissible from restricted radiation devices (Class 1 TV devices) that produce an RF carrier modulated by a TV signal, including inexpensive TV cameras, and TV cartridge and videoplayer systems. It was also proposed that these devices be type approved by the commission.

The commission said that there was a "beneficial utility" in coupling TV cameras with standard TV sets for many special purposes in industry, governmental operations, schools and homes, but that it wished to avoid uncontrolled use of the radio spectrum and harmful interference.

The proposed rules would place an upper limit on permissible RF radiation from Class 1 TV devices. The limit is intended to permit the reproduction of a picture of good quality when the device is directly connected to a TV receiver of average characteristics, but the limit is intended to be sufficiently low that the interference potential of the device, coupled with a TV set, would be confined to an area within a few feet of either unit.

## National Electronics Service Conference Conducted in Hot Springs, Arkansas

The sixth National Electronics Service Conference was held at the Arlington Hotel in Hot Springs, Ark. Very capably coordinated by Don Martin, the meeting proved to be a great success.

Those attending the conference were divided into five groups to discuss in detail the following topics: "Standardization of In-Warranty Parts and Labor Forms," "Deter-

*continued on page 32*

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continued from page 30

mining Fair Rates for In-Warranty Products Service," "Consumerism and the Responsibility of Each Segment of the Electronics Industry," "How Can Electronics Parts Manufacturers Speed Up Development of Universal Parts for Newly Introduced Products," and "Ways to Implement the National Training Coordinator Program."

(Unfortunately this conference was held so late in the month that it is not possible to include the resolutions formulated by each discussion group and passed by the conference. We expect to include them in next month's issue.)

**Consumer Electronics Sales Increase over 1970 Figures**

Total U.S. sales of consumer electronics, reflecting U.S. produced and imported products, for the first six months of 1971 showed increases in all categories over the same period in 1970, reported the Electronic Industries Association's Marketing Services Department. Even stronger second quarter activity, indicating a continuing pick-up, was also noted by Jack Wayman, staff vice president, EIA, Consumer Electronics Group.

Total U.S. color-TV sets sales during the first half of 1971 were 42.3 percent ahead of the number sold during the first half of 1970. (Second quarter total U.S. color-TV set sales were up 54.3 percent from the second quarter sales a year ago.) B/W TV-set total U.S. sales for the first half of 1971 were 21.5 percent ahead of sales in the first six months a year ago. (Second quarter total U.S. B/W TV-set sales were up 23.4 percent from a year ago.)

Total U.S. sales of tape players are incomplete because of the non-availability of total automobile tape player statistics. Other than automobile tape player sales, however, increased 44.1 percent for the first six months of 1971 over sales in the same period last year. (The second quarter increase was 55.4 percent.)

**New Monthly Report Covers ISCET Activities**

As a trade journal dedicated to serving your professional needs, we feel that it is extremely important to emphasize the activities of various national trade associations directly related to your work. It is our belief that you should be kept aware of what they are doing and encouraged to participate in their programs.

For this reason, we are now making space available monthly for special reports from the International Society of Certified Electronic Technicians. We would be pleased to give comparable coverage to any similar national organization.

**ISCET Report, October 1971**

Darryl Widman, CET, the new ISCET chairman, is a dynamic young man who will do a great deal to put "ISCET on the map." Already some great strides have been made as Mr. Widman pointed out in his recent speech at the CSEA (California association) board meeting. A few of these comments by Mr. Widman, and the list of topics, continued on page 64

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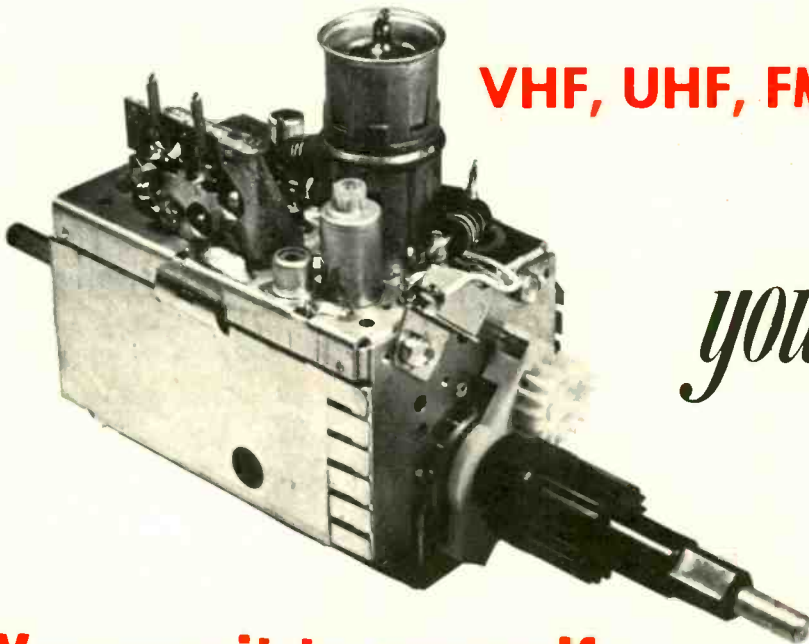
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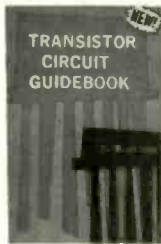
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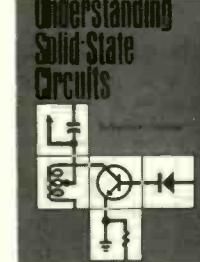
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## NEW AND NOTEWORTHY

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



### TRIGGERED-SWEEP SCOPE 701

*Provides either vector or dual-trace modes*

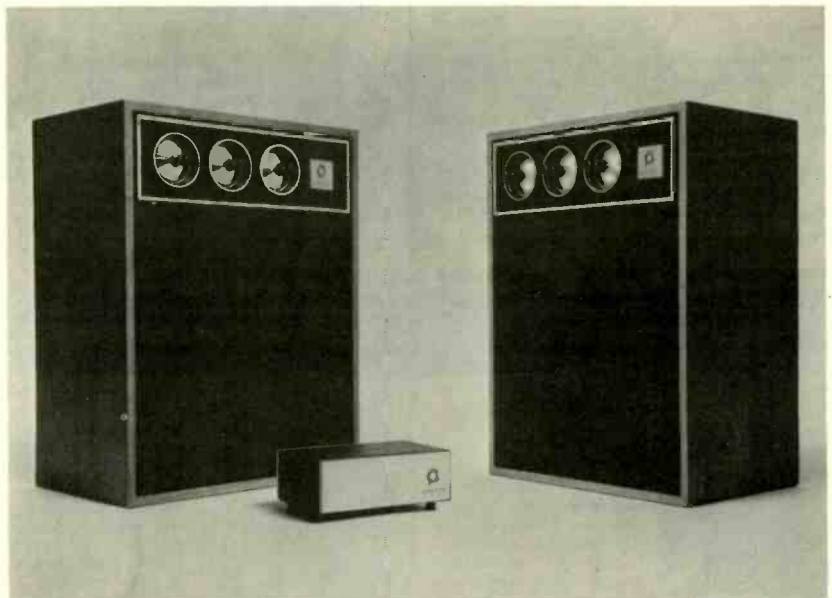
The Model PS163 dual-trace triggered-sweep scope is designed for observing Channel A, Channel B, the two channels alternately, two waveforms developed by chopping the dual inputs, or a vector pattern at the push of a button. A switch on the front panel provides a choice of illuminating either a vector or grid graticule in front of the CRT. Both channels are said to have 5mv/cm direct-probe sensitivity, there being a 13 position input attenuator included to read low-capacitance probe measurements directly without calculations. Specifications indicate a vertical bandwidth of dc to 8MHz  $\pm$  3dB, the instrument being usable to 20MHz. The time base is said to be adjustable from 0.1 $\mu$ s to 0.1 sec in 19 ranges, plus TV horizontal, TV vertical, 60Hz and external positions. Price \$495. Sencore.

**FOR MORE NEW PRODUCTS  
SEE PAGE 67**

### SECURITY CAMERA 700

*No adjustment necessary  
once properly focused*

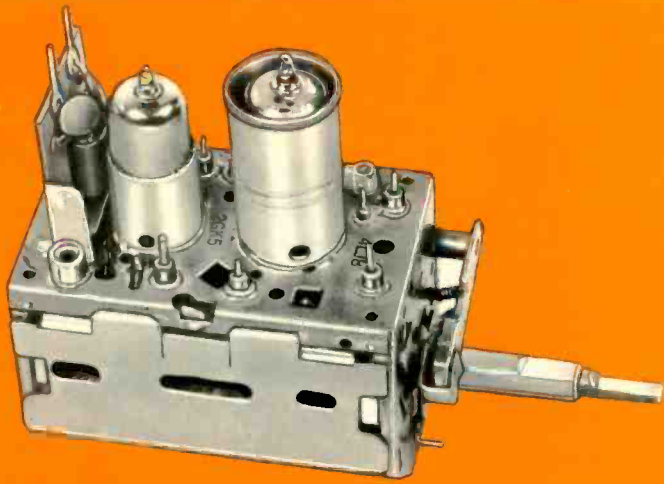
The Model PVC829 security camera is compact, lightweight and simple in design, reportedly requiring no further adjustment once it is focused. The camera is said to have a switchable RF/video output which enables it to feed both video monitors and standard home TV receivers. Specifications indicate a 2/3-in. vidicon, a 525-line random interlace scanning system, 450-line resolution, 10-step gray scale, and a signal-to-noise ratio better than 40dB. Price: \$275.00. Audiotronics Corp.



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**TEKLAB REPORT**

# Exploring Zenith's Titan 110 Color-TV Chassis -- Part II

by Joseph Zauhar

Three integrated circuit packages on two Duramodule cards make up the complete color processing system

■ Last month we reviewed the power supply, horizontal and video processor circuits used in the 25CC-55 all solid-state color-TV chassis.

The color processing circuits used in this chassis employ three IC packages, and the subcarrier regenerator IC is contained in a 16-lead dual in-line plastic package known as the DIP package. This is the same package that has been used as the sound detector in the 22AB-55 TV receiver.

As we review these important circuits, they can be followed in this month's TEKFAK Schematic No. 1383.

### Automatic Tint Guard

To improve flesh-tone reproduction from station to station or from time to time on a given station, this chassis employs a "Tint Guard," which is said to be identical to the circuit used in the 40BC50 chassis. The customer is permitted to select one of two different options of color demodulator matrix. The selection is made by pulling out the HUE control knob located on the front panel to select the modified matrix. This circuit will reportedly help the customer accept the color rendition of flesh tones without control adjustment.

Modification of the color matrix is accomplished by closing switch  $S_1$  (Fig. 1). When  $S_1$  is closed, a 680pf capacitor is connected in parallel with the 820pf capacitor and 68 $\Omega$  resistor that provide the terminator impedance for the demodulation injection phase shifting network. The result of adding the 680pf capacitor to the network is an increase in the angle between the

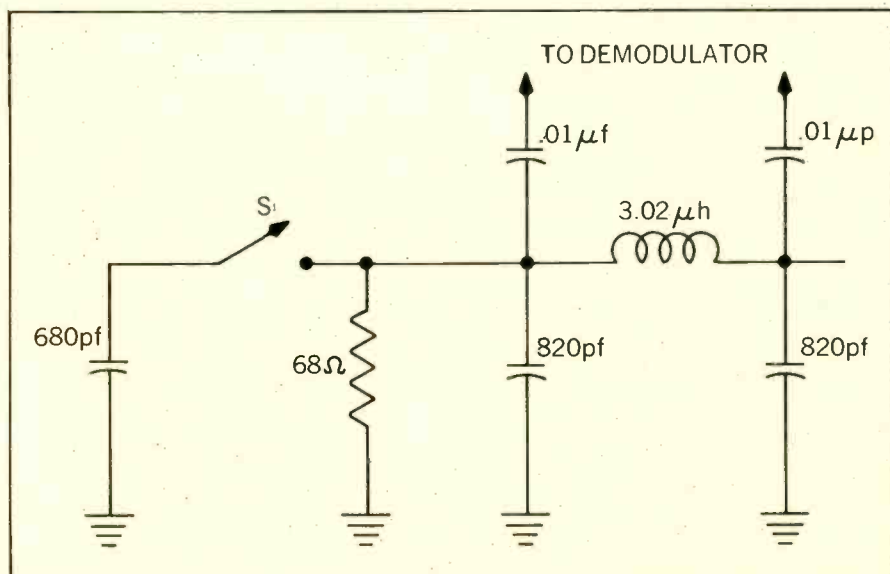


Fig. 1—A simplified diagram of the Automatic Tint Guard circuit employed in Zenith's 25CC55 color-TV chassis.

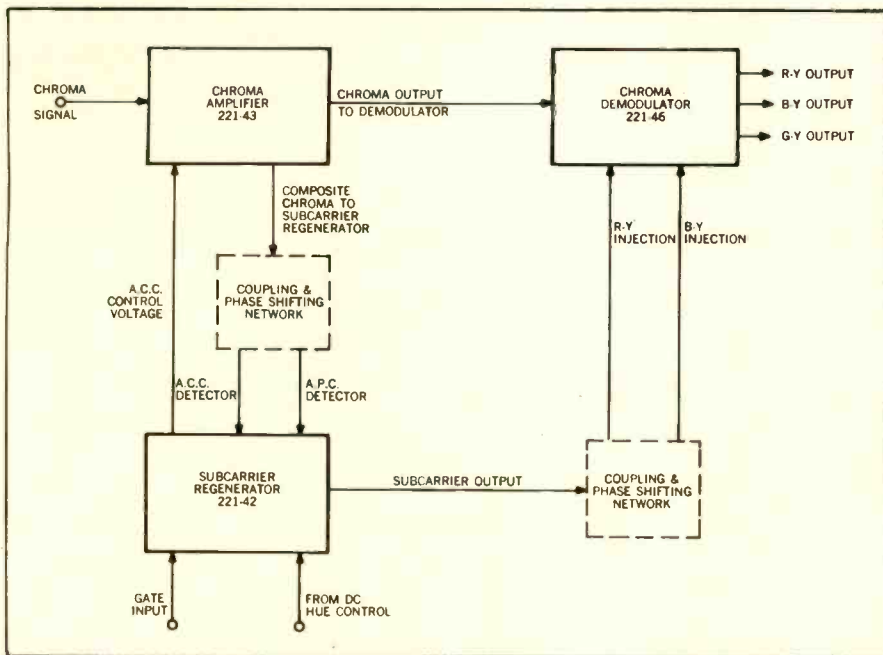


Fig. 2—Block diagram of the color processing system employing three IC packages. Courtesy of Zenith Corp.

R-Y and B-Y demodulator outputs and a decrease in the G-Y amplitude.

While viewing a gated rainbow signal on the TV screen and moving the TINT GUARD switch from a normal to the modified position, the blue bars shift to our right and the red bars move to the left.

We then turned to a good color transmission and adjusted the receiver controls for the best possible picture with the Automatic Tint Guard (ATG) switch in the OFF position. Then the HUE control was rotated so that the flesh tones were of a greenish cast. By activating the ATG feature, the flesh tones changed from green to a near normal picture. Again, the ATG was turned OFF and the HUE control was rotated to produce a magenta flesh tone. Then by reactivating the ATG feature the magenta flesh tones returned to a satisfactory picture.

### Color Processing Circuits

The color processing system (Fig. 2) employs three IC's, each contained in an in-line multi-terminal package which plugs into an appropriate socket. Two of the color processing Duramodules (cards No. 9-27 and 9-37) used in this chassis are shown in Fig. 3 and 4 respectively.

Card No. 9-27 is color-coded black for easy identification and contains circuitry for the color subcarrier regeneration functions of the color processing system. This card is the carrier for the 221-42 IC. All of the component parts are mounted in holes which form rectangular coordinate patterns. The black stripes trace the copper pattern located under the card.

The IC is symmetrical in shape and form to prevent misapplication and damage. Identification before insertion can be made in the following way: A hollow center cavity in the socket has a pointed configuration (or notch) on one end. The end of the socket corresponding to that pointed cavity shape also corresponds to the pin No. 1 end of the device, and this pin is also identified on the integrated circuit.

Sub-carrier regenerator assembly, No. 9-27 provides the crystal control oscillator, APC phase detector, ACC phase detector, and dc hue control functions of the color processing system.

Duramodule No. 9-37 (Fig. 4) is color coded orange and contains two IC's, the 221-43 chroma amplifier and the 221-46 demodulator. The chroma amplifier IC No. 221-43 (color-coded orange) is located to the left on the 9-37 card.

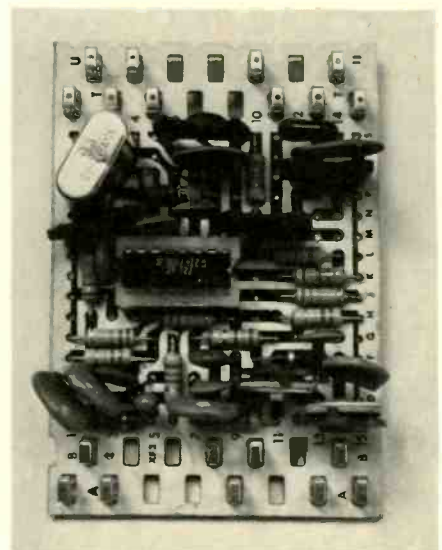


Fig. 3—Photo of Duramodule No. 9-27 with IC No. 221-42, which provides the circuitry for color subcarrier regeneration.

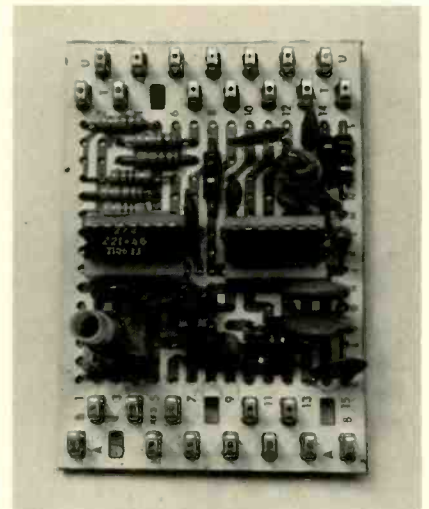


Fig. 4—Photo of Duramodule No. 9-37, color-coded orange, which contains two IC's, the 221-43 chroma amplifier and the 221-46 demodulator.

