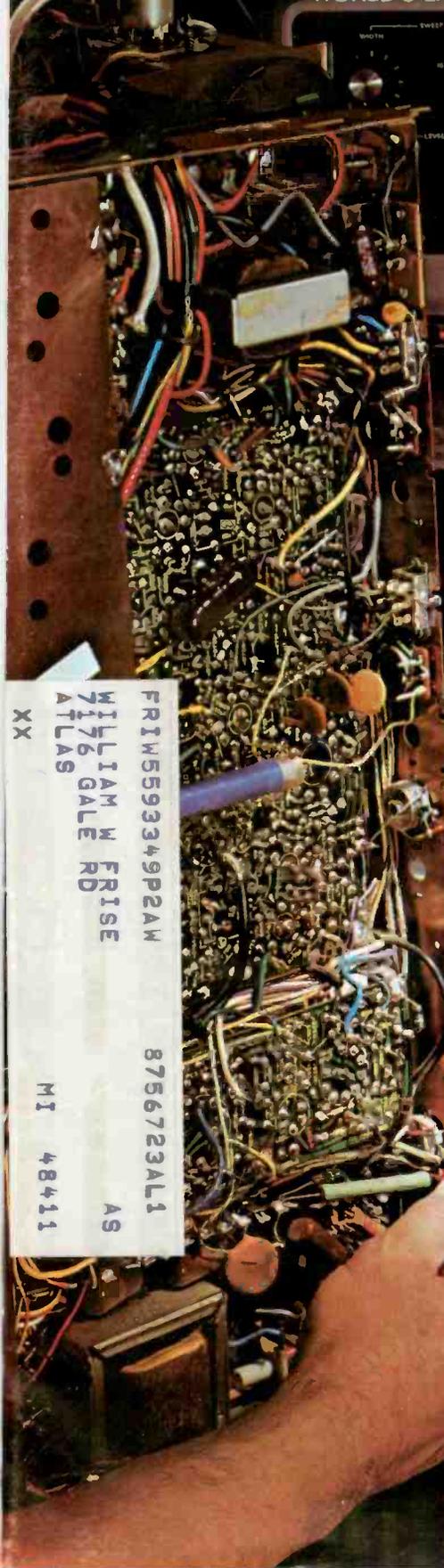


NOVEMBER 1972  A HARCOURT BRACE JOVANOVIICH PUBLICATION

ELECTRONIC TECHNICIAN/DEALER

WORLD'S LARGEST TV-RADIO SERVICE & SALES CIRCULATION



SERVICE
LITERATURE

FR1W5593349P2AM
WILLIAM W FRISE
7176 GALE RD
ATLAS
MI 48411
AS
8756723AL1

Basic Digital Circuitry

There must be an easier way...



There is: Sylvania's Chek-A-Color test jig.

TV servicemen were never meant to be movingmen.

But, that was before antique, modern and French Provincial units that included hi-fi, tape decks and record players were built around a large-screen color TV set.

Getting those units to the shop can be a big job.

That's why we developed our two Chek-A-Color test jig units. One, our full-house model, gives everything you need to test a chassis. The other is a basic unit that practically lets you design your own test jig.

All you have to take back to the shop is the electronic guts of the TV monsters.

Regardless of the size of the original picture, Chek-A-Color lets you see it on a benchtop 14-inch



(diagonal) screen. It adapts to both high and low focus voltage sets and a full line of adapters lets you test over 5,000 different models.

A front-panel switch controls a yoke programming system that gives you a range of impedances and/or deflection voltages to closely match both tube and solid-state systems.

For actual testing, a convenient meter lets you measure anode voltage and a speaker lets you check sound performance.

Since Chek-A-Color handles tube, hybrid and solid-state chassis, there won't be many complete cabinets to lug.

With a Chek-A-Color test jig all you have to take is the chassis. Get the picture? Sylvania Electronic Components,

lets you see it on a benchtop 14-inch

GTE SYLVANIA

100 First Avenue, Waltham, Mass. 02154

GROUP
243

SCHEMATIC NO.

SCHEMATIC NO.

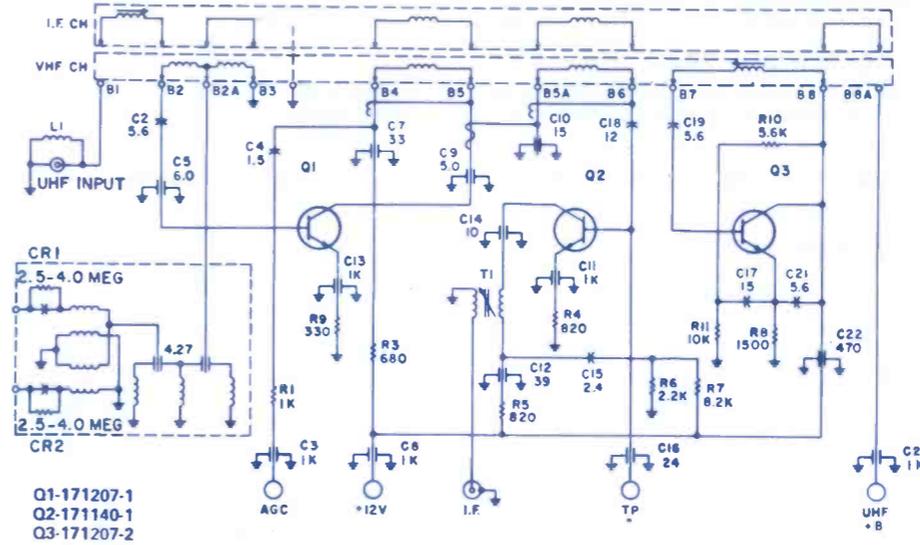
EMERSON 1446
TV Chassis T25H4-1A

MAGNAVOX 1445
Color-TV Chassis T974

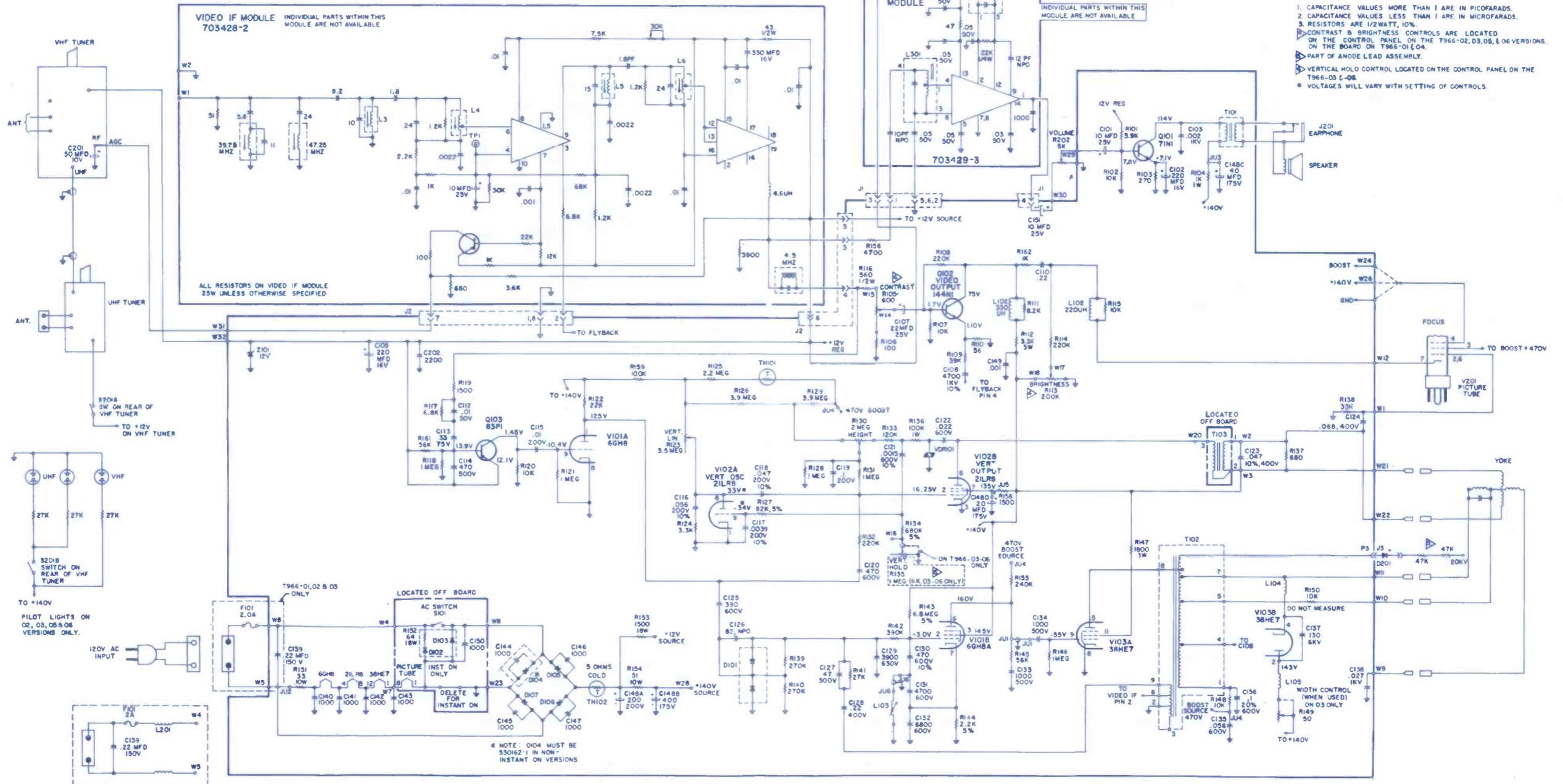
MAGNAVOX 1443
TV Chassis T966 Series

RCA SALES CORP. 1444
Color-TV Chassis CTC48 Series

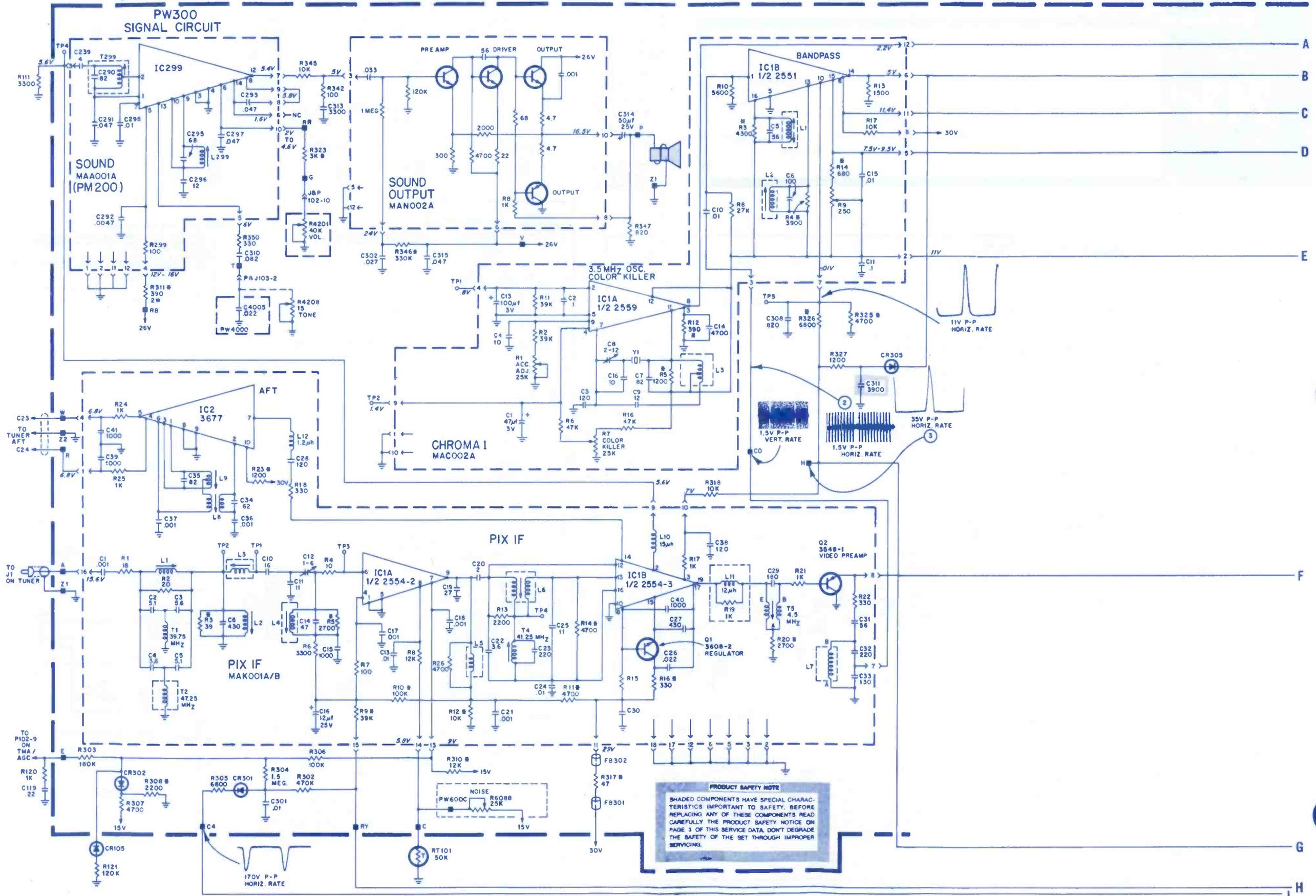
VHF TUNER SCHEMATIC



Q1-171207-1
Q2-171140-1
Q3-171207-2

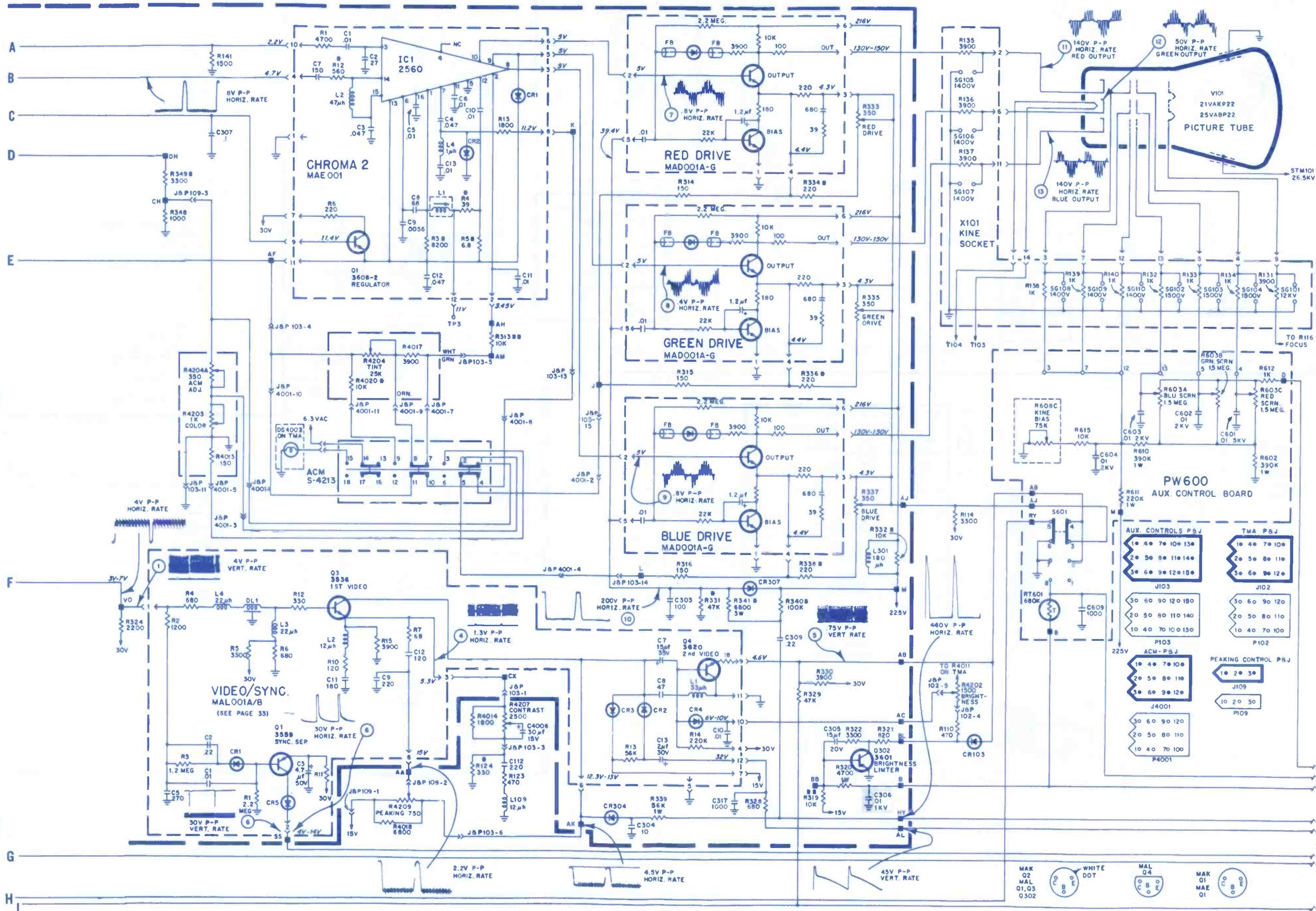


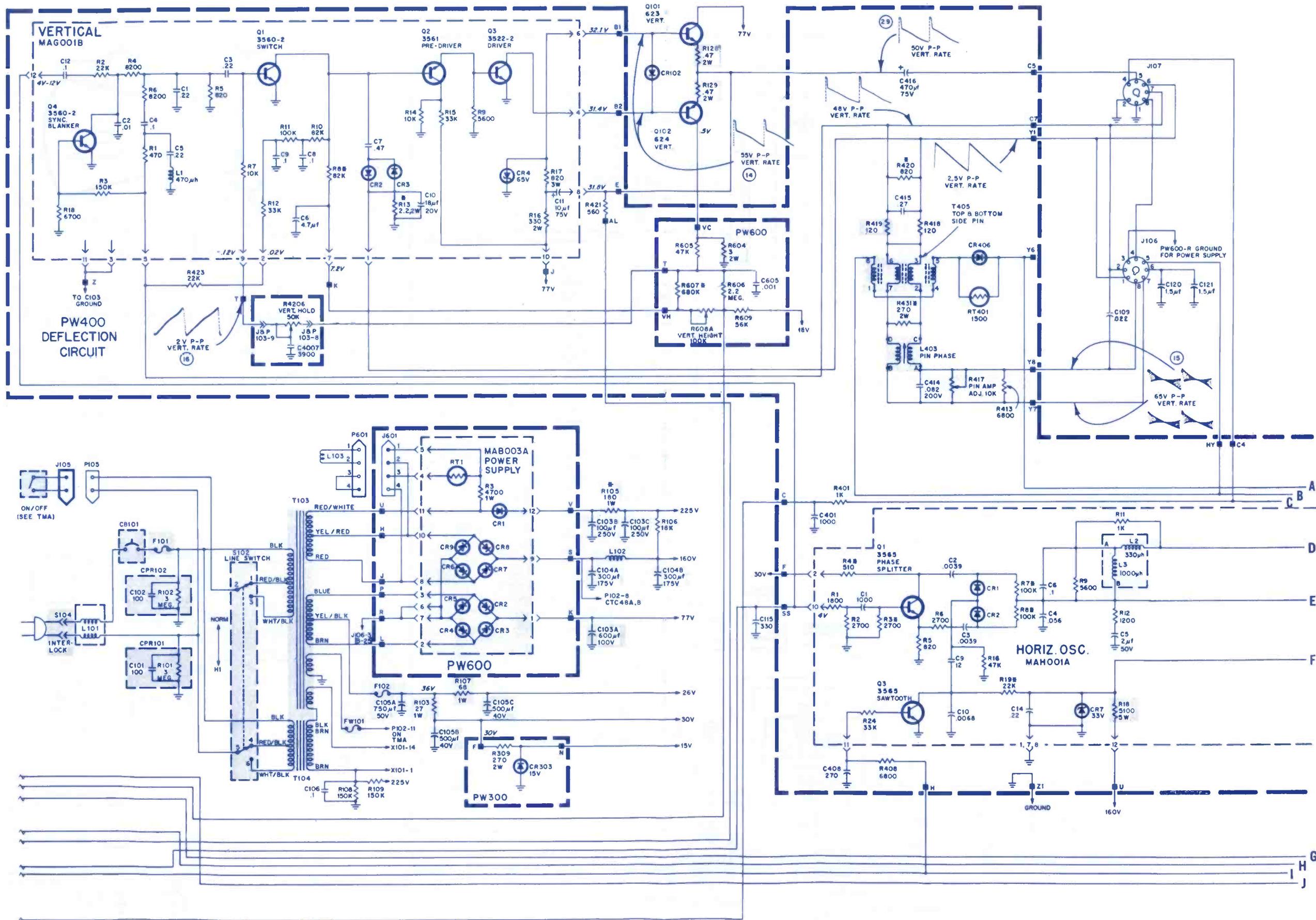
NOTES: UNLESS OTHERWISE SPECIFIED
 1. CAPACITANCE VALUES MORE THAN 1 ARE IN PICOFARADS.
 2. CAPACITANCE VALUES LESS THAN 1 ARE IN MICROFARADS.
 3. RESISTORS ARE 1/2WATT, 10%.
 CONTRAST & BRIGHTNESS CONTROLS ARE LOCATED ON THE CONTROL PANEL ON THE T966-02, 03, 05, & 06 VERSIONS ON THE BOARD ON T966-01 & 04.
 PART OF ANODE LEAD ASSEMBLY.
 VERTICAL HOLD CONTROL LOCATED ON THE CONTROL PANEL ON THE T966-03 & 06.
 VOLTAGES WILL VARY WITH SETTING OF CONTROLS.

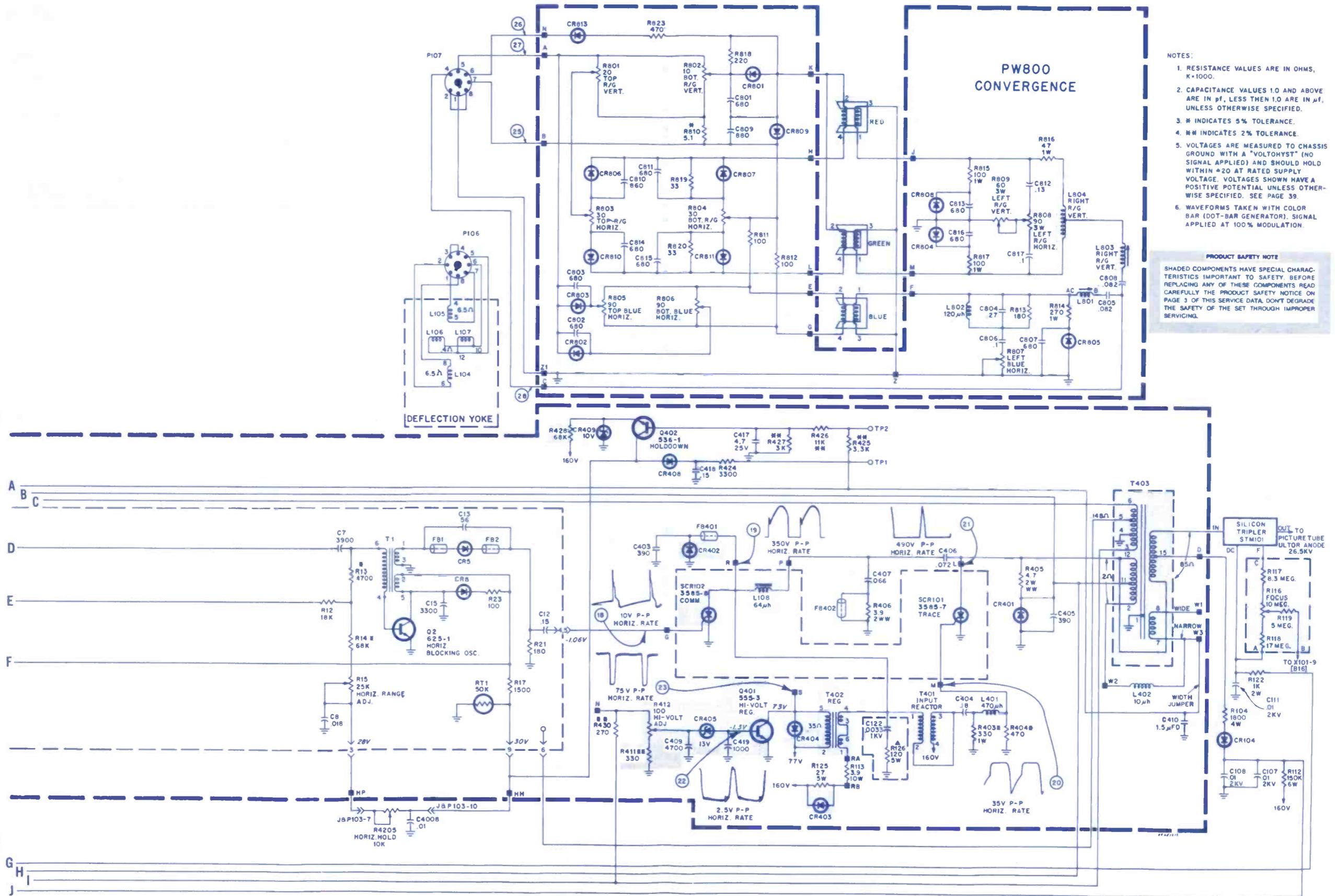


RCA CONTINUED NEXT PAGE

RCA SALES CORP.
Color-TV Chassis
CTC48 Series







- NOTES:
1. RESISTANCE VALUES ARE IN OHMS, K=1000.
 2. CAPACITANCE VALUES 1.0 AND ABOVE ARE IN μ F, LESS THAN 1.0 ARE IN μ F, UNLESS OTHERWISE SPECIFIED.
 3. W INDICATES 5% TOLERANCE.
 4. WW INDICATES 2% TOLERANCE.
 5. VOLTAGES ARE MEASURED TO CHASSIS GROUND WITH A "VOLTOHYST" (NO SIGNAL APPLIED) AND SHOULD HOLD WITHIN ± 20 AT RATED SUPPLY VOLTAGE. VOLTAGES SHOWN HAVE A POSITIVE POTENTIAL UNLESS OTHERWISE SPECIFIED. SEE PAGE 39.
 6. WAVEFORMS TAKEN WITH COLOR BAR (DOT-BAR GENERATOR). SIGNAL APPLIED AT 100% MODULATION.

PRODUCT SAFETY NOTE

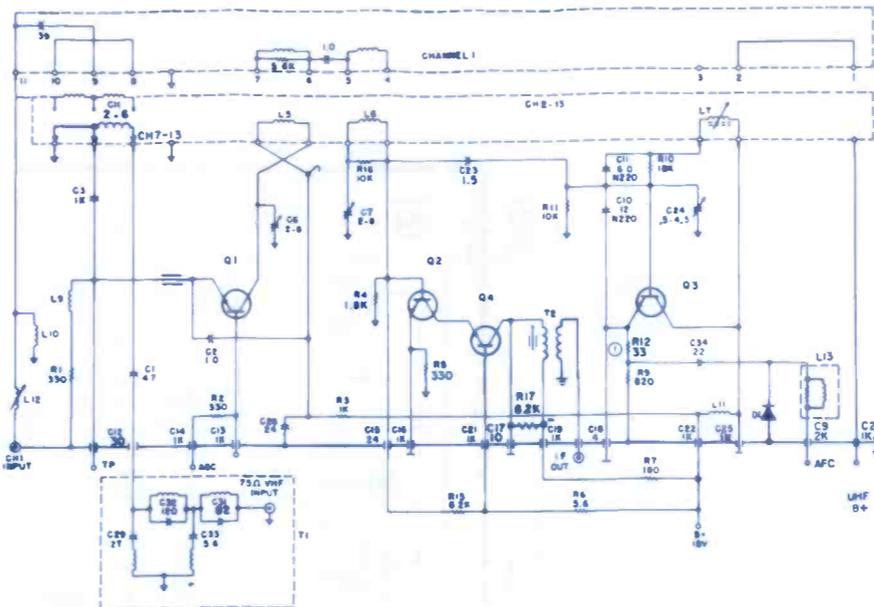
SHADED COMPONENTS HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS READ CAREFULLY THE PRODUCT SAFETY NOTICE ON PAGE 3 OF THIS SERVICE DATA. DON'T DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING.

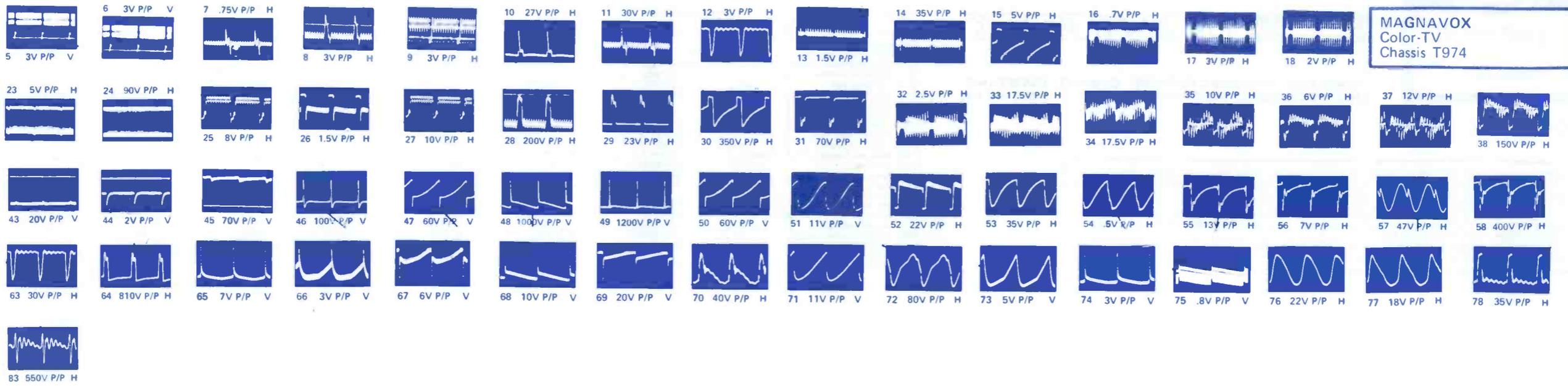
SYMBOL DESCRIPTION MAGNAVOX PART NO.

L12—sound detector coil assy, 4.5 MHz	361422-3
L13—quad coil, 4.5 MHz	361389-2
L152—horiz efficiency coil	361022-5
L205—chroma xformer, ACC	360950-8
L501A,B—horiz frequency & sine wave	360960-3
L702—reactance coil	360963-3
T130—power xformer	300294-3
T150—high voltage xformer	361411-2
T151—focus coil	361306-1
T180—vert output xformer	320376-2
T201—chroma bandpass xformer	361339-1
T202—chroma output xformer	361343-1
T701—3.58MHz osc xformer	361198-2
T702—burst xformer	361094-2
deflection yoke	361380-5
C133A,B,C—electrolytic 80, 30, 50µf, 450v	270071-21
C134A,B,C—electrolytic 80-80µf, 450v, 20, 350v	270071-24
R154—metal oxide, 15K, 10%, 7W	230197-1539
R156—metal oxide, 1K, 5%, 5W	230196-1095
R157—carbon 66K, 20%, 6KV	230161-3
R306—wire wound 3300Ω, 5%, 7W	240081-165
R308—metal oxide 5600Ω, 10%, 5W	230195-5629
R1—47.25 null control, 100Ω	220193-23

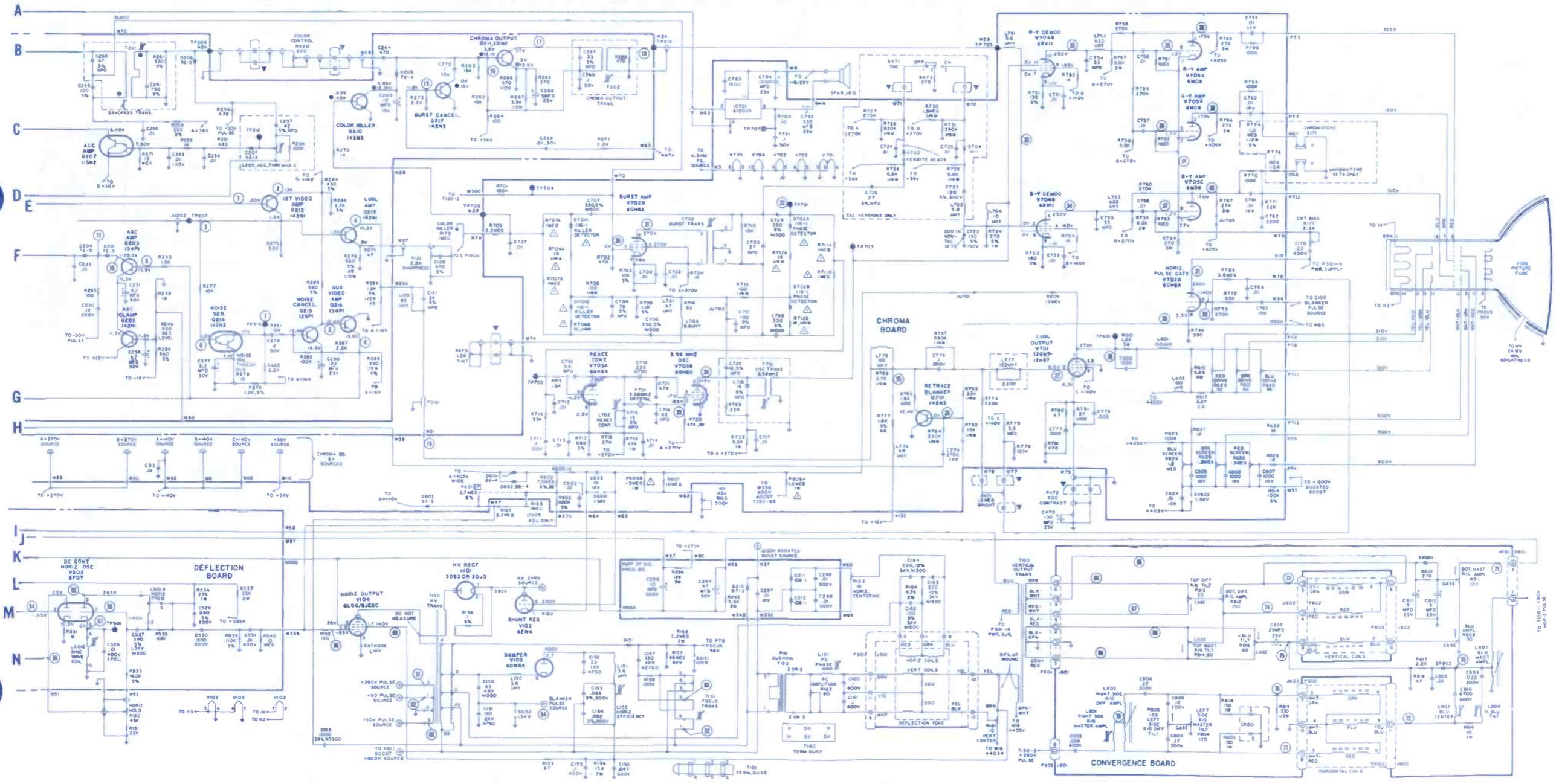
R11—41.25 null control, 250Ω	220193-18
R77—AFT DC balance control, 5K	220193-22
R120—AGC control, 50K	220208-33
R121—sharpness control, 2.5K	220146-84
R122—horiz centering control, 10Ω	220181-12
R161—vert centering control, 10Ω	220181-1
R163—high voltage adjust, 500K	220208-65
R166—hold down adjust, 1M	220208-34
R170—color killer control, 1M	220208-34
R171—CRT bias control, 2500Ω	220181-11
R150—horiz hold, 45K	220193-11
R246—detector level adjust, 500Ω	220193-13
R278—noise inverter threshold adjust, 1K	220220-31
R612—vert linearity, 500K	220220-33
R619—vert height, 3.4M	230170-5
RV131—thermistor	230175-1
VDR131—varistor	230167-7
F1—fuse, 5a, 125v, slo-blo	181021-5500
F2—fuse, 5a, 125v, slo-blo	181021-5500
F3—fuse, 1.5a, 125v, slo-blo	181021-5150
F4—fuse, 20a, 32v, slo-blo	181021-6020
F1 fuse holder	180997-1
F2 fuse holder	180947-2

