ATARI believes that the information described in this manual is accurate and reliable, and much care has been taken in its preparation. However, no responsibility, financial or otherwise, shall be accepted for any consequences arising out of the use of this material. Information contained herein is subject to change. Revisions may be issued to advise of such changes and/or additions.

Correspondence regarding this document should be forwarded to Manager of Technical Support, Consumer Product Service, ATARI, Incorporated, 845 Maude Avenue, Sunnyvale, CA 94086.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

INTRODUCTION

The Point-of-Purchase (POP) Field Service Manual is a reference guide for you, the service technician. The information presented in this manual, when used in conjunction with ATARI training enables you to repair and maintain the POP display.

This Field Service Manual is organized in eight sections:

- Theory of Operation - Overview of how the POP display works.
- Schematics - Electrical drawings and layouts for major components (in a separate packet accompanying this manual).
- Testing and Troubleshooting - Overview of tests which assist in diagnosing malfunctions.
- Diagnostic Flowcharts - Detailed procedures for troubleshooting and repairing the POP display.
- Symptom Checklist - Failure information to assist the experienced technician arrive at a rapid diagnosis of problems.
- Control Panel - Schematics for troubleshooting failures with the control lines.
- Parts List - Detailed breakdown of all parts used in the POP display.
- Service Bulletins - Section to be used to hold Field Change Orders, Upgrade Bulletins and Tech Tips.

SECTION 1

THEORY OF OPERATION

OVERVIEW

The POP is a state-of-the-art microcomputer. It receives instructions for the operation of different games from individual Read-Only-Memory (ROM) game cartridges. The POP interprets data from the game controllers and executes commands on the television screen. Figure 1-1 is a block diagram of the functional flow of the POP.

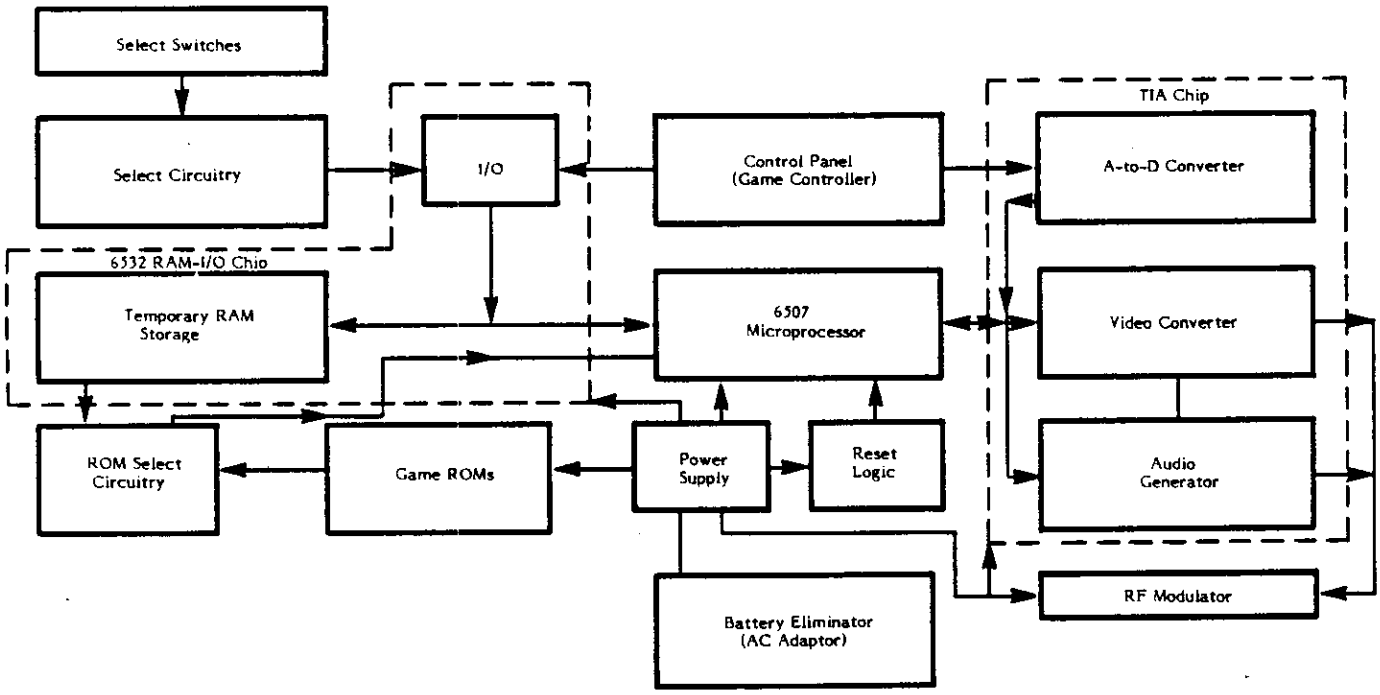


Figure 1-1. Fuctional Block Diagram

GAME CONSOLE

The POP board sets in a metal enclosure that shields the mainboard from radiating electronic noise which originates in the television set.

MAINBOARD

The mainboard is a Printed Circuit Board (PCB) which holds the power supply, the RF modulator, the microprocessor (MPU) chip, a combination Random Access Memory Input/Output (RAM-I/O) chip, and a Television Interface Adaptor (TIA) chip. The board also includes numerous capacitors, resistors, transistors, and other assorted electronic components.

- Power Supply

  The power supply is composed of a +5 volt regulator, filter capacitors, and the power ON/OFF switch. Unregulated DC is supplied to the logic portion of the PCB from the AC power adaptor. A suppy of +5 is routed through a filter circuit to the RF modulator. This reduces the amount of RF radiation generated by the game.

- RF Modulator

  The RF module converts the signal received from the Television Interface Adaptor to a frequency that a televison can receive and interpret. A coaxial cable passes this signal from the RF module to the cable mounted to the back of the television.

- Microprocessor Chip

  The 6507 Microprocessor (MPU) chip is an 8-bit microprocessor that is responsible for the coordination of all circuitry in the POP. It controls and monitors the functions of the RAM and the TIA, reads information from the ROMs and instructs the TIA in what to display.

- Random Access Memory-Input/Output Chip

  Temporary storage of data from the MPU is provided by the 6532 Random Access Memory-Input/Output (RAM-I/O) chip. This chip scans the I/O joystick lines for input. It also keeps track of the internal timing of the chips for accurate video coordination./

- Television Interface Adaptor Chip

  This ATARI proprietary chip generates audio and video signals which are required by the RF modulator. The TIA also contains the analog-to-digital converter circuitry that allows the MPU to understand signals originating in the paddle game controllers and to keep track of all player missiles and collision registers.

  The TIA outputs are processed by additional circuitry into a composite video, sound and color signal which is routed to the RF module. It also generates the Sync signal for the unit.

- Color Circuit

  The master oscillator consists of a crystal, two transistors and additional circuitry which oscillate at a frequency of 3.57 MHz (plus or minus .004).

SUMMARY

The POP is a microcomputer that enables the user to select any of the ATARI ROM cartridges installed on the PCB and play it for a predetermined period of time.

Three chips on the mainboard allow for the interaction between the game and the player. These chips are the microprocessor (MPU), the Random Access Memory-Input/Output (RAM-I/O) and the Television Interface Adaptor (TIA).

SECTION 3

TESTING AND TROUBLESHOOTING

EQUIPMENT REQUIREMENTS

You require the following six pieces of equipment before you can troubleshoot the ATARI VCS™ Point of Purchase Display unit (POP):

- 15MHz Oscilloscope
- Frequency Counter
- 2.6 Domestic Diagnostic Cartridge
- Signal Tracing Device Chip
- Color Television Set (properly adjusted)
- POP Field Service Manual

TEST

Before you begin troubleshooting the POP you must make the following modifications:

1. The POP Game ROMs must be modified according to POP ROM Modification, page 1 (part number FD100029), regarding placement and/or replacement of Game ROMs. This ensures that you are not repairing a game ROM which is to be later removed.

2. Install the static modification per the following instructions:

   A. Make certain that you have the following:

      1) Zener Diodes (1N3747 - C017654) two each.

      2) Capacitors (.0047uf - C014180-08) two each.

      3) Masking compound.

   B. Attach the Zener Diode to the capacitor (See Figure 3-1).

      Make certain that the polarity is correct.

   C. Make certain the holes into which the assembly (built in Figure 3-1) is to be inserted are clear of all solder.

   D. Insert and solder the two assemblies (built in Figure 3-1) into the two locations indicated on the POP PCB (See Figure 3-2).

   E. Coat the areas shaded on the top of the PCB (as illustrated in Figure 3-3) with masking compound.

The POP PCB is now statically modified to Atari specifications.

3. With the control panel of the POP off, carefully clean and lubricate the metal fingers of each X-Y (joystick) controller.

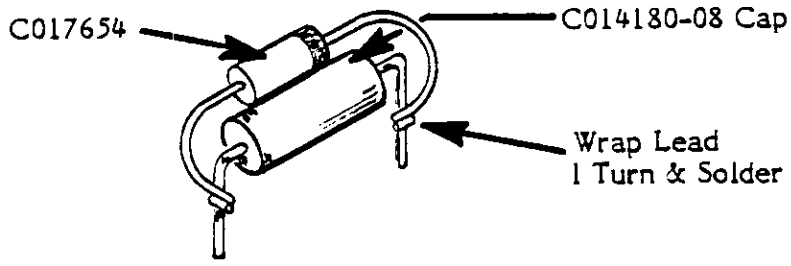


Figure 3-1. POP Static Modification
(Zener Diode)

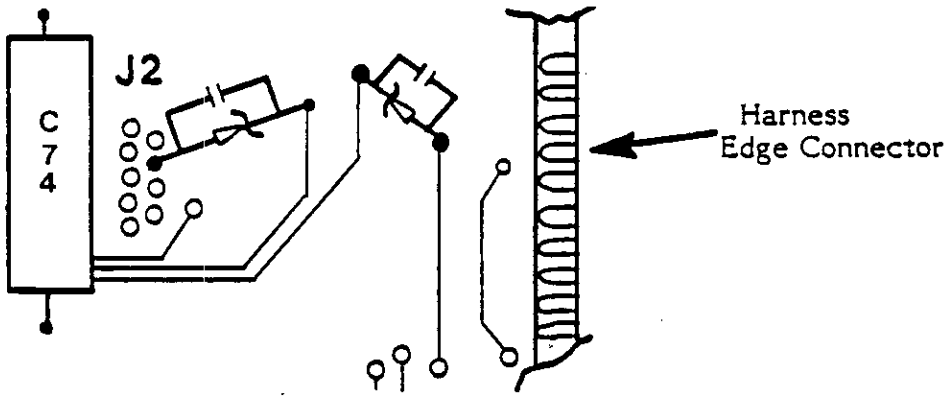


Figure 3-2. Assembly Installation

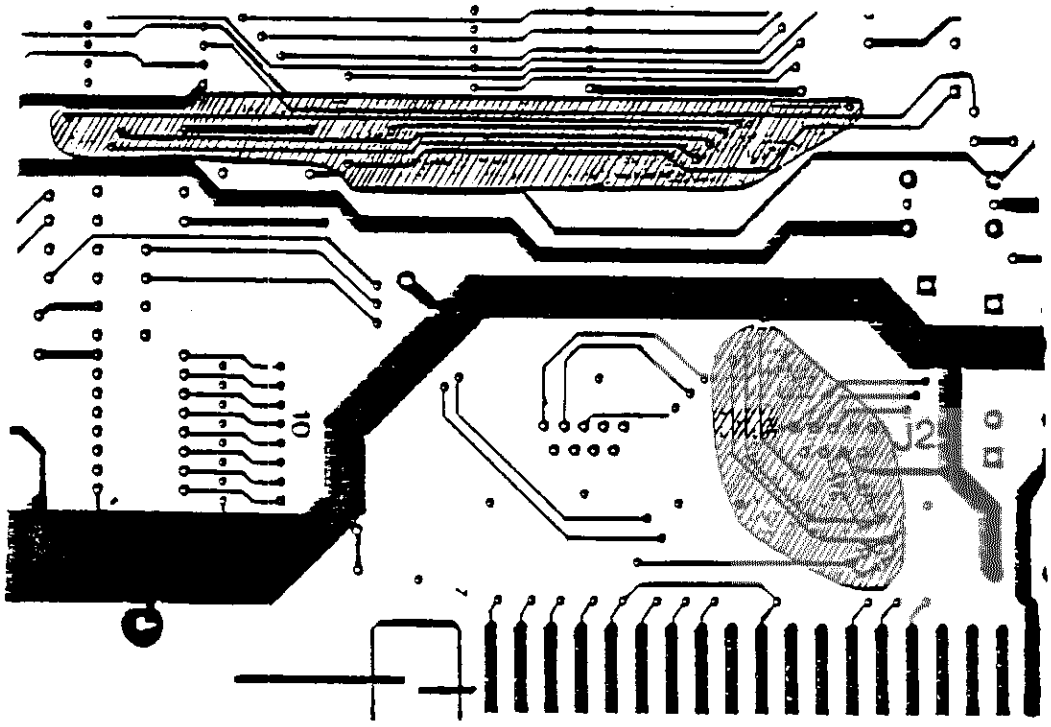


Figure 3-3. Mask Placement

The testing of the POP is in two parts. The first part uses just the displays of the POP itself to determine if it is indeed defective. If you determine that the unit is indeed defective, you must then use the 2.6 Diagnostic cartridge to pinpoint the probable error.

Before you can use the 2.6 Diagnostic cartridge, however, you must modify the POP PCB. Perform the following two instructions before trying to use the 2.6 Diagnostic cartridge.

1. Remove the ROM in position 7 (M6).

2. Remove the two jumper wires at position F10 (to the right of the RF jack).

3. Press position 4 on device A8 to the ON position for infinite gameplay.

The 2.6 cartridge can now be called to the screen by you selecting game 7.

Because of the physical absence of player option switches, you must short certain lines together in order to get the proper diagnostic displayed on the television screen. These lines are located at F10. Figure 3-4 illustrates which lines must be shorted.

