

SECTION 5

MAINTENANCE & SERVICE

5-1. GENERAL

5-2. This section provides instructions, procedures, and information necessary to maintain, troubleshoot, and repair the EIP Autohet Microwave Counter.

5-3. FUSE REPLACEMENT

5-4. The counter uses one fuse, located on the rear panel. For proper operation, use only the fuse specified below; do not increase fuse rating or change fuse type. Set 115/230 slide switch on rear panel to match nominal power line voltage.

For 115 VAC operation: use a 1.5A, Slow-Blow, 3AB/MDX type fuse.

For 230 VAC operation: use a 0.75A, Slow-Blow, 3AB/MDL type fuse.

5-5. AIR CIRCULATION

5-6. During operation of the counter, the internal fan draws in cooling air through the vents in the enclosure. If these vents are blocked, the temperature inside the enclosure may rise to the point where counter stability is reduced, and component life shortened.

5-7. COUNTER SERVICING

5-8. Recommended Service Procedures:

a. To remove plug-in PC Boards: Ease board out of socket by lifting up on board handles. Remove carefully to avoid placing strain on any connecting cables.

b. To unplug flat ribbon cables: Turn off power to counter. Use an IC Extractor Tool (EIP Part 5000094 or equivalent) to unplug connector.

c. To remove PCB socket locating key: Key must be turned 90° before removal from or re-installation into socket, to avoid contact damage. Use long-nose pliers for removal or insertion.

d. A Troubleshooting Kit (EIP Part 2000005) is available to facilitate adjustments and repairs of the counter. Contents include PCB Extender Cards, IC Removal Tool, Summing Amplifier, adapter cables and connectors.

e. Internal cable and harness routing is shown both on a label attached to the top cover of the counter, and in Figure 9-2.

f. Circuit descriptions of PC Board and modular assemblies are shown on the same pages as the related schematic diagram and component locator in Section 9.

g. Troubleshooting Trees shown later in this section are intended only as a guide, and do not describe every possible failure situation. To speed troubleshooting of a board: replace the board with a known good one.

h. A listing of recommended test equipment for servicing, calibration, and performance testing, is given in Table 5-1. Other equipment may be used provided performance equals or exceeds that listed.

i. A Schematic Diagram of a Summing Amplifier used in certain counter tests, is shown in Figure 5-1. This unit may be constructed by the user, or may be purchased directly from EIP (Part Number 2010050).

5-9. Servicing Precautions

a. The Video Amplifier (A204) and the Source/Amplifier (A201) should be replaced rather than being serviced in the field, due to the specialized test equipment and procedures required for recalibration.

b. If Converter Control 2 (A202) is repaired either at EIP or in the field, recalibration in its associated counter will be required for proper counter operation.

CAUTION

DO NOT ATTEMPT REPAIR OR DISASSEMBLY OF THE FOLLOWING COMPONENTS: YIG/COMB GENERATOR (A207), MIXER (A205), INPUT ATTENUATOR (A206), OR TIME BASE OSCILLATOR (TCXO OR OVEN OPTION).

5-10. FACTORY SERVICE

5-11. If the counter is to be returned to EIP for service or repair, BE SURE TO INCLUDE THE FOLLOWING INFORMATION WITH THE SHIPMENT: *

- Name and address of owner.
- Model and complete serial number of counter.
- A COMPLETE description of trouble (e.g. under

EQUIPMENT DESCRIPTION	MFR.	MODEL	Section 5 - Service		
			Section 6 - Calibration		Section 7 - Performance
Signal Source:					
(1) 20 Hz - 10 MHz	HP	651B	x		x
(2) 10 MHz - 1 GHz	Wavetek	2001B	x	x	x
(3) 1 GHz - 12.4/18 GHz	S-D	521-series	x	x	x
Oscilloscope (Main Frame)	HP	180C	x	x	
Dual Channel Ampl. (Plug-In)	HP	1801A	x	x	
Delayed Time Base (Plug-In)	HP	1821A	x	x	
Digital Voltmeter (4½ digit)	Dana	4800	x	x	
Power Meter	HP	432B	x	x	x
Thermistor Mount (10 MHz-18 GHz)	HP	8478	x	x	x
Frequency Standard	HP	105A		x	
VLF Comparator	HP	117A		x	
Summing Amplifier *	EIP	2010050*	x	x	
Variable 115 Vac Source	Staco	3PN501			x
Extender Card	EIP	2020021	x	x	
Adapter Cable (SMC to BNC)	EIP	2040015	x	x	
Misc. attenuators, adapters and cables			x	x	x

* See Figure 5-1.