VHF TUNER SCHEMATIC DIAGRAM



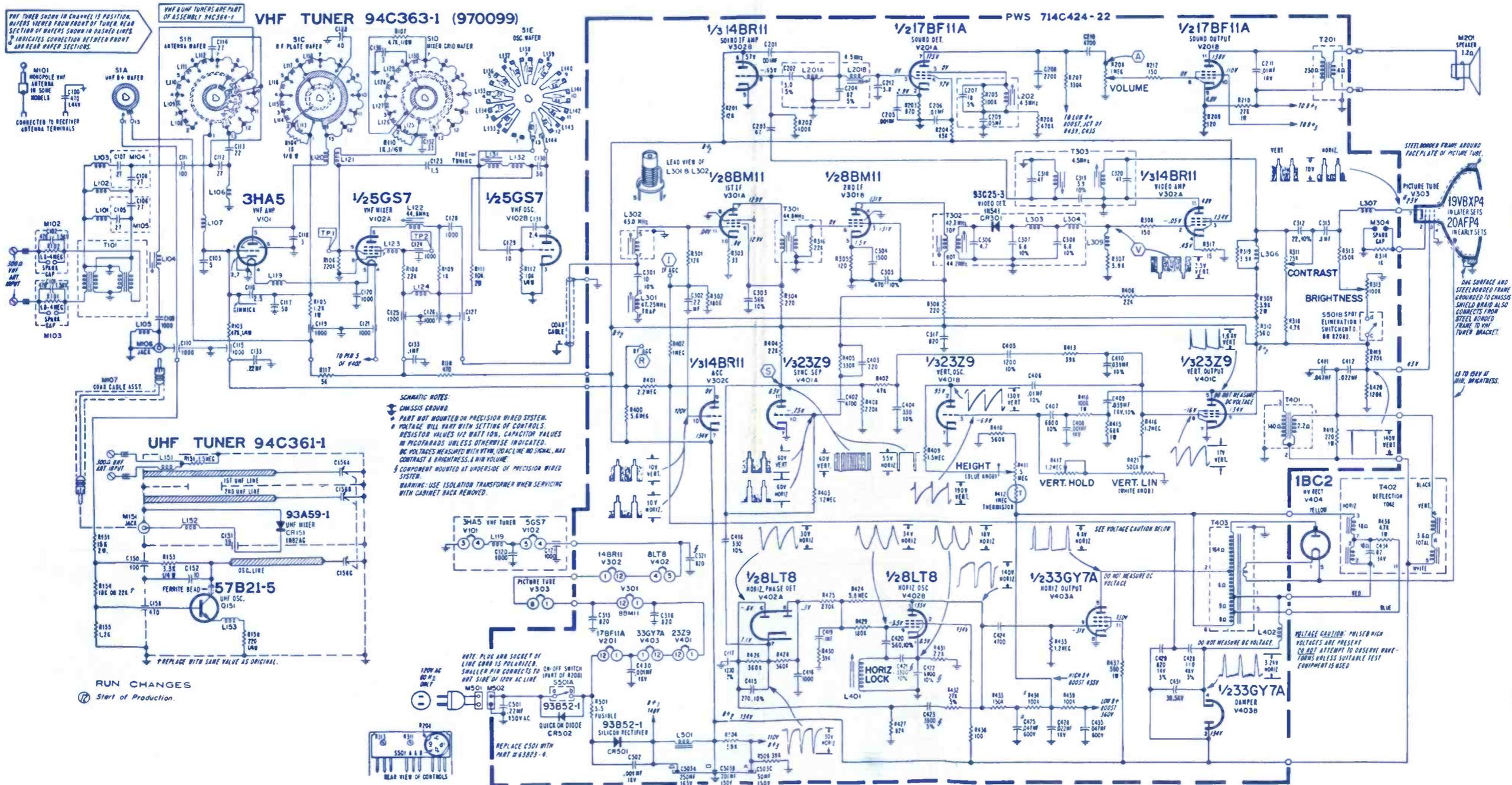


MAGNAVOX
Color-TV
Chassis T974

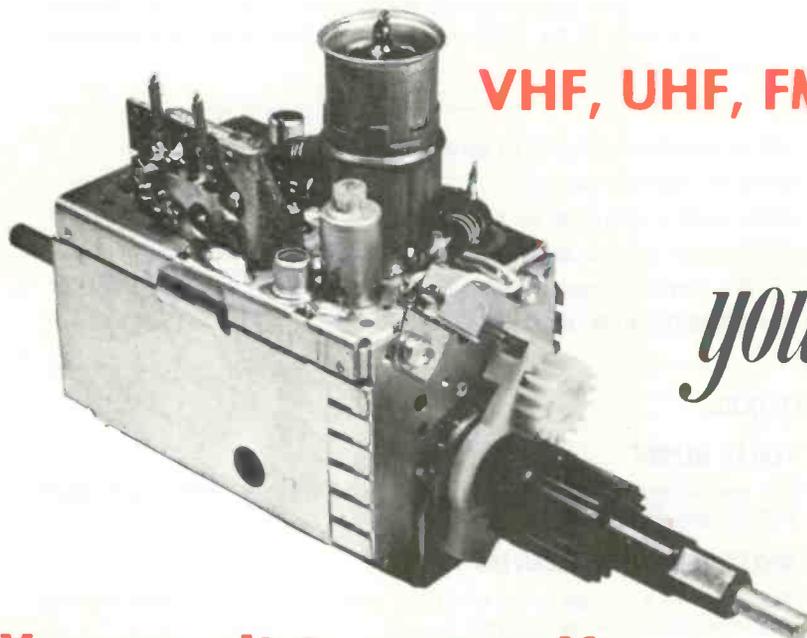


SYMBOL	DESCRIPTION	EMERSON PART NO.
R208	1M vol control and on-off switch	75A126-2
R309	3900Ω 2w	970000
R311	25K contrast control	Part of R208
R313	100K brightness control	Part of R208
R411	5M height control	970001
R412	1M thermistor	61A41-2
R417	1.2M vert hold control	75A100-8
R421	500K vert linearity control	970002
R501	5.5A fuse	61A48-1
C503A	250μf, 165v elect	67A30-12
C503B	200μf, 150v elect	67A30-12
C503C	50μf, 150v elect	67A30-12
L202	quad coil (includes C207 & R205)	970013
L301	47.25MHz	72A308-8
L401	horiz lock coil	94A17-21
T201	audio output xformer	79A124-1
T301	1st IF xformer	970015
T302	2nd IF xformer (includes C306)	72A310-1
T303	sound takeoff & 4.5MHz trap	72A185-7
T401	vert output xformer	79A123-1
T402	deflection yoke assembly	970016
T403	horiz output xformer	79A138-2
	vht tuner	970099
	uhf tuner	93A361-3

ELECTRONIC TECHNICIAN/DEALER is published monthly by HARCOURT BRACE JOVANOVIICH PUBLICATIONS, INC., 1 East First St., Duluth, Minn. 55802. Subscription rates: One year \$6, two years \$10, three years \$13, in the United States and Canada. Other countries: One year \$15, two years \$24, three years \$30. Single copies 75¢ in the United States, and \$2 in other countries. Second class postage paid at Duluth, Minnesota 55806 and at additional mailing offices. Copyright 1972 by HARCOURT BRACE JOVANOVIICH PUBLICATIONS, INC.
POSTMASTER: Send Form 3579 to ELECTRONIC TECHNICIAN/DEALER, HARCOURT BRACE JOVANOVIICH PUBLICATIONS, INC., 1 East First St., Duluth, Minn. 55802.



TV TUNER SERVICE



VHF, UHF, FM or IF-Subchassis. . .
 . . . All Makes

you get...

Fast 8 hr. Service!

You owe it to yourself

to try P.T.S. We are the fastest growing, oldest and now the largest tuner service company in the world. Here is what you get:

1. Fastest Service — 8 hr. — in and out the same day. Overnight transit to one of our six plants, for parts, tuners or IF-modules.
2. All tuners cleaned inside and out, repaired, realigned and air tested.
3. On IF-modules all stages checked, all traps set with high calibre test equipment.
4. Fine Quality! Your customers are satisfied and you are not bothered with returning your units for rework!
5. Lower Cost! Up to \$5.50 less than other tuner companies!
6. Friendly, helpful personalized service!



1 YEAR GUARANTEE

We offer you finer, faster...

Precision

Tuner Service



VHF-UHF-FM **\$ 9.95**
 UV-COMBO **\$16.95**
 IF-MODULE **\$12.50**

Major Parts charged at Net Price

CUSTOMIZED REPLACEMENTS AVAILABLE FOR \$12.95 UP (NEW OR REBUILT)

LIKE TO DO IT YOURSELF?

PTS makes all tuner parts available to you.

Send one dollar (redeemable) for our

TUNER REPLACEMENT GUIDE AND PARTS CATALOG

- 60 pages of top information
- Blow-up of all tuners
- Largest exact tuner replacement guide
- Antenna Coil Replacement Guide
- Multi-fit Replacement Tuner Shaft Guide

For fastest service, send faulty unit with tubes, shields and all broken parts to:

PTS ELECTRONICS, INC.

HOME OFFICE—P. O. Box 272—Bloomington, Ind. 47401	Tel. 812/824-9331
EAST—P. O. Box 3189—Springfield, Mass. 01103	Tel. 413/734-2737
WEST COAST—P. O. Box 41354—Sacramento, Calif. 95841	Tel. 916/482-6220
MOUNTAIN—P. O. Box 4145—Denver, Colo. 80204	Tel. 303/244-2819
SOUTHWEST—P. O. Box 7332—Longview, Tex. 75601	Tel. 214/753-4334
SOUTHEAST—P. O. Box 6771—Jacksonville, Fla. 32205	Tel. 904/389-9952

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

ELECTRONIC TECHNICIAN/DEALER

NOVEMBER 1972 • VOLUME 94 NUMBER 11

PHILLIP DAHLEN, CET
Editor
1 East First Street
Duluth, Minn. 55802
(218) 727-8511

ALFRED A. MENEGUS
Publisher
757 Third Avenue
New York, N.Y. 10017
(212) 572-4838
(212) 572-4839

TOM GRENEY
Publishing Director

JOSEPH ZAUHAR
Managing Editor

GAYNELLE DAVIDSON
Production Manager

JOHN PASZAK
Graphic Design

LILLIE PEARSON
Circulation Fulfillment

JOHN KESSLER
Manager, Reader Services

MANAGERS

JIM SMITH, CET
43 East Ohio Street
Chicago, Ill. 60611
(312) 467-0670

CHUCK CUMMINGS
Ad Space South/West
613 North O'Connor
Irving, Texas 75060
(214) 253-8678

KEN JORDAN
DONALD D. HOUSTON
1901 West 8th Street
Los Angeles, Calif. 90057
(213) 483-8530

CHARLES S. HARRISON
CY JOBSON
57 Post Street
San Francisco, Calif. 94104
(415) 392-6794

ROBERT UPTON
Tokyo, Japan
C.P.O., Box 1717

This month's cover photo is supplied through the courtesy of the John Fluke Manufacturing Co., manufacturers of the digital multimeter described in the Test Instrument Report on page 60.

-
- 3 TEKFAQ: Up-to-date schematics for easier servicing.
 - 22 EDITORIAL: Space-Age Neighbor.
 - 24 NEWS: Events of interest to our industry.
 - 28 READER'S AID: What you need or have for sale.
 - 30 LETTERS: Pertinent comments concerning past issues.
 - 34 NEW AND NOTEWORTHY: Merchandise of special interest.
-

FEATURES

39 TEKLAB REPORT

The modular circuitry that we encountered when examining RCA's Model ER475 Portable Color-TV Set.

43 WHAT'S NEW IN TV RECEIVERS FOR 1973

The second in a two-part series of articles concerned with the TV sets that you may be selling or servicing next year.

49 KENWOOD'S KC-6060A SOLID STATE AUDIO LAB-SCOPE

The features that we observed when examining a scope designed for use by your audiophile customers.

56 BASIC DIGITAL CIRCUITRY

The first in a series of articles concerned with the type of digital circuitry that you may soon be servicing.

60 TEST INSTRUMENT REPORT

Reviewing specifications for Fluke's Model 8000A 3½-digit Multimeter.

-
- 62 COLORFAQ: Tips for easier color-TV set repair.
 - 64 TECHNICAL DIGEST: Hints and shortcuts for more effective servicing.
 - 67 NEW PRODUCTS: Instruments and components to make your job easier.
 - 71 DEALER SHOWCASE: These items may increase your sales revenue.
 - 75 TECHNICAL LITERATURE: Informative material that you may need.
 - 77 BOOK REVIEWS: Our appraisal of recent publications.
 - 78 ADVERTISER'S INDEX: Manufacturers concerned about you.
 - 79 READER'S SERVICE: A source of additional information.
-



A HARCOURT BRACE JOVANOVIICH PUBLICATION



HARCOURT BRACE JOVANOVIICH PUBLICATIONS: James Milholland, Jr., Chairman; Robert L. Edgell, President; Lars Fladmark, Senior Vice President; Richard Moeller, Treasurer; John G. Reynolds, Vice President; Thomas Greney, Vice President; Ezra Pincus, Vice President; Bruce B. Howat, Vice President; James Gherna, Vice President.

ELECTRONIC TECHNICIAN/DEALER is published monthly by Harcourt Brace Jovanovich Publications. Corporate Offices: 757 Third Avenue, New York, New York 10017. Advertising Offices: 43 East Ohio Street, Chicago, Illinois 60611 and 757 Third Avenue, New York, New York 10017. Editorial, Accounting, Ad Production and Circulation Offices: 1 East First Street, Duluth, Minnesota 55802. Subscription rates: One year \$6, two years \$10, three years \$13, in the United States and Canada. Other countries: one year \$15, two years \$24, three years \$30. Single copies: 75¢ in the U.S. and Canada; all other countries \$2. Second class postage paid at Duluth, Minnesota 55806 and at additional mailing offices.

POSTMASTER: Send form 3579 to ELECTRONIC TECHNICIAN/DEALER, P.O. Box 6016, Duluth, Minnesota 55806.

Copyright © 1972 by Harcourt Brace Jovanovich, Inc. All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from the editor or publisher.

Now every product in this catalog is available on a special money saving offer from your RCA distributor.



A complete new look from RCA in Antenna System Accessories

RCA's all new line of Antenna System Accessories has been planned and designed to fulfill specific requirements of any antenna system in every detail. Covering every requirement from a simple passive two-set coupler up to a complete amplified, 82-channel coaxial multi-outlet distribution system for houses, offices, stores and small apartment buildings, this new line is complete in every respect and represents a new standard of performance, convenience and styling.

The entire line is advance-engineered by RCA to meet rigid performance standards. RCA's all-solid-state circuitry provides dependable trouble-free performance. Protection against lightning induced voltage surges is provided in all amplifiers. All passive devices designed for low insertion loss.

All housings have RCA's "new-look styling" in molded high MPAC® plastic cabinets. Similar styling design for all models presents a uniform appearance for a complete line.

Installation convenience . . . mounting is simplified with the use of the new RCA "slip-on" clamps. No solder connections are required to connect any model into a system. Serrated washers simplify connecting 300-ohm line to the devices. All hardware, complete installation instructions and system wiring connectors are included with every model.

INDEX

Multi-Set Couplers	3
Band Separators (Back of Set)	5
(Wall Mount)	7
Matching Transformers	8
Antenna Couplers	9
Interference Filters and Traps	11
Wall Outlets and Plugs	13
Preamplifiers	16
Distribution Amplifiers	24
Typical Distribution Systems	31

This is how to get it.

The RCA Antenna Systems Accessories Catalog is the TV service dealer's complete guide to better reception for his customers and more sales. So tune in and get your free copy today with absolutely no obligation. Ask your local RCA Parts and Accessories distributor how to get your free copy, and find out about

the special money saving offer available from participating RCA distributors. For the name and address of your nearest RCA distributor, write: RCA Parts and Accessories, Distribution Services, 2000 Clements Bridge Road, Deptford, New Jersey 08096. **RCA**

. . . for more details circle 130 on Reader Service Card

Space-Age Neighbor



In the April issue of **ELECTRONIC TECHNICIAN/DEALER**, Isaac Blonder predicted that by early 1973 Canada would have a domestic TV satellite in space, providing up to 12 TV channels at

frequencies somewhere around 4GHz. Our September news section contained a photograph of that satellite, which is now scheduled to be in orbit this month—and may even be functioning in space by the time you read this editorial.

From the limited information that we have been able to obtain, it seems that the satellite was developed by the Hughes Aircraft Co. in El Segundo, Calif.; that it will be put into space by our government space center at Cape Kennedy, Fla.; and that it will be tracked with Hughes equipment in Guam as it is brought into synchronous orbit—all of these services having been provided under contract with Telesat Canada.

Since the satellite will be transmitting a beam width of $3\frac{1}{2}^\circ$ by $7\frac{1}{2}^\circ$, reception will not only be possible in Canada, but also in much of the United States. This satellite is expected to be located above the equator somewhere between 85° and 110° west longitude, 22,300 miles above the Pacific Ocean. Upon checking our maps and doing a little math, we observe that this could locate the satellite almost due south of Minneapolis, approximately $6\frac{1}{2}^\circ$ below the noon-day sun. Like the moon, we expect that the orbit of this satellite will appear to shift north and south, depending upon the seasons. Being in synchronous orbit, it should otherwise appear stationary.

I feel that this satellite is a real credit to Canada—a country that has had enough sense to use its

money to put our country's space-age technology to some practical use that directly affects the public.

Although I applaud their wise decision, I am annoyed by the fact that things are so snarled in Washington red tape that there have not yet been public announcements of even definite plans for such a system to serve our own country. We will instead be forced to borrow from a Canadian Satellite (made here in the U.S.) program material (quite possibly originated by one of the four major U.S. TV networks) not intended for our use.

I hope that the above paragraph has not offended any of my many Canadian friends. I greatly admire their nation and the significant work that it has done with a smaller population, and therefore a smaller economy. They too have great scientists, and I have observed when in Canada some of the excellent TV program material that they do originate for use in their nation. This situation is instead a slap in the face of our own country—where too many involved in communications are so wrapped up in their own interests that they fail to show adequate concern for the people in our own country's TV fringe and non-reception areas. CATV is not the only answer!

I feel that there are many parts of our nation where the population is much too thin for a system of wired TV to be economically feasible. There are also some population centers where people are lucky if they are even able to scrape together enough money to purchase a used TV set, let alone subscribe to a wired TV service.

CATV promoters are now most interested in high-density population areas that already have quite a number of over-the-air TV channels—selling the public on “better” reception (which sometimes actually

turns out to be worse) and additional program material. However, satellite systems, functioning on an international scale, can provide many, many times the program material available on even the most sophisticated CATV system, with the satellite antenna representing a one-time cost that can be less than that of a second TV set. Local TV stations can continue to provide the news and programs of special interest to the immediate geographical area. And as for two-way communications, AT&T is well on the road to developing public two-way video communications systems that are not limited to a mere 20 or so channels—each person having their own private or party line.

Several decades ago Budapest, Hungary went modern and installed wired music throughout the city—yet radio prevailed. Now we talk of a nation wired for pictures.

The CATV promoters are not the only people that would like to take away our right to over-the-air TV for their personal gain. Some manufacturers of two-way radios have openly spoken of eliminating this form of TV—choosing to disregard greater public needs. No one said much when we lost TV Channel 1—44 to 50MHz—to two-way radio, then later in many areas the top 14 UHF channels; but more recently we also lost the bottom seven UHF channels to such applications in the top 10 urban areas in the U.S. (Some day all automobiles will probably be equipped with two-way radios, but with computerized switching techniques, this should be possible through the proper budgeting of other portions of the radio spectrum.)

Since the Canadians did purchase this satellite for their own domestic use, most of us in the U.S. are rather ignorant concerning the exact microwave

continued on page 78

Everytime we introduce a new product, you become more important.

New products mean more business. Not only for us, but for you. Independent service technicians. Once a product leaves our hands, it's in yours. Along with our reputation for making quality electronics. And for standing behind them. That's why you're so important to us. You help us maintain our good name. Product after product. Year after year.

Our products are designed not to break down. But the present state of the art, and the continuous flow of new and unique products, con-

tinue to provide opportunities for the service technician.

We think about you even before we introduce a product. We build our equipment for easy serviceability. Service literature and replacement parts are programmed to be available when a product goes to market. Not months later, when a customer may need help. There's no delay for you. No inconvenience for your customer.

As a special feature, we subscribe to a country-wide, toll free tele-

phone referral system. It operates 24 hours a day, 355 days of the year. When a customer calls 800-243-6000 asking for Panasonic service, he is referred to the nearest authorized independent service center. Yes, our nationwide network of authorized service centers is made up of men like you, independent service technicians. Panasonic depends on you. For in-warranty and out-of-warranty work. It adds up to more business for you. And, it's no wonder that you become more important to us.



Panasonic.

just slightly ahead of our time

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

Panasonic Service Division, 10-16 44th Drive, Long Island City, N.Y. 11101

NEWS OF THE INDUSTRY

Board Approves Changes In IS CET Program

At the NEA and IS CET board meetings in Omaha, Neb. during the first week of October, some basic changes and clarifications were made concerning the IS CET program.

It was decided that the serviceability rating of consumer electronic products—formerly an NEA function that has been given much publicity by some TV set manufacturers—will in the future be an IS CET function with the administrative support of NEA.

In response to pressures by some correspondence schools, IS CET will set up a committee concerned with the rating of more schools. In the opinion of the IS CET Board, many correspondence schools currently fail to include an adequate hands-on approach, relying too heavily on theory in their curriculum. Therefore, only two correspondence schools have thus far received the association's endorsement.

At the request of some members, a standardization of the use of the initials CET after the signature of those having passed the CET Exam was recommended. It has been suggested that the association promote the use of these initials by everyone passing the exam, and that they appear in capital letters without periods—as in the signature following this month's editorial.

The questions supplied this month are similar to those included in Part VI of the CET Exam.

Section VI Instruments

1. A basic meter movement uses shunts to change the (current/voltage) ranges.

2. The curve tracer can be used to check voltage versus current characteristics of any active solid-state devices. (True/False)
3. Calibration of the vertical amplifiers in a scope is normally a "factory-type" setting. (True/False)
4. A sawtooth voltage is normally used for a time base at the horizontal plates in the scope's CRT. (True/False)
5. A post marker generator used in alignment places markers on a response curve by injecting energy into the unit being aligned. (True/False)

Explanation

1. Shunts are used to bypass some of the current around the meter movement to increase the current ranges. Series resistances are used to limit meter current in voltmeters.
2. True. The curve tracer "looks" at current from one element of the solid-state component while that element's voltage is varied; such as, collector current versus collector voltage.
3. False. Calibration is normally a "front-panel" adjustment on most vertical amplifiers in scopes.
4. True. A sawtooth is used to deflect the electron beam in the horizontal direction at a linear rate from left to right (as viewed from the screen) and to return the beam quickly to the left side. The left-to-right movement can then be calibrated in units of time since the movement is linear with respect to time.
5. False. A post marker generator injects energy onto the response curve after it comes from the unit being aligned.

NEW EICO TR-410

Solid-State Triggered Sweep 10MHz Oscilloscope

\$379.⁹⁵

Never before has so much been built into a low cost solid state triggered sweep scope!



INCLUDES EXCLUSIVE
DUAL PROBE

EICO introduces the first laboratory quality, high performance, wideband Triggered Sweep Oscilloscope, at a price you can afford!

Use as Vectorscope for Color TV Servicing ■ 3 calibration voltages (2, 5 and 10) ■ Quick connect BNC connector at Vertical Input ■ Front panel adjustable Horizontal and Vertical DC Balance Controls ■ Vertical and Horizontal selection of AC or DC modes of amplification ■ Sweep synchronized Gate Output ■ Flat faced CRT ■ Z Axis input ■ Rear panel astigmatism control ■ Edge lit calibrated screen ■ Operates on a standard 120 volt, a low 100 volt or a 220-230 volt line.

FREE 1973 EICO CATALOG

For name of nearest dealer and free catalog check re-order service card or send 25¢ for prompt first class mail service. EICO—263 Malta St., B'klyn, N.Y. 11207



... for more details circle 112 on Reader Service Card



Those attending the meeting held for the St. Louis "Open Sesame Street" project include: (L to R) Mrs. Lillie Milkie, Chairman of the project (AOA Aux.); Vincent Lutz, CET, NEA Director of Special Activities; Carol Wells, Mayor's Council on Youth; and Marilyn Rothbard, Consultant to KETC School Services. The "Open Sesame Street" Project for providing TV sets to non-profit day-care centers, thus enabling pre-school disadvantaged children to watch Sesame Street, was "Kicked Off" in October in St. Louis. The project is sponsored by The American Optometric Assn. Auxiliary and National Electronic Assns. The AOA Auxiliary will collect the donated TV sets and NEA members will safety check them before delivery to the day-care centers. The program is national in scope.

Service Dealer Contributes \$124.50 to S.I.S. Fund

At the Joint Convention in New Orleans last August, Bob Harrison handed Morris L. Finneburgh, Sr., E.H.F., Trustee for the S.I.S. Fund, a check for \$124.50 that he

A Message to All Independent TV Service!

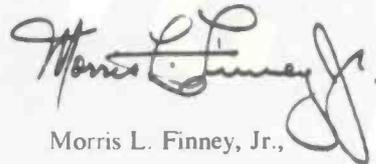
*The Finney Antenna Company offers congratulations to
NATESA and NEA
on their Historical Merger Project!*

The Finney Antenna Company is highly honored by the unanimous selection of its Senior Officer—M. L. Finneburgh, Sr., E.H.F. — as Moderator-Chairman of the all important NATESA/NEA Joint Merger Committees.

The Finney Antenna Company Board of Directors — recognizing that the future security of Independent TV Service is seriously involved — has taken the following action:

“Morris L. Finneburgh, Sr., E.H.F. has been temporarily relieved of certain important Company administrative responsibilities in order to invest his maximum time, efforts and guidance in behalf of the TV SERVICE INDUSTRY MERGER PROJECT”.

The Finney Antenna Company knows no ethically better way of continuing to earn the respect, confidence and patronage of our Industry.



Morris L. Finney, Jr.,
President

had received from Richard S. Megyese of Hi Fi Clinic, Inc., Virginia Beach, Va.

We were advised that this generous gift represented 50 percent of the insurance rebate that Mr. Megyese received as a result of his activities with the Virginia Electronics Assn.

We hope to hear of many other similar contributions by other service dealers concerned with maintaining the public image of Superior Independent Service.

Merger Committee Conducts Successful Memphis Meeting

The first of a series of NATESA/NEA Merger Committee Meetings was held at the Admiral Ben Bow Hotel in Memphis, Tenn. on September 29 and 30, 1972. The Friday meeting lasted until approximately 3:00 in the morning, while the Saturday session was from 9:00 a.m. until 4:00 p.m. The meeting was attended by the following members of the NATESA Committee: Leroy Ragsdale, Ft. Smith, Ark., Chairman; Gerald Hall, Milwaukee, Wis.; Clifford Shaw, Va.; George Weiss, Chicago, Ill.; and Edward Gorman, N.Y. The attending NEA Committee members were: Norris Browne, Houston, Tex., Chairman; Charles Couch, Fla.; Virgil Gaither, Calif.; Emmett Hughes, Kan.; and Paul Dontje, Denver, Colo.

Les Nesvik, the ex-official member representing ISCET, could not attend due to an important previous engagement. The Joint Committee Chairman, Morris Finneburgh, Sr., appointed Mr. Ragsdale as Recording Secretary for the present and subsequent Joint Committee Meetings and Mr. Browne as Parliamentarian.

A surprisingly substantial amount of progress was ac-

complished at the first meeting. Plans were set up for a subcommittee to develop a complete package, including by-laws, constitution and procedure for the election of a Board of Directors and officers. Tentatively a name for the new association is—NESDA (National Electronic Service Dealer Association). The name is subject to possible change.

It was unanimously agreed that Frank Moch (NATESA) and Richard Glass (NEA) would be elected to the position



of Executive Vice Presidents for the new association. A subcommittee will, at subsequent committee meetings, present an outline of their separate duties. It was suggested that in the broad sense Mr. Moch have the responsibility of public
continued on next page

THE NEW 360° VALVE...

IT SPRAYS UP

MAGIC VISTA

IT SPRAYS DOWN

**GOLDEN
FOAM
CORRECTS
TUNER
PROBLEMS
LIKE
MAGIC!**



GC ELECTRONICS
DIVISION OF HYDROMETALS, INC.
ROCKFORD, ILLINOIS 61101 U.S.A.



... for more details circle 118 on Reader Service Card

NEWS...

continued from page 25

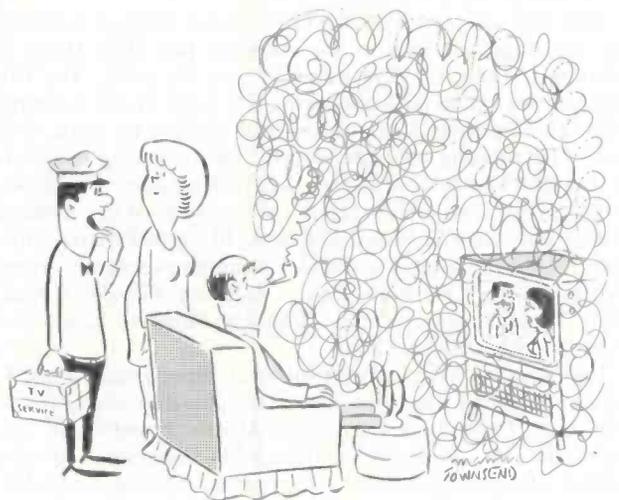
relations, governmental contacts, publicity and other such procedures and responsibilities; while Mr. Glass would be in charge of internal and administrative affairs.

The Joint Committee agreed that no paid official of the new association would be allowed to own or independently operate a publication in the field of Independent Service. The Joint Committee unanimously agreed that there should be a continuation and maximum support of the CET Examination, IS CET and the development of a "shop certification" similar to the program initiated by NATESA. The Joint Committee unanimously decided that Messrs. Moch and Glass would not be invited to the next Joint Committee Meeting, but that an invitation would be considered for subsequent committee meetings. The next Joint Committee Meeting will be held in the first week of December 1972 in Denver, Colo with Mr. Paul Dontje as host.

Many other subjects pertaining to the procedure of merger were discussed at length and in most cases there was unanimous agreement with only the matter of detailed refinements to be accomplished. At the Denver meeting it will be decided as to whether or not the Joint Merger Committees will request early ratification by the governing bodies of NATESA and NEA and their membership, or to await the 1973 Joint NATESA/NEA Convention in Kansas City for the finalizing of the merger.

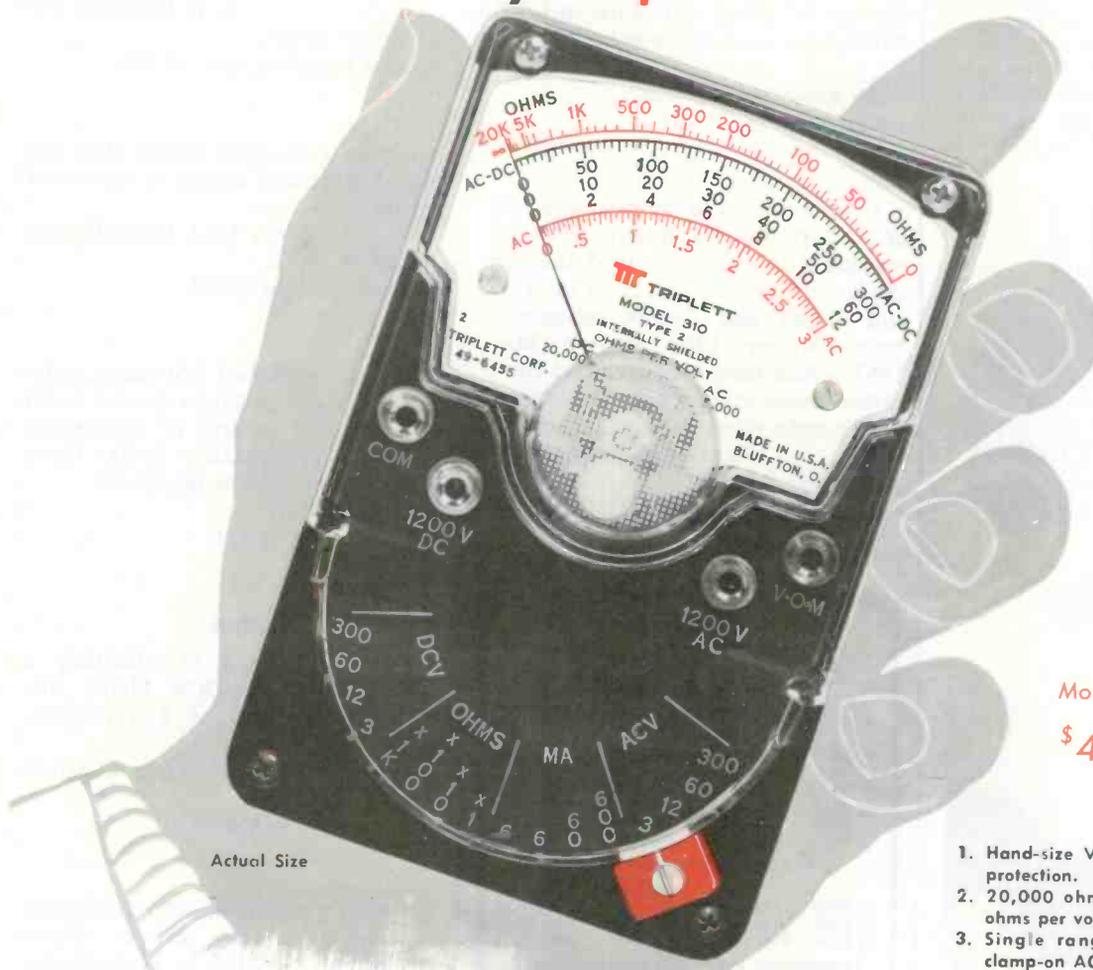
Much concern and good discussion was accomplished on the subject of retaining and protecting the reputation, image and dignity of both NATESA and NEA and their professional executive leaders: Messrs. Moch and Glass. No specific motion nor discussion was presented in reference to the location of the 1974 convention. However, if the merger is accomplished and ratified by the time of the Kansas City Convention in August, 1973, it was generally agreed that a 1974 Hawaiian Convention to celebrate the merger would be acceptable.

At the close of the long and extremely constructive Joint Merger Committee Meeting, a motion was unanimously passed thanking Mr. Finneburgh, Sr., E.H.F. for his untiring effort as Chairman, and asking that he continue to act as Chairman and Co-ordinator of subsequent meetings until the merger project is completed. It was generally agreed by all in attendance that a "giant step forward" had been taken in behalf of the image and future security of all Independent Service. When the new national association is accomplished, plans are in the works for an all-out effort to reach a membership of 10,000.



"H'm'm! You say your color isn't coming through very clear?"

If you want the
World's **most**
popular hand-sized V-O-M...
Buy **Triplett's 310**



Actual Size

Model 310
\$46

1. Hand-size V-O-M with diode overload protection.
2. 20,000 ohms per volt DC and 5,000 ohms per volt AC.
3. Single range switch; provision for clamp-on AC ammeter.

Handy by virtue of its operating convenience and its small size, Triplett's Model 310 V-O-M is no miniature when it comes to rugged capability on the job. With outstanding readability, 18 ranges, 20,000 Ohms per Volt DC sensitivity (5,000 Ohms per Volt AC) and diode overload protection, the 310 can handle practically every electrical measurement you'll need to make. Accuracy on DC is 3%: 4% on AC. Most popular V-O-M of its type, Triplett's **Model 310** is a real value at **\$46**

If you'd prefer the extra ruggedness of a suspension movement, the extra sensitivity of 15,000 Ohms per Volt on AC, the extra reliability of an enclosed range-switch and the extra convenience of a DC polarity-reversing switch, ask for Triplett's **Model 310-C** at **\$59**. Or, if you need the additional sensitivity of an FET V-O-M with 10 megohm DC input, the additional ranges of 300 mV DC and X1 megohm, the additional rug-

gedness of a suspension movement and the convenience of a polarity-reversing switch, insist on Triplett's **Model 310-FET** at **\$78**

See them all at your local Triplett distributor or, for a free demonstration, see him or your Triplett sales representative. Triplett Corporation, Bluffton, Ohio 45817.

TRIPLETT

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

... for more details circle 136 on Reader Service Card

now...a better way to drive and adjust hex socket screws

...IN PRECISION WORK

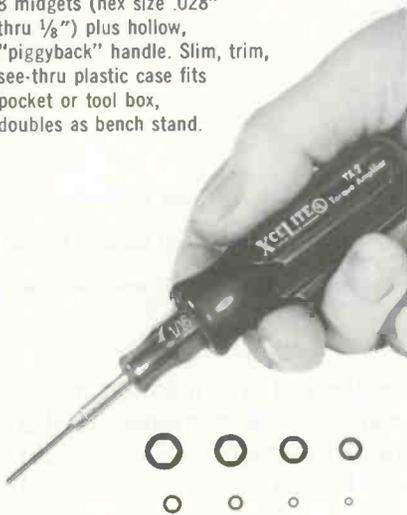
With the tools in this new, compact convertible screwdriver set, you can turn all types of hex socket screws... in all types of locations... faster, easier than with conventional keys.

Handy midgets are ideal for such delicate, precision work as assembly and servicing of instruments and controls. Remarkable "piggyback" torque amplifier handle adds grip, reach, and power needed for other applications, lets you do more jobs with fewer tools.



PS-89 SET

8 midgets (hex size .028" thru 1/8") plus hollow, "piggyback" handle. Slim, trim, see-thru plastic case fits pocket or tool box, doubles as bench stand.



REQUEST COMPLETE HAND TOOL CATALOG

which includes information on other Xcelite Compact Sets, too — slot tip/ Phillips/Scrulox® screwdrivers, nutdrivers, and combinations.



Nationwide availability through local distributor

XCELITE, INC., 14 Bank St., Orchard Park, N. Y. 14127
In Canada contact Charles W. Pointon, Ltd.