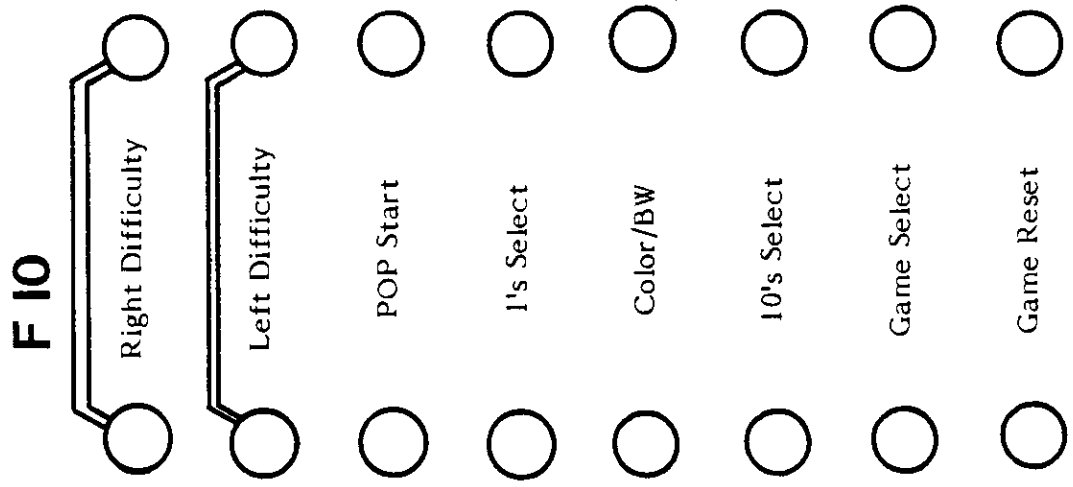


Figure 3-4. F10 Switch Legend

Defective RAM Test

- Purpose: To test the 6532 chip (RAM I/O) for proper operation.

- Format: At power-up, the television displays solid diagonal of some type if the RAM is defective. Figure 3-5 illustrates some of the known examples of screens which indicate a defective RAM I/O.

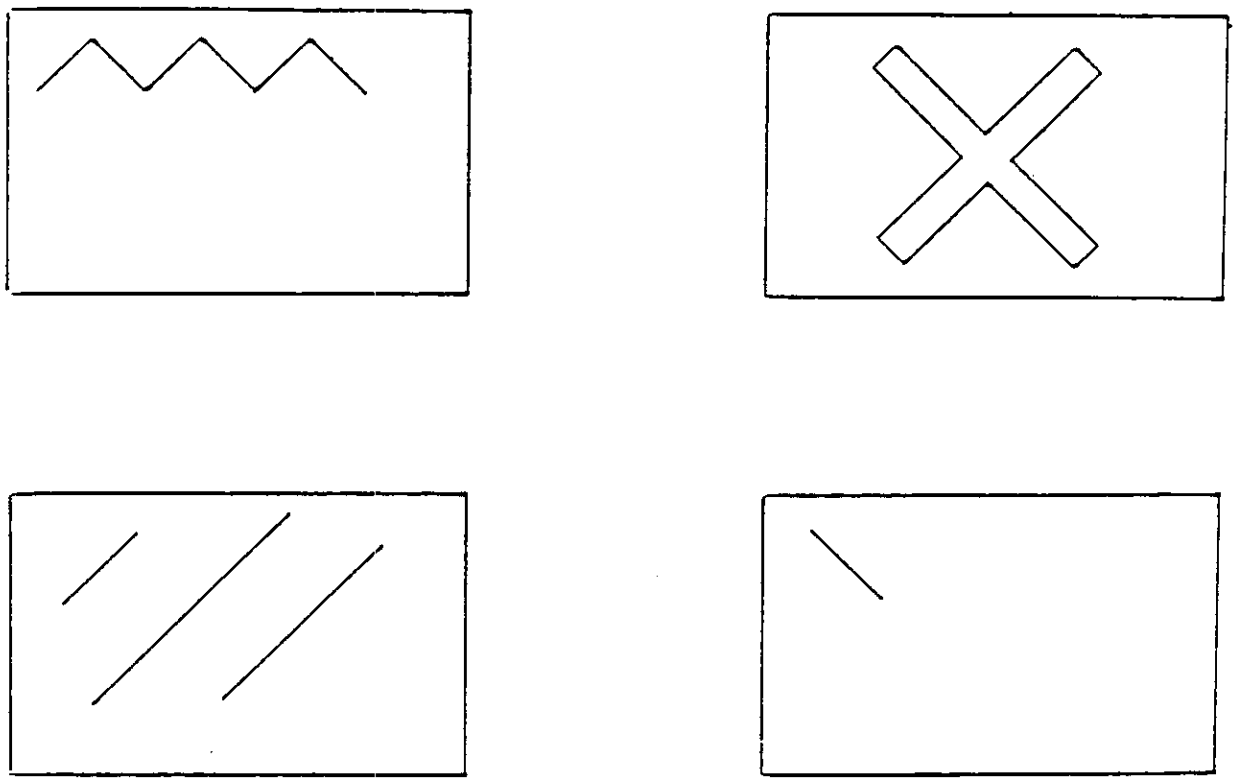


Figure 3-5. Defective RAM I/O Patterns

Color Bar Test

- Purpose: To test the color-generating functions of the TIA chip and associated circuitry for proper operation.

- Format: A screen of 15 horizontal color bars is displayed (See Figure 3-6). The screen should be steady and unchanging. A gray or blue horizontal reference line extends across the screen about four bars from the bottom. This reference line is thinner than the bars around it. R70 should be adjusted to the bars immediately above and below the reference line to within one shade of each other. (The bars should be goldenrod in color.) Proper operation of the unit is indicated by being able to make this adjustment and by consistent color within the entire span of each bar on the screen. Minor glitches on the edges of the color bar are acceptable. Leave this test on for at least 60 seconds in order to catch any intermittent problems, such as a bar momentarily changing colors or blanking out.

*** * * NOTE * * ***

Figure 3-6 is a black and white representation of a color television screen.

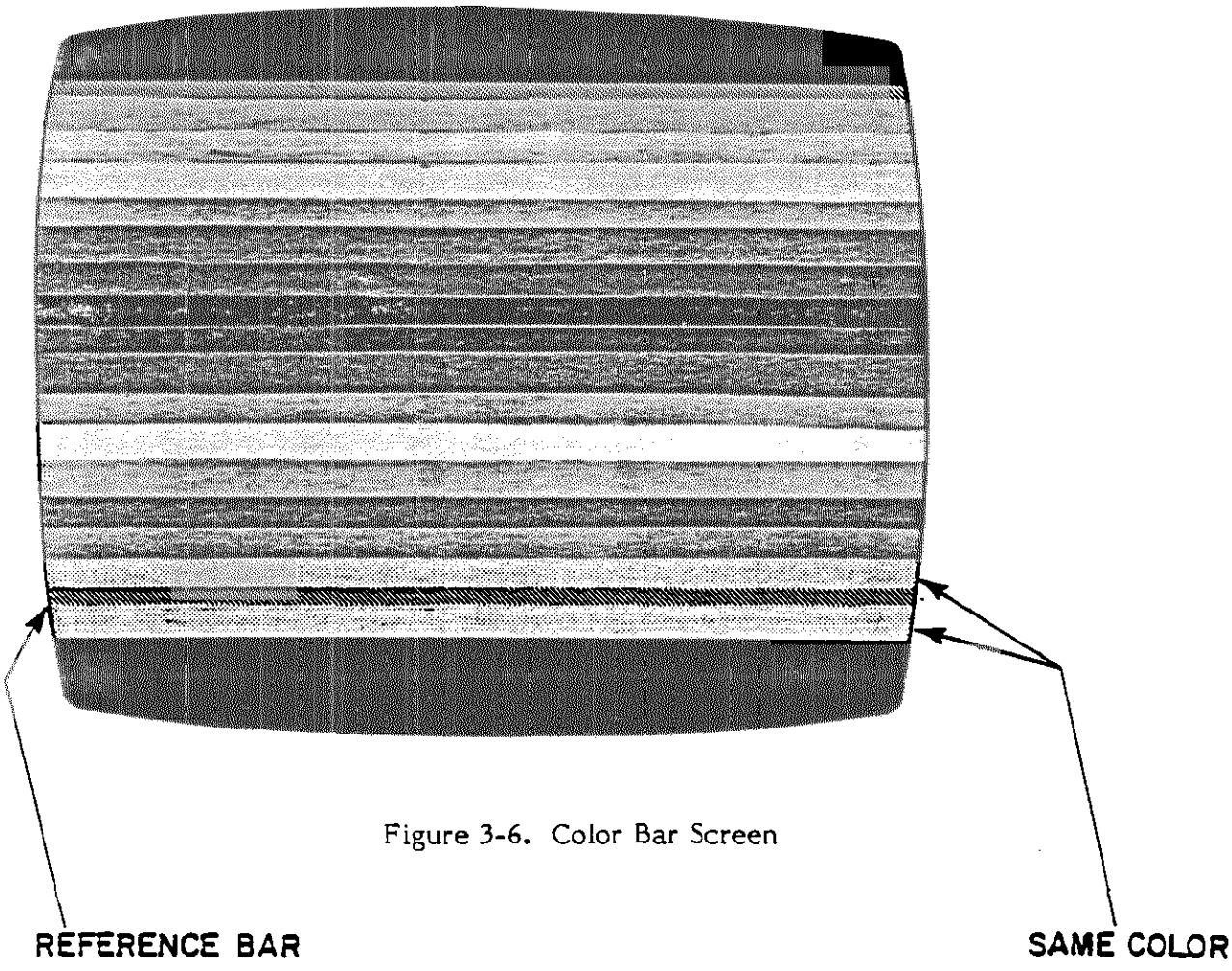


Figure 3-6. Color Bar Screen

Gray Bar Test

- Purpose: To test the function of the luminenscence lines (LM0, LM1, and LM2) from the TIA chip to the RF module.

- Format: Short the color/black and white switch with the proper tool. Eight horizontal gray bars are displayed, going from black at the top to white at the bottom in even steps (See Figure 3-7). The screen should be steady and unchanging. The lines may have minor glitches on their edges. A thin white line always appears just over the top (black) bar. No color should appear anywhere on the screen. The areas above the top (black) bar and below the bottom (white) bar are of no importance to the test. This test should be left on for at least 60 seconds to ensure that there is no "flashing" of color or shifting of the gray bars.

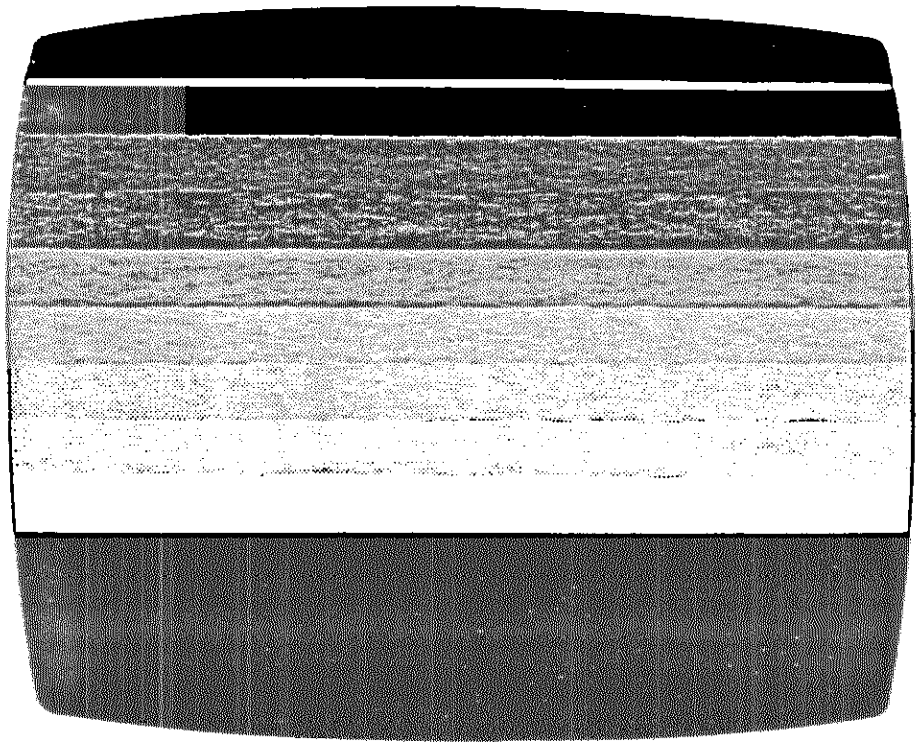


Figure 3-7. Gray Bar Screen

Audio Tone Test

- Purpose: To test the function of the audio tone generation and modulation circuitry.

- Format: Short the right difficulty switches. This test displays two alternating patterns on the screen (See Figure 3-8) while two alternating tones are heard. The tones change in sync with the screen. This test continues for one full cycle after the switch returned to the initial position.

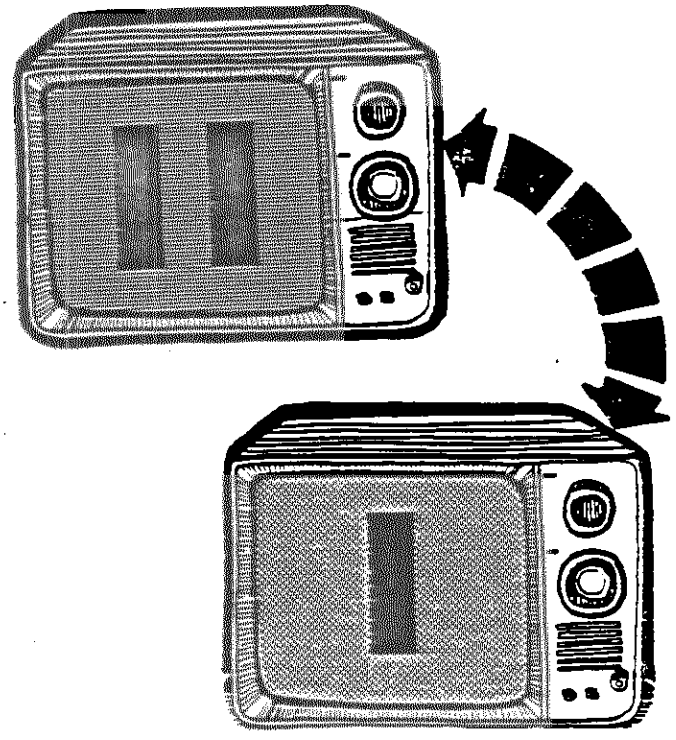


Figure 3-8. Audio Tone Screen

SECTION 3A

DISASSEMBLY FOR ADJUSTMENTS

REMOVING THE CONTROL PANEL/ACCESSING THE PCB

A. Unlock the sliding doors.

B. Remove doors. Slide doors to open position; lift each separately and pull the bottom towards you.

C. Remove the VCS security bar from the top of the control panel.

D. Remove all plugs from the VCS.

E. Remove the VCS from the control panel.

F. Remove the wing nuts from the carriage bolts located at the back of the control panel on the underside, about five inches from each side panel.