This Duramodule card provides the function of ACC gain control amplification, color killing, dc gain control amplification, color demodulation, and chroma matrixing of the color processing system.

Duramodule cards No. 9-27 and 9-37, with the peripheral components located just off the terminal strips, comprise the entire color channel of these TV receivers.

### Subcarrier Regenerator Circuit

The subcarrier regenerator used in the 25CC55 is almost identical to the one used in the 4B25C19 and 40BC50 color chassis. Low level chroma information appearing at



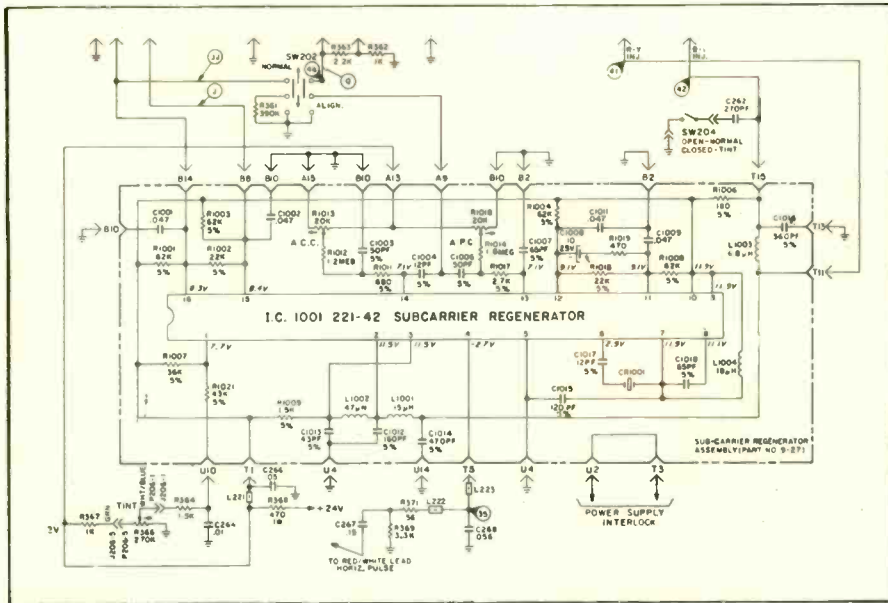


Fig. 5—The chroma subcarrier IC used in the 25CC55 color chassis. Courtesy of Zenith Corp.

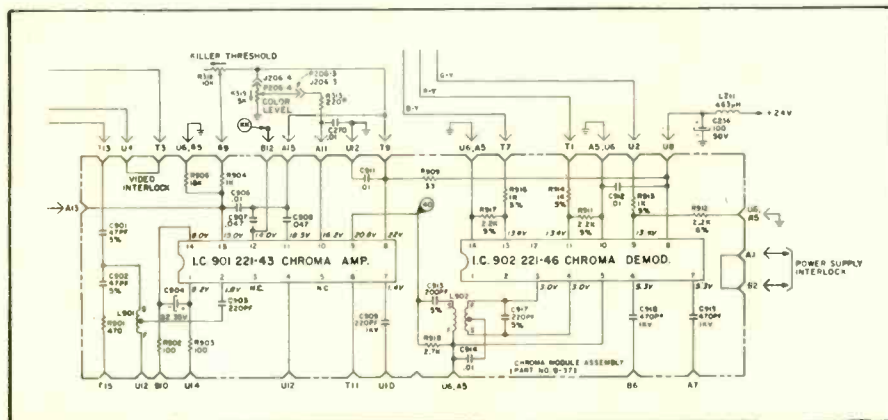


Fig. 6—Schematic of the chroma demodulator circuit, which is contained in an in-line multi-terminal package and plugs into its associated socket. Courtesy of Zenith Corp.

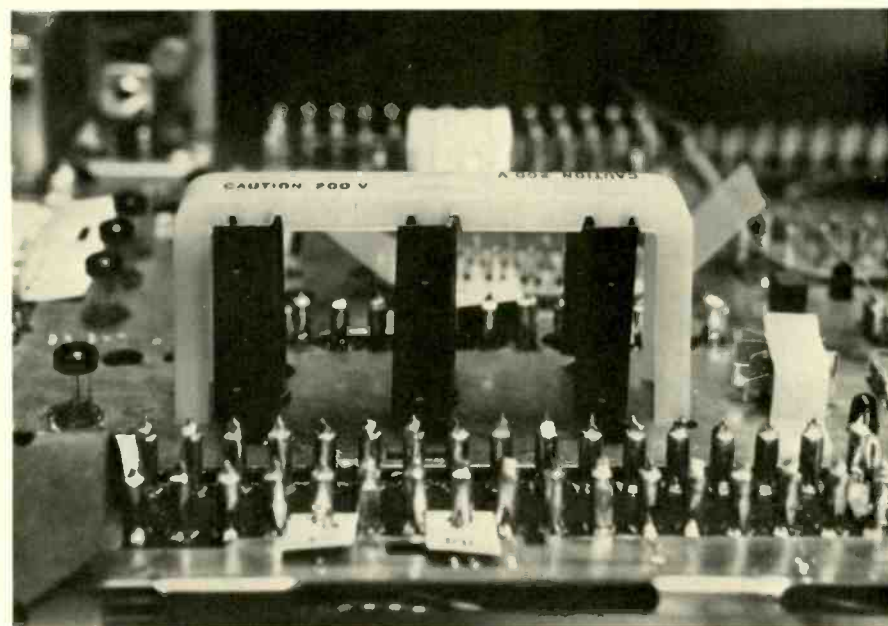
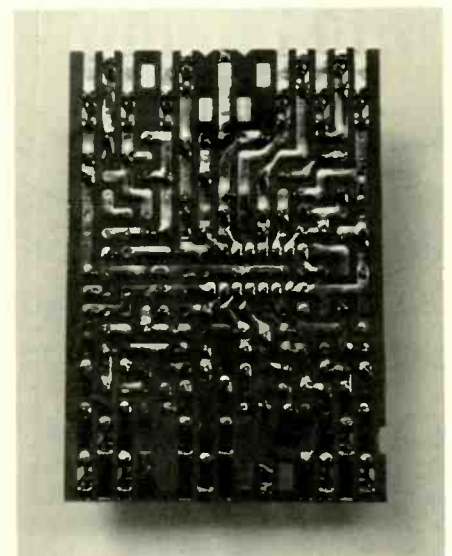


Photo showing the three video output transistors, which plug into sockets on the 25CC55 color chassis.



Underside of Duramodule No. 9-27 showing the connecting circuits.

test point Q (Fig. 5) is coupled through the NORMAL-ALIGN switch to the junction of the 12pf and 50pf capacitors and enters the subcarrier regenerator IC at terminals No. 13 and 14. The capacitors mentioned, plus associated circuitry, form a quadrature network to provide the proper phase of the burst signals for developing ACC and APC (Automatic phase control) voltages.

ACC voltage, developed within the IC, appears across terminals No. 15 and 16 (test points J and JJ). Normal ACC voltage is very low in this particular design, approximately 0.035v. APC voltage, developed within the IC, appears across terminals No. 11 and 12, and is applied to the oscillator section within the IC. Terminal No. 6 is the oscillator input, while the oscillator output (3.58MHz CW) appears across terminals No. 7 and 8.

The subcarrier output signal appears across terminals No. 2 and 3 and is coupled to a phase delay network (47μh and 15μh coils and associated capacitors).

The subcarrier signal appearing at the junction of the 15μh coil and 470pf capacitor is of -(R-Y) phase and is coupled to a 6.8μh coil, then injected into the demodulator. The 6.8μh coil and 360pf capacitor delay the subcarrier signal 105° to a -(B-Y) phase and couple the signal into the demodulator.

continued on page 62

# What's New In TV Receivers For 1972

More 25-in. black matrix picture tubes, increased use of modular circuits with solid-state components, and prices lowered on some remote-control units, highlight the features employed in TV sets for this coming year

■ Even with some price increases in various TV set models, we also find an increase in sales over the previous two years. Most manufacturers have shown their new line with a number of features geared to increase sales by offering better picture quality, easier customer tuning and modular circuits for reliability and simplified tuning.

Some of the manufacturers have lowered their prices on remote control units and expanded them to a greater portion of their new line, which will now attract buyers who could not afford this luxury before.

We will see more preset controls to simplify tuning for customers who become confused with color tuning. Some TV set manufacturers will be using a marker on the controls, while others will have a push-button with separate preset controls.

Solid-state devices are used in more than 80 percent of the circuitry and the K-20 chassis employs an IC sound system in Admiral's new color-TV set line.

Electrohome's color chassis C10 employs a fifth harmonic horizontal output system and a solid-state high voltage rectifier.

A new AFC circuit will be used in the Magnavox T958 chassis to make the setting of the TINT control less critical for reproducing flesh tones.

The 60Hz power transformer has been replaced by a small compact power supply on a module in Motorola's Quasar series of color-TV receivers.

A 7-in. diagonal screen color-TV portable receiver adaptable for ac or car battery operation is introduced by Panasonic.

This article will review some of the features and circuits employed

in the new TV sets, and a more detailed circuit description will be given each month in the Teklab Report.

## ADMIRAL

According to the Admiral Corp., a new Solarcolor system and 18 new 25-in. consoles, with exclusive color monitor controls and solid-state remote controls, highlights their line of 37 new color-TV receivers.

The new TV sets reportedly have solid-state devices in more than 80 percent of their circuitry—this includes the 12-, 16-, 18-, 19-, 21-, 23-, and 25-in. TV receivers.

The company indicates that its Solarcolor system technologically

combines the black matrix picture tube with high-gain hybrid video circuitry to produce a color picture more than 100 percent brighter. The hybrid K-20 chassis is said to employ an IC sound system—with ca-



A color-TV set, Model 3L3568, is introduced by Admiral. It is said to include a 23-in. (295 sq.-in.) Super Brite color picture tube, 25kv chassis, instant play and automatic fine tuning. Courtesy of Admiral Corp.

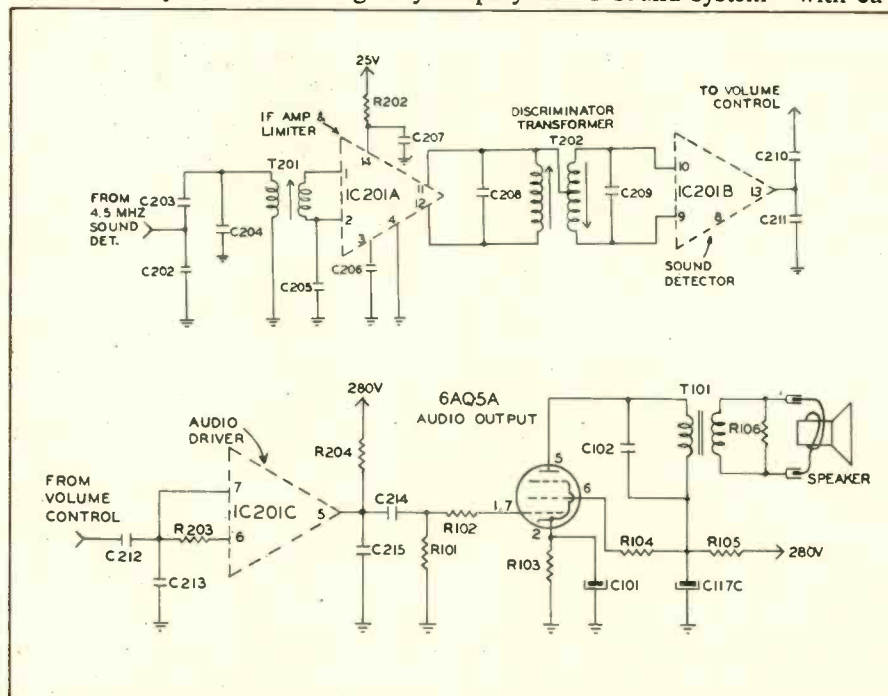


Fig. 1—Admiral's hybrid K-20 color chassis employs an IC sound system. Courtesy of Admiral Corp.

pacitors, diodes, sound amplifier, audio pre-amplifier and sound detector in one IC package, as shown in Fig. 1.

A single touch AFC and COLOR MONITOR control enables the viewer to set the flesh tones the way he wants them. A separate override circuit corrects the flesh-tone range for a satisfactory picture, while a switch "locks in" the preferred shading on all channels—reportedly eliminating the need to readjust the flesh tones when changing channels.

Admiral's Sonar solid-state, multi-function remote control is available on nine of the new models—controlling the ON/OFF, VOLUME LEVEL and CHANNEL SELECTOR controls.

Additional features on the new color models include automatic fine tuning (AFC), instant play and a two-year replacement warranty on picture tubes.

Basic features on the new color-TV sets include a 22 to 25kv chassis, three-stage IF amplifier, automatic degaussing, two-speed transistorized UHF tuner, and a Super Scope VHF tuner with pre-set fine tuning.

## ELECTROHOME

Electrohome's new main line color chassis, C10, is employed with the 26-, 22-, 20- and 19-in. screen sizes.

The chassis uses a fifth harmonic horizontal output circuit and a solid-state stacked silicon high voltage rectifier. According to the manufacturer, excellent scan regulation and low high-voltage impedance (eliminating the regulator tube) is made possible by using VDR feedback. This system reportedly has high reliability without X-radiation. Fifth harmonic tuning of the flyback circuit reportedly results in a flat-top retrace pulse. This stabilizes the high voltage at greater brightness levels at a lower beam current than the higher impedance third harmonic systems.

This chassis also features automatic tint ("Electrotint") and auto-



Electrohome's Andorra Color-TV set employing the C10 Chassis. Courtesy of Electrohome, Limited.

matic fine tuning with electronic (varactor) manual fine tuning ("Electrolok").

A number of the 26-in. models use varactor tuning (VHF and UHF) in conjunction with Electrohome's own 16 position channel selector and four customer-preset UHF channel positions.

All models are said to feature serviceability, with the console models having a pull-out flip-up chassis for complete in-cabinet accessibility. The control panel on the 26-in. models is designed to tilt out for access from the front to all panel components, tuners and dynamic convergence adjustments.

## MAGNAVOX

Magnavox reports that it has expanded its Total Automatic Color (TAC) line to include all models for 1972, and has added new features to create a more complete TAC system.

An improved matrix picture tube is incorporated in many 19-in. and larger TV sets, containing a redesigned hybrid chassis. The Deluxe



The Magnavox table Model C6243 has a 16-in. (diagonally measured) screen, total Automatic Color, removable sun shield, remote control and automatic shut-off. Courtesy of Magnavox Co.

Total Automatic Color System is said to include the instant-color tuning features introduced in 1969.

The new Magna-Power hybrid chassis incorporates transistors in most circuits and tubes in the high voltage applications.

The Model T962 color chassis is the deluxe model used in the upper end of the product line. This is a tube-type chassis with a transformer power supply, and it is said to be only used in console and stereo theater sets equipped with the 25-in. matrix-type color picture tube.

Most of the circuits used in this chassis are identical to the circuits used in the T958 chassis. The T962 chassis will employ the new 6EN4 high frequency regulator tube and circuitry that has been in use in the deluxe chassis for some years. The ATC circuit is the basic ATC circuit that was used with the T951 chassis.

The Model T958 color-TV chassis is used in a wide variety of applications, including most entertainment centers in which the T950 chassis was used this past year.

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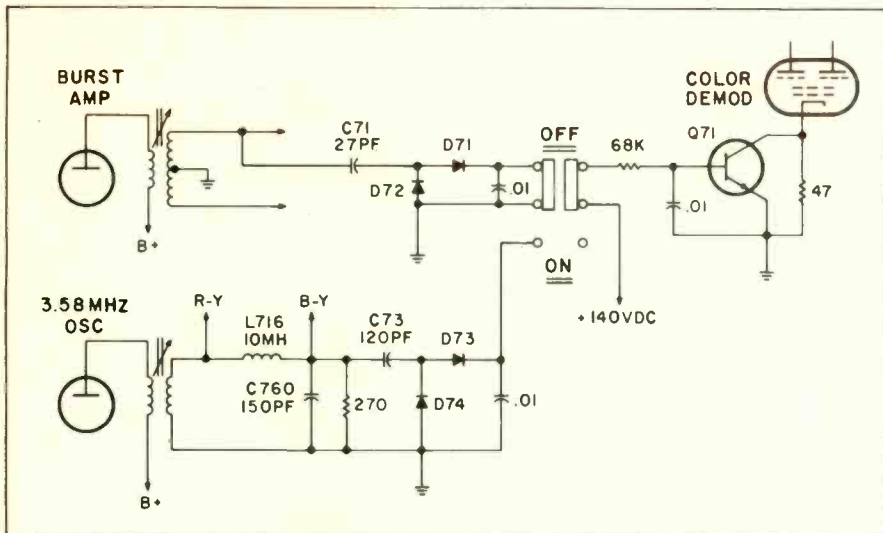


Fig. 2—The new Automatic Tint Control circuit (AFT) employed in the Magnavox T958 color chassis functions to make the setting of the tint control less critical. Courtesy of Magnavox Co.

The Model T958 is a tube-type chassis with a transformer power supply and similar to the T951 chassis produced this past year. The pincushion corrector circuit used in previous models has been replaced by a circuit employing a saturable reactor rather than a vacuum tube. The vertical deflection circuit has been modified and the familiar 6GF7 vertical oscillator/output tube has been replaced by a 6LU8 tube.

The high-voltage regulator tube has been changed to a 6EN4 and the focus rectifier socket is an enclosed type to give added protection.

This chassis is also said to have a new ATC circuit which functions

to make the setting of the TINT control less critical. The circuit is shown in Fig. 2.

One group of portable TV sets is designated "small screen" portables and is available in 12-, 14- and 16-in. picture tube sizes. Each picture tube size is associated with a specific chassis model number. The 12-in. tube is used with the T956 chassis, the 14-in. tube is used with the T936 chassis, and the 16-in. tube is used with the T957 chassis.

The T956 and the T957 chassis are reportedly new models recently introduced, and both are electrically very similar to the T936 chassis, except for minor circuit modifications.

Also, introduced is the T952 color chassis, which will be used in the

middle of the product line and will be used in portable models employing an 18-in. picture tube.

## MOTOROLA

A new all solid-state (except for the picture tube) Quasar\* color-TV chassis includes a compact power supply on a module and a remote control that reportedly costs only \$50 more than comparable models without this feature.