TABLE 5-1. RECOMMENDED TEST EQUIPMENT

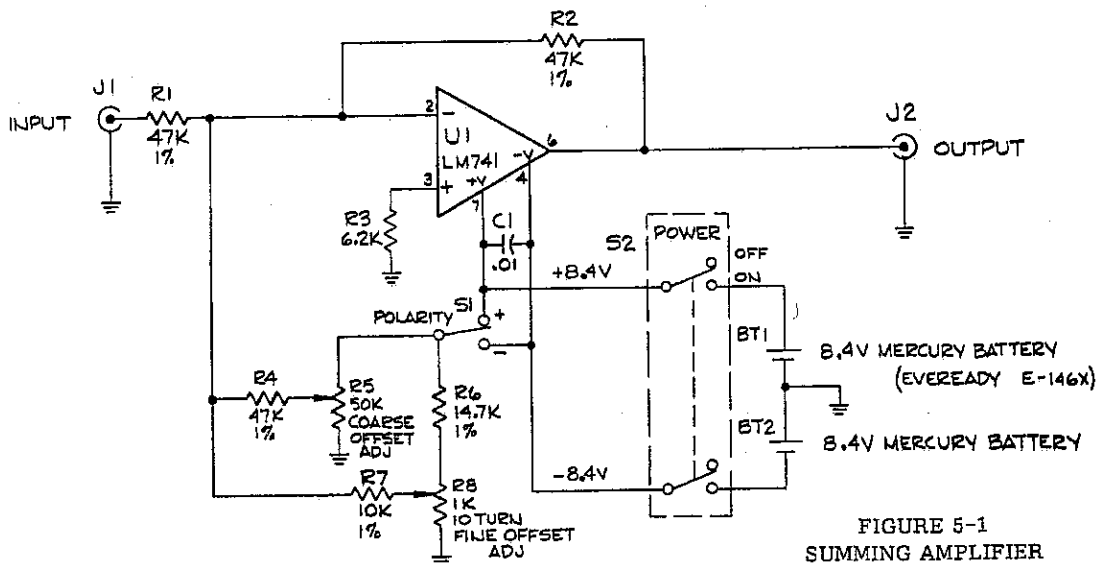


FIGURE 5-1
SUMMING AMPLIFIER

what conditions did trouble occur? What was the signal level? What associated equipment was attached or connected to the counter? Did that equipment fail too?)*

d. Name and telephone number of someone familiar with the problem, who may be contacted by EIP for any further information if necessary.

e. Shipping address to which counter is to be returned; include any special shipping instructions.

f. Pack the counter as follows:

(1) Wrap the counter in plastic or heavy kraft paper, and repack in the original shipping container (if still available) using the original packing material.

(2) If the original container and packing material are no longer available, use a heavy (275 lb. test) double-walled carton, with approximately 4" of suitable packing material between the inner and outer walls, with additional packing material as required between the counter and the inner carton. Seal with strong filamentary tape or strapping.

(3) Mark the shipping container to indicate that it contains fragile electronic instruments. Ship to EIP at address shown on title page of this manual.

* A COUNTER REPAIR AND RETURN FORM IS BOUND INTO THE BACK OF THIS MANUAL. IF THE FORM IS MISSING, PLEASE SUPPLY THE INFORMATION REQUESTED IN THE ABOVE PARAGRAPH.

5-12. TROUBLESHOOTING

5-13. MALFUNCTION AT TURN ON

5-14. If the counter fails to turn on (no display, no fan, etc.), make the following checks:

- a. 115/230 switch at proper setting.
- b. Power cord plugged into counter and into AC power source.
- c. Correct AC power available at source.
- d. Counter fuse good.
- e. POWER switch at "On" position (button depressed and green indicator showing).
- f. PC Boards and connectors are properly engaged.
- g. Counter power supply voltages correct (measured on Counter Interconnect PC Board A113).

5-15. FAILURE TO INDICATE ALL ZEROS

5-16. If counter turns on, but fails to indicate all zeros with no applied signal, CHECK THAT:

- a. No RESOLUTION switches are depressed.
- b. INT/EXT switch is set to INT.
- c. PC Boards and connectors are properly engaged.
- d. Counter Power Supply (A107) voltages correct.
- e. Perform Visual Display Test by pressing TEST and RESET switches simultaneously; display should show "8" in all decade positions.
- f. If counter fails the Visual Display Test, refer to Troubleshooting Tree - Figure 5-2. If counter displays all eights but a digit is missing, refer to Figure 5-3. If the display does not show all zeros when it should, refer to Figure 5-4.

5-17. MALFUNCTION IN SELF TEST

5-18. If counter turns on, but fails to indicate a reading of 10 000 000 (10 MHz) in the TEST mode, CHECK THAT:

- a. Counter indicates all zeros with no applied signal.
- b. PC Boards and connectors are properly engaged.
- c. Counter Power Supply (A107) voltages correct.
- d. Counter passes Visual Display Test (para. 5-16).
- e. Refer to Figure 5-5.

5-19. MALFUNCTION IN BAND IB (10 MHz to 300 MHz)

5-20. If counter fails to read frequency correctly, CHECK THAT:

- a. Counter is set to Band IB (10 MHz - 300 MHz position).
- b. A signal is applied to the Band I input connector. The signal level and frequency should be as specified for Band IB.
- c. If signal input is correct, counter should indicate all zeros when signal is removed. If not, refer to paragraph 5-16.
- d. Counter passes Visual Display Test (para. 5-16).
- e. Counter operates correctly in TEST mode. If not, refer to paragraph 5-18.
- f. Refer to Figure 5-6.

5-21. MALFUNCTION IN BAND IA
(20 Hz to 135 MHz)

5-22. If counter fails to read frequency correctly, CHECK THAT:

- a. Counter is set to Band IA (20 Hz - 135 MHz position).
- b. A signal is applied to the Band I input connector. The signal level and frequency should be as specified for Band IA.
- c. If signal input is correct, counter should indicate all zeros when signal is removed. If not, refer to paragraph 5-16.
- d. Counter passes Visual Display Test (para. 5-16).
- e. Counter operates correctly in TEST mode. If not, refer to paragraph 5-18.
- f. Counter operates properly in Band IB.
- g. Refer to Figure 5-7.

5-23. MALFUNCTION IN BAND II
(100 MHz to 850 MHz)

5-24. If counter fails to read frequency correctly, CHECK THAT:

- a. Counter is set to Band II (100 MHz - 850 MHz position).
- b. A signal is applied to the Band II input connector. The signal level and frequency should be as specified for Band II.
- c. If signal input is correct, counter should indicate all zeros when signal is removed. If not, refer to paragraph 5-16.
- d. Counter passes Visual Display Test (para. 5-16).
- e. Counter operates correctly in TEST mode. If not, refer to paragraph 5-18.
- f. Prescaler PC Board (A109) connector and co-ax cables properly engaged.
- g. Counter operates properly in Band IB.
- h. Refer to Figure 5-8.