G. Remove the carriage bolts. You may have to lift the control panel to relieve tension on the bolts.

H. Unplug the connector halfway between the black box and the control panel.

I. Remove the ten Phillips-head screws holding the plexiglass cover on the control panel.

J. Remove the menu card and discard.

K. Put the new menu card in place.

L. Cover the card with the plexiglass and secure with the ten Phillips-head screws removed in Step I.

M. Turn the control panel over. Be careful not to damage the joysticks.

N. Snap the black box connection on the PCB cable together with the one on the control panel. Do not force this connection. If the connection cannot be easily made, check to make certain that the pins and pin connectors are correctly aligned, and try again.

O. Lift and replace the control panel. Make certain that the PCB is in place and that all cabling is properly stored.

P. Insert carriage bolts, which were removed in Step G.

Q. Secure carriage bolts with wiring nuts.

R. Place dummy VCS in same location as the VCS removed in Step E.

S. Secure VCS with security bar removed in Step C.

T. Replace sliding doors. Insert back door (without the lock) top first, and then gently push in the bottom of the door. Use the same procedure with the front door.

SETTING CHANNEL POSITION

The PCB is set to operate on Channel 3 of your television. If a local television station is interfering with the game signal on Channel 3, you can change the game's channel to Channel 2. If you wish to change channels, read on, if not please push the PCB back into place and reverse the procedures in the Removing the Control Panel Section, page 3A-1.

To change the channel setting, you need to change the "jumper" that is on the PCB itself. If you have not already cut the plastic tie that holds the PCB in the the metal box, cut it from the outside of the box and carefully remove it.

Now, pull the PCB towards you about 5 inches. The plugs are located behind the back-right corner of the RF module (silver-color box). Refer to Figure 3A-1 on the preceding page..

SECTION 4

DIAGNOSTIC FLOWCHART

The Diagnostic Flow Chart is intended to be easy to use and the primary aid when trouble-shooting the POP. Follow the prompts in the order presented. When a question is asked, follow the line from that box which best applies to the unit's situation. When that line terminates with a letter inside a circle, turn to that page, locate the letter in another circle, and continue the diagnosis. The flow chart leaves nothing to chance, it tells you when to perform a specific test, and when to replace components.

When the flowchart branches to R - call ATARI, Techline Specialist.

Inside California
(800) 672-1466

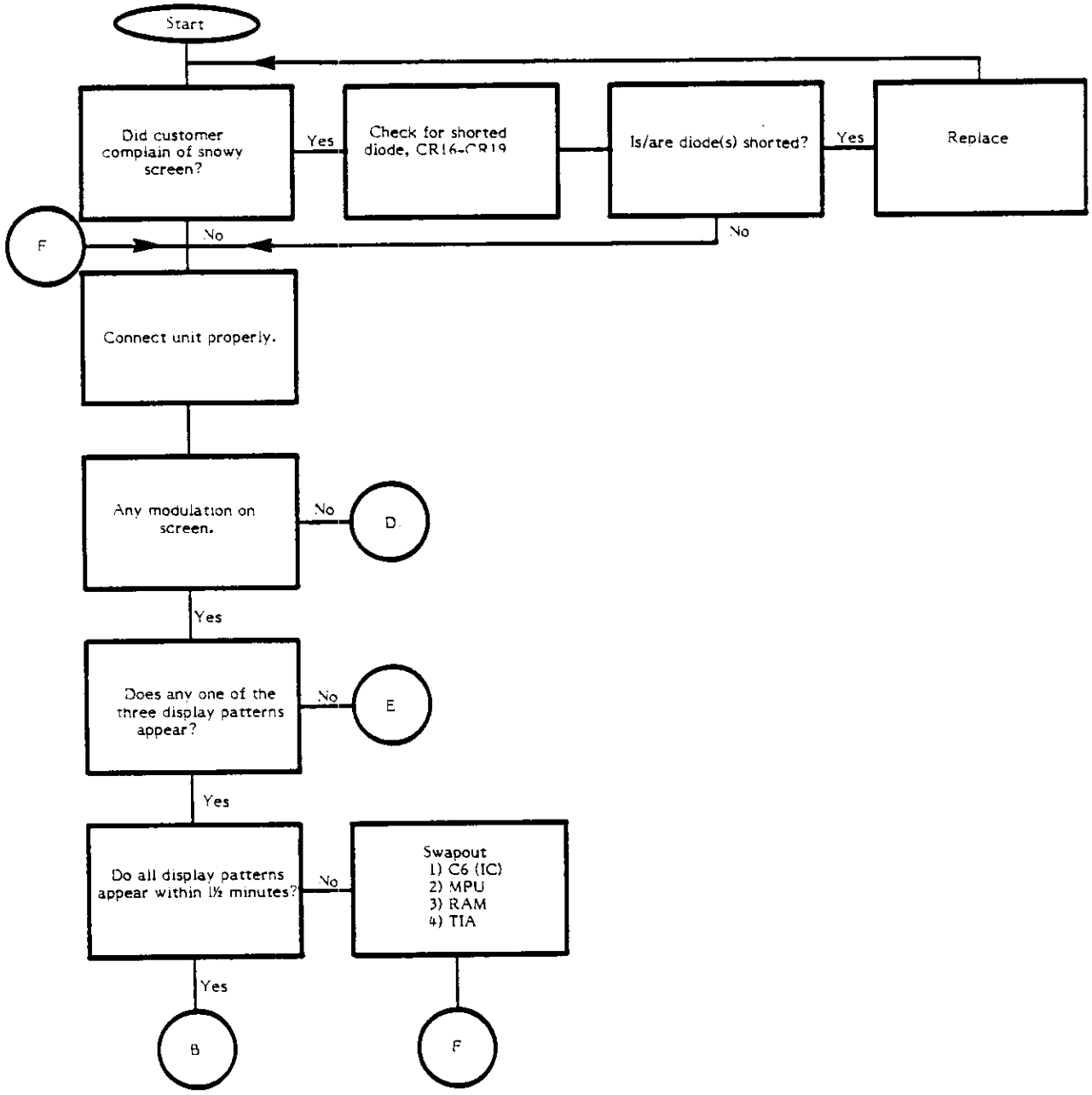
Outside California
(800) 538-1535

CAUTION:

Extreme care should be taken when handling the integrated circuit chips. They are all very sensitive to static electricity and can easily be erased by careless handling. Always keep the chips in their plastic carrier tubes or on conductive foam when not handling them. Make certain you are well grounded when handling the chips. Atari strongly recommends that you wear a conductive grounding band (which ties from your arm to ground) when handling the chips. The chips are also susceptible to damage from stress when being removed from or inserted into the sockets. Always use a chip-puller when removing the chips. Do not pry the chips out with a screwdriver or any other tool.

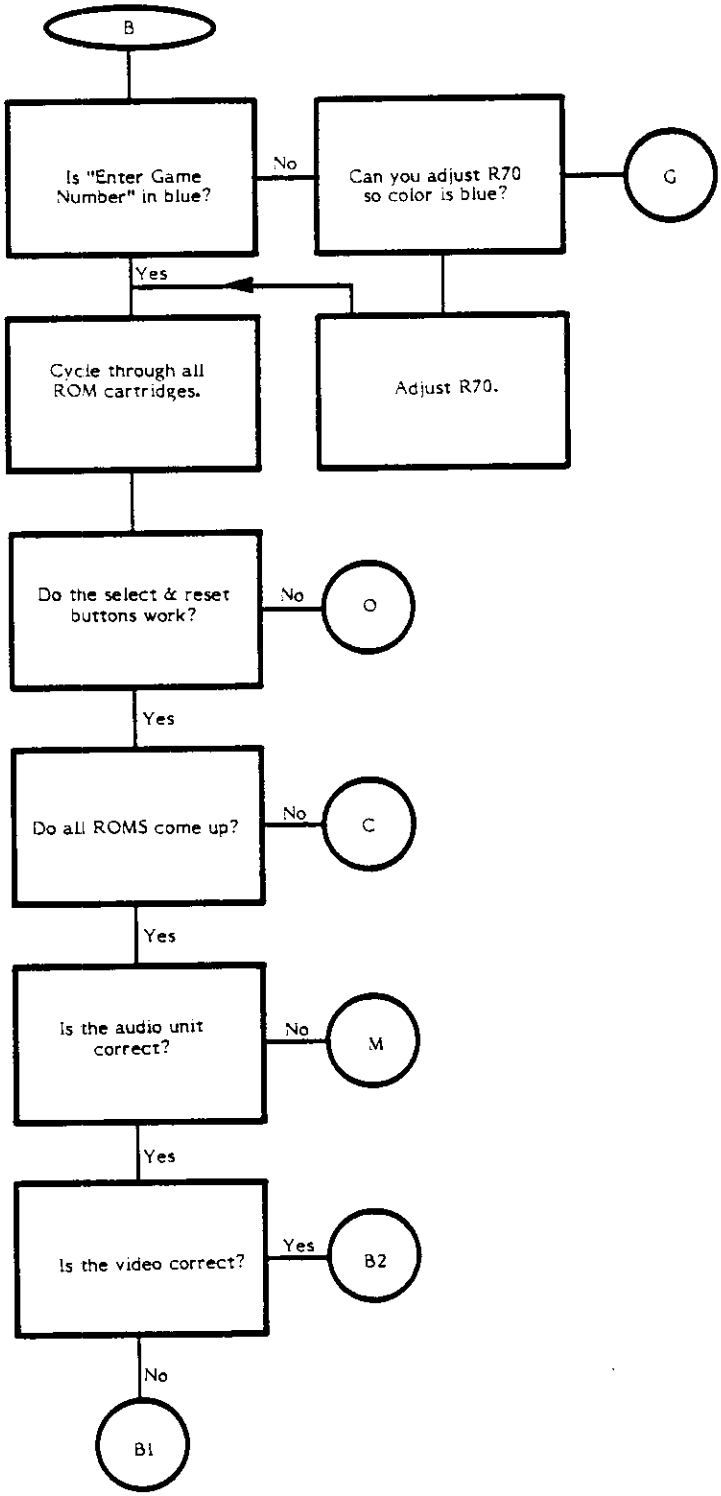
Failure to follow the above guidelines results in unusually high chip failure rates and extra expense.

POP DIAGOSTIC FLOWCHARTS

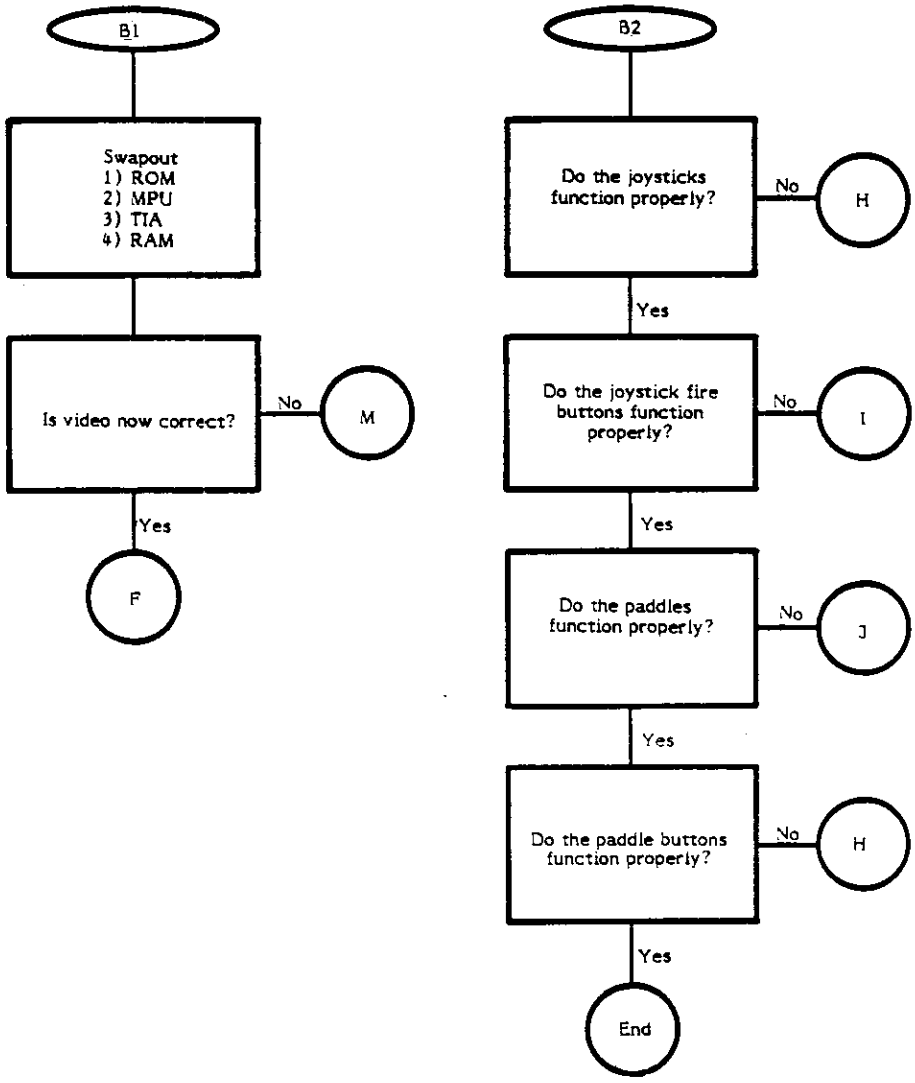


INDEX OF FLOWCHARTS

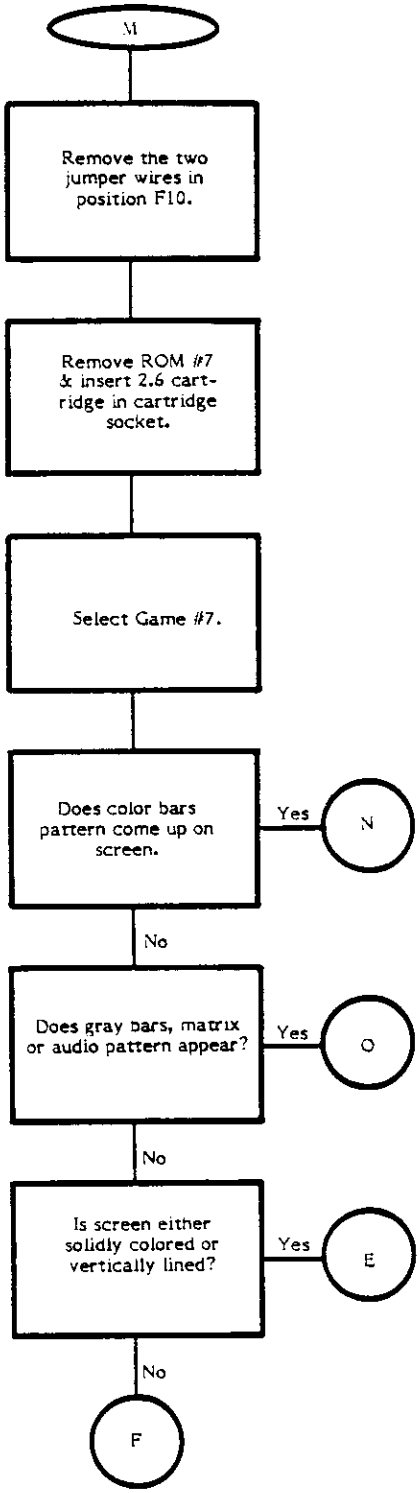
GAME ROM TEST



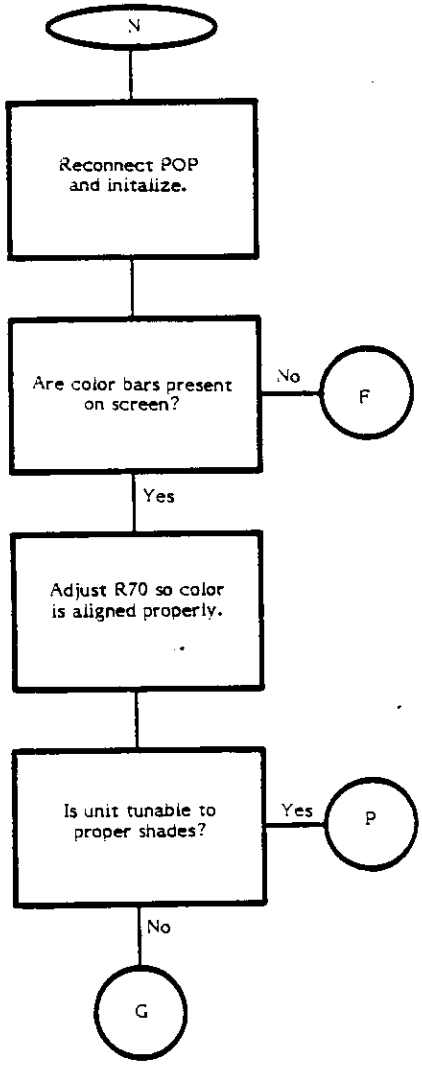
GAME ROM TEST (Cont)