A Quasar Brite black surround picture tube is employed on specified models and the one-button Insta-Matic\* color-TV tuning control has been extended into all portions of the color-TV line, except the model 16-in. and 18-in. (diagonally measured) Quasar portables. The 1972 all solid-state Quasar series will include an electronic power supply consisting of a conventional rectifier and doubler circuit operating from the ac line as a power source to operate the Switch Mode Power Supply (see Fig. 3).

The dc output voltage of the doubler circuit is applied to an oscillator, operating at the horizontal scan frequency of the receiver and is synchronized to it. The driver output operates a transistor used as a switch from 280v dc to ground. By making the switch open and close rapidly, the dc signal is modulated. The interrupted dc passing through the primary of the switch transformer induces a voltage in the secondary of the transformer. This voltage is now rectified, filtered and loaded.

Another winding on the transformer (regulator winding) also has a voltage induced in it that is rectified by a diode and used as a control voltage for the driver circuits. This

*continued on page 73*

\* Trademark of Motorola.



Motorola's Model WT688HW modular table-top TV set, with a 21-in. (diagonally measured) screen and accessory furniture pieces. Courtesy of Motorola, Inc.

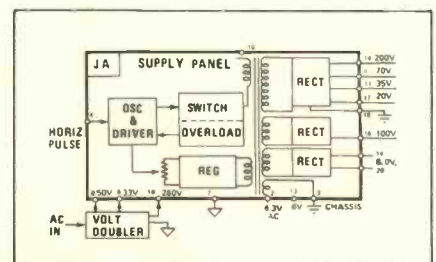


Fig. 3—Block diagram of Motorola's self-regulated and self-protected power supply on a replaceable panel for quick, in-home servicing. Courtesy of Motorola, Inc.

# New Solid-State Antenna

by Phillip Dahlen

Printed circuit, etched from solid copper, replaces the many tubular elements found in standard antennas of comparable power

■ A 5-lb, solid-state TV antenna has just recently been unveiled which measures  $34\frac{1}{8}$  by 28 by  $3\frac{13}{16}$  in.

According to the news release, this antenna—the Stellar 2001—was perfected after three years of experimentation at the JFD Research and Development Laboratories in Champaign, Ill. According to these reports, comprehensive field tests in various parts of the country have indicated satisfactory reception of stations up to 70 miles from transmitters, depending on signal strength.

The manufacturer indicates that a high signal-to-noise level is maintained by providing antenna directivity, amplifying the received signal at the point of reception, properly matching the input of the amplifier to the impedance of the receiving element, using amplifiers that provide a linear transfer characteristic, and separating frequency bands by reactive filters so that the overloading of active elements is virtually non-existent.

Specifications indicate that the new antenna offers a gain over the half-wave dipole on the low-VHF band of 5 to 9dB, high-VHF band of 10 to 15dB, UHF band of 2 to 6dB; front-to-back ratio on the low-VHF band of up to 7dB, high-VHF band of 15 to 25dB, UHF band of 12 to 24dB; the front-to-side ratio being greater than 20dB.

This antenna is said to be shipped complete with mounting brackets, solid-state power supply and a two-set coupler which can be attached to the back of the TV set. A  $75\Omega$  coaxial cable is used to safeguard the quality of the color-TV signal from the antenna to the TV set. To operate a second TV set, a

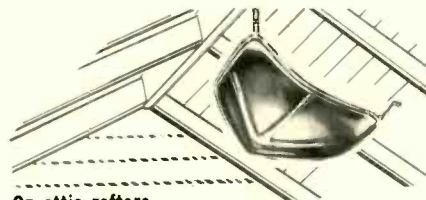
twin-lead can reportedly be used inside the home.

From the illustrations shown in this article, we can see that quite a variety of mounting arrangements are possible with the new antenna.

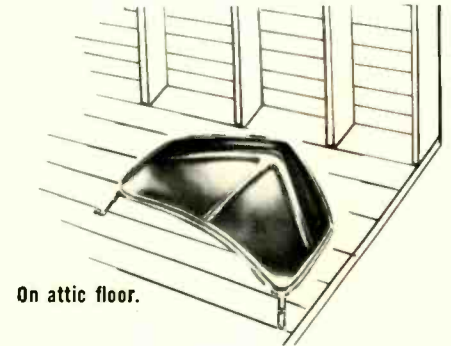
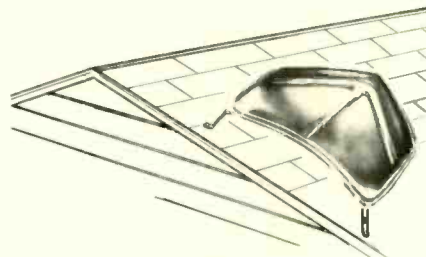
We installed a Stellar 2001 antenna in an attic about 10 miles outside of Duluth. The resulting reception of Channels 3, 6, 8 and 10 (we have no UHF channels) was extremely clear and no ghost image was apparent.

Only one word of caution should

be given those installing this antenna. The coupler for a second TV set is intended to be used. When left disconnected, a herringbone pattern was observed on all channels and could not be eliminated by adjusting the TV set AGC control. Merely placing our fingers across the output terminals for a second TV set loaded the antenna amplifier down properly, and the problem was completely eliminated by connecting a short wire between the two  $300\Omega$  terminal screws. ■

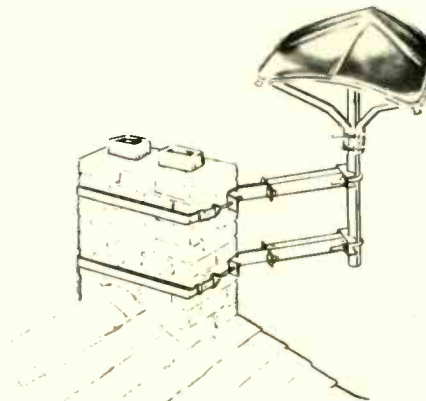


On attic rafters.

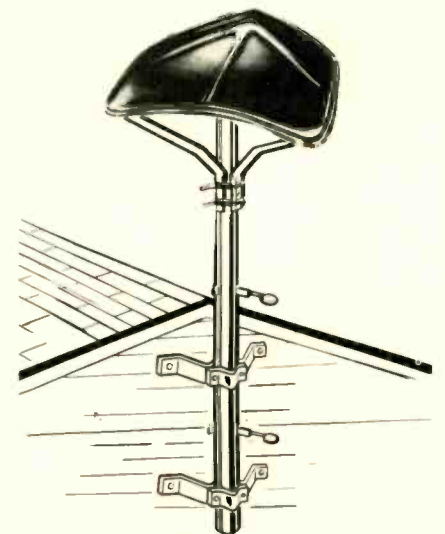


On attic floor.

On flat or slanted roof (up to  $40^\circ$ ).



On chimney mounts (with or without rotor).



On walls (with or without rotor).

# Checking Integrated Circuits

by Jud Williams

## Techniques for observing the signature patterns of linear integrated circuits

■ The saga of the dynamic transistor curve tracer goes on. . . . First its application was restricted to industrial and engineering use—for sorting and classifying transistors and for circuit design. Then, it was



Fig. 1—The Model A curve tracer teams up with a general-purpose scope to become a complete semi-conductor testing facility.

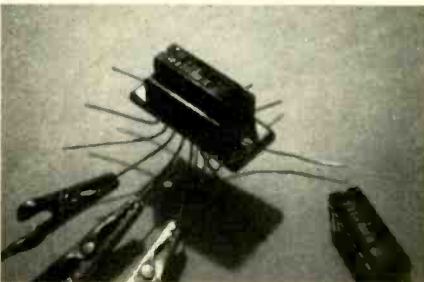


Fig. 2—Leads of sufficient length are connected to the IC socket so that the curve-tracer clips may be attached.

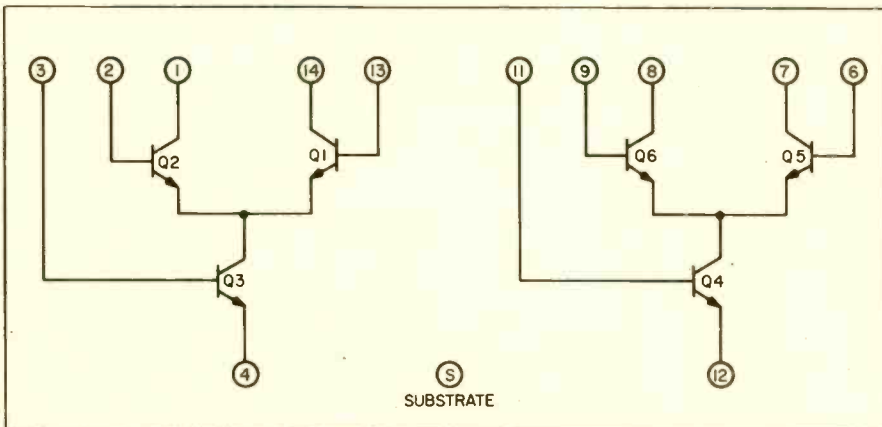


Fig. 3—Manufacturer's schematic of circuitry equivalent to its T1V differential-amplifier IC. Courtesy of Motorola.

discovered that transistors could be checked in-circuit with the dynamic transistor curve tracer by using a technique very similar to that used when testing them out of circuit. By displaying the so-called "signature pattern" of an in-circuit transistor, its condition can rapidly be determined. This technique has been so fully developed that it is now being added to the service literature of at least two TV-set manufacturers.

As a logical next step, the same technique has been applied to integrated circuits. This article will examine the technique used on the Motorola T1V, a dual differential amplifier similar to the RCA CA-3054 in a dual in-line package. This IC was chosen because of the accessibility of the transistors within the unit. Some IC's contain voltage regulating circuits, making it impossible to effectively check the internal circuits with the curve tracer. The IC under consideration here may be checked as a three-terminal device, just like an ordinary transistor. The terminals on the IC are attached in two different configurations so that both transistors are made to turn on.

In order to understand the action

that takes place during these tests, it is necessary to know how the curve tracer functions. The dynamic transistor curve tracer develops two signals. One signal sweeps the collector-to-emitter of a transistor with a 120Hz pulsating dc, while a second signal supplies the base with steps of current from a staircase generator. The voltage that develops across the transistor is applied to the horizontal axis of a scope, and the signal that develops across the collector current sensing resistor is displayed on the vertical axis of the

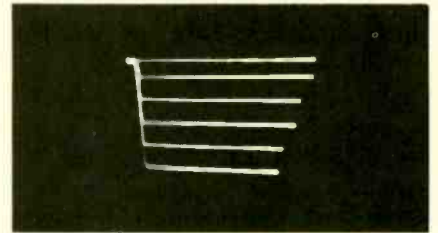


Fig. 4—Family of curves for current-regulating transistor Q3 in the Motorola T1V differential-amplifier IC.

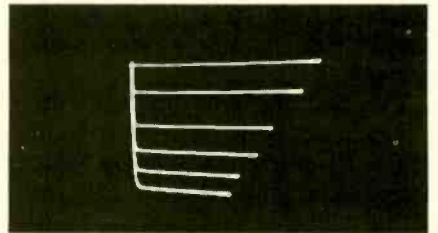


Fig. 5—Family of curves showing the combined effects of two transistors (Q2 and Q3) in the differential-amplifier IC.

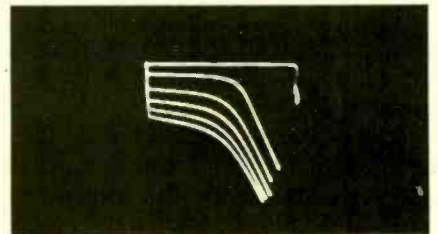


Fig. 6—The collector avalanche region of transistors Q2 and Q3 in series becomes apparent at a  $V_{CE}$  setting of 70v.

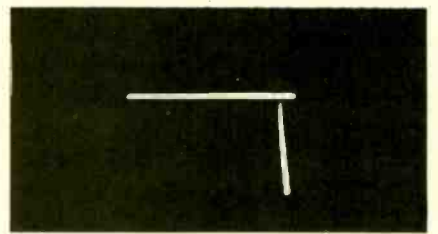


Fig. 7—Collector breakdown voltage of one half of the differential amplifier (transistor Q2).

by Jack Jaques

scope. The resulting display is a Lissajous pattern (Fig. 1).

The Jud Williams Model A curve tracer used in these investigations comes equipped with a cable terminating in three alligator clips. The signals produced by the curve tracer appear at these clips, and when connected to any three-terminal semiconductor device, a family of characteristic curves will be displayed on a scope. When testing integrated circuits, it is necessary to insert the device into a suitable test socket that has leads long enough to clip onto (Fig. 2).

Referring to the manufacturer's diagram of the IC (Fig. 3), the first connection is made so that the collector lead from the curve tracer attaches to Pins 1 and 2, so that the base and collector of transistor Q2 are tied together. The curve tracer's base lead is attached to Pin 3 (the base of transistor Q3). With the last connection, the emitter lead of the curve tracer is attached to pin 3 (the emitter of transistor Q3).

With the curve tracer adjusted to provide a collector-to-emitter voltage of 20v and a base current of  $10\mu\text{a}$  per step, while the polarity is switched to NPN, a family of curves (like those shown in Fig. 4) is produced. To test this portion of the IC further, the connections between the curve tracer and IC remain the same while the jumper between Pins 1 and 2 is moved to between Pins 2 and 3 of the IC. Since this ties the bases of the two transistors (Q2 and Q3) together, the base current must be increased to  $100\mu\text{a}$  per step, or more, to obtain the display shown in Fig. 5.

The same procedure may be used to check the remaining circuits in the IC. When testing this kind of circuit, if a family of curves does not appear there may be a shorted junction—which appears as a single vertical line on the scope—or an open junction—which appears as a single horizontal line.

When checking the breakdown voltage, with no signal applied to the bases, the circuit may be tested with the bases connected together or floating. In our tests, the negative resistance avalanche point (break-

*continued on page 62*

The third in a series that is intended to clarify and simplify the usage of specific semiconductors. This month's article refers specifically to diodes that are used in applications other than power rectifiers.

■ Any attempt to cover the entire field of small-signal diodes would be a monumental task due to the many and varied "exotic" types (tunnel diodes, hot-carrier diodes, tuning diodes, etc., etc.). Therefore, this article will deal only with the types that are commonly encountered in today's radio and TV service industry. The most common usage for these devices will be found in the following areas:

#### AM and FM Radios

Second detector (usually germanium)

Ratio detector, discriminator (usually germanium, however, late models are using silicon)

Biasing (silicon, frequently will use low-voltage, low-current power rectifier)

Noise limiter (usually silicon)

AGC (usually germanium)

AFC (usually germanium)

Tuning (silicon)

#### TV Sets

UHF mixer (germanium or silicon, most late models are using silicon and "hot-carrier" diodes)

Ratio detector, discriminator (usually germanium, however, late models are using silicon)

Biasing (silicon, frequently will use low-voltage, low-current power rectifier)

AGC (usually germanium)

AFC (usually germanium)

Horizontal phase detector (selenium or silicon, usually dual units)

Video detector (usually germanium)

Blanking (usually silicon)

DC restorer (silicon)

Tuning (silicon)

Although these specifications can serve as a useful guide, there are several electrical characteristics that must be considered when making replacements. For example, almost all UHF tuners utilize a diode mixer and require a device that will operate at the high frequencies involved. Two of the important characteristics that must be considered for this application are the diode capacitance ( $C_T$ ), which should be less than 1pf, and the series inductance ( $L_s$ ), which should be less than 10nh (nanohenries). While there are several good diodes available for this purpose (probably the most popular being the 1N82A), the newer "hot-carrier" diodes, such as the HEP RO700, offer a much lower noise figure and will operate at frequencies in excess of 1GHz. This device will also give excellent results in detector, ratio detector and discriminator circuits.

Another circuit that can be quite troublesome is the horizontal phase detector. As stated in an earlier article, selenium exhibits an aging characteristic very similar to the weakening process of vacuum tubes, and these circuits can be greatly improved by using dual silicon devices for replacement.

Electronic tuning—another application that is growing quite fast—utilizes the voltage-variable capacitance diode (tuning diode or varactor). These devices operate in a circuit under reverse bias conditions and the diode junction capacitance changes as the applied reverse voltage is changed. For example, the capacitance of the HEP R2505 will vary from 50pf to 175pf when the applied voltage is varied from 30v

*continued on page 73*

*The author is HEP technical manager of Motorola Semiconductor Products, Inc., Phoenix, Ariz.*

# Move Slowly on that New Lease

Signing a lease may be the most important step an electronic technician or dealer ever takes. The lease must be executed properly and to his advantage. But there are many pitfalls to watch for in a bad lease.

by Ernest Fair

■ No technician or dealer should ever sign any lease without legal advice, for the lawyer's fee is just so much insurance that all rights are protected in the lease. The entanglements of modern rental and lease law are such that no layman can hope to keep up with them.

The lease should be written and recorded in the county clerk's office. Difficulties always arise over oral leases. Unrecorded leases may result in troubles in the establishment of credit or other business operations.

In signing any lease, the closest consideration should be given to the period of time in the future that will be covered by the lease. For if agreeing to terms that are profitable with today's good business conditions, a reversal during the life of the lease can easily force the tenant into bankruptcy. That is why so many firms, as well as landlords, prefer the percentage type of lease—it gives them protection against unforeseen bad business conditions.

Also make certain of the physical property actually leased and have those portions of the lease describing property and building checked most closely. Just taking for granted that the lease description covers such an important point is no assurance that such protection is therein.

Be certain that the amount of rental is clearly stated, that the length of the lease is set forth beyond dispute, and that the exact time when rental payments are to be made is set forth—the latter covering provisions for any possible default of such rent. The fewer conditions secured on the last point, the

better protection had against unforeseen reverses.

It is also wise to specify tax responsibilities in the lease, clearly defining those to be paid by the landlord and those that the tenant must pay. A similar division of responsibilities should be included concerning building and property repairs, and insurance. The more detail included in the lease, the fewer causes for dispute during the life of the lease, and the better the protection for the technician's or dealer's business.

Provisions for a possible sublease should also be part of the agreement. If possible, reserve some rights in this respect since they may be of some advantage to the business in the future.