... for more details circle 141 on Reader Service Card

READERS' AID

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

For Sale

I have previous issues of ELECTRONIC TECHNICIAN/DEALER from January 1958 to present, less schematics. Will sell them in one batch very reasonable. My age is forcing retirement, so I will have no further need for them.

W. B. GARNER

8126 Amarillo Blvd. East
Amarillo, Texas 79107

I have for sale a complete set of ELECTRONIC TECHNICIAN/DEALER magazines from August 1965 through the current issue. I also have the Circuit Digest and Tekfax schematics from October 1960 through May 1965, which have been removed from earlier copies due to space limitations. Please make offer.

WILLIAM H. RAUCKMANN

1314 Osgood Rd.
Colorado Springs, Colo. 80915

Business For Sale

Having reached retirement age, I wish to find a qualified buyer for my TV sales and service business, which has been built over a nine year period. The 800 sq ft block building and technician cottage are located on the 1/3 acre lot. This business has been a pa and ma operation with a gross average over five years of \$40,000. Sale includes complete up-to-date equipment and inventory. Please write for complete details.

A. B. KENNEDY TV

Rt. 4 Box 1358A
Apache Junction, Ariz. 85220

I have a two-man service shop for sale. I will send details to interested parties.

MELS TV & RADIO REPAIR

161 N. W. Main
Blackfoot, Idaho 83221

A well established (20 years) radio and TV service business located north of Denver in an area of tremendous growth. Approximately \$1500 down "takes over" balance negotiable.

P.O. Box 21007
Denver, Colo. 80221

Schematic Wanted

I am interested in obtaining a schematic for a VOCA Model 101, built by Demolab of Los Angeles, Calif.

GARY L. MILLS

1511 E. 7th St.
Parkersburg, W.Va. 26101

I need a schematic for a Stromberg Carlson short wave receiver, Model 230-H. If available, a photographic view of the chassis would be helpful.

LARRY COLLINS

88 Cornell Dr.
Enfield, Conn. 06082

I need an operating manual and schematic for a Jackson Universal Oscillator, Model 420.

IDEAL STORE OF CATSKILL

350 Main St.
Catskill, N.Y. 12414

Part Needed

I need a schematic and power transformer, No. P-18-165, for a Paco Model 5-50 oscilloscope.

C. M. CHRISTIAN

218 Hilton Ave.
Biloxi, Miss. 39531

T & T VALUE SALE

RAYTHEON NEW JOBBER-BOXED TUBES

80% off LIST

<input type="checkbox"/> 6GH8	5 for \$3.45	<input type="checkbox"/> 6DW4	5 for \$4.05
<input type="checkbox"/> 6JE6	5 for \$8.80	<input type="checkbox"/> 3A3	5 for \$4.40
<input type="checkbox"/> 6BK4	5 for \$8.15	<input type="checkbox"/> 6JS6	5 for \$8.05
<input type="checkbox"/> 6DQ6	5 for \$5.85	<input type="checkbox"/> 6AX4	5 for \$4.05
<input type="checkbox"/> 6FQ7	5 for \$3.25	<input type="checkbox"/> 8FQ7	5 for \$3.25
<input type="checkbox"/> 1G3	5 for \$4.35	<input type="checkbox"/> 6BZ6	5 for \$3.40

RCA NEW JOBBER-BOXED TUBES

70 & 10% off LIST

<input type="checkbox"/> 6GH8	5 for \$4.46	<input type="checkbox"/> 6BK4	5 for \$11.00
<input type="checkbox"/> 6FQ7	5 for \$4.40	<input type="checkbox"/> 6DW4	5 for \$5.54
<input type="checkbox"/> 6JE6	5 for \$13.03	<input type="checkbox"/> 3A3	5 for \$5.94

TRANSISTORS XACT. REPLACEMENT (BOXED)

<input type="checkbox"/> SK3018-HEP709 (list \$2.25 ea.)	5 for \$2.25
<input type="checkbox"/> SK3020-HEP50 (list \$2.20 ea.)	5 for \$2.20
<input type="checkbox"/> SK3021-HEP240 (list \$3.15 ea.)	5 for \$3.15
<input type="checkbox"/> SK3026-HEP241 (list \$3.00 ea.)	5 for \$3.00
<input type="checkbox"/> SK3041-HEP245 (list \$4.20 ea.)	5 for \$4.20

<input type="checkbox"/> IN60 DIODES	50 for \$1.00
<input type="checkbox"/> 2 AMP. 1000 PIV RECT	10 for \$1.00
<input type="checkbox"/> 40 & 40 MFD at 450 VOLTS, DC	2 for \$1.00
<input type="checkbox"/> 60 at 350, 100 at 350, 160 at 350	2 for \$1.00
<input type="checkbox"/> 3.58 COLOR CRYSTALS	2 for \$1.50
<input type="checkbox"/> GARRARD CHANGER, Model 2025	\$19.95

COLOR YOKE SPECIALS

<input type="checkbox"/> SYLVANIA 51-29986-2	\$5.95
<input type="checkbox"/> ZENITH S89633	\$5.95
<input type="checkbox"/> RAYTHEON, IEC, RCA, G.E., SYLVANIA, etc., TUBES	up to 80% off list

FREE GIFT WITH EVERY ORDER!

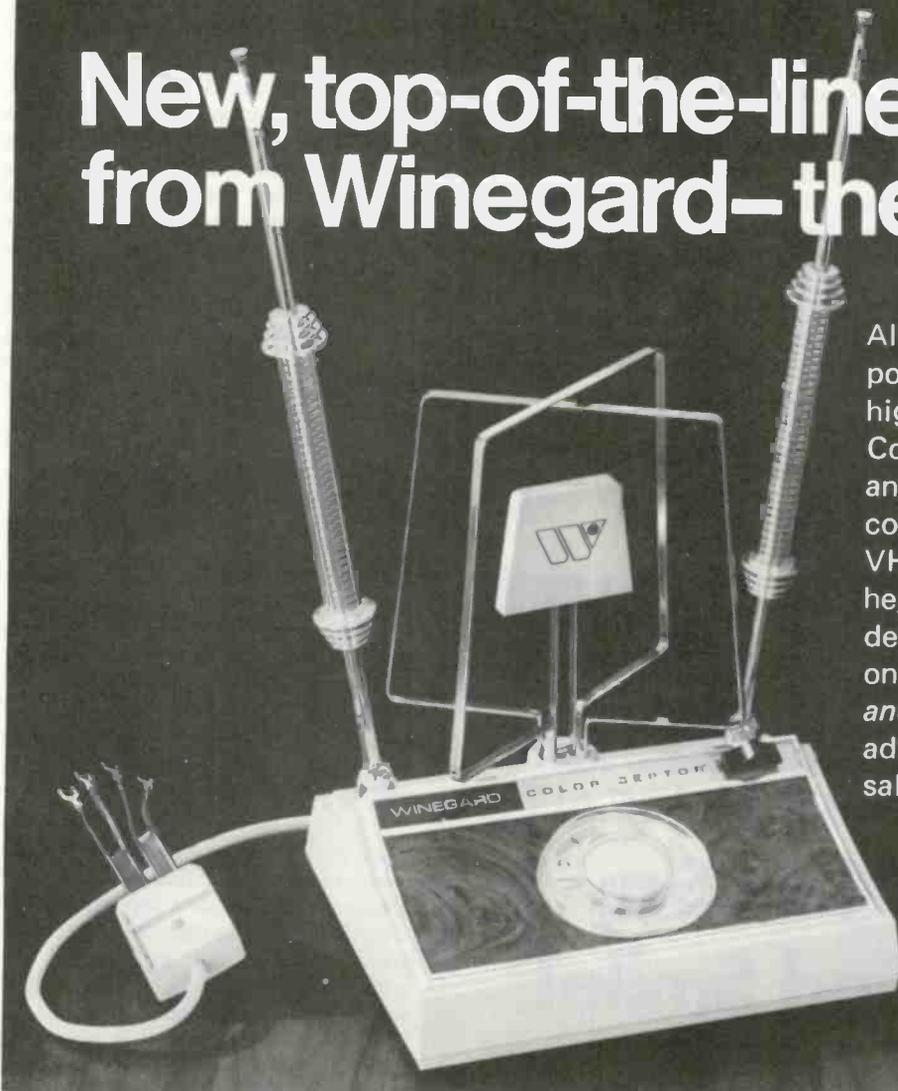
Minimum Order \$30—F.O.B. Brooklyn
Catalogs \$1—Refundable upon your order

T & T SALES CO.

4802 AVENUE K
BROOKLYN, N. Y. 11234
Phone: (212) 241-5940

... for more details circle 115 on Reader Service Card

New, top-of-the-line antenna from Winegard—the top line!



All new and a real powerhouse! Winegard's high-styled CR-400 Color-Ceptor all-channel antenna—features coaxial cable and VHF-UHF signal filter to help minimize ghosting, deliver top performance on all channels—color and FM. Nationally advertised for maximum sales!

Now, Winegard gives you a full line to sell, from \$19.95 to just \$5.95, so you can offer the right antenna for every customer who wants a good indoor model.

Call your Winegard distributor: he'll give you all the facts on

Winegard's promotional help:

- national advertising
- compact, in-store display unit
- special merchandising program for *high profits and turnover!*

Call him now—and make your indoor antenna business a real money-maker!!

WINEGARD
TELEVISION SYSTEMS
Winegard Company, 3000 Kirkwood Street,
Burlington, Iowa 52601



... for more details circle 139 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.

Working in a Toy Shop

About a year ago, I was at a service training meeting and met an interesting fellow. He had been working for a dealer that knew nothing about electronics other than to tell this techni-

cian to "fix it."

The technician, who seemed to be qualified, had been unable to get much test equipment over the years that he was employed for this dealer. He had hobby-type equipment, as that was all the dealer would pay for. This technician, alone in his "toy" shop, was doing the best that he could with the equipment the store owner would provide. As time went on, some of his "cheap" equipment broke down and the dealer would not replace it or provide funds for repair—saying the equipment was not needed.

Toward the end, the only piece of equipment left working in the shop was a cheap VOM, which after many years of hard use finally broke down. When the technician tried to replace it, the shop owner hit the roof, saying it was not needed. So here was a man working under stone-age conditions with no equipment, yet required to operate this dealer's repair department.

What did he do? He quit! The real topper was that the dealer was paying this man, I believe after seven years with the store, \$75.00 per week. We were all stunned at the meeting when he related the story during a break. I no longer remember where he worked, his name or other details.

However, I do recall him saying that the very next day he went down the street and got hired for a "living wage" at a fully equipped shop.

I have often thought of this man and how he must have been "brainwashed" into believing that his job was the only one left on the face of this earth. And with such fear, for all those years had been unable to bring himself to quitting.

I believe that through our associations and trade publications we are made aware of the fact that we must conduct ourselves in a top professional manner—demanding, within reason, proper professional equipment, demanding and getting a "living wage," and in turn *earning* our money.

Even this man saw that he was a fool all those years. Many have slipped into this condition without seeing it happen.

Step back, fellow technician, what is the condition where you work? What is the money you are making? Are you giving your employer a fair day's work? Do you buy books and trade publications to know how to do your job properly? Are you keeping up with the new things? Do you go to the service sessions?

If you are falling short, "shape up." If your employer is giving you the short end of the stick, "bug out."

TIM SKONING

Leader

AUDIO TEST INSTRUMENTS

Now You Can Say Service... and Smile!



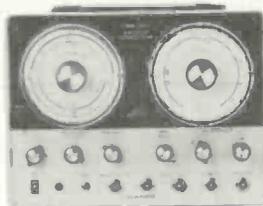
**LV-77
FET MULTIMETER**
Solid state dependability and stability plus high impedance—make this a fine general purpose meter. Has dual power supply—batteries and AC line. It's truly portable! $\pm 3\%$ full scale accuracy with easy to read, clearly marked face panel.

\$109.95

**LFM-30
TAPE SPEED/CHECKER**

Checks any tape recorder for speed and drift accuracy at 3KHz as well as 1, 2, 4, 5, 6, 7, 8 & 9KHz frequencies. 100MV to 10Vrms input level. $\pm 5\%$ end scale accuracy with -3% to $+3\%$ test range. Complete with carrying case.

\$129.95



**LSW-250
FM-TV SWEEP/MARKER
GENERATOR**

Use with any scope to test and service FM, TV and more. Has 2-260MHz freq. range, cont. adjustable, with calibrated markings for most often used bands. Marking method is post injection with external signal input provision. Highly stable and accurate. With accessories.

\$309.95



**LMV-89
2 CHAN. AC
MILLIVOLT METER**

Test stereo circuitry and 4-channel too—especially where differences exist in voltage at two separate points. $\pm 3\%$ full scale accuracy (1KHz); dB scale readings at 0dB=0.775V and 1V each. 2 chans, 100MV to 300V range in 12 steps. With separate pointers. Individual switches, and amplifier systems. Both channels operate separately or together.

\$229.95



Write for details. See your distributor.

The more you see... the more you believe... the more you save

Leader Instruments Corp. 37-27 Twenty-Seventh St. L.I.C., N.Y. 11101 (212) 729-7410

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

Voices Loud AMEN!

Just a line to say that I have just read your Editor's Memo about "Three Brothers" and your reply to the gentleman who wrote about too much theory in the CET exam; I wish to voice a loud AMEN! to what you had to say.

I couldn't agree more on the importance of fundamental theory in practical service work, and I'm speaking not only as an electronics instructor

continued on page 32

7

NEW RATINGS (in 1000, 1600, and 2000V) ADDED

to world's broadest line of dipped tubulars!

SPRAGUE DIFILM® ORANGE DROP® CAPACITORS



- Designed to provide the electronics industry with compact capacitors with outstanding dependability under conditions of high heat and humidity.
- Dual dielectric—combines the best features of both polyester film and special capacitor tissue.
- Impregnated with HCX[®], an exclusive Sprague synthetic hydrocarbon material which fills every void in the paper, every pinhole in the film before it poly-

- merizes, resulting in a solid, rock-hard capacitor section.
- Double dipped in bright orange epoxy resin for moisture and mechanical protection.
- Leakproof—because impregnant is solid, there is no oil to leak, no wax to drip.
- Designed for operation at temperatures to +125 C.
- Capacitance tolerance, ±10%.

μF	D. x L.	Sprague Products Cat. No.	μF	D. x L.	Sprague Products Cat. No.	μF	D. x L.	Sprague Products Cat. No.
200 VOLTS D-C			600 VOLTS D-C (cont.)			1000 VOLTS D-C (cont.)		
.02	29/64 x 15/16	2PS-S20	.005	29/64 x 3/4	6PS-D50	.022	3/64 x 1 3/8	10PS-S22
.022	29/64 x 15/16	2PS-S22	.0056	15/32 x 3/4	6PS-D56	.033	19/32 x 1 3/8	10PS-S33
.047	33/64 x 15/16	2PS-S47	.006	15/32 x 3/4	6PS-D60	*.039	43/64 x 1 3/8	10PS-S39
.05	33/64 x 15/16	2PS-S50	.0068	15/32 x 3/4	6PS-D68	.047	43/64 x 1 3/8	10PS-S47
.1	35/64 x 1 1/4	2PS-P10	.0075	15/32 x 3/4	6PS-D75	*.056	47/64 x 1 11/16	10PS-S56
.15	5/8 x 1 1/4	2PS-P15	.008	29/64 x 15/16	6PS-D80	.068	47/64 x 1 11/16	10PS-S68
.2	43/64 x 1 3/8	2PS-P20	.0082	29/64 x 15/16	6PS-D82	*.082	47/64 x 1 11/16	10PS-S82
.22	43/64 x 1 3/8	2PS-P22	.01	29/64 x 15/16	6PS-S10	.1	49/64 x 1 11/16	10PS-P10
.25	43/64 x 1 3/8	2PS-P25	.012	31/64 x 15/16	6PS-S12			
.33	11/16 x 1 11/16	2PS-P33	.015	31/64 x 15/16	6PS-S15	1600 VOLTS D-C		
.47	49/64 x 1 11/16	2PS-P47	.02	35/64 x 15/16	6PS-S20	.0005	1/2 x 7/8	16PS-T50
.5	49/64 x 1 11/16	2PS-P50	.022	35/64 x 15/16	6PS-S22	.001	13/32 x 7/8	16PS-D10
			.025	35/64 x 15/16	6PS-S25	.0015	7/16 x 7/8	16PS-D15
400 VOLTS D-C			.027	17/32 x 1 1/4	6PS-S27	.002	1/2 x 7/8	16PS-D20
.01	15/32 x 3/4	4PS-S10	.03	17/32 x 1 1/4	6PS-S30	.0022	1/2 x 7/8	16PS-D22
.015	33/64 x 3/4	4PS-S15	.033	17/32 x 1 1/4	6PS-S33	.003	7/16 x 1 1/8	16PS-D30
.02	31/64 x 15/16	4PS-S20	.035	17/32 x 1 1/4	6PS-S35	.0033	7/16 x 1 1/8	16PS-D33
.022	31/64 x 15/16	4PS-S22	.039	19/32 x 1 1/4	6PS-S39	*.0039	31/64 x 1 1/8	16PS-D39
.025	31/64 x 15/16	4PS-S25	.04	19/32 x 1 1/4	6PS-S40	.004	31/64 x 1 1/8	16PS-D40
.03	17/32 x 15/16	4PS-S30	.047	19/32 x 1 1/4	6PS-S47	.0047	31/64 x 1 1/8	16PS-D47
.033	17/32 x 15/16	4PS-S33	.05	19/32 x 1 1/4	6PS-S50	.005	31/64 x 1 1/8	16PS-D50
.04	33/64 x 1 1/4	4PS-S40	.056	41/64 x 1 1/4	6PS-S56	.006	17/32 x 1 1/8	16PS-D60
.047	33/64 x 1 1/4	4PS-S47	.06	41/64 x 1 1/4	6PS-S60	.0068	17/32 x 1 1/8	16PS-D68
.05	33/64 x 1 1/4	4PS-S50	.068	41/64 x 1 1/4	6PS-S68	.007	17/32 x 1 1/8	16PS-D70
.056	37/64 x 1 1/4	4PS-S56	.075	41/64 x 1 1/4	6PS-S75	.0075	17/32 x 1 1/8	16PS-D75
.068	37/64 x 1 1/4	4PS-S68	.082	11/16 x 1 3/8	6PS-S82	.008	3/8 x 1 3/32	16PS-D80
.075	37/64 x 1 1/4	4PS-S75	.1	11/16 x 1 3/8	6PS-P10	.01	3/8 x 1 3/32	16PS-S10
.1	41/64 x 1 1/4	4PS-P10	.15	47/64 x 1 11/16	6PS-P15	.015	21/32 x 1 19/64	16PS-S15
.15	43/64 x 1 3/8	4PS-P15	.2	27/32 x 1 11/16	6PS-P20	*.018	3/4 x 1 19/64	16PS-S18
.2	43/64 x 1 3/8	4PS-P20	.22	27/32 x 1 11/16	6PS-P22	.02	3/4 x 1 19/64	16PS-S20
.22	43/64 x 1 3/8	4PS-P22	.25	27/32 x 1 11/16	6PS-P25	.022	3/4 x 1 19/64	16PS-S22
.25	43/64 x 1 3/8	4PS-P25	.33	59/64 x 1 11/16	6PS-P33	.03	3/4 x 1 39/64	16PS-S30
			.47	1 1/64 x 1 11/16	6PS-P47	.033	3/4 x 1 39/64	16PS-S33
						.04	27/32 x 1 39/64	16PS-S40
						.047	27/32 x 1 39/64	16PS-S47
						.05	27/32 x 1 39/64	16PS-S50
						2000 VOLTS D-C		
						.001	3/8 x 1 1/4	20PS-D10
						.0015	27/64 x 1 1/8	20PS-D15
						.0022	15/32 x 1 1/8	20PS-D22
						.0033	33/64 x 1 1/8	20PS-D33
						.0047	1/2 x 1 3/8	20PS-D47
						.0056	37/64 x 1 3/8	20PS-D56
						.0068	37/64 x 1 3/8	20PS-D68
						*.0082	39/64 x 1 3/8	20PS-D82
						*.027	51/64 x 1 11/16	20PS-S27

*New rating



MEMBER

For information on Sprague's broad line of components for the service trade, get Catalog C-620 from your Sprague Distributor or write to Sprague Products Co. 65 Marshall St., North Adams, Mass. 01247

THE BROAD-LINE PRODUCER OF ELECTRONIC PARTS



6S-2105

... for more details circle 133 on Reader Service Card

LETTERS...

continued from page 30

tor, but also as a graduate from the school of hard knocks! Countless are the ways I used basic theory in the dozen or so years I spent in the radio-TV service business before embracing the teaching profession.

The only complaint I had when I wrote my CET exam was that a few questions were somewhat ambiguous; but then so were some of the test questions I composed for our students in my first year of teaching! I've

learned a lot about wording exam questions properly, in the last ten years! Presumably, NEA will periodically revise their CET exams, and I would hope that these ambiguities will be removed.

Keep up the good work, Phil.

LAMBERT HUNEALT

Any Reference Material Permitted?

I have been following, with great interest, your recent series concerning the CET Exam.

If we don't have the needle, there's no point in looking for it.

We're a prime manufacturer of phonograph needles and cartridges. So we're always ahead in needle knowledge. That's why your E-V/Game distributor always has just the right replacement needle you want. Factory sealed. Attractively packaged. And priced right.

And, it's easy to specify Electro-Voice needles. They're listed in the most up-to-date, comprehensive catalog in the industry. Simplified cross-referencing and precise illustrations enable you to pinpoint what you want in seconds.

Tell your local distributor haystacks are for making love. Ask him for a free E-V/Game needle and accessories catalog today. Or contact us. E-V/Game, Inc., Box 711, Freeport, N.Y. 11520.

E-V/GAME, INC.

Division of Electro-Voice, Inc. • A GULTON Company
In Canada: E-V of Canada, Ltd., Gananoque, Ontario



... for more details circle 111 on Reader Service Card

I would like to add that in my opinion if a fella has to drag out a few books and brush up on theory a little to pass the exam, it's still a small price to pay if it will help us police our profession (and it needs it!) and make it more difficult for people who are lazy, incompetent or dishonest to make a bad name for those of us who are not.

Also, in regard to the exam (as I intend to take it), is one entitled to have any reference material on hand or is it strictly from the top of your head?

Thank you for letting me say my piece.

JOHN BOSHEAR

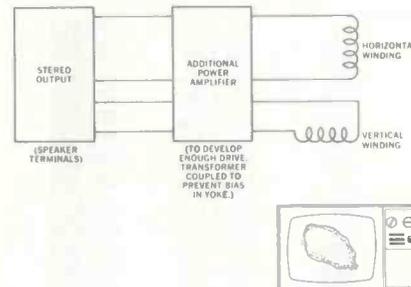
BOSHEAR ENTERPRISES

Sorry, no reference material or notes allowed. Ed.

Interesting Window Display

Another technician and I have converted an old color-TV set into a unique (we think) advertising display. Since your magazine is aimed at the radio and television servicemen and dealers, we thought they may be interested in making a similar display for their business.

In essence we took off the yoke in a 21-in. (90°) TV set and replaced it with an identical yoke to which the



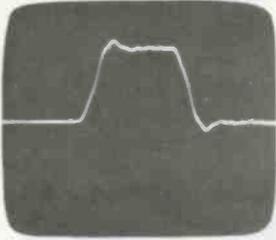
output of a stereo system was connected (the original yoke remained functional for the high-voltage supply). The result is a myriad of patterns 180° displaced from each other.

A color-TV set not worth repairing may be ideal for this eye-catching display... only the high voltage and dc voltages to the guns must be working properly. A weak picture tube is okay as long as the three guns are alright (we used a booster on ours).

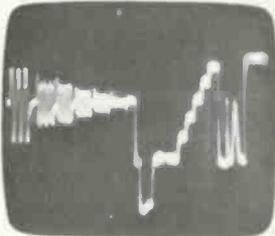
There are many possibilities for visual display... music and voice, of course, produce many effects, but other sources such as a short-wave receiver output of code Teletype, etc. are interesting. For an added effect, we recorded some advertising for the store and piped it into the yoke to make the patterns coincide with our sales pitch.

VERN ELDRIDGE

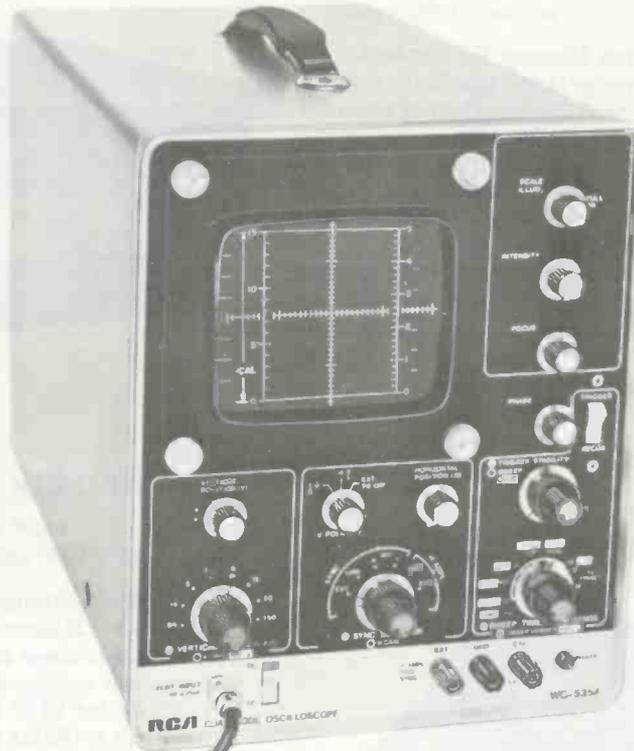
TRIGGERED SWEEP



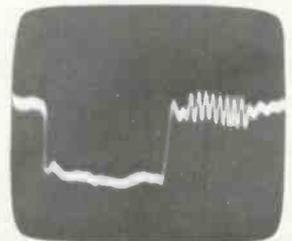
250-nanosecond (¼-microsecond) pulse demonstrates trace expansion and rise time capability of the new RCA WO-535A in Triggered Sweep Mode.



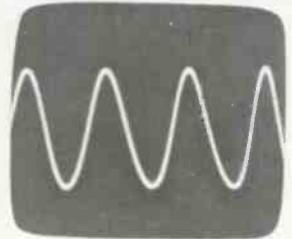
Typical TV VITS pattern on the new RCA WO-535A in Triggered Sweep Mode.



RECURRENT SWEEP



Expanded video signal on the new RCA WO-535A in Recurrent Sweep Mode shows the horizontal sync pulse and 3.58 MHz color-burst signal.



3.58 MHz sine-wave as shown on new RCA WO-535A in Recurrent Sweep Mode.

Now...a 5-inch triggered/recurrent sweep oscilloscope for only \$329*

It's the all solid-state RCA WO-535A featuring one-step calibration for simplified voltage measurements and usable frequency response to 10 MHz.

In the Triggered Sweep Mode, you can lock in waveforms and patterns that cannot be viewed easily using recurrent sweep. Triggered sweep with wide, variable trace expansion permits you to view small segments of complex waveforms, such as vertical-interval test signals (VITS). In the Recurrent Sweep Mode, you get all the ad-

vantages of a conventional continuous-sweep oscilloscope.

There are many other features of the WO-535A you'll like — and your RCA Distributor will be glad to supply complete information about this general-purpose oscilloscope that provides high performance in such applications as radio and TV servicing, industrial maintenance, troubleshooting, and general waveform analysis.

Also ask your RCA Distributor for the full story on the RCA WO-505A,

priced at \$299*, and the RCA WO-33A, priced at \$180*. Or write RCA Test Equipment Headquarters, Harrison, N.J. 07029.

*Optional Distributor Resale Price, complete with direct/low capacitance shielded probe and cable.

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

RCA

NEW AND NOTEWORTHY

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

SOLID-STATE FREQUENCY COUNTER KIT 700

*Frequencies to 120MHz
with eight-digit readout*

The Model IB-1102 Frequency Counter Kit employs eight cold-cathode display tubes, an overrange lamp, gate lamp and two indicator lamps to provide an easy-to-read display. Overall accuracy is assured by the use of a pre-built temperature compensated crystal oscillator. The unit reportedly has a sensitivity of 50mv to 100MHz and 125mv above, and accepts inputs up to 120v rms from 1Hz to 150Hz, 50v at 40MHz, and 3v at 120MHz without damage to the instrument. The latest emitter coupled logic is said to be used and the full 8-digit readout lets you read frequencies with the best possible resolution (down to 1Hz) without switching the time base. Plug-in ICs and circuit boards are provided to speed and simplify assembly and service. The unit can be wired for either 120v ac or 240v ac operation. Price: \$349.95. Heath Company.



**FOR MORE
NEW PRODUCTS
SEE PAGE 67**

FIELD STRENGTH METER 701

*Compact lightweight design
with separate VHF and UHF tuners*

A new Field Strength Meter, Model FS-719, reportedly reads directly in dBmv (and microvolts) to show exact signal levels, and provides continuous coverage from 54MHz to 216MHz for VHF TV and FM, and 470MHz to 890MHz for UHF-TV. It has a 75 Ω input. Meter ranges: 25 μ v to 1,000 μ v—basic scale: 250 μ v to 10,000 μ v with one attenuator "in"; 25,000 μ v to 100,000 μ v with two attenuators "in." Sensitivity with minimum detectable signal 10 μ v. This solid-state unit is lightweight, battery operated, and housed in a rugged case with a large accessory compartment. Safety switch turns OFF power when cover is closed. Audio output jack and crystal earphone are included. Dealer net price: \$228. Sadelco, Inc.

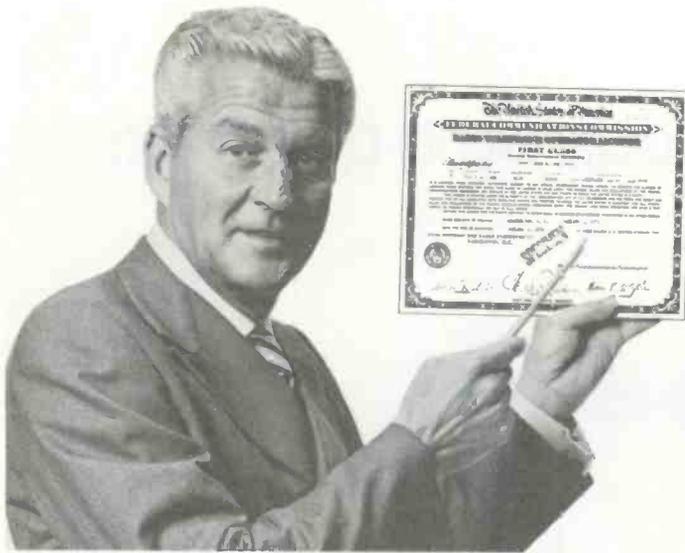


TWO-CHANNEL AC MILLIVOLT METER 702

*Checks audio signal quality of
two-channel and four-channel circuitry*

The Model LMV-89 Two-Channel AC Millivolt Meter is designed to check audio signal quality of two- and four-channel stereo circuitry. The measuring range is from 100 μ v to 300v in 12 steps and full scale accuracy is reportedly $\pm 3\%$; while decibel scale readings are at 0dB = 0.775v and 1v each over the entire range. The unit reportedly has a single, easy-to-read meter face and two independent scales with separate pointers. Each of the two channels has individual switches and amplifier systems to assure operation without crosstalk effect. Both channels operate separately or in common at channel two. Scale calibration is based on the effective value of a sine wave output. The unit measures 8 in. high by 6 in. wide by 10 in. deep and weighs 8 lb. Leader Instruments Corp.





It's like having a license to live better!

More money, better jobs, greater opportunities...a Government FCC License gives you a big edge, and CIE has the course you need to get it...backed by a Money-Back Warranty.*

Compare what you're doing now—auto mechanics, assembly line, shop work—with the exciting new opportunities you can have as a *licensed* service technician!

In just 10 years the number of licensed communications *stations* has grown from 100,000 to over 2,000,000—including those for police and fire departments, airlines, merchant marine, pipeline companies, telephone companies, taxicabs, railroads, trucking firms, delivery services! And according to Federal law, no one is permitted to operate or service such communications equipment without a Commercial FCC License or without being under the direct supervision of a licensed operator.

Industry needs licensed technicians

In addition to communications stations, TV and radio, think of the opportunities in big industry. At leading companies like Burroughs Corporation, for example, "The licensed man is the one called upon to handle the challenging assignments."

Start your own business

If you don't want to work for somebody else, you can open your own shop or service business. The basic principles of Electronics you learn in preparing for your Government FCC License exam will give you the know-how—and your License will *prove* it to everybody!

CIE training really works

Why not start preparing for your FCC License right

Joseph E. Perry of Cambridge, Massachusetts passed his license exam and got a new job with 40% more pay. "I'm now an Engineering Specialist with National Radio Company, Inc., testing prototype equipment. CIE training gave me the electronics technology I needed to pass the exam for First Class FCC License. I'm already earning 40% more than I could without my CIE training."

Ralph E. Butler, Columbus, Ohio, signed up for CIE's First Class FCC License course and completed it while in the Navy. "Now I'm responsible for transmitter operations at both WSPO-AM and WVKO-FM. CIE meant so much to me, I talked two of my Navy buddies into taking courses."

now... in your spare time... at home... with a licensing course from Cleveland Institute of Electronics? CIE's training has proven so effective that in a recent survey of 787 CIE graduates, better than *9 out of 10* CIE grads passed the Government FCC License exam! That's why CIE can offer their famous Money-Back Warranty:

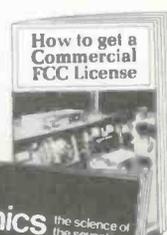
* When you complete any FCC Licensing course, you will be able to pass your FCC exam or be entitled to a full refund of all tuition paid. This warranty is valid during the entire completion time allowed for your course—you get your FCC License OR YOUR MONEY BACK!

APPROVED UNDER G.I. BILL

All CIE career courses are approved for educational benefits under the G.I. Bill. If you are a Veteran, or in service now, check box on reply card or coupon for G.I. Bill information.

Send for FREE book today

Mail the reply card or coupon today and we'll send you, absolutely free, our information book on how to get an FCC License. And we'll *include* our FREE illustrated school catalog. For your convenience, we'll try to have a representative call. If the reply card and the coupon have been removed, write: Cleveland Institute of Electronics, Inc., 1776 East 17th Street, Cleveland, Ohio 44114.



CIE Cleveland Institute of Electronics, Inc.

1776 East 17th Street, Cleveland, Ohio 44114
Accredited Member National Home Study Council

Please send me your two FREE books:

1. Your book on "How To Get A Commercial FCC License."
2. Your illustrated school catalog, "Succeed in Electronics."

Name _____ (Please Print)

Address _____

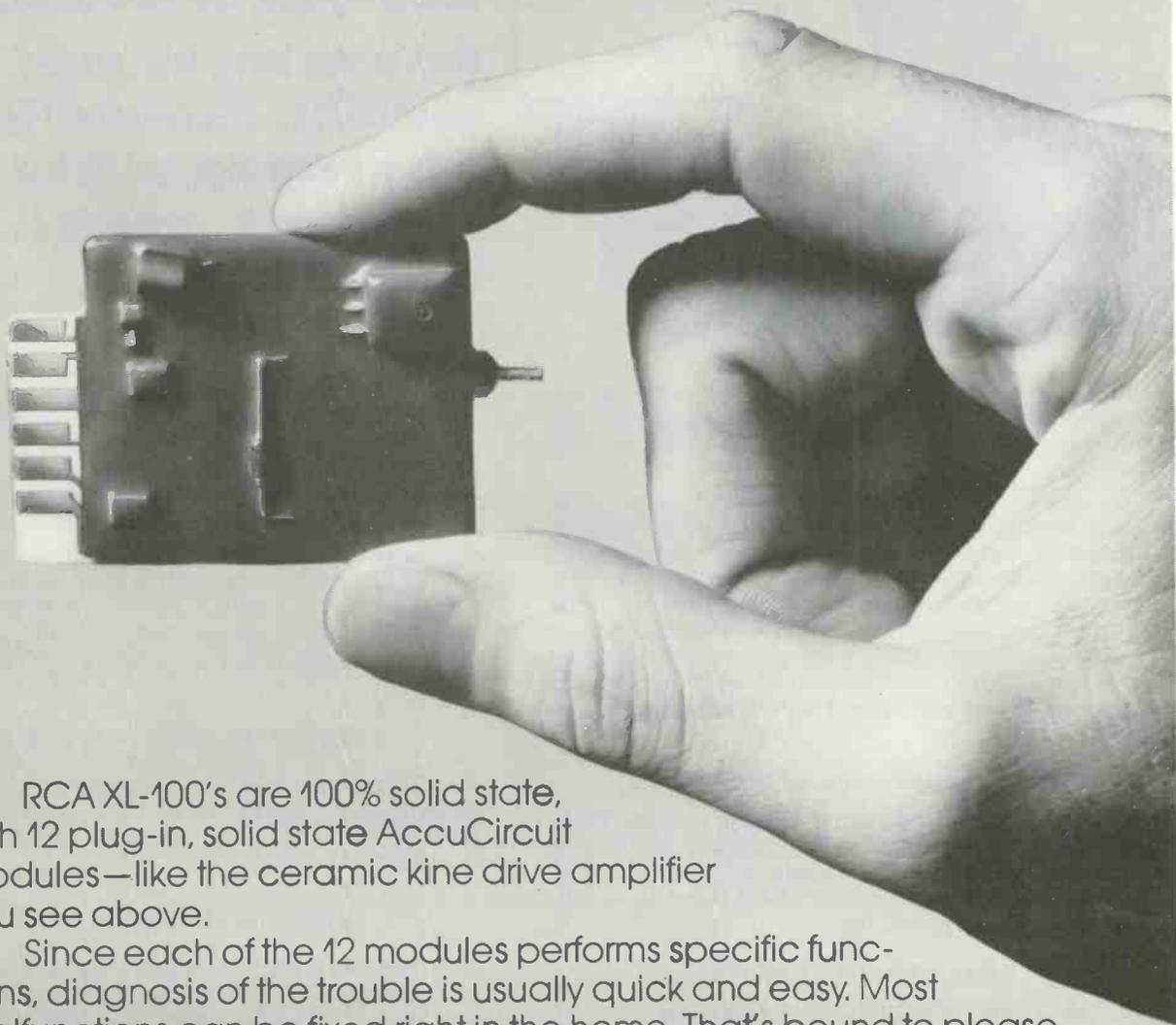
City _____ State _____ Zip _____

Veterans and Servicemen: Check here for G.I. Bill Information.

