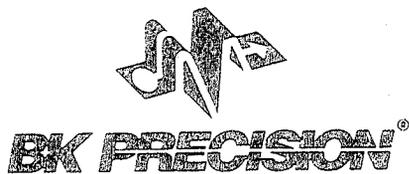
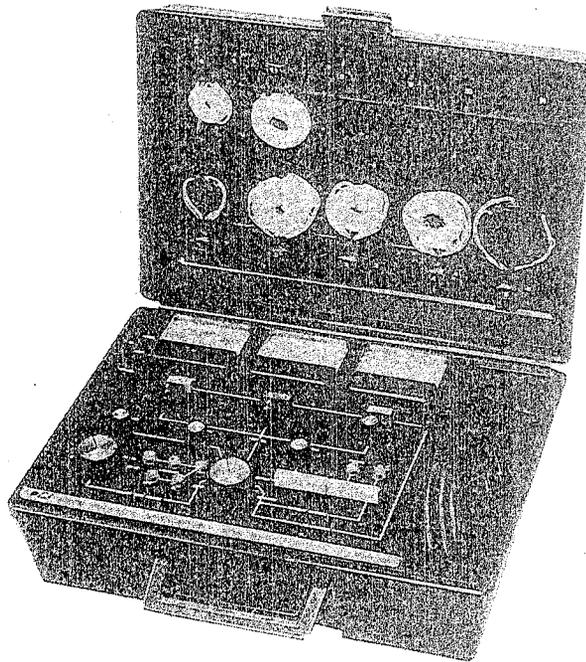


SERVICE MANUAL



Model 467

# CATHODE RAY TUBE RESTORER/ANALYZER



Maxtec International Corp. 6470 West Cortland Street Chicago, Illinois 60635

## DESCRIPTION

The Model 467 CRT Restorer/Analyzer has been designed to evaluate all Black and White and Color television picture tubes with a high degree of accuracy by using just one simple test.

This tester utilizes solid-state digital multiplexing circuits which will test the three guns in rapid fire sequence for emission, tracking, leakage, focus, and

life tests. The tester also provides improved rejuvenation circuits which can remove shorts, clean and balance the guns, and restore the emission capabilities of the cathode for each gun independently.

Adapters are provided to directly test all common TV picture tubes. Refer to the Set-Up Chart for the correct adapter number and test voltage to use.

## SPECIFICATIONS

Tests Performed	Emission	Test Voltages	
	Leakage	Heater	0-7 @ 2.0 Amps
Restore Functions	Tracking (Color Tubes)	G1 Bias	7-14 @ 600 Milliamps
	Life	G2 Supply	Neg. (-) 30 to Neg. (-) 100 Volts DC
	Focus Continuity		Normal, 0-350 Volts DC
	Short Removal		High, 180-530 Volts DC
Meters	Gun Cleaning and Balancing	Power Requirements	117 Volts AC, 60 Hz, 40 Watts
	Cathode Rejuvenation	Fuses (Internal)	
Meter Indications	Three, 2-1/2", D'Arsonval Movement	Heater Supply	3/10 Amp, 3AG Slo-Blo
	Emission	High Voltage Supply	3/8 Amp, 3AG Slo-Blo
	Restoring Current	Size	13-1/2" x 10" x 5-3/4"
	Heater Voltage	Weight	10 lbs
	G1 Bias Voltage		
Power Line Voltage			

## DISASSEMBLY INSTRUCTIONS

## To Remove from Case

1. Remove four screws holding rubber feet from bottom of case.
2. Remove one screw and washer from front of case (below lid catch).
3. Lift chassis upward and remove from case.

## To Remove Printed Circuit Board Assembly

1. Remove all knobs from front panel.
2. Remove retaining nuts and washers from the Red G2 and Blue G2 controls, and the Function switch.
3. Remove one screw from right front side of front panel cover.

4. Partially remove the front panel cover and disconnect wires from each meter.
5. Remove neon bulbs N1 thru N8 from lens caps.
6. Remove front panel cover.
7. Remove two screws holding line cord and output cable assembly bracket to chassis.
8. Remove four screws holding printed board to chassis.
9. Partially remove printed board from chassis far enough to remove cable connectors A and B from printed board.
10. Remove printed board assembly from chassis.

## REASSEMBLY

1. Place front panel cover in front of chassis in its proper position.
2. Position printed board assembly against bottom of chassis and connect meter leads to their respective meter. Make sure positive (+) lead and negative (-) are connected properly to the meter.

Refer to schematic (Fig. 3) and printed board layout (Fig. 2) to determine correct lead identification.