Since the percentage-type lease is a common one, give thorough consideration to the pros and cons of its advisability, as well as the features therein which can be worked to the tenant's advantage. Any proposal from a landlord for such a lease should be closely checked over.

Percentage leases are good for the average technician or dealer since they offer protection from a high, fixed rental on inflated property values. They also have an advantage to the tenant in that his net income is somewhat stabilized since he will have to pay less rent should present business conditions turn bad during the period covered by the lease.

The lease should very definitely contain clauses giving the tenant the right or privilege to erect a building or change the present premises if he so desires. Long term leases of this

nature should provide for alteration of the premises by the landlord in a definitely prescribed manner.

Such a provision, if desired by the tenant, should set forth the time or circumstances when this shall be done—as a landlord may put off such alterations during high-percentage rent time, claiming that his rent return is so low that alteration is impossible. The inclusion of as definite a date as possible is, therefore, of distinct advantage.

The lease should also set forth the obligation of the landlord to repair any damage by fire or other causes, or to construct a new building immediately if the old one is destroyed. Provisions concerning the rental percentage during such a period should be part of the agreement and not left to chance for setting at the time it occurs. There should also be a clause setting forth the rights of the tenant should the building be condemned.

There are four types of percentage leases in wide use in this country today. These call for payment of: a stated percentage of sales or service revenue with no guaranteed minimum rental payment; a stated percentage of revenue with maximum and minimum payments stated; and a percentage of all profits arising from occupancy.

The first method has a disadvantage in that it generally requires a higher than usual percentage rate, while with the second method the guaranteed minimum is generally as much as 75 percent of what would be considered a reasonable fixed rental. The percentage in any lease of this type should never be so high that it becomes a real burden at any time business drops below a good level.

The third method described has a disadvantage in that few landlords are willing to accept a reasonable minimum amount during bad years in view of limited increase provisions.

The last method listed is becoming more and more popular, but is one of the most dangerous to the technician or dealer. If the lease is drawn up improperly, it may result in partnership liability since the sharing of profits is recognized as

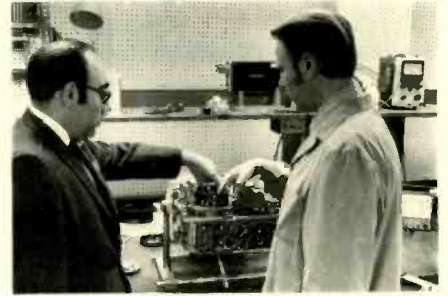
*continued on page 71*



## GUEST AUTHOR

# VTR Careers

by Ernest Khouri



*Upon joining Panasonic in August 1967, Ernest Khouri first served as a Long Island City service manager, and has since become their national service manager. Prior to that, he worked for Admiral Corp. where he progressed from technician through shop supervisor to branch manager of Long Island City operations. He has also been an instructor in color-TV set repair for Admiral Corp. in the New York City area. Mr. Khouri is shown in the photo (left) discussing the servicing of a Panasonic video tape player with Werner Boecker, servicenter supervisor—VTR/CCTV, at the service division's headquarters in Long Island City, N.Y.*

In professional football, one of the basic rules is to look ahead to the next play. The same rule holds true for the electronics technician. If you want to stay in the first division in your profession, you've got to look ahead to what products will be important up the road.

■ Although no one in the industry knows for sure what video tape recording system will ultimately triumph in the home marketplace, or even whether one system will prevail, now is a very good time to make a move into the expanding VTR service field.

The reason is simple—you don't have to wait for the coming boom in home unit sales. The video tape recorder closed-circuit TV markets are booming right now. Banks, elementary and secondary schools, colleges, universities, offices and factories all are present users of this equipment. For the most part, they have been successful with its use and will be adding more elements to their systems in the future.

All of these users demand from a dealer that he have the capability not only to install, but also to fully maintain and service the system.

For the TV technician, this means the time is right now to start getting some basic knowledge about VTR/CCTV. Then, when the demand begins to accelerate for technicians, in about a year or so, you'll be ready to step into a higher paying area of electronics, because you'll have some basics under your belt.

The key to getting on the first rung of the VTR career ladder is to prepare yourself for the transition from TV sets to video tape recorders. This transition will be much more complex than the move from B/W-TV sets to color-TV sets.

One reason is that you probably will be having your first encounter with tape transports and the mechanical drive systems that are im-

portant elements of VTR. Second, the technology of video recording and playback signal processing no doubt will be a new area for you.

In VTR's, adjustments of motor-speed control, video-head synchronization, tape-speed controls and tension are critical elements in maintaining compatibility between a number of machines in a system. The tolerances in VTR equipment, in comparison to home TV sets, is much narrower. A slight maladjustment in a TV set may go completely by the home viewer's eye, but in a VTR/CCTV system it may disrupt all the elements of the installation. When you are servicing a VTR system that is responsible for security in a bank or office building, your margin of error is much narrower than for a TV set tuned to a rerun of an old movie.

The technician who wants to get into VTR work can start to broaden his technical knowledge of tape transport systems by becoming familiar with audio tape recorders. This route will help you understand tape transport systems and the relationship of torque and tension on the take-up and supply reels, as well as how drive mechanisms relate to wow and flutter, the alignment of heads, and other key elements of signal recording.

In addition to getting some first-hand knowledge of tape systems by working with audio recorders, the technician also can find valuable information about the new technology via trade publications and books available from technical publishing houses.

Another important thing to remember is to make known your desire to get into VTR/CCTV work. At Panasonic, we try to upgrade our present technicians into the VTR service area. Ultimately, we hope to have each of our technicians capable of servicing all the products we make—from multi-band radios to VTR's. For the technician who voices a desire to get into VTR work, the chances are very good that he can be trained to become a more professional and higher paid technician.

For the most part, the number of VTR openings at the manufacturer level will be limited because most companies generally upgrade from their consumer products group. But for the technician who is already working for a manufacturer's consumer products division, showing an interest in VTR can be very important at this stage of the game. There may not be an opening now, but within a year or so things are expected to change considerably.

On the other hand, numerous openings are expected to develop at the dealer level in the next year or two.

By showing an interest and developing some basic knowledge via audio recorders and keeping up on

*continued on page 62*

# TEST INSTRUMENT REPORT

## Digital IC Color Generators

by Phillip Dahlen

■ Although we seldom feature more than one test instrument in each monthly report, this time an exception was made due to the similarity of these two instruments—B & K's Model 1243 and Model 1246 Digital IC Color generators.

The parts list sheet that is included with the instruction manual for each color generator is about as interesting as the generators themselves. Realizing that some electronic technicians are still not well acquainted with digital circuitry, in addition to printing a complete color-generator schematic, the manufacturer has printed a schematic of each integrated circuit, plus a full page of well drafted waveforms showing how the signal from a 189,800Hz  $\pm 0.005\%$  crystal-controlled oscillator is counted down to produce the instrument's 15,816Hz horizontal sweep frequency (within 4.2% of the 15,750Hz sweep frequency used by TV stations—a very adequate approximation) and its 59.9Hz vertical sweep frequency (within 0.15% of the 60Hz sweep frequency used by TV stations).

These waveforms also show the digital formation of the composite video signal containing the horizontal sync pulse, blanking pedestal (back porch), reference white level, reference black level, vertical video line pulses, vertical sync pulse, and horizontal video line pulses.

The manufacturer's schematic also shows a 3,563,705Hz  $\pm 0.001\%$  ( $\pm 35.6\text{Hz}$ ) crystal-controlled oscillator being used to produce the color signal supplied by the generator.

Although both instruments contain virtually identical countdown circuitry, they differ in that one is designed for producing six video patterns (Model 1243) while the other is designed for producing nine video patterns (Model 1246). Also, the former one is said to be factory tuned to Channel 3 (61.25MHz  $\pm 0.5\%$ ) and tunable through Channels 3, 4 and 5; while the latter is

said to have a crystal-controlled RF output that can be switched between Channel 3 (61.25MHz  $\pm 0.005\%$ ) and Channel 4 (67.25MHz  $\pm 0.005\%$ ), a 4.5MHz oscillator

circuit for accurately fine tuning a TV set, and color gun killers.

Manufacturer specifications that apply to both instruments include the following:

### Patterns

Purity .....	Clear raster
Dots .....	9 × 9
Crosshatch .....	1 × 1 Crosshair
	9 × 9
Color Bars .....	Gated Rainbow: 10 bars at 30° intervals from burst.
	R—Y, B—Y, —(R—Y): three bars gated at 90°, 180° and 270° from burst.

### Line Width

Horizontal .....	One horizontal line (54 $\mu$ s)
Vertical .....	Preset to 0.25 $\mu$ s, internally adjustable from 0.1 to 0.8 $\mu$ s.

### Chroma

Offset subcarrier system utilizing a frequency of 3.579545MHz—1H (or 15,816Hz) = 3.563729MHz  $\pm 0.001\%$ . Also, the 10 bars and R—Y, B—Y, —(R—Y) are produced by gating with 189kHz and 63kHz signals respectively. The subcarrier level is adjustable from 0 to 200% with a front-panel control adjustment.

### Signal Synthesis

The composite video signal approximates TV standards.

		Frequency	Pulse Width
<i>Sync</i> (H = 63.22 $\mu$ s)			
Horizontal		15,816Hz	0.08H (5.4 $\mu$ s)
Vertical		59.91Hz	4H (253 $\mu$ s)
<i>Blanking</i>	<i>Total</i>	<i>Front Porch</i>	<i>Rear Porch</i>
Horizontal	0.145H (9.2 $\mu$ s)	—	0.06H (3.8 $\mu$ s)
Vertical	16H (1012 $\mu$ s)	4H (253 $\mu$ s)	8H (506 $\mu$ s)

### RF Output

Level ..... 10mv typical into a 300 $\Omega$  load.

### Power Requirements

100 to 130v ac, 50/60Hz

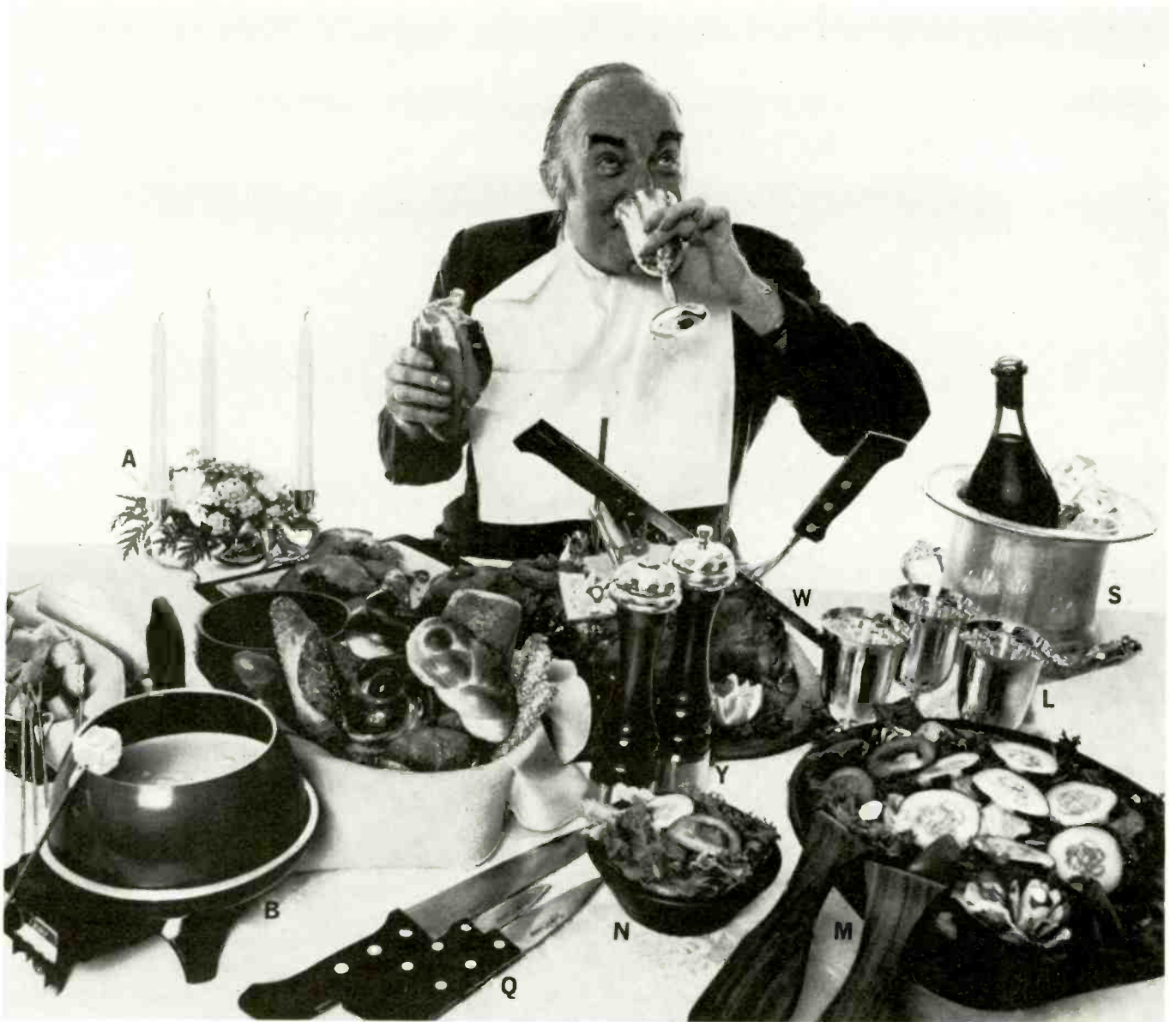
Internal power supply is transformer isolated, full-wave rectifier and transistor-zener regulated to provide a constant and ripple-free supply voltage.

### Operating Range

From —20°F to +140°F with no performance degradation.

B & K's Model 1246 (left) and Model 1243 (right) digital color generators. For more details circle 900 on Reader Service Card.





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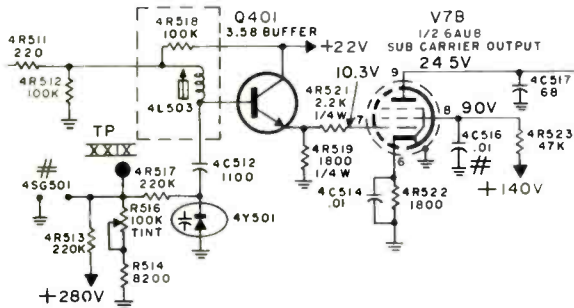
# COLORFAX

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

## GENERAL ELECTRIC

### Color TV Chassis C-1—Troubleshooting Guide

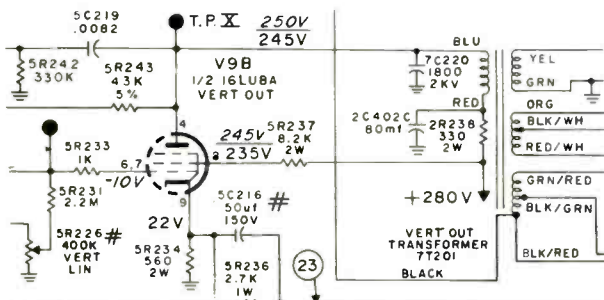
Symptom: Intermittent or weak color. Cause: Shorted 3.58 Buffer Transistor Q401.



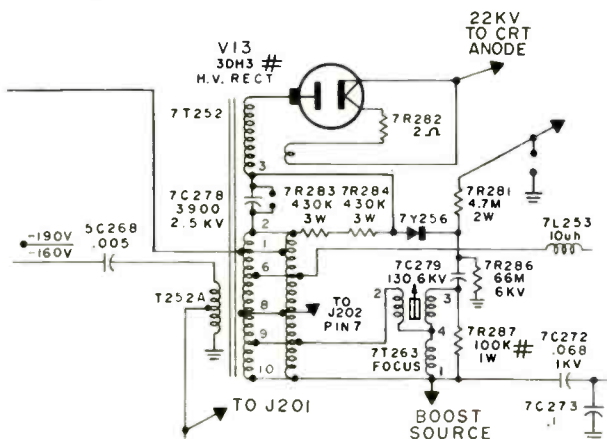
Symptom: No vertical sweep. Cause: Resistor 2R238 open. Check load side of resistor for short.

Symptom: Lacks vertical sweep and will not adjust with VERTICAL HEIGHT and LINEARITY controls. Cause: Electrolytic capacitor 5C216 open.

Symptom: Vertical foldover on bottom of raster. Cause: The vertical output transformer (7T201) has low inductance. The inductance may check with an ohmmeter.

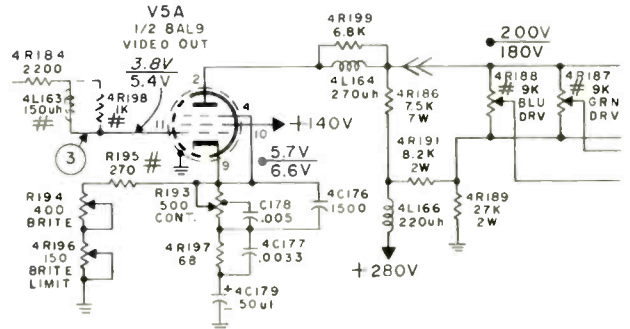


Symptom: Arcing in focus tracking network. Cause: Defective capacitor 7C278.

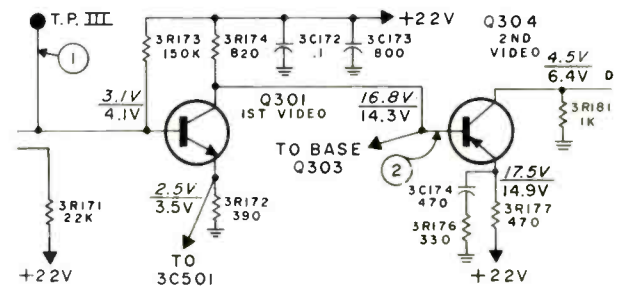


Symptom: Arcing in focus tracking network. Excessive

CRT beam current creates a large voltage drop across focus tracking resistors, 7R283, 7R284, causing the protective spark-gap capacitor, 7C278 to arc continuously. Possible Causes: Video output tube 8AL9 shorted. Electrolytic capacitor 4C179 shorted. CONTRAST or BRIGHTNESS

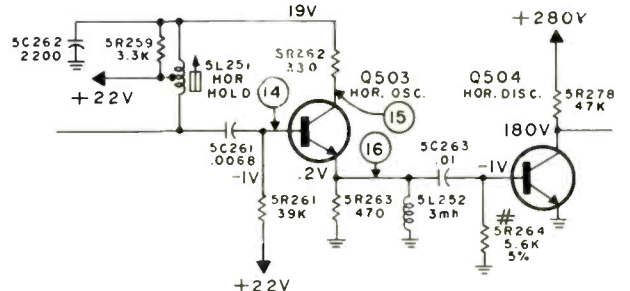


control wiring or terminal shorted to ground. The second video transistor Q304 shorted. The first video transistor Q301 shorted.