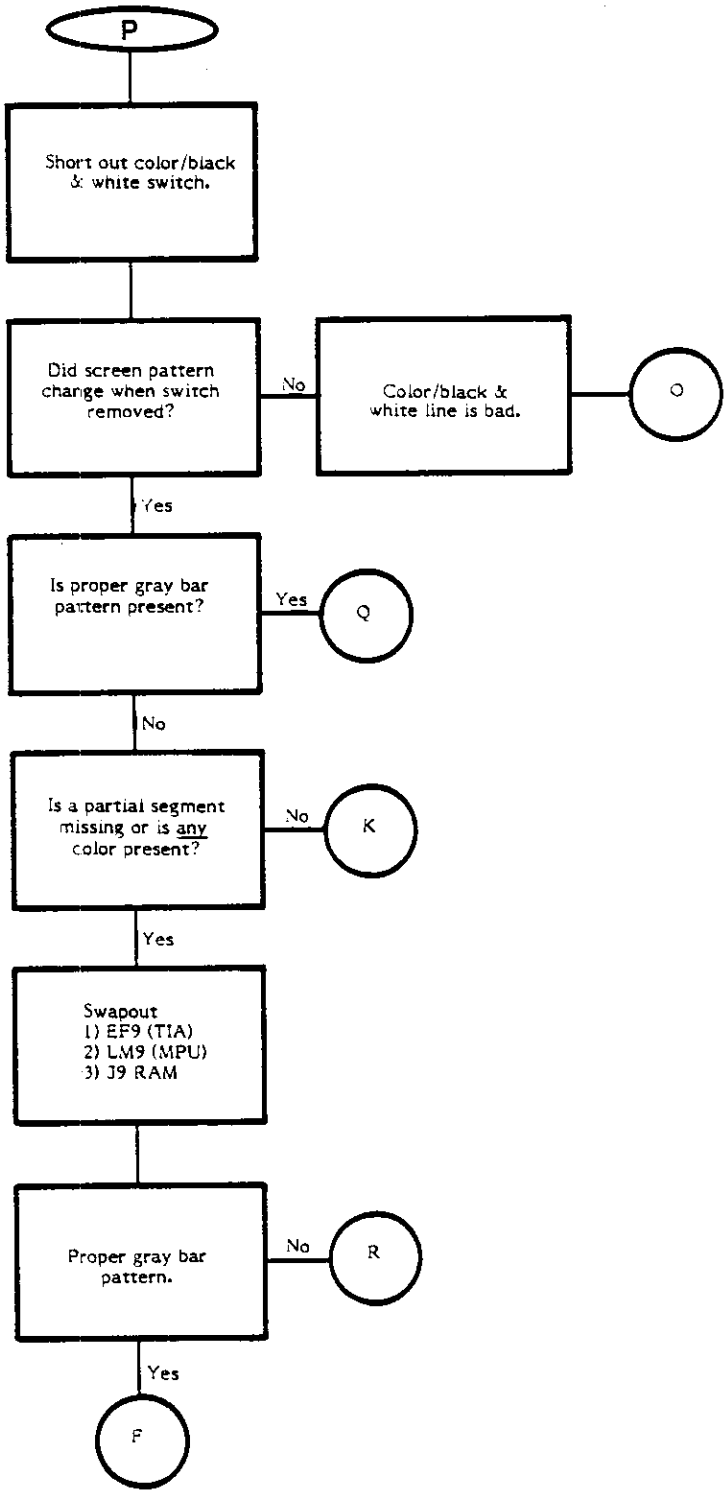
2.6 CARTRIDGE TEST



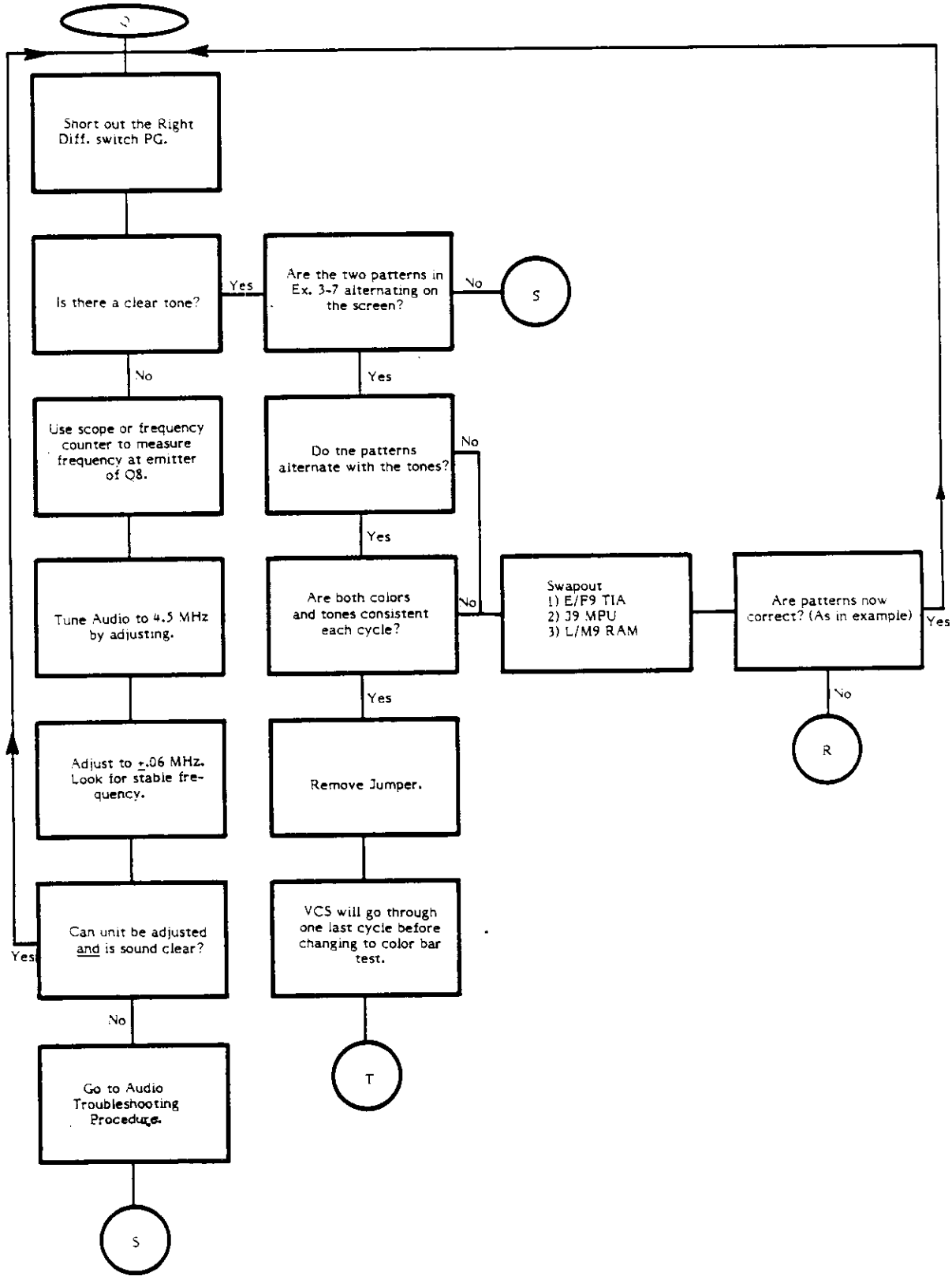
COLOR BAR TEST



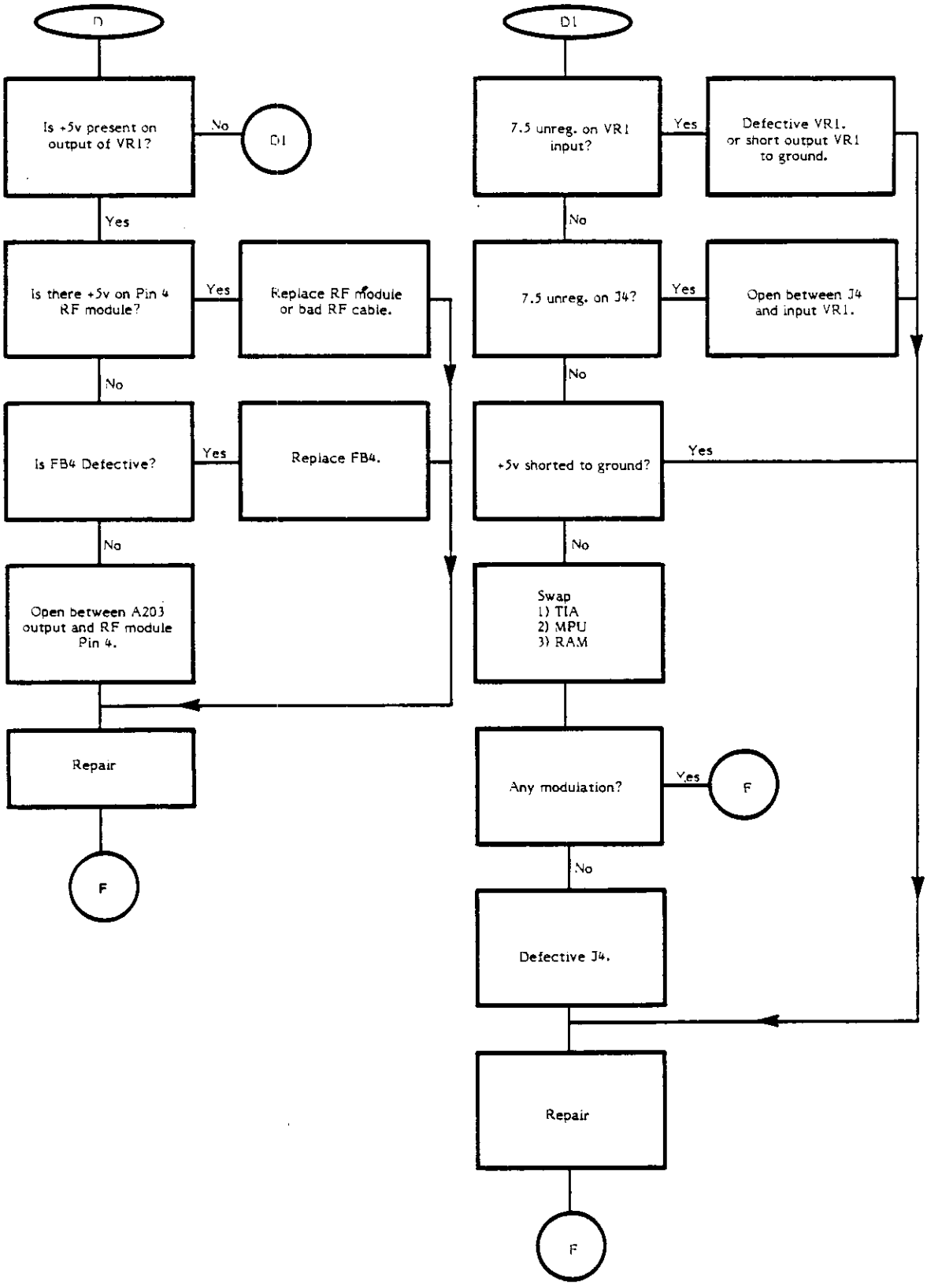
GRAY BAR TEST

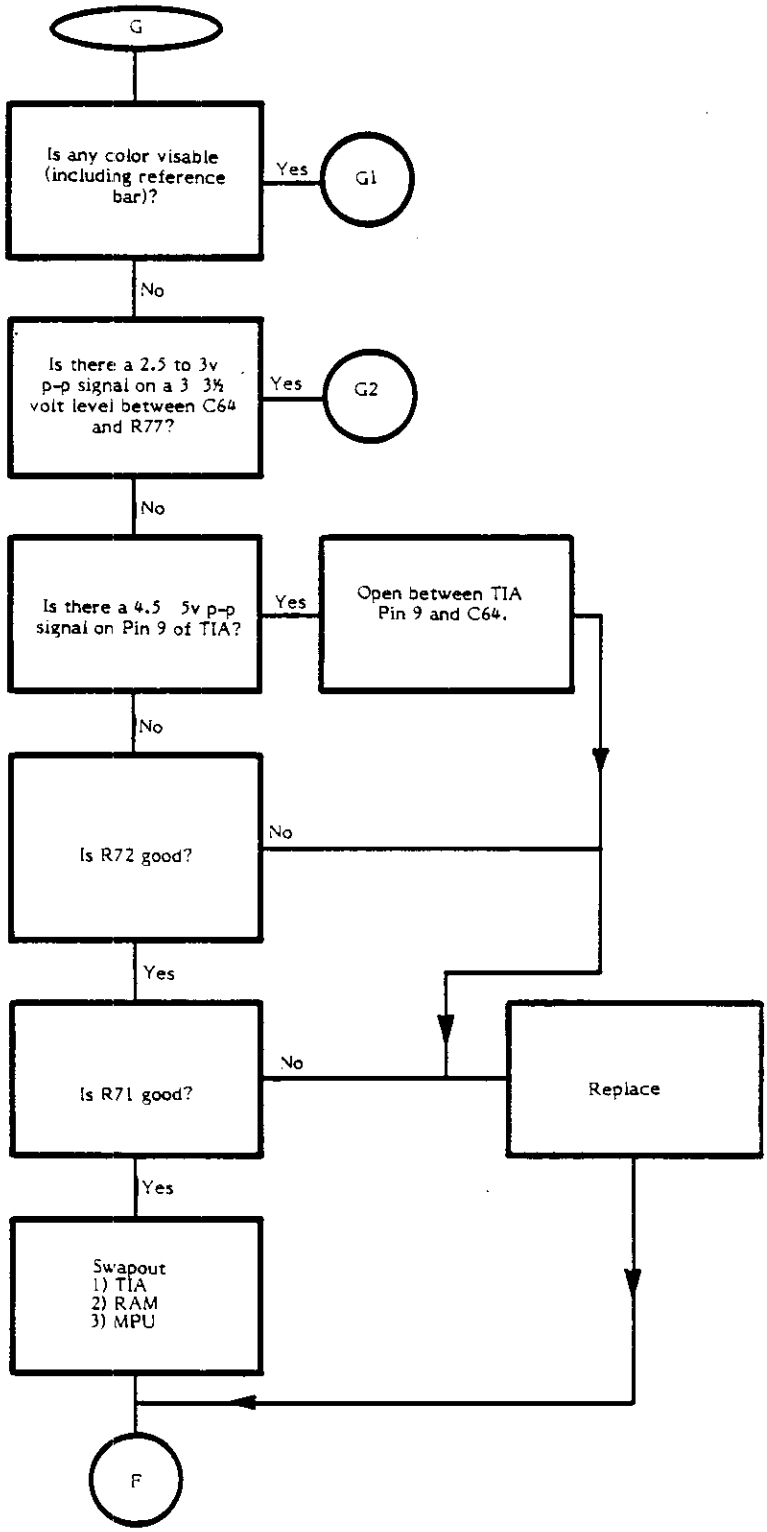


AUDIO TEST PROCEDURE

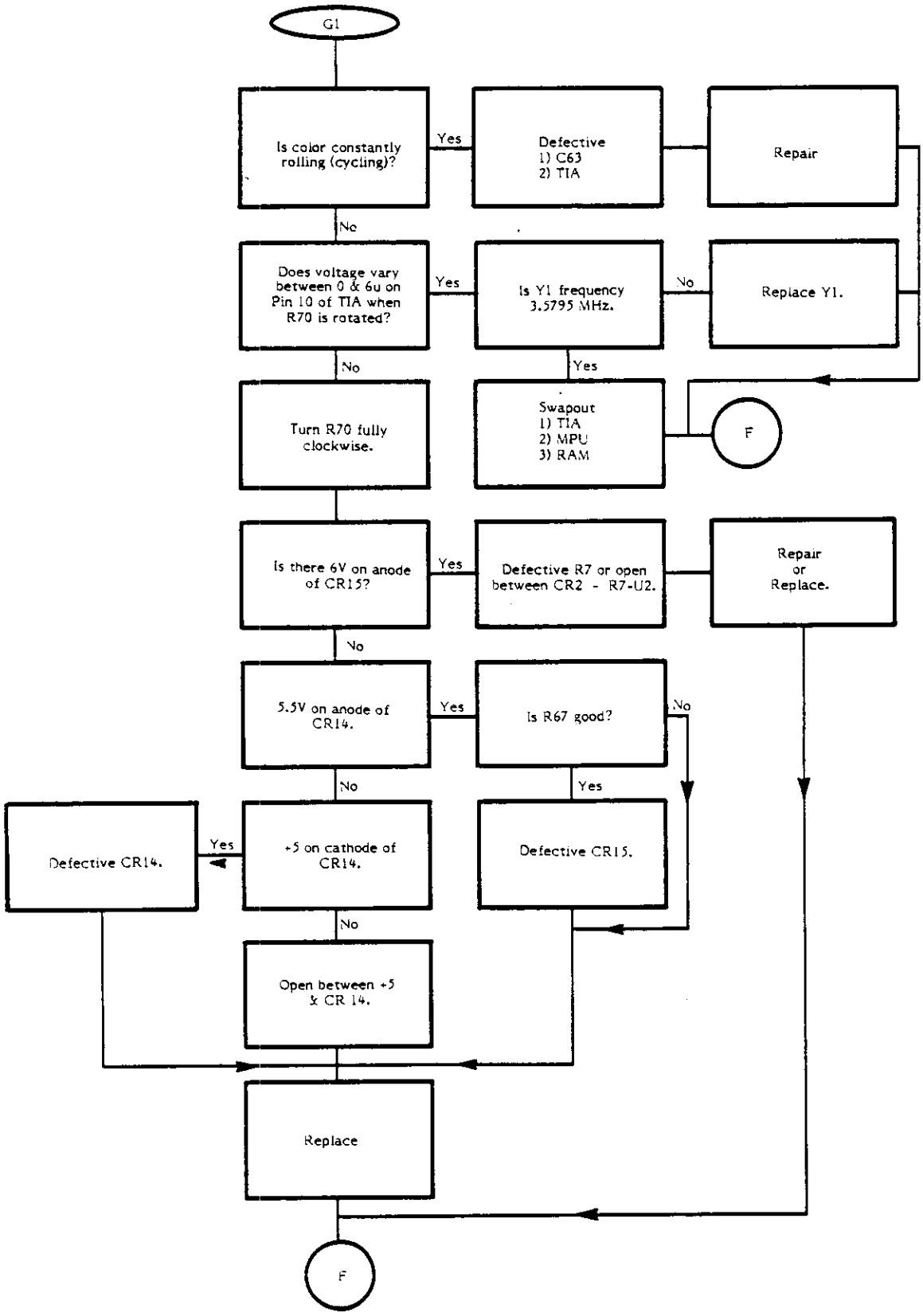


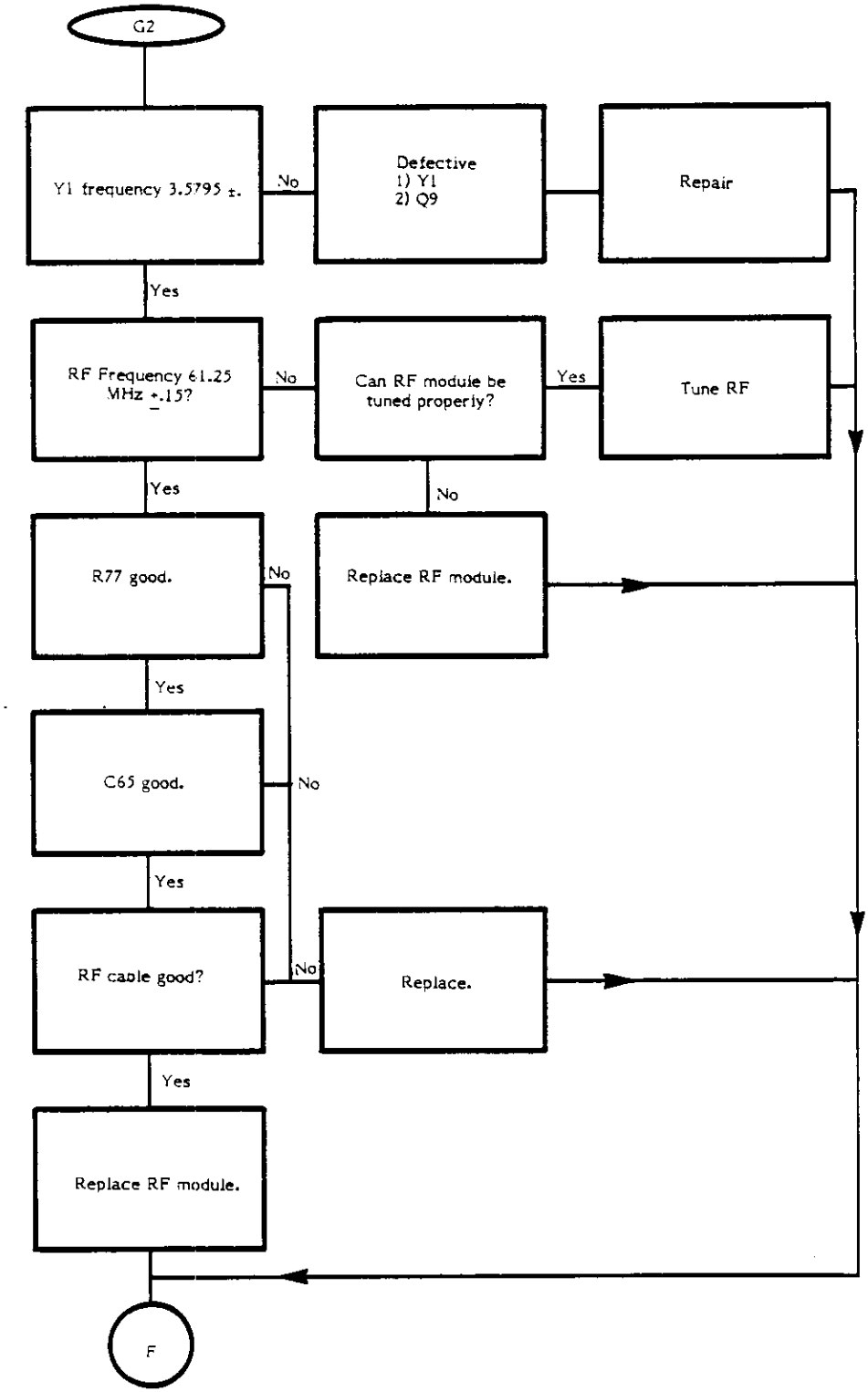
SNOWY SCREEN TROUBLESHOOTING PROCEDURES