3. Position front panel cover onto chassis and replace retaining nuts and washers on Red G2 and Blue G2 controls and tighten.

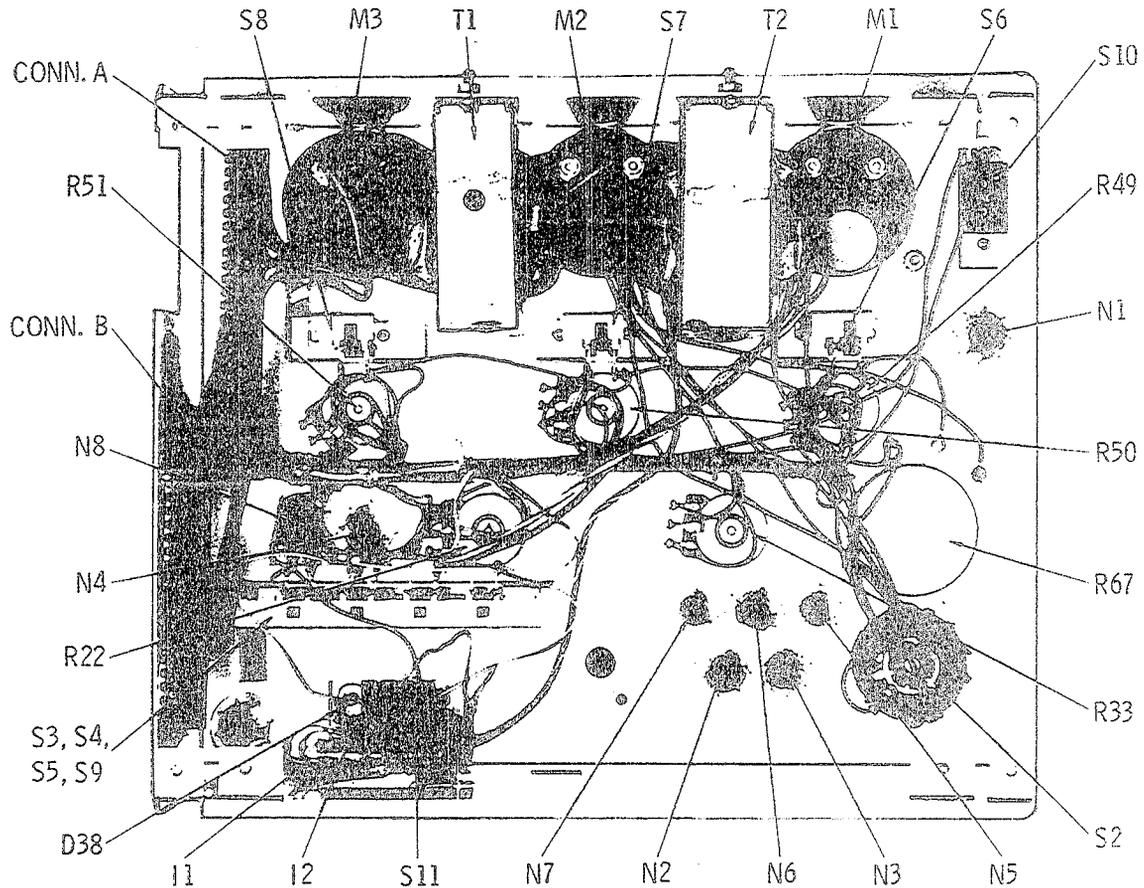


Fig. 1. Rear View of Front Panel - Parts Location.

4. Replace screw on front right side of chassis.
5. Insert neon bulbs N1 thru N8 into their proper lens cap. Refer to the schematic (Fig. 3) and printed board layout (Fig. 2) to determine correct placement of bulbs.
6. Replace connectors A and B onto printed board.
7. Place printed board onto chassis and replace retaining nut and washer on Function switch and tighten.
8. Replace two screws holding line cord and output cable to chassis.
9. Replace four screws holding printed board to chassis.
10. Replace all knobs on front panel controls.
11. Lower chassis into case and replace screw and washer on front of case and four screws and rubber feet on bottom of case.

## CALIBRATION ADJUSTMENTS

### Heater Voltage

1. Connect Adapter No. 3 to output cable.
2. Connect an AC voltmeter to pins 1 and 14 of adapter.
3. Set voltmeter to the 10-volt range.
4. Connect AC line cord of tester into 117 VAC outlet and set Function control to the SET-UP position.
5. Set HTR Range switch to the 4-7 volt position.

6. Adjust HTR control to read exactly 6.3 volts on external AC voltmeter.
7. Adjust HTR Cal control (R16) on printed board (see Fig. 2 for location) so that HTR voltmeter on tester (Red/B&W) indicates exactly 6.3 volts.