Symptom: Raster weave. Cause: Internal leakage in damper tube 19CG3.

Symptom: Arcing at HV rectifier socket. Cause: Leakage in corona seal. Remove corona seal, replace any damaged components, and install new corona seal, ET90X23.



Symptom: Low level ac hum (mechanical and can be heard with VOLUME control down). The line chokes are dressed against chassis below ac interlock. Remedy: Dress line choke away from metal.

Symptom: Horizontal foldover in center of screen (drive line). Cause: Defective horizontal discharge transistor Q504.

continued on page 56



When people  
turn to you  
to make things  
right again...



**use GE semiconductor replacements**  
(made by professionals for professionals)

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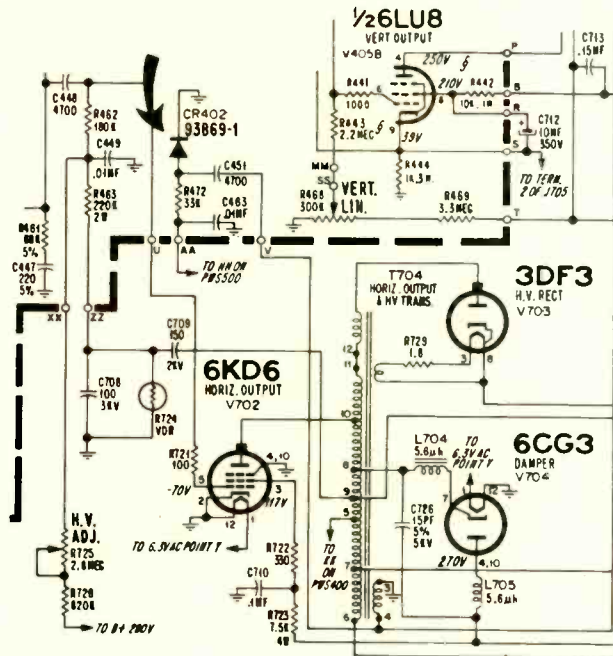
# COLORFAX...

continued from page 54

## ADMIRAL

Color TV Chassis K16—Service Hints

Complaint: No control of brightness. Possible Cause: Defective diode CR402 (93B69-1). Check for presence of negative voltage at the anode of this diode; it should be approximately -130 to -160v. This diode and associated

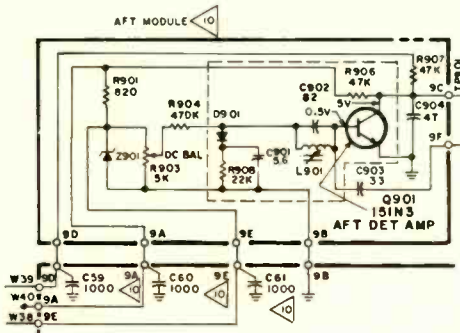


components provide the negative voltage for controlling brightness through the master brightness control and for the background controls. This circuit is not used for HV regulation in the K16 chassis as it was in some previous chassis. Diode 93A60-3 may be used in place of 93A69-1.

## MAGNAVOX

Color TV Chassis T936—AFT Field Adjustment

When field adjusting the AFT circuit, select a station broadcasting a color program, preferably VHF, adjusting the fine tuning for optimum picture and sound with the AFT switch in the OFF position. Connect a VTVM across points 9E and 9D of the AFT module and move the AFT



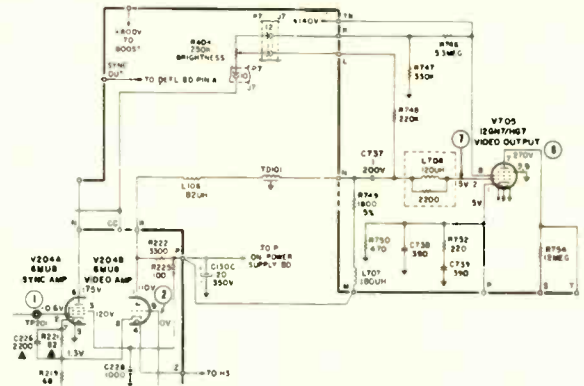
switch to ON. Adjust the dc balance control, R903 for 0v.

Remove the VTVM and while watching the picture, move the AFT switch to OFF. If no change in the quality of the picture or chroma level is noted, no further adjustment is required. If a change is noted, switch the AFT switch to ON and adjust the slug in coil L901 for optimum picture and sound. Then switch the AFT OFF and then ON

—while observing the picture. Retouch the adjustment of coil L901 until little or no difference in picture quality is noted between the OFF and ON positions of the AFT switch. Check all available stations and compromise the adjustment of L901 if necessary.

Color TV Chassis T950/T951—Elimination of High Resolution "Screen Door" Checkering Effect

As part of a video circuit modification to increase video resolution, some late production versions of the T950 and T951 chassis were produced without a capacitor across coil L106, at the input of the delay line. Along with increased resolution, these TV sets may be subject to a checkering or "screen door" effect in the picture. To reduce this effect, a later production chassis modification has added a 27pf capacitor (Part No. 250508-2705) across L106 in the T950 chassis and a 20pf capacitor (Part No. 250508-2005) across L106 in the T951 chassis. To reduce the screen door effect on a chassis produced without the capacitor across L106, install the appropriate value capacitor as indicated. Although a 33pf capacitor was originally



used in earlier versions, be careful not to use this value in chassis that were produced without it. Because of other circuit changes, the installation of a 33pf capacitor in this circuit would eliminate the screen door effect, but it would also reduce video resolution.

Color-TV Chassis T958 and T962—New 6EN4 High-Voltage Regulator Tube

The 6EN4 is an improved high-voltage regulator tube and is a recommended replacement for the 6BK4/6EL4 type. You are cautioned, however, that the 6BK4/6EL4 cannot be used in chassis designed to use the 6EN4. This is because the grid connection on the tube socket has been changed from pin 5 to pin 6, and if a 6BK4/6EL4 should be substituted on these chassis, there would be no connection to the tube grid. Under these circumstances, the high-voltage hold-down circuit will be activated and will automatically limit the high voltage to 18kv.

The T958 chassis used the 6EN4 in initial production, however, the T962 was initially produced with the 6BK4C/6EL4 type. Later production of the T962 chassis has since gone exclusively to the 6EN4 type. During this changeover period, the tube/chassis labels on some models using the T962 chassis identified the high-voltage regulator as 6EN4/6EL4. You are cautioned in this case to always use the 6EN4 as a replacement to be assured regulation.

continued on page 72

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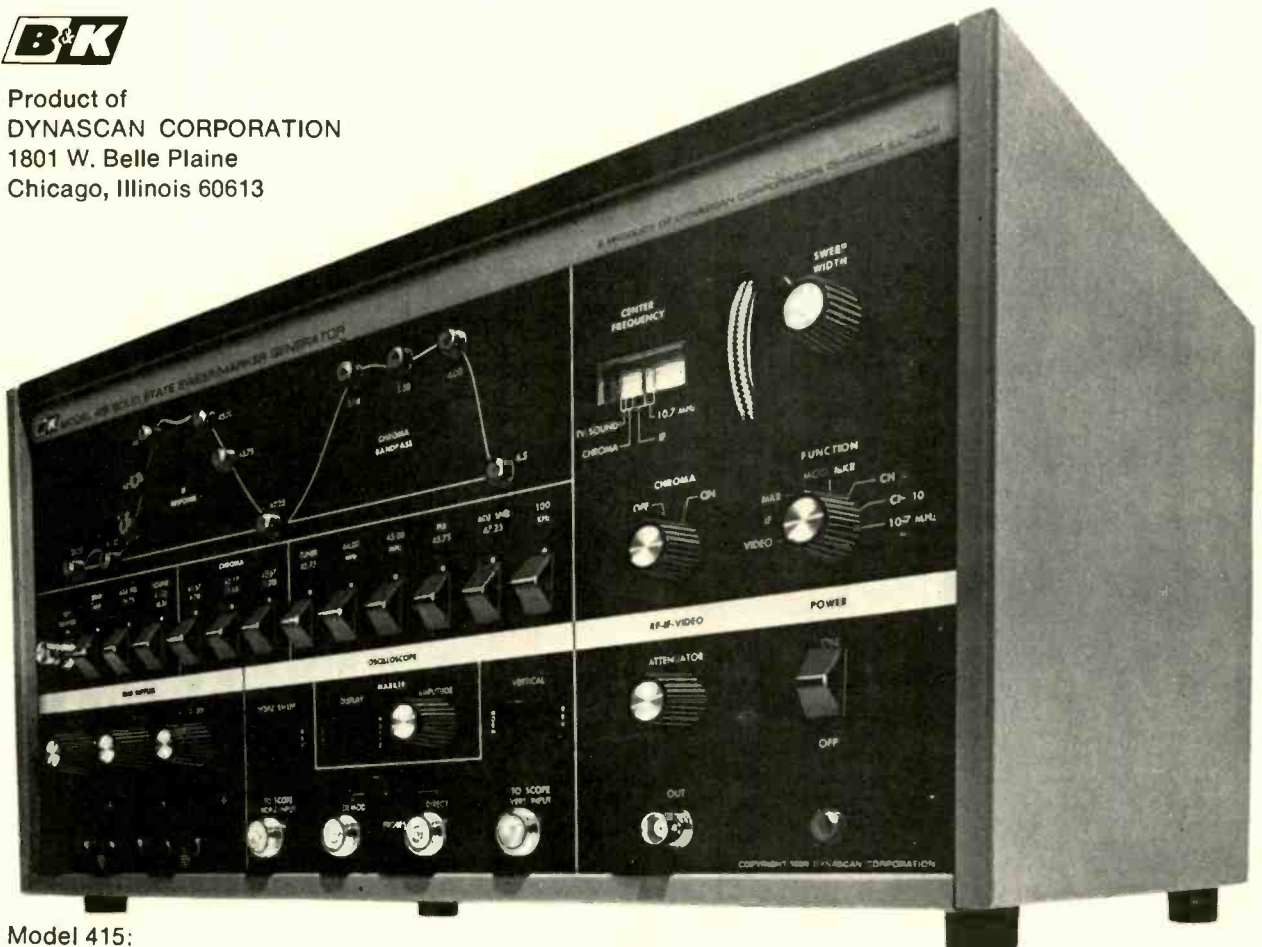
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# TECHNICAL DIGEST

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

## WESTINGHOUSE

### Transistor Compensating Circuits

The following statement is true for the majority of transistor amplifier circuits—the higher the base resistance, the poorer the current stability; and the higher the emitter resistance, the better the current stability. In other words, keep the base resistance as low as possible and the emitter resistance as high as possible.

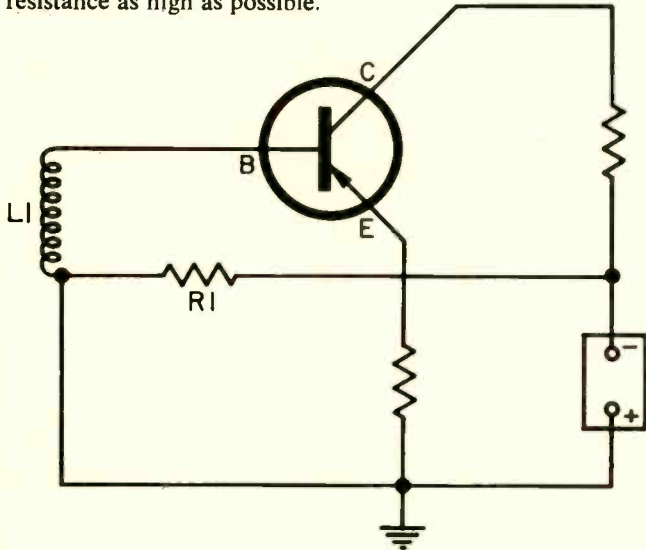


Fig. 1—Transformer Input Bias Circuit

Three methods of using resistors for temperature compensation are shown. A transformer input circuit as shown in Fig. 1 has a low resistance in the base lead and a resistor

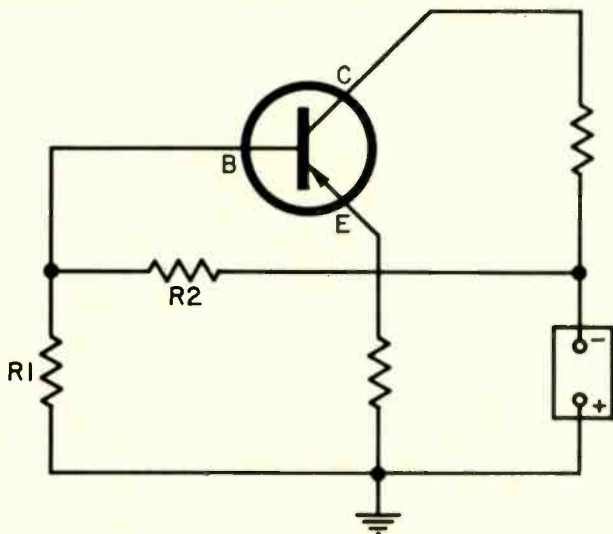


Fig. 2—Voltage Divider Bias Circuit

in the emitter lead. A temperature rise causes more current to flow through the transistor because of the decrease in emitter-base junction resistance. But since the emitter

resistance is larger than the base emitter junction resistance, the variation at the base-emitter junction is overcome by the presence of the emitter resistor. This resistor is commonly called a "swamping" resistor.

Very large input variations could cause overloading and distortion of the signal. This is prevented to some extent by the emitter resistor. The negative alternation increases forward bias, which increases current. The voltage drop across the emitter resistor also increases. This will sufficiently oppose the changing forward bias so that the swing will not go into the distortion region of the transistor's operating curve. Similarly, positive alternations of the input signal decreases the amount of current through the transistor and the voltage drop across the emitter resistor. This represents an aid to forward bias. In either case, if the forward bias tends to increase or decrease too much, there is an opposing emitter voltage which keeps the current from exceeding the limits of the transistor.

The second method of compensation, shown in Fig. 2, is a fixed bias applied to the base-emitter circuit by a voltage divider. The two resistors, R1 and R2, are in parallel so that the effective resistance in the base circuit is reduced. This type of circuit is also commonly used with other types of devices such as diodes and thermistors in place of resistors.

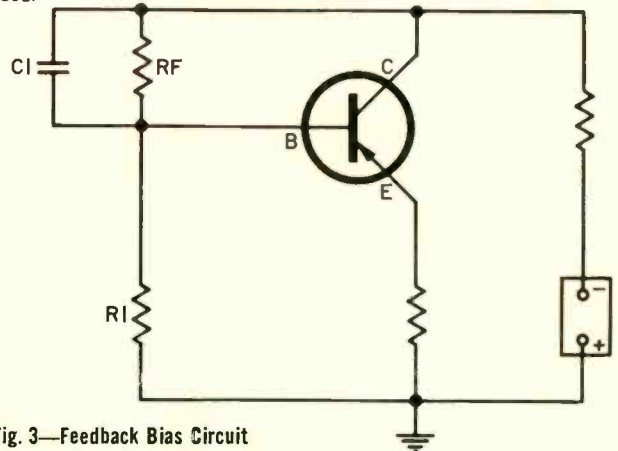


Fig. 3—Feedback Bias Circuit

The third type of resistive circuit, shown in Fig. 3, uses a feedback resistor between the collector and base. You will recall that in a common emitter amplifier there is a base-to-collector polarity reversal. As the signal at the base goes in a negative direction, the collector signal goes in a positive direction. If a small part of the output signal is fed through capacitor C1 to the base, the input signal will be reduced slightly in amplitude. This configuration is used to allow the amplifier to handle large input signal variations.

## OLYMPIC

### Radio Chassis 330R, 330-1—Shorted Output Transistor 2SD205

In many instances where a shorted output transistor was suspected, the shorted condition was attributed to a break-

*continued on page 60*



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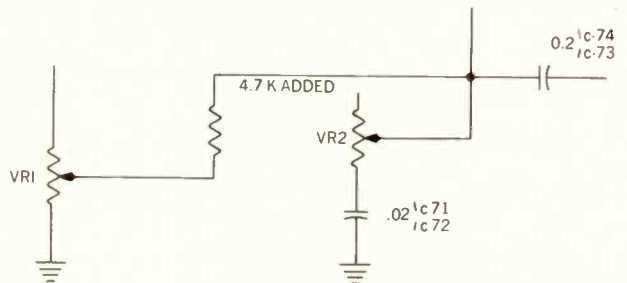
## TECH DIGEST...

*continued from page 58*

down in the mylar insulator (Part No. INJ 70179) between the transistor body and heat sink. Before you replace this transistor, inspect the condition of the insulator to ensure that such a breakdown has not occurred. This condition will not damage the transistor.

### Radio Chassis 329, 329-3—TONE Control Ineffective at Low Volume

If the TONE control is ineffective at low listening levels, locate dual VOLUME control VR-1. Remove the two leads connected to the center tap of each section and insert a 4.7K, 1/2w resistor between the center lug and the two



open leads of each section. The modified TONE control circuit should conform to the schematic as drawn. TONE control VR-2 is wired as drawn in all production chassis with the high end open, rather than connected as shown in the original schematic.

### MAGNAVOX

#### TV Chassis T925—Selection of Correct Replacement Horizontal Output Transformer T501

Before ordering a replacement horizontal output transformer (T501), inspect the original transformer. If its terminals are arranged in two rows as in Fig. 1, replace it with Magnavox Part No. 361048-4. If its terminals are arranged in a semicircle as in Fig. 2, replace it with Magnavox Part No. 36A039-3.