5-25. MALFUNCTION IN BAND III
(825 MHz to 18 GHz)

5-26. If counter fails to read frequency correctly, CHECK THAT:

- a. Counter is set to Band III (825 MHz - 18 GHz position).
- b. A signal is applied to the Band III input connector. The signal level and frequency should be as specified for Band III.
- c. If signal input is correct, counter should indicate all zeros when signal is removed. If not, refer to paragraph 5-16.
- d. Counter passes Visual Display Test (para. 5-16).
- e. Counter operates correctly in TEST mode. If not, refer to paragraph 5-18.
- f. Counter operates properly in Bands I and II.
- g. Converter Control (A202 and A203) PC Board connectors and co-ax cables are properly engaged.
- h. Refer to Figure 5-9.

5-27. LOCKBOX MALFUNCTION

5-28. If counter fails to lock, CHECK THAT:

- a. Programmed frequency matches related counter operating band.
- b. Programmed frequency is within specific capture range.
- c. Phase Lock Out signal is connected to the FM or phase lock input of the source being locked.
- d. Source being locked has an FM or phase lock input which meets the requirements of the 371.
- e. Refer to Figure 5-10.

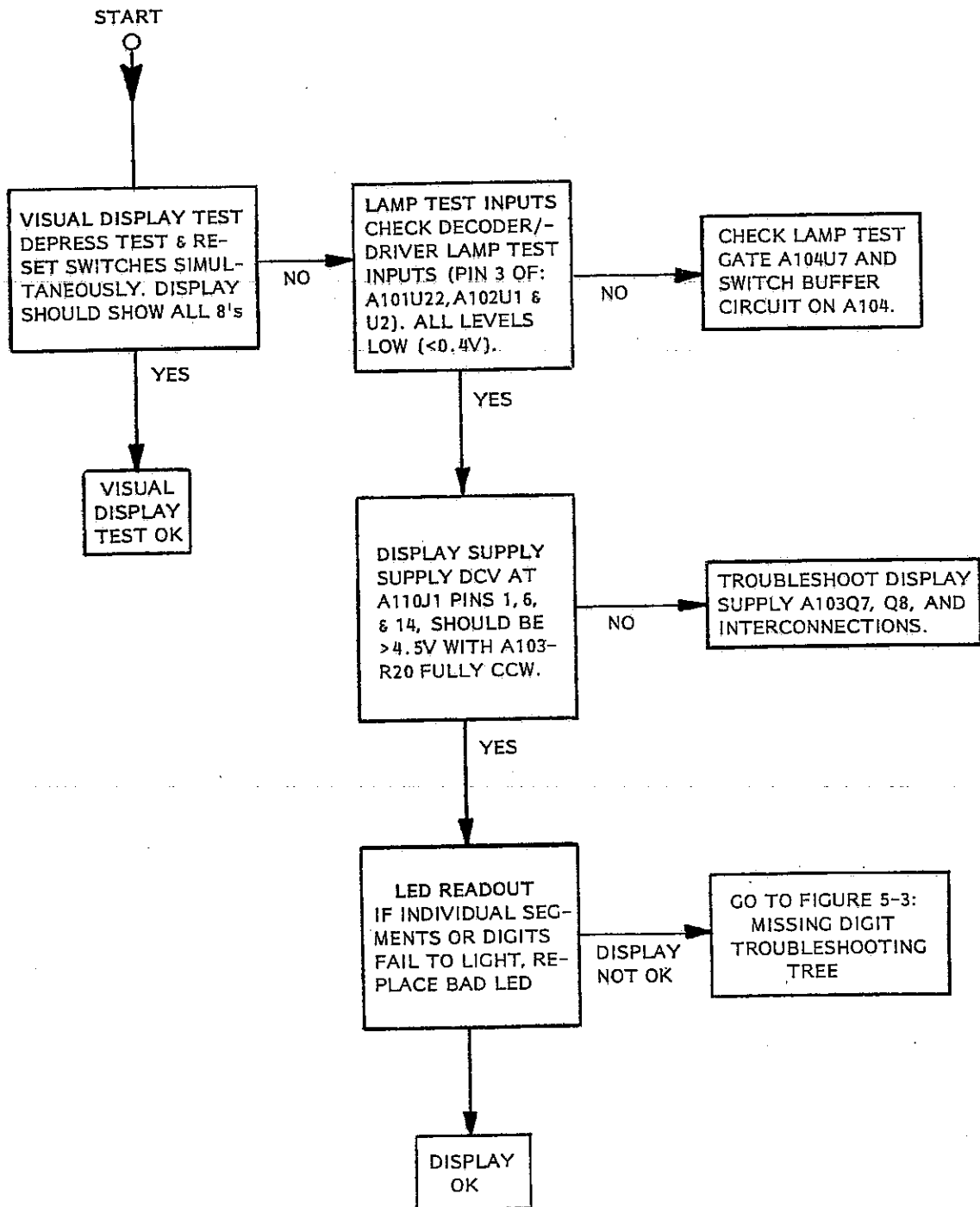


FIGURE 5-2
VISUAL DISPLAY TEST
TROUBLESHOOTING TREE

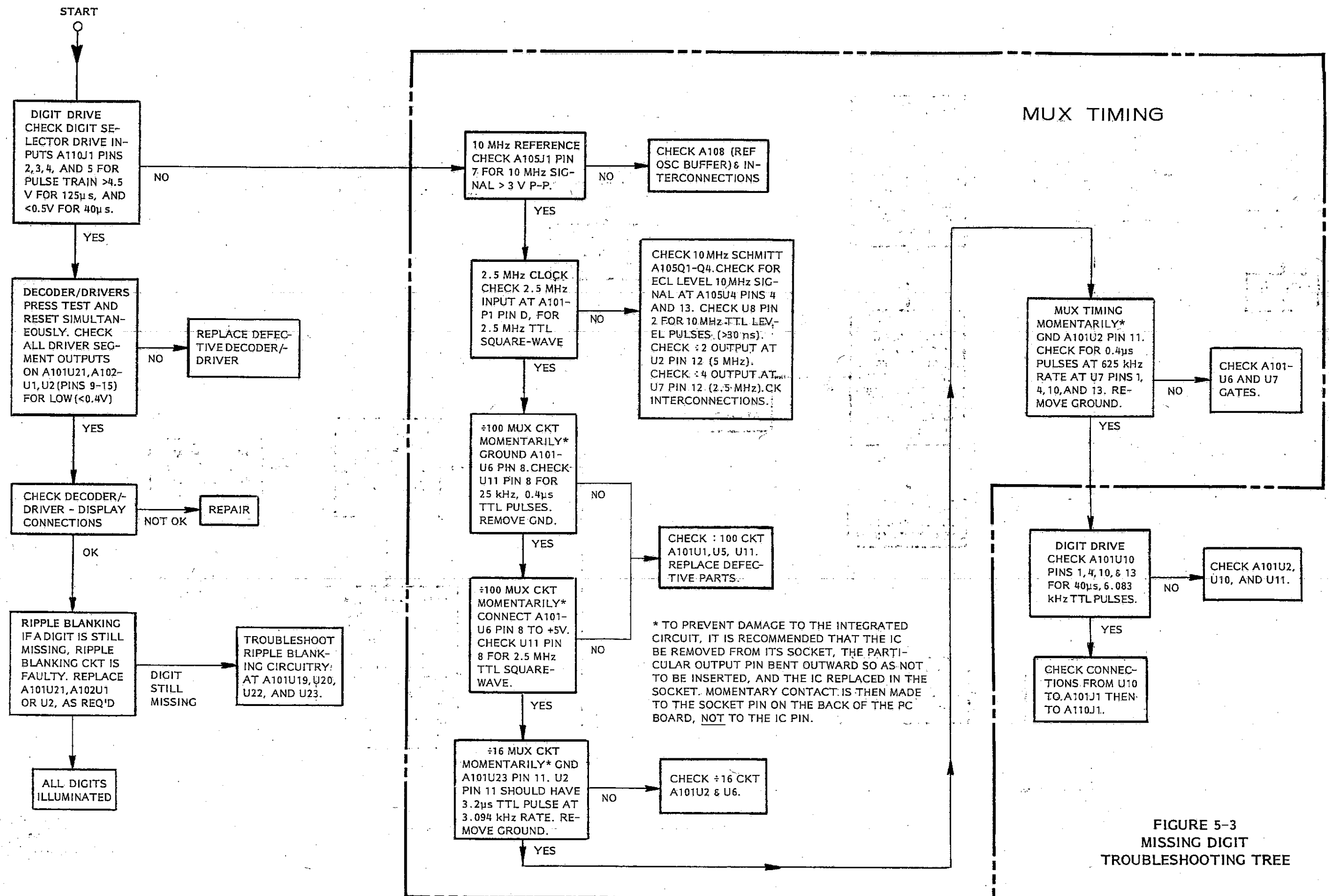


FIGURE 5-3
MISSING DIGIT
TROUBLESHOOTING TREE

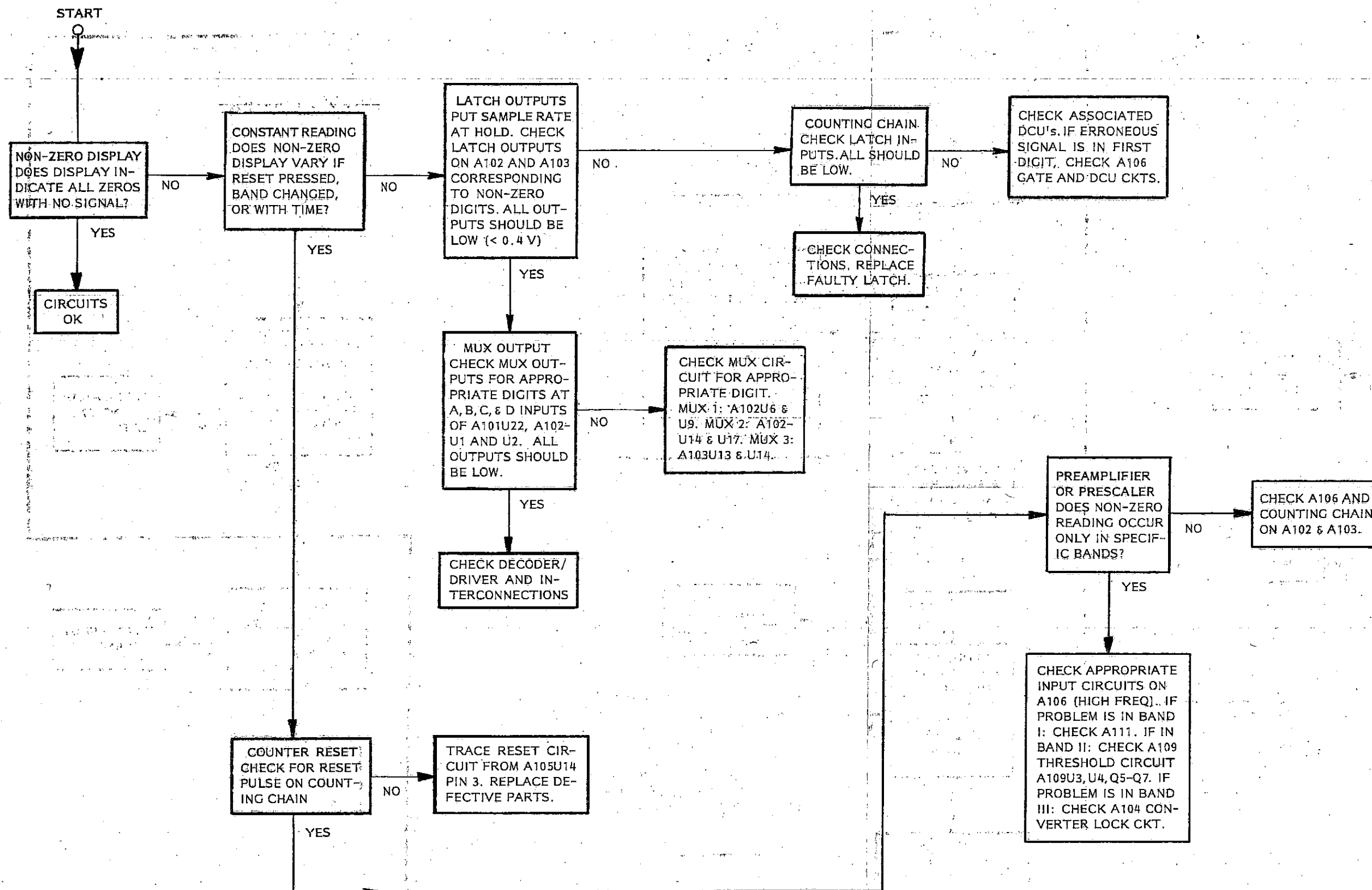


FIGURE 5-4
NON-ZERO DISPLAY
TROUBLESHOOTING TREE

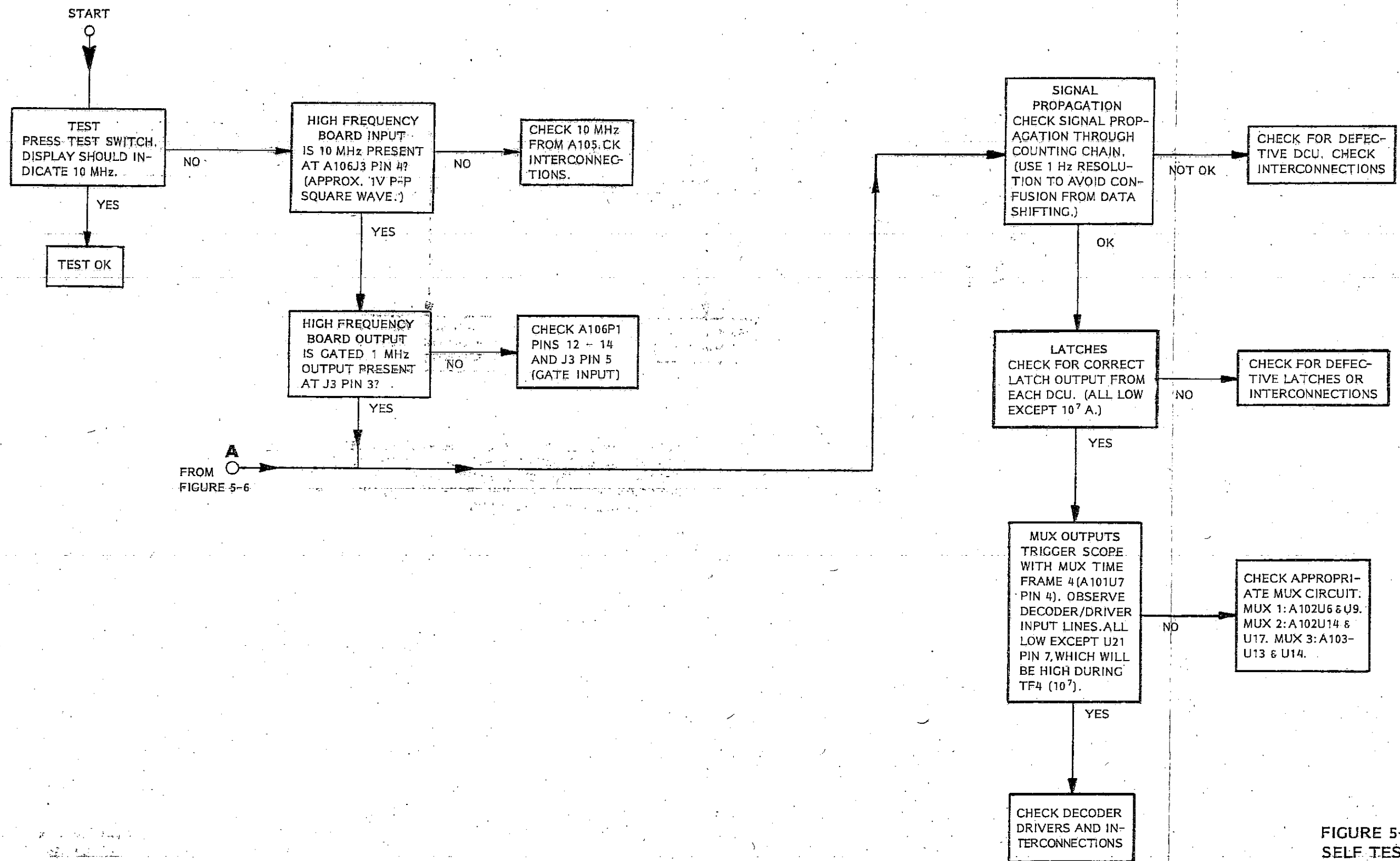
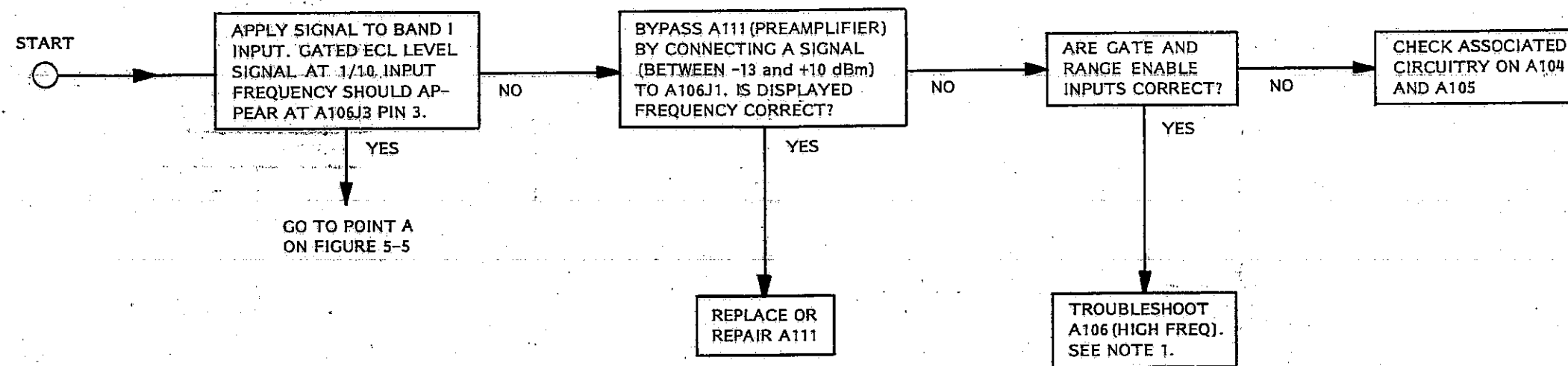