### Tracking Range

1. Connect Adapter No. 3 to output cable.
2. Connect a 100K, 1/2 Watt resistor between pins 2 and 13 of adapter.

3. Turn all three G2 controls and Tracking control fully counterclockwise.
4. Set G2 switch to NORMAL position.
5. Connect AC cord of tester into 117 VAC outlet and set Function switch to SET-UP position until unit warms up.
6. Set Function switch to TEST position.
7. Adjust Red/B&W G2 control so that Red/B&W meter reads full scale.
8. Push tracking button and adjust Min Pulse Cal control (R23) on printed board (see Fig. 2 for location) for minimum reading.

## TROUBLESHOOTING

All troubleshooting procedures such as voltage measurements, waveform analysis, and adjustments can be made from the bottom side of the printed circuit board. See Fig. 2 for location of voltage and

waveform test points and the schematic in Fig. 3 for correct voltages and waveforms. Disassembly of the printed board will only be necessary if a component needs replacing.

## TROUBLESHOOTING CHART

Symptom	Check
Set inoperative. Power light does not come on.	<ol style="list-style-type: none"> <li>1. Fuse F1.</li> <li>2. Function switch S1.</li> </ol>
Power light comes on. Blue G2 meter does not indicate line voltage.	<ol style="list-style-type: none"> <li>1. Meter M3.</li> <li>2. Function switch S1.</li> <li>3. Rectifier D16.</li> <li>4. Resistor R20.</li> </ol>
Heater circuit inoperative on all positions. HTR Set control does not function.	<ol style="list-style-type: none"> <li>1. Fuse F2.</li> <li>2. Function switch S1.</li> <li>3. HTR Range switch S2.</li> <li>4. Secondary voltages of transformer T2.</li> <li>5. HTR Cal control R16.</li> <li>6. Rejuvenate switches S6B, S7B, and S8B.</li> <li>7. Cable connector A.</li> </ol>
CRT heater lights. Meter does not indicate voltage.	<ol style="list-style-type: none"> <li>1. Meter M1.</li> <li>2. HTR Cal control R16.</li> <li>3. Diode D30.</li> <li>4. Resistors R17, R18, and R69.</li> </ol>
No G1 control voltage.	<ol style="list-style-type: none"> <li>1. Meter M2.</li> <li>2. G1 control R33.</li> <li>3. Rectifier D18.</li> <li>4. Transformer T1.</li> <li>5. Capacitor C20.</li> <li>6. Resistors R32 and R35.</li> </ol>
One G2 control fails to adjust properly.	<ol style="list-style-type: none"> <li>1. Collectors of Q2, Q3, and Q4 with scope for typical square wave. A straight line indicates a bad transistor.</li> <li>2. G2 controls R49, R50, and R51.</li> <li>3. Transistors Q5, Q6, Q7.</li> <li>4. Multiplex generator voltages and waveforms.</li> <li>5. IC1A, IC1B, IC2C, and IC2D.</li> </ol>
All G2 controls fail to adjust properly.	<ol style="list-style-type: none"> <li>1. 12BH7A tube V1.</li> <li>2. Transistor Q1.</li> <li>3. Rectifiers D1 thru D4.</li> <li>4. Transformer T1.</li> <li>5. Capacitors C11 and C12.</li> <li>6. Resistors R41 and R43.</li> <li>7. Multiplex generator waveforms.</li> <li>8. IC1A, IC1B, IC2C, and IC2D.</li> </ol>

