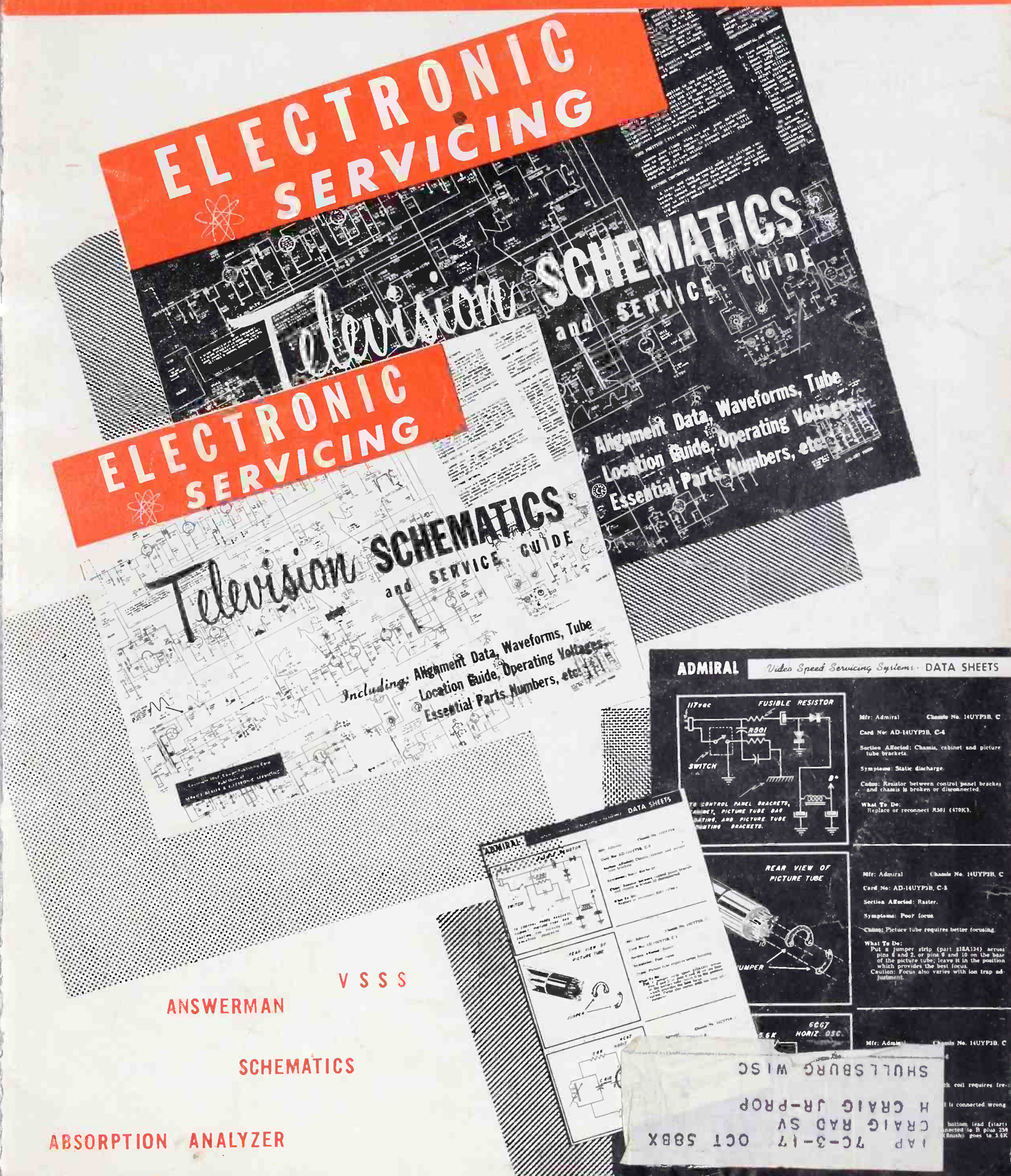
ELECTRONIC SERVICING

JUNE 1958 • 50¢



VSSS

ANSWERMAN

SCHEMATICS

ABSORPTION ANALYZER

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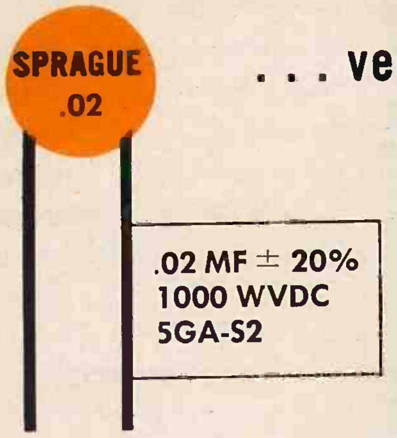

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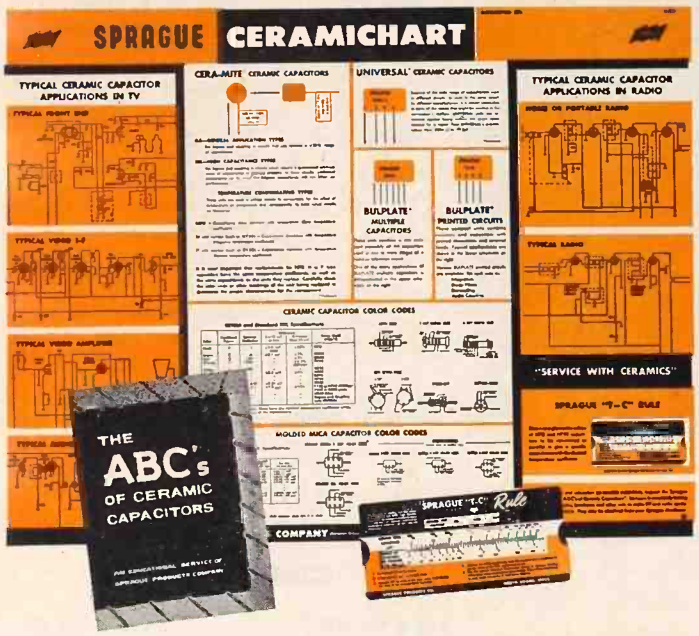

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Servicing With An Absorption Analyzer

by M. Tepper

An absorption analyzer is a useful piece of test equipment. The techniques for using this device are discussed in this article.

TIME is money. Any device that will enable a service technician to cut the length of time required to service a receiver is a money-saver.

A typical absorption analyzer,* (*Fig. 1*) is a dynamic test equipment unit capable of extremely fast and accurate checks of circuit operation, without the necessity of removing the equipment from its cabinet. Although this article will deal mainly with the use of the instrument for service of black and white, and color TV receivers, the uses are wide and varied. Essentially the instrument can be used wherever a waveform is present in a vacuum tube circuit. This covers a lot of territory, and a lot of equipment. Some of the additional uses are in repair of radios, communication receivers, transmitters, radar, etc.

Fig. 1—Absorption analyzer and probe. Note the few controls.

Pickup Probes

The heart of the analyzer is an electrostatic pick-up probe. The probe, by its special shape and design, is capable of being capacity coupled to the signal in the plate circuit of a tube. Since the plate of a vacuum tube is the outermost electrode, placing a circular metal conductor about the tube envelope permits capacitive coupling to the circuit.

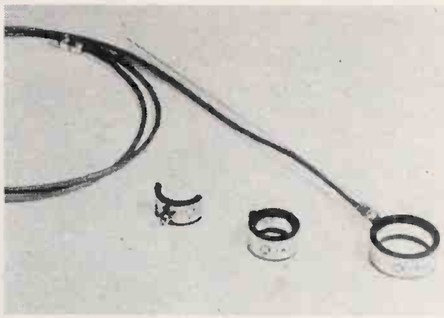

Fig. 2 — Several probe tips are supplied for different tubes.

Fig. 3—This probe permits the analyzer to be used as a scope.

Picking up the plate signal in this manner has two great advantages. First, there is no direct connection to the circuit and therefore no loading of the circuit under test. Second, the ease and speed with which it can be accomplished. As shown in *Fig. 2*, the probes are constructed for the various size tube envelopes. A half ring or crescent probe is for use with dual-type tubes such as the 6SN7, where each half of the tube may have a different signal. In addition to the electrostatic pick-up probe, a direct probe, (*Fig. 3*) with a built-in attenuator is available for conventional oscilloscope servicing with the analyzer.

Analyzer Input

The signal picked up by the probe is applied to the analyzer. The analyzer block diagram (*Fig. 4*) shows the basic circuits to consist of a front end, (tuner), detector and a specially designed oscilloscope. The input, if already detected, may be switched directly to the vertical amplifier of the oscilloscope. When applying an *rf*, or *if* signal, the input is switched to the appropriate position and applied to

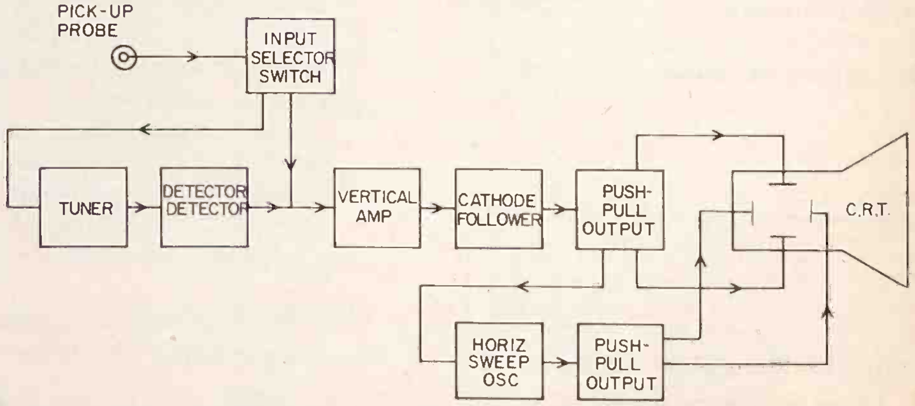

Fig. 4—The block diagram of the absorption analyzer is much the same as that of a scope except for the special input circuit.

*Kingston Electronic Corp.
Medfield, Mass.

the tuner.

The tuner is the well known Standard Coil rotary drum type, which comes complete with all 12 *vhf* channel strips. In addition, special tuner coil strips are supplied for 3.58, 4.5, 20 and 40 *mc bands*. These are inserted in place of the unused channels in the local area in which the service technician is located. These special tuner coil strips are for use with color TV circuits, intercarrier sound *if* circuits, and both 20 and 40 *mc if* circuits.

Sweep Amplifiers

The oscilloscope sweep amplifiers differ slightly with the two other analyzer models available. The analyzer model illustrated has been designed exclusively for the radio and television service technician. A quick snap of the switch will set the oscilloscope sweep circuits to the correct frequency for use with either a vertical circuit signal, or a horizontal circuit signal. Another model analyzer designed for general purpose use contains a variable frequency stepping switch permitting the selection of any desired oscilloscope sweep frequency.

Operation

Operation of the instrument in actual use is rapid and it takes more time to discuss than to do. All operations can be carried out without removal of the receiver chassis from its cabinet. The entire instrument has been designed for portable field use as well as bench use.

The use of the instrument is simple since the number of controls having been kept to a minimum. When checking an *rf* or *if* signal the input selector is set to the appropriate setting, the band selector switch, (tuner), is set for the desired channel or *if* frequency, and the oscilloscope sweep switch set to V or H for vertical or horizontal signal viewing. The probe is then used to follow the signal throughout the circuits for quick location of weak, distorted, noisy, or missing signals. The use of the electrostatic probe, permitting top-side operation, alleviates the time consuming job of disassembling a receiver. Probing about the underside of a chassis with its accompanying tedious, frustrating location of the correct tube socket, and tube socket terminal, is also reduced. The accompanying trouble shooting chart will best illustrate the ease and rapid use of the analyzer in following the signal waveforms from antenna to *crt* and speaker.

ANALYZER TROUBLE SHOOTING CHART

Circuit under test.	Test for the following:
Antenna	Test for the input *rf* signal. An open or intermittent lead-in. Use for antenna orientation. Check for incoming noise signals. Feed the lead-in through the probe, run the probe up and down the lead-in to check for standing waves.
RF Amplifier	Check for cathode to heater 60 cycle leakage. Test for weak *rf* input signal. Check for overloading and sync clipping due to wrong setting or defective *agc*, gassy tube, etc.
Oscillator and Mixer	An *if* output indicates the oscillator and mixer are operating correctly. To localize the difficulty with no *if* output, set the analyzer tuner for the correct channel. An *rf* output indicates the mixer is operating, and the difficulty is in the oscillator.
IF Amplifier	Test for increasing gain with each succeeding stage. Check for cathode to heater 60 cycle leakage. Examine the waveform for 120 cycle power supply hum. Check for overloading and sync clipping due to wrong setting or defective *agc*, gassy tube, etc. Test for noise pickup at the same frequency as that used for the *if* circuits.
Detector and Video Amplifier	Check for detected output signal. Test for gain from detector to output signal applied to the *crt*. Check for proper contrast action by examining the variation in gain while varying the contrast control.
Sync Separator	Check for the presence of sync pulses. Examine the waveform for the absence of video information. Test for the correct amplitude of the sync pulses.
AGC	To check for *agc* action, check the waveform of the *rf* amplifier, remove an *if* amplifier tube. The *agc* applied to the *rf* amplifier will increase the gain of the *rf* amplifier, increasing the amplitude of the waveform present. Replacing the *if* amplifier tube, the increased *agc* voltage will return the gain of the *rf* amplifier to normal. For series string tube circuits, varying the AGC control will indicate variation in gain in the *rf* amplifier.
Keyed agc	Check for the presence of horizontal pulses in the keyed *agc* tube.
Vertical Oscillator and Amplifier	Check the oscillator for sweep signal output. Test the vertical amplifier for the presence and proper amplitude of the vertical sweep voltage waveform. In receivers using the vertical pulse for vertical retrace blanking, check for the presence of the vertical blanking pulse at the signal lead of the *crt*.
Horizontal Oscillator and Amplifier	Test for the presence of the horizontal oscillator signal waveform. The shape of the horizontal oscillator waveform will vary with the type of horizontal circuit used. Test the horizontal amplifier for the presence and proper amplitude of the horizontal sweep voltage waveform. Check the damper tube operation by the presence of the horizontal output pulse waveform.
Sound *if* Amplifier	For audible signal testing plug earphones into the front panel jack labelled Sound. Test for the presence of sound at the video amplifier. Where the sound takeoff is at video detector, the presence of audio will have to be tested at the sound *if* tube.

[*Continued on page* 28]

ANSW

Dear Mr. Answerman:

I have a condition of vertical bars appearing in the left portion of the picture on an Emerson chassis 120381-M that I don't seem to be able to eliminate. I have checked the circuits thoroughly and nothing appears to be defective. The only possible reason I can find for the deflection circuit ringing is the fact that the customer has just moved into a new home where the line voltage is abnormally high. The high B plus voltage may be causing the trouble. If this is the case what can you suggest I do?

L. G.
Dallas, Texas

Horizontal deflection coil ringing produces a fluctuation in the horizontal deflection magnetic field. This causes the electron beam to slow down or speed up according to the nonlinearity or ripple developed in the deflection current sawtooth for each horizontal line. Thus, vertical bars result, generally on the left side of the picture. This condition is different from that of each line being displaced vertically due to a defect in the vertical deflection system. It is therefore most important to determine which type of trouble is being experienced. In other words, deflects in the picture on the left side can be due to ringing in the horizontal deflection coils, an unbalance between the two deflection coils or an excessive coupling between the horizontal and vertical deflection coils. To be able to correct the condition requires that the nature of the problem be known.