FIGURE 5-5
SELF TEST
TROUBLESHOOTING TREE



NOTE 1: TROUBLESHOOTING OF A106 REQUIRES USE OF A SAMPLING OSCILLOSCOPE WITH A 1 GHz OR GREATER BANDWIDTH. CARE MUST BE EXERCISED TO LOAD CIRCUIT JUNCTION LIGHTLY. MAXIMUM PROBE CAPACITANCE: 1 PF. MINIMUM RESISTANCE: 500 OHMS.

FIGURE 5-6
BAND 1B
TROUBLESHOOTING TREE

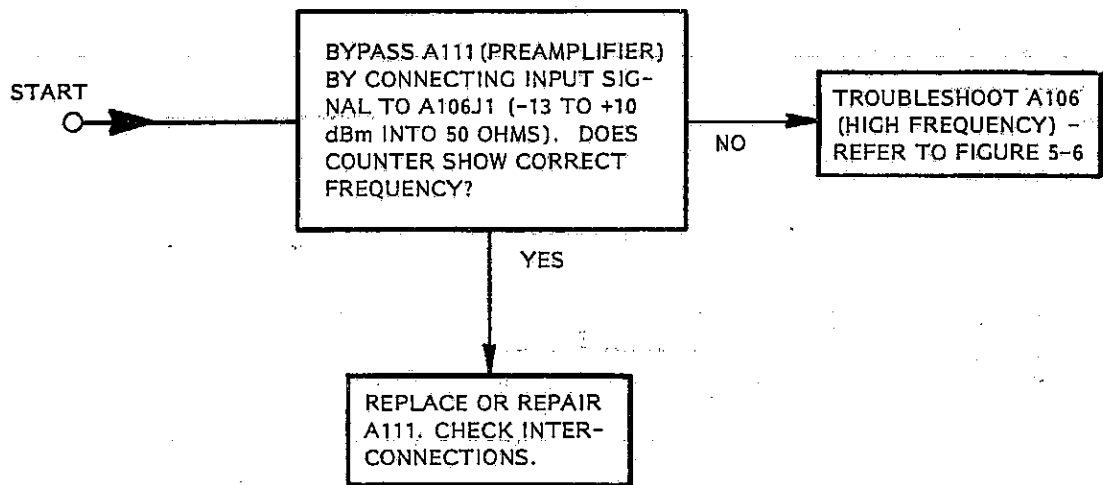
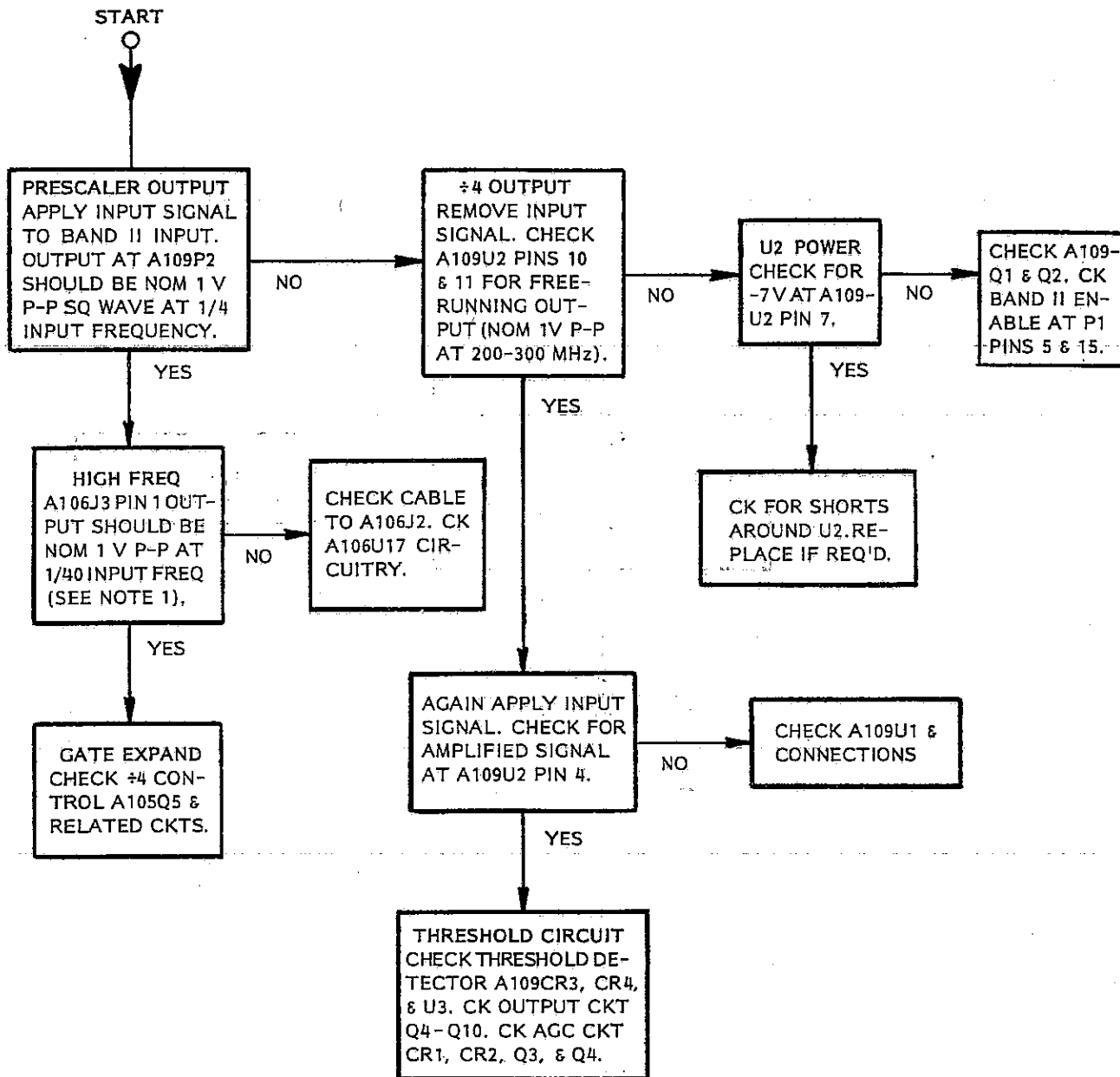


FIGURE 5-7
BAND IA
TROUBLESHOOTING TREE



NOTE 1: TROUBLESHOOTING OF A106 REQUIRES USE OF A SAMPLING OSCILLOSCOPE WITH A 1 GHz OR GREATER BANDWIDTH. CARE MUST BE EXERCISED TO LOAD CIRCUIT JUNCTION LIGHTLY. MAXIMUM PROBE CAPACITANCE: 1 PF. MINIMUM RESISTANCE: 500 OHMS.