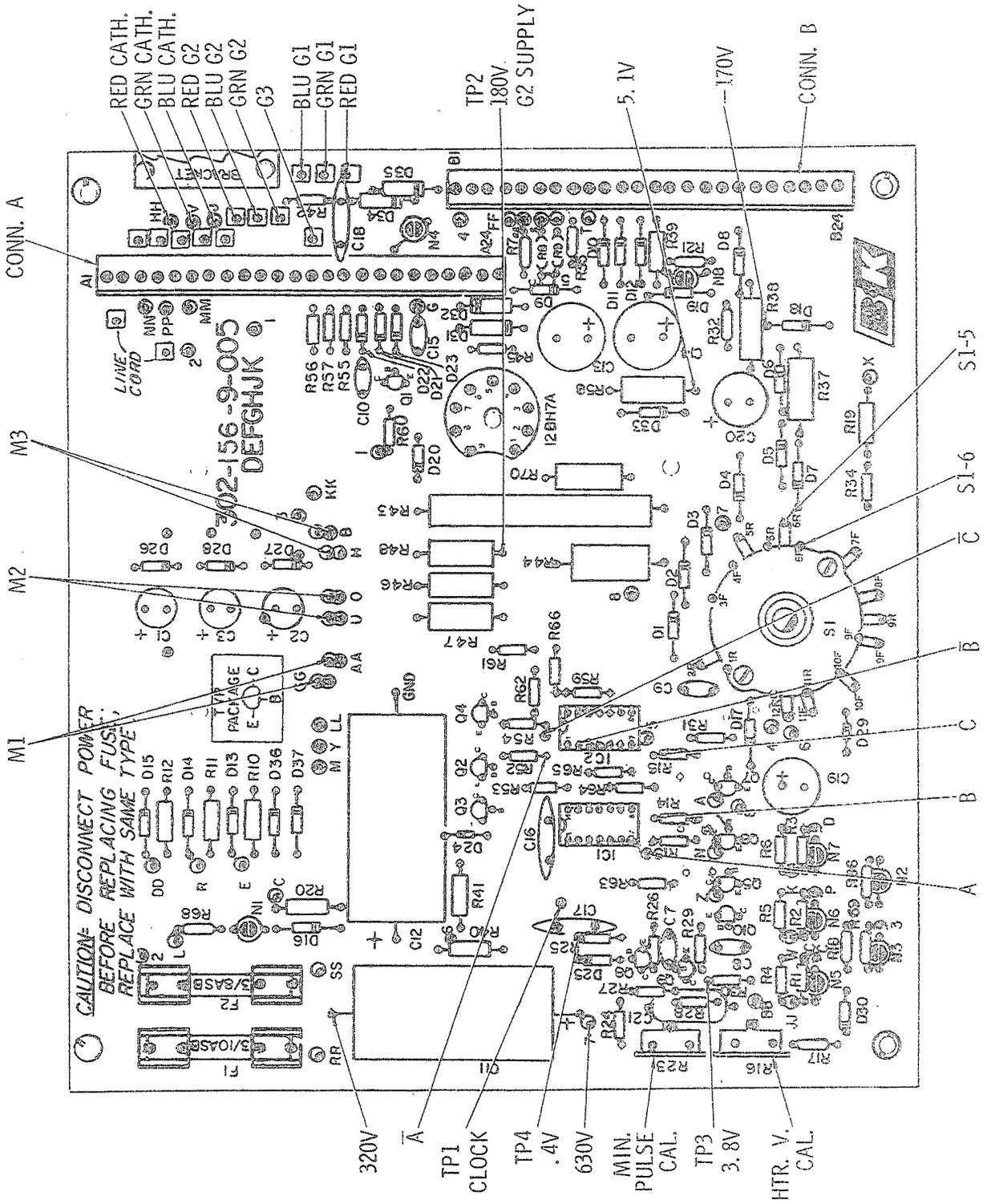


Fig. 2. Printed Circuit Board Layout - Component Side.

Symptom	Check
No indication of leakage.	<ol style="list-style-type: none"> <li>170 volt power supply voltages.</li> <li>Transistors Q5, Q6, and Q7.</li> <li>Neon lamps N5, N6, and N7.</li> <li>Multiplex generator waveforms.</li> <li>IC1A, IC1B, IC2C, IC2D.</li> </ol>
One meter moves upscale when other two G2 controls are turned up. Function switch in CUT-OFF position.	<ol style="list-style-type: none"> <li>Transistors Q5, Q6, or Q7 (the one switching that meter).</li> </ol>
One meter reads noticeably higher than other two. Function switch in CUT-OFF position.	<ol style="list-style-type: none"> <li>Transistors Q5, Q6, or Q7 (the one switching that meter).</li> </ol>
One meter falls noticeably lower than other two in Tracking test.	<ol style="list-style-type: none"> <li>Transistors Q5, Q6, or Q7 (the one switching that meter).</li> </ol>
Tracking control works, but in reverse direction and/or not with full range.	<ol style="list-style-type: none"> <li>Transistor Q10.</li> <li>Tracking Range adjustment (R23).</li> </ol>
Tracking circuit inoperative.	<ol style="list-style-type: none"> <li>Transistor Q8, Q9, or Q10.</li> <li>Voltages and components in clock circuit.</li> <li>IC2A and IC2B.</li> <li>Tracking control R22.</li> <li>Min Pulse Cal control R23.</li> </ol>
Restore Functions inoperative.	<ol style="list-style-type: none"> <li>270 volt power supply voltages</li> <li>Ballast tubes I1 and I2.</li> <li>Rectifiers D5, D6, and D7.</li> <li>Rejuvenate switches S6A, S7A, and S8A.</li> <li>Remove Short switch S4A and S4B.</li> </ol>