If examination reveals that the vertical bars are the result of ringing in the horizontal deflection system, it is quite possible, as you mention, that the high line voltage has brought about the nonlinearity or ringing in the horizontal deflection circuit. Since you have most probably checked

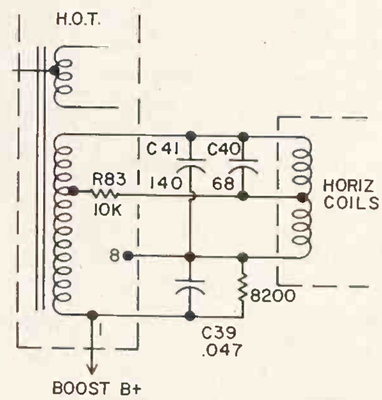

Fig. 1—Flyback transformer for the Emerson 120381M.

the condensers shown in *Fig. 1,* the next step that can be taken is to make several changes that will possibly clear up the condition. Resistor *R83* can be reduced from *10K* ohms to *2.2K* ohms adding to the damping affect of this resistor. Condenser *C39, .047 mf,* can be removed from its connection at terminal ♯1 of the horizontal output transformer and connected directly to the 255 volt source which will also decrease the possibility of deflection circuit

ERMAN

resonance.

Of course, the possibility exists that at some previous time the yoke may have been replaced by a supposed equivalent substitution and now with the higher B plus the ringing is more pronounced. It may very well be that more capacity is required to lower the resonant frequency of the horizontal windings and thereby reduce the susceptibility to ringing. Therefore if the condition persists vary the capacitances of *C40* and *C41* to see if the condition can be corrected. Another *68 mmf* might be added in parallel with the existing condenser *C40*.

If the inspection of the picture has revealed that the vertical bars are the result of the electron beam being displaced vertically it is most likely occurring because of a large amount of capacitive coupling between the horizontal and vertical windings of the yoke. This allows a horizontal deflection on pulse to be coupled into the vertical deflection coil.

This latter type of picture distortion is frequently reduced or eliminated by adding a condenser of about *270 mmf* between the horizontal and vertical windings of the yoke. Connect the condenser between the center of the vertical winding and the *rf* ground side of the horizontal winding thereby bypassing the high frequency pulses to *rf* ground potential. If the addition of a condenser does not correct the condition it is suggested that the yoke be replaced with a replacement recommended by the receiver manufacturer.

Dear Mr. Answerman:

We have a problem with a 27 series Magnavox TV receiver which you may be able to help us with. There is a hum or horizontal bright bar across the center of the picture which I have been unable to eliminate. I have checked by substitution all tubes in the receiver which might cause such a hum in the picture, and tested all the electrolytic condensers, etc. We would appreciate any thoughts you may have that might permit us to correct this trouble.

E. C.
St. Louis, Mo.

The Magnavox Service News Letter made available through their general service manager mentions in the

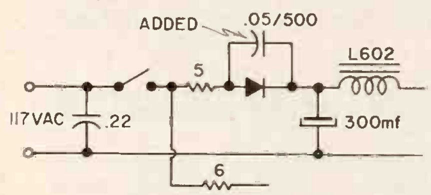

Fig. 2—Power supply change to eliminate hum bar.

April 3, 1958 issue a correction for this possible trouble. The letter states that a *.05 mf, 500 volt* ceramic capacitor should be shunted across the power rectifier as shown in *Fig. 2* to eliminate the hum bar. Evidently the power rectifier is radiating a pulse which is being picked up somewhere along the video signal path and applied to the picture tube.

[*Continued on page* 30]

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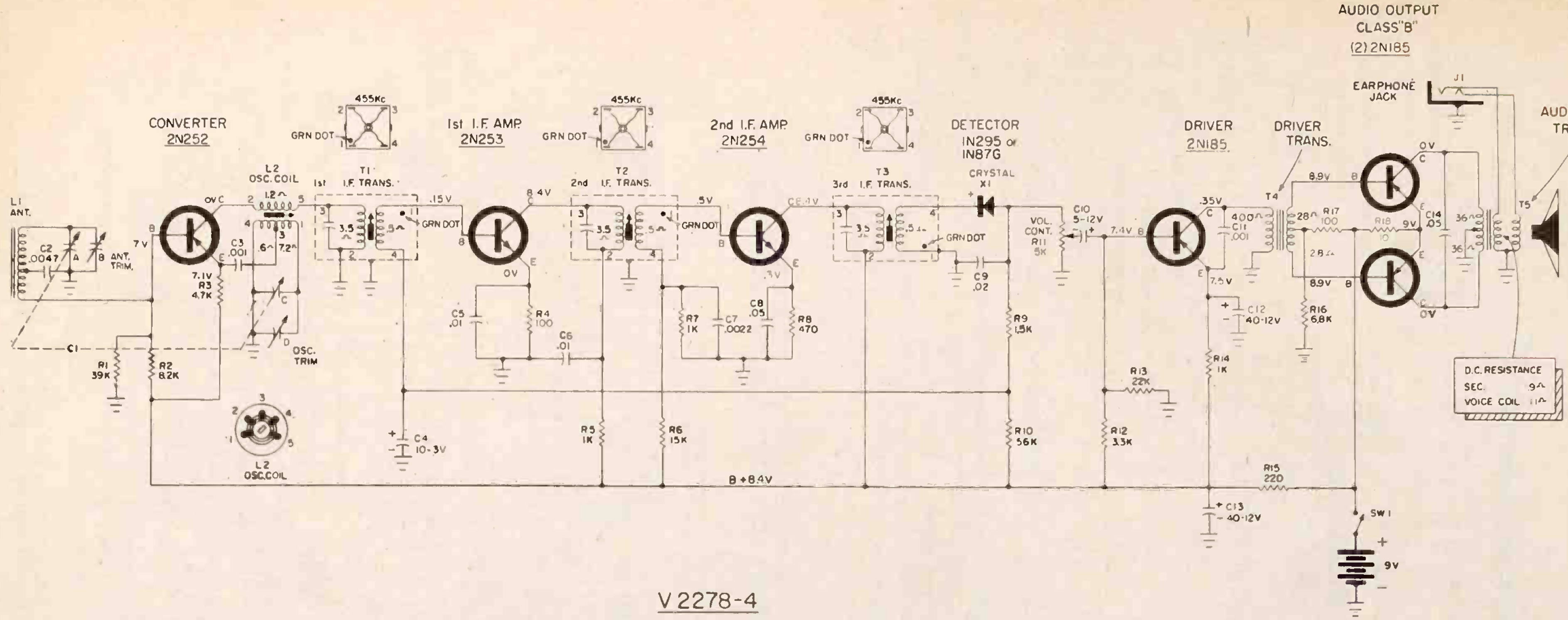
WESTINGHOUSE

Chassis V-2278-4



NOTES:

1. DURING SERVICING, TOTAL CURRENT SHOULD BE METERED. WITH NO SIGNAL, AND VOLUME CONTROL AT MINIMUM, TOTAL BATTERY SHOULD BE APPROX. 6 MA
2. VOLTAGE MEASUREMENTS MADE WITH A V.T.V.M. FROM POINTS INDICATED TO GND. WITH TUNING CAPACITOR AT MAXIMUM, VOLUME CONTROL AT MINIMUM, BATTERY SOURCE AT 9 VOLTS.
3. AUDIO OUTPUT TRANSISTORS 2N185 MUST BE MATCHED PAIRS.
4. ALL CAPACITORS ARE IN MICROFARADS AND RESISTORS ARE IN OHMS.

JUNCTION TRANSISTOR		
NO.	TYPE	FUNCTION
2N252	PNP	CONVERTER
2N253	NPN	1st I.F. AMPLIFER
2N254	NPN	2nd I.F. AMPLIFER
2N185	PNP	AUDIO DRIVER
2N185	PNP	AUDIO OUTPUT

ALIGNMENT REQUIREMENTS

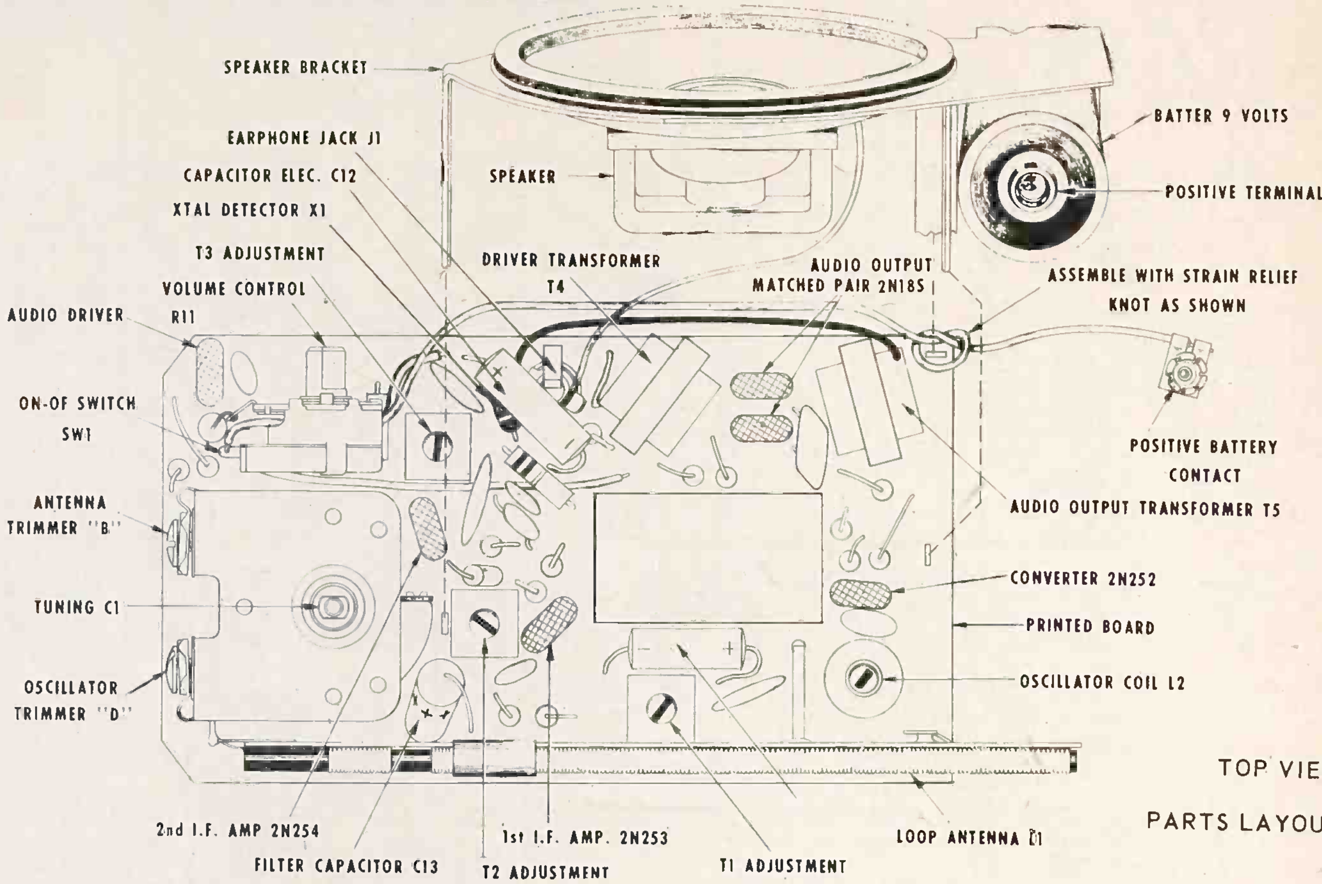
Signal Generator — Use generator providing modulated 455KC and AM broadcast frequencies. Connect a 4 or 5 turn loop of wire across output cable. Keep output of generator low enough to just give an indication on VTVM or output meter. Keep volume control at maximum to avoid AVC action.
Indicator — Connect VTVM or output meter across voice coil.
Receiver — Set volume control to maximum. Be sure during RF alignment that the hand or any objects on the bench do not come in close contact with the antenna loop or detuning will occur and alignment will be incorrect.
Alignment Tool — Use a fiber aligning tool that snugly fits the slot in the ferrite core to prevent chipping of the slot.

ALIGNMENT PROCEDURE

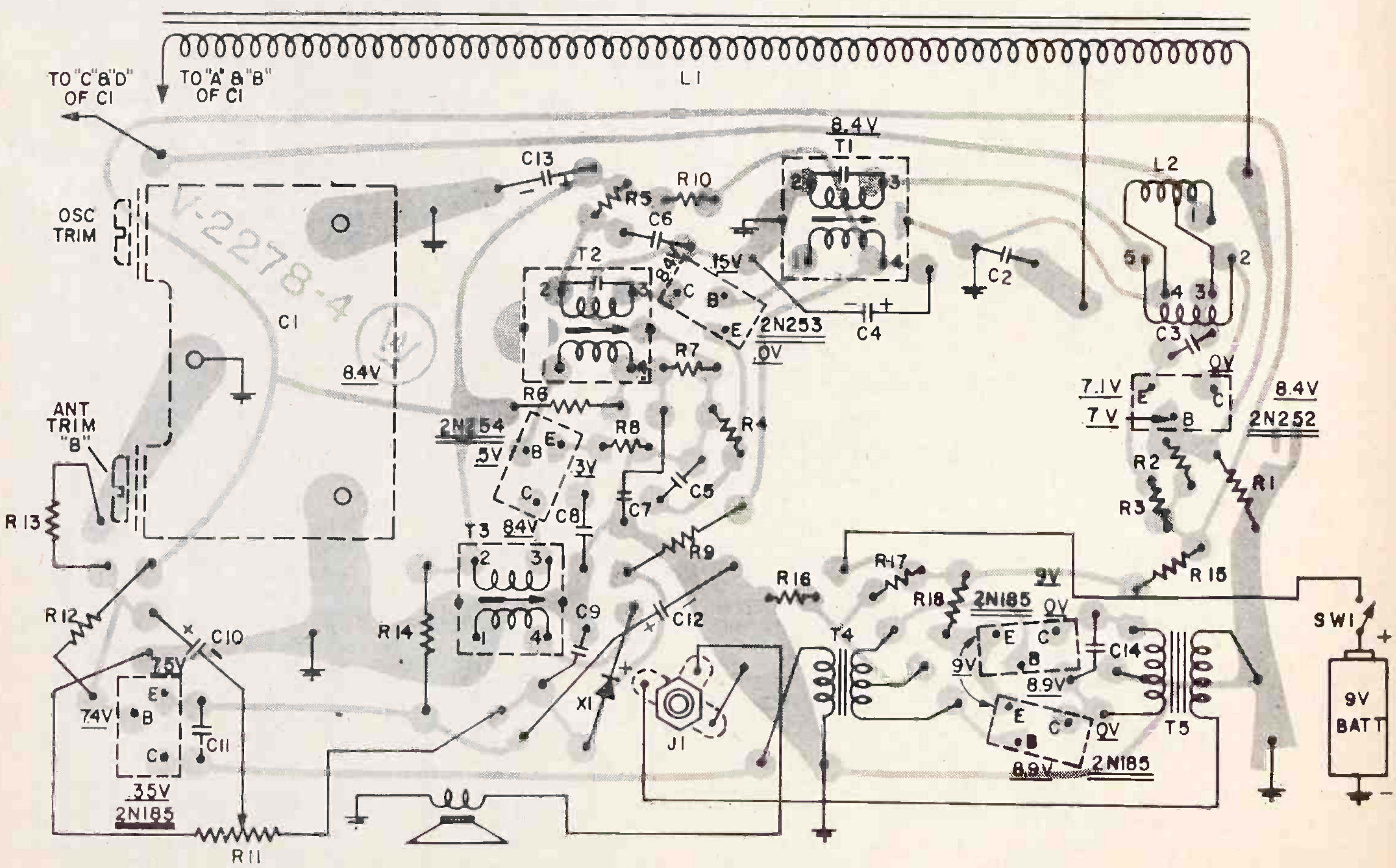
Loosely couple modulated signal to:	Generator frequency	C1 setting	Adjust for maximum:
Loop L1	455KC	maximum	T3, T2 and T1 in order. Reduce generator output if necessary for T2 and T1 adjustments
Loop L1	1625KC	minimum	Oscillator trimmer "D"
Loop L1	1400KC	1400KC	RF trimmer "B"
Loop L1	600KC	600KC	Oscillator coil, L2, if necessary