FIGURE 5-8
BAND II
TROUBLESHOOTING TREE

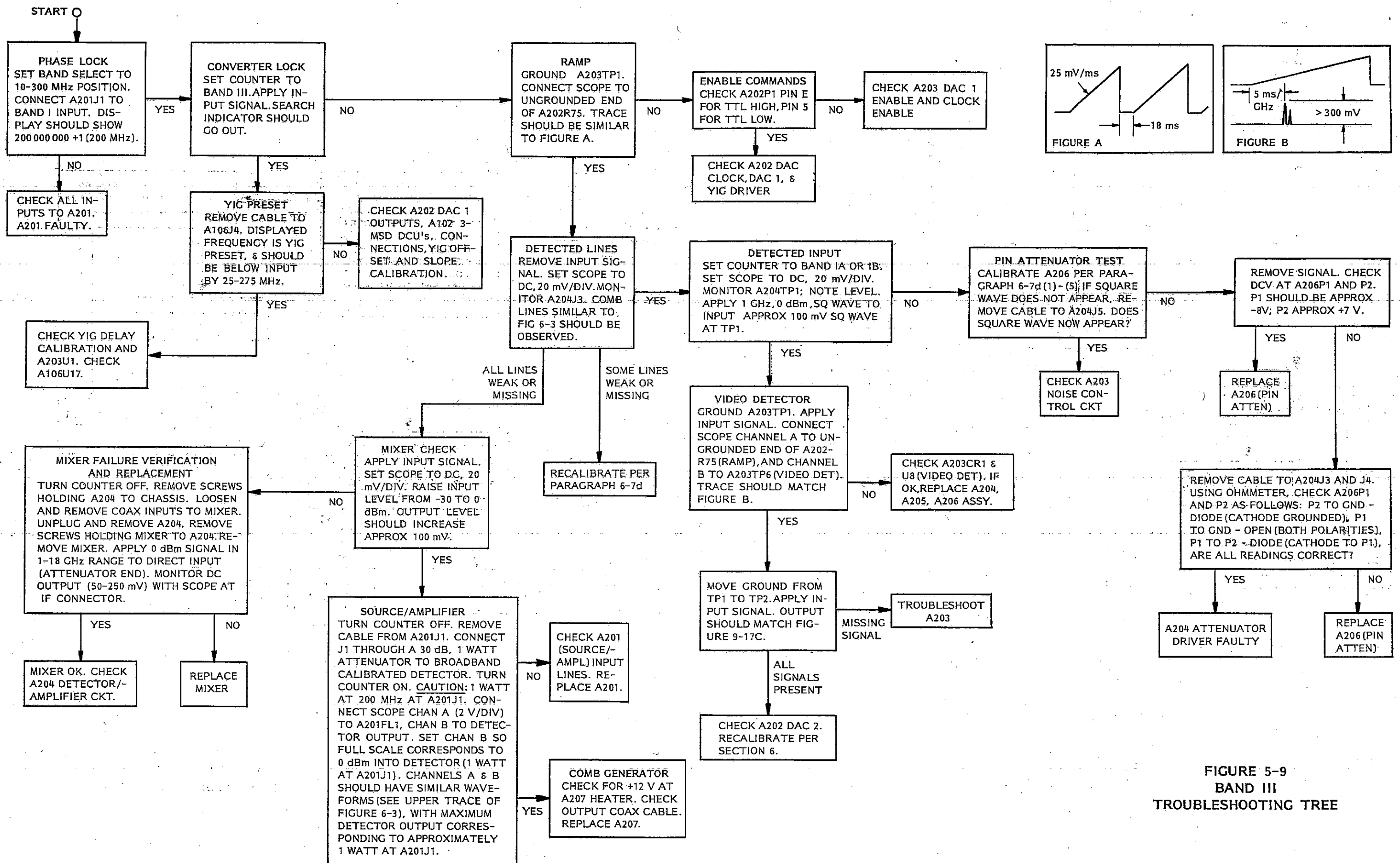


FIGURE 5-9
BAND III
TROUBLESHOOTING TREE

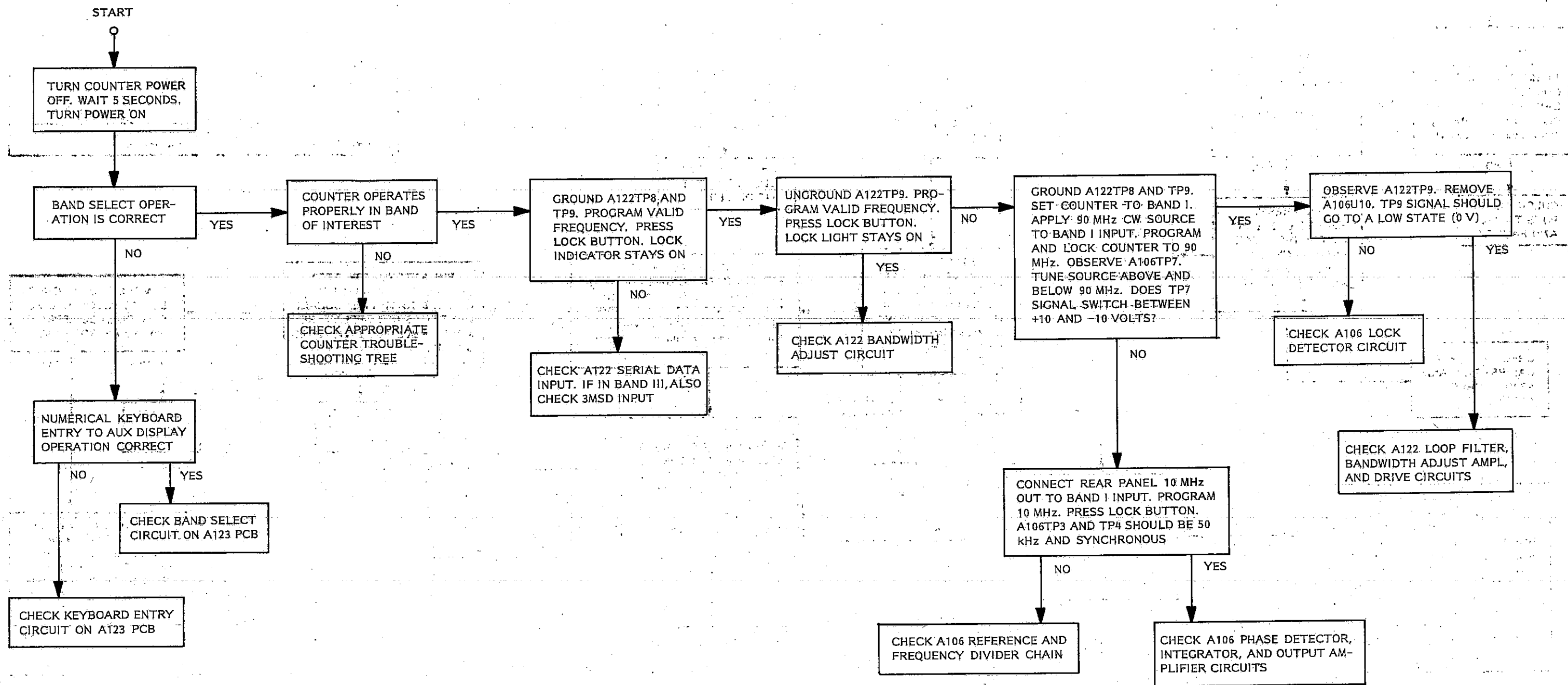


FIGURE 5-10
LOCKBOX OPERATION
TROUBLESHOOTING TREE