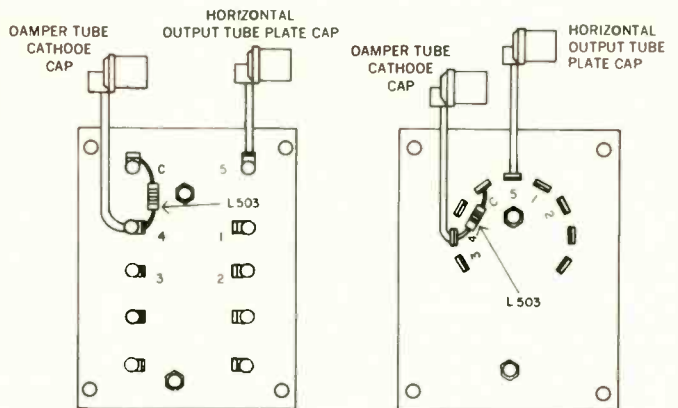


Fig. 1—Replace with Part No. 361048-4.

Fig. 2—Replace with Part No. 36A039-3.

#### TV Chassis T925—Selection of Correct Replacement Volume ON/OFF Control VR1

Before ordering a replacement volume ON/OFF control (VR1) inspect the original control. If the control has a flat

shaft as in Fig. 1, replace it with Magnavox Part No. 220192-15. If the control shaft is knurled and slotted as in

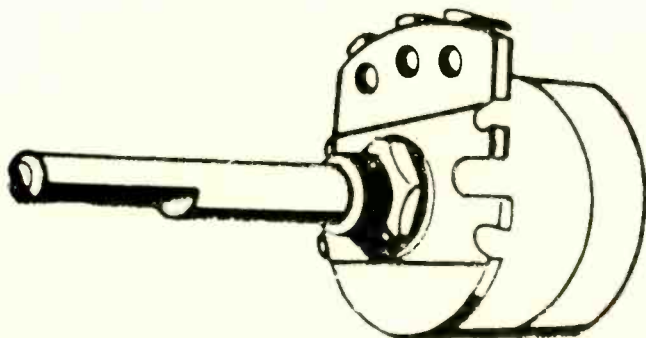


Fig. 1—Replace with Part No. 220192-15.

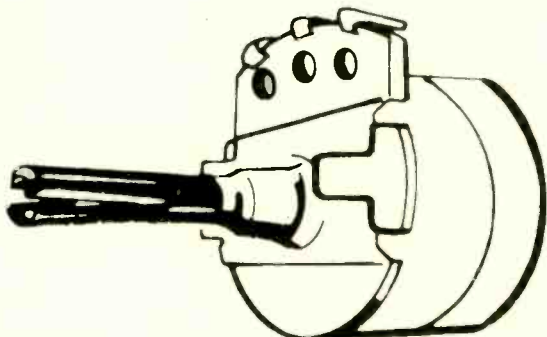


Fig. 2—Replace with Part No. 22A009-3 (T925-03 chassis) and Part No. 22A010-17 (T925-04 and later chassis).

Fig. 2, replace it with Magnavox Part No. 22A009-3 (on T925-03 chassis) or Magnavox Part No. 22A010-17 (on T925-04 and later chassis).

#### TV Model 1S117/2S117—12DEP4 Picture Tube Replacement

Those models using the T917-02 TV chassis employ type 12DEP4 picture tube. When a replacement picture tube is needed, it is said to be important that you use a Magnavox replacement 12DEP4. Physical dimensions of the 12DEP4 will vary between the different picture tube manufacturers to the extent that the cabinet back cannot be fitted into place if some general replacement types are used.



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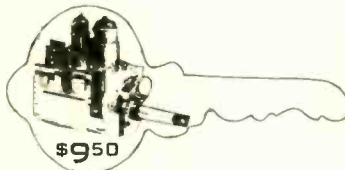
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## ZENITH'S TITAN...

*continued from page 43*

A gating pulse for burst gating is coupled into terminal No. 4 from the horizontal-sweep circuitry. This pulse is properly delayed and has a peak-to-peak value of approximately 7v to 10v.

### Chroma Demodulator Circuit

The chroma demodulator IC (Fig. 6) employed on the 25CC55 chassis is very similar to the IC employed on the 4B25C19 and 40BC-50 chassis. The chroma demodulator, like the chroma amplifier and sub-carrier regenerator IC, is contained in an in-line multi-terminal package which plugs into its associated socket.

The 3.58MHz CW injection signals for demodulation are coupled from the subcarrier regenerator circuits to terminals No. 6 and 7 through two 470pf capacitors. Terminal No. 6 receives a 3.58MHz CW signal which is of  $-(R-Y)$  phase while terminal No. 7 receives a 3.58MHz signal which is of  $-(B-Y)$  phase. Thus, the CW injection signals are separated by  $105^\circ$ . Therefore, the output signals from the demodulator represent color video signals which represent a demodulation axis of  $105^\circ$ . A  $-(B-Y)$  output appears at terminal No. 13, a  $-(R-Y)$  output appears at terminal No. 11 and a  $-(G-Y)$  output appears at terminal No. 9. Equal output load resistors appear in all three output circuits (2.2K and 1K resistors).

### APC and ACC Controls

We noted a NORMAL-ALIGN switch located on the top center of the chassis. This switch is used only when adjusting the APC and ACC controls.

To adjust the APC control, a color-bar generator pattern is tuned in on the receiver. The switch is placed in the ALIGN position (removing incoming burst and chroma) and the APC control is adjusted for minimum movement of color bars through the picture. This procedure is similar to that performed on previous chassis where the reactance coil was adjusted for this result.

To adjust the ACC control, the switch is placed in the ALIGN position and a voltmeter connected from

test point Q (Fig. 5) to ground. Then, while alternately "shorting" and "opening" the contacts across test points J and JJ, the ACC control is adjusted until no difference in voltage reading occurs whether test points J and JJ are shorted or open.

The ACC output voltage (approximately .035v) appears across terminals No. 15 and 16 of the sub-carrier regenerator IC and is coupled to the chroma amplifier IC at terminals No. 1 and 14. The APC voltage appearing across terminals No. 11 and 12 is used internally in the subcarrier regenerator IC for oscillator control.

### Conclusion

This TV set employs a Chroma-color 25VAMP22 picture tube which is said to have a truer aspect ratio than previous tube types. The aspect ratio for a picture is defined as the ratio between width and height. These tubes have an aspect of 4-to-3 or that of the picture as transmitted by the TV station. Previous tubes have had an aspect ratio that was closer to 5-to-4. The new tube also uses a "Compound Curve" faceplate which reportedly results in a flatter screen.

Servicing a 25CC55 chassis employing Duramodules can be fast and easy if spare modules are stocked. From the standpoint of servicing speed, the most effective technique is to first determine if the defect is within, or external to, a Duramodule. This can be determined by installing a known good module in the questionable circuit. If this resolves the problem, the defect is within the original module. Part substitution is simplified because the modules have sockets for the transistors and IC's. The manufacturer also supplies a computer type block diagram troubleshooting chart which makes the defective circuit easy to locate. ■

### GUEST AUTHOR...

*continued from page 51*

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Reputable VTR manufacturers are fully aware of how vital a good training program is both for their factory and dealer service organizations. VTR/CCTV sales often are in the five or six figure area, and the dealer with a top service facility will often make the sale on this basis rather than on price alone. The result is that VTR dealer technicians have available to them some of the finest training in electronics.

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### CHECKING CIRCUITS...

*continued from page 49*

down voltage) was reached at 70v (Fig. 6) with both bases floating and 40v with the bases tied together but no signal applied.

In these tests, the voltage usually used to sweep the collector-to-emitter junction may be used. If this signal is applied to the base-to-collector junction of transistor Q2 (Pins 1 and 2), a diode type of trace will appear on the scope (Fig. 7). The trace looks very much like the letter "j." If this same signal is applied to the base-to-emitter junction of any of the transistors, such as Pins 3 and 4 of transistor Q3, the characteristic "L" shaped zener trace will appear. Thus we are able to test junctions individually as well as the transistors as a whole.

Although we did not have the opportunity to test the IC's in-circuit, we may reasonably assume that it would be as simple as checking transistors in-circuit. The only hitch is that we must know what is inside the IC package. ■

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Darryl Widman, CET

Mr. Widman is the owner of Television City in Santa Barbara, Calif. He has been in electronics for over 14 years, active in association work and past president of the Santa Barbara chapter of CSEA. His hobby of all things is electronics. He and his wife, Diana, are expecting their first child soon. At 34, he has, and will, contribute much to our industry. Let us support him.

A few of the projects now being developed by ISCET are:

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- ISCET TECH—a proposed technical library to gather all possible technical literature and service information, keeping on file for our future reference. A big project, and it is under way.
- Expanded technical information in the ISCET NEWS-LETTER. JESSUP program (upgrading of servicing, equipment and procedures).
- Review of the requirement standards for ISCET membership.

- Serviceability program, including test instrument evaluation.

- CET programs—a continuous reevaluation and improvement, coordinating with other programs and encouraging all technicians to become CET's.

- Implementation of the "Code of Ethics."

- Promotion of "Professionalism" in the electronics service industry.

Norris Browne, CET, NEA president, has expressed his support of ISCET and their programs. He says, "condition is go."

An organizational meeting was held recently in Portland, Oregon, to establish the first ISCET group for that state. Approximately 20 were in attendance—nominating officers, establishing by-laws and proposing numerous future projects. We hope to publish news from all local groups.

CETs who are interested in joining ISCET may contact Ron Crow, CET, 1306 Douglas, Ames, Iowa 50010 or Ed Schon, CET, 5944 N.E. Sandy Blvd., Portland, Oregon 97213.

Your Reporter,  
Ed Schon, CET

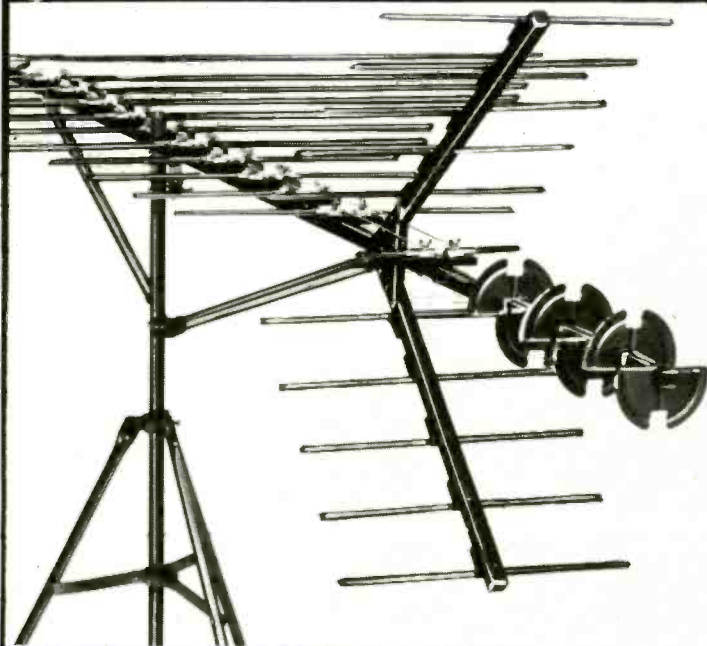
### EIA Petitions FCC for 80 New CB Channels in 200MHz Band

The Citizens Radio Section of Electronic Industries Assn. has petitioned the FCC to establish a new "Class E Citizens Radio Service." The proposed Class E service would have 80 channels with 25kHz spacing from 220 to 222MHz and utilize frequency modulation.

The petition cites that the present Class D service has demonstrated a strong and growing need for personal two-way radio communications for both safety and convenience of individual citizens in conducting their daily business and personal activities. Its goal is also to take what the industry has learned from the present service's shortcomings and apply the knowledge to the creation of the new and more effective Class E service. Absent from Class E would be skip interference, RF noise and over-crowding.

continued on page 66

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### -CONTENTS-

#### CONTENTS 1965 MODELS

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

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Covers all 1966 color and B & W models of: Admiral, Airline, Andrea, Coronado, Curtis Mathes, Dumont, Emerson, General Electric, Hoffman, Magnavox, Motorola, Olympic, Packard-Bell, Philco, RCA Victor, Sears-Silvertone, Setchell-Carlson, Sonora, Sylvania, Truetone, Westinghouse, and Zenith.

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#### CONTENTS 1967 MODELS

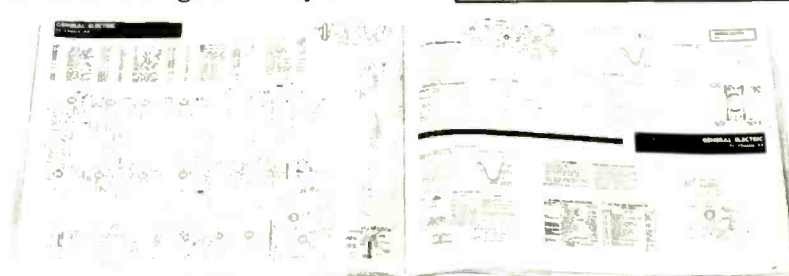
Covers all 1967 color and B & W models of: Admiral, Airline, Andrea, Coronado, Curtis Mathes, Dumont, Emerson, General Electric, Hoffman, Magnavox, Motorola, Olympic, Packard-Bell, Philco-Ford, RCA Victor, Sears-Silvertone, Setchell-Carlson, Truetone, Westinghouse, and Zenith.

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#### CONTENTS 1968 MODELS

Covers all 1968 color and B & W models for: Admiral, Airline, Andrea, Coronado, Curtis Mathes, Dumont, Emerson, General Electric, Hoffman, Magnavox, Motorola, Olympic, Packard-Bell, Philco-Ford, RCA Victor, Sears-Silvertone, Setchell-Carlson, Sonora, Sylvania, Truetone, Westinghouse, and Zenith.

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ET-101

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It is estimated that the proposed 80 new channels would be completely adequate for a minimum of 2,500,000 licensees. Power output to the antenna would be 25w.

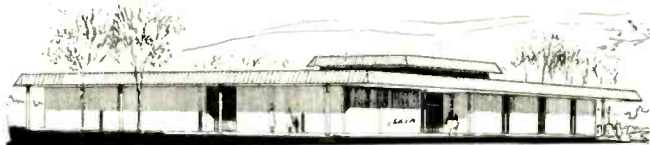
The proposal antenna height rules would also be changed. Antenna heights would be limited to 20 ft. above the nearest man-made or natural object within 500 yds.; or 60 ft. above the existing terrain (whichever is higher). New and simplified licensing procedures are also recommended. A short form license application, included with each set, would be used to self-assign call numbers based upon the individual's Social Security number.

### LETA Plans Construction of Regional Training Center

The Louisville Electronic Technicians Assn. has begun a fund raising drive for the construction of a regional training center and association headquarters.

Gene Dillingham, executive and advertising editor of the *ELECTRONIC TECHNICIANS NEWS* explained that this project is being supported by technicians, dealers, distributors, manufacturers and associations. Its doors will be open to all such groups, offering special facilities designed specifically for in-service training, which is now too frequently attempted in motels inadequately designed for such activities. The center is to be managed and run only by those that have made a direct financial contribution to the center.

The association feels that with such a center, training classes can be conducted in such a manner that electronic technicians will be willing to drive many miles to attend. There it will be possible to conduct all-day classes which will be far more effective than many of the evening classes now conducted.



(tentative design)

Drawing courtesy of *ELECTRONIC TECHNICIANS NEWS*.

Anyone wishing to contribute toward this building fund or seeking more information may write to: LETA Building Fund, 2343 Frankfort Ave., Louisville, Ky. 40204.

### NATESA Holds Convention in Hot Springs, Arkansas

The 1971 NATESA Convention and Electronics Trade Show was held in Hot Springs, Ark. Its hosts—the Television & Electronic Service Association of Arkansas, Inc.—did an excellent job in planning the convention and making the stay enjoyable.

Officers elected at the convention include the following: President: Leo Shumavon of Leo Shumavon Radio & TV, Boston, Mass. Vice President: Harrol Eales of Eales TV of Oklahoma City, Okla. Secretary General: Stanley Brohn

of Stan's TV, Baton Rouge, La. Treasurer: Tom Easum of Easum Radio and Television, Memphis, Tenn.

NATESA went on record as supporting proper TV-radio service licensing based upon the protection of the public interest, plus ethical and properly trained and equipped services.

It also went on record as opposing unfair extended warranties which deprive independent service dealers of their right to compete, and which fail to compensate the servicer for services rendered to satisfy the product purchaser—even if in the final analysis the request for service may have been a nuisance call or due to customers' ignorance of using the TV set—due in turn to lack of proper demonstration at time of purchase or failure of the user to read the instruction manual.

The association resolved its financial status and is at present in the "black."

It moved to support and implement the Total Service concept as a means to improve members' competitive status.

NATESA agreed to study and implement holding its 1972 convention jointly with the NEA. Both groups, plus the ISCT and the Louisiana State Association plan to meet in New Orleans in August 1972, with separate official business sessions but combined meal, seminar and exhibition operations.

### Nice to See You, Mr. Hoover

Many people do not realize that television is almost as old as radio—going back to the early 1920's. The first public television demonstration was, in fact, on April 7, 1927, when Herbert Hoover, then Secretary of Commerce, talked to and saw AT&T president Walter Gifford 200 miles away in New York City.

Now the original equipment used in that demonstration has been found and is on display in the Hoover Library in West Branch, Iowa, thanks to the combined efforts of Northwestern Bell, Bell Laboratories, AT&T Long Lines and Western Electric.



"The original TV set is a valuable addition to the library," said Thomas Thalken, its director, "and will pull people in here so they can see the rest of this man's fascinating life." The library was officially reopened May 30 after extensive remodeling and expansion of its exhibits.

After the demonstration, the New York Times' correspondent quoted Hoover as saying: "It was as if a photograph had suddenly come to life and begun to talk, nod its head and look this way and that."



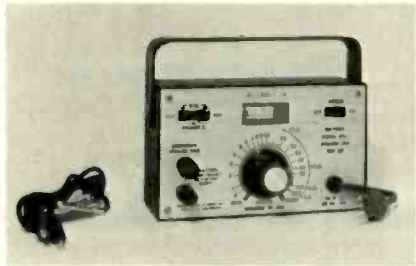
# NEW PRODUCTS

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

## SPEAKER LINE TESTER 703

*Features self contained direct-reading meter*

A speaker line tester, Model LTS-1, is said to be a self-contained ac powered direct-reading instrument designed for determining the wattage required for any 25v or 70v speaker line up to 200w, the wattage drawn by a



speaker with a 25v or 70v transformer and the impedance of a speaker voice coil. An illuminated sensitive meter is reportedly used for null detection. Dimensions of the unit are 6¼ in. W by 3¾ in. H by 2 in. D. Price \$34.75. Trutone Electronics.