WESTINGHOUSE

Chassis V-2278-4



TOP VIEW, PARTS LAYOUT



BOTTOM VIEW OF PRINTED CIRCUIT BOARD SHOWING COMPONENTS SYMBOLICALLY

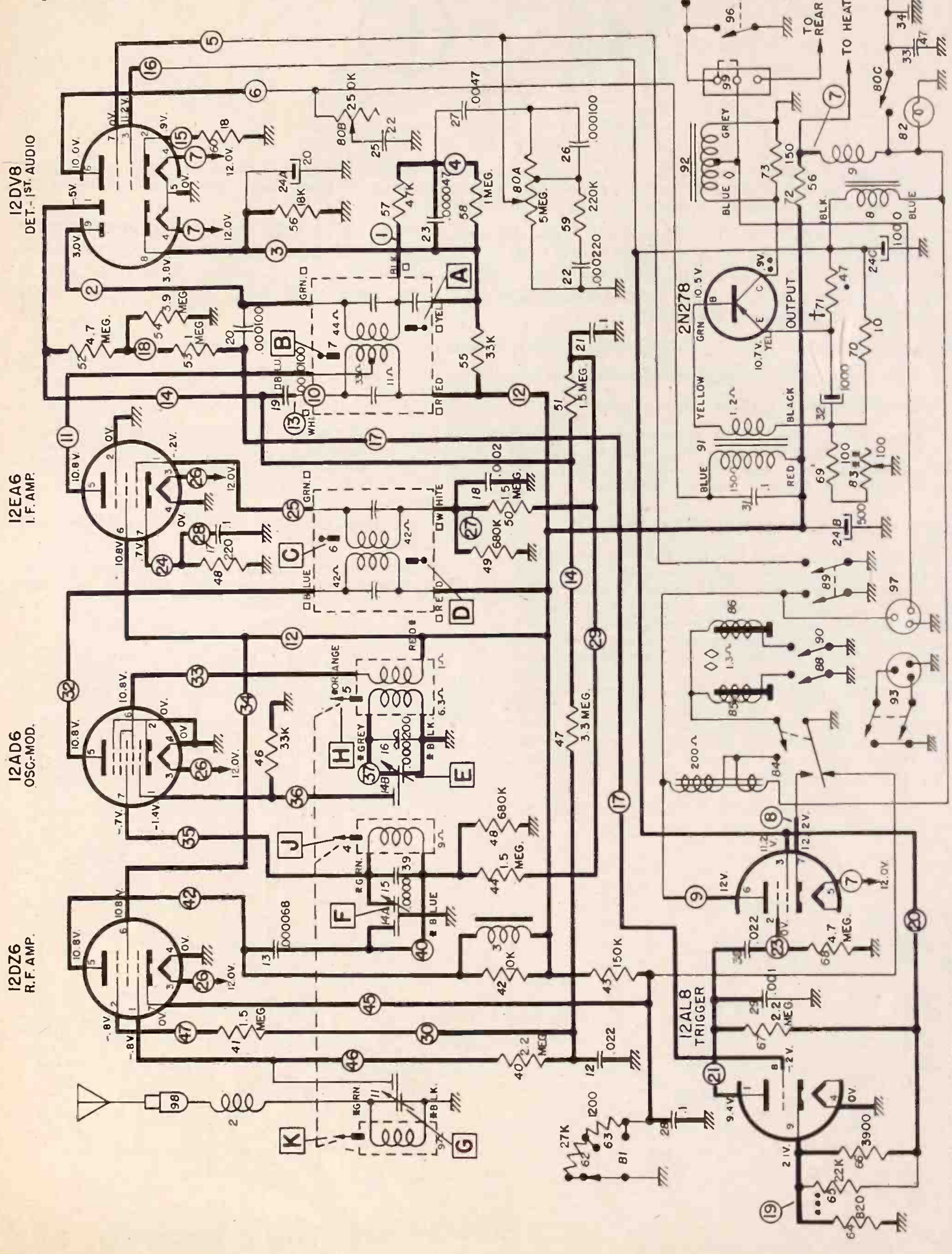
OLDSMOBILE

Delco-Oldsmobile 989129

IMPORTANT!

When radio is operated on battery eliminator, the tuner may stop seeking every time a solenoid energizes, due to voltage regulation.

Speaker socket, Illus. 96, is a shorting-type to prevent transistor damage if speaker is disconnected. If not opened, radio will be very weak or dead.

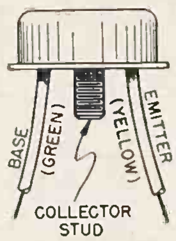


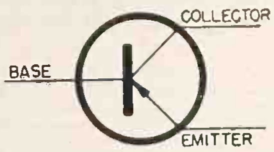
OLDSMOBILE MODEL 989129
PRINTED CIRCUIT SHOWN IN HEAVY LINES

TUNER CIRCUIT COMPONENTS

Delco-Oldsmobile 989129

RECOMMENDED TROUBLESHOOTING PROCEDURE





The tube stages in this receiver may be checked in the same manner as similar stages in high voltage tube circuit radios. CAUTION: Do not ground any point in the transistor base circuit, including the input transformer secondary, Illustration 91 as this will either damage the transistor or open the emitter resistor.

THE TRANSISTOR IS FUSED BY A FUSE TYPE RESISTOR (Illus. 71) IN THE EMITTER CIRCUIT. THIS RESISTOR OPENS QUICKLY IF A SHORT OCCURS IN THE 2N278 CIRCUIT. CHECK ACROSS THIS RESISTOR (SEE PAGE 4) USING OHMMETER ON RX1 SCALE. IF OVER 1 OHM, MOUNT A NEW RESISTOR AT THIS POINT. CAUTION: THIS SPECIAL RESISTOR PREVENTS FIRE, AND MUST BE REPLACED WITH EXACT PART OR WARRANTY IS VOID.

The recommended procedure for checking this radio is as follows:

1. Make certain the antenna is good, and the "A" supply voltage normal.
2. Check the tubes by substituting new ones.
3. Signal trace, using isolated (capacitor in lead) signal generator or "signal tracer." A strong audio signal injected at the 12DV8 tube plate, pin #6, should be heard in the case of a dead radio. (A quick check of the audio stage can be made with the radio warmed up by pulling out the 12DV8 tube and listening for a "click." If the "click" is heard, the transistor stage is working.)

TROUBLE SHOOTING THE OUTPUT STAGE

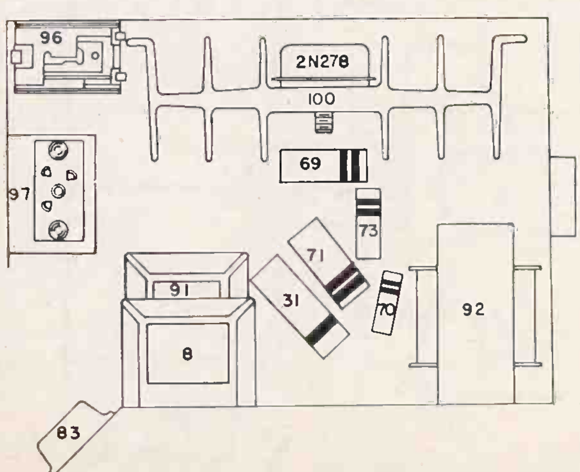
A quick way to determine that the 2N278 is conducting can be made by checking the collector voltage, from transistor case to the radio case. If no voltage is present, the transistor is not conducting or the transistor heat radiator is grounded to the radio case. If the voltage at the collector is higher than listed, the transistor is conducting too heavily (check with milliammeter) or the output transformer is open. The amount of current the transistor conducts is determined by the voltages at each element, the resistor in the base and emitter circuits, the input transformer secondary resistance, and the transistor itself. The most common defect in the transistor is an internal short between emitter and collector. To check for this, use the following procedure.

1. Unsolder base and emitter leads from the circuit.
2. Set ohmmeter on the "R x 1" scale (no other scale should be used.)
3. Place negative lead of ohmmeter (polarity refers to internal ohmmeter battery) on collector, and positive lead on the emitter.
4. The transistor is shorted if reading is "O."

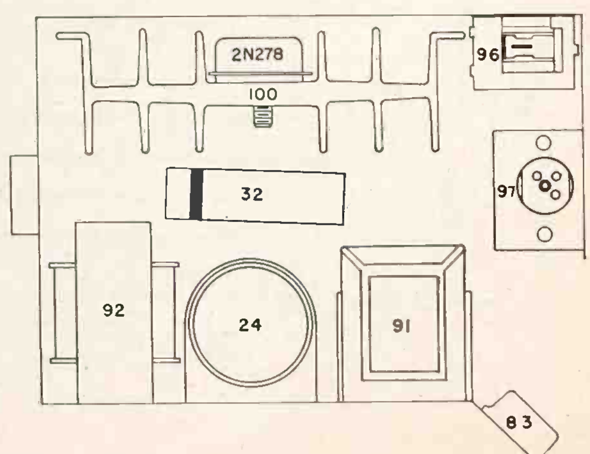
If a transistor is replaced, the "bias" adjustment should be made for the new transistor. Adjust bias potentiometer (Illus. 83) to obtain proper collector voltage with 12 volt input to radio.

RADIO BLOWS FUSES

If the radio blows fuses, check for a shorted transistor. If the transistor is okay, check for a short in the radio "A" supply circuit.



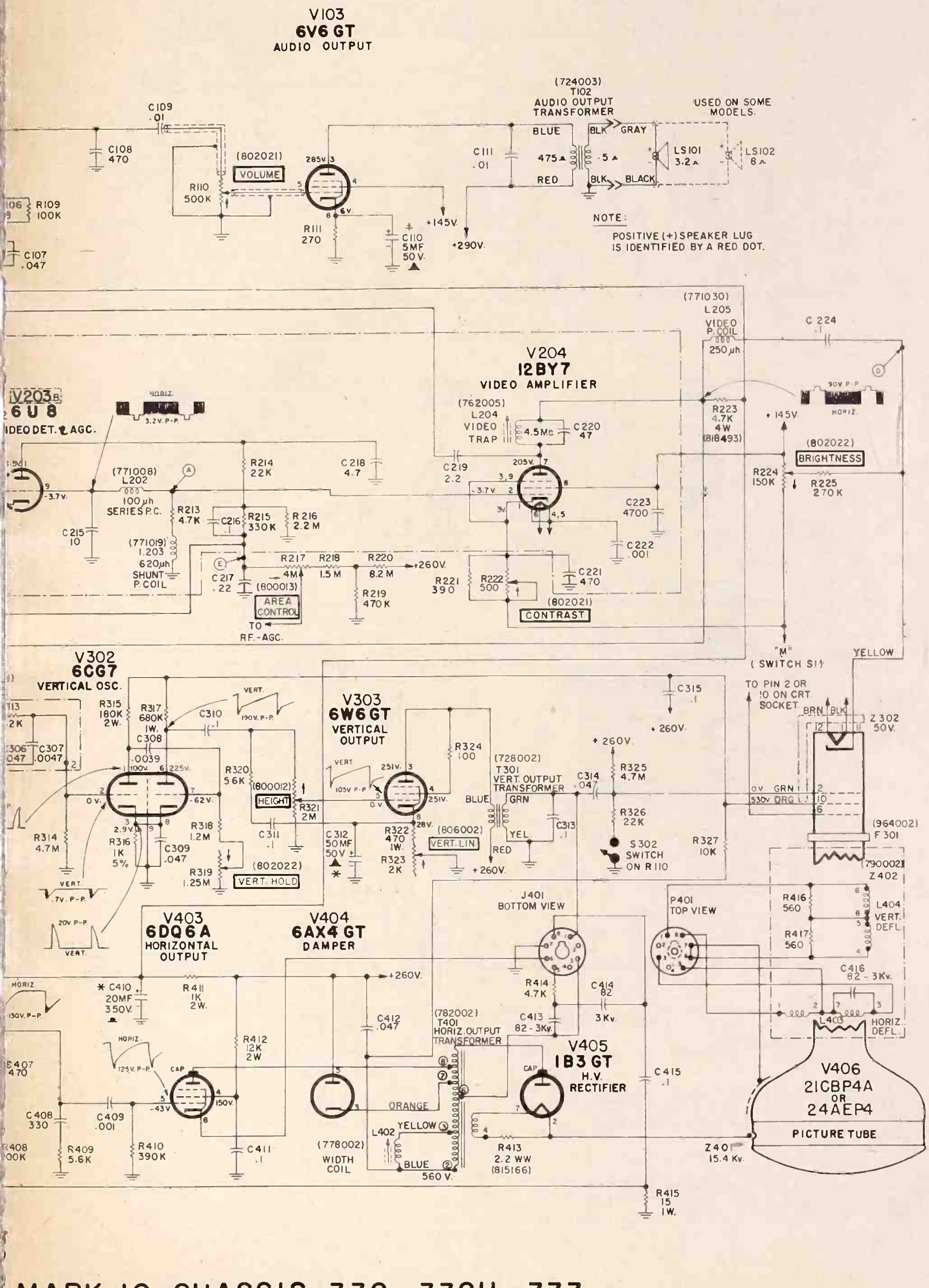
PARTS LAYOUT—TOP VIEW



PARTS LAYOUT—BOTTOM VIEW

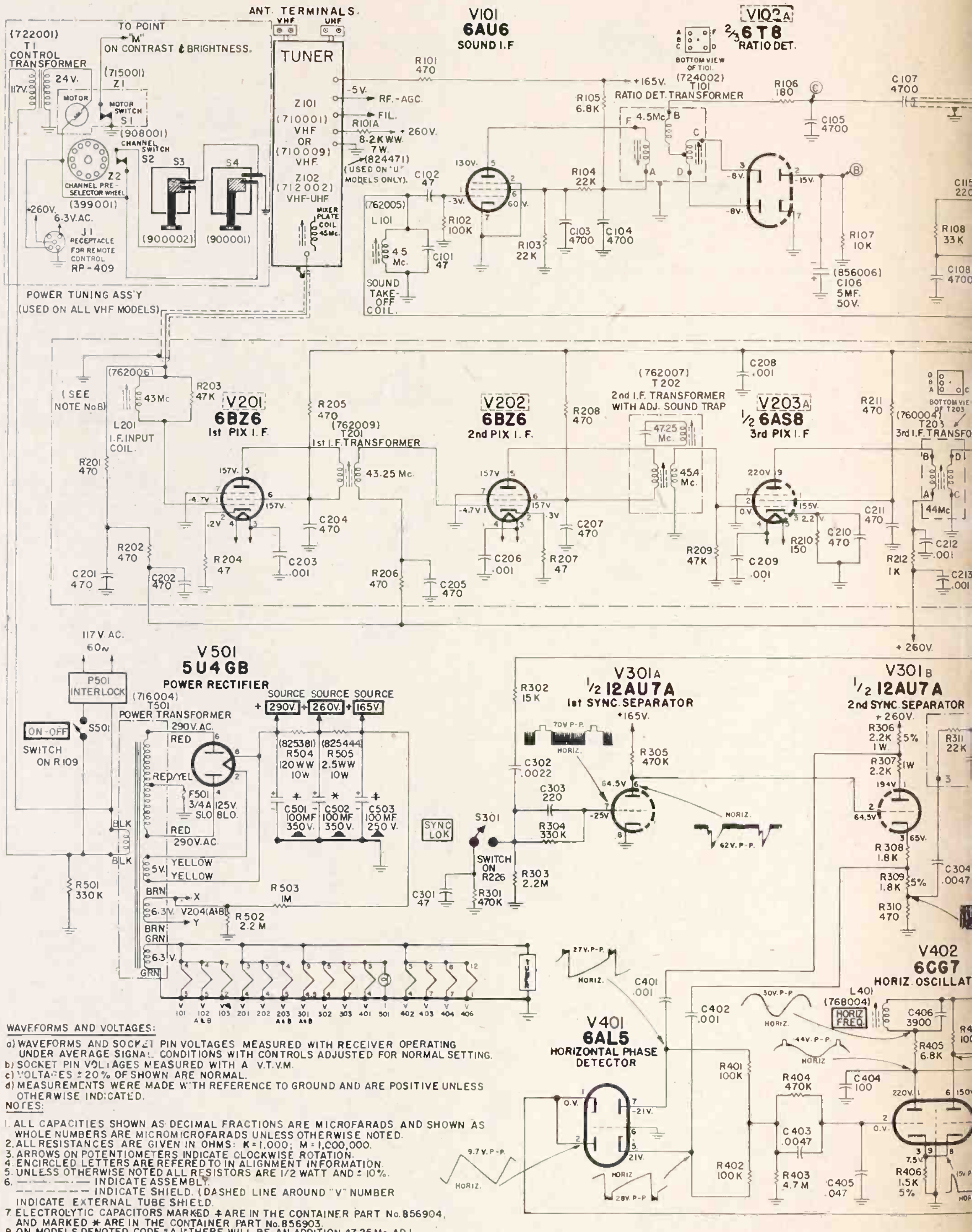
Television Receiver Chassis 332, 332U, 333