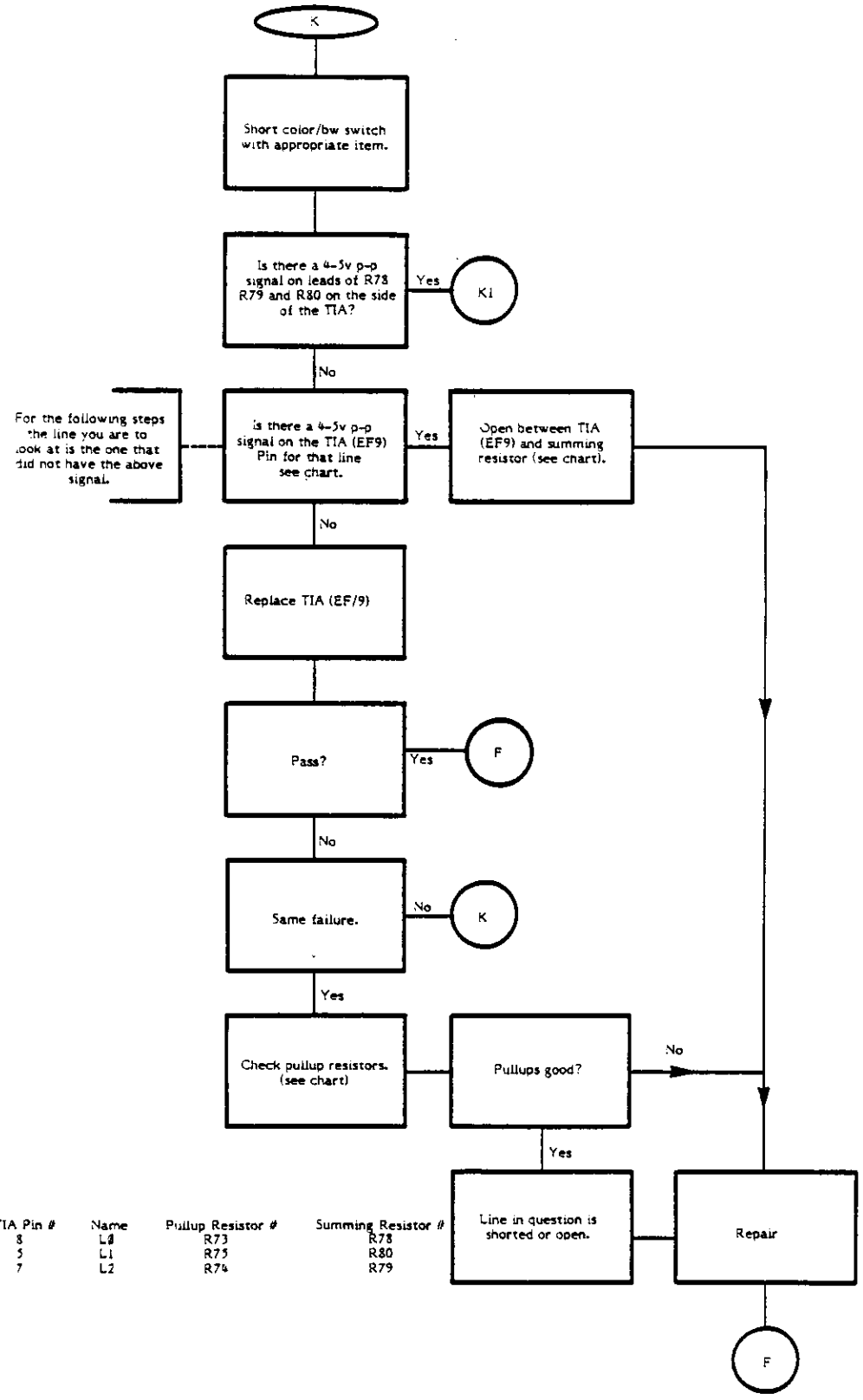

G
Is any color visable (including reference bar)?
Yes
G1
No
Is there a 2.5 to 3v p-p signal on a 3 3½ volt level between C64 and R77?
Yes
G2
No
Is there a 4.5 5v p-p signal on Pin 9 of TIA?
Yes
Open between TIA Pin 9 and C64.
No
Is R72 good?
No
Yes
Is R71 good?
No
Replace
Yes
Swapout
1) TIA
2) RAM
3) MPU
F

COLOR TROUBLESHOOTING (Cont)