## ROSIN-CORE SOLDER 704

*A fast flowing solder with excellent wetting action*

The rosin-core flux is reportedly predetermined in direct ratio to the size of the solder strand. The rosin residue after soldering is said to be non-corrosive, non-conductive, non-hygroscopic and fungus resistant. The manufacturer indicates that it is available



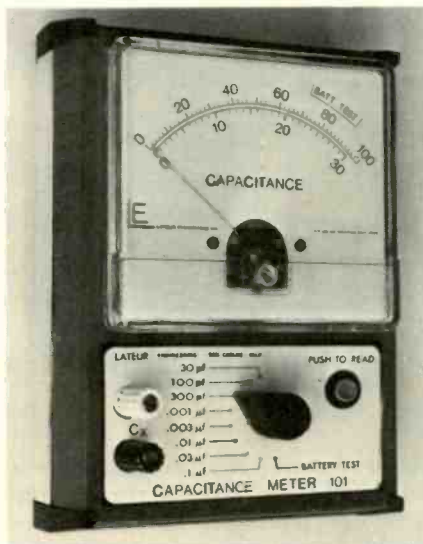
in a dispenser tube and in a 1 lb bulk reel. The dispenser fits into a pocket, tool-kit or caddy, coming in 110 in. of .062 (1/16) in. diameter, 60/40

tin-lead alloy. The bulk solder, designed for bench-type work, comes in 40/60, 50/50, and 60/40 composition tin/lead alloy ratios in a variety of diameters. Chemtronics, Inc.

## DIRECT READING CAPACITANCE METER 705

*Direct reading, portable operated unit*

A capacitance meter designed to cover a range from 2pf to 0.1µf, is said to use such circuit features as IC op amps, ultrastable precision FET circuits and printed circuit switches. The meter is direct reading, portable and battery-operated. It is designed to be quickly switched through its eight



scale ranges until the reading is obtained, saving time and eliminating mistakes. The unit weighs 1¾ lb and measures 5 in. W x 7 in. L x 2 in. H. Price: \$94.50. Lateur Engineering Co.

## MATV TRANSFORMER 706

*Provides greater direct pick up rejection*

The Model T-2000 all-channel matching transformer is said to feature high braid rejection, good bal-



ance, low insertion loss and excellent match to provide greater direct pick-

up rejection while maintaining the signal match between cable and TV. Jerrold.

## ANTENNA INSTALLATION ACCESSORIES KITS 707

*Use with antenna of your choice*

Any combination of mounts and mounting accessories can reportedly be packaged into a complete accessories installation kit. The kits can be custom assembled with the required



stand-offs, wire, guying accessories, lightning protection components, masts, etc., and as little as 25 of any one kind of kit can be ordered. Also available in any quantity are 24 stock kits. Detailed instructions for installation are included in each kit. South River.

## MINIATURE ROTARY TRIM SWITCH 708

*Can be inserted in tight areas*

A miniature single pole double-throw rotary switch, called the Oak Miniature Trim Switch, reportedly



provides needed electrical switching capability in an equipment area that is physically inaccessible to operators' fingers. The switch is simply inserted and soldered into the PC board and actuated by a 90° turn of a screwdriver. Measuring 0.359 in.

H by 0.375 in. in diameter, the switch is rated through 100v dc with a 100ma resistive load. Specifications indicate that its contacts are formed of copper-  
*continued on next page*



## DEALER SHOWCASE

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

### CASSETTE ADAPTOR 712

*Designed to solve cassette-vs-cartridge problem*

The Model 580 cassette adaptor is designed to allow the user to play cassettes on a standard eight-track cartridge player. Specifications indicate



that it accepts any standard stereo cassette the same way a cassette player does, and plugs into any standard eight-track cartridge tape player the same way a cartridge does. Toyo.

### SHORT-WAVE RADIO 713

*Self-contained AM and General coverage short-wave receiver*

The Model S-125, "Star-Quest II" is said to be an all-transistor four-band broadcast and short-wave table radio with easy reading dial legend. The radio tunes standard AM broadcast (550 to 1600KHz), SW1 (2.0 to 5.0MHz), SW2 (4.8 to 11.5MHz), and SW3 (11.0 to 30.0MHz). To



make the "Star-Quest II" more adaptable to portability, it is equipped with an external power jack to operate from a battery power source. An Everready Type 732 lantern battery, eight "D" size flashlight batteries wired in Series or a 12v car battery can be used as a

power source. The controls consist of: Main tuning, electrical bandspread, volume/power on-off, band selector, BFO on-off, and standby on-off. The band-spread control is designed to separate the crowded short-wave stations and zero-in on the station selected. The set is 12 in. wide, 5½ in. high by 5 in. deep. It weighs 8 lb and operates on 117 vac 50/60Hz power with a 6-ft. line cord. Price: \$59.95. The Hallicrafters Co.

### INDOOR ANTENNA 714

*Features hi-impact housing*

An indoor antenna, with hi-impact 5 tyron housing, is designed to include a shielded color cable and VHF-UHF



signal filter to assure better color reception. Other features include a 12-position fine tuning control that will reportedly operate on channels 2 to 83. Antenna Corporation of America.

### HEADPHONES 715

*Lightweight to eliminate distracting head pressure*

The Model SE-L20 stereo headphones are reportedly lightweight (7 to 8 oz), thus eliminating the distracting head pressure of heavier units. Earpads, designed for optimum softness, pressure and thickness, contribute to listener comfort. The back of each headphone unit consists of a perforated metallic cone. This open construction does not completely enclose the listener's ears. Therefore, the sound is said to be comparable to a high qual-

ity speaker system. The SE-L20 comprises a pair of 1½ in. dynamic speakers in each headphone, using a voice-coil driven, ultra-thin polyester cone. The frequency range is 20Hz to 20



KHz. The headphones can be connected to any amplifier having an output impedance range of 4Ω to 16Ω. Maximum signal drive is 0.5v, while sensitivity is 97dB/0.1v. Price \$29.95. U. S. Pioneer Electronics Corp.

### PHONE AMPLIFIER 716

*Designed to permit hands-free operation*

Designed for hands-free, work-or-play calls and conferences, a desk-top telephone amplification system is produced to provide special voice fidelity characteristics. Specifications indicate that it consists of a mini-speaker and a lightweight cradle—with integral ON-OFF switch—for the phone handset, containing a solid-state amplifier operated by a regular 9v transistor battery. Since operation is actuated by the weight of the handset, reportedly the only time the unit has to be



touched in the course of a conversation is for possible VOLUME control adjustment. The system is said to have a 4- by 8-in. amplifier base and 3½-in. *continued on next page*

## DEALER SHOWCASE

*continued from page 69*  
by 4¼ in. speaker, the system weighing 15 oz. Saxton.

### FM TWO-WAY RADIO 717

*Designed for use on the 30 to 50MHz low-band*



A new portable FM two-way radio is designed for low-band (30 to 50MHz) operation. The unit is said to be able to provide two-way communications for public safety, construction companies, plant and campus security operations, farming, general business, etc. It is reportedly available in either a standard or external microphone configuration with 1.5w of RF power output for one or two frequency operation.

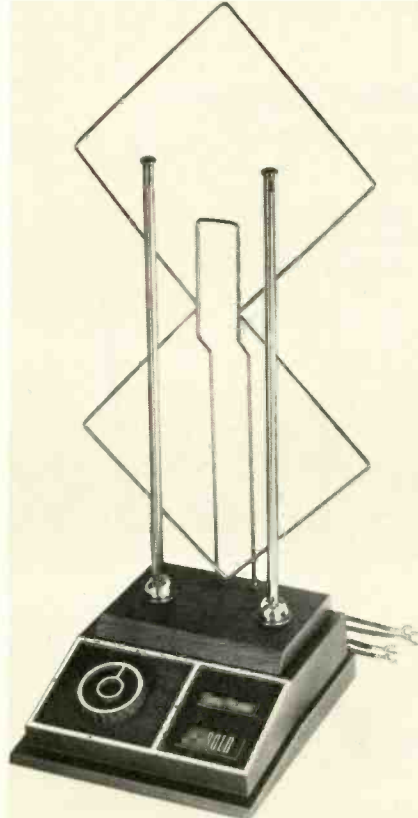
Specifications indicate that it can be powered with either a rechargeable nickel-cadmium battery or a long-lasting mercury battery. Also available is a battery cartridge clip which can

reportedly be loaded with AA size mercury or alkaline cells. Measuring 8.0- by 3.1- by 1.6-in., the radio is said to be available with either a carrier squelch or tone-coded squelch. Motorola.

### INDOOR ANTENNA 718

*Uses unique color phasing circuit*

The Color Phase Model JIN-5 antenna uses a unique color phasing circuit for excellent UHF, VHF, and FM reception. UHF signals are received on a double diamond UHF element. Similar in principle to the "quad



array" used by hams, the double diamond element provides high gain. VHF and FM signals are received on corrosion resistant telescoping elements. The color phasing circuit reportedly insures that all color signals reach the TV set in phase, eliminating most color smears. Price: \$14.95. Jerrold Electronics Corp.

### SOLID-STATE AMPLIFIER 719

*Fades out music for voice announcements*

A Model 614 Solid-State Amplifier is designed for electronic fade-out of music for 60ms to eliminate noise and abruptness; however, it is fast enough to allow the entire voice announcement to be heard. At the conclusion of the announcement a 375ms time

sequence eases the music in, almost unnoticed. The voice channel is said to have a response of 700Hz to 3KHz,  $\pm 2$ dB, and minimum "roll-off" of  $-10$ dB at 100Hz and 20KHz. For high fidelity music reproduction, the program channel reportedly has a



20Hz to 20KHz response,  $\pm 2$ dB, at less than 1% distortion. The specifications indicate that power output is 14w rms, with 4 $\Omega$ , 25v, and 70v outputs. The unit measures 3 in. high by 12 in. wide and weighs 6 lb. Darome, Inc.

### STEREO RECEIVER 720

*Features wide tuning scale and calibrated signal-strength meter*

The Model STA-6010 stereo receiver has a rated power output of 70w  $\pm 1$ dB across an 8 $\Omega$  load or 55w of



music power (1HF) across an 8 $\Omega$  load. Tuning features are said to include a wide tuning scale and a 0-to-10 calibrated signal-strength meter. Sensitivity is rated at 1.8 $\mu$ v. Although TUNING, FUNCTION SELECTION, VOLUME, BALANCE, BASS and TREBLE controls are reportedly rotary controls; the MODE, TAPE MONITOR, LOUDNESS, HIGH-FILTER, LOW-FILTER and REMOTE-SPEAKER controls are said to be lever controls. Specifications indicate that on the back panel there is a six-function input terminal board, color-coded spring-loaded connectors for speakers and antennas, and an independent adjustment screw on the AM bar antenna. The unit is said to measure 4½ in. H by 15¼ in. W by 12¾ in. D and weigh 17 lb. Nikko.

### SECURITY SYSTEM 721

*Provides advanced capabilities and remote wireless operation*

A self-contained security system, which is said to include a remote wireless operated unit, has been designated as Model 1200/FM. It reportedly permits the user to activate a call for help

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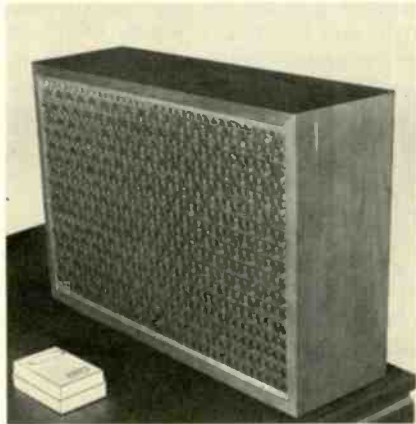
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... for more details circle 131 on Reader Service Card

at a distance of up to 150 ft from the control enclosure—disguised as a speaker console. The system is activated by a small, hand-held wireless FM transmitter or appropriate sensor. During an emergency, a pre-programmed tape cassette automatically dials a silent and discreet call for help



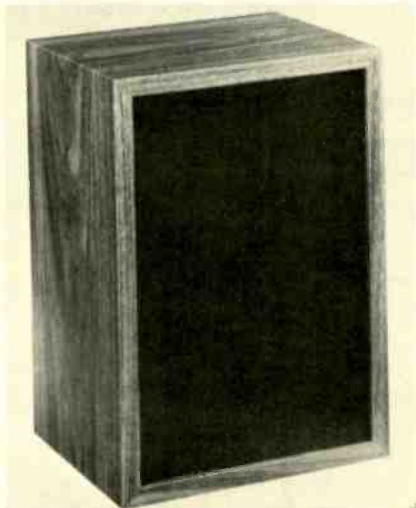
in the case of robbery, equipment failure, medical situation or for personal safety. Other features include arming and dis-arming upon leaving or entering the premises. Price \$249.00. Dial-arm.

## SPEAKER SYSTEM

722

*Budget priced with matched speakers*

An X-air 2-way speaker system, Model S-131, features matched speakers in an acoustically sealed enclosure. It is reportedly a budget-priced system, offering sound reproduction from a long throw woofer, special



high efficiency tweeter and electronic crossover. The walnut finished cabinet has contrasting grille cloth. Manufacturers specifications indicate a response of 40 to 16,000Hz with a power capacity of up to 15w. Its impedance is said to be 8Ω. The unit measures 11½ in. by 8 in. by 6¼ in. Price \$18.95. Olson Electronics.

## LEASE . . .

*continued from page 50*

evidence of partnership.

When percentage rates are established, the figures should be set only after having determined what would be a fair return on the location, the volume of business that can be anticipated during the period covered by the lease and, particularly, the recapture clauses in the lease which generally specify how the lease may be terminated and how the landlord may gain possession of the property.

In some leases, landlords insert clauses calling for the tenant to pay part of the taxes on the property. When this is done, a compensating reduction in the amount of the lease should be obtained. There have also been some clauses calling for the tenant to pay a higher percentage if prices become inflated. Such a clause should be accepted only if a method for determining the existence of such prices can be arrived at and made part of the clause. This is a point around which considerable disputes could be waged at any time.

It is also a good procedure to balance out the probable payments

over the life of the percentage lease before agreeing to terms. The best method for doing this is to set down the amount that would be paid under a fixed-price lease over the entire period—then setting up a scale of percentages that would approximate the same amount for the total period. This figure, balanced against anticipated sales for the period, can determine whether or not the percentage sought by the landlord is economically sound for the tenant.

The lease should contain a clause specifying the rights of the landlord with respect to the technician's or dealer's business and to his books in validating the declared sales upon which the percentage lease payment is made. Sometimes that is handled by oral agreement. Such procedure is extremely unsound for conditions change from time to time. Whatever method of verification of proof that is agreed upon, it should be a definite part of the lease.

The lease should also include definite instructions concerning who shall have access to the firm's books or records. Generally, such examination should be done by an accounting firm agreeable to both parties. ■

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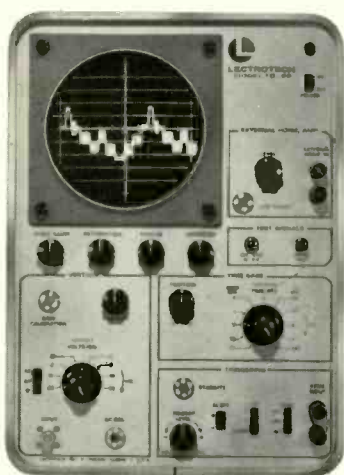
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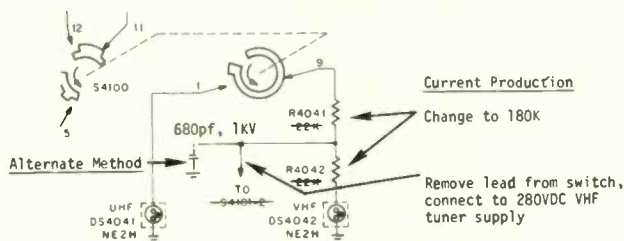
## COLORFAX...

continued from page 56

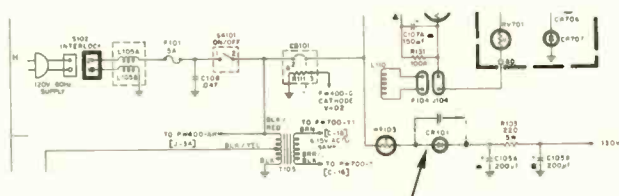
RCA SALES CORP.

Color TV Chassis CTC 52 Series—"Hum-Bar" Interference

There is the possibility of a hum-bar in the picture on TV sets employing this chassis, when operated in weak signal areas. The interference appears as the "silicon-bar" type normally associated with the power supply rectifiers. In some cases the interference may be from the neon channel indicator bulbs. For TV sets in current production the bulbs are operated on dc, as shown in the partial schematic.



An alternate method, which may eliminate the interference on one channel but not another, is to add a capacitor as shown.

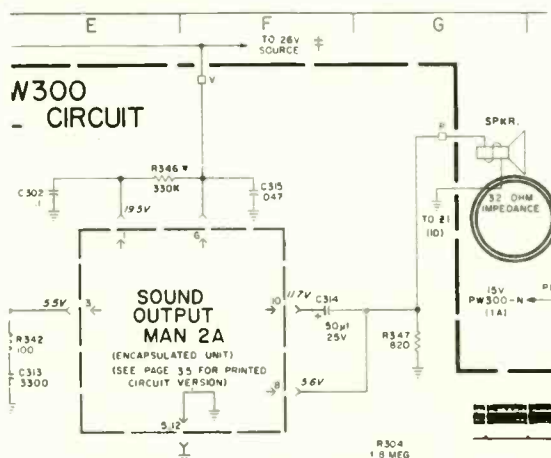


Parallel replacement  
diode with a 680pf,  
1kV capacitor.

Premature failure of the 130v B+ supply diode, CR101, in early-production TV sets utilizing this chassis may, in some instances, be the result of a kine arc damaging the diode. To prevent failures, make certain that a 680pf, 1kv capacitor (Stock No. 113165) is connected in parallel with the replacement.

Color TV Chassis CTC 46 Series—Sound Output Module

The output impedance of the sound output module (MAN) is relatively high (32 to 35Ω) compared to other current color chassis.