HOFFMAN



MARK 10 CHASSIS 332, 332U, 333

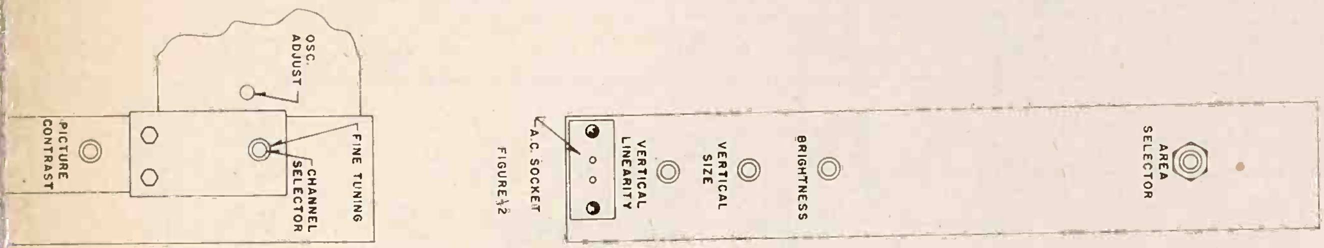
ELECTRONIC SERVICING / *Manufacturer's Schematics*

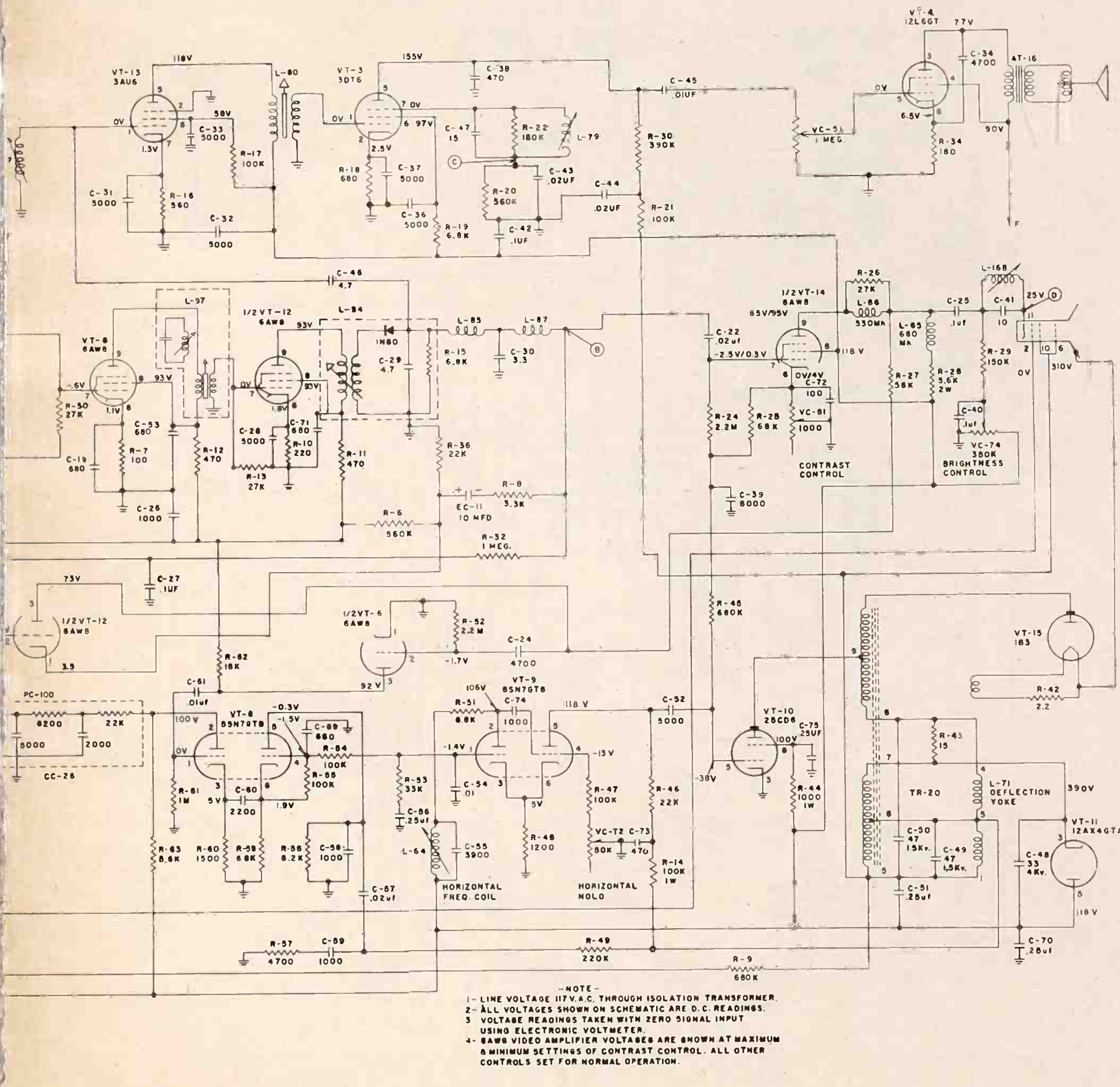


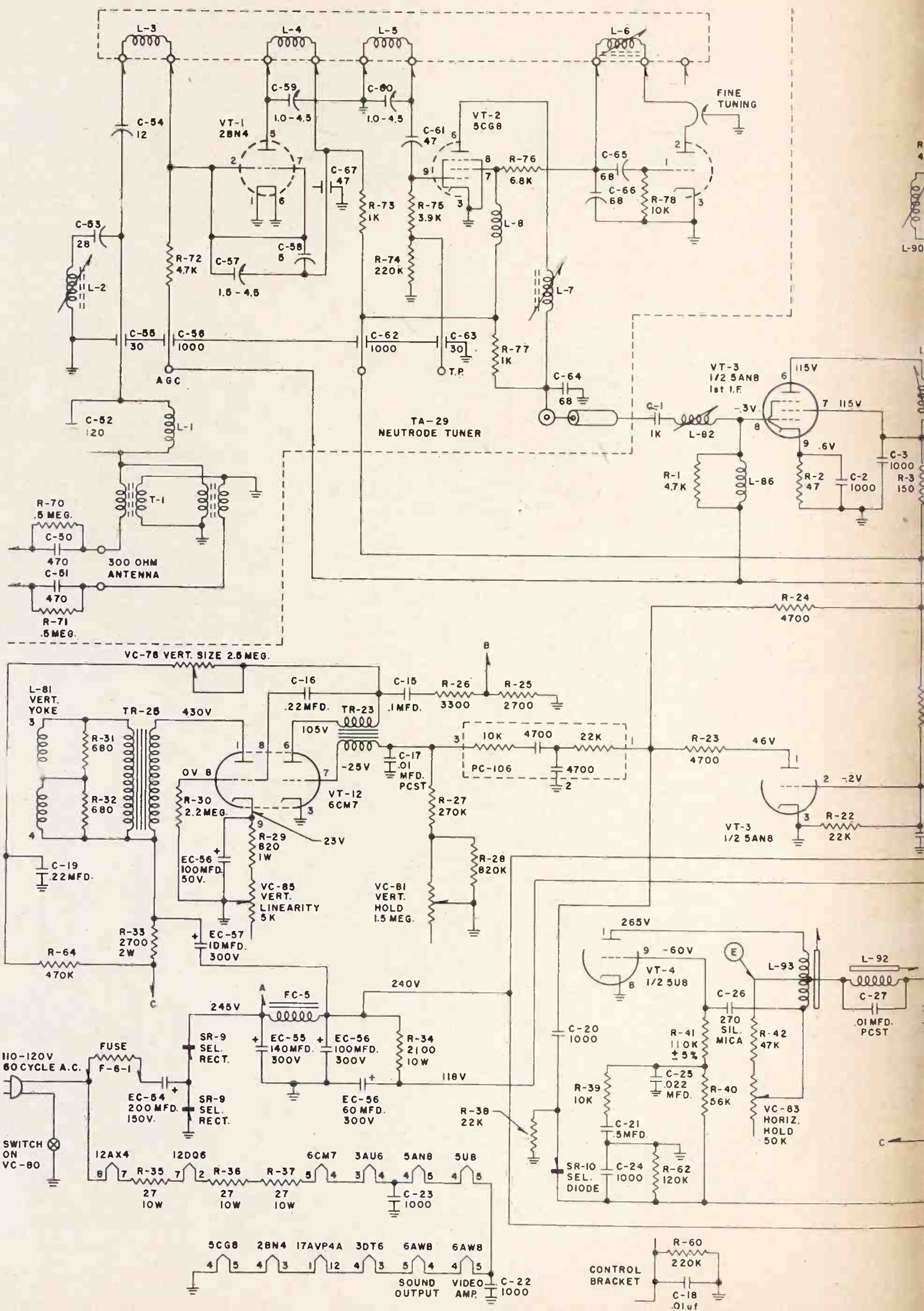
WAVEFORMS AND VOLTAGES:
a) WAVEFORMS AND SOCKET PIN VOLTAGES MEASURED WITH RECEIVER OPERATING UNDER AVERAGE SIGNAL CONDITIONS WITH CONTROLS ADJUSTED FOR NORMAL SETTING.
b) SOCKET PIN VOLTAGES MEASURED WITH A V.T.V.M.
c) VOLTAGES ± 20% OF SHOWN ARE NORMAL.
d) MEASUREMENTS WERE MADE WITH REFERENCE TO GROUND AND ARE POSITIVE UNLESS OTHERWISE INDICATED.

NOTES:
1. ALL CAPACITIES SHOWN AS DECIMAL FRACTIONS ARE MICROFARADS AND SHOWN AS WHOLE NUMBERS ARE MICROMICROFARADS UNLESS OTHERWISE NOTED.
2. ALL RESISTANCES ARE GIVEN IN OHMS: K=1,000; M=1,000,000.
3. ARROWS ON POTENTIOMETERS INDICATE CLOCKWISE ROTATION.
4. ENCIRCLED LETTERS ARE REFERED TO IN ALIGNMENT INFORMATION.
5. UNLESS OTHERWISE NOTED ALL RESISTORS ARE 1/2 WATT AND ± 10%.
6. —·—·—·— INDICATE ASSEMBLY.
——————— INDICATE SHIELD. (DASHED LINE AROUND "V" NUMBER INDICATE EXTERNAL TUBE SHIELD.
7. ELECTROLYTIC CAPACITORS MARKED ✱ ARE IN THE CONTAINER PART No.856904, AND MARKED ✱ ARE IN THE CONTAINER PART No.856903.
8. ON MODELS DENOTED CODE "AJ" THERE WILL BE AN ADDITION 47.25Mc. ADJ. CHANNEL SOUND TRAP ON I.F. INPUT COIL L201.
9. NUMERALS SHOWN IN PARENTHESIS (XXXXXX) INDICATE HOFFMAN PART No.

SCHEMATIC DIAGRAM FOR HOFFM


OSC. ADJUST
PICTURE CONTRAST
FINE TUNING
CHANNEL SELECTOR
FIGURE ½
A.C. SOCKET
VERTICAL LINEARITY
VERTICAL SIZE
BRIGHTNESS
AREA SELECTOR

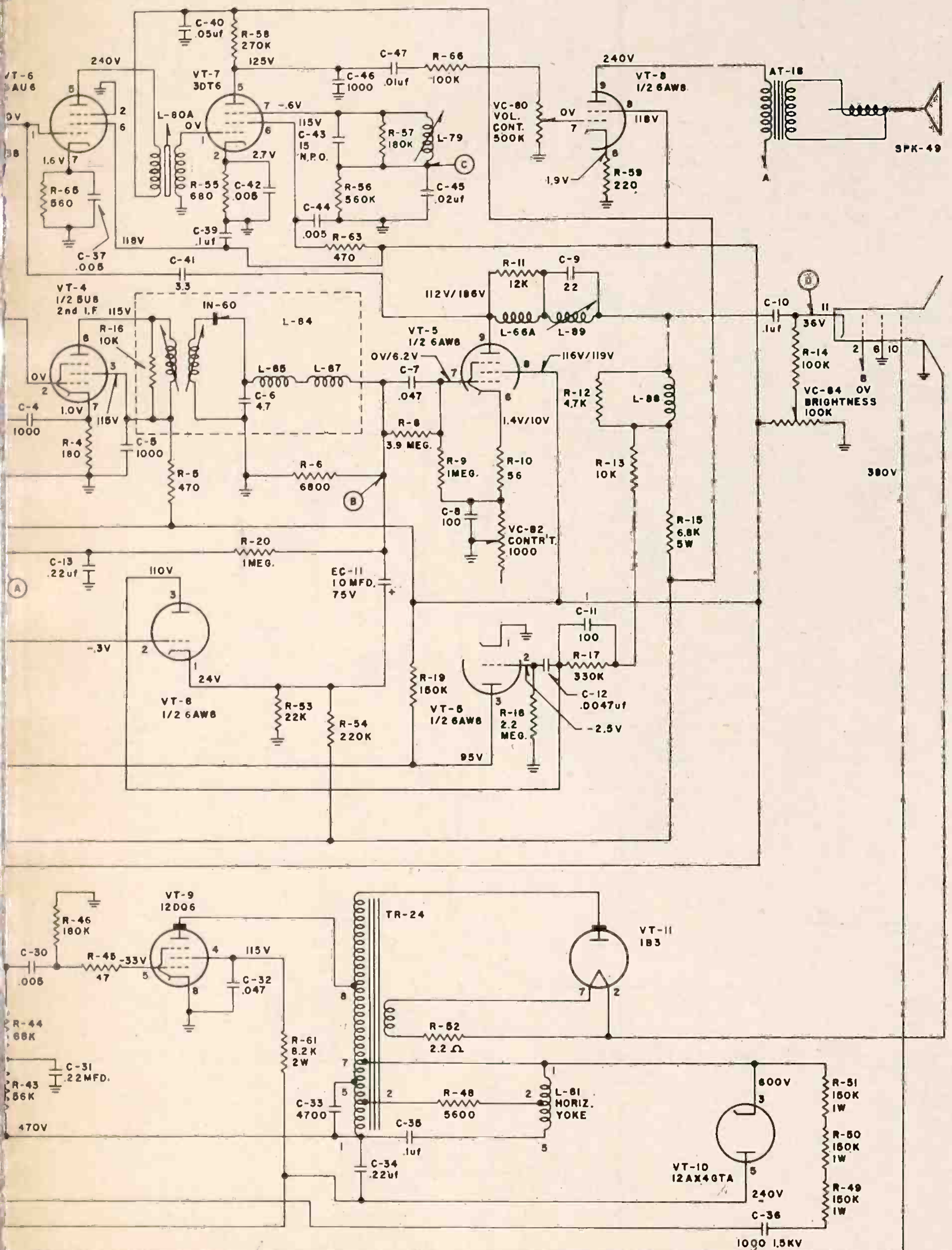

VT-13 3AU6
VT-3 3DT6
VT-4 12L6GT
AT-16
VC-5 1 MEG.
VT-6 6AW8
1/2 VT-12 6AW8
1/2 VT-14 6AW8
CONTRAST CONTROL
VC-74 380K BRIGHTNESS CONTROL
1/2 VT-12 6AW8
1/2 VT-6 6AW8
VT-8 6SN7GTB
VT-9 6SN7GTB
VT-10 25CD6
VT-15 1B3
VT-11 12AX4GTA
TR-20
L-71 DEFLECTION YOKE
HORIZONTAL FREQ. COIL
HORIZONTAL HOLD
PC-100
CC-26
-NOTE-
1- LINE VOLTAGE 117 V.A.C. THROUGH ISOLATION TRANSFORMER.
2- ALL VOLTAGES SHOWN ON SCHEMATIC ARE D.C. READINGS.
3 VOLTAGE READINGS TAKEN WITH ZERO SIGNAL INPUT USING ELECTRONIC VOLTMETER.
4- 6AW8 VIDEO AMPLIFIER VOLTAGES ARE SHOWN AT MAXIMUM & MINIMUM SETTINGS OF CONTRAST CONTROL. ALL OTHER CONTROLS SET FOR NORMAL OPERATION.