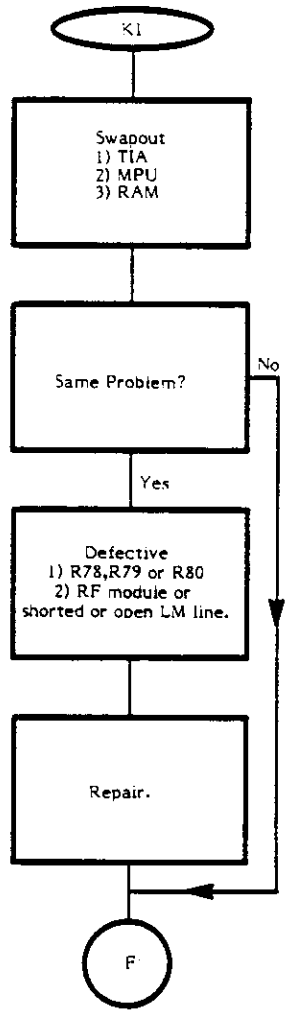

G2
Y1 frequency 3.5795 ±.
No
Defective
1) Y1
2) Q9
Repair
Yes
RF Frequency 61.25 MHz ±.15?
No
Can RF module be tuned properly?
Yes
Tune RF
Yes
No
R77 good.
No
Replace RF module.
Yes
C65 good.
No
Yes
RF cable good?
No
Replace.
Yes
Replace RF module.
F

GRAY BAR TROUBLESHOOTING

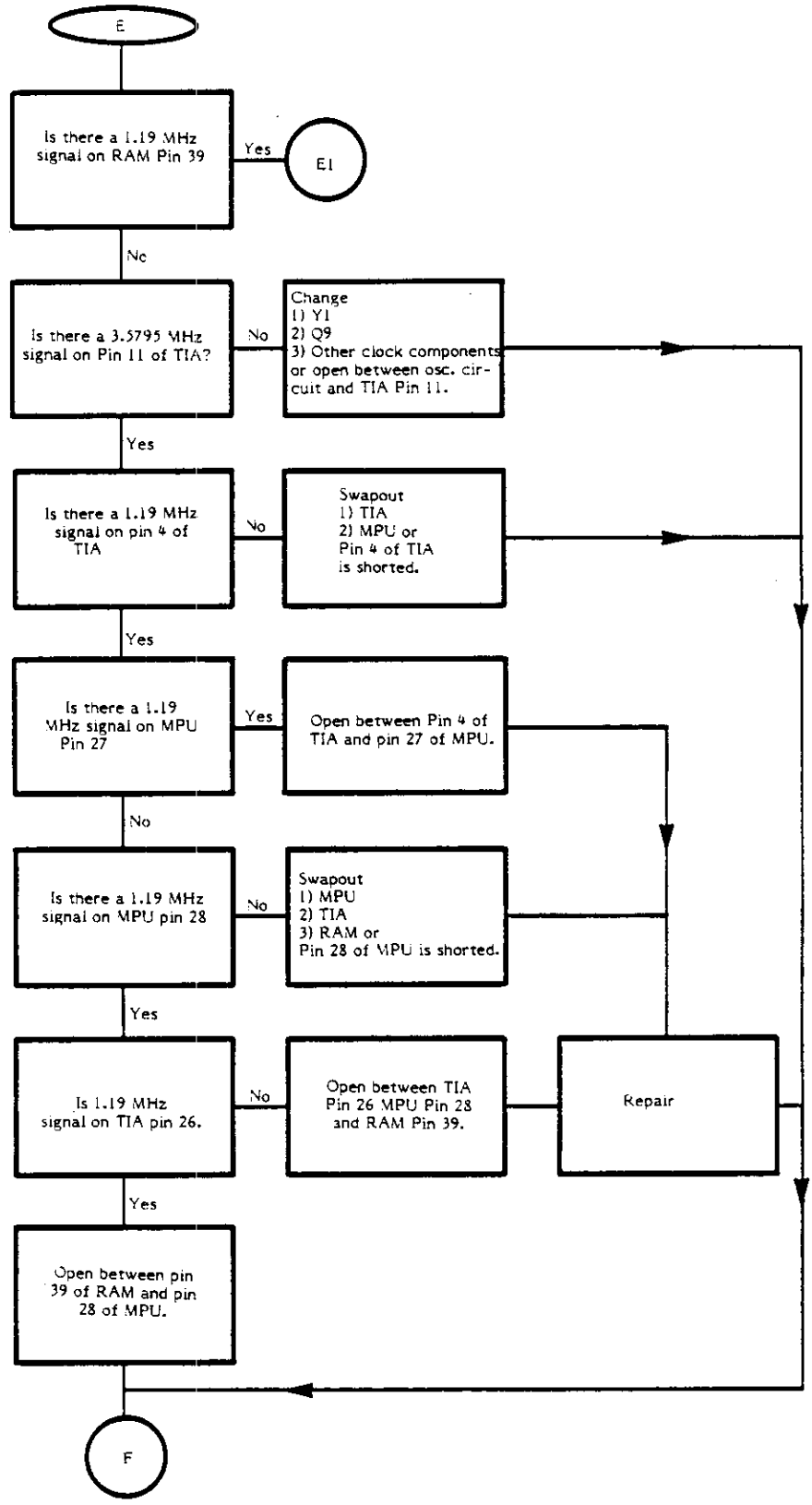


TIA Pin #	Name	Pullup Resistor #	Summing Resistor #
8	L0	R73	R78
5	L1	R75	R80
7	L2	R74	R79

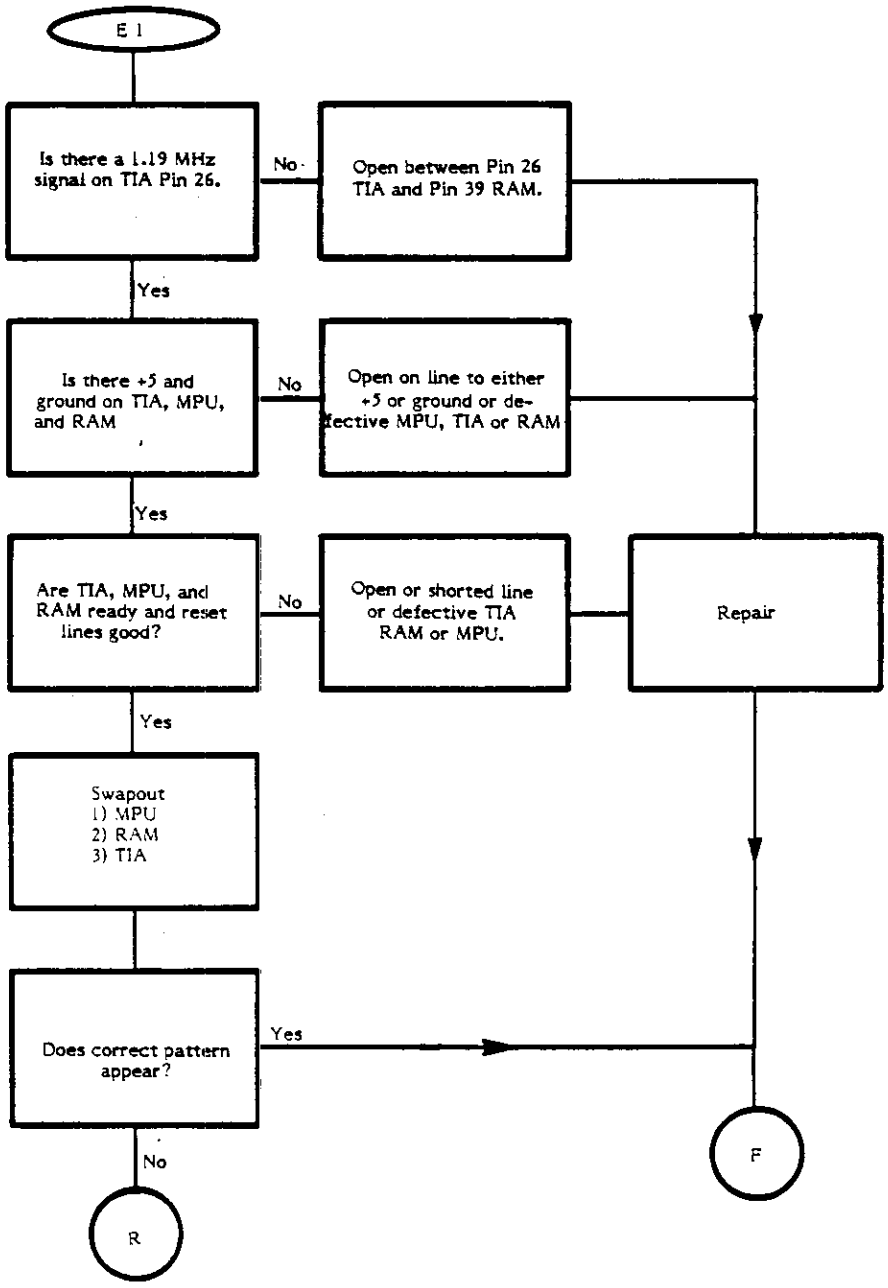
GRAY BAR TROUBLESHOOTING (Cont)



SOLID COLORED SCREEN TROUBLESHOOTING

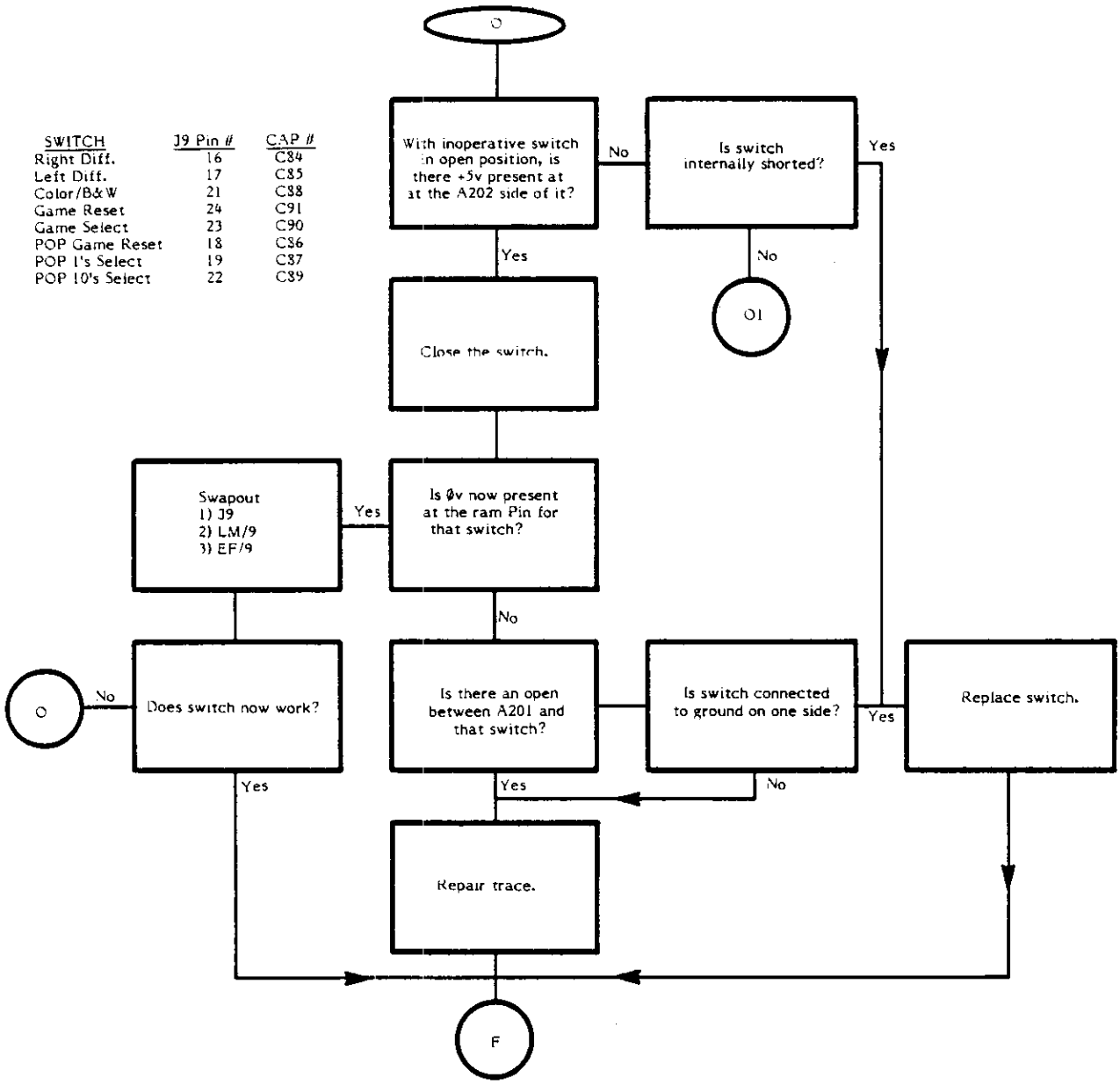


SOLID COLORED SCREEN TROUBLESHOOTING (Cont)

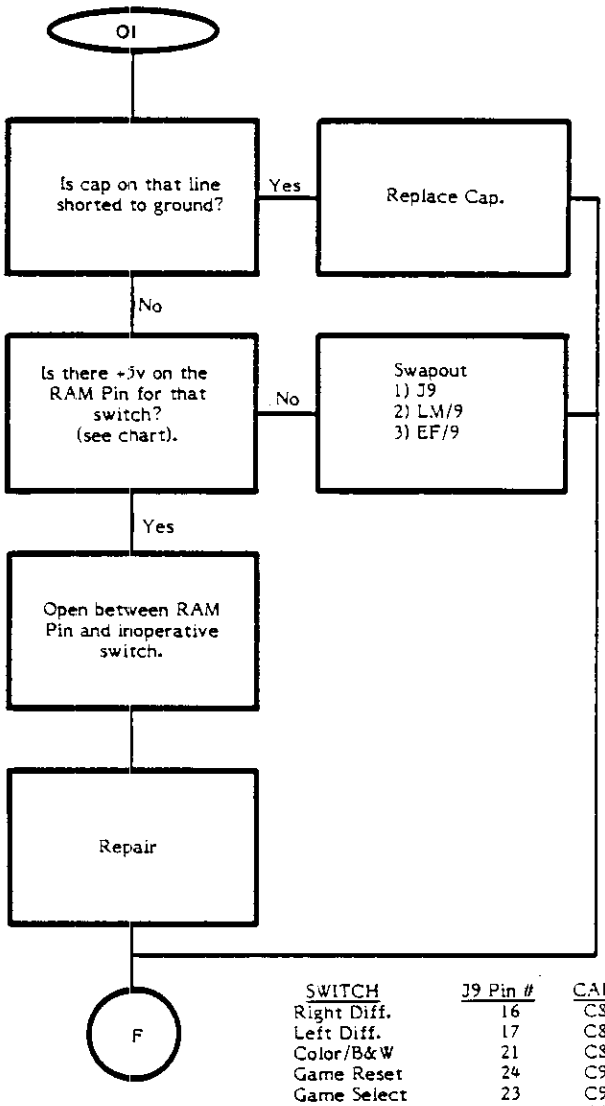


DEFECTIVE SWITCH TROUBLESHOOTING

SWITCH	J9 Pin #	CAP #
Right Diff.	16	C84
Left Diff.	17	C85
Color/B&W	21	C88
Game Reset	24	C91
Game Select	23	C90
POP Game Reset	18	C86
POP 1's Select	19	C87
POP 10's Select	22	C89