In the event bench servicing is required, make certain a lower impedance (4 to 8Ω) test speaker is not used, since this can result in damage to MAN module components.

## NEW TVs...

*continued from page 46*

voltage controls the duration of the time that the switch remains closed (transistor conducting) and automatically regulates the output voltage.

An overload circuit also protects the transistor switch and other components from excessive currents by shutting down the system. This protection automatically removes the voltage from the load. To reset the system, turn the TV set OFF for about five or six seconds and then turn it ON again. If the problem of excessive currents has been removed, the power supply will again supply output power.

Insta-Matic color tuning reportedly does away with the adjustment of the INTENSITY, HUE, BRIGHTNESS, CONTRAST and FINE TUNING controls. Insta-Matic tuning is said to do this adjusting with one button.

The remote control transmitter uses only two push buttons—one turns the set ON or OFF and changes the volume level, the other changes channels. All other adjustments are eliminated with Insta-Matic color tuning.

Similar to its Insta-Matic color tuning counterpart, a green light glows when the "Quick Set" button is activated.

### PANASONIC

Panasonic indicates that there are 23 TV sets in its 1972 line. Featured are three new color portables in both a contemporary American Series and Swivel Vision series—each containing 12-, 16-, and 19-in. models.

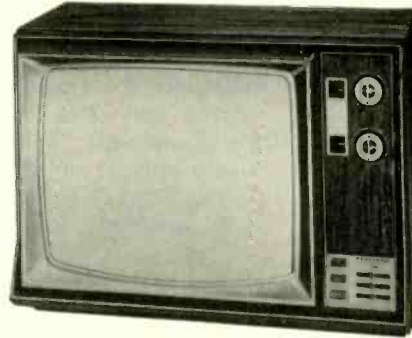
The Model CT-392, one of three sets in the contemporary American series, features a 19-in. diagonal screen with Panalock AFT, which is designed to lock in the best picture electronically by touching a key.

One of the three sets in the Swivel Vision series, the Model CT-27, has a 12-in. diagonal screen and "Self-Set" color designed to lock in the color at the touch of a button.

Also introduced is a Pana-Port Seven, Model CT-771 portable color-TV receiver. This 7-in. diagonal-screen TV set is said to be adaptable for ac, car battery and clip-on battery operation.

Panasonic's first wireless remote-control color-TV set is the Model CT-395VR. This 19-in. diagonal-screen table model features a "Self-Set" COLOR control, which at the touch of a button reportedly provides instant factory pre-set color.

The Model CT-396 is an all solid-state, 19-in. diagonal screen portable with active self-set color which automatically adjusts the color.



Panasonic's first venture into a large size screen is the Lynwood, Model CT-210—a 21-in. (diagonally measured) screen table model with self-set color. *Courtesy of Panasonic*

Panasonic's first venture into the large screen set is the Model C210, a 21-in. diagonal screen table model. Other features include three ICs, instant picture and sound, plus AFT. ■

## SEMI-TIPS...

*continued from page 49*

to 4v. In tuning circuits of this nature, the power supply voltage and control network must be extremely stable and serviced only with high-quality components.

Most small-signal diode replacements can be accomplished quite readily if a few basic considerations—such as applied voltage, current requirements, operating frequencies and device material (silicon or germanium)—are made. Most of this information can be determined from the equipment schematic diagram.

One point to remember is that germanium devices will usually indicate a forward voltage drop of less than 1v, while silicon devices will indicate a voltage drop of 1v or more. Once these requirements have been established, they should be compared with the electrical data of the replacement device, and in most cases an adequate replacement can be determined. ■

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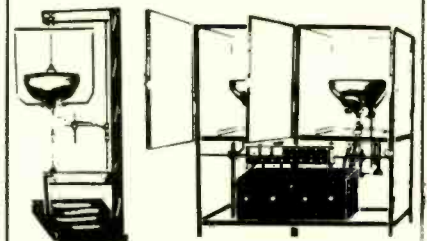
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# TECHNICAL LITERATURE

## Miniature Electrolytic Capacitors

A four-page cross-referenced guide and price book for miniature aluminum electrolytic capacitors includes specifications for the miniature capacitors and compares them by part number with similar products marketed by other noted manufacturers. Local Corp. Pond Hill Industrial Park, Great Neck, L.I., New York.

## Semiconductor Guide & Catalog

Semiconductor devices are cross-referenced to HEP replacements in the 1971 Cross-Reference Guide and Catalog. Included in the catalog are 1N, 2N, 3N, JEDEC, manufacturers' regular and special house numbers, and many international devices. There are 471 HEP items included in this guide, including kits, books and accessories. The devices are listed by type number with a packaging index, device dimension drawings and selection guide information. Motorola Inc., Semiconductor Products Div., 5005 E. McDowell Rd., Phoenix, Ariz. 85008.

## Electronic Test Accessories

The 1971 catalog of electronic test accessories contains more than 450 individual products. The products featured in the 60-page catalog include a series of stress relieved and weather-proofed BNC cable assemblies, connecting leads featuring miniature "mini test" clips, high-voltage (30kv) connectors, coaxial panel receptacles, 6-in. deep shielded "Black Boxes" with card guides, miniature sized shielded "Black Boxes," phenolic box-

es available in red or green, plus several miscellaneous banana plug adapters and accessories. Pomona Electronics Co., Inc., 1500 East Ninth St., Pomona, Calif. 91766

## Precision Components

A listing of 35,000 precision components is included in the catalog, No. 35. This 446-page catalog has an easy-to-use thumb index to identify groups of similar components. Items and product lines include gears, power supplies, shafting, bearings, spacers, fasteners, couplings, kits, speed reducers, clutches, clamps and "No-Slip" belts. The catalog also includes racks, brakes, dials, tool components and differentials. PIC Design Corp., P.O. Box 335, Benrus Center, Ridgefield, Conn. 06877.

## Consumer Product Catalog

A 52-page catalog, No. FR-71-A, describing the Audiotex product line, includes items ranging from hi-fi equipment to stereo accessories. Also included are a variety of TV antenna installation hardware items and a cable-connector-adaptor line for stereo equipment applications. Other products include acoustic-suspension loudspeaker systems, speaker switching devices, stereo headphones, microphones and accessories, intercoms and telephone accessories. GC Electronics Div. of Hydrometals, Inc., 400 S. Wyman St., Rockford, Ill. 61101.

## Toggle Switch Catalog

The 12-page catalog, No. 700, of subminiature toggle, rocker and paddle handle switches, includes photographs, specifications and prices. C & K Components, Inc., 103 Morse St., Watertown, Mass. 02172.

## Antenna Rods

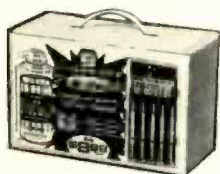
This catalog describes telescoping antenna rods with swivel bases and sliding adapters for rods to disappear. Replacement rods included are for portable TV sets, walkie-talkies and portable AM/FM radios. Russell Industries, Inc., 96 Station Plaza, Lynbrook, N.Y. 11563.

## Replacement Parts

This 1971 catalog, 71D, includes cassette and standard tape recorder belts, phono belts, cam tires, turret drives, idler and inter-wheel drives, pressure rollers and pinch rollers. Detailed illustrations and dimensions are provided. Special features include 28 brand new drive wheels, belts and pressure rollers for record changers, cassette, reel-to-reel and 8-track players. Also new is a "Fraction to Decimal Equivalence Chart," an aid in determining proper belt and wheel measurements. Other features include a 13-page cross reference section alphabetically listing over 165 brand name set manufacturers, manufacturers' part numbers, description, stock numbers and set model numbers. The 32-page catalog also includes a "Quick Reference Numerical Index and Substitution Guide," referring the user to the pages of the catalog where products are illustrated for fast identification. Electro-Voice, Inc., Buchanan, Mich. 49107.

## Rotary Switch

An eight-page bulletin, SP-395, provides complete design information for using Multidex rotary switches. Along with dimensional specifications, the publication provides easy-to-use information needed for selecting the right combination of switch parts to fit the right application. Included are types of clip material available, life cycle and temperature characteristics, recommended blade material, and other data needed to assure optimum design selection. Oak Manufacturing Co., a division of Oak Electro/Netics Corp., Crystal Lake, Ill. 60014.



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# Metric When?

## National Bureau of Standards presses for positive action

■ Electronic technicians and dealers are currently faced with the task of working with two units of measure. In fact, there is probably no greater segment of the American public that is so involved with the Metric System. For all electrical measurements—volts, watts, amperes, ohms, henries, farads—are Metric rather than English or Customary units of measure. In fact, few if any of our schematics contain any Customary units of measure. And many of the foreign products serviced and sold are built to metric dimensions.

It was 150 years ago that John Quincy Adams wrote an eloquent and comprehensive report for the Congress. Based on a four-year investigation, his report dealt with the metric question and the modernization of our measurement system.

Many times since then, Congress has considered the merits of adopting the Metric System. Each time, action was postponed, often because the Metric system was not then in use by our major trading partners abroad. Now, with every other major nation converted to metric or committed to conversion, this obstacle has been removed.

In the light of these and other changing circumstances, the Congress directed the Secretary of Commerce to undertake the U.S. Metric Study. Its purpose was to evaluate the impact on America of the metric trend and to consider alternatives for national policy.

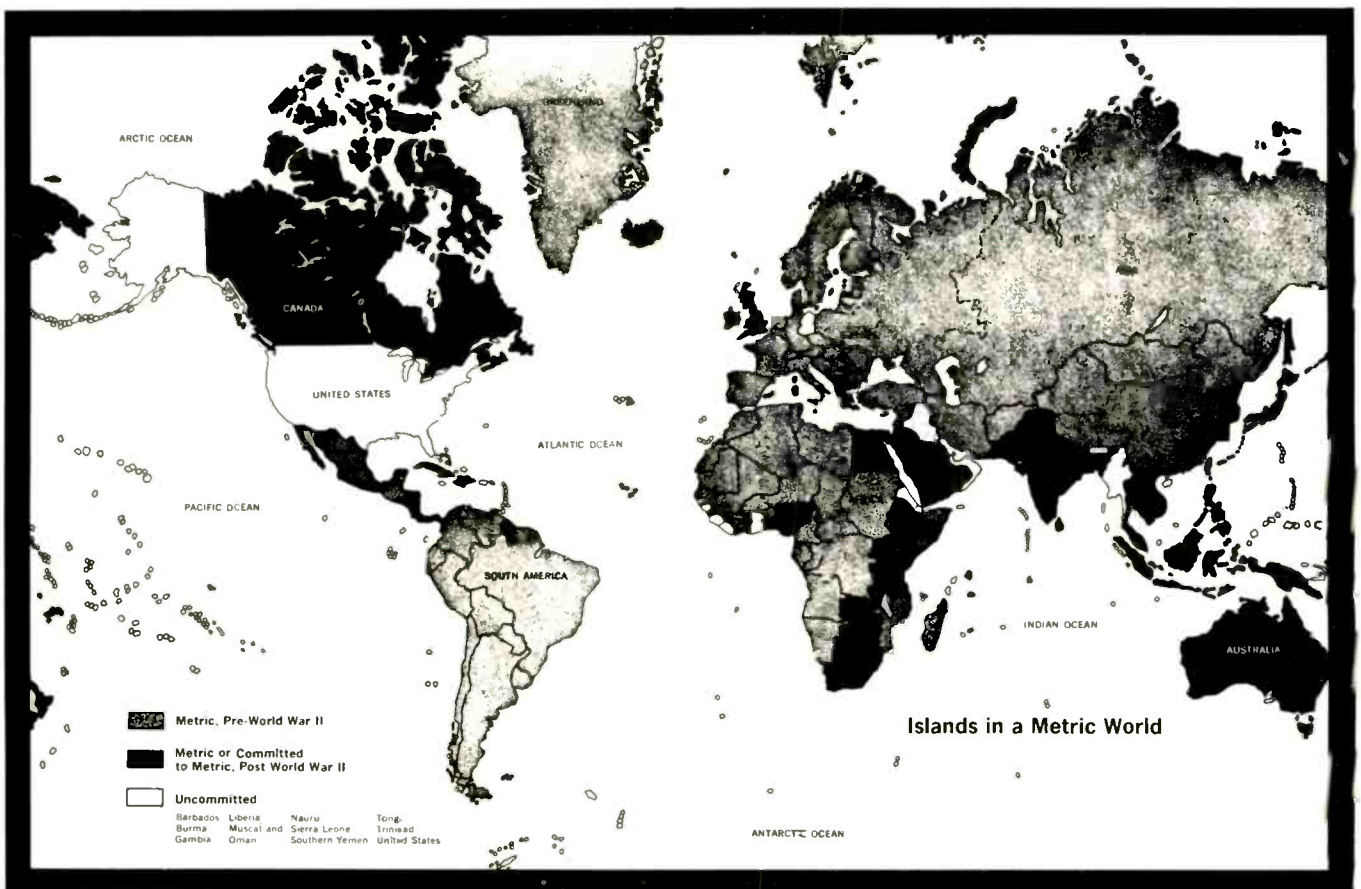
The U.S. Metric Study concludes that eventually the United States will join the rest of the world in the use of the Metric System as the dominant common language of measurement. Rather than drifting to metric with no national plan to help the sectors of our society and guide our relationships abroad, a carefully planned transition in which all sectors participate voluntarily is preferable. The change will not come quickly, nor will it be without difficulty; but Americans working cooperatively can resolve this question once and for all.

The basis for the conclusion that the U.S. will eventually be metric lies in the findings of the study that America is already metric in some respects; that we are becoming more so; and that the great majority of businessmen, educators and other informed participants in the study reported that increased use of the metric system is in the best interest of America. They also believe that it is better for the nation to move to metric by plan rather than by no plan at all.

They go beyond the question of whether or not the United States should progressively replace its present measurement language with metric. The question they ask is how and when America will choose to make the change. It is primarily a question of timing and preparation. Shall the nation do so by plan over a comparatively brief period of 10 to 15 years? Or shall it drift toward a metric status, over a much longer period of time, with some parts of the society inadequately prepared for the increasing prevalence of metric usage?

Consequently, the costs and benefits to be considered are not so much those of changing to metric versus

*continued on page 76*



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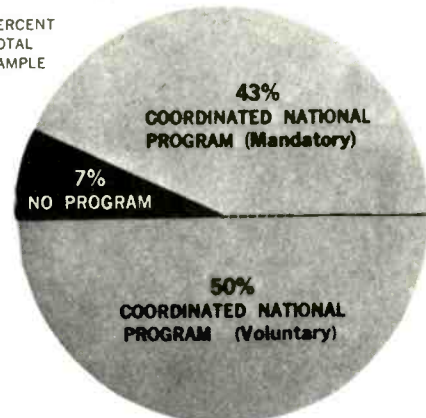
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Manufacturing Businesses:  
"If Increased Metric Usage is in  
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PERCENT TOTAL SAMPLE



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## METRIC WHEN...

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not changing at all. The key comparison is between changing by plan versus changing with no plan—with no framework to guide the nation.

On the basis of all the factors that were considered, the study concludes that it would be best for the nation to change to metric under a coordinated program that provides for flexibility and encourages the various sectors of society to deal with their particular problems voluntarily. Within this framework, these sectors would work out their own timetables and programs, dovetailing them with those of other sectors. ■

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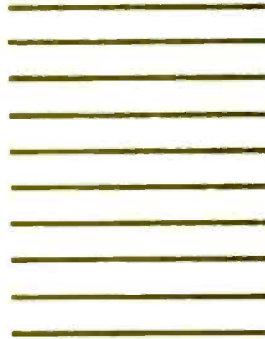
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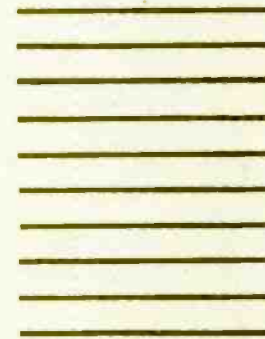
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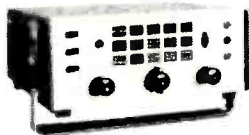


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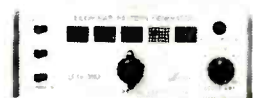
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| 19GZP22  | 490ALB22  | 490XB22  |
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| 19VACP22  | 21GVP22   |
| 21AXP22   | 21FKP22   |
| 21AXP22A  | 21GUP22   |
| 21AXP22A/ | 21GUP22/  |
| 21AXP22   | 21FBP22A  |
| 21CYP22   | 21GVP22   |
| 21CYP22A  | 21GVP22/  |
| 21FBP22   | 21FJP22A  |
| 21FBP22A  | 21GXP22   |
| 21FBP22A/ | 21GYP22   |
| 21GUP22   | 21GZP22   |
| 21FJP22   | 21HAP22   |
| 21FJP22A  |           |

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| 23VAHP22 | 26AGP22  | 25BVP22 |
| 23VALP22 | 25AJP22  | 25BWP22 |
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| 23VAQP22 | 25AP22A  | 25CBP22 |
| 23VARP22 | 25AP22A/ | 25CP22  |
| 23VASP22 | 25XP22   | 25CP22A |
| 23VATP22 | 25AQP22  | 25FP22  |
| 23VAUP22 | 25ASP22  | 25FP22A |
| 23VAWP22 | 25AWP22  | 25GP22  |
| 23VAXP22 | 25AXP22  | 25GP22A |
| 23VAYP22 | 25AZP22  | 25RP22  |
| 23VAZP22 | 25BAP22  | 25SP22  |
| 23VBAP22 | 25BCP22  | 25VP22  |
| 23VBCP22 | 25BDP22  | 25WP22  |
| 23VBDP22 | 25BFP22  | 25XP22  |
| 23VBEP22 | 25BGP22  | 25XP22/ |
| 23VBGP22 | 25BHP22  | 25AP22A |
| 23VBHP22 | 25BJP22  | 25YP22  |
| 23VBJP22 | 25BMP22  | 25YP22/ |
| 23VBRP22 | 25BP22   | 25BP22A |
| 25ABP22  | 25BP22A  | 25ZP22  |
| 25ADP22  | 25BP22A/ |         |
|          | 25YP22   |         |

Here's the way to save yourself time, give your customers faster service and improve your profit. Stock these three RCA Hi-Lite color picture tubes and have immediate replacements for the fastest moving industry types — 185 of them.

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