L-3
L-4
L-5
L-6
FINE TUNING
C-59
1.0-4.5
C-60
1.0-4.5
C-54
12
VT-1
2BN4
C-61
47
VT-2
5CG8
R-76
6.8K
C-65
68
C-66
68
R-78
10K
C-67
47
R-73
1K
R-75
3.9K
L-8
C-63
28
L-2
R-72
4.7K
C-57
1.5-4.5
C-58
5
R-74
220K
L-7
C-55
30
C-56
1000
C-62
1000
C-63
30
T.P.
R-77
1K
AGC
C-64
68
C-52
120
L-1
TA-29
NEUTRODE TUNER
VT-3
1/2 5AN8
1st I.F.
115V
C-1
1K
L-82
-.3V
.6V
R-1
4.7K
L-86
R-2
47
C-2
1000
C-3
1000
R-3
150
L-90
T-1
R-70
.5 MEG.
C-50
470
300 OHM
ANTENNA
C-51
470
R-71
.5MEG.
R-24
4700
VC-78 VERT. SIZE 2.5MEG.
L-81
VERT.
YOKE
TR-25
430V
C-16
.22MFD.
TR-23
C-15
.1MFD.
R-26
3300
R-25
2700
R-31
680
R-32
680
105V
-25V
C-17
.01
MFD.
PCST
10K
4700
22K
PC-106
R-23
4700
46V
-2V
OV
R-30
2.2MEG.
VT-12
6CM7
R-27
270K
R-29
820
1W
23V
R-22
22K
VT-3
1/2 5AN8
C-19
.22MFD.
EC-56
100MFD.
50V.
VC-85
VERT.
LINEARITY
5K
R-28
820K
VC-81
VERT.
HOLD
1.5 MEG.
R-33
2700
2W
EC-57
10MFD.
300V
R-64
470K
265V
-60V
VT-4
1/2 5U8
L-93
L-92
C-27
.01MFD.
PCST
240V
245V
FC-5
C-26
270
SIL.
MICA
R-42
47K
C-20
1000
R-41
110K
±5%
SR-9
SEL.
RECT.
EC-55
140MFD.
300V
EC-56
100MFD.
300V
R-34
2100
10W
C-25
.022
MFD.
110-120V
60 CYCLE A.C.
FUSE
F-6-1
EC-54
200MFD.
150V.
118V
EC-56
60 MFD.
300V
R-39
10K
R-40
56K
R-38
22K
C-21
.5MFD.
VC-83
HORIZ.
HOLD
50K
SWITCH
ON
VC-80
12AX4
12DQ6
6CM7
3AU6
5AN8
5U8
R-35
27
10W
R-36
27
10W
R-37
27
10W
C-23
1000
SR-10
SEL.
DIODE
C-24
1000
R-62
120K
5CG8
2BN4
17AVP4A
3DT6
6AW8
6AW8
SOUND
OUTPUT
VIDEO
AMP.
C-22
1000
CONTROL
BRACKET
R-60
220K
C-18
.01uf

Television Receiver Chassis 72916

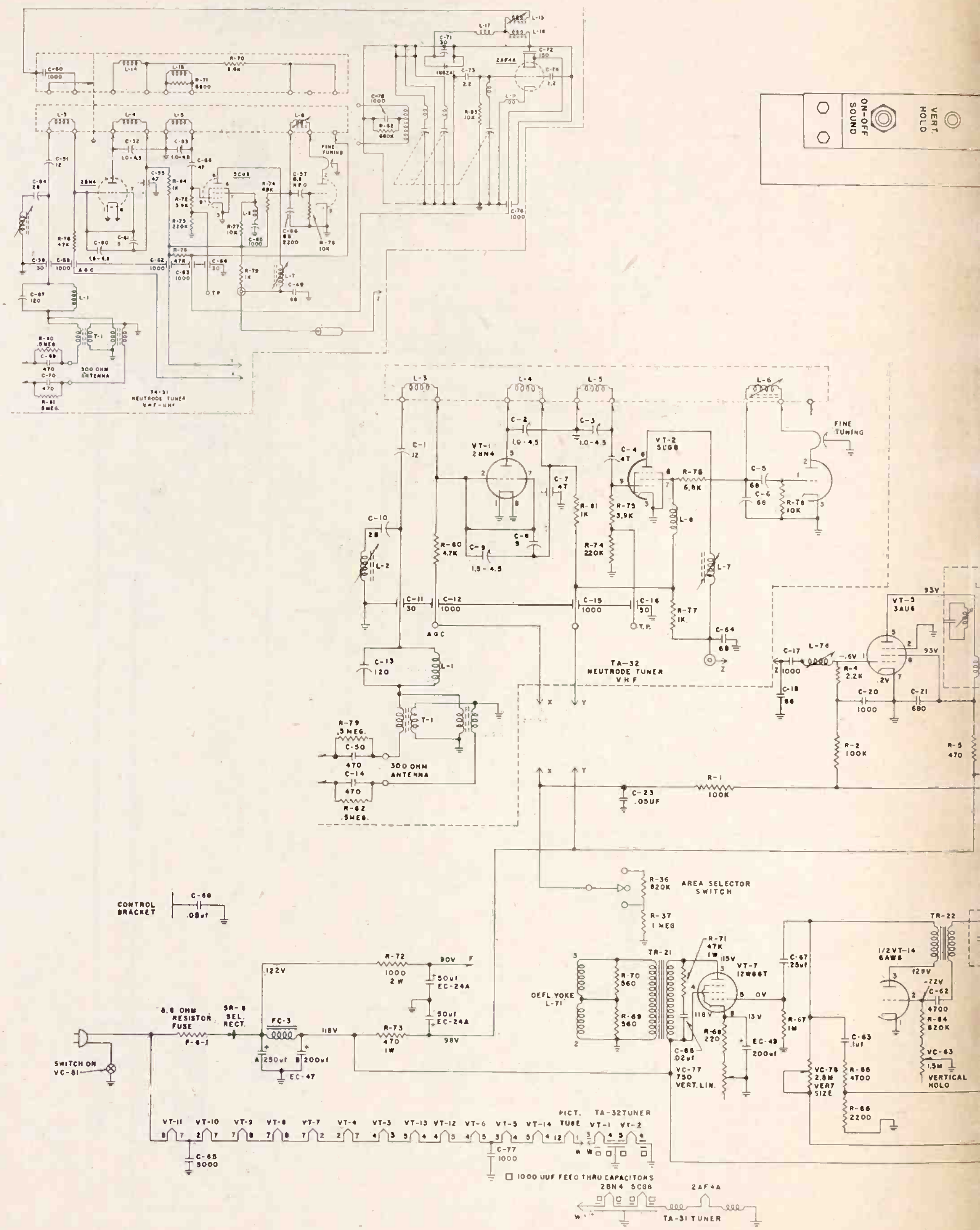
TRAVLER

—NOTE—
1- LINE VOLTAGE 117 V.A.C. THROUGH ISOLATION TRANSFORMER.
2- ALL VOLTAGES SHOWN ON SCHEMATIC ARE D.C. READINGS.
3- VOLTAGE READINGS TAKEN WITH ZERO SIGNAL INPUT USING ELECTRONIC VOLTMETER.
4- 6AW8 VIDEO AMPLIFIER VOLTAGES ARE SHOWN AT MAXIMUM & MINIMUM SETTINGS OF CONTRAST CONTROL. ALL OTHER CONTROLS SET FOR NORMAL OPERATION.

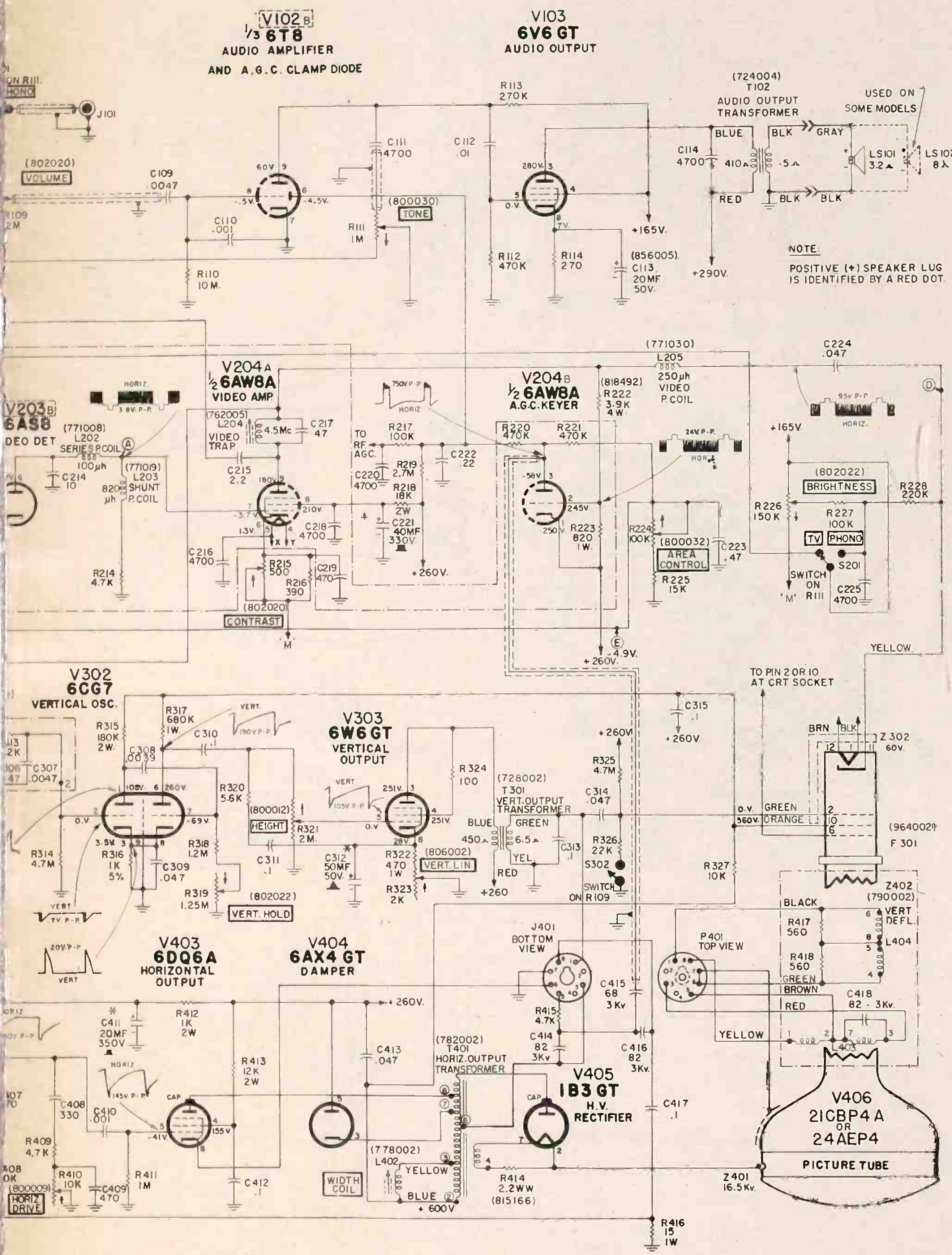


RAV-LER RADIO CORP.
CAGO, ILL. ORLEANS, IND.
CHASSIS NO. 72916

SD-196 A

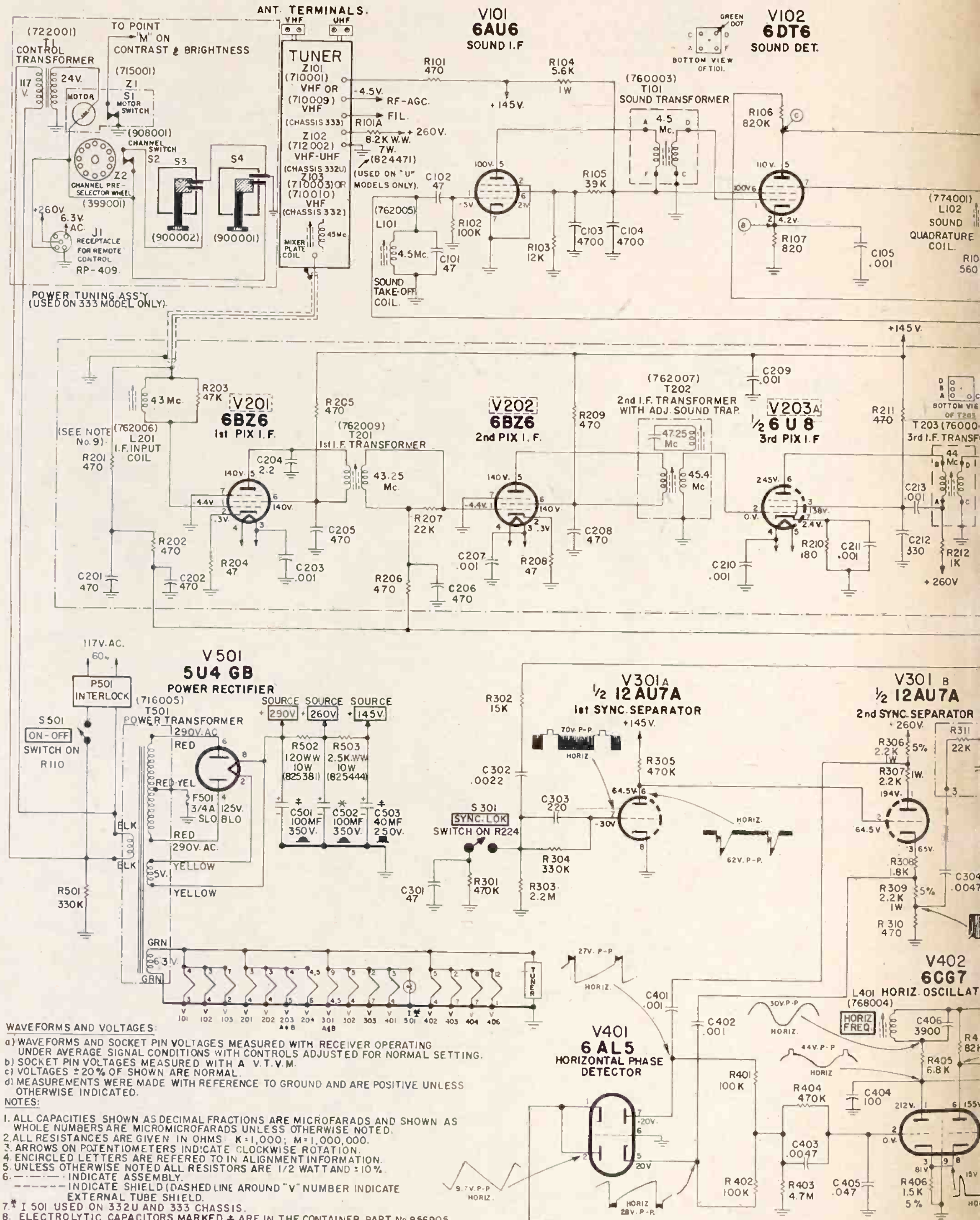

TA-31 NEUTRODE TUNER VHF-UHF
300 OHM ANTENNA
FINE TUNING
ON-OFF SOUND
VERT. HOLD
TA-32 NEUTRODE TUNER VHF
300 OHM ANTENNA
FINE TUNING
AGC
T.P.
AREA SELECTOR SWITCH
CONTROL BRACKET
DEFL YOKE L-71
5.6 OHM RESISTOR FUSE F-6-J
SR-8 SEL. RECT.
SWITCH ON VC-81
VC-77 750 VERT. LIN.
VC-78 2.5M VERT SIZE
VC-63 1.5M VERTICAL HOLD
PICT. TUBE
TA-32 TUNER
1000 UUF FEED THRU CAPACITORS
TA-31 TUNER

HOFFMAN



SUPER MARK 10 CHASSIS 334, 334U

ELECTRONIC SERVICING / *Manufacturer's Schematics*



WAVEFORMS AND VOLTAGES:

a) WAVEFORMS AND SOCKET PIN VOLTAGES MEASURED WITH RECEIVER OPERATING UNDER AVERAGE SIGNAL CONDITIONS WITH CONTROLS ADJUSTED FOR NORMAL SETTING.
b) SOCKET PIN VOLTAGES MEASURED WITH A V.T.V.M.
c) VOLTAGES ± 20% OF SHOWN ARE NORMAL.
d) MEASUREMENTS WERE MADE WITH REFERENCE TO GROUND AND ARE POSITIVE UNLESS OTHERWISE INDICATED.