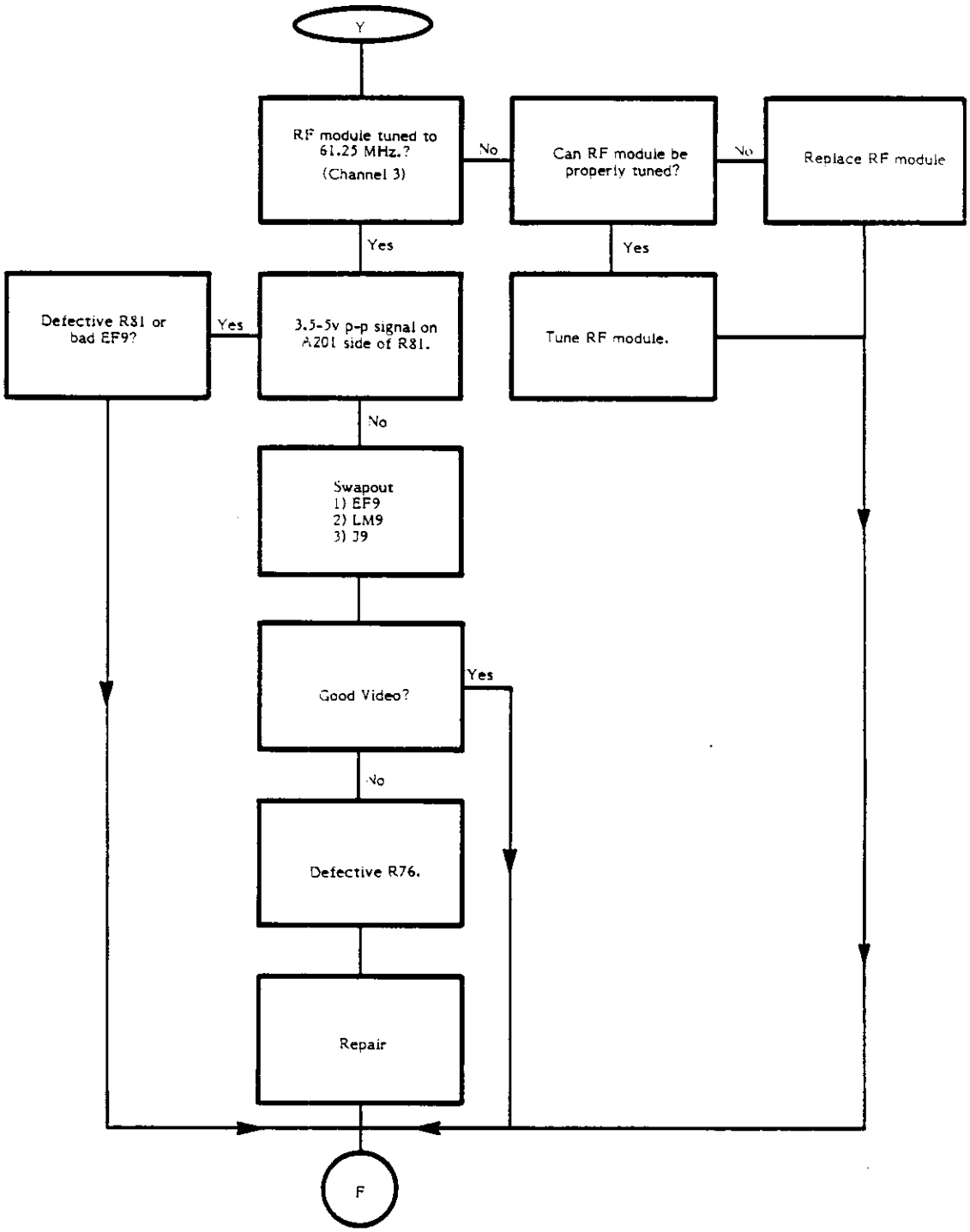


DEFECTIVE SWITCH TROUBLESHOOTING (Cont)

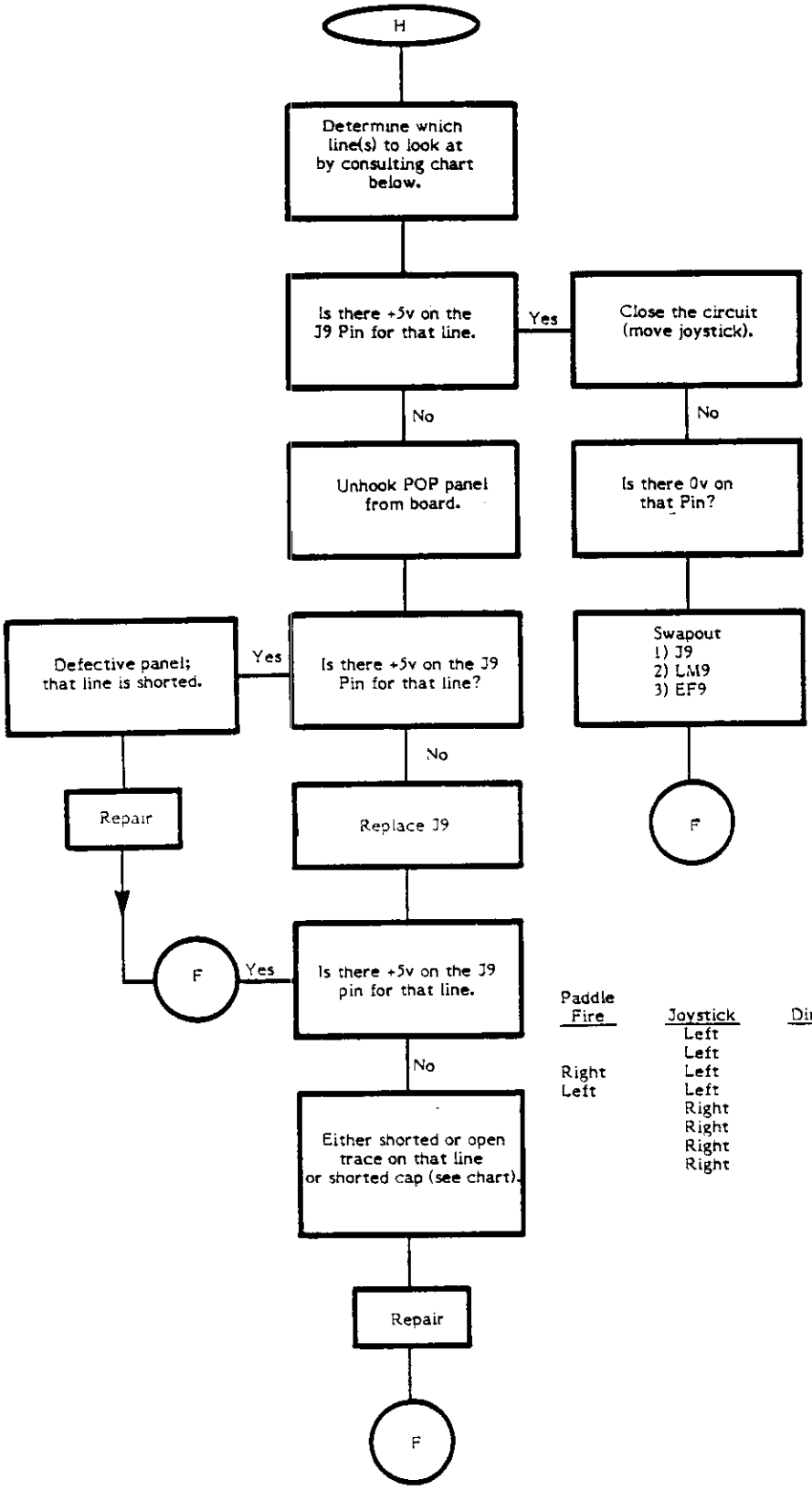


SWITCH	J9 Pin #	CAP #
Right Diff.	16	C84
Left Diff.	17	C85
Color/B&W	21	C88
Game Reset	24	C91
Game Select	23	C90
POP Game Reset	18	C86
POP 1's Select	19	C87
POP 10's Select	22	C89

BAD SYNC TROUBLESHOOTING

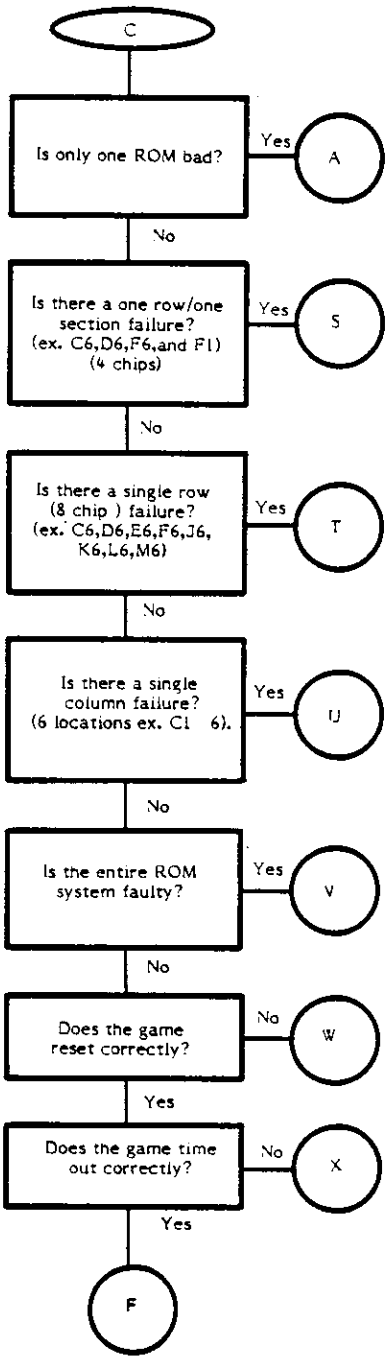


DEFECTIVE I/O LINE TROUBLESHOOTING

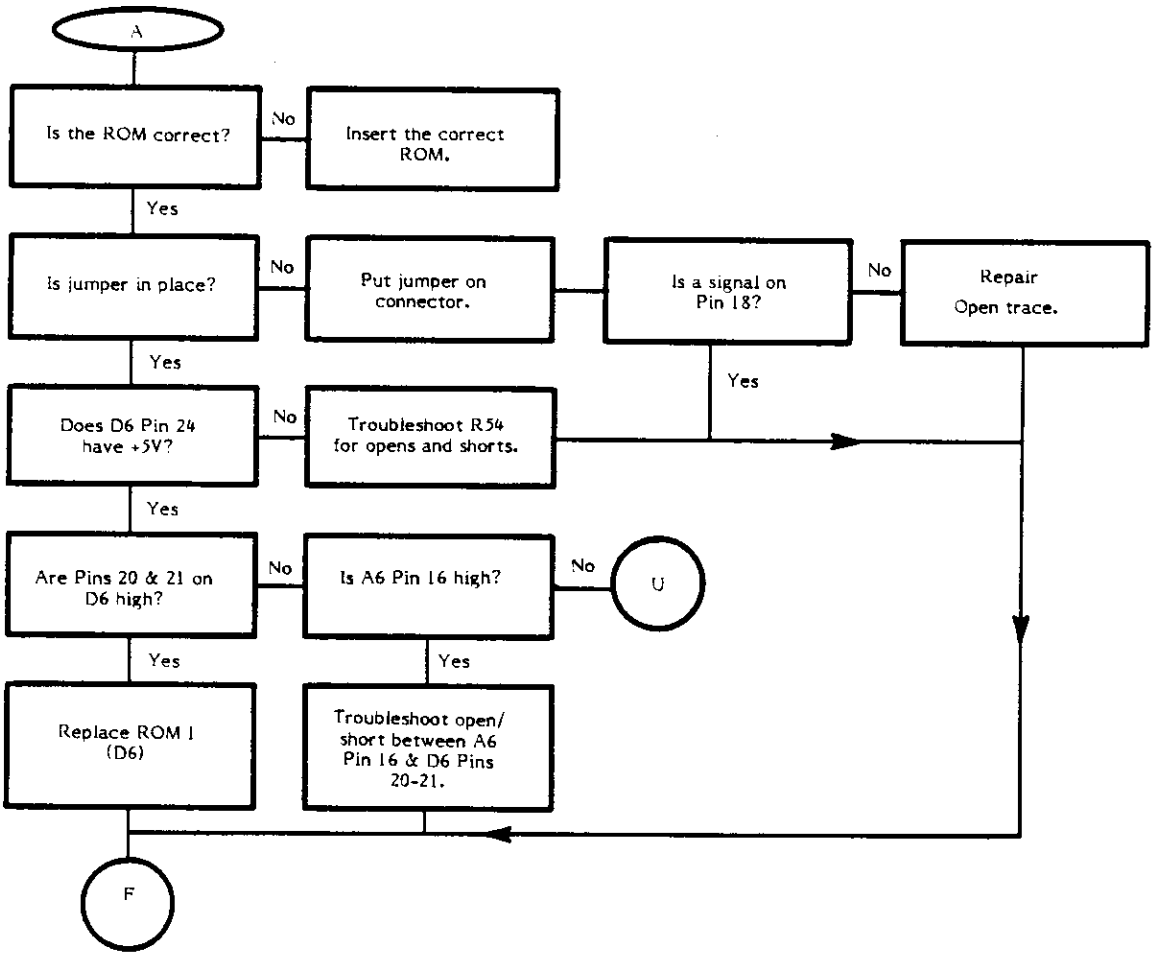


Paddle Fire	Joystick	Direction	J9 Pin	Cap #
	Left	Up	12	C58
	Left	Down	13	C57
Right	Left	Left	14	C56
Left	Left	Right	15	C55
	Right	Up	12	C62
	Right	Down	13	C61
	Right	Left	14	C60
	Right	Right	15	C59