ET-64

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

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



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

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

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

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

Something else: Whether you're servicing an XL-100 console, table model or portable, most modules are interchangeable, function for function. That will make your life easier, and you won't have to worry about stocking a large parts inventory.

RCA XL-100. It's already got a great reputation. It could even add to yours.

RCA **XL-100** 
100% Solid State AccuColor

TEKLAB REPORT

RCA's Argosy Model ER475 Portable Color-TV Set

by Joseph Zauhar

The solid-state modular construction of this chassis practically revolutionizes manufacturer's servicing

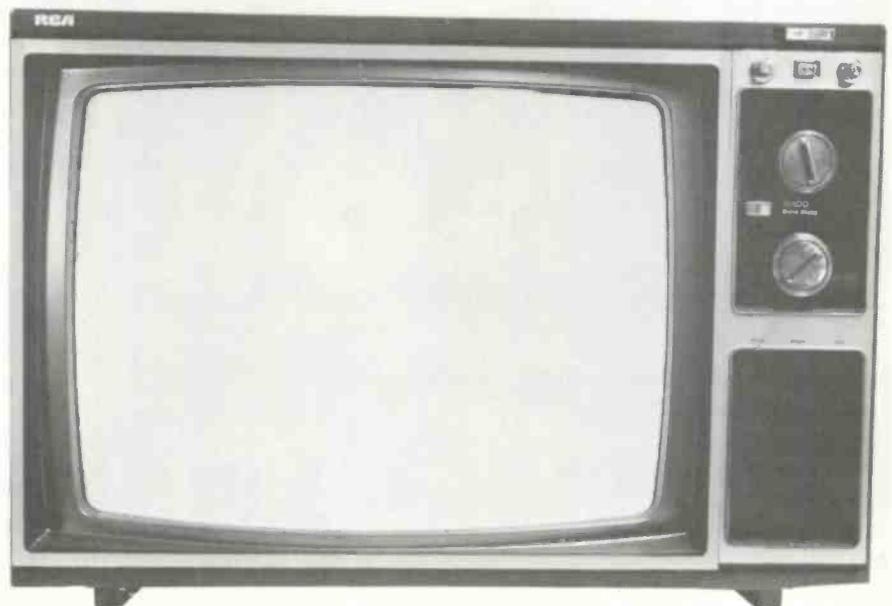
■ In 1968 RCA introduced the CTC40 color-TV chassis which was their first solid-state TV set, using only a high-voltage rectifier tube in addition to the CRT. Next came the CTC47 chassis which was released in 1969. This TV-chassis retained most of the circuits used in the CTC40 with several significant changes such as electronically tuned VHF tuner and solid-state high-voltage rectification, using a voltage quadrupler.

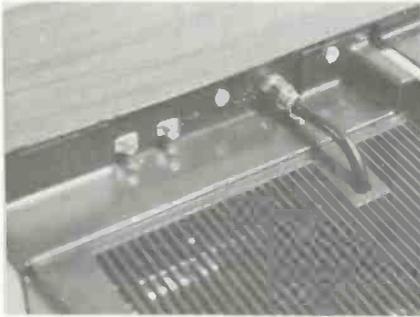
The CTC44 chassis represented the third generation of their solid-state color-TV receivers, including some of the basic circuit designs carried over from the CTC40 chassis

with many updated features, which included the high-voltage quadrupler and motorless remote VOLUME, TINT and COLOR controls carried over from the CTC47 chassis. The CTC49 chassis is a natural outgrowth of these predecessors.

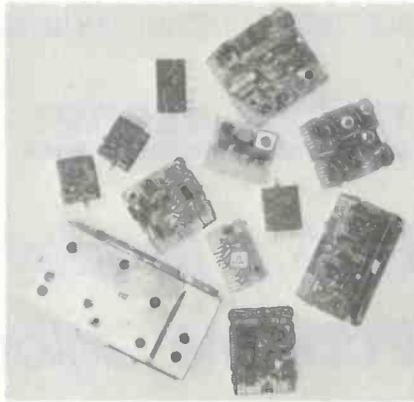
The Argosy Model ER475W, employing the CTC59 chassis, sent to us for review is very similar in concept and physical appearance to the very familiar CTC49 chassis. This 100-percent solid-state chassis employs 12 plug-in boards that are compatible with those used in either the CTC49 or the CTC46 chassis. An ultra-rectangular, 110° deflection picture tube (19BLP22) is

The Argosy, Model ER475, employing the CTC59 chassis, is continued as RCA's top-of-the-line, all-solid-state portable color-TV set.

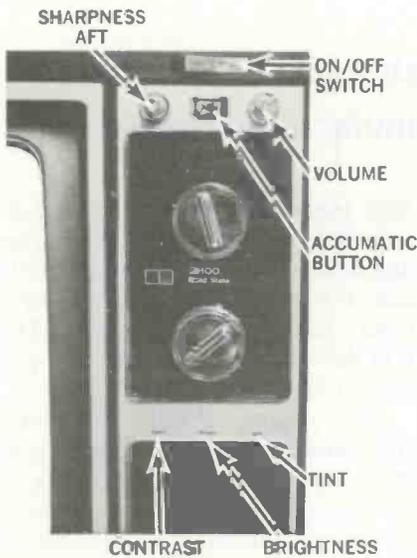




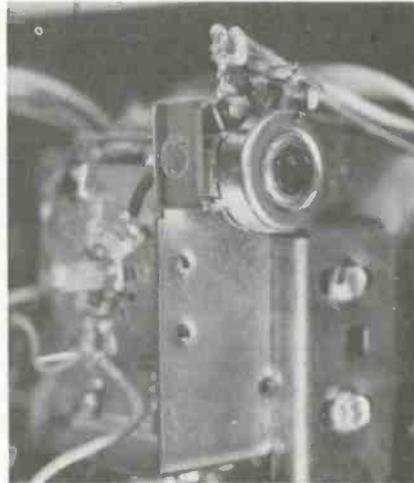
A 75Ω antenna connector is located on the back cover to allow direct connection to an MATV system without additional adapters.



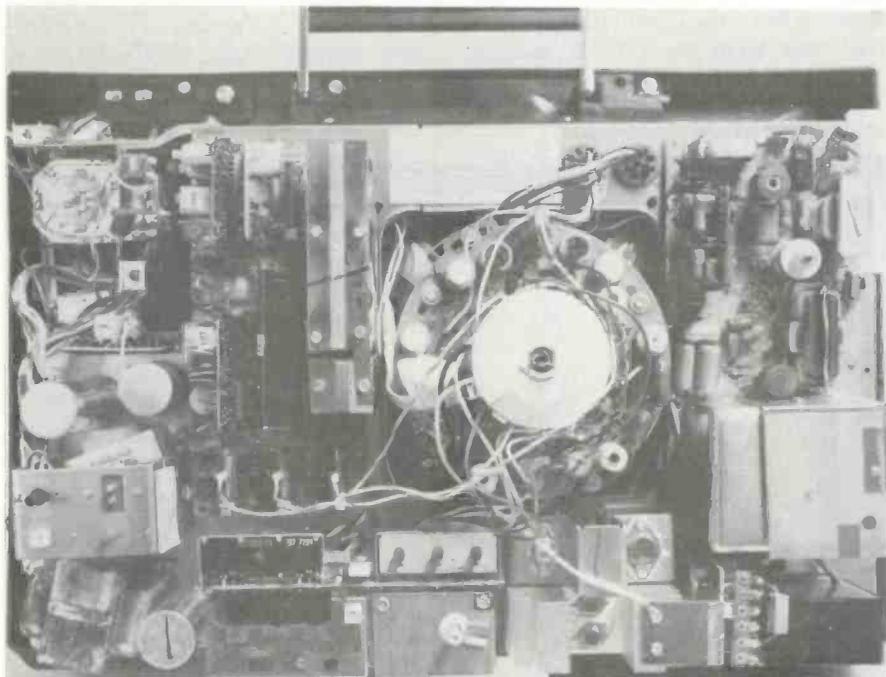
The 12 plug-in modules contain a majority of the circuits employed in the CTC59 chassis and are compatible with those used in either the CTC46 or CTC49 chassis.



The front control panel, showing the location of the various controls.



The ACM COLOR-LEVEL control located at the top-rear of the tuner mount brackets is a screwdriver adjustment.



Rear view of RCA's CTC59 color-TV chassis which is quite similar to the CTC49 chassis.

used to provide a 19-in (measured diagonally) screen size.

When unpacking the TV set, we were quite impressed with its cabinet. Not only is it made of nicely styled high-impact plastic with wood-grain acrylic finish, it is much slimmer than earlier cabinets—having been reduced 19 percent in depth by using the new 110° deflection picture tube rather than a 90° one. Serviceability is also incorporated in the cabinet design, there being fewer screws on the back cover and no screws on the bottom of the cover under the cabinet. In most cases, this has eliminated the need for tipping the set forward or removing the set from the stand for servicing.

The TV set has a 75Ω coaxial cable input for direct-line MATV systems. This cable can be connected without a special adapter or additional service. Additional shielding is employed on the VHF tuner to help prevent unwanted signal interference.

Many of the controls on the front panel are only partially exposed, giving the TV set a smooth uncluttered look. These include the ON/OFF switch, SHARP/AFT, VOLUME, COLOR, BRIGHTNESS and TINT controls, along with the ACM button. The rocker type ON/OFF switch is conveniently located at the top edge of the cabinet within easy reach.

The AccuMatic switch (ACM), when in the ON position, effectively places the COLOR LEVEL and TINT controls at predetermined settings. It also produces a slight shift in the color demodulator circuitry output and color drive outputs.

The main chassis contains the power transformer, power-supply filters, audio-output transistor, two vertical-output transistors, high-voltage quadrupler and focus bleeder, plus the SCR's and diodes of the horizontal deflection system. Although transformer powered, one side of ac line is connected to the chassis.

The PW200 board mounted on the main chassis contains the three SCREEN controls, plus the CONTRAST, NOISE, KINE BIAS, VERTICAL HOLD and HEIGHT controls, and the three-position SERVICE switch.

The PW300 board serves as the parent board for all but the MAB,

MAH and MAG modules. In addition to containing edge connector sockets for these modules, this board also contains the audio-driver and brightness limiter transistors (Q301 and Q302) and the three KINE DRIVE controls.

The PW400 board contains the MAH and MAG modules, plus most of the components for the horizontal-deflection and high-voltage systems, including the high-voltage regulator and the side-pincushion amplifier and control potentiometer.

Most wire connections to the main chassis are made with sockets, making chassis removal easier if required for servicing.

Much of the circuitry employed in the CTC59 chassis is quite similar to that in the CTC46 and CTC49 chassis, and our review will cover some of these circuit modifications. The circuits for this chassis can be followed in Tekfax Schematic No. 1408, March 1972.

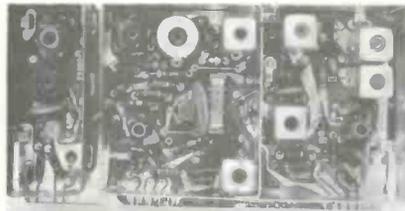
Signal Processing Circuit

The signal processing circuitry remains the same as in the CTC46 chassis with some minor component value differences on the main circuit board (PW300), and the same circuit configuration and adjustment procedure is used. However, the ACM COLOR-LEVEL control is adjusted with a screwdriver and is mounted at the top-rear of the tuner mount bracket.

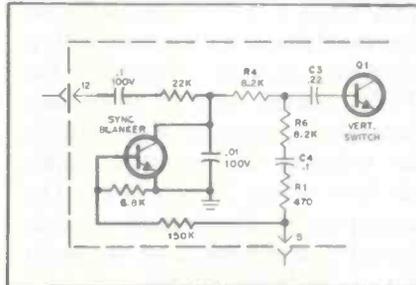
Vertical Circuit

A change was made in the vertical module, MAG001, which appears in all currently produced modular chassis; however, the new MAG001B module is compatible as a replacement for all MAG001A boards before the change was effected. Shown in the partial schematic is the new "Sync Blanking Circuitry" which has been added to the MAG001 module. The added components are shown in bold lines.

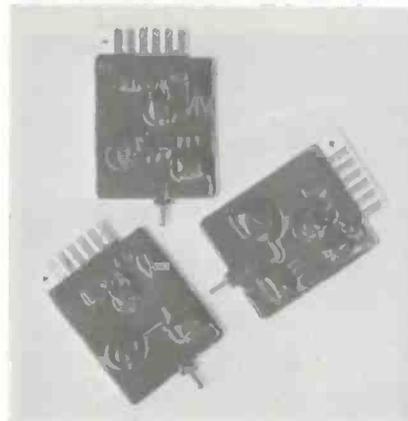
The operation of this circuit can be more clearly understood if we follow the basic operation of the vertical switching transistor, Q1. The yoke circuitry feedback pulses are coupled to the transistor base to sustain the free-running operation of the vertical oscillator. Sync pulses at the vertical rate are applied



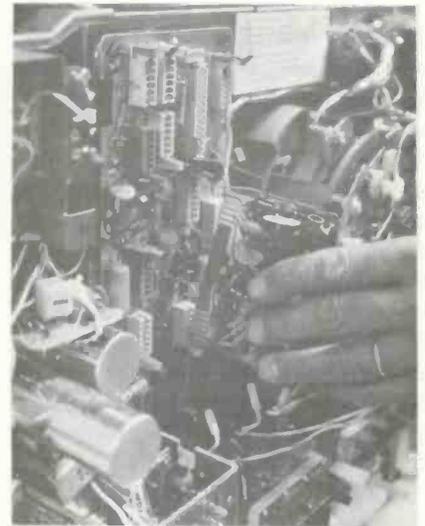
Module MFK contains two transistors and two IC's, and includes all the IF amplifiers and the keyed-AGC circuit.



Partial schematic showing the new "Sync Blanking Circuitry" (in bold lines) added to the MAG001 module. Courtesy of RCA.



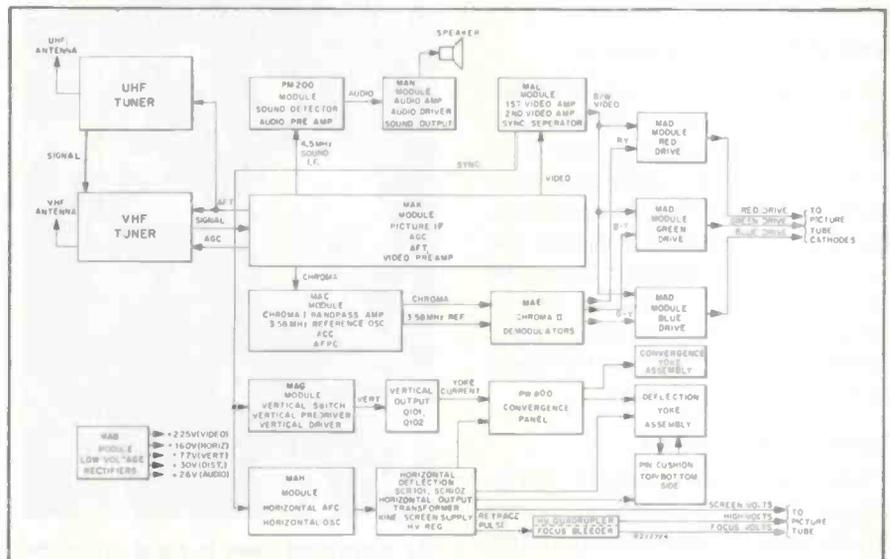
The ceramic MAD modules are interchangeable, requiring only readjustments of the KINE-DRIVE control for tracking.



The plug-in modules with edge connectors are held securely in place by two spring clips, simplifying removal.



A hermetically sealed solid-state quadrupler reduces the required pulse from about 23kv to 6kv.



A functional block diagram of the CTC59 color-TV chassis. Courtesy of RCA.

through board contact No. 12 to the base of transistor Q1, synchronizing the oscillator operation to the proper frequency.

The sensitivity of this vertical system to low-level sync pulses makes its output acceptable despite noise pulses, such as those found in improperly maintained CCTV systems where the vertical sync pulses actually become clipped off or badly suppressed. In problems like this, the only signal present in the sync system of the receiver is an abnormal blanking pulse.

Noise produced by cross-modulation, thermal noise, ripple, or other sources, can appear on this blanking pulse and trigger the vertical switch a second time, shortly after the beginning of the vertical scan, producing the appearance of vertical jitter. The new MAG001B vertical module helps prevent the noise from prematurely triggering the vertical switch.

The sync blanker circuit is used to permit only the leading edge of the vertical-sync pulse to be effective in triggering the vertical switch ON. A yoke circuit pulse is coupled to the base of the sync blanker transistor, this feedback pulse driving the sync blanker into saturation and thus effectively shorting the remaining portion of the sync pulse to ground. Only a short duration spike, representing the leading edge of the sync pulse, is employed in synchronizing the vertical oscillator to the correct scanning frequency.

Vertical-Output Transistors

This chassis also employs metal-cased transistors in its vertical-output stage to provide greater reliability. The circuit configuration remains unchanged, but to accommodate the new output transistors the heat-sinks are changed from the type used in other modular chassis designs. The two vertical output transistors are located on the lower right of the main chassis.

High-Voltage System

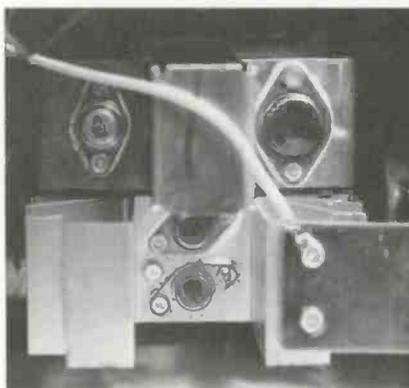
The fixed-tuned flyback transformer in the high-voltage system does not need a separate adjustment for third harmonic tuning. Other differences in the deflection circuit-

ry involve minor component value changes on the main circuit board (PW400), but these changes do not change the circuit operation or configuration.

The CTC59 and the CTC49 chassis employ the same deflection yoke; while the high-voltage power supply differs from the conventional types, which rectify a positive pulse from the flyback transformer with a half-wave rectifier. Instead, the CTC59 chassis uses a solid-state quadrupler to produce high voltage, thus reducing the required amplitude from about 23kv to 6kv. The quadrupler is hermetically sealed, repairable, and located on the lower right of the main chassis.

Video System

Most of the video system has



The CTC59 chassis now employs metal-cased, vertical-output transistors.



The convergence panel is placed around the neck of the picture tube to conserve cabinet space and reduce wire lengths to the panel.

some resemblance to the ones found in earlier chassis. The matrixing of luminance and chrominance video outside the picture tube has not been done in an RCA color-TV chassis since the CTC2 color-TV chassis was discontinued. The most important advantage of this system is that the load offered by the three picture tube cathodes may now be divided equally among three moderately rated drivers instead of one relatively high-power device, thus eliminating the three kine-control-grid drivers.

The three identical MAD modules are used to drive the three picture tube cathodes. The luminance signals are driven in parallel, but each is driven by its respective color-difference signal and the output signals are true color-video signals: red, blue and green. Each module also contains a bias regulator stage which stabilizes the dc operating point of the output amplifier by returning the output voltage to the same point during each horizontal blanking interval. This system is the same as the one used in the CTC49 chassis.

Summary

We feel that the picture and color quality produced by the set is very good and that the AccuMatic color monitor (ACM) button is excellent for customers having trouble adjusting a color-TV set, while others may still adjust the set manually for personal preference of the color desired.

From the serviceability standpoint, this chassis is designed to permit easy access to all modules, making the substitution method of troubleshooting very feasible. The use of circuit modules should enable the service technician to correct the majority of problems in the home. Most of the circuitry used in this TV chassis is contained in but 11 modules, three of which are identical so that only nine items need be stocked in addition to the replacements for five plug-in transistors, two plug-in SCR's and two diodes of the horizontal-deflection circuit. These should be carried on service calls to reduce service time in the home. ■

What's New in TV Receivers for 1973

by Joseph Zauhar

Part II—Many of these TV-sets employ new chassis and circuit designs to simplify servicing



Channel Master's 19-in. (diagonally measured) Model 6143 color-TV set. Courtesy of Channel Master.



Electrohome's 19-in. (diagonally measured) "Contour" color-TV set features a new Electracolor control for constant color. Courtesy of Electrohome.

■ Last month we reviewed the new 1973 TV sets manufactured by Admiral, Emerson, General Electric, Magnavox and Motorola. The manufacturers of the TV sets reviewed this month—like those covered last month—have made substantial progress in the development of all-solid-state modular chassis, some now producing their third generation models having brighter picture tubes and more pushbutton tuning. Many of these TV set manufacturers have given much consideration to chassis designs that simplify any required servicing.

CHANNEL MASTER

Channel Master is introducing 13 new TV sets, constituting the largest TV line in the company's history. This introduction includes nine color-TV sets, ranging from a 15-in. portable to three 25-in. custom sets in hardwood-crafted cabinets. Most of the sets feature Instachrome circuitry, with automatic COLOR, TINT and HUE controls, and an Integrid chassis consisting of a series of plug-in modules to permit quick in-home servicing. Other engineering features include a full-power transformer, twin oversized dual-cone speakers and a high-voltage tripler. The black-matrix picture tube employed carries a three year warranty that is not prorated.

Two new portables will be featured in Channel Master's color-TV line. Shown in this article is the 19-in. (diagonally measured) Model 6143 which is said to

offer consistent color fidelity through its Automatic Fine Tuning and Automatic Tint Modifier circuit. The TV set also includes slide COLOR and TINT controls. Channel Master's 15-in. entry, Model 6131, is reportedly smaller and lighter than any portable TV in its class.

Added to Channel Master's B/W TV line for 1973 is a console and table/portable model featuring a 22-in. (diagonally measured) picture tube with a 2 year warranty.

The Model 6145 console, the Basque, features an authentic styled Spanish Grille design in oak finish hardwoods, while the Model 6144, table/portable, with its own cart, offers the compactness of a portable with console features and styling. Two new B/W-TV portables are also added to the line. These include a 12-in. (diagonally measured) Model 6139 and a 19-in. (diagonally measured) Model 6142.

ELECTROHOME

Innovations in Electrohome's new color-TV line include an all-transistorized chassis, a 75 Ω cable provision, an all-electronic remote control unit and a new Electrocolor circuit which automatically provides constant color density.

Screen sizes (measured diagonally) include 18-, 19-, 21-, and 25-in. models. Most control panels have only a few exposed controls—ON/OFF, VOLUME, and VHF/UHF channel selector—while other controls are hidden

from view. For the electronic technicians a built-in sensing device indicates what circuits are not functioning in the chassis.

The 19-in. (diagonally measured) Capri incorporates a transistorized chassis design, automatic COLOR DENSITY, automatic TINT and COLOR controls, plus a built-in circuit function sensing device and a 75Ω cable hookup provision.

One 25-in. (diagonally measured) unit is a Spanish styled model, the Armada. This transistorized design features comparable 12 VHF/12 UHF varactor slide tuning, automatic color density, automatic color and tint, plus built-in sensing of functioning circuits.

PANASONIC

Panasonic has introduced five new B/W and six new color-TV sets to their consumer electronics line, including the company's first 25-in. (diagonally measured) color-TV set.

The Marlow, Model CT-250, is a console color-TV set with a 25-in picture, providing 315 sq in. of viewing. The TV set features the new "Pana-Matrix" picture tube. Other features in the Marlow include four integrated circuits, 50 solid-state devices, and an automatic, illuminated "self-set" COLOR control. By touching a button, pre-set color is provided instantly. Also included is a matching stand, illuminated AFT button, automatic degaussing, noise cancellor circuit, 10 position detent UHF tuner and antenna connectors for CATV/master antenna systems.

The Glenwood, Model CT-398, is a 19-in. (diagonally measured) portable color-TV set featuring the company's "Quatrecolor" chassis and a Q-Lock control that is designed to electronically compensate for any change in the incoming color signal. The chassis incorporates all solid-state construction, including integrated circuits and five modular circuit boards for more service-

ability. It also features the Pana-Matrix picture tube and automatic controls for color adjustment.

The Woodbridge, Model CT-701, is a 17-in. (diagonally measured) portable color-TV set also featuring "Quatrecolor" and the Q-Lock control. Other features include automatic degaussing, set-and-forget tuning on VHF, UHF click-stop tuner and a VACATION switch.

The Cheswick, Model CT-301, is a 13-in. (diagonally measured) portable color-TV set with Panalock AFT and Q-Lock II. To fine tune the picture, simply touch the Panalock Key. Color tuning is simplified with Q-Lock II, which offers pre-set COLOR and electronic TINT levels. A 70 position click-stop UHF tuner is also featured.

The Evanston, Model CT-994, is a solid-state 9-in. (diagonally measured) portable color-TV set weighing 29 lb. It features three integrated circuits, 90 solid-state devices, plus Panalock AFT control and Q-Lock II.

PHILCO-FORD

Philco-Ford's new color-TV line combines its latest engineering advances in solid-state circuitry, black matrix picture tube and automatic tuning.

Among the 18 new color-TV console entries, all but two come with three-dimensional full-to-the-floor cabinets. The portable color-TV line features a total of 10 entries in 14-, 16-, 18-, and 19-in. (diagonally measured) screen sizes.

Highlighting the new line is the introduction of the Philcomatic III color-TV set featuring a new 100 percent solid-state modular chassis. The chassis, called the "Boss," brings a fully modularized approach, which they call "functional modularization" to solid state. This chassis includes 14 modules which reportedly operate independently of each other, but in concert. Actually each module has its own specific functions to perform and if one module malfunctions, the other will reportedly continue to operate, simplifying servicing problems.

The modules are said to be flame retardant and notched to fit into the chassis only one way. A code



A new Pana-Matrix picture tube is employed on Panasonic's Marlow, Model CT-250, console color-TV set. Courtesy of Panasonic.



Philco-Ford's 25-in. (diagonally measured) Model C7430BWA employs a new all-solid-state modular chassis. Courtesy of Philco-Ford.

number designates the modules function. According to the manufacturer, the cost of each module has been kept low enough that an inoperable unit can simply be discarded or be replaced with newer, more sophisticated ones as technologies are developed.

A new picture tube, the Philcomatic Super Black Matrix, reportedly uses an improved light transmission glass to allow 85 percent of the available light from the electron beam gun to filter through—producing a brighter and sharper picture. The picture tube also features a new gun design using a metal cathode which reportedly lasts from two to three times as long as earlier models.

Tuning is simplified on the new color-TV line, with the Philcomatic advanced color tuning system featuring one step tuning. The viewer selects the channel and removes his hand when the Philcomatic light appears. If the light doesn't appear immediately, the viewer need only turn the fine-tuning knob until it does, then remove his hand and the picture is adjusted. The Philcomatic III tuning is automatic, but leaves room for individual preferences. Even when the tuning system is in the automatic position, it allows the viewer to adjust the COLOR, TINT, CONTRAST and BRIGHTNESS controls to his own individual preferences.

On selected 19-in. and 25-in. models the Philcomatic pushbutton tuning selector is available—featuring VVC (Voltage Variable Capacitance) instead of the usual rotary channel selector. These sets feature 12 buttons which can be set by the owner of the TV set to different combinations of VHF or UHF channels. Once set, the advanced tuning system will automatically lock in the proper picture.

Several other models in the 1973 line will feature Philco's new Channel-Set selector providing 70-position detent tuning. In this system, the channel selector will stop or "click" as each channel is reached.

Other features include "instant play" and easy-out chassis construction, enabling the chassis to be removed from the top without the need to get under the cabinet. Two "mother-board" panels, which are permanently

attached to the chassis, contain 15 percent of the circuitry, the balance being on modules.

According to the manufacturer, a comparison of wiring between the Philcomatic III chassis and Philco's 1972 25-in. color-TV sets showed that the new model has less than half as much actual wiring footage, about two-thirds as many actual pieces of wire, and less than half as many hand-made wiring connections.

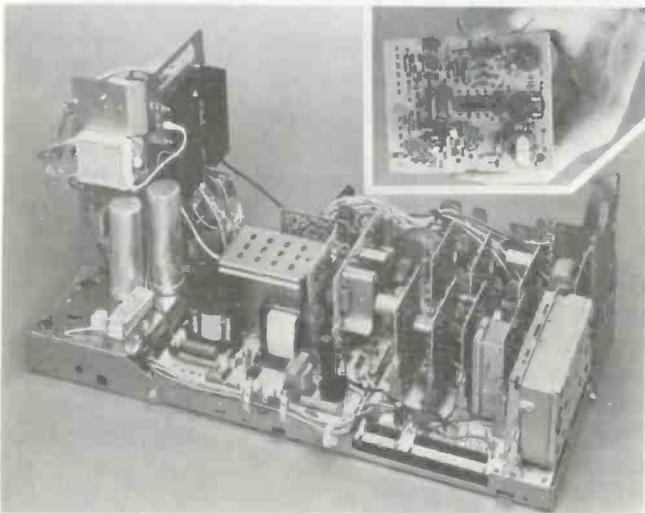
In the B/W portable and console TV lines, Philco-Ford will reportedly satisfy all the consumers' basic needs in screen sizes, features and styling. The console entries include a Mediterranean, Early American and two Contemporary models, all with 22-in. (diagonally measured) screens. The portable TV sets come in 8-, 12-, 13-, 16-, 19-, and 22-in. screen sizes.

RCA SALES CORP.

RCA is introducing its new color-TV line with more than 75 percent of the models, including portables, employing 100 percent solid-state circuitry.

In consoles and combination models, over 90 percent of all TV sets are 100 percent solid state. According to the manufacturer, the new line will feature more remote-controlled models, new furniture styling, broader use of the black matrix picture tube and provisions for better cable-TV reception.

Nine color-TV chassis will provide a wide selection in color-TV models. At the top of the line is the all-solid-state CTC54 chassis, with varactor tuning, ACM, plug-in modules and engineering features which make up the most sophisticated chassis in the line. A new CTC48 chassis, complementing and sharing many of the CTC54 all-solid-state circuits, is employed in the bulk of the XL-100 console models. This chassis is designed to replace the CTC46 chassis in the R-Line TV receivers. These two chassis are very similar in design; the major variations occurring in the horizontal deflection, tuner and remote control, and auxiliary-control panels. Some of the features available include: slide controls,



Philco-Ford's solid-state Philcomatic III chassis employs 14 modules, each about the size of an average file card. Courtesy of Philco-Ford.



RCA's Royalton, Model GR-802, color-TV set employs a tempered black architectural glass top. Courtesy of RCA Sales Corp.

70-detent UHF, varactor-tuned UHF, and four-function remote with triac power control.

The deflection system of the CTC47 chassis is one of the SCR systems first introduced in the CTC40 chassis in 1968. In this chassis, as in the CTC40, there is no impedance-matching required between the yoke and the trace diode. This chassis also employs a high-voltage tripler instead of a quadrupler and it requires a greater pulse output from the flyback transformer, about 9kv instead of 7.5kv. The width on the CTC48 chassis is controlled by selecting the appropriate "tap" on the flyback primary windings. This chassis employs basically the same overvoltage protection circuit as employed in the CTC46 chassis.

The familiar CTC39 chassis is retained in the R Line with essentially no circuit changes. One significant new feature, however, is a flame-retardant horizontal-output transformer. This transformer is electrically the same as the one used in earlier production of the TV set.

The CTC51, 52, 53, and CTC55 chassis—familiar from the Q Line—will remain in the new line with a few changes which have been carried back from the CTC63 chassis. These changes, all of which were developed for the CTC63 chassis, have been made in the following circuits: The vertical-destable circuit is where the cathode lead of the vertical output tube is now opened with the SERVICE switch, rather than grounding the grid of the tube for set-up procedures. A vertical retrace-blanking transistor has been added to improve blanking, but the high-voltage protection circuit of the CTC63 connected with the blanker is not used with this chassis. A thermal fuse is placed in the horizontal-output tube cathode, protecting the chassis and cabinet from overheating effects.

The CTC59 chassis, which is featured in this month's Teklab Report, remains virtually unchanged from the Q-line TV sets. Early production of the remote-controlled chassis did not include the triac power-controlled circuit, which was incorporated in later production.

A new set added to the color-TV line is a hybrid portable employing the CTC63 chassis, which is similar to the CTC55 from which it evolved. This chassis is developed to drive a 19-in. (diagonally measured) bi-potential high-focus voltage picture tube. The principal differences between this chassis and the CTC55 is the deflection and high-voltage system. The picture tube used with the CTC63 requires 4 to 6kv of focus voltage, higher deflection currents and about 3.5kv more anode voltage. The horizontal-output tube employed is a 36MC6 with higher ratings to meet the additional power requirements. A fusible link is used as a thermal fuse in the cathode of this tube for protection against overheating.

The CTC63 employs a two-section vertical integrator, instead of a single section as used in the CTC55, allowing a faster rise time of vertical sync while retaining good horizontal-sync rejection.

A total of eight different chassis are employed in the new B/W-TV line. Two chassis, the KCS188 and the new KCS187, provide a choice of tube or all-solid-state performance in the 12-in. (diagonally measured) size.

The KCS187 employs the solid-state modular concept and approximately 80 percent of the circuit functions are accomplished by six modules. The KCS188 tube-type chassis continues in the new line for this year. Also, available is a 15-in. (diagonally measured) set employing the KCS168 chassis and available with remote control.

Three large-screen portable receivers, with a wide choice of features, are made available in continued chassis. A 19-in. (diagonally measured) portable employs the KCS186 solid-state chassis using five plug-in modules. The tube-type vertical KCS171 chassis is also used with the 18-in. and 19-in. (diagonally measured) portables. The KCS172 tube-type chassis is used to drive a 19-in. or 20-in. (diagonally measured) tube and employs familiar circuitry.

The KCS179 and KCS183 hybrid chassis are continued chassis used with the 22-in. (diagonally measured) screens. A KRK149 VHF tuner is mated with the KRK204, a 70-position, detented UHF tuner. The selection of all 82 TV channels with parity of UHF and VHF tuning is provided by this combination.

SYLVANIA

Sylvania's 1973 color-TV line includes sets with black matrix picture tubes, all solid-state chassis and a Perma-Lock tuning system. Six of the Chro-Matrix consoles are also equipped with the new GT-100—a 100 percent solid-state chassis with automatic pushbut-



The Gibraltar 90 chassis is 90 percent solid-state and includes a Perma Lock system that tunes pre-set COLOR, TINT, and BRIGHTNESS settings in Sylvania's Model GL2237P color-TV set. *Courtesy of Sylvania*

ton tuning. In this chassis, electronic circuits replace mechanical tuner parts and any combination of 11 VHF or UHF channels can be pre-selected for pushbutton tuning. A solid-state voltage multiplier and plug-in transistors are used to simplify servicing. Also included is the Perma-Tint circuit which reduces flesh-tone variations.

Circuit advancements in the Gibraltar 100 are said to provide better sound and circuit reliability, along with good color performance under large signal and

continued on page 76

Introducing the expensive curve tracer that doesn't cost a lot.

The B&K Model 501A.

It's a lab-quality instrument that provides fast analysis of all semiconductors including J-FET's, MOS-FET's, signal and power bipolar transistors, SCR's, UJT's and diodes.

You can test transistors in circuit for GO/NO GO condition. Badly distorted curves will indicate the stage where a defective transistor or other faulty component exists.

The 501A is complete—with scope graticule and FP-3 probe for fast, one-handed in-circuit testing. It generates true current and voltage steps, with 3% accuracy, for measuring beta at all current levels. And it has a sweep up to 100 volts and 100 milliamperes.

With the 501A, curves are displayed on an auxiliary scope screen. And you can hook it up to any scope—old or new.