NOTES:

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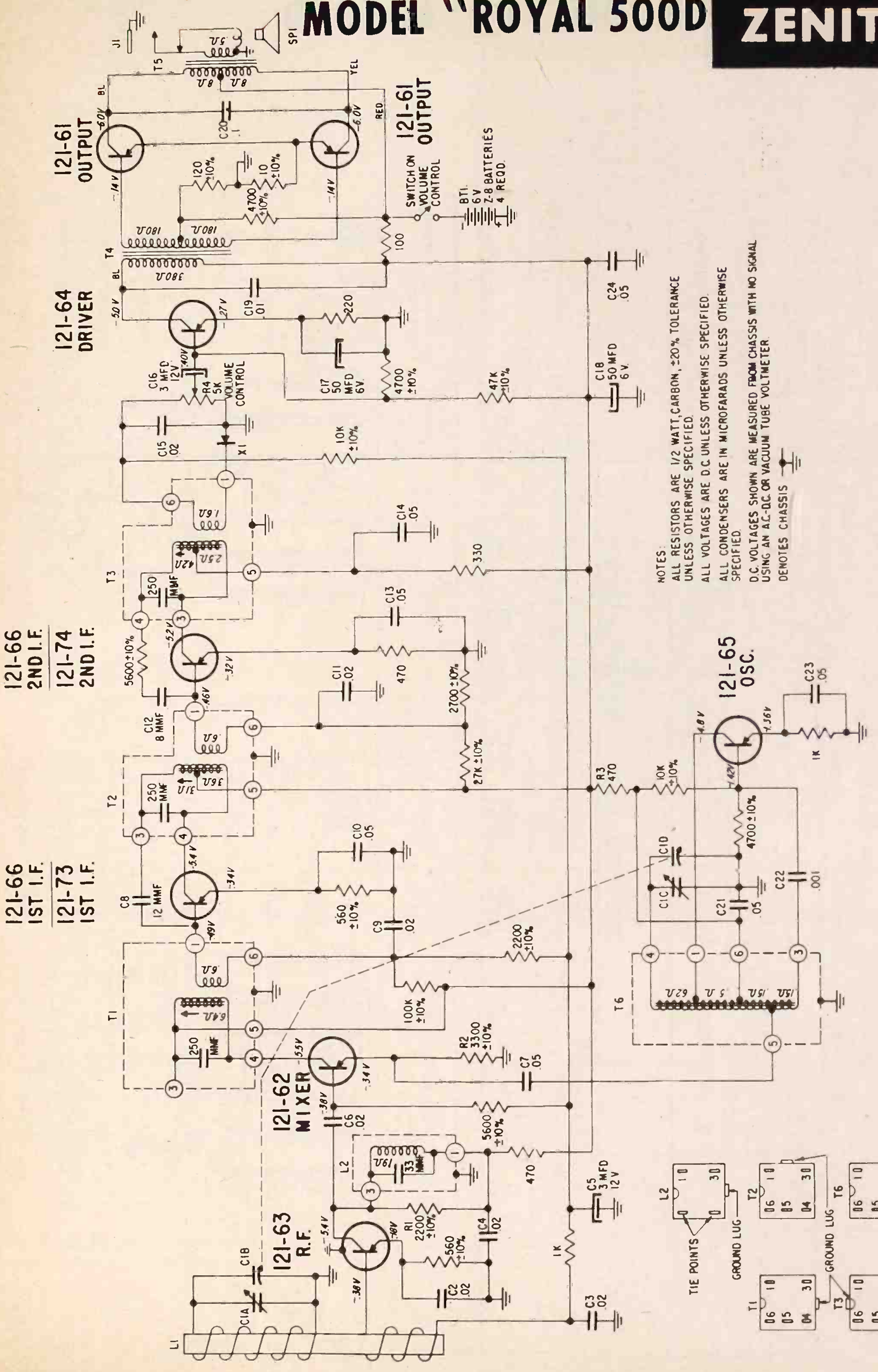
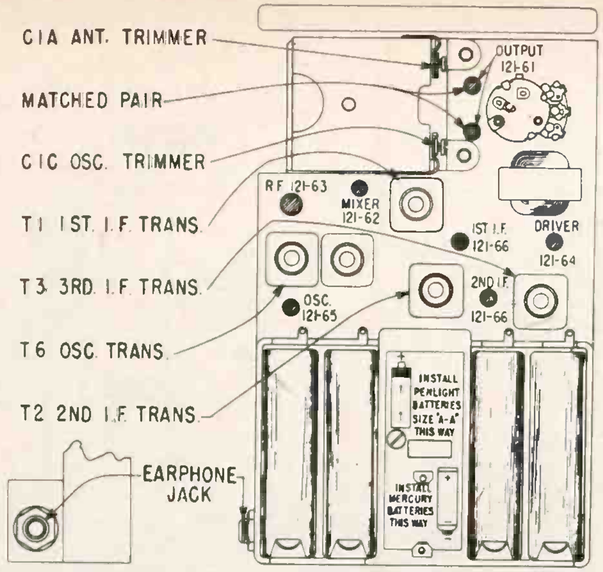
6. —·—·— INDICATE ASSEMBLY.
   ------ INDICATE SHIELD (DASHED LINE AROUND "V" NUMBER INDICATE EXTERNAL TUBE SHIELD.
7. ✱ I 501 USED ON 332U AND 333 CHASSIS.
8. ELECTROLYTIC CAPACITORS MARKED ✝ ARE IN THE CONTAINER PAPT No.856905 AND MARKED ✱ ARE IN THE CONTAINER PART No.856903.
9. ON MODELS DENOTED CODE "AJ" THERE WILL BE AN ADDITION 47.25 Mc. ADJ. CHANNEL SOUND TRAP ON I.F. INPUT COIL L201.
10. NUMERALS SHOWN IN PARENTHESIS (XXXXXX) INDICATE HOFFMAN PART No.

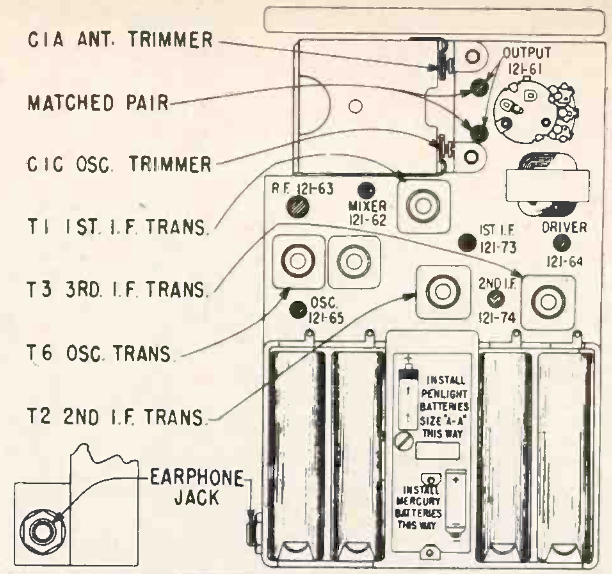
SCHEMATIC DIAGRAM FOR HOFFM

MODEL "ROYAL 500D" ZENITH



ZENITH MODEL "ROYAL 500D





Chassis	Chassis Color Dot	Transistor Layout Label Color	Part No.	R.F.	Mixer	Osc.	1st I.F.	2nd I.F.	Crystal Diode Detector	Driver	Output-Output	Supplier
8AT40Z2	Red	Red 102-3762	Zenith Type	121-63 PNP	121-62 PNP	121-65 PNP	121-73 PNP	121-74 PNP	103-19 IN87G	121-64 PNP	121-61 Matched Pair PNP PNP	R.C.A.
8AT40Z2	Black	Black 102-3488	Zenith Type	121-63 PNP	121-62 PNP	121-65 PNP	121-66 PNP	121-66 PNP	103-19 IN87G	121-64 PNP	121-61 Matched Pair PNP PNP	R.C.A.

ALIGNMENT PROCEDURE

Operation	Input Signal Frequency	Connect Inner Conductor From Oscillator To	Connect Outer Shield Conductor From Oscillator To	Set Dial At	Trimmers	Purpose
1	455 KC	ONE TURN LOOSELY COUPLED TO WAVEMAGNET	Chassis	600 KC	Adj. T1, T2, T3 for maximum output.	For I.F. Alignment
2	1620 KC		—	Gang wide open.	C1C	Set Oscillator to dial scale.
3	535 KC		—	Gang	Adjust slug in T6	Set Oscillator to dial scale.
4	REPEAT STEPS 2 & 3		—	—	—	—
5	1260 KC		—	1260 KC	C1A	Align loop ant.

ELECTRONIC SERVICING COMPLETE MANUFACTURERS SCHEMATICS. An exclusive service of Cowan Publishing Corp.

Mfr: Admiral Chassis No. 14YP3B

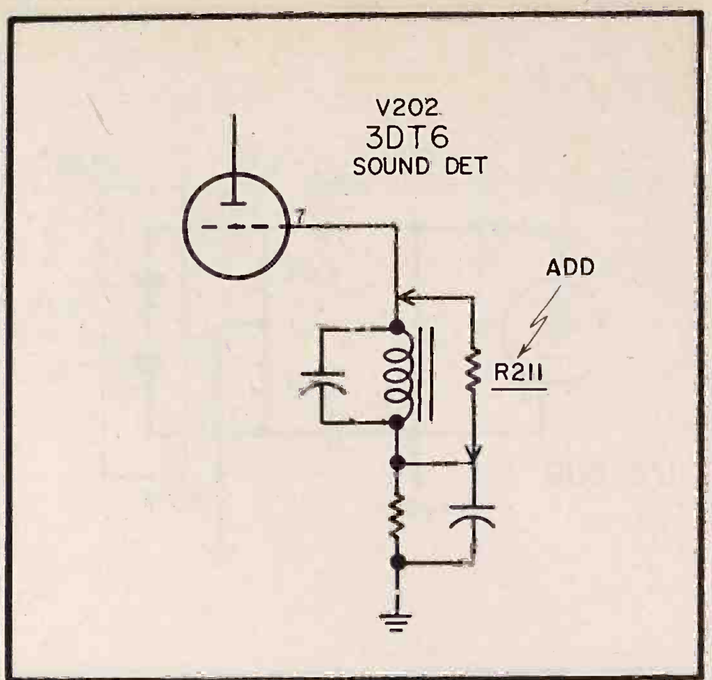
Card No: AD-14YP-1

Section Affected: Sound.

Symptoms: Poor sound on very weak signals.

Reason For Change: To improve sound on weak signals by lowering Q of *L202*.

What To Do: Add *R211*, 100K in parallel with *L202*.



Mfr: Admiral Chassis No. 14YP3B

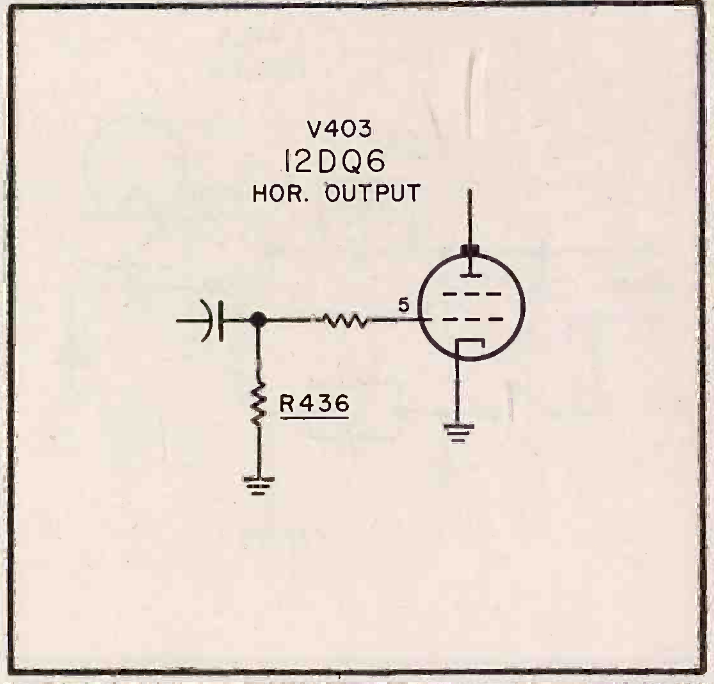
Card No: AD-14YP-2

Section Affected: Raster

Symptoms: Drive lines appearing with different 12DQ6 output tubes.

Reason For Change: To reduce the possibility of drive lines with different output tubes.

What To Do: Reduce *R436* from *470K* to *330K*.



Mfr: Admiral Chassis No. 14YP3B

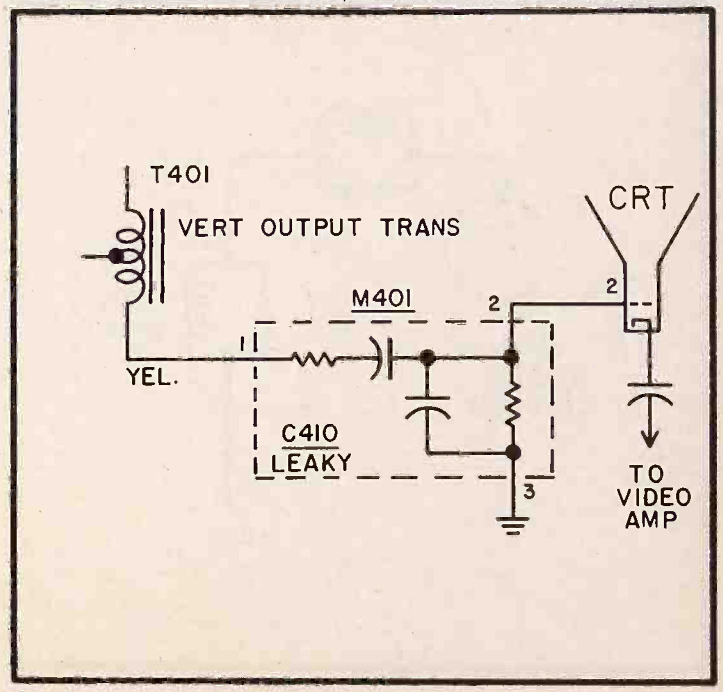
Card No: AD-14YP-3

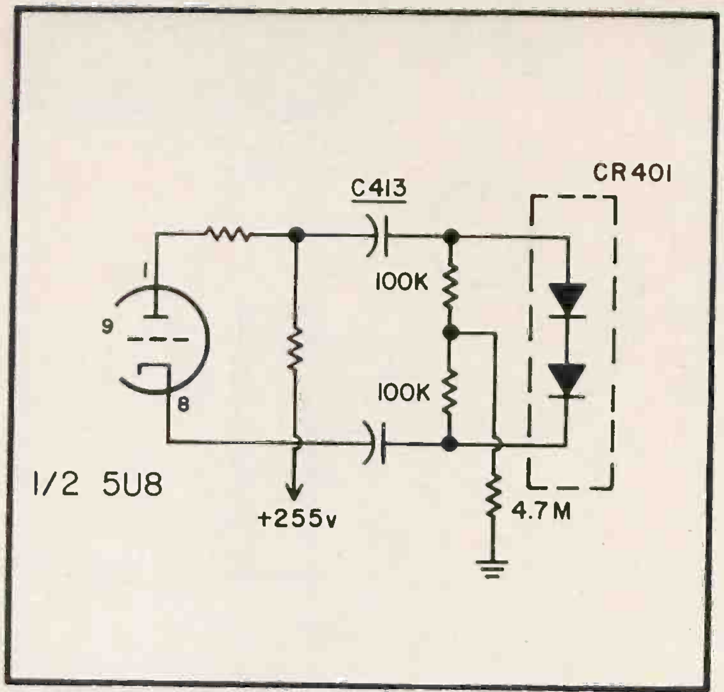
Section Affected: Raster

Symptoms: Excessive brightness. Little or no brightness control action.