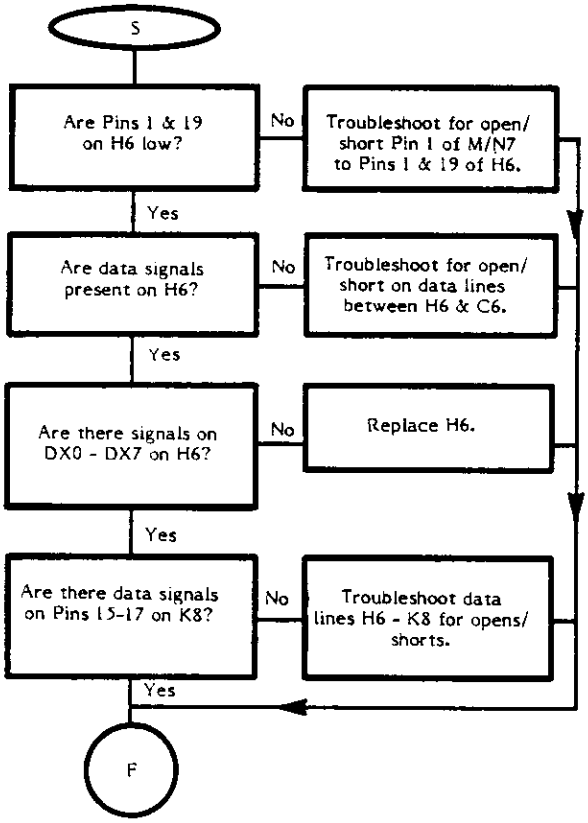
DEFECTIVE ROM TROUBLESHOOTING



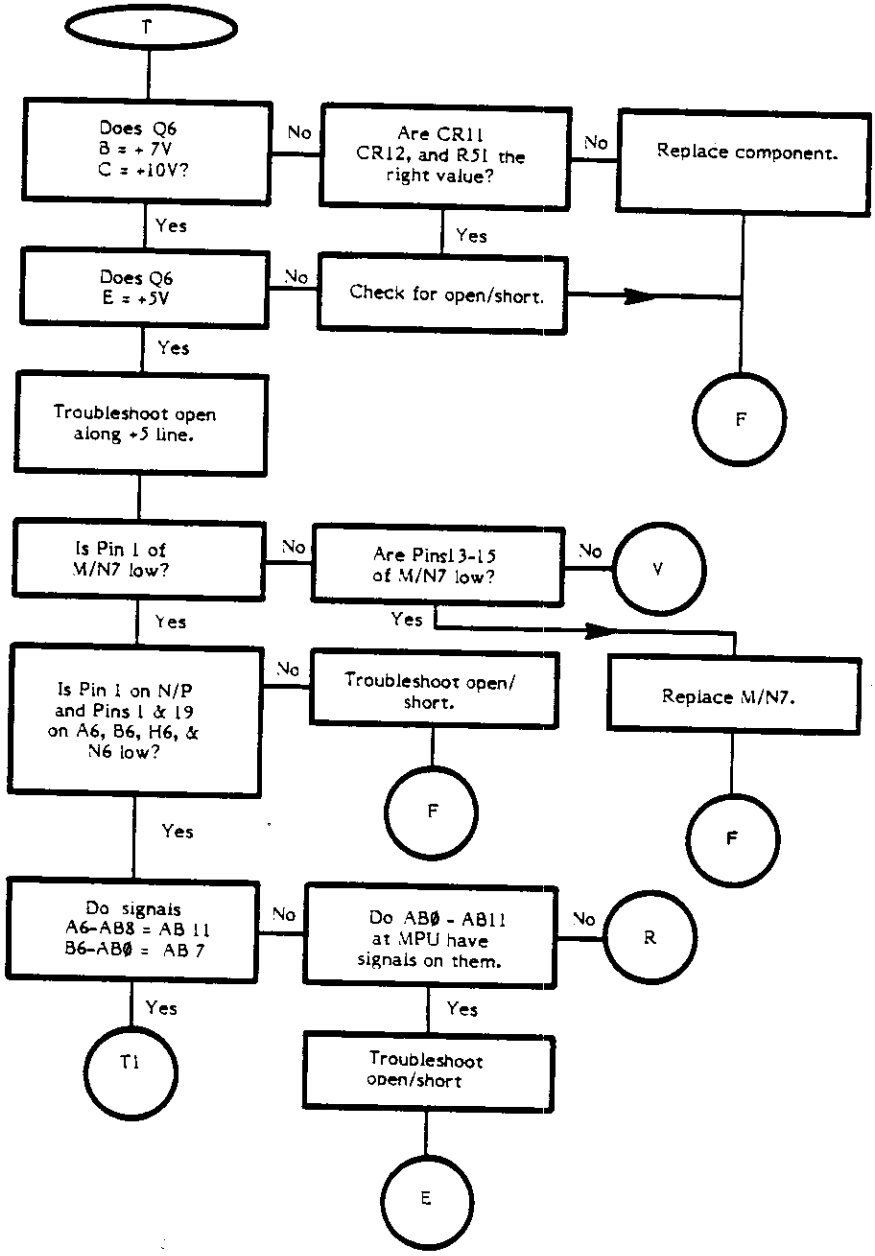
SINGLE ROM FAULTY (ei ROM 1, DEVICE D6)



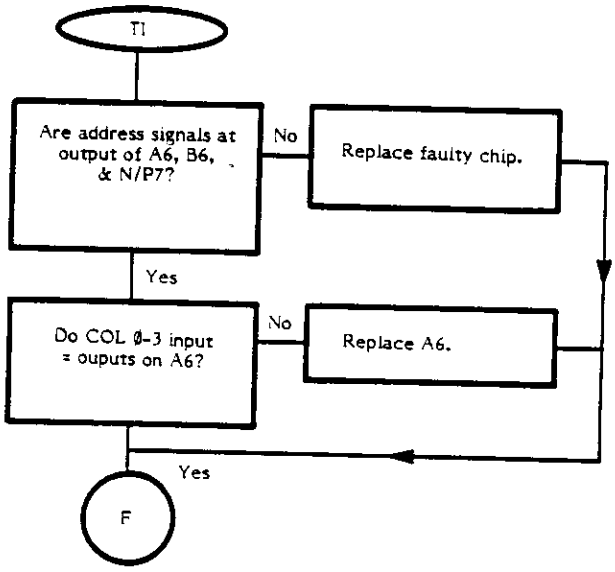
ONE ROW - ONE SECTION FAULTY, A GROUP OF FOUR CHIPS (i.e., ROW 0, SECTION X, DEVICES C6, 06, E6, & F1)



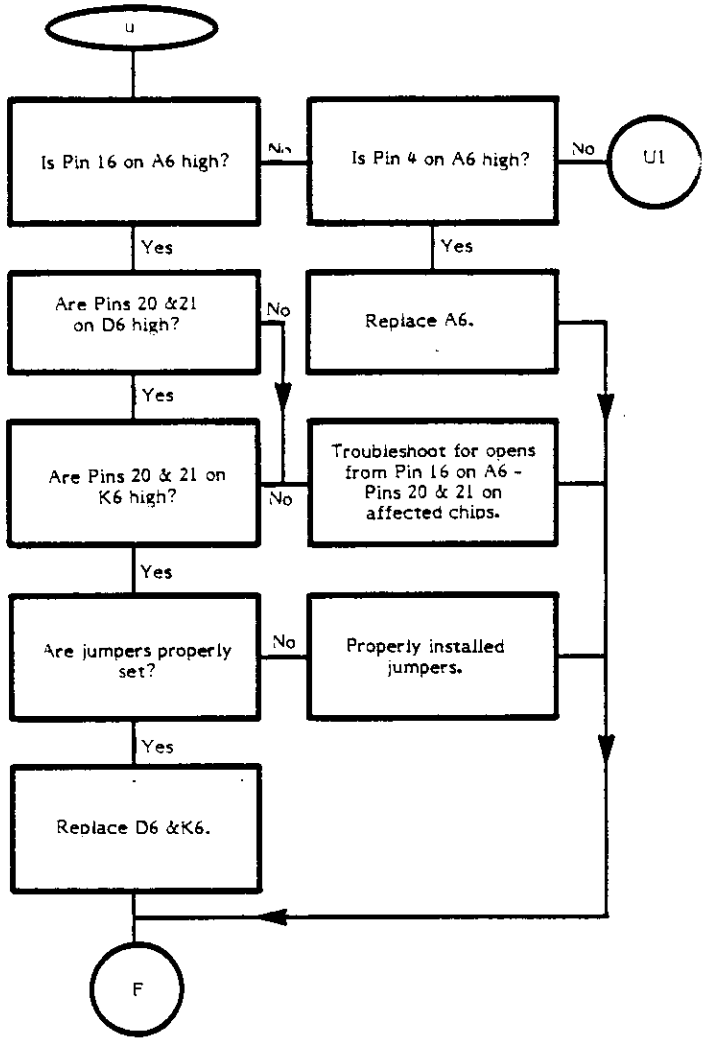
SINGLE ROW FAULTY, A GROUP OF 8 CHIPS (i.e., ROW 0 DEVICES C6, D6, E6, F6, J6, K6, L6 AND M6)



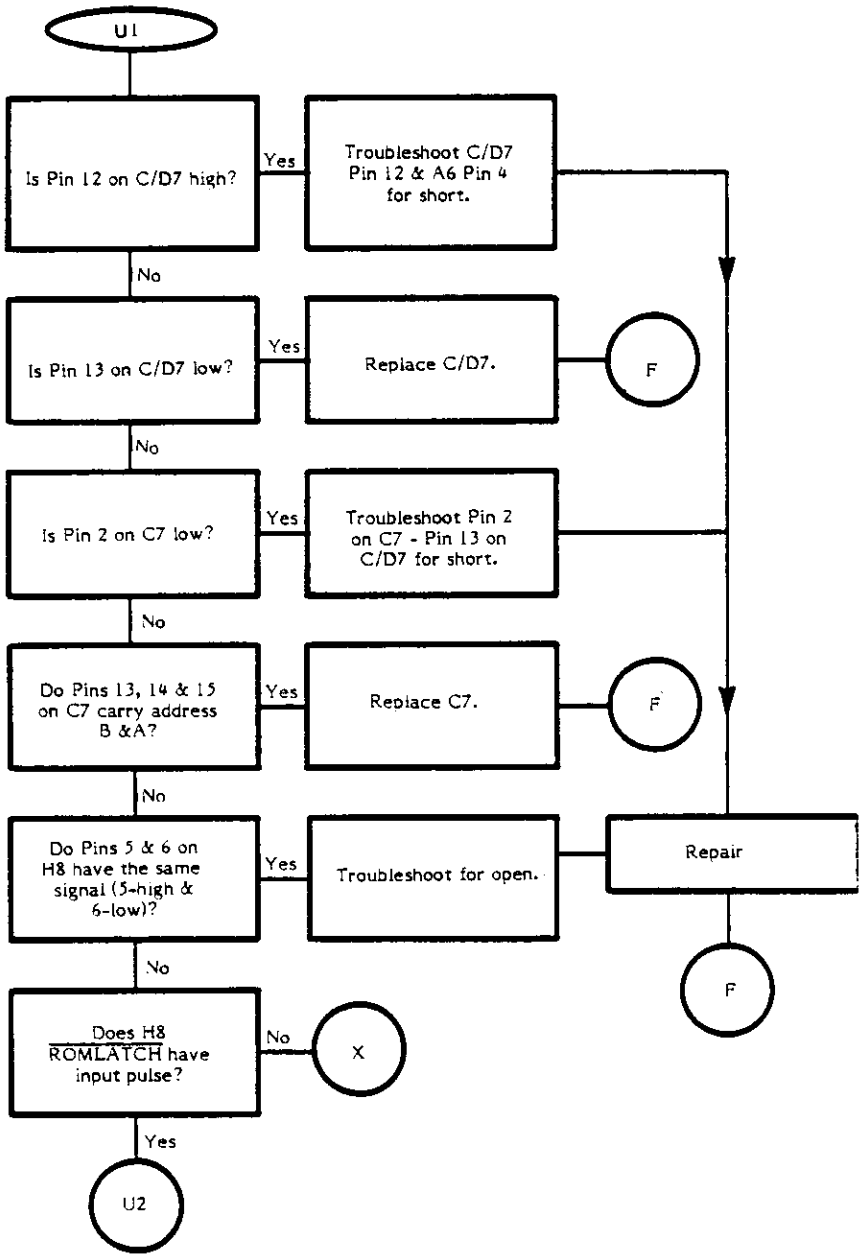
SINGLE ROW FAULTY (Cont)



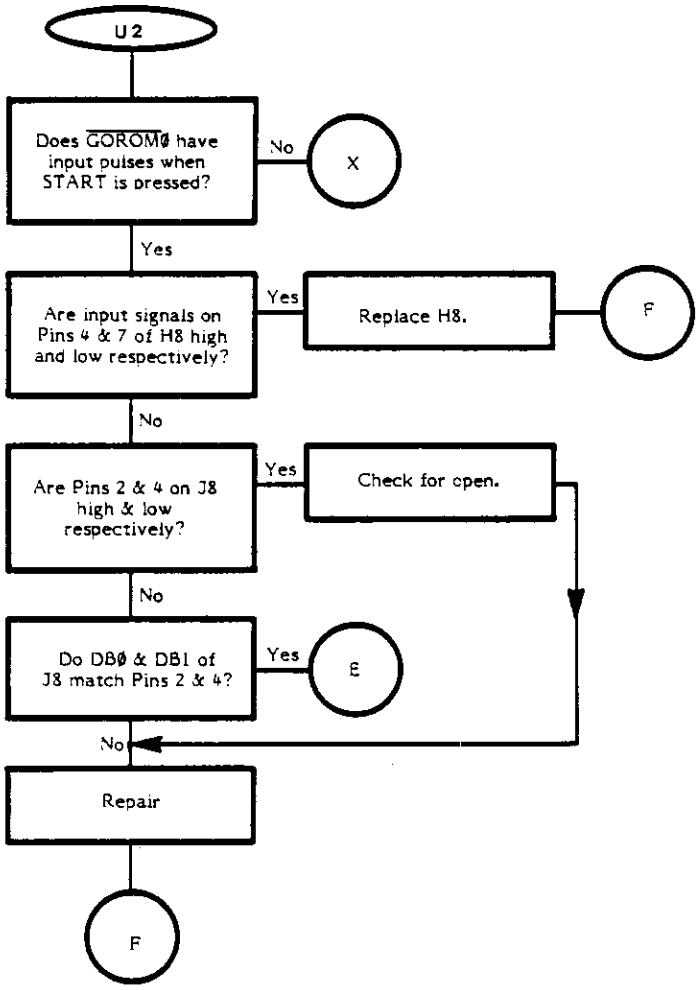
SINGLE COLUMN FAULTY, COLUMN ONE (1) IS USED AS THE EXAMPLE