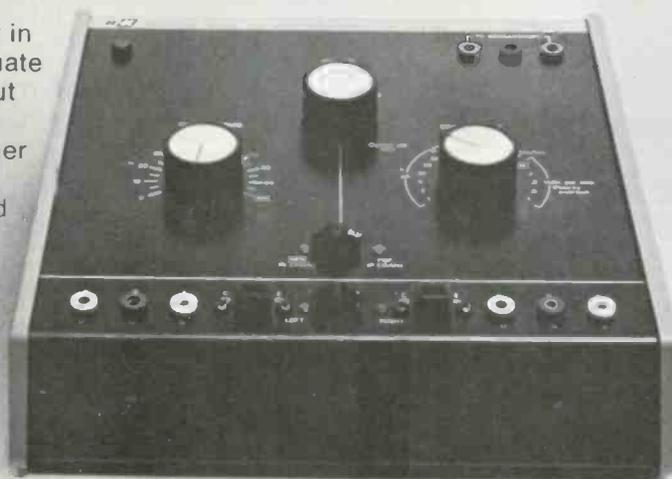
All three controls can be set in quick-test positions to test and evaluate 90% of all solid-state devices without manufacturer's data sheets.

The 501A won't burn out either the semiconductors or itself.

With all these features, you'd think the 501A was an expensive curve tracer. But look at the price.

For complete technical data, call your B&K distributor. Or write Dynascan Corporation.

\$129⁹⁵



Very good equipment
at a very good price. **B&K**

Product of Dynascan Corporation
1801 West Belle Plaine Avenue, Chicago, Illinois 60613

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



Our ECG 102A transistor replaces...

To Be Replaced	ECG Replacement	To Be Replaced	ECG Replacement
HB333	102A	MA3939C	102A
HB364	102A	MA3939D	102A
HB566	102A	MA815	102A
HB75	102A	MA881	102A
HB75C	102A	MA882	102A
HB77	102A	MA883	102A
HB77CB	102A	MA884	102A
HB156	102A	MA885	102A
HB156C	102A	MA887	102A
HB171	102A	MA888	102A
HB172	102A	MA889	102A
HB173	102A	MA890	102A
HB176	102A	MA891	102A
HB178	102A	MA892	102A
HB186	102A	MA893	102A
HB187	102A	MA894	102A
HB263	102A	MA895	102A
HB270	102A	MA896	102A

and hundreds more.

The 102A is only one big part of our very small line.

Just 124 Sylvania ECG semiconductor parts will replace over 41,000 manufacturer's part numbers and JEDEC types.

Our new ECG semiconductor replacement guide makes it easy for you to find out exactly which one of ours is the one you need.

With our guide and our 124 replacements, you can service practically any solid-state entertainment product on the market.

No more lugging sets back to the shop because you couldn't carry all the parts you needed.

With Sylvania's 124 semiconductors you can handle almost all of your repair jobs right in your customer's home.

Stock up on Sylvania ECG semiconductors now.

It's just another small thing from GTE Sylvania that can take a big load off your back.

Sylvania Electronic Components, Waltham, Mass. 02154

GTE SYLVANIA

■ Audio component systems are becoming so sophisticated that some of the more critical audiophiles are turning to the use of electronic instruments for making precise adjustments. With this in mind, Kenwood has introduced its Model KC-6060A Solid State Audio Lab-Scope, which is styled to match other audio components in the product line (Fig. 1).

For evaluation purposes, Kenwood shipped us its Model KT-7001 AM-FM Stereo Tuner (Fig. 2) and Model KA-7002 Solid State Stereo Amplifier (Fig. 3), to be used in conjunction with the scope (Fig. 4) that it also sent us. Together, these three components form a very attractive system.

The scope is definitely designed for the consumer rather than the electronic technician. This is quite apparent in the arrangement of inputs and controls.

For most applications, the audiophile will use merely the inputs provided at the rear of the scope, thus concealing all connecting electrical cables during normal use (although banana-plug-type connectors are also provided on the front panel for optional use). At the rear, four inputs are provided (Fig. 5) in addition to three outputs—all of these terminals consisting of phono-type sockets.

The scope's FM Multipath Horizontal and Vertical inputs are connected by phono-type cables directly to the corresponding outputs at the rear of the tuner (Fig. 6), while the scope's left and right audio inputs may be connected to either the tuner's

tape recorder outputs or one of the two sets of tape recorder outputs on the stereo amplifier (we chose to use the tape recorder A, left and right channel record outputs—Fig 7.)

The left- and right-channel direct-output jacks are wired directly to the rear left- and right-channel audio-input jacks, thus providing an output for the tape recorder or any other component displaced by the scope's audio input connections (a complete schematic of the scope is provided in Fig. 8). The only other scope output is a 1kHz test signal that can be fed through other audio components.

The FM Multipath HORIZONTAL- and VERTICAL-GAIN controls are located on the scope's rear panel. This we consider an appropriate location since the scope trace can also be adjusted by the front panel HORIZONTAL- and VERTICAL-GAIN controls—in fact we never even found need to adjust the rear panel settings. All other controls are conveniently located on the front panel.

The POWER switch, plus the FOCUS, INTENSITY, HORIZONTAL-GAIN, VERTICAL-GAIN and SWEEP controls are all basically like those found on conventional scopes—and thus they needn't be described to experienced electronic technicians. The 1kHz OSCILLATOR control merely varies the amplitude of the oscillator output, and the REAR/FRONT switch selects the set of stereo inputs used (either front or back panel).

So much for the more conventional controls. We were pleased to note that sliding potentiometers are used for HORIZONTAL and

Kenwood's KC-6060A Solid State Audio Lab-Scope

by Phillip Dahlen

More sophisticated audio system adjustments can now be made by the audiophile who expands his system to include a matching scope



Fig. 1—Kenwood's Model KC-6060A Solid State Audio Lab-Scope (right) is styled to match other audio components in the product line.



Fig. 2—FM Multipath signals for the scope were obtained from Kenwood's Model KT-7001 AM-FM Stereo Tuner.

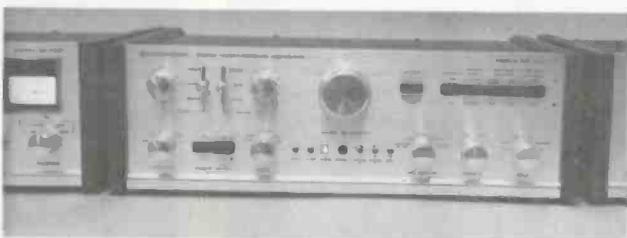


Fig. 3—Audio signals for the scope were obtained from Kenwood's Model KA-7002 Solid State Stereo Amplifier.

VERTICAL POSITIONING of the scope trace—simplifying such adjustments by the less technically inclined customers. The SELECTOR switch is also definitely designed for consumer use, for with each position of this switch, a corresponding lamp is illuminated the right of the scope trace

—indicating the current mode of operation.

When the SELECTOR switch is fully counterclockwise, a lamp indicates that the vertical trace displayed consists of an internally applied 0.1v p-p test signal (1kHz) that can be used for calibration purposes (Fig. 9).



Fig. 4—Kenwood's Model KC-606A Solid State Audio Lab-Scope.

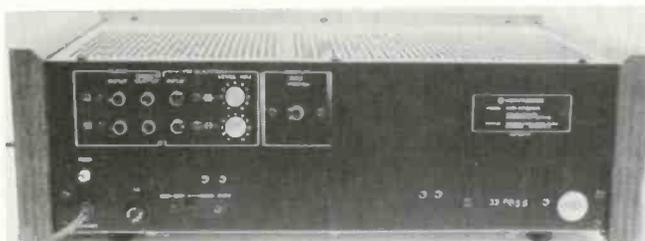


Fig. 5—Input and output terminals at the back of the scope.

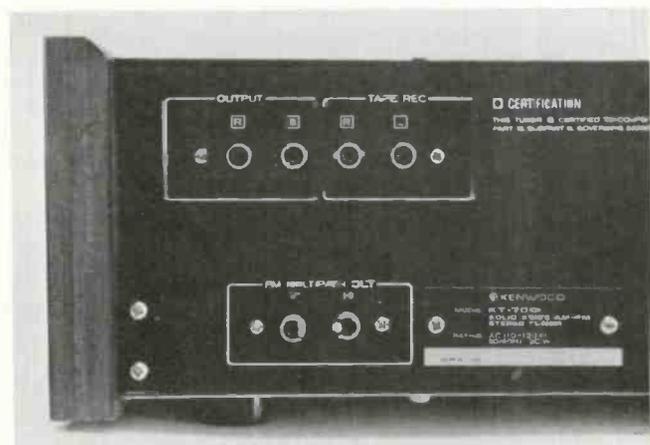


Fig. 6—Output terminals at the back of the AM-FM stereo tuner.

The dimensions of this waveform can be adjusted with the VERTICAL-GAIN and HORIZONTAL-SWEEP controls.

Upon rotating the SELECTOR switch one position clockwise (from its formerly full counterclockwise position), a lamp indicates that the waveform observed represents the left stereo channel (Fig. 10); while in the next position another lamp indicates that the new waveform observed represents the right stereo channel (Fig. 11). Either waveform display may be adjusted by the VERTICAL-GAIN and HORIZONTAL-SWEEP controls. Their shape is also affected by the type of sound observed, the sound level of the stereo amplifier, and tone-control or audio-filtering settings.

The Stereo Display represents one of the most useful functions of the scope. With the tuner SELECTOR switch set for FM MONAURAL reception, the same audio signal is fed to both the left and right channels of the stereo amplifier. Thus the amplifier can be critically adjusted for the same gain on both channels, resulting in a single diagonal trace on the scope (Fig. 12).

In addition to being used for adjusting the stereo amplifier, the stereo display can prove useful for monitoring the types of stereo FM or other stereo programming received—which can be anything from announcers whose voices are transmitted equally through both channels (producing a waveform similar to that shown in Fig. 12); to an-

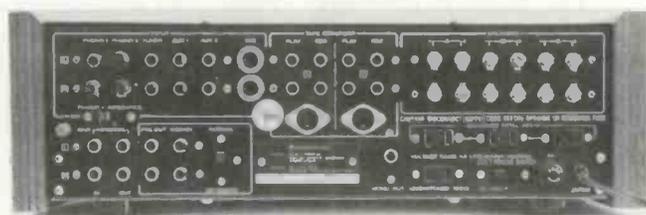


Fig. 7—Input and output terminals at the back of the stereo amplifier.

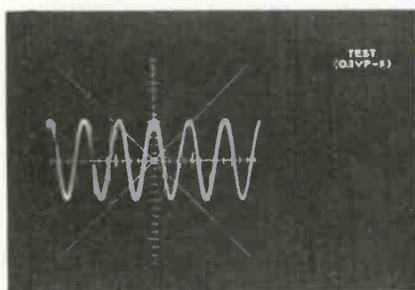


Fig. 9—Waveform produced by an internally applied 0.1v p-p, 1kHz test signal.

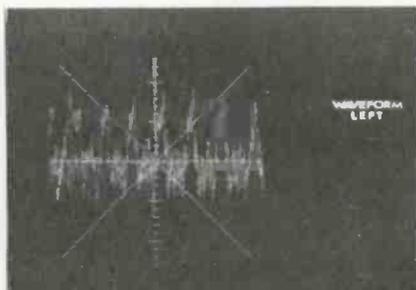


Fig. 10—Waveform obtained from the left stereo channel.

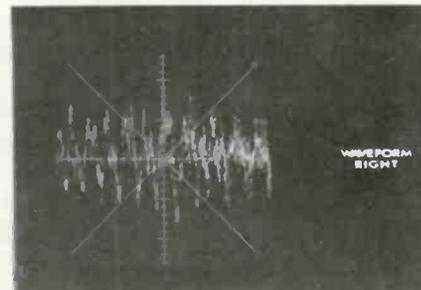


Fig. 11—Waveform obtained from the right stereo channel.

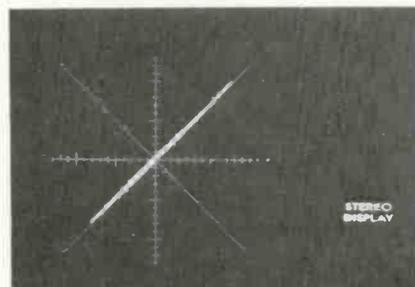


Fig. 12—Stereo display resulting when the same audio signal is present in both the left and right stereo channels.

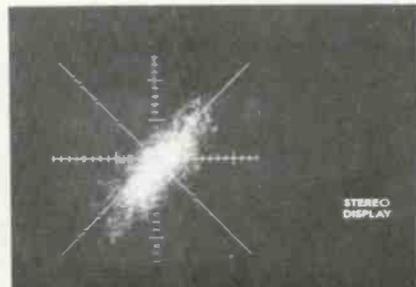


Fig. 13—Stereo display resulting when there is only minor channel separation in the stereo signal observed.

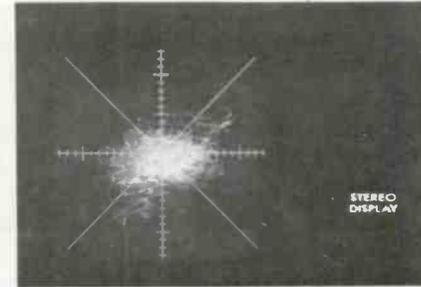


Fig. 14—Stereo display resulting when there is a significant amount of channel separation in the stereo signal observed.

nouncers that are a little trickier and use a slight amount of phase shifting to add a stereo dimension to their voice, producing a rather flat elliptical scope trace; to music containing only a minor stereo element (Fig. 13); to music with a great degree of channel separation (Fig. 14). With such scope displays, one quickly real-

izes that their ears aren't playing tricks with them—that frequently the "stereo" information received is really something else.

It was while in the stereo mode that the automatic spot killer circuitry proved quite useful, for when no audio signal was present, the scope beam was automatically switched

OFF—thus eliminating the bright spot that would otherwise appear at the center of the screen during the absence of horizontal and vertical deflections.

In the last remaining mode (FM MULTIPATH), the scope can also be used for observing FM receiver signal conditions. Fig. 15 shows a photo-

graph resulting from a time exposure that was made as the receiver was tuned from a frequency below that of a local FM station (left portion of scope trace) to a frequency above that of the station. (The resulting scope trace appears distorted due to the extremely strong signal conditions normally present in the ET/D electronics lab. This characteristic waveform has been described in a number of previous articles.) An expanded trace of the on-station FM Multipath signal can be seen in Fig. 16, while an expanded trace of the above-frequency signal can be seen in Fig. 17. (For best reception, the antenna system should be adjusted to eliminate reflected RF signals and thus produce a much flatter topped characteristic curve than that shown in Fig. 15.)

Although the waveforms observed thus far on the scope appear quite satisfactory, we decided to also see what sort of waveforms the scope would

continued on page 66

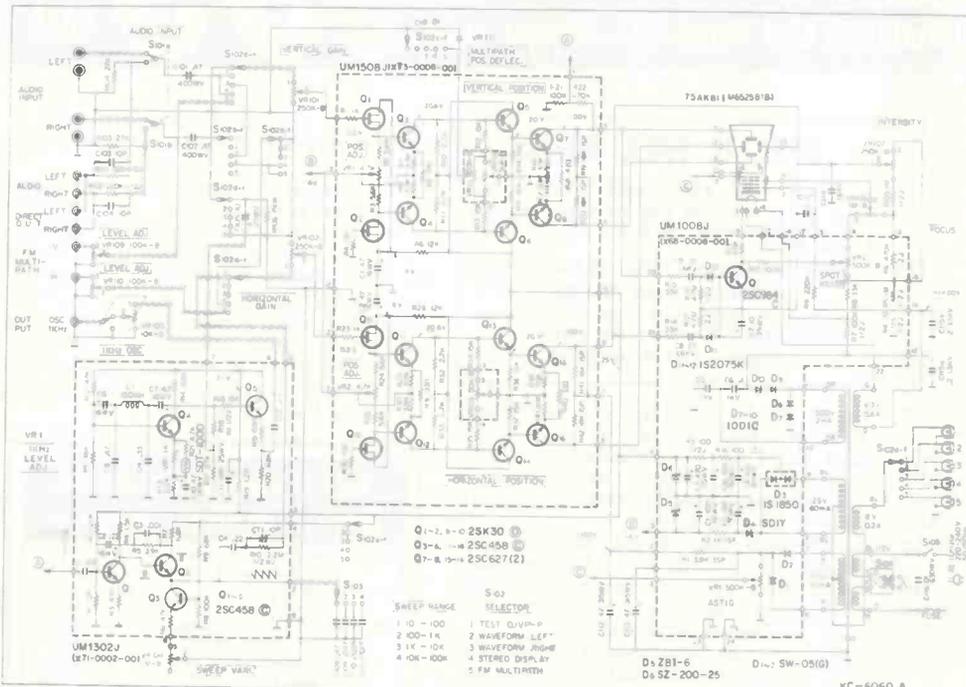


Fig. 8—Schematic of the audio lab-scope.

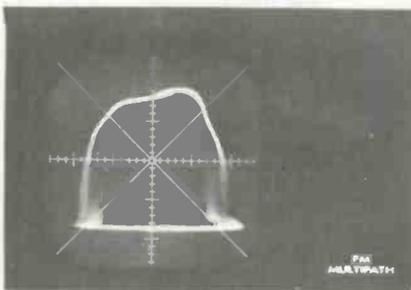


Fig. 15—Time exposure of the pattern traced out as the FM receiver was tuned.

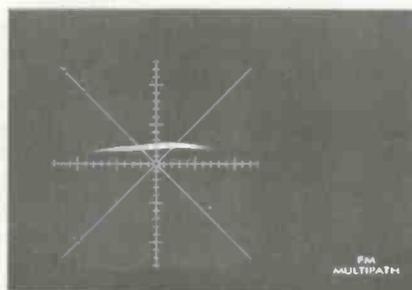


Fig. 16—Expanded trace of the on-station FM Multipath signal.

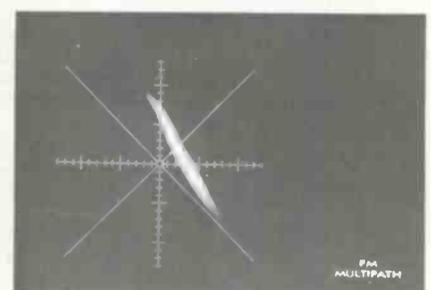


Fig. 17—Expanded trace of the above-frequency FM Multipath signal.

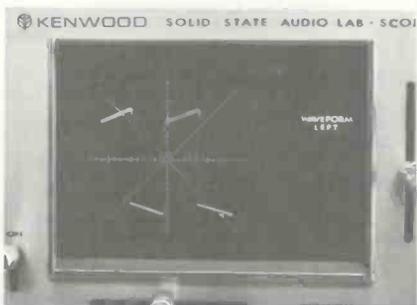


Fig. 18—Waveform observed when applying a 20Hz square wave to the scope.

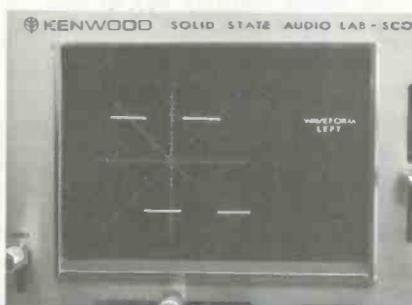


Fig. 19—Waveform observed when applying a 2kHz square wave to the scope.

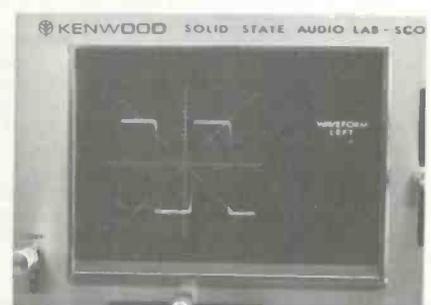


Fig. 20—Waveform observed when applying a 200kHz square wave to the scope.

An Extraordinary Offer

to introduce you to the benefits of Membership in

ELECTRONICS BOOK CLUB

for a limited time only you can obtain

ANY 3 OF THESE UNIQUE BOOKS . . . yours for only **99¢** each
... with Trial Club Membership (Combined List Price \$35.85)

May we send you your choice of any three books on the facing page as part of an unusual offer of a Trial Membership in Electronics Book Club?

Here are quality hardbound volumes, each especially designed to help you increase your know-how, earning power, and enjoyment of electronics.

These handsome, hardbound books are indicative of the many other fine offerings made to Members . . . important books to read and keep . . . volumes with your specialized interests in mind.

Whatever your interest in electronics—radio and TV servicing, audio and hi-fi, industrial electronics, communications, engineering—you will find that Electronics Book Club will help you.

With the Club providing you with top quality books, you may broaden your knowledge and skills to build your income and increase your understanding of electronics, too.

How You Profit From Club Membership

This special offer is just a sample of the help and generous savings the Club offers you. For here is a Club devoted exclusively to seeking out only those titles of direct interest to you. Membership in the Club offers you several advantages.

- 1. Charter Bonus:** Take any three of the books shown (combined values up to \$35.85) for only 99¢ each with your Trial Membership.
- 2. Guaranteed Savings:** The Club guarantees to save you 15% to 75% on all books offered.
- 3. Continuing Bonus:** If you continue after this trial Membership, you will earn a Dividend Certificate for every book you purchase. Three Certificates, plus payment of the nominal sum of \$1.99, will entitle you to a valuable Book Dividend which you may choose from a special list provided members.
- 4. Wide Selection:** Members are annually offered over 50 authoritative books on all phases of electronics.
- 5. Bonus Books:** If you continue in the Club after fulfilling your Trial Membership, you will receive a Bonus Dividend Certificate with each addi-

SPECIAL FREE BONUS

. . . if you act now!

Yes, if you fill in and mail the membership application card today, you'll also get this Bonus Book, FREE!

1972 POPULAR TUBE/TRANSISTOR SUBSTITUTION GUIDE

An all-in-one substitution guide for both tubes and transistors. 8 sections, 256 pages.

Regular List Price \$4.95

tional Club Selection you purchase. For the small charge of only \$1.99, plus three (3) Certificates, you may select a book of your choice from a special list of quality books periodicaly sent to Members.

6. Prevents You From Missing New Books: The Club's FREE monthly *News* gives you advance notice of important new books . . . books vital to your continued advancement.

This extraordinary offer is intended to prove to you, through your own experience, that these very real advantages can be yours . . . that it is possible to keep up with the literature published in your areas of interest . . . and to save substantially while so doing.

How the Club Works

Forthcoming selections are described in the FREE monthly *Club News*. Thus, you are among the first to know about, and to own if you desire, significant new books. You choose only the main or alternate selection you want (or advise if you wish no book at all) by means of a handy form and return envelope enclosed with the *News*. As part of your Trial Membership, you need purchase as few as four books during the coming 12 months. You would probably buy at least this many anyway . . . without the substantial savings offered through Club Membership.

Limited Time Offer!

Here, then, is an interesting opportunity to enroll on a trial basis . . . to prove to yourself, in a short time, the advantages of belonging to Electronics Book Club. We urge you, if this unique offer is appealing, to act

promptly, for we've reserved only a limited number of books for new Members.

To start your Membership on these attractive terms, simply fill out and mail the postage-paid airmail card today. You will receive the three books of your choice for 10-day inspection. **SEND NO MONEY!** If you are not delighted, return them within 10 days and your Trial Membership will be cancelled without cost or obligation. Electronics Book Club, Blue Ridge Summit, Pa. 17214.

Typical Savings Offered Club Members on Recent Selections

Basic Electronics Course	List Price \$8.95; Club Price \$5.95
Refrigeration	List Price \$7.95; Club Price \$4.95
Beginner's Guide to Computer Program'g	List Price \$9.95; Club Price \$6.95
How to Solve Solid-State Ckt. Troubles	List Price \$8.95; Club Price \$5.95
Elements of Tape Recorder Repairs	List Price \$7.95; Club Price \$4.95
Handbook of Electronic Tables: 2nd Ed.	List Price \$7.95; Club Price \$4.95
How to Repair Small Gas Engines	List Price \$8.95; Club Price \$5.95
Fire & Theft Security Systems	List Price \$7.95; Club Price \$4.95
Servicing Electronic Organs	List Price \$7.95; Club Price \$4.95
Industrial Electronics: Princ. & Practice	List Price \$8.95; Club Price \$5.95
Electronics Data Handbook: New 2nd Ed.	List Price \$7.95; Club Price \$4.95
How to Interpret TV Waveforms	List Price \$7.95; Club Price \$4.95
Inst. & Svcing. Electronic Protective Sys.	List Price \$7.95; Club Price \$4.95
Electronic Testers for Auto Tune-Up	List Price \$7.95; Club Price \$4.95
Basic Color Television Course	List Price \$9.95; Club Price \$6.95
199 Color TV Troubles & Solutions	List Price \$7.95; Club Price \$4.95
Commercial FCC License Handbook	List Price \$8.95; Club Price \$5.95
RCA Color TV Service Manual—Vol. 2	List Price \$7.95; Club Price \$4.95
Citizens Band Radio Service Manual	List Price \$7.95; Club Price \$4.95
Electronic Musical Instruments	List Price \$7.95; Club Price \$4.95
Computer Technician's Handbook	List Price \$10.95; Club Price \$7.95
Servicing Modern Hi-Fi Stereo Systems	List Price \$7.95; Club Price \$4.95

SEND NO MONEY! Simply fill in and mail postage-paid Airmail card today!

Major Appliance Repair Guide

Everything you need to know to fix any major electrical appliance is contained in this comprehensive, up-to-date volume. The authors explain every step in great detail, and illustrate typical situations with detailed photos and drawings. Numerous troubleshooting charts help you pinpoint the cause of virtually any problem in a matter of minutes. Repair procedures are included for dishwashers, clothes washers, dryers, water heaters, garbage disposers, and ranges, using typical models and case-history data drawn from actual experience. In every case, the material is based on practical, down-to-earth reasoning and techniques. 288 pps., over 260 illus. Hardbound.

List Price \$8.95 • Order No. 555

RCA Monochrome TV Service Manual



Covers 33 RCA black-and-white models from 1964 to current chassis — KCS136 to KCS178 — packed with vital service data regarding adjustments, alignment and troubleshooting tips. Initial chapters cover tuners, IF repair and alignment video circuits, AGC and sync circuits, and vertical and horizontal sweep systems. The remainder of the manual deals with specific chassis. There are chassis layout drawings, circuit board component location diagrams, specific information relating to construction and adjustment plus case-history troubleshooting data. Includes data on small portable and compact models. 276 pps. 8 1/2 x 11. Over 150 illustrations.

List Price \$7.95 • Order No. 549

Practical Color TV Servicing Techniques



This brand-new updated and expanded second edition contains troubleshooting guidelines and case histories on the latest solid-state receivers, including a 4-color section with 32 trouble-symptom photos and a foldout section with 6 complete TV receiver schematics. Now included are service tips and techniques on RCA, Motorola and Zenith solid-state chassis, plus a host of case histories and current data on G.E. chassis. In fact, each of the 12 chapters is filled with information applicable to virtually any brand of color TV receiver, enabling you to solve tough-dog troubles quickly. 404 pps., 250 illus. Hardbound.

List Price \$8.95 • Order No. 434

199 Electronic Test & Alignment Techniques



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

List Price \$7.95 • Order No. 593

How to Use Test Instruments in Electronics Servicing



A long-needed, practical handbook on test equipment applications — ranging from the use of audio gear to tube and transistor checkers. Not a "how-it-works" treatment, but a "how-to" manual describing specific tests and troubleshooting techniques. You'll discover new ways to use your scope and several new "tricks" you can perform with multimeters. You'll learn signal-injection troubleshooting, how to measure inductance and capacitance with the help of your signal generator, pointers for using markers, sweeps and pattern generators, shortcuts and special techniques for color TV troubleshooting, how to test audio circuits and equipment. 256 pps., over 200 illus. Hardbound.

List Price \$7.95 • Order No. 485

Electric Motor Test & Repair



A guide to maintenance practices for all types of small horsepower motors. While many of the larger motor repair shops find it more expedient to replace low-horsepower units, rewinding of small electric motors is still a wide-spread and profitable practice. This practical guide contains a wealth of information on testing and rewinding small motors of every type, including fan, starter, polyphase, capacitor, induction, synchronous, etc. Early chapters tell you how to set up a motor test panel, make general tests and measurements, and advise you about the tools and equipment necessary (such as an armature winder, wedge driver, cutting and gauging board, coil taper, puller plate, etc.). 160 pps., 102 illus. Comb-bound with soft cover.

List Price \$6.95 • Order No. T-97

TV Trouble Diagnosis Made Easy



A brand-new picture-symptom guide for solving every TV trouble, both color and black-and-white. You simply compare the symptoms you see and hear with those pictured or described and you'll be able to pinpoint any trouble to a specific circuit and component in short order. In the first chapter, each trouble symptom is pictured and described to help you identify the probable cause. From there you are referred to one of the remaining 19 chapters dealing with specific troubles in each section of the receiver, explaining how to further analyze existing symptoms and pinpoint troubles. Individual component tests are suggested, too, everything from flybacks to translators. 236 pps., 225 illus. Hardbound.

List Price \$7.95 • Order No. 544

Electronic Circuit Design Handbook



New Fourth Edition! A new fourth enlarged edition of the ever popular circuit designer's "cookbook," now containing over 600 proven circuits for all types of functions, selected from thousands on the basis of originality and practical application. Now you can have, at your fingertips, this carefully planned reference source of tried and tested circuits. Selected on the basis of their usefulness, this detailed compilation of practical design data is the answer to the need for an organized gathering of proved circuits — both basic and advanced designs that can easily serve as stepping stones to almost any kind of circuit you might want to build. 384 pps., 19 fig. sections, over 600 illus. 8 1/2 x 11. List Price \$17.95 Order No. T-101

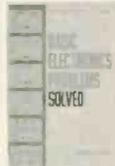
Handbook of Semiconductor Circuits



Contains 124 examples of standard transistor circuits, complete with operational data for amplifiers, oscillators, logic and switching circuits, power supplies, and various nonlinear circuits. The broad range of circuits included were selected on the basis of application and practicality. A design philosophy section is included with each group of circuits, thereby providing a basis for understanding circuits other than those selected as examples. This is a collection of practical circuits which have wide application. Each circuit description includes data concerning any unique design or operational data. Hundreds of illustrations and diagrams. 448 pps., 6" x 9". Hardbound.

List Price \$8.95 • Order No. G-30

Basic Electronics Problems Solved



Here are easy step-by-step solutions to many basic electronics problems in a convenient one-stop source dealing with both solid-state and tube-type circuits. The content not only presents a detailed explanation of each point, but also provides many actual examples on how to work out problems. Then, to firmly fix the information in your mind, there are numerous example problems for you to solve; answers to these are included in one Appendix, and worked out solutions in another. Covers 103 circuits. AC circuits, powers of ten, semiconductor, power supplies, and receiver circuits. A final chapter shows you how to use a rule to speed calculations. 192 pps., over 100 illus. Hardbound.

List Price \$7.95 • Order No. 530

199 TV Tough-Dog Problems Solved



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

List Price \$7.95 • Order No. 559

How to Use Color TV Test Instruments



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

List Price \$7.95 • Order No. 577

64 Hobby Projects For Home & Car



Here's a variety of gadgets a bound to please almost everybody — from the hobbyist and experimenter to the engineer who likes to make things in his own home workshop. From an auto ice alarm to a vibrator generator, from an amazing electric candle that lights with a match to a splash alarm for the swimming pool, there's a host of fun-to-build devices, many of which are quite unique. For the home there are 28 individual projects, for the car a total of 36, each accompanied by a schematic and/or pictorial diagram and parts list. If you like to build, here's a fine collection of practical projects with everything worked out for you except the fun! 192 pps. Hardbound.

List Price \$6.95 • Order No. 487

Working with Semiconductors



A BRAND-NEW working guidebook to semiconductor circuit operation of value to technicians and engineers who work with solid-state equipment. The wonderful aspect of this book is that you can really develop a thorough understanding of semiconductors — and actually enjoy doing it! This up-to-the-minute volume aroids dry, theoretical mathematical explanation — it tells you simply how and why things work — backed up by large, clear expository illustrations. More advanced circuits covered are: transistor oscillators, multivibrators, Eccles-Jordan and Schmitt trigger circuits, crystal-controlled generators, counters, power supplies, high-frequency circuits, field-effect transistors, unijunction transistors, tunnel diodes, SCR's, etc. 224 pps., over 185 illus., 15 chart. List Price \$7.95 • Order No. 501

TV, Radio, Hi-Fi Hints & Kinks



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

List Price \$7.95 • Order No. 561

Modern Radio Repair Techniques



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

List Price \$7.95 • Order No. 580

AN EXTRAORDINARY OFFER...

For more details circle 105 on Reader Service Card

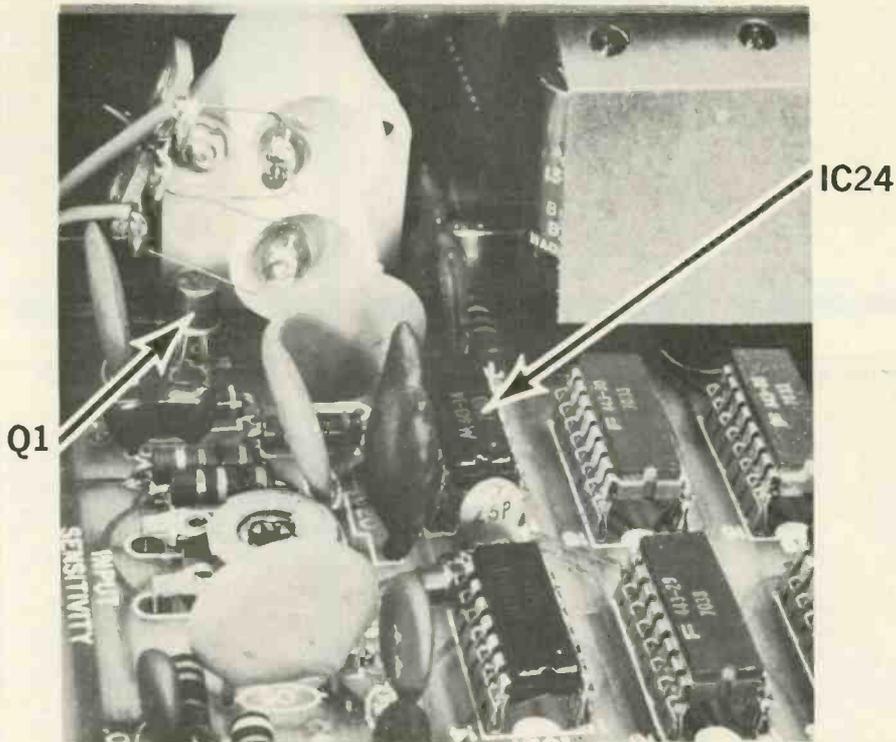


Fig. 1—The dual-gate MOSFET (Q1) and integrated circuit (IC24) used in the input circuitry. Only two of the six inverters in this integrated circuit function together as the Schmitt trigger. The other inverters will be described in a future article.

Basic Digital Circuitry

by Phillip Dahlen

Some fundamental characteristics of new circuitry that is becoming increasingly common in consumer electronic products

■ With the development of low-cost digital integrated circuits, computer-type functions have suddenly become practical for applications that would never have been seriously considered even a few years ago. As an example, previous issues of *ELECTRONIC TECHNICIAN/DEALER* have covered the use of digital circuitry when tuning Magnavox's 1500 DTI Receiver (Page 40 of our July 1972 issue), as well as for adjusting the volume of a Motorola TV set (Page 41 of our February 1972 issue). The Heath Co. is currently marketing an FM tuner that can be tuned with digital touch-tone-type circuitry, and we have recently learned of a Japanese TV-set manufacturer that plans to omit all mechanical TV channel indicators from a coming model. Instead, IC digital circuitry will be used to generate a complex video signal for superimposing numerals upon the TV picture viewed to automatically indicate the channel received.

With such developments in digital circuitry already a reality or soon to be on the market, it is becoming increasingly important that electronic technicians be able to understand some basic digital circuitry. And in describing such circuitry, we will use for most of our examples the circuitry found in Heath's Model IB-101 Frequency Counter—the first of a number of frequency counters that Heath has recently placed on the market.

Unlike previous articles dealing with circuit fundamentals, this series of articles will not cover the theory of sub-component functions. In fact, in our coverage of the integrated circuitry we will not even be concerned with the equivalent transistor circuitry contained within. Instead, all components will be considered on a "go/no-go" basis—they either produce the expected results or they are probably defective. Thus, these articles may seem a little unusual to many readers of *ELECTRONIC TECHNICIAN/DEALER*, since they are concerned with little more than how signal waveforms observed on a scope inter-relate during the proper function of this frequency counter. (The complete schematic of the frequency

counter circuitry—Fig. 7—will be referred to frequently in this and future articles of the series.)

Since this series is not intended as a course in basic computer technology, we are intentionally omitting the general use of such terms as negative logic, S, T, C, Q and \bar{Q} —although in future independent study the understanding of such terms may come more easily as a result of this series.

The second article in this series (following this introductory one) is a rather lengthy article telling how basic flip-flop circuitry—which typically counts from zero to one and then back to zero again—can be used to count to 10 and thus form the basic building block of the decade counter. Numerous composite scope pictures are included in that article to show just how this is done. First, however, it is necessary to see how a signal of some known or unknown frequency is changed to the type of signal that can be handled by these flip-flops.