Cause: Leakage or short in *C410*, part of printed circuit *M401*.

What To Do: Replace *M401*.





Mfr: Admiral | Chassis No. 14YP3B

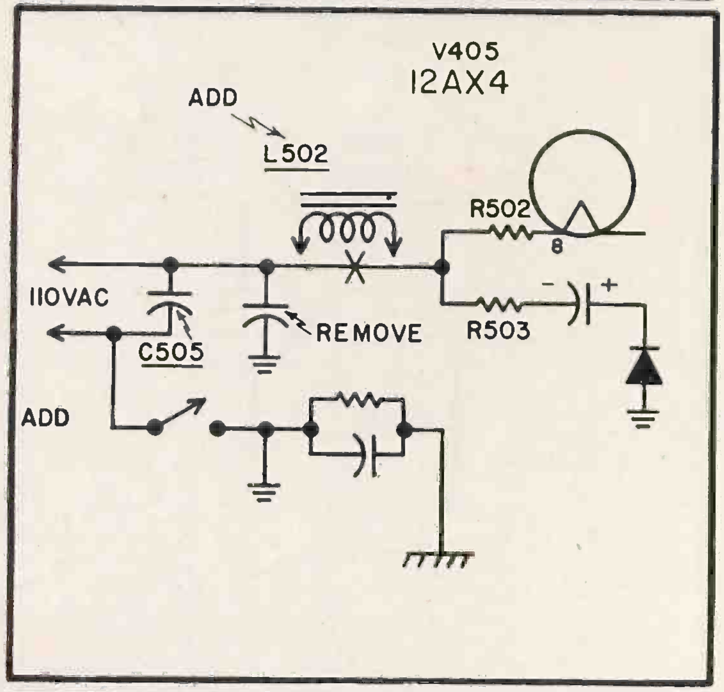
Card No: AD-14YP-4

Section Affected: Raster

Symptoms: No raster.

Cause: Shorted *C413*.

What To Do: Replace *C413, .001 mfd.* It is also possible that the excessive positive voltage applied to the diodes *CR401* may damage them and require their being replaced.



Mfr: Admiral | **Chassis No.** 14YP3B

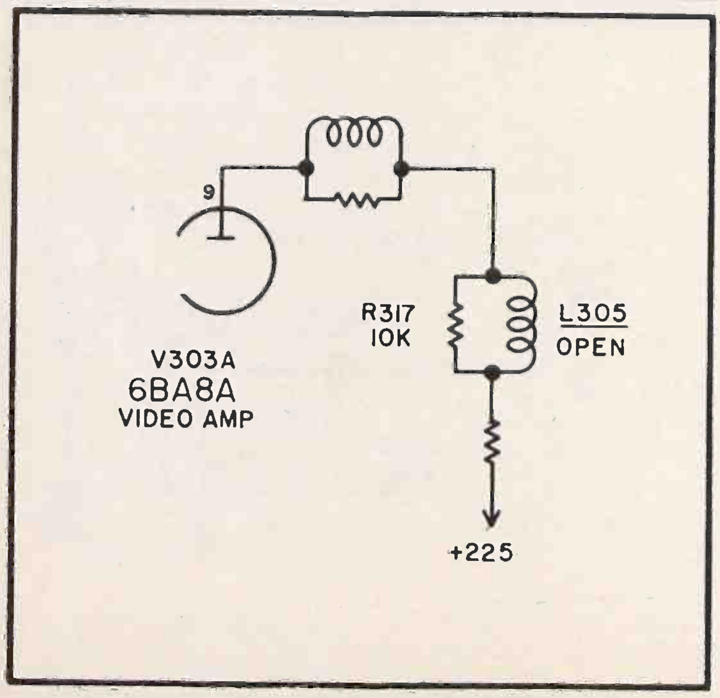
Card No: AD14YP-5

Section Affected: *AC* Line

Symptoms: Horizontal radiation interference through *ac* line.

Reason For Change: To suppress horizontal sweep radiation reducing beat interference on *am* radios.

What To Do: Remove *C501* between *ac* line and ground. Add *C505, .047 1KV,* across the line at the terminals of the *ac* interlock. Insert *rf* choke *L502*, part #73B31-1 between one side of the *ac* line and the junction of resistors *R502* and *R503*.



Mfr: Admiral | **Chassis No.** 14YP3B

Card No: AD-14YP-6

Section Affected: Pix

Symptoms: Excessive contrast, poor pix detail, (focus good).

Cause: Open *L305* causing *R317* to act as part of video amp plate load resistance.

What To Do: Repair or replace *L305* (L305 is is wound on R317).

Mfr: Motorola **Chassis No.** TS423

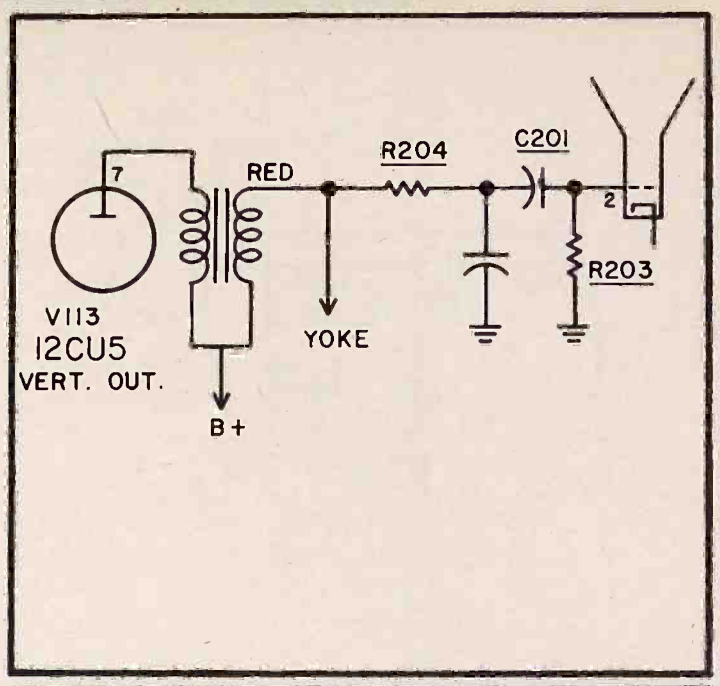
Card No: MO-TS423-1

Section Affected: Raster

Symptoms: Excessive brightness. Brightness control inoperative.

Cause: Leaky or shorted *C201* in vertical blanking circuit.

What To Do: Replace *C201*, .01 *mfd.*, check *R204*, *3.3k* and *R203*, *47K* and replace if they have changed value.



Mfr: Motorola **Chassis No.** TS423

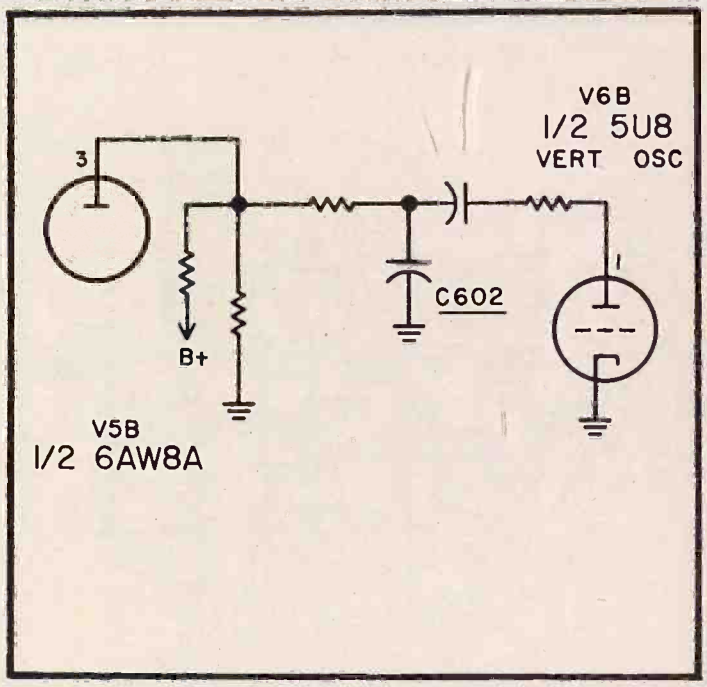
Card No: MO-TS423-2

Section Affected: Sync

Symptoms: No vertical hold.

Cause: Shorted *C602*.

What To Do: Replace *C602*, .001 mfd.



Mfr: Motorola **Chassis No.** TS423

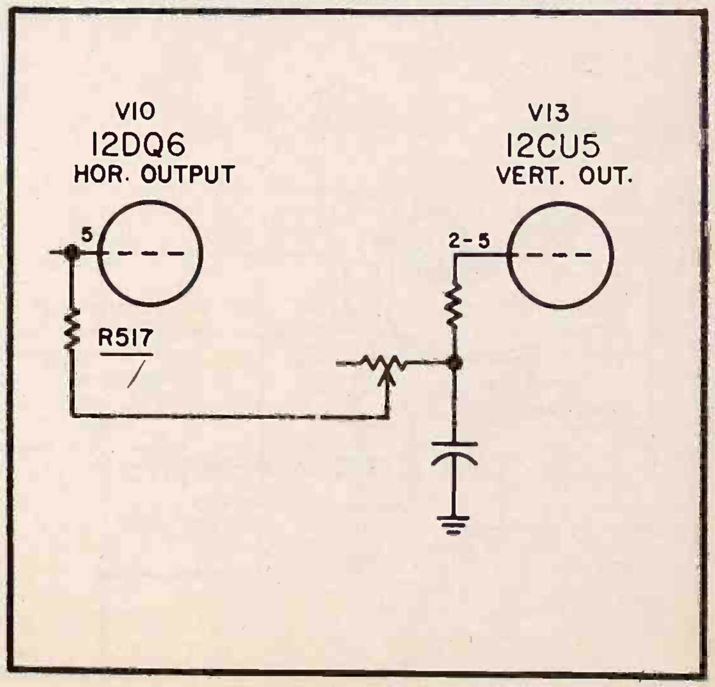
Card No: MO-TS423-3

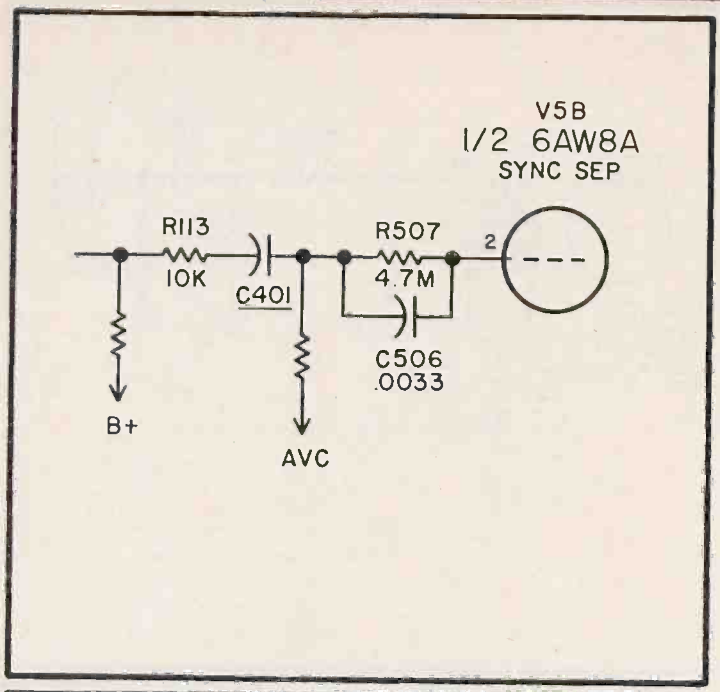
Section Affected: Vertical sweep.

Symptoms: Poor vertical linearity. Linearity control at extreme end.

Reason For Change: To center the vertical linearity action.

What To Do: Change *R517* from *1 meg* to *470K.*





Mfr: Motorola **Chassis No.** TS423

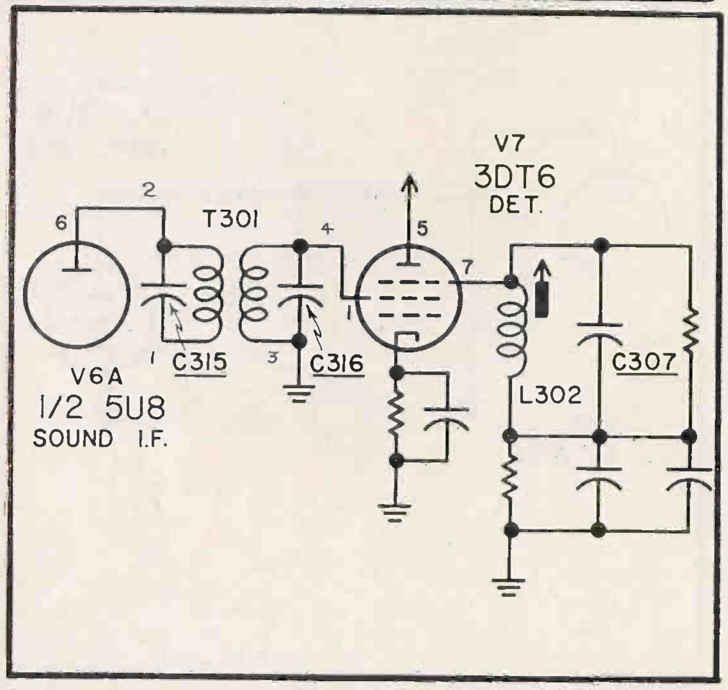
Card No: MO-TS423-4

Section Affected: Pix—Sync. Sound

Symptoms: Video overload and sync instability. Buzz in sound.

Cause: Leaky or shorted *C401*.

What To Do: Replace *C401*, .01 *mfd.*



Mfr: Motorola **Chassis No.** TS423

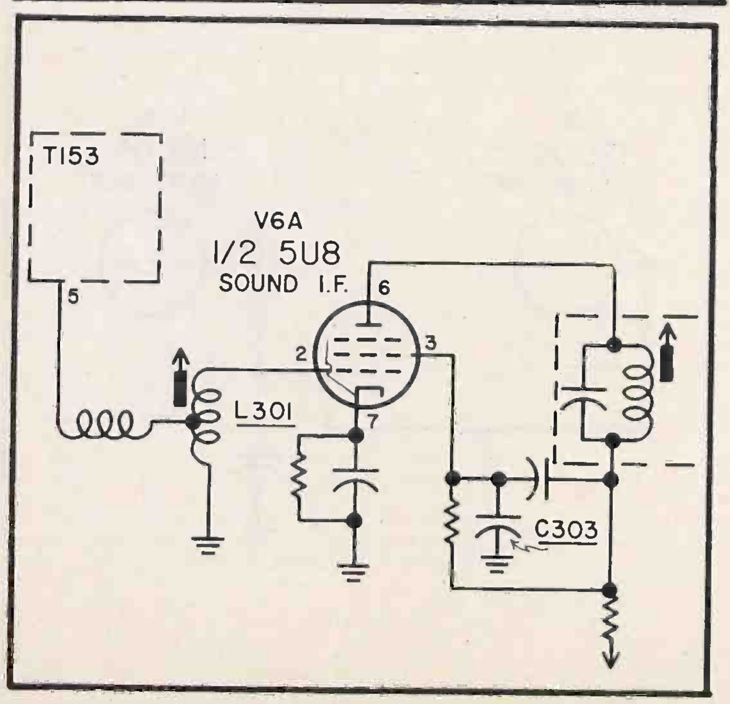
Card No: MO-TS423-5

Section Affected: Sound

Symptoms: Drift. Frequent fine tuning necessary.

Reason For Change: To reduce drift in sound detector circuit.

What To Do: Change *C315* from 4.7 *mmf* to 5.6 *mmf*. Replace *C307*, 18 *mmf* with Motorola part #21K125707 and *C316*, 10 *mmf*, with part #21R121114. These are special condensers chosen for minimum drift.