The flip-flops used in this instrument can automatically handle an extremely broad range of counting rates, but those in the first decade circuitry can be activated only by negative pulses from an applied square-wave-type signal—remaining unaffected by longer duration negative pulses, positive pulses of any duration, or any voltage levels of the applied signal. This, the first article in the series, is thus concerned with automatically converting an applied signal of varying amplitude (a signal voltage range of 100mv rms to 200v rms) and frequency (1Hz to 15MHz) into an appropriate square-wave-type signal for activating the decade-counter circuitry.

The initial circuitry for processing the applied input signal of unknown frequency consists basically of a dual-gate MOSFET (Q1) and two inverters (IC24 inverters E and F), which function together as a regenerative, bistable Schmitt trigger. These two semiconductors are shown in Fig. 1.

The MOSFET is designed in such a manner that internal zener diodes protect it against overload, while its dual design acts as an automatic level control. Thus the am-

plitude of its output (within limits) is not greatly affected by either the frequency or the voltage of the applied signal. This semiconductor tends to clip the applied signal, initiating the process of forming a square-wave signal.

Higher-frequency signals pass more readily through capacitor C4, while coil L1 limits this attenuation. Resistor R7 adjusts the threshold of the Schmitt-trigger circuitry, being used to bias it so that the voltage at the input of inverter F is just below the turn-on point.

The Schmitt-trigger circuit serves to “sharpen the corners” of the square wave resulting from the input signal, and its output is also of virtually constant amplitude despite the frequency and amplitude of the signal fed to the frequency counter. Although the positive and negative portions of the resulting waveform may not always be of equal time intervals to form a true square wave, it is the negative pulses generated during its switch from a positive to a negative state that really interests us.

So much for circuit description. The scope traces in Fig. 2 through 6 demonstrate the operation of this circuitry.

In Fig. 2 we note (top trace) the application of a 100.0v rms, 60Hz signal to the frequency counter, the signal fed to inverter F (second trace), the signal fed to inverter E (third trace), and the output of the Schmitt-trigger circuit (bottom trace).

(It is, of course, not possible to photograph all of the waveforms shown in Fig. 4 simultaneously on the Telequipment Model D67 dual-trace scope used for this article. The photograph shown is instead a composite picture produced by first taking three dual-trace photographs. The first photograph contained the top two waveforms—that of the 100v rms, 60Hz signal applied to the frequency counter and the resulting signal fed to inverter F—IC 24, Pin 8. The second photograph consisted again of the 100v rms signal, plus the signal applied to inverter E—IC24, Pin 7. And the third photograph consisted of still again the 100v rms signal, plus the

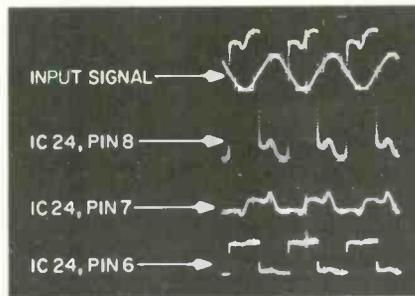


Fig. 2—Waveforms observed in the input circuitry when applying a 100.0v rms, 60Hz signal.

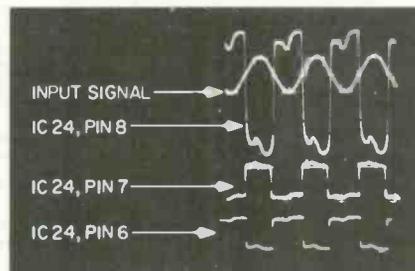


Fig. 3—Waveforms observed in the input circuitry when applying a 10.00v rms, 60Hz signal.

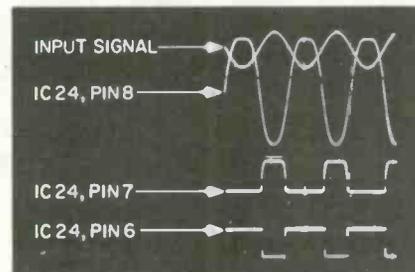


Fig. 4—Waveforms observed in the input circuitry when applying a 1.00v rms, 60Hz signal.

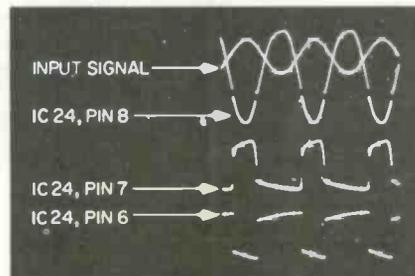


Fig. 5—Waveforms observed in the input circuitry when applying a 6kHz signal.

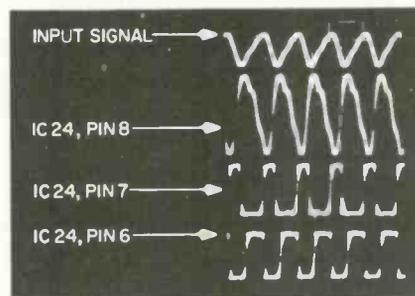


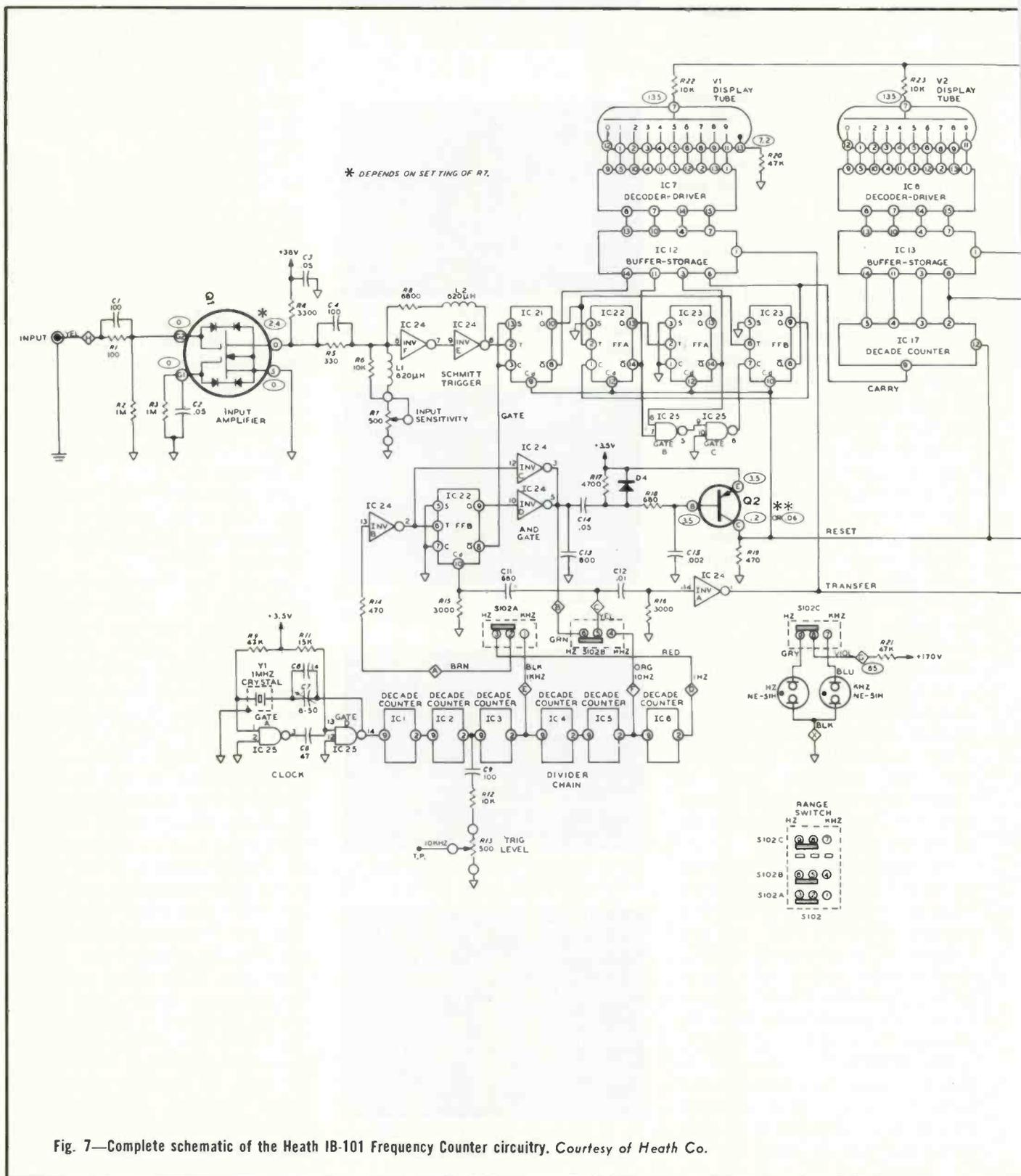
Fig. 6—Waveforms observed in the input circuitry when applying a 6MHz signal.

signal present at the output of the Schmitt-trigger circuit—IC24, Pin 6. Upon aligning the three photographs of the 100v rms scope traces horizontally, so that they appeared in phase with one another, we were able to determine the corresponding

phase relationships of the other signals. The second and third 100v rms waveforms were then cropped from the photographs, the remaining photographed scope traces positioned together in the composite picture to maintain the observed

phase relationships.)

Similar composite pictures were produced of the waveforms that are observed when the applied signal voltage is reduced to 10.00v rms (Fig. 3) and 1.00v rms (Fig. 4). (For the second trace in all three il-



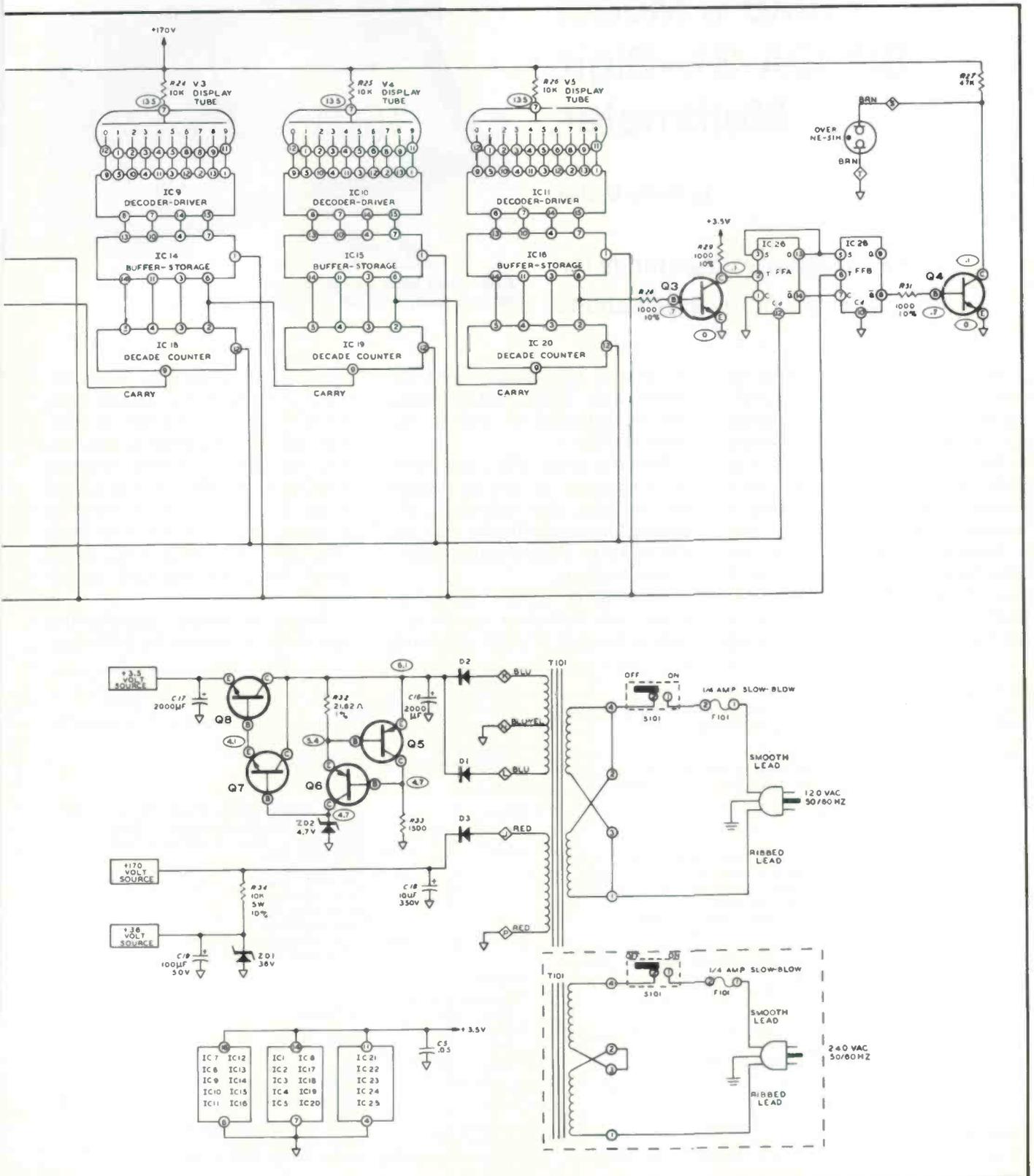
illustrations—the signal fed to inverter F—we used a relatively large scale of 100mv/cm on the scope gradient to observe more closely any variation in resulting amplitude.)

To observe the circuit's apparent

independence to the applied signal frequency, we also applied a low-voltage 6kHz signal to the frequency counter and observed how it was changed into a waveform resembling that of a square wave (Fig. 5). The same observations were made with

the application of a 6MHz signal (Fig. 6).

Next month's article will continue this subject by showing how the square-wave-type signals produced by this circuitry are processed by the decade circuitry. ■

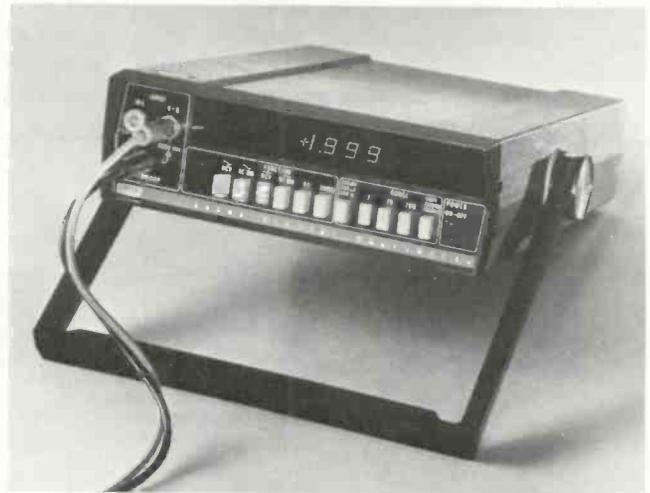


TEST INSTRUMENT REPORT

Fluke's Model 8000A 3½-Digit Multimeter

by Phillip Dahlen

Has a higher voltage range for
more servicing applications



Fluke's Model 8000A 3½-Digit Multimeter.
For more details circle 900 on the Reader Service Card.

Not too long ago, while using another digital multimeter for checking scope voltages, we encountered a 1100v CRT voltage. Not wanting to be bothered with a high-voltage probe, we chose to make these measurements with a VOM having a mechanical meter movement. Such a handicap, however, would not have occurred had we instead been using Fluke's Model 8000A 3½-digit multimeter, for it is able to handle voltages up to 1200v. (With

its optional high-voltage probe, the instrument's upper voltage range can be extended to include 1kv through 30kv.)

Priced at under \$300, this instrument measures ac and dc voltages and currents, plus resistances, displaying the measurements with the use of LED (light-emitting diode) digital readouts.

In addition to the high-voltage probe, this instrument can be used with a number of other interesting

options and accessories. These include a rechargeable battery pack for a minimum of 8 hours of portable use, digital printer output, deluxe test lead kit, a probe covering 100kHz to 100MHz with a voltage range of 0.25v to 30v, a clamp-on ac probe having ranges from 2a to 20a, plus a carrying case, front-panel dust cover and rack mounting kit.

Other interesting manufacturer specifications include the following:

DC Voltage

Ranges: $\pm 199.9\text{mv}$, $\pm 1.999\text{v}$, $\pm 19.99\text{v}$, $\pm 199.9\text{v}$, $\pm 1199\text{v}$
Accuracy: $\pm(0.1\%$ of reading + 1 digit)
(1 year, 59°F to 95°F)
Input Impedance: 10M, all ranges
Normal Mode Rejection: Greater than 60dB at 50Hz and 60Hz
Common Mode Rejection: Greater than 120dB at dc, 50Hz and 60Hz (1K unbalance)
Maximum Input Voltage: 1200v rms, all ranges

AC Voltage

Ranges: 199.9mv, 1.999v, 19.99v, 199.9v, 1199v
Accuracy: 45Hz to 10kHz: $\pm(0.5\%$ of reading + 2 digits)
(1 year, 59°F to 95°F)
10kHz to 20kHz: $\pm(0.7\%$ of reading + 2 digits)
Input Impedance: 10M in parallel with 100pf
Common Mode Rejection: Greater than 60dB at 50Hz and 60Hz (1K unbalance)
Maximum Input Voltage: 1200v rms
Not to exceed $10^7\text{v} \times \text{Hz}$ product on 20v, 200v and 1200v ranges
500v rms on 200mv and 2v ranges

DC Current

Ranges: $\pm 199.9\mu\text{a}$, $\pm 1.999\text{ma}$, $\pm 19.99\text{ma}$, $\pm 199.9\text{ma}$, $\pm 1999\text{ma}$
Accuracy: $\pm(0.3\%$ of reading + 1 digit)
(1 year, 59°F to 95°F)
Voltage Burden: 0.22v maximum up to 2a
Maximum Input Current: 2a rms, fuse protected

AC Current

Ranges: 199.9 μa , 1.999ma, 19.99ma, 199.9ma, 1999ma

Accuracy: 2a range: 45Hz to 3kHz: $\pm(1\%$ of reading + 2 digits)
(1 year, 59°F to 95°F)
Other ranges: 45Hz to 10kHz: $\pm(1\%$ of reading + 2 digits)
Voltage Burden: 0.22v maximum up to 2a
Maximum Input Current: 2a rms, fuse protected

Resistance

Ranges: 199.9 Ω , 1.999K, 19.99K, 199.9K, 1999K, 19.99M
Accuracy: 20M range: $\pm(0.5\%$ of reading + 1 digit)
(1 year, 59°F to 95°F)
Other ranges: $\pm(0.2\%$ of reading + 1 digit)
Current through unknown: 200 Ω range, 1ma
2K range, 1ma
20K range, 100 μa
200K range, 1 μa
2000K range, 1 μa
20M range, 0.1 μa
Maximum Input Voltage: 200 Ω and 2K ranges, 130v rms
20K through 20M ranges, 250v rms

General

Maximum Common Mode Voltage: 1200v peak
Operating Temperature Range: 14°F to 131°F
Storage Temperature Range without batteries: -40°F to 167°F
Humidity Range: 0 to 80% relative humidity
Display: 7-segment light-emitting diodes, 0.25 in. character height
Dimensions: 8½ in. wide by 2½ in. high by 10 in. deep
Weight: 2¾ lb without batteries
AC Power Requirements: 100-115-230v ac, 50Hz to 400Hz, 2w

GREATEST TV Schematic Bargain EVER Offered

NOW-Complete TV Schematics for less than 5¢ each

COLOR TV
Covers ALL
Color Sets
1960 - 1968

BLACK & WHITE
Coverage for
23 U.S. Brands
1965 - 1968

TV TECH/MATICS - 8 Giant Volumes

Cover 99% of Color TV-4 Years B&W!

Here are FABULOUS savings on nationally-known TV schematic and service data. Here is everything you need to fill your vital service data needs for TV model years 1965 through 1968 . . . plus COLOR TV coverage from 1960 through 1968! What it amounts to is a low, low cost of less than \$9.00 per year for your TV service data . . . with an extra 5 years of Color TV coverage thrown in for good measure! Compare that with the over \$100 a year you may now be paying for comparable information.

SERVICE DATA FOR MORE THAN 20 BRANDS

TV TECH/MATICS is the ideal Service Data package for today's modern technician. It includes complete schematic diagrams and vital servicing data for every TV receiver produced by more than 20 leading American Manufacturers for 1965, 1966, 1967, and 1968. All diagrams and servicing details are completely authentic, based on information provided by the original equipment manufacturers. Each year's coverage is permanently bound into two convenient-to-use volumes which open flat to 11" x 29½", ready to provide you with instant service data at your workbench. Some of the diagrams are as large as 58" x 22".

EASY TO USE

TV TECH/MATICS is easy to use. Brand names are arranged alphabetically by model year. No more hunting through several file drawers to find the schematic you need! And at the special low price, think of the savings you will enjoy on your schematic needs . . . think of the time you'll save by having the schematics you need right at your fingertips in handy, permanently-bound form!

TV TECH/MATICS is the ideal way to cut down your schematic expenses, and to enjoy the convenience of having all your data needs right at your fingertips.

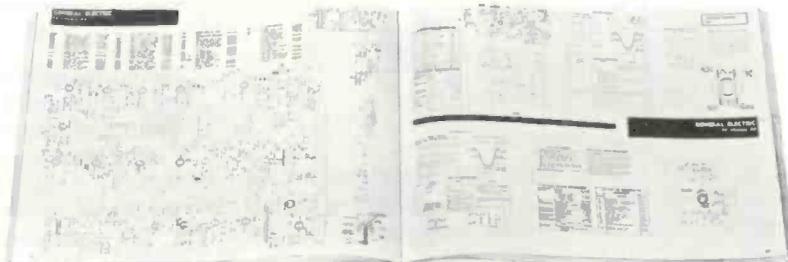
8 BIG Volumes
Regular Price \$79.60
... NOW YOURS
for only \$34.95

HERE'S WHAT YOU GET

You receive 8 BIG volumes in all, two for each year from 1965 through 1968. Included is a clearly detailed and annotated TV schematic diagram for each specific model. You also get complete replacement parts lists, alignment instructions, tube and component location diagrams, plus key waveforms and voltage readings . . . all the information you need to service over 90% of the TV receivers you'll encounter!

STREAMLINED AND CONVENIENT

All the information for a given model is contained on two facing sheets. The special bound-leaf format allows pages to lie flat when open. Each volume is organized alphabetically by manufacturer, then numerically by model number. In addition, a handy Chassis/Model Finder is bound into each volume. Regular list price for each year's coverage — 2 BIG volumes — is \$19.90. All 8 volumes normally sell for \$79.60. Your price is ONLY \$34.95 . . . a savings of nearly \$45.00!



LARGE PAGES contain complete circuit schematics, replacement parts lists, alignment instructions critical part locations, important waveforms and voltage readings.

MONEY-BACK GUARANTEE

You MUST be satisfied that TV TECH/MATICS is the greatest bargain in TV Schematics ever offered. Order at our risk for FREE 10-day examination. Prove to yourself they are worth many times the price. You can return them in 10 days for full refund or cancellation of invoice. No need to send money. But, the supply is limited, so fill-in and mail the NO-RISK coupon today to obtain these time-saving, money-making manuals.

-CONTENTS-

CONTENTS 1965 MODELS

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

PUBLISHER'S LIST PRICE \$19.90

CONTENTS 1966 MODELS

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

PUBLISHER'S LIST PRICE \$19.90

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.

PUBLISHER'S LIST PRICE \$19.90

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.

PUBLISHER'S LIST PRICE \$19.90

NO RISK COUPON—MAIL TODAY

TAB Books, Blue Ridge Summit, Pa. 17214

- I enclose \$34.95 for which please send me your complete 8-Volume Tech/Matics Schematic offer postage prepaid.
- Please invoice me for \$34.95 plus postage. Same return privileges.

Name

Company

Address

City State Zip

(Paid orders shipped prepaid. Pa. resident add 6% Sales Tax. Outside USA 10% extra.)

ET-112

COLORFAX

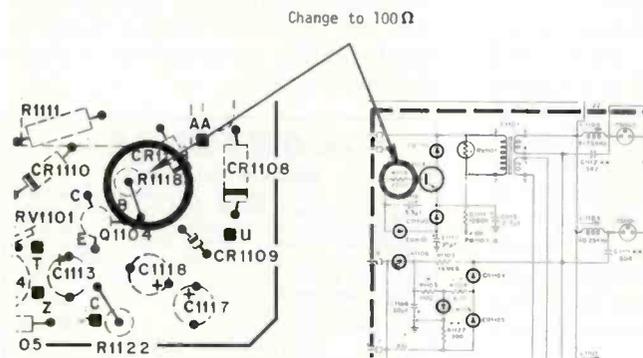
The material used in this section is selected from information supplied through the cooperation of the respective manufacturers or their agencies.

RCA SALES CORP.

Slow Remote Control Operation

There is the possibility of slow reaction of the remote system in early-production instruments. This symptom has been described as "slow turn-ON/OFF," "delayed channel change," "sluggish remote action," etc.

A resistor value change in the noise immunity circuit,

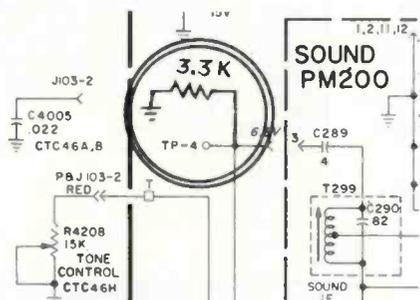


(base of transistor Q1104) as shown in the above illustration, may be helpful in resolving this symptom.

Color-TV Chassis CTC46 Series—Hum Modulation

There have been isolated instances of hum modulation in instruments utilizing this chassis. The intensity of the hum is variable with the fine tuning.

Usually the hum can be reduced to an acceptable level by



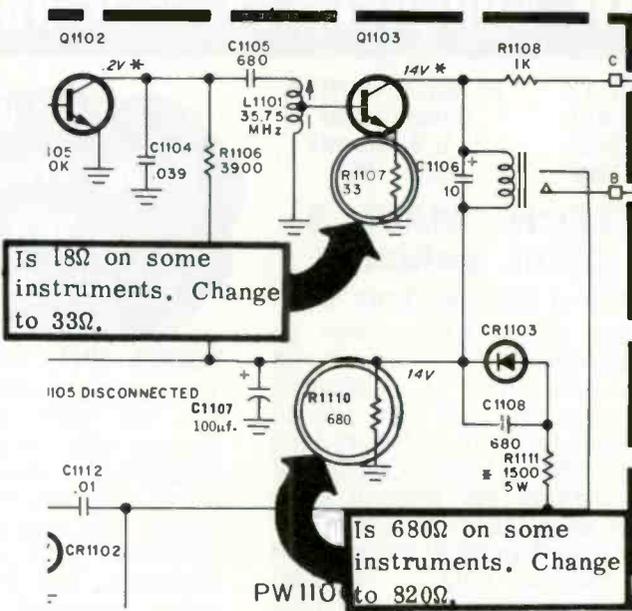
connecting a 3300Ω resistor from TP4 to ground on the PW400 board. If the hum is still present on strong signals a smaller value resistor may be used. However, do not use a value lower than 2200Ω.

Color-TV Chassis CTC52 Series—Remote Noise Immunity

In the event early-production versions of the CTC52XR chassis exhibit poor remote noise immunity, i.e. the remote function is triggered by spurious noise (such as telephone ringing, etc.), the following changes may improve selectivity.

First check the value of emitter resistor R1107; and if it is 18Ω, change it to 33Ω. Then check the value of power supply resistor R1110; and if it is 680Ω, change it to a 820Ω, 5%, 1w film type. Resistor R1110 is connected from the cathode of diode CR1103 to ground. This resistor and

C1107 (a 100μf electrolytic capacitor) were inadvertently left off the Service Data schematic.

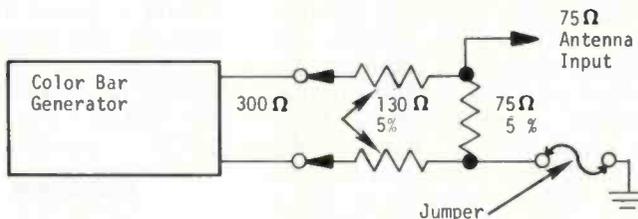


Color-TV Chassis CTC59 Series—Use of Color Bar Generator

The CTC59 is a "Hot" chassis. Therefore, normal hot-chassis servicing procedures should be observed when servicing this chassis.

The 300-to-75Ω balun transformer is mounted on the back cover of Model EQ475W/WR TV sets and is connected to the antenna block through a short coaxial cable with a standard antenna-type coaxial connector. There are several ways of connecting the 300Ω output of a color bar generator to the TV set with the back cover removed:

Connect the generator directly to the 75Ω coaxial connector wiring using a 1/2w resistor lead to make contact with



the center conductor and ground the other lead. This method is satisfactory for most service requirements even though the impedance mismatch causes some "ghosting."

Construct a resistive matching pad as shown in illustration. This will minimize "ghosting" but will also attenuate the signal somewhat.

Use a commercial 75-to-300Ω matching transformer (or another TV balun transformer, Stock No. 134986) with appropriate connectors.

Make an extension cable for the back cover-to-instrument connection. Use coaxial cable with a male connector on one end, female on the other.

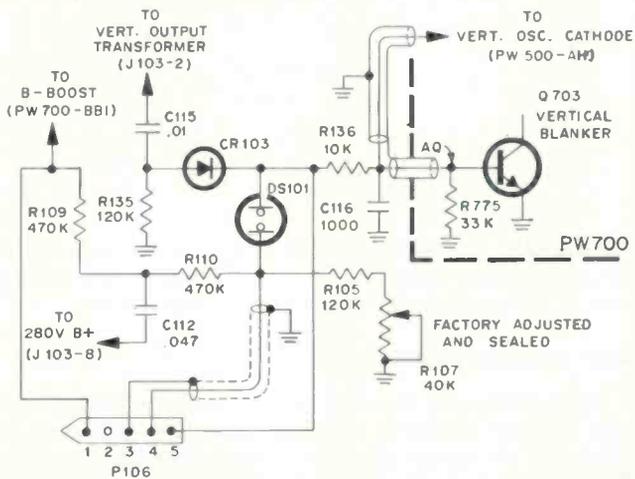
Color-TV Chassis CTC63 Series—High-Voltage Protection Circuit/ Isolating "No Video" Symptoms

In the event the high voltage increases above a predetermined level, the high-voltage protection circuit blanks the video signal by activating the vertical blanking stage. The symptom of "No Video" in the CTC63 chassis may be attributed to one of three areas: the video stages, the high-

voltage circuit, or the high-voltage protection circuit.

Outlined are procedures which can be used to isolate the symptom to a specific circuit area:

Apply power to the receiver. Then visually inspect the neon bulb, DS101, shown in illustration. If the neon bulb is lighted, proceed to the next step. If the bulb is not lighted, the problem is in the video section and troubleshooting of the video circuitry will be required.



CTC 63 - HIGH VOLTAGE PROTECTION CIRCUIT SCHEMATIC

Measure the voltage from Pin 1 to Pin 3 (ground) of the test fixture plug, P106. If this voltage exceeds 880v, the problem is in the high-voltage section; while if it does not exceed the 880v, the problem is in the high-voltage protection section. It is then necessary to troubleshoot the high-voltage protection section.

Should the solution of a problem in the high-voltage protection circuit involve replacement of variable resistor R107, it is necessary to reset the control for proper circuit operation. The following procedures are prescribed for correct adjustment:

Set the line voltage to 120v and the BRIGHTNESS control to minimum. Connect a 10M, 1% precision resistor to Pins 1 and 4 of test fixture P106 (leads should be as short as possible). Then from a fully clockwise position, rotate control R107 until the neon bulb fires. Then, very slowly turn control R107 in a clockwise direction until the neon bulb is just extinguished. Adjust the customer controls for a normal picture. Check the operation of the high-voltage protection circuit by connecting a 5M, 1% precision resistor to Pins 1 and 4 of test fixture P106. The video should now be blanked. Cement the control (R107) after the proper setup is achieved.

MOVING?

Be sure to let us know
your new address.

Please enclose
a complete address label
from one of your recent issues.

Here's a Special offer to show you how you can cut back on TV haul backs.

FREE

Our solid state replacement/renewal parts for color TV receivers work so that you don't have to do a lot of extra work. EDI SOLID-TUBES, multipliers, stick and cartridge rectifiers all help avoid haul backs. You cut back on annoying call backs.

5 EDI SOLID-TUBES serve as plug-in replacements for 25 vacuum tubes. That means you don't have to contend with tube filaments that fail. And you eliminate the need for the filament winding on the fly-back transformer. EDI solid state SOLID-TUBES are instant starting, run cool without x-radiation and provide greater reliability as well as longer life.



BUY \$25.00

WORTH OF SOLID STATE
SOLID-TUBES
AND

GET THIS FREE



5 1/4 x 9 x 5 1/2

We're so convinced that our SOLID-TUBES and other solid state replacement/renewal parts mean solid business for you and EDI that we make this FREE offer. Buy \$25.00 worth of solid state SOLID-TUBES or other replacement/renewal parts from your local distributor and you'll get a handy 9 drawer small parts cabinet FREE.

To get your FREE cabinet, please send a copy of your invoice showing purchase, together with the attached coupon. Write for a FREE EDI solid state replacement/renewal parts guide.

MR. JOEL WASSERMAN, DISTRIBUTOR PRODUCT SALES MANAGER
Electronic Devices, Inc., 21 Gray Oaks Avenue, Yonkers, N. Y. 10710

- Please send FREE cabinet. I enclose invoice showing purchase of \$25.00 worth of EDI solid state replacement/renewal parts.
- I would like a copy of your solid state replacement/renewal parts guide.

NAME _____

COMPANY _____

ADDRESS _____

CITY, STATE, ZIP _____

edi

ELECTRONIC DEVICES, INC.

21 GRAY OAKS AVENUE, YONKERS, N. Y. 10710
PHONE: 914-965-4400 TELETYPE: 710-560-0021
IN CANADA: LEN FINKLER, LTD.

designers and manufacturers of
solid state devices since 1952

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

TECHNICAL DIGEST

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

ADMIRAL

Repairing Power Tune Radios

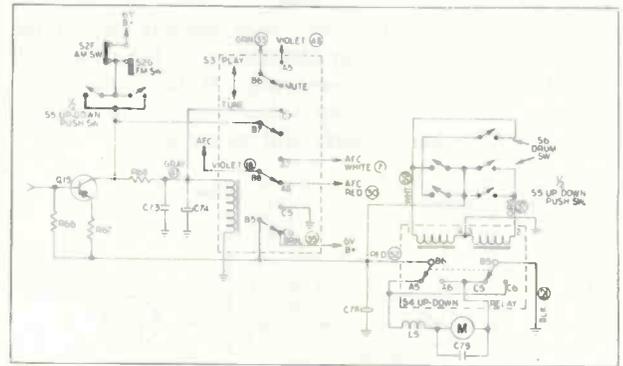
Studying the simplified schematics before repairing the power tune section of Models YK367, YK361A, YK367A or PRF157 can save you time and make the repair easier. The remaining circuits in these sets are standard FM-AM radio circuits.

Model YK 367-15B4 Chassis

The variable tuning gang capacitor can be manually tuned with the knob or power tuned with the 6v dc motor. Motor rotation direction is controlled by a DPDT relay, S4, which reverses the motor leads. The motor direction relay is controlled by the UP/DOWN pushbuttons or by the dial drum reversing switch, S6, located at one end of the dial drum. At either end of the dial, one set of drum switch contacts closes to reverse the motor direction through relay S4.

The dc power for the drum switch and the remainder of the power tune section is switched ON or OFF by a set of contacts on the power tune relay, S3. This relay can only be closed by supplying power to it from the UP or DOWN pushbutton through the AM or FM pushbutton, it can only

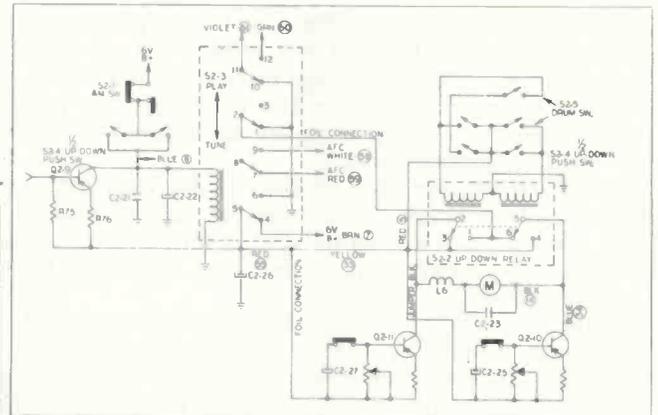
be opened by turning the set OFF, or by amplifying an AM or FM station signal enough in the power tune section to



bias the Q15 transistor to cutoff. Since this transistor is in the relay control circuit, it will open the relay and disconnect dc power from the entire power tune section.

Models YK361A, YK367A-15B4 Chassis

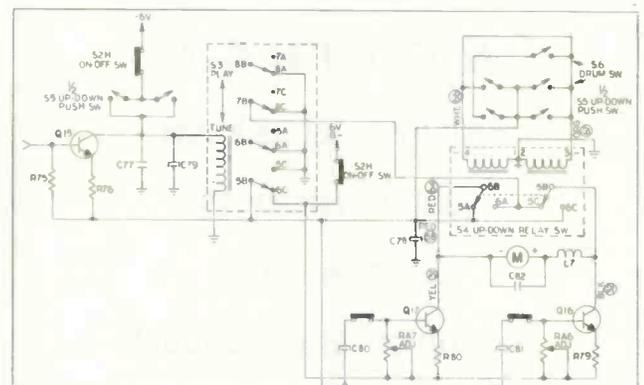
These radios use the same basic circuit as YK367 but with different schematic symbols. The main difference is that when the motor drives the dial downward, transistor Q2-11 conducts to charge the C2-27 electrolytic capacitor.



When a station is detected, S2-2 relay opens but the motor continues to operate long enough to discharge C2-27. When tuning upward, Q2-10 and C2-25 perform in a similar manner.

Model PRF157-17B4 Chassis

This third version of power tuning uses NPN transistors instead of the PNP types used in the previous sets, so the



batteries are reversed to provide -6v instead of +6v. The symbols and the layout of the board are different but the circuits are similar.



Servicemaster

— your best buy

in domestic

and

foreign

tubes.

- Discounted to provide you with a higher profit margin.
- Proven quality for better customer satisfaction.
- A complete range of domestic and foreign service types for consumer and industrial electronics.

For complete details, contact your International representative today, or International Components, 10 Daniel Street, Farmingdale, New York 11735/(516) 293-1500.

International

International Components Corp. Div. of IESC

... for more details circle 120 on Reader Service Card

Troubleshooting

A good approach to troubleshooting the power tune section is as follows:

Repair any defect in the AM or FM section before looking at the power tune section. If the motor will not operate with the UP or DOWN button depressed, trace the dc power from the motor back through the motor reversing relay and to the dc power source of the power tune relay. Transistors Q16, Q17, Q2-10, Q2-11 can be disconnected if suspected. If the motor does not stop at a station, check for the trouble on the power tune circuit board. With the motor running, you may want to disconnect a motor lead while servicing the power tune board. Power is only applied to the power tune section when the power tune relay is closed.

A few radio motors have been found that rock back and forth at the end of the dial. This is usually caused by a defective dial drum switch. Make sure that the replacement has not been damaged in handling.

Replacement Relays

Four different relay boards have been used in the production of models YK367 (manual S1091), YK361A and YK367A (manual S1091A) and PRF157 (manual S1240). It can be difficult to determine the correct replacement relay from the information given in the service manual.

A table has been prepared to help you. The board num-

BOARD NUMBER	SYMBOL	DESCRIPTION	PART NO.
569096	S3	On-Off Power Tuning 40 (MQ-13G6) 1 1/2 x 1-1/8 x 11/16	2083A1-3
569096	S4	Magnet or Motor Relay P25 S25 (MQ-11H) 1 1/2 x 1-1/8 x 11/16	2083A1-4
YD1569009-0 or YD1569009-2	S2-2	Magnet or Motor Relay DC6V P-26 S-60 1-3/16 x 1-1/8 x 11/16	2083A1-8 or -12
YD1569009-0 or YD1569009-2	S2-3	On-Off Power Tuning 511 46-1.650 0.41Cul 1-1/4 x 1-1/8 x 11/16	2083A1-7
YD1569008-0	S2-2	On-Off Power Tuning 40 1-1/8 x 1-1/8 x 3/4	2083A1-11
YD1569008-0	S2-3	Magnet or Motor Relay 68 1-1/8 x 1-1/8 x 3/4	2083A1-10
YD2418002-0	S3	On-Off Power Tuning 511 46-1.650 0.14Cul 1-1/4 x 1-1/8 x 11/16	2083A1-7
YD2418002-0	S4	Magnet or Motor Relay DC6V P-26 S-60 1 1/2 x 7/8 x 11/16	2083A1-12

ber is printed on the underside of the relay board. The information printed on the relay coil is shown in the description column of the table along with the size of the relay's plastic case.

Comments from our readers are always welcome.

Address your letters to:

Phillip Dahlen, C.E.T., Editor
Electronic Technician/Dealer
1 East First Street
Duluth, Minnesota 55802.

Lowest priced digital multimeter



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

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

Kit IM-1202, 6 lbs. **79.95***

Lowest priced frequency counter



**NEW HEATHKIT 5-Digit 30 MHz
Counter
Kit
IB-1100
\$169.95***

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

Kit IB-1100, 6 lbs. **169.95***

HEATHKIT
Schlumberger



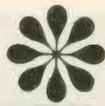
The FREE
Heathkit
Catalog
has
over 350
fun to
build
kits.
Order
yours
today

HEATH COMPANY
Dept. 24-11
Benton Harbor, Michigan 49022

Please send FREE Heathkit Catalog.
 Enclosed is \$_____, plus shipping.
Please send model(s)_____

Name _____
Address _____
City _____ State _____ Zip _____
Prices & specifications subject to change
without notice.
*Mail order prices; F.O.B. factory. TE-276

... for more details circle 119 on Reader Service Card



* New digital V.O.M. \$299

- 26 ranges to measure ac/dc voltages from 100 microvolts to 1200 V, ac/dc currents from 100 nanoamperes to 2 amperes and resistance from 100 milliohms to 20 megohms.
- Basic dc accuracy, 0.1%.
- Guaranteed for one full year. Fluke gives you the best specs and strongest warranty on the market today for the lowest cost of ownership ever.
- Wide choice of options including rechargeable battery pack, digital printer output, deluxe test leads, high-voltage probe, RF probe, 200-amp ac current probe, carrying case, dust cover and rack mounts.
- Unique self-zero feature eliminates offset errors.
- Rugged high-impact case with securely mounted internal electronics.
- Service centers throughout U.S., Canada, Europe and Far East for 48-hour turnaround repairs.

FLUKE P. O. Box 7428,
Seattle, Washington 98133.

Get all the details from your nearest Fluke sales office. Dial toll-free 800-426-0361 for address of office nearest you.
... for more details circle 116 on Reader Service Card

NEW GIFT IDEA!

WAHL "ISO-TIP" Cordless SOLDERING IRON

Give the greatest advance in soldering since electricity!



"Iso-Tip" cuts soldering free from cord and plug! Solders up to 100 joints on a battery charge. Heats in 5 seconds. New working freedom at work, home or in the field! Complete with charger. See your electronic wholesaler or order direct. Model No. 7500 \$19.95

WAHL CLIPPER CORPORATION
2902 Locust Street • Sterling, Illinois 61081
(815) 625-6525
"Manufacturing excellence for over 50 years"

... for more details circle 137 on Reader Service Card

KENWOOD SCOPE...

continued from page 51

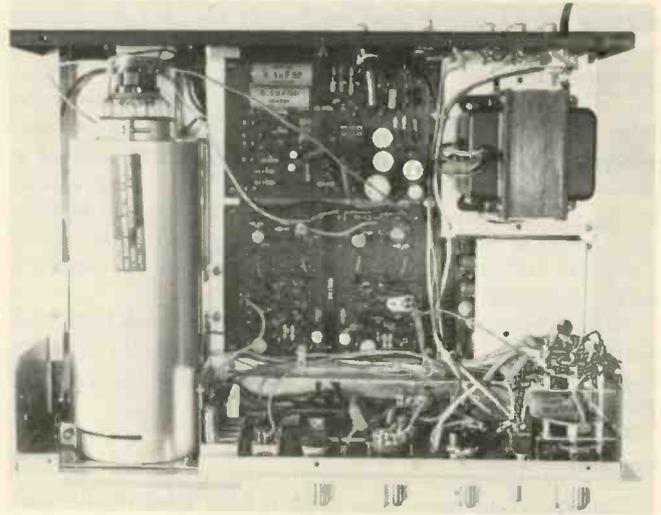


Fig. 21—Top view of scope with cover and sides removed.

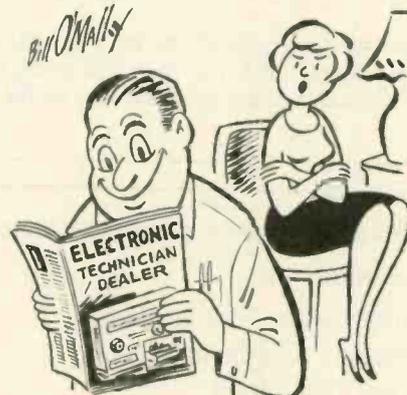
produce when applying square-wave signals to the scope's left-channel front-panel audio input. Fig. 18 shows the waveform observed under these conditions when applying a 20Hz signal, Fig. 19 shows the waveform observed when applying a 2kHz signal, and Fig. 20 shows the waveform observed when applying a 200kHz signal.

Manufacturer specifications indicate that the scope's horizontal and vertical amplifiers have a sensitivity of 25mv p-p/cm at the front panel input and a sensitivity of 250mv p-p/cm at the rear panel input, there being a

frequency response of 3Hz to 200kHz -3dB or less, with a 250K input impedance and an input capacity of less than 40pf at the front panel input and less than 60pf at the rear panel.

The scope's horizontal-sweep generator is said to have internal negative synchronization and cover a range of 10Hz to 100kHz in four steps.

We were quite impressed with the clean layout of components within the scope (Fig. 21), and with the frequent use of labels instructing the customer to refer the instrument to qualified service personnel for maintenance. ■



"I REMEMBER WHEN YOU USED TO LOOK AT ME LIKE THAT!"

NEW PRODUCTS

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

WIRE STRIPPER 703

Strips wire automatically with one squeeze of handle

A new tool is designed to strip wire automatically with but one squeeze of the handles, speeding up your work.



Any single conductor 8 to 22 A.W.G., stranded or solid, is inserted into the proper die. When squeezing the handles, one set of jaws clasps the wire while the other set cuts the insulation and strips up to 7/8 in. of insulation from the wire at each stroke. The tool is available in

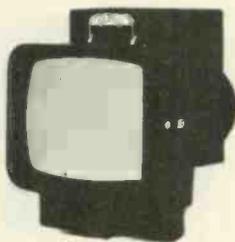
either boxed No. 70159 or carded No. 70160. Vaco Products.

COLOR TEST JIGS 704

Offered in kit form

Five new portable color test jigs in kit form, including four 15-in. models, are offered for the first time in the Pix-O-Scope line. The kits include cabinet and necessary components, less picture tube.

A patented yoke adapter is available for use in servicing various makes. With a color picture tube added and the proper yoke adapter connected, each kit may be used to check any domestic television set in the home. Determination can be made quickly, whether trouble is caused by the picture tube, convergence board or chassis. This enables the service man to show the customer when a new picture tube is



needed. The new kit line includes four 15-in. models and one 19-in. model. The 15-in. model is said to be the smallest on the market and weighs only 28 lb. The line also consists of patented portable color test jigs complete with color picture tube, special circuit to allow setting of the efficiency coil, dc meter, kv meter, mv meter, volt-ohm meter, built-in color bar generator, and eye-bolts for safe hanging in the shop. Pix-O-Scope Inc.

WD-40 705

Stops moisture-induced short circuits

WD-40 reportedly has the ability to drive out moisture from the pores of metals and is used as a contact cleaner that also eliminates corrosion. It is said to quickly and effectively dry out wet electric motors and deposits a thin molecular film to inhibit re-entry of damaging moisture—preventing rust, corrosion and further malfunction. As it is a non-conductor, the product may freely be used on motors, generators, alternators, wiring and connectors. It is also said to be a dependable moisture and corrosion preventative for TV tuners, amplifiers, potentiometers, printed circuits and precision electron-

ic components—eliminating moisture and corrosion that are the prime



causes of short circuits and power failure. The product reportedly will not harm rubber, plastics or fine finishes and is available in aerosol spray cans or bulk sizes. WD-40 Co.

TRANSISTOR CURVE TRACER

Checks transistors in-circuit 706 regardless of the circuit impedance

When used with a general purpose oscilloscope, the Model A Dynamic Transistor Curve Tracer becomes a complete semiconductor testing facility. *continued on next page*

SAVE TIME WITH OUR CHEMICAL SIGNAL TRACER

Time is money. And nothing eats up time like troublesome Intermittents.

There is a way to fight back, though. With a faster kind of test equipment that comes in a can: SUPER FROST AID. After the set 'cooks' and the problem appears, hunt it down in minutes with SUPER FROST AID's unbeatable (-55°F) cooling power. Even on the most crowded printed circuit, SUPER FROST AID's lack of liquid residue lets you check component-by-component with pinpoint applications. And it's long-lasting—saves you more by using less!

Next Intermittent you run across, cure the problem faster with a chemical signal tracer. SUPER FROST AID (catalog # 4500)—one of the best-selling chemical tools from

CHEMTRONICS INC.
1260 RALPH AVE., BROOKLYN, N.Y. 11236
TEL. (212) 629-1300

Our business is improving yours.

... for more details circle 106 on Reader Service Card

ARROW AUTOMATIC STAPLE GUNS

CUT WIRE & CABLE INSTALLATION COSTS

... without cutting into insulation!

SAFE! Grooved Guide positions wire for proper staple envelopment! Grooved Driving Blade stops staple at right depth of penetration to prevent cutting into wire or cable insulation!

No. T-18—Fits wires up to 3/16" in diameter.



BELL, TELEPHONE, THERMOSTAT, INTERCOM, BURGLAR ALARM and other low voltage wiring.

Uses T-18 staples with 3/16" round crown in 3/8" leg length only.

No. T-25—Fits wires up to 1/4" in diameter.



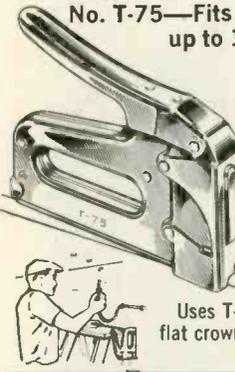
Same basic construction and fastens same wires as No. T-18.

Also used for **RADIANT HEAT WIRE**

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

T-18 and T-25 staples also available in Monel and with beige, brown and ivory finish at extra cost.

No. T-75—Fits wires and cables up to 1/2" in diameter.



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

Also used as **DRIVE RINGS** in stringing wires.

Uses T-75 staples with 1/2" flat crown in 9/16", 5/8" and 7/8" leg lengths.

Arrow Automatic Staple Guns save 70% in time and effort on every type of wire or cable fastening job. Arrow staples are specially designed with divergent-pointed legs for easier driving and rosin-coated for greater holding power! All-steel construction and high-carbon hardened steel working parts are your assurance of maximum long-life service and trouble-free performance.

Ask your Electrical Supply Dealer or write for further details.

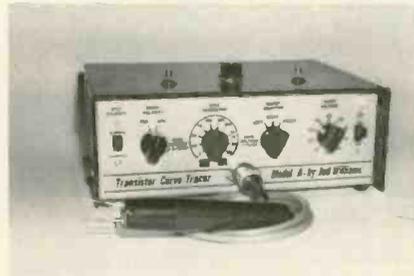
ARROW FASTENER COMPANY INC.
Saddle Brook, New Jersey 07863
"Pioneers and Pacesetters
For Almost A Half Century"

... for more details circle 101 on Reader Service Card

NEW PRODUCTS...

continued from page 67

ity. The instrument graphically analyzes the characteristics of transistors, diodes, rectifiers, tunnel diodes and zeners by displaying their characteristics on the oscilloscope screen. The resulting family of characteristic



curves reveals the gain, saturation voltage, linearity, dynamic collector impedance, leakage, breakdown voltage, polarity and alloy of bipolar transistors. Tests performed on field-effect transistors include mutual conductance in either the depletion or enhancement mode, pinch-off voltage and polarity. The unit can also be used to differentiate between junction and insulated gate FET's. The unit reportedly cannot damage the semiconductor under test even if it is improperly inserted and checks transistors in-circuit regardless of the circuit impedance by using the "signature pattern" technique—a family of curves resulting from subjecting in-circuit transistors to the curve tracers signals. The instrument measures 8 3/8" in. W by 3 1/2" in. H by 6 1/2" in. D and comes complete with probe. Jud Williams Co.

ANTENNA AMPLIFIER 707

Provides two outputs from single antenna

A new two-set antenna signal amplifier—Model TA-82, Colorcaster II—reportedly amplifies all UHF and VHF TV channels, plus all FM stations. The amplifier makes it easy for a single antenna to serve two or more TV or FM receivers, providing two outputs from a single input.



Gain at each output is said to be 8dB at VHF and FM, 5dB at UHF. Completely solid state, the unit is encased in an attractive cyclac housing that mounts easily behind a TV set or in any other convenient location. Input

and output impedances of the amplifier are 300Ω matched to twinlead. The response is reportedly flat within 1/2dB per channel and isolation between outputs is rated at least 15dB. The unit comes on a colorful peg-board display card which graphically illustrates its applications and features with simple installation instructions. Jerrold Electronics Corp.

FET VOM

708

Fifty-three ranges on four scales

A portable, lab-grade FET VOM, Model IM-104 reportedly combines accuracy, versatility, convenience and ruggedness in an easily assembled kit. Low-drift 1% precision metal film and wire wound resistors are used for greater stability, and dual FET meter amplifier circuitry is provided for a 10M input impedance and instant operation. There are 53 ranges on four scales, which include nine dc-v-acv ranges from 0.1v to 1000v; six current ranges from 0.01ma to 1000ma, dc and ac; 7 resistance ranges from 1Ω to 100M, conventional or low-voltage modes; decibel ranges from -40dB to +62dB; and dc null scale with reportedly better than 1mv resolution. The 4 1/2-in. taut-band meter is diode protected and built-in circuitry indicates the condition of the battery at the flip of the range selector. Heath Company.



DEGREASER 709

Completely safe for delicate instruments

A cleaning agent has been developed that is said to be completely safe for degreasing delicate instruments, electronic equipment and circuit boards, as well as motors, recording tapes, switches, relays and similar parts and equipment.

The Freon TF Degreaser can reportedly be sprayed onto the instrument or component and will flush away contaminants, than evaporate instantly without leaving a residual film. According to the manufacturer, it is safe to use on plastics, elastomers, metals, and photographic films. It is said to be non-flammable and non-toxic. To fa-



Facilitate use in small, hard to reach areas, the degreaser is provided with an extension attachment for pinpoint applications. Crown.

710

COLOR-TV COMPONENTS KIT

Contains most-common components for RCA XL-100 chassis

The new XL-100 Components Kit is designed to give technicians greater servicing capabilities for the RCA XL-100 solid-state color-TV chassis. This kit contains a variety of transistors, diodes and resistors, plus one circuit breaker—27 components in all. All of the components have been selected for fast, efficient service of the chassis. The kit contains 11 more components



than the Power Device Kit offered previously. A special parts location diagram and a separate cross reference chart is included with the kit, which fits conveniently into the lid of the RCA module caddy—another time-saving in-the-home servicing aid. For technicians already using the old Power Device Kit, RCA is offering a special "Add-on" kit. The kit, 12H181, includes the 11 new components in the new plastic box with a cross reference and parts location diagram. RCA Parts and Accessories.

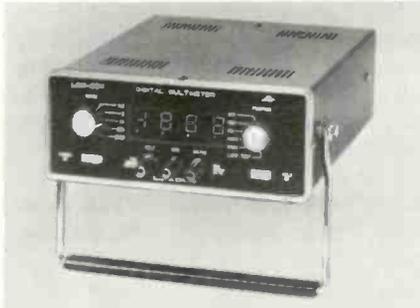
DIGITAL MULTIMETER

711

Measures voltage, current and resistance in 25 ranges

The Model LDM-850 is a digital readout ac/dc multimeter that measures voltage, current and resistance in 25 ranges. The instrument reportedly has a scale accuracy of 1.0% or greater and will provide a 3-1/2 digit non-blinking display up to 1,999. Specifications indicate that it offers a dual-slope operating mode and has a maximum input voltage of 1,000v dc and 350v ac with a 10M input impedance. Rated sensitivity ranges from 100µv to 1v with current from 0.2ma to 1,000ma on dc. Resistance readings reportedly range from 0.2K to 2,000K. Other features include automatic polarity reversal and overrange lamp indication. The display has a hold and

lock position and there is a segmented display lamp test position. The sam-



pling frequency is 200m/sec and there is an INSTANT-RESPONSE, MANUAL-RANGE switch with appropriate decimal indications. The unit also has a dual power supply for field or in-shop testing and measures 10 in. W by 7 3/4 in. D by 3 1/4 in. H. Leader Instruments.

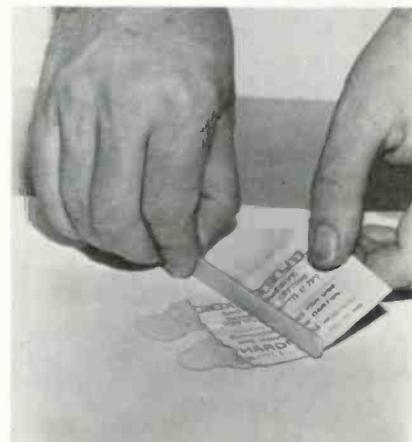
ADHESIVE

712

Packaged in twin-pack to assure proper mixing ratio

Double/Bubble is reportedly an extra-fast-setting, self-curing, Epoweld adhesive—a two-part epoxy that bonds to almost anything. For maximum convenience, parts A and B are packaged in a foil twin-pack that

assures that the mix will be in proper ratio. This adhesive is said to set in just 3 to 4 min, has excellent resistance to weather, hot and cold water,



gasoline, oil, etc., and produces a bond that will resist stresses up to 1 1/2 tons per sq in. Hardman Inc.

OSCILLOSCOPE

713

25MHz bandwidth with X-Y capability

The Model D66 is a dual-trace, lightweight and compact 25MHz *continued on next page*

all test jigs GO SOLID STATE with a TELEMATIC TRANSVERTER

service:
Motorola
Zenith
Sylvania
RCA... etc. etc...

- Converts any test jig to service any solid state TV.
 - Simple plug-in operation
 - Economical — Saves buying a solid state jig.
 - Versatile — Dual impedance.
- Available from your distributor.

TeleMatic



2245 PITKIN AVE., BROOKLYN, N. Y. 11207

Write Us! Free subscription for current cross-reference charts

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



DIAL & CODER

Delta's Instant Emergency Telephone Warning System.

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

CHECK THESE FEATURES!

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

This one's really priced right!

Made in U.S.A.

Write or Call today for free sales details!



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

Superior Products At Sensible Prices

... for more details circle 109 on Reader Service Card

NEW PRODUCTS...

continued from page 69

scope. Bright displays are obtained by using 10kv on the rectangular 5-in. CRT, which has a big 8 by 10cm display area. A wide range of sweep rates are reportedly included from 100ns/div to 2 sec/div (20ns/div with X5 magnifier), X-Y measurement capability, 5% accuracy and 14ns risetime,



make the scope ideal for general use. Sensitivity extends to 10mv/cm at 15MHz. The ability to trigger at TV field or line rates will allow those in the TV industry to use these facilities to view a selected line or field. Tektronix, Inc.

ANTENNAS

714

Most-needed exact antenna replacements



A floor display, Model WE19, contains six each of the 23 fastest moving model numbers of universal and exact antenna replacements for AM/FM radio, portable TV sets, walkie talkie and two-way radios. The new slim design saves

pegboard and wall space and contains 138 packages. Workman Electronic Products.

ADHESIVE

715

Electrically conductive and resists high temperatures

A electrically conductive silver-epoxy adhesive for critical high temperature (up to 190°) bonding and sealing applications is developed. Tra-Duct 2924 is a two-part conductive composition of specially blended epoxy materials and highly refined silver which is free of copper, carbon and other impurities. This paste formulation reportedly combines the adhesive

properties of epoxies with the electrical and thermal conductivity of pure silver. The adhesive is especially recommended for the repair of electronic



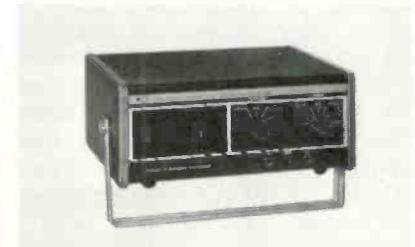
modules, waveguides, RF shields and similar applications in circumstances where conventional soldering or jointing techniques would be difficult or impossible. Tra-Con Inc.

DIGITAL MULTIMETER

716

Positive overrange and wrong polarity indication

A new, solid-state digital multimeter, Model 281, reportedly features a large, stable 2-1/2 digit numerical display with automatically positioned



decimal point, 100% overrange capability, full overload protection, positive overrange and wrong polarity indication, high sensitivity, 1% accuracy and 10M input impedance. It is said to be lightweight and portable with a convenient five-position handle that doubles as a stand for eye-level viewing. The instrument measures 3-1/2 in. H by 7 in. W by 9 in. D. Dynascan Corp.

MOST VERSATILE Stereo Theatre TRUCK DEVELOPED!

FURNITURE PADS 5.50

21.50 CONSOLE TV COVER

YEATS PLATFORM DOLLY \$32.95

DeLuxe Model No. 14 \$69.50

FREE illustrated brochure

YEATS APPLIANCE DOLLY SALES CO.
1307 W. FOND DU LAC AVE.
MILWAUKEE, WIS. 53205

... for more details circle 142 on Reader Service Card

DEALER SHOWCASE

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

AM/FM/STEREO PHONO 717

Budget-priced matrixed four-channel package

For the four-channel enthusiast, a new budget-priced package, Model E-1008, is equipped to bring reproduc-



tions from matrixed four-channel recordings or four-channel FM broadcasts. It will reportedly also enhance the sound of conventional stereo. Included are tuner-amplifier for AM as well as FM with AFC; 20w IHF music power; Micromatic record player with synchronous four-pole motor; four air suspension speaker systems, each with 6-in. speaker; four-channel decoder; and three long-play records. Magnavox.

CB RADIO 718

Features Selector Drum For Displaying Channel Numbers

A new 23-channel CB radio, the Messenger 122, is said to come with a unique rotary selector drum. This design permits larger illuminated channel numbers for readings at a glance, thus making it especially easy to change channels while operating mobile. Also featured is push-button



"instant on" that is entirely separate from the VOLUME and SQUELCH controls. This allows these settings to remain undisturbed and eliminates the need for readjustment every time the unit is turned ON. On transmit, the unit has electronic speech compression for higher average modulation to increase range capability. E. F. Johnson Co.

LECTERN SOUND SYSTEM 719

Completely self contained and sets up in seconds

Introduced is the Speech Director II, a portable lectern sound system that features a solid-state amplifier, sound



c o l u m n speaker system and modernized styling. The system is said to be completely self contained and sets up in s e c o n d s , making it ideal for professional lecturers and speakers. Op-

erating on 110v ac or the single self-contained 12v battery, it can reportedly be used in every location, even outdoors. The built-in four-speaker sound column speaker system aims the sound to the audience in a focused beam. The unit is designed with input and output jacks to easily accommodate accessory items such as a second microphone and satellite speaker system. Outputs for recording and inputs for music sources on tape or record are included. The complete unit is enclosed in a rugged case finished in scuff-resistant pebble-textured grey vinyl. Argos Products Co.

SPEAKER PROTECTOR 720

Prevents stereo speaker blow-outs

An electronic "fuse" has been designed to keep overloaded stereo speakers from blowing out. The speaker



protector, No. R47001, has solid-state circuitry and is self contained, requiring no other power source. Actuated by sound itself, the protector is said to automatically limit output of the stereo hi-fi amplifier without impairing tone quality. Speaker cones that might otherwise burn out or burst under the strain of overload are reportedly saved. Limiting is achieved by a compressing action, which can be preset to defy excessive levels. Robins Industries Corp.

continued on next page

INVENTORY SALE

RAYTHEON—G.E. TUBES

3BE6	.....	\$ .25 ea.
3EJ7	.....	\$ .60 ea.
3HQ5	.....	\$1.25 ea.
3KT6	.....	\$ .85 ea.
4BU8	.....	\$ .60 ea.
6AL5	.....	\$ .60 ea.
6AU6	.....	\$ .65 ea.
6BA11	.....	\$ .95 ea.
6BQ7	.....	\$ .90 ea.
6SN7	.....	\$ .75 ea.
12EK6-12DZ6	.....	\$ .60 ea.
12GE5	.....	\$ .95 ea.
35EH5	.....	\$ .90 ea.
300 Asst'd Resist. 1 & 2 Watt	.....	\$4.95
100 Mica Cond. Asst'd	.....	\$1.49
20 Asst'd Mallory Controls	.....	\$2.49
25 Asst'd Cond. (Cans)	.....	\$4.95
25 Asst'd Cond. (Axial)	.....	\$4.95

DIODES—SEMI CONDUCTORS

HEP 170-2.5 Amp. 1000 PIV	..... 25 for \$4.95
6500 PIV Focus Rect.	..... 4 for \$2.00
13.5KV Focus Rect.	..... 5 for \$3.00
18.5 KV Focus Rect.	..... 3 for \$2.49
Sel. Boost Rect.	..... 5 for \$2.00
Crystal Diodes 1N34A	..... 25 for \$2.00

CONDENSERS—AXIAL LEADS

25 mfd. 25 volts	..... 5 for \$1.00
50 mfd. 50 volts	..... 4 for \$1.00
50 mfd. 150 volts	..... 6 for \$1.49
100 mfd. 150 volts	..... 12 for \$1.98
1000 mfd. 50 volts	..... 6 for \$2.49
30 mfd. 450 volts	..... 6 for \$1.98

CONDENSERS (CANS)

300 mfd. 150 volts	..... 3 for \$1.98
500 mfd. 200 volts	..... 2 for \$1.98
300 mfd. 200 volts	..... 4 for \$1.98

PHONO EQUIPMENT

Mono Tone Arms TO Cart.	..... 2 for \$2.19
Stereo Tone Arms TO Cart	..... 2 for \$2.98
Equiv. Astatic 133 Boxed	..... \$3.19 ea.
Equiv. Astatic 142	..... \$2.79 ea.
Equiv. Astatic 13TX Boxed	..... \$2.98 ea.
Equiv. Sonotone 8T Boxed	..... \$2.98 ea.
Equiv. BSR5H Boxed	..... \$2.49 ea.
Equiv. Euphonics U-1 Boxed	..... \$2.49 ea.
Equiv. EV 275 Boxed	..... \$3.59 ea.
Equiv. EV 5015	..... \$3.59 ea.
RCA Phono Plugs	..... 10 for \$1.00
Knife Switches DPDT	..... 4 for \$1.00
4 Align. Tools Asst'd.	..... \$1.19

MINIMUM ORDER \$15.00

SEND FOR FREE CATALOG

TUBES UP TO 80% OFF

SEND CHECK OR MONEY ORDER

TV TECH SPECIALS

P.O. BOX 603

Kings Park, L.I., New York 11754

... for more details circle 134 on Reader Service Card

SOLVE YOUR DRIVE BELT PROBLEMS IN MINUTES

with ONEIDA'S all new DRIVE BELT KITS

- Eliminates "Down Time" on special and foreign belts.
- No need to stock replacement belts; makes any size in minutes.
- No molds or complicated vulcanizing processes to follow.
- No special skill required, cutting guide, cutting tools and adhesive all included.
- Special Insta-Weld® adhesive makes replacement belts as strong as or stronger than originals for lasting repairs.



ORK-1 Round Rubber Drive Belt Kit \$19.95

ORK-2 Flat and Square Rubber Drive Belt Kit \$19.95

ORK-3 "O" Ring Kit \$19.95

Get up to five times your investment back in belt sales. Each of these kits will make from 80-100 dollars or more in rubber drive belts. Included with the kit is the special cutting guide, razor blade, Special Insta-Weld® adhesive, a large quantity of rubber stock and easy-to-follow directions. Nothing has been left out. Packed in an attractive, handy, plastic box that fits into the tube caddy or on the bench. Now, you can replace over 90% of the belts found on tape recorders, phonographs and cassette recorders, both foreign and domestic, right on the spot. Check with your distributor now. If he doesn't stock them, ask him to order them for you today.

PERMABOND ADHESIVE POWER WITH ONEIDA'S Insta-Weld®



Makes Space Age Bonds

Great for: Rubber • Plastic • Metal • Ceramics • Glass • Etc.

Insta-Weld® is new, not epoxy, nothing you have heard of before. There is no mixing, just apply and hold parts together. Just seconds are all that is required for a bond stronger than anything you could ever get before. One drop supports 2,000 pounds per square inch.

Now make economical repairs that were never before possible. Extremely economical, up to 132 bonds per tube.

NEW INSTA-WELD®

only \$2.00 per 2-gram tube

oneida ELECTRONIC MFG., INC.
MEADVILLE, PENNA. 16335

for more details circle 125 on Reader Service Card

DEALER SHOWCASE...

continued from page 71

MICROPHONE 721

Designed for base station operation

Introduced is the SBE-100X, a base station microphone with preamplifier for SBE use in all communications applications. The microphone is die cast designed for heavy usage in base station applications and includes a unique split bar for "press-to-talk" or

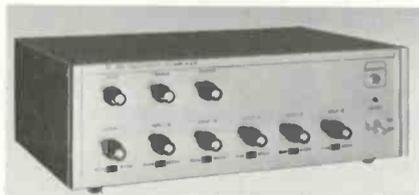


"lock-to-talk" operation, which represents an advance in operational ease for base-station microphones. The microphone is finished in black with dull chrome highlights. Linear Systems Inc.

PA AMPLIFIERS/BOOSTERS 722

Provides 39 modular combinations allowing up to 6 modular inputs

A flexible series of TA-900PA amplifiers, boosters and mixer preamplifiers consists of 10w, 30w, 60w and 100w amplifiers, plus 50w and 100w boosters. A unique design is said to



provide 39 modular combinations, allowing up to six modular inputs with a variety of connectors. The specifications indicate less than 2% THD over the frequency range of 50Hz to 15kHz and a frequency response of 20Hz to 20kHz ± 1dB. The noise level is reportedly not less than 60dB below the rated output with the microphone preamplifier. Toa Electric Co.

ELECTRONIC TURNTABLE 723

Servo-controlled for precise speed calibration

A servo-controlled electronic turntable, Model GA212, is designed with an integrated tone arm and a sturdy hinged dust cover. The dc powered manual turntable provides two speeds—33⅓ and 45 rpm. Two independent potentiometers allow for precise speed calibration so as to obtain exact musical pitch regardless of voltage, power-

line frequency variation or tracking force. Capacity switches select the speed and stop, while automatic shut-off at the end of the record is provided

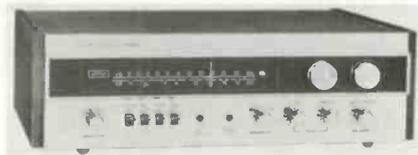


by a photoelectric switch. Tone arm cueing, through a touch rocker bar, is reportedly positive, hydraulically damped and accurate. The generator motor and flexible belt drive system are designed to filter out vibration and rumble. Correction of drift, wow and flutter is constantly compensated for. North American Philips Corp.

AM/FM STEREO RECEIVER 724

FM sensitivity is rated at 1.9µv

The Model S7100A receiver is rated at 70w (IHF), 44w rms across an 8Ω load, both channels driven. It features a direct-coupled amplifier, ceramic FM IF filtering, FM MUTING switch and a front panel control for tape dubbing. FM sensitivity is



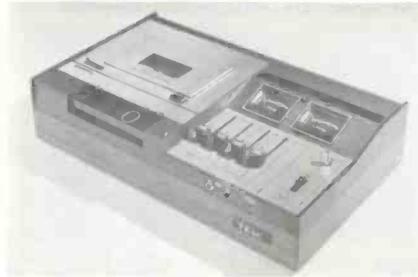
rated at 1.9µv (IHF), selectivity at 50dB. Retail price is \$199.95 with walnut case included. Sherwood Electronic Lab., Inc.

CASSETTE DECK 725

Designed to maximum control of record and playback functions

Specifications indicate that the Model 220 cassette deck has the following features: An extremely hard ferrite tape contact surface which is virtually wear free; core material that is machined from permalloy; bias selector for chromium dioxide tape and high density ferric oxide tape; plus four separate preamps, two for record and two for playback. Also incorporated in the unit are linear

potentiometers for the LEVEL control, a four-pole hysteresis synchronous motor, tape selector switch, automatic shut-off mechanism, all silicon transistorized solid-state preamps, expanded-scale high-visibility VU meters, tape travel direction indicator, finger-



tip piano key operation (with pause control) and built-in headphone and microphone jacks. TEAC Corp. of America.

PARTS AND TOOL ORGANIZER

Keeps parts organized and indexed for immediate reference **726**

The Vize-Kase is said to be a completely transparent portable parts and tool organizer for the technician using assorted small parts, mechanically or electronically oriented. The case offers



a practical solution to keeping parts in an orderly fashion and indexed for immediate reference. It is available in seven models ranging from 46 to 79 compartments, each having its own hinged cover and snap type lock. The outer case and covers are molded from high-impact plastic, making the outer case virtually indestructible; and its transparency enables the user to see contents without opening the case. Mega Industries Corp.

FOUR-CHANNEL DECODER **727**

Synthesizes four-channel sound from two-channel source

The Model SDW-Q, Universal four-channel decoder, decodes CBS SQ and EV encoded records as well as synthesizes four-channel sound from any two-channel source. The unit is said to retain full bass response in the

rear channels, utilizing a special 300Hz turnover in the matrix/phase shift circuitry. Other features include



a FRONT-TO-BACK BALANCE control, MASTER VOLUME control, TAPE MONITOR switch, SOURCE switch and MATRIX MODE switches. Metrotec Electronics, Inc.