Mfr: Motorola **Chassis No.** TS423

Card No: MO-TS423-6

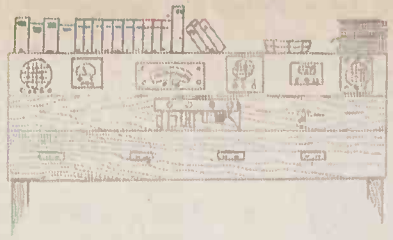
Section Affected: Sound

Symptoms: Insufficient sound volume.

Reason For Change: To increase sound volume.

What To Do: Increase the value of *C303* from .0015 *mfd.* to .0033 *mfd.* Replace L301 (sound take-off coil) with Motorola part #24K746552.

Workbench



By Paul Goldberg

Sylvania 1-508-1 Reduced Raster

The receiver was turned on and it was observed that there was insufficient high voltage and width. About one inch was lacking on each side. The vertical sweep moreover, just managed to fill the screen. Reference to the diagram indicated that the 560 volt positive boost voltage was supplied to the vertical oscillator, 6C4, V116, but was not supplied to V20, 12AU7, the horizontal oscillator and discharge tube. The first check was a voltage measurement at the high voltage fuse where the B+ supply voltage was located. The meter measured correctly at about 330 volts positive. This eliminated the low voltage supply as a possible cause of the trouble. The 1B3 high voltage rectifiers V24 and V25 were replaced individually, because if they have a plate to filament leak they could affect the width, boost and high voltage. The damper, 6V3, V23 and the horizontal output tube 6BQ6, V22 were replaced individually, but had no effect.

A scope was set up and a waveform check was made at the grid of the 6BQ6. The waveform checked correctly with the manufacturers service data. Therefore, the horizontal oscillator was supplying the correct drive.

The boost voltage was next measured at the cathode (cap) of the 6V3, damper. Here, instead of measuring the correct 560 volts positive, the measurement was 450 volts positive. This low boost voltage we assumed was the reason for the insufficient vertical sweep and horizontal width. The screen pin #4 of the 6BQ6, was next measured correctly at about 160 volts.

Because there was not the slightest sign of a trapezoidal effect, which would accuse the yoke, I suspected *T63*, the horizontal output transformer. Before doing anything so rash as replacing it, a voltage leakage check was made of the following condensers in the high voltage section; *C2667A*, *C267B*, *C264*, *C270*, but all showed no leakage. No check was made of *C268* and *C269* across the horizontal linearity coil as the horizontal linearity seemed o.k.

It was noticed at this point after glancing at the diagram, that the bleeder resistor, *R270*, *39K*, could most assuredly cause a trouble of this kind.

[*Continued on page* 28]

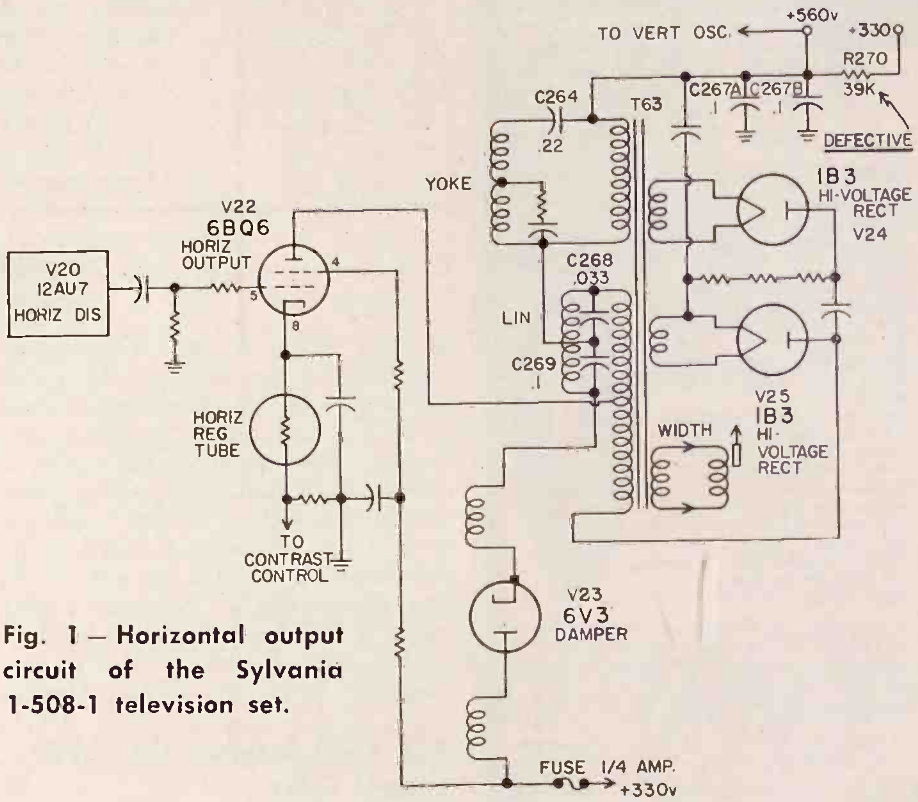


Fig. 1 — Horizontal output circuit of the Sylvania 1-508-1 television set.

ABSORPTION ANALYZER

[*from page* 5]

Audio Amplifier — With gated beam type detector circuits check for sound at the gated beam detector tube. Test for increased audio output at the power output stage. With discriminator type detector circuits test for audio at the triode first audio amplifier. Test for increased output at the power output stage. Distortion may be checked at any of the above test points. To check the speaker, test for the presence of an audio in the leads carrying the signal to the speaker voice coil. ■■

WORKBENCH

[*from page* 27]

Resistor *R270* was then checked and was found to measure *3K*. What was amazing, was that this resistor didn't show any signs of having been overheated. After replacing *R270* with a new *39K, 2* watt, the receiver functioned properly. The boost voltage which was obviously diminished by the defective *R270* is the plate voltage for the 6BQ6, horizontal output tube. If it is lowered due to a defect of this kind, it would cause the insufficient width and high voltage.

RCA Color Receiver 21-CD-8725 Loss of Color

It was noted that the picture was seen in black and white on both color and black and white channels. A defect in practically any of the tubes in the color section of this receiver may cause this problem.

Referring to *Fig. 2,* the first and 2nd bandpass amplifiers, V701B and V702A amplify the chroma. During color reception the burst signal is amplified by V702B, and is processed by the phase detector, killer detector and killer stages in such a way that the 2nd bandpass amplifier, V702A is biased to allow conduction. The color signals therefore can pass through to the circuits which are necessary for color reproduction.

During black and white reception, no burst signal is present, and the stages mentioned above operate in such a way as to drive V702A into cutoff, thus rendering the following color stages inoperative, and producing a black and white picture.

The 3.58 *mc* oscillator and reactance tube V707A-B, feeds an important voltage to the killer detector, and in addition supplies the input for the demodulators. The X and Z demodulators, V703A-B remove the chroma information from the 3.58 *mc* carrier.

Each one of these tubes was replaced individually, but had no effect. A voltage check was next made at pin 1 of the 6U8A color killer tube. The voltage measured about 23 volts negative. This voltage was enough to cut off the 2nd bandpass amplifier, V702A. This indicated that the killer tube was conducting. A voltage check was next made at pin 7 of the 6BN8 killer detector. Here the meter read 8 volts positive. For normal

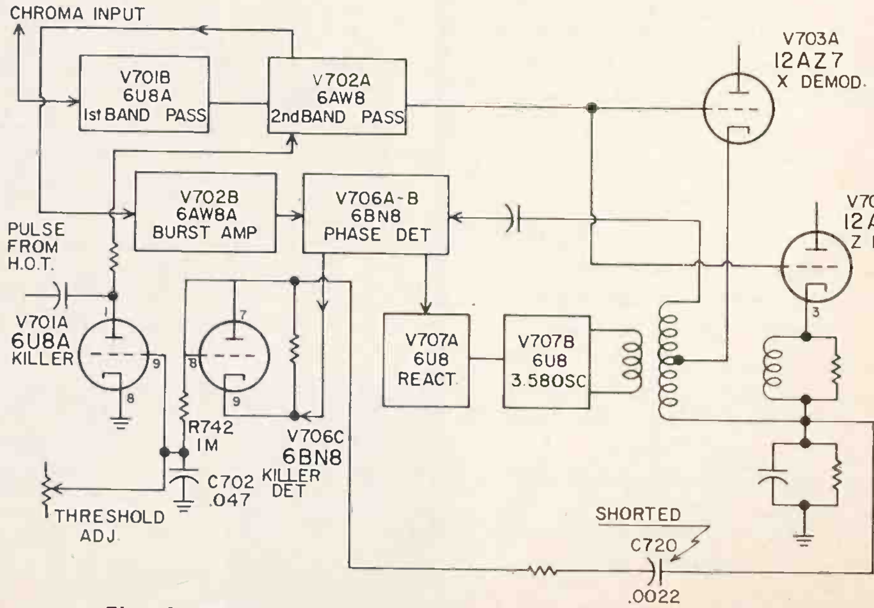


Fig. 2—Diagram of color circuits in the RCA 21CD8725.

TRADE LITERATURE

A new data bulletin, recently published by Sprague Products Company, 71 Marshall St., North Adams, Mass., is entitled "The ABC's of Ceramic Capacitors." Prepared as part of Sprague's continuing educational service program, this bulletin treats in easy-to-understand language all the major ceramic capacitor types—high-k, general application, the three temperature compensating types, multiple, universal, buttonhead, high voltage "doorknob," and printed circuits. The bulletin covers the history of capacitors, the construction of modern capacitors, descriptions of basic terms and many photos, charts and application data.

• • •

A new pocket-size folder, "TV Service Safety Hints," just printed by P. R. Mallory & Co. Inc. is designed for use by television service engineers to give customers a better understanding of the job that the service profession is doing. Based on the series of cartoon advertisements which Mallory has been using for several years in TV Guide, this folder tells television set owners "don't do it yourself—call on us!" It dramatizes the dangers and pitfalls of amateur "doctoring" of television ailments, in humorous and informative style.

The folder is an effective and inexpensive promotional piece which the service technician can mail to his customers, leave at neighboring homes after completing a service call, or present when delivering a new set. Space is provided for imprinting of the individual dealer's name. Service dealers and associations can obtain quantities of these folders at $1.00 per 100 from their nearest Mallory distributor, or by writing to Distributor Division, P. R. Mallory & Co. Inc., Indianapolis 6, Indiana.

• • •

The Chicago Standard Transformer Corporation, 3501 West Addison St., Chicago 18, Illinois, has published a handy wall chart, listing Stancor exact replacement flybacks and yokes, by original manufacturers part numbers. The chart, printed on index cardboard, lists each TV set manufacturer alphabetically. All units for

[Continued from page 30]

WORKBENCH

[*from page* 28]

color operation this voltage should be about 1 volt negative. This was the clue. A voltage from the output circuit of the 3.58 *mc* oscillator, V707B, is sent back through capacitor *C720* to the plate of the killer detector. When the negative burst is fed to the killer detector cathode, and the feedback voltage goes positive at the plate, current flows causing *C702* to charge up negatively and cut off the killer tube, V701A. Since the voltage at the plate of the killer detector read 8 volts positive instead of about 1 volt negative, *C720* was clipped open and voltage leakage checked. It was found to have a dead short. Capacitor *C720* was replaced with a new .0222 *mf* and the color picture now came in properly. The threshold adjustment was made, and then checked for operation on a color channel. With *C270* shorted, the positive 8 volt from the demodulator athode was now directly fed to the plate of the killer detector through the 1 meg resistor *R742* to the grid of the killer tube. The positive 8 volts on the killer caused it to conduct heavily cutting off the 2nd chroma bandpass amplifier, thus killing the color. ■■

oped leakage, placing a positive voltage on the picture tube grid. If you remove condenser *C115* from the circuit the brightness control will probably function normally but retrace lines will be evident.

The following letter is another example of the type of problem that can result from a failure in the vertical retrace circuitry.

Dear Sir:

I have a receiver in which I haven't been able to obtain a raster or picture even though there is sufficient high voltage, I believe. I don't have a high voltage meter so that I can't be certain on this point but I can draw a high voltage arc that appears about normal. I have changed and checked those components I suspected might be the cause of the trouble. I have even replaced the picture tube thinking the electron gun was defective but the tube was good as I found out by using it with another TV receiver. The voltages are normal at either side of the brightness control and at the variable arm.

The receiver is the Motorola TS-533 chassis.

H. T.
Boston, Mass.

The above problem is probably another condition where a component in the vertical retrace circuitry failed and caused an opposite condition to the case previously given. An interesting point about these two cases is that it

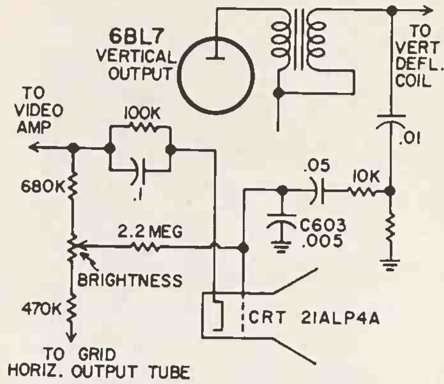


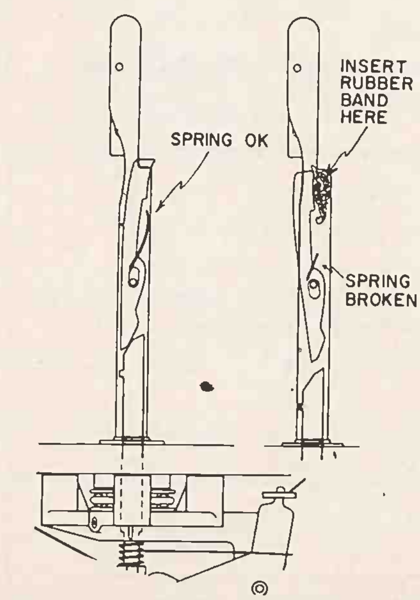
Fig. 5—Retrace blanking with a positive control grid voltage.

was a condenser that failed in both instances. Here, condenser *C603* (*Fig. 5*) has undoubtedly shorted bringing the grid down to ground potential. The positive voltage applied to the grid cancelled some of the positive voltage applied to the cathode. When *C603* shorts it causes the picture tube to be biased beyond cutoff so that it would not be possible to obtain a raster or picture. ■■

Advertiser's Index

Shop Hints and Short Cuts

We would welcome hints and short cuts from our readers. ES will pay $5 for each hint used. Sorry, but we cannot be responsible for unaccepted material. In case of duplication, first received will be accepted.



When the ejector spring in the spindle post snaps, a piece of rubber band stuffed in the opening of the spindle (as shown above) will serve as well. We have done it many times and never had a call back.

R. M.
Fairlawn, N.J.

A few transistor portables which we've had in the shop squealed and motorboated quite badly. Immediately the filter and decoupling capacitors were suspected, but they all proved to be OK. The trouble was finally traced to dirty battery contacts. We cleaned them and applied a very thin coat of solder and the sets played like new again. (Be careful not to apply too much heat otherwise the temper will be taken out of the contacts.) Many manufacturers are now cad plating the battery contacts so as to avoid this difficulty.

R. G.
Houston, Texas

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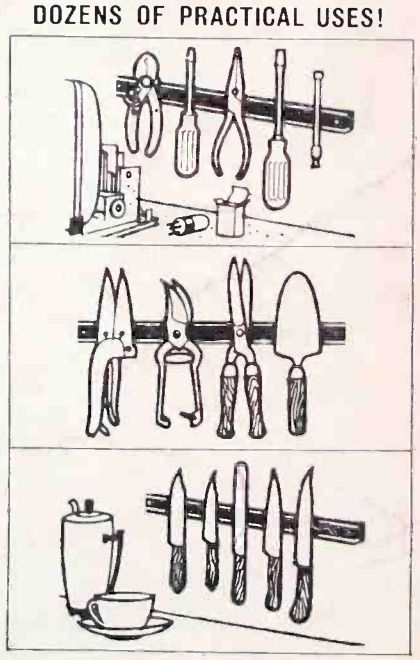

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