AM/FM RECEIVER **728**

Has 195w of IHF music power output

The Model SX-727 AM/FM stereo receiver, with up to 195w of IHF music power output (across 4Ω), is reportedly capable of handling two tape decks, two turntables, three pairs of speaker systems and a mike. The front-end uses a junction type FET in the first stage of a two-stage RF amplifier. The result is a sensitivity of 1.8μv, IHF; a high signal-to-noise ratio *continued on next page*

YOUR PROFITS

OWN and OPERATE A COLOR TUBE CENTER

**Our Three Point
Program Is
Developed to
Insure Profits**

1. Complete Plant (rebuild all types of CRTS)
2. Engineering and Management Assistance on Continuing basis
3. Sales Program

For further information
please write or phone

Color Tube Center

P.O. Box 14 South Holland Illinois 60473
312/333-2003

NEW

From



CT-1

Will allow you to Dynamically test all types of capacitors.



The Model CT-1 features a built-in electronic power supply providing BOTH AC and DC Test Voltages in a special circuit with highly sensitive NEON type leakage indicator. The CT-1 permits quick, accurate testing of condensers for leakage or shorts with actual DC voltage applied and readily indicates intermittent OPEN condensers with AC applied. Self-regulating power supply circuit provides tapered forming current to suit particular requirements of capacitor under test. Special circuit re-forms and polarizes electrolytic and tantalum capacitors under test. High sensitivity permits determination of condenser dielectric breakdown before leakage causes major shut-down.

Only **\$16.95** postpaid

Capacitance Range: .00025 — 1000 mfd.
Sensitivity: Over 200 MEG OHMS

To Troubleshoot

FAST & EASY

use: Serviset

Model EC
PATENTED



\$34.95
Postpaid

A precision engineered professional quality electronic test instrument. Ideal for field or bench servicing of all types of Communications gear.

CHECKS: sync, sweep, video, audio circuits, high voltage supplies (DC, RF or Pulse), low voltage supplies, coils, capacitors, resistors, tubes, transistors, diodes, transformers, speakers, etc. Will locate trouble to a particular stage, determine defective component and can actually be clamped in circuit to restore circuit operation temporarily in 80% of component or tube defects. Ideal for locating and confirming intermittents.

SPECIFICATIONS:

RF & AF Signal Tracer, RF & AF Signal Injector, AC & DC Voltage Indicator 0/60/550/20,000 DC Polarity Indicator 60/550/20,000 volts, Lo ohms 0-5, Hi ohms 0-500k-20 meg-ohms, Tests Condensers, .00025-12 mfd., Tests Resistors 2 ohms-20 megohms, 2 Capacitance Sub ranges .01-.1 & 4-40 mfd., 3 Resistance Sub ranges 50-500 ohms, 5k-25k, 100k-1 meg.

30-Day Unconditional Money Back Guarantee,
90-Day Parts Warranty. ORDER TODAY.

LEE ELECTRONIC LABS., INC.



88 Evans Street
Watertown, Massachusetts 02172

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

... for more details circle 124 on Reader Service Card

A NEW LINE OF TROUBLE FREE MATV CATV PRODUCTS



MATCHING TRANSFORMER, SPLITTER AND DIRECTIONAL TAPS IN BOTH MINIATURE AND STANDARD SIZES, HYBRID AND DIRECTIONAL WALLPLATES, LIGHTNING GROUNDING ARRESTERS

Cases are epoxy covered cadmium plated steel • Circuits embedded in polyurethane foam, encased in epoxy resin • High degree directivity prevents unwanted reflected signals. • Shockproof • Waterproof

ASK FOR CAT.# 144C

WORKMAN
Subsidiary of IPM TECHNOLOGY INC.
BOX 3626 SARASOTA, FLA. 33576

Electronic
PRODUCTS, INC.

... for more details circle 140 on Reader Service Card

FACTORY SERVICE REPLACEMENT PARTS

Amphenol

CADRE

Commander

Catalog & Prices on Request

Check your distributor
or write or call direct:

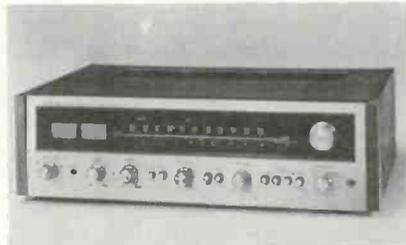
COMMANDER COMMUNICATIONS

DIVISION OF *Astel Electronics Corporation*
P.O. Box B
Prospect Heights, Ill. 60070

DEALER SHOWCASE...

continued from page 73

tio of 70dB and optimum reception. Ceramic filters are used in both the AM and FM IF sections. IC's in the IF help produce a capture ratio of 2.0dB. The unit also uses an FET equipped switchable FM muting circuit to eliminate unpleasant interstation noise. Harmonic distortion is reportedly less

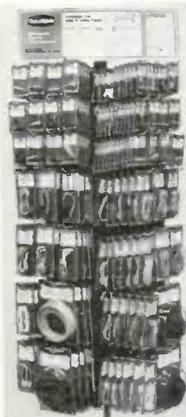


than 0.1% and frequency response is 10Hz to 20kHz, with a maximum variation of 1dB. The direct-coupled complementary symmetry power amplifier, with both channels driven at 1kHz, can supply 40w plus 40w for 8Ω speakers. With both channels driven in the range of 20Hz to 20kHz, the output is 37w plus 37w across 8Ω, with continuous power output and less than 0.5% harmonic distortion. When power output is decreased to 24w per channel, harmonic distortion and IM drop to less than 0.03%. The frequency response is 7Hz to 80kHz with a variation of 1dB, while the IHF power bandwidth is 10Hz to 60kHz, measured across an 8Ω load, with harmonic distortion of less than 0.5%. Price: \$349.95. U.S. Pioneer Electronics Corp.

AUDIO ACCESSORIES 729

Occupies only a few feet of floor space

A rotating peg rack merchandiser, Display No. A9914, holds a complete line of accessories for stereo or monaural enthusiasts. The products—including audio connector patch cords, adapters, speaker extensions, plugs, jacks, wire and accessories—are individually blister packed and coded for quick and easy identification. A permanent header sign explains how the coding system works, making it a simple matter to quickly select the correct item. It is said to hold 242 packages (23 assorted items). Saxton.



SSB/AM CB RADIO 730

Features 15w peak envelope power

The Cheetah SSB is reportedly the smallest mobile side-band unit on the market, yet features the maximum 15w peak envelope power allowed on



single side band. It also has an SWR bridge for checking antennas. Some of the features include: variable RF gain that controls both AM and SSB, plug in mike and power cord, S/RF meter that changes color from transmit to receive and RF noise blanker. Retail for \$339.95. Pearce-Simpson Div., Gladding Corp.

STATEMENT REQUIRED BY THE ACT OF OCTOBER 23, 1962 (39 U.S. Code, 4369) SHOWING THE OWNERSHIP, MANAGEMENT AND CIRCULATION OF ELECTRONIC TECHNICIAN/DEALER published monthly by Harcourt Brace Jovanovich, Inc., 757 Third Avenue, New York, New York 10017, for November 1972.

1. The names and addresses of the publisher, editor and managing editor are: Publisher, Alfred A. Menegus, 757 Third Avenue, New York, New York 10017; Editor, Phillip Dahlen, 1 East First Street, Duluth, Minnesota 55802; Managing Editor, Joseph Zauhar, 1 East First Street, Duluth, Minnesota 55802.

2. The owner is: Harcourt Brace Jovanovich, Inc., 757 Third Avenue, New York, New York 10017. Holders of One Per Cent (1.0%) or more of the outstanding shares of Harcourt Brace Jovanovich, Inc., as of August 21, 1972: Cede & Co., Box 20, Bowling Green Station, New York, New York; Comptroller of the State of N.Y. in Trust for the Common Retirement Fund, c/o Directory of the Retirement Accounts, Governor Alfred E. Smith Building, Albany, New York 12225; Cudd & Co., P.O. Box 1508, New York, New York; Katherine Brice Cummings, c/o Ernst Cane Berner & Gitlin, 5 West 45th Street, New York, New York 10036; C. A. England & Co., P.O. Box 1368, Church Street Station, New York, New York 10008; Donald H. Harcourt, 2444 Brinkeroff Ave., Santa Ynez, California; Ellen Knowles Harcourt, William I. Jovanovich & Peter J. Ryan as Trustees u/t/a dated 5/23/66, 20 Exchange Place, New York, New York 10015; Hastings Harcourt, 835 Laguna Street, Santa Barbara, California 93101; Hare & Co., c/o Bank of New York, Bank Window, Church Street Station, New York, New York 10015; Harwood & Co., c/o State Street Bank & Trust Company, Boston, Massachusetts; Walter J. Johnson, 19 Hewitt Avenue, Bronxville, New York 10708; Thekla E. Johnson, 19 Hewitt Avenue, Bronxville, New York 10708; William Jovanovich, P.O. Box 295, Briarcliff Manor, New York 10510; Kane & Co., c/o Chase Manhattan Bank, 1 Chase Manhattan Plaza, New York, New York; Live & Co., c/o The Central Trust Company, Trust Department, Cincinnati 1, Ohio; Lynn & Co., P.O. Box 2010, Church Street Station, New York, New York 10008; New York State Teachers Retirement System—Division of the Treasury, Box 7002, Albany, New York 12205; O'Neil & Co., P.O. Box 11028, New York, New York 10049; Perc & Co., c/o Trust Dept.-Safekeeping Division, Northwestern National Bank, Minneapolis, Minnesota 55440; Shaw & Co., P.O. Box 1426, Church Street Station, New York, New York, 10015; Sigler & Co, c/o Manufacturers Hanover Trust Company, New York, New York 10015; Stawls & Co., P.O. Box 1479, Church Street Station, New York, New York 10008; Joseph C. Sndelar, 794 Park Boulevard, Glen Ellyn, Illinois 60137; Robert J. Sindelar, 1838 Somerset Lane, Northbrook, Illinois 60062.

3. The known bondholders, mortgagees and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: None.

4. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was 70,652. Free distribution by mail carrier or other media: 1,647. Total distribution 72,299.

(Signature) Richard Moeller
Treasurer

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

TECHNICAL LITERATURE

TV/Appliance Dolly

The new 1973 catalog describes a complete line of dollies, appliance covers, utility straps and other time and labor saving devices. All models are now reportedly improved to move loads up or down stairs twice as fast as they did previously. Yeats Appliance Dolly Sales Co., 1300 West Fond du Lac Ave., Milwaukee, Wisc. 53205.

Relays

A new 4-page brochure and cross-reference guide describing miniature antenna change-over, heavy duty power relays and do-it-yourself kits is now available. General purpose midjet relays are available as SPDT, DPDT or 3PDT configurations with 5a or 10a contacts. Heavy duty power relays are available in a DPDT configuration for 20a operation. J. W. Miller Co., 19070 Reyes Ave., Compton, Calif., 90221.

TV/FM Antenna Guide

A 10-page guide to installing TV and FM antennas is available covering antenna selection, masts, mounts, lead-in wire, lightning protection and multi-set systems. Illustrated with a series of clear, complete pictures and diagrams, the guide gives the reader step-by-step instructions on various types of home antenna installations. Practical tips on how and where to take lead-in wire into the house, how to run coaxial cable and twinlead indoors and out, and how to drill through exterior walls are included. Jerrold Electronics Corp., 401 Walnut St., Philadelphia, Pa. 19105.

Electronic Components

A 32-page, 1972-73 commercial products catalog is now available which contains details on a wide range of products ranging from replacement components for home entertainment and industrial electronic equipment, to components for hobbyists. Replacement components for home entertainment equipment include transistors, integrated circuits, rectifiers, diodes, solid-state tube replacements and electrolytic capacitors. The catalog contains photographs of the products, case diagrams of the devices and price information. International Rectifier Corp., Semiconductor Div., 233 Kansas St., El Segundo, Calif. 90245.

Technical Publications

A flyer, Form No. SMF-109, describes the broad range of technical publications on solid-state devices available from the manufacturer's solid-state division. These publications include the new Databook series, the popular technical manual series, a reference handbook on solid-state power circuits, and a variety of catalogs and brochures. They provide accurate, detailed, up-to-date information on the theory of operation, mounting and handling techniques, circuit applications, and definitive ratings and characteristics for all the manufacturer's solid-state devices, including integrated circuits, transistors, power hybrid circuits, thyristors, rectifiers, and other solid-state diodes. RCA Solid State Division, Box 3200, Somerville, N.J. 08876.

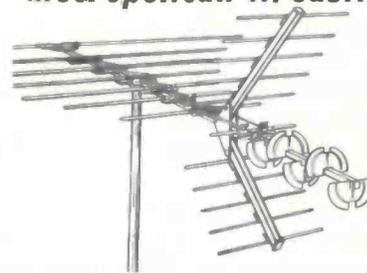
Circuit Protection Products

A new 56-page, multi-color, product catalog featuring complete mechanical and electrical specifications for all types of glass and ceramic tube fuses, fuseholders, fuse clips and blocks, automatic and manual reset circuit breakers, heavy and medium duty relays, alarm buzzers and momentary action switches, is being offered at no charge. The catalog provides product photos, schematic diagrams and operating characteristics of many types of circuit protection devices and components. A special nine-page "Fuseology" section is devoted to an informative presentation of basic fuse and circuit protection technology and includes time/current characteristic charts for the main fuse range. Littelfuse, Inc., Dept. 19 PR, 800 E. Northwest Highway, Des Plaines, Ill. 60016.

Electrolytic Capacitors

A new color-TV electrolytic replacement guide, the M-945, is released. It contains a specially selected listing of Types TVL and PCL aluminum electrolytics intended for color-TV servicing. The guide also lists 54 leading color TV manufacturers along with the catalog numbers of the TVL/PCL units which fit their respective chassis. A cataloging innovation is the listing of the number of color-TV sets a given TVL or PCL is used in. The service technicians thus know the most popular capacitor types and can stock accordingly. All capacitors are identified by catalog number, capacitances, dc working voltages, dimensions and the number of color-TV set makes in which it is used. Sprague Products Co., Marshall St., North Adams, Mass. 01247.

The No. 1 Antenna for Metropolitan Areas...



RMS 'STAR-TRACK'™ #SK-716 VHF/UHF/FM COLOR ANTENNA...

Similar design to Space Tracking Antennas— 5 UHF Disc Directors, 7 VHF Cut-to-Channel Elements, 1 Driven Element, and 10 Corner Reflector Elements. 23 Elements for maximum reception— Up to 50 miles on VHF, and up to 50 miles on UHF. Single down-lead— includes VHF/UHF Splitter. Suggested Retail..... \$39.95

Breaking All Sales Records...

since their introduction— 6 performance proven models for all areas— See Your Distributor.

RMS ELECTRONICS, INC.

50 Antin Place, Bronx, N.Y. 10462
Tel. (212) 892-6700

... for more details circle 132 on Reader Service Card

Why pay an answering service when you can own your own?

Dictaphone has a machine to make sure you never lose another cent through a missed phone call or a garbled message. In fact, we have a whole line of them.

They're called Ansafones. You can buy one outright or possibly lease it for about what you're paying your answering service now. And it works for you 24 hours a day, 7 days a week.

For a free brochure describing how much an Ansafone can help you, write:

Dictaphone

Box 0-11-24, 120 Old Post Road
Rye, New York 10580

Ansafone and Dictaphone are registered trade marks of Dictaphone Corp.

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

TV RECEIVERS ...

continued from page 46

brightness variations.

In the audio output stage is a complimentary pair of transistors similar to a push-pull circuit, dc coupled to the driver transistor.

In the power supply, an additional winding has been added to the power transformer for half-wave rectification. This winding also provides a 200v source for the collector voltages of the color amplifiers.

A new electronic VHF tuner, which is similar to the Hopt and GI Varactor unit, will be found on some versions of the E01 chassis. The UHF tuner has a three-section Autodyne circuit, differing from the Hopt and GI units used previously, which employ an RF, mixer and oscillator transistor. The Autodyne tuner employs two transistors: one as a mixer and oscillator and the second as the RF amplifier.

A 70-detent UHF tuner is used in the 19-in. (diagonally measured) color-TV sets, Models MY2086, MY2087 and MY2088, with a channel read-out on film, identifying all 70 UHF channel numbers. Tuning is accomplished by fine tuning on the detented position. Each detent position will tune in the adjacent channels.

Two entertainment centers with 19- and 25-in. tubes (diagonally measured) feature Perma-Lock—a tuning system that, at the touch of a button, “locks-in” pre-set COLOR, TINT and BRIGHTNESS levels and corrects flesh tone variations.

The Chro-Matrix picture tube and the Gibraltar 90 chassis will be included in 15 of these models, which are 90 percent solid-state.

Other screen sizes (diagonally measured) include three 19-in. portables, three 21-in. table models, three 23-in. models, one 18-in. portable, and one 14-in. portable.

ZENITH

Zenith introduced two lines of color-TV sets, featuring an advanced superbright color picture tube, a new modular all solid-state chassis, electronic tuning and an automatic one-button COLOR control.

The super Chromacolor picture tube is featured in 41 sets in the 43 model line. The solid-state chassis, the Titan 200, powers all of the 25-in. (diagonally measured) models. The active phosphor area seen by the viewer has been increased, with a new iris mask development in which the size of the phosphor dots which make up the picture was enlarged in the super Chromacolor picture tube.

The Titan 200 chassis is used in 10 sets with the new solid-state electronic tuning system, reportedly making it easier to pre-set the TV set from the front for up to any combination of 14 VHF and UHF channels.

Also introduced is a new Chromatic tuning system with a control button on the front of the set. Pressing the button gives the set owner the convenience of color TV pictures pre-set at the factory, eliminating the adjustment of the BRIGHTNESS, CONTRAST, COLOR LEVEL and TINT controls. This feature is included in 38 color-TV sets.

The Titan 200 chassis is featured in all 25-in. color-TV models. This chassis employs five plug-in dura-

modules, three other individual modules and four integrated circuits. A typical use of the IC's is the color processing system of the TV set. Each module accom-



Zenith's Avante I is a 25-in. (diagonally measured) solid-state color-TV set that features Chromatic one-button tuning. *Courtesy of Zenith.*

modates solid-state components and permits their arrangement on a modular carrier in any of various circuit configurations. They are flat mounted rather than edge mounted on the chassis.

With remote control becoming increasingly popular in color-TV sets, a completely separate line (17 sets) features three different systems of Space Command ultrasonic remote TV tuning: the 600X, 500 and 100.

The B/W line of TV sets comprises 17 models in five different screen sizes, including a 19-in. remote-control portable called the “Celestial,” which employs the Space Command 100 systems of remote VHF tuning that turns the set ON, OFF and changes VHF channels. ■



“He was trying to repair the TV antenna yesterday when that big storm came up.”

BOOK REVIEWS

NORTH AMERICAN RADIO-TV STATION GUIDE by Vane A. Jones, published by Howard W. Sams, 160 pages, paperbound, \$3.95.

We have received a number of requests in the past concerning the location of TV stations and their assigned frequency so that plans can be initiated for the construction of fringe-area TV antenna systems. Thus far, this is the only condensed source of such information that we have been able to locate.

The eighth edition of this publication is said to list over 5500 AM stations, over 3000 FM stations and over 1200 TV stations in the United States, Canada, Mexico and the West Indies (we didn't take time to count). These listings are broken down into the following categories: TV stations by geographical location, TV stations by channels, FM stations by geographical location, FM stations by frequency, AM stations by geographical location, AM stations by frequency, and AM, FM and TV stations by call letters.

The TV station listings include call letters, location, channel number and network; while the FM station listing also includes antenna height above average terrain and transmitter power; the AM station listing adding both daytime and nighttime transmitter power information. We are sorry that this additional transmitter information is not included in the TV station listing, although fringe-area TV reception is more a case of trial and error.

The material provided in this book appears very well presented and should be of value to those concerned with receiving and identifying distant AM, FM or TV signals.

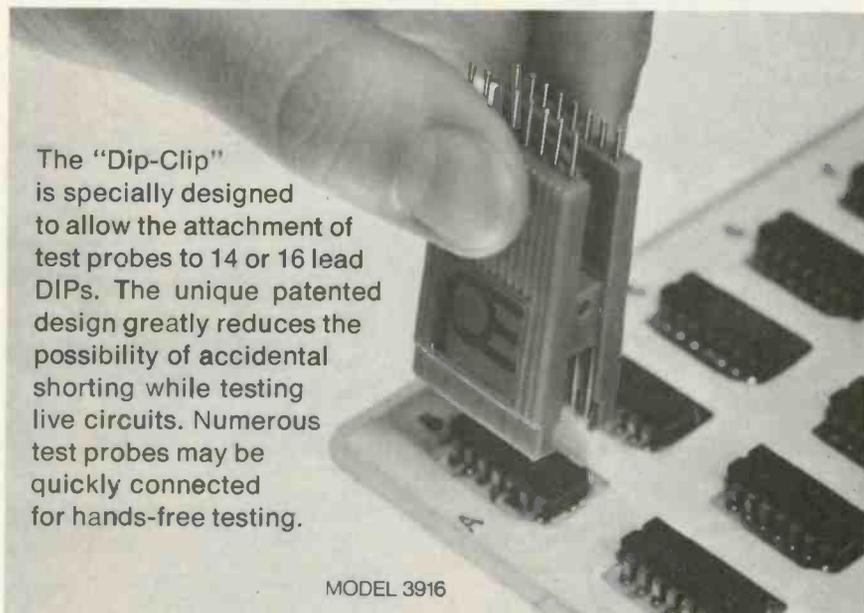
199 COLOR TV TROUBLES & SOLUTIONS by Robert L. Goodman, published by Tab Books, 224 pages, paperbound, \$4.95.

This book's 11-page table of contents contains a lengthy alphabetical listing of circuit defects according to the brand and chassis of the TV set being serviced. Using this as a reference, one can then quickly find the page of the book describing the symptoms of the problem in the TV set that is being serviced—along with a partial schematic of related circuitry and suggestions as to the probable cause.

The book is well written, clearly describing circuit symptoms. It should prove a useful guide for the less experienced TV electronic technician.

dip clip

T.M.



The "Dip-Clip" is specially designed to allow the attachment of test probes to 14 or 16 lead DIPs. The unique patented design greatly reduces the possibility of accidental shorting while testing live circuits. Numerous test probes may be quickly connected for hands-free testing.

MODEL 3916



POMONA ELECTRONICS

1500 E. Ninth St., Pomona, Calif. 91766 • Telephone: (714) 623-3463

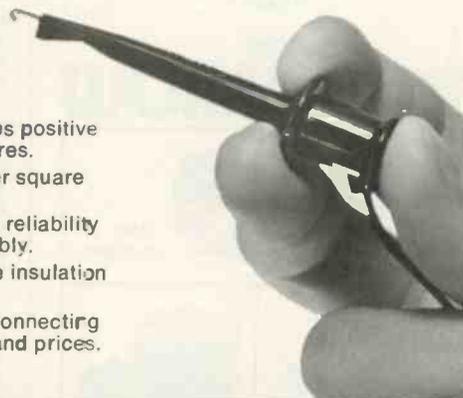
... for more details circle 127 on Reader Service Card

the grabber

T.M.

Our plunger action Mini-Test Clip is designed specifically for reaching into densely packaged miniaturized circuitry to make rapid, reliable tests.

- Gold plated copper contact hook makes positive connection, and won't damage lead wires.
- Specially designed tip slides down over square Wire-Wrap[®] pins for solid contact.
- Integrally molded wire assures greater reliability and eliminates time-consuming assembly.
- Molded nylon probe provides complete insulation to point of connection.
- Four models offer widest selection of connecting plugs. Write for complete information and prices.



POMONA ELECTRONICS

1500 E. Ninth St., Pomona, Calif. 91766 • Telephone: (714) 623-3463

*Registered trademark of Gardner-Denver Co.

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

NEW ENDECO Desoldering Kits

MODEL
300-K
KIT
SHOWN



All you need to handle almost any desoldering and resoldering job!

Kit 300K includes the famous Endeco pencil desoldering iron Model 300, six different size tips (.038 to .090) for any job, tip cleaning tool, and metal stand for iron... all in a handy lifetime steel storage box. \$19.90 net. Model 300K-3 with a 3-wire cord \$20.90. Also a similar kit for military users. Kit 100K with large Endeco iron (Model 100A) is \$27.40, and 3-wire Kit 100AD-3 \$28.40.

SEE YOUR DISTRIBUTOR OR WRITE



**ENTERPRISE
DEVELOPMENT
CORPORATION**

5127 East 65th St., Indianapolis, Ind. 46320

... for more details circle 114 on Reader Service Card

DESIGNS OF THE NEW SHAPE OF SOUND TOMORROW



PARTS & ACCESSORIES

DC MOTORS & BELTS

COMPLETE CATALOG AVAILABLE.
CALL YOUR WELTRON DISTRIBUTOR TODAY!
or write or call direct.

Weltron
COMPANY

514 East Peabody Street, Durham, N.C. 27702
919-682-0333

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

READERS SERVICE INDEX

ADVERTISER'S INDEX

101	Arrow Fastener Co., Inc.	68
102	Aztek	74
103	B&K Div., Dynascan Corp.	47
104	Book Club—Schematics	61
105	Book Club—Tab Books	52-55
106	Chemtronics, Inc.	67
107	Cleveland Institute of Electronics	35-37
108	Cusack Electronics	73
109	Delta Products, Inc.	70
110	Dictaphone	75
111	E-V/Game, Inc.	32
112	EICO Electronic Instruments Co., Inc.	24
113	Electronic Devices, Inc.	63
114	Enterprise Development Corp.	78
	Finney Company, The	25
116	John Fluke Mfg. Co.	66
117	Fordham Radio Supply Co., Inc.	78
118	GC Electronics Co.	26
	GTE Sylvania, Electronic Components	48, 2nd Cover
119	Heath Company, The	65
120	International Components Corp.	64
121	Jensen Tools & Alloys	78
122	Leader Instruments Corp.	3rd Cover
123	Leader Instruments Corp.	30
124	Lee Electronic Labs Co., Inc.	73
125	Oneida Electronic Mfg.	72
126	Panasonic-Service Div.	23
127	Pomona Electronics	77
128	Pomona Electronics	77
129	Precision Tuner Service	19
	RCA Consumer Electronics	38
130	RCA Parts & Accessories	21
	RCA Semiconductors	4th Cover
131	RCA Test Equipment	33
132	RMS Electronics, Inc.	75
133	Sprague Products Co.	31
115	T & T Sales Co.	28
134	TV Tech Aid	71
135	Telematic Div., UXL Corp.	69
136	Triplet Corporation	27
137	Wahl Clipper Corp.	66
138	Weltron Co., Inc.	78
139	Winegard Company	29
140	Workman Electronic Products	74
141	Xcelite, Inc.	28
142	Yeats Appliance Dolly Sales Co.	70

NEW PRODUCTS

700	Solid-State Frequency Counter Kit	34
701	Field Strength Meter	34
702	Two-Channel AC Millivolt Meter	34
703	Wire Stripper	67
704	Color Test Jigs	67
705	WD-40	67
706	Transistor Curve Tracer	67
707	Antenna Amplifier	68
708	FET VOM	68
709	Degreaser	68
710	Color-TV Components Kit	69
711	Digital Multimeter	69
712	Adhesive	69
713	Oscilloscope	69
714	Antennas	70
715	Adhesive	70
716	Digital Multimeter	70
717	AM/FM Stereo Phono	71
718	CB Radio	71
719	Lectern Sound System	71
720	Speaker Protector	71
721	Microphone	72
722	PA Amplifiers/Boosters	72
723	Electronic Turntable	72
724	AM/FM Stereo Receiver	72
725	Cassette Deck	72
726	Parts and Tool Organizer	73
727	Four-Channel Decoder	73
728	AM/FM Receiver	73
729	Audio Accessories	74
730	SSB/AM CB Radio	74

TEST INSTRUMENT

900	Fluke's Model 8000A 3½-Digit Multimeter	60
-----	---	----

DISCOUNT PRICES TEST EQUIPMENT



**I.E.C./Mullard Tubes Specials
Catalog & Prices on Request**

FORDHAM Radio Supply
Company, Inc.



265 E. 149 Street, Bronx, N.Y.
Tel: (212) 585-0330

RCA

DISTRIBUTORS OF ELECTRONIC SUPPLIES

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

FREE CATALOG TOOLS

HARD-TO-FIND PRECISION TOOLS

Lists more than 1700 items—pliers, tweezers, wire strippers, vacuum systems, relay tools, optical equipment, tool kits and cases. Also includes four pages of useful "Tool Tips" to aid in tool selection.

JENSEN TOOLS
4117 N. 44th Street, Phoenix, Ariz. 85018

... for more details circle 121 on Reader Service Card

EDITORIAL...

continued from page 22

frequencies assigned to each of the 12 new Canadian TV channels, the number of channels initially used, their English and French program schedules, and copyright limitations that might concern those of us in the U.S. that would like to tune in.

I am very interested in the possibility of personally installing a satellite antenna so that I may know first-hand what our readers can expect to encounter. Any specific information from those dealing with the Canadian satellite—either through program transmissions or the development of new satellite antennas for public use—would certainly be appreciated. A free nation such as ours cannot consider restricting its public video communications to but a hunk of cable.

Philip Dahlen, CET

Circle the Reader Service numbers of those items of interest to you.

GET MORE FACTS
NO POSTAGE NECESSARY

Your own personal copy for only pennies per issue

For those countries outside the U.S., please apply appropriate postage before mailing

READER SERVICE INFORMATION CARD

For more information on products or services mentioned in this issue, simply circle the appropriate numbers below, type or print your name and address and drop in the mail.

ADVERTISED PRODUCTS

101	110	119	128	137	146
102	111	120	129	138	147
103	112	121	130	139	148
104	113	122	131	140	149
105	114	123	132	141	150
106	115	124	133	142	151
107	116	125	134	143	152
108	117	126	135	144	153
109	118	127	136	145	154

TEST INSTRUMENTS

900	909
901	910
902	911
903	912
904	913
905	914
906	915
907	916
908	917

NEW PRODUCTS

700	709	718	727	736	745
701	710	719	728	737	746
702	711	720	729	738	747
703	712	721	730	739	748
704	713	722	731	740	749
705	714	723	732	741	750
706	715	724	733	742	751
707	716	725	734	743	752
708	717	726	735	744	753

This card is usable until February 5, 1973.

11/72

NAME _____ POSITION _____
 COMPANY _____ STREET _____
 CITY _____ STATE _____ ZIP CODE _____

BUSINESS REPLY MAIL

NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

FIRST CLASS

PERMIT NO. 665

DULUTH, MINNESOTA

POSTAGE WILL BE PAID BY

Reader Service Department

ELECTRONIC TECHNICIAN/DEALER

POST OFFICE BOX 6016, DULUTH, MINNESOTA 55806

For those countries outside the U.S., please apply appropriate postage before mailing



PERSONAL SUBSCRIPTION CARD

GET A FREE BONUS WITH YOUR PERSONAL SUBSCRIPTION TO ELECTRONIC TECHNICIAN/DEALER!

- 3 Years \$13 2 Years \$10 1 Year \$6*
 Payment Enclosed Bill Me

*BONUS: With a 2 or 3 year subscription, you receive both TEKFAX 110 and the COLOR TV GUIDEBOOK free! If you are subscribing for 1 year, please indicate your choice of either: TEKFAX 110 COLOR TV GUIDEBOOK



IMPORTANT! Please check your business classification.

Type of Business
Check One

- A. Independent or Self-Employed Service Technician
 B. Independent Electronic Service Organiz.
 C. Retailer with Electronic Service Dept.
 D. Electronics, Radio, TV Manuf
 E. Industrial Electronic Service
 F. Wholesale, Jobber, Distributor
 G. Other (Specify).....

Position
Check One

- H. Technician
 I. Owner, Manager, Buyer
 J. Service Manager
 K. Other

Be sure you have checked appropriate boxes above.

NAME _____ STREET _____
 FIRM _____ TITLE _____
 CITY _____ STATE _____ ZIP _____

If you are renewing your subscription, check here and attach your address label. If you renew your subscription for 2 to 3 years, you are still eligible to receive your free bonus.

BUSINESS REPLY MAIL

NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

FIRST CLASS

PERMIT NO. 665

DULUTH, MINNESOTA

POSTAGE WILL BE PAID BY

Reader Service Department

ELECTRONIC TECHNICIAN/DEALER

POST OFFICE BOX 6016, DULUTH, MINNESOTA 55806

GET MORE FACTS

NO POSTAGE
NECESSARY

For those countries outside the U.S., please apply appropriate postage before mailing.

READER SERVICE INFORMATION CARD

For more information on products or services mentioned in this issue, simply circle the appropriate numbers below, type or print your name and address and drop in the mail.

ADVERTISED PRODUCTS

101	110	119	128	137	146
102	111	120	129	138	147
103	112	121	130	139	148
104	113	122	131	140	149
105	114	123	132	141	150
106	115	124	133	142	151
107	116	125	134	143	152
108	117	126	135	144	153
109	118	127	136	145	154

TEST INSTRUMENTS

900	909
901	910
902	911
903	912
904	913
905	914
906	915
907	916
908	917

NEW PRODUCTS

700	709	718	727	736	745
701	710	719	728	737	746
702	711	720	729	738	747
703	712	721	730	739	748
704	713	722	731	740	749
705	714	723	732	741	750
706	715	724	733	742	751
707	716	725	734	743	752
708	717	726	735	744	753

This card is usable until February 5, 1973.

11/72

NAME _____ POSITION _____

COMPANY _____ STREET _____

CITY _____ STATE _____ ZIP CODE _____

Circle
the
Reader
Service
numbers
of those
items of
interest
to you.

BUSINESS REPLY MAIL

NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

FIRST CLASS

PERMIT NO. 665

DULUTH, MINNESOTA

POSTAGE WILL BE PAID BY

Circulation Department

ELECTRONIC TECHNICIAN/DEALER

POST OFFICE BOX 6016, DULUTH, MINNESOTA 55806

Your own
personal
copy
for
only
pennies
per issue

Leader

The more
you see
...The more
you believe.

LBO-505 DUAL CHANNEL/ DUAL TRACE 5" OSCILLOSCOPE

Outduels them all! Solid state accuracy, performance. Has triggered & auto sweep; AC or DC coupling per channel; 15MHz bandwidth; 100nanosec/cm max. speed (10Xmag.); 10MVp-p/cm vert. sensitivity; cont. scale illumination w/front panel control; Sep. or simult. display of 2 signals to compare input-and-output, for color, B&W, audio & more. Checks gain, loss, distortion, phase shift, freq. Complete with probes, adapters, leads.



\$559.95

LTC-905 CURVE TRACER

Test Transistor, Triac, SCR, Diode, FET & MOSFET quality... in-or-out of circuit, with precise voltage or current steps. Has exclusive, variable h'z'l length adjustment to 100V sweep. Places entire h'z'l trace on all scope faces. Sweep Voltage is 8 steps selectable. An all IC timesaver that checks for opens, shorts, leakages. Complete with special probes and leads.



\$119.95

LSG-231 FM MULTIPLEX/ STEREO GENERATOR

Solid state stability that has no equal for Multiplex testing and service. Compact, easy to use. Checks separation, balance, alignment. 19KHz pilot signal freq. has ± 2 Hz accuracy. The 1KHz audio signal freq. has $\pm 1\%$ accuracy. Signal separation is 50dB. 0-3Vrms output, cont. variable. It's so accurate you may not want to use a scope! With handy tilt-stand.



\$229.95

LSB-41 RC SUBSTITUTION BOX

The quick, easy way to obtain resistor and capacitor values. No more "scrounging" through small parts bins, no more struggles with unmarked or illegible color coding. Has 24 EIA standard, 10%, 1W resistor subs, from 10 Ω to 10M Ω . Selects any of 22 standard capacitor subs. Lightweight, compact.



\$59.95



Send for your copy of the new 1972-73 Leader catalog. Features new "Leadership" performance products & accessories unmatched in every way.

The more you see...
the more you believe.

Leader

INSTRUMENTS CORP.

37 - 27 Twenty-Seventh Street,

Long Island City, N.Y. 11101 (212) 729-7410

sk

The Solid-State System ... for better servicing

It all works together to help you meet today's tough demands of solid-state servicing. See your RCA Distributor now and put SK, The RCA Solid-State Replacement System, to work in your business. You'll see why you can't beat it for better servicing and profits. It's the system built from your point of view.

RCA/Electronic Components
Harrison, N.J. 07029

RCA
Electronic
Components

RCA Quality Product

- Top-of-the-line premium devices
- Meet or exceed specs for professional servicing
- 146 RCA SKs replace over 50,000 devices

RCA Solid-State Hardware

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



RCA Information Support

- Replacement Guide (SPG-202M) cross-references over 50,000 domestic and foreign devices and supplies specific application information to assure correct replacement
- SK Quick Selection Wall Chart (1L1367A) ... saves you time making the right choice
- Three slide-film/cassette tape presentations on Transistor Servicing cover Basic Techniques for Transistor Checking (1L1337), Identifying The Defective Stage (1L1377), Identifying & Replacing The Defective Component (1L1378), plus the Transistor Servicing Booklet (1L1379). Available through your RCA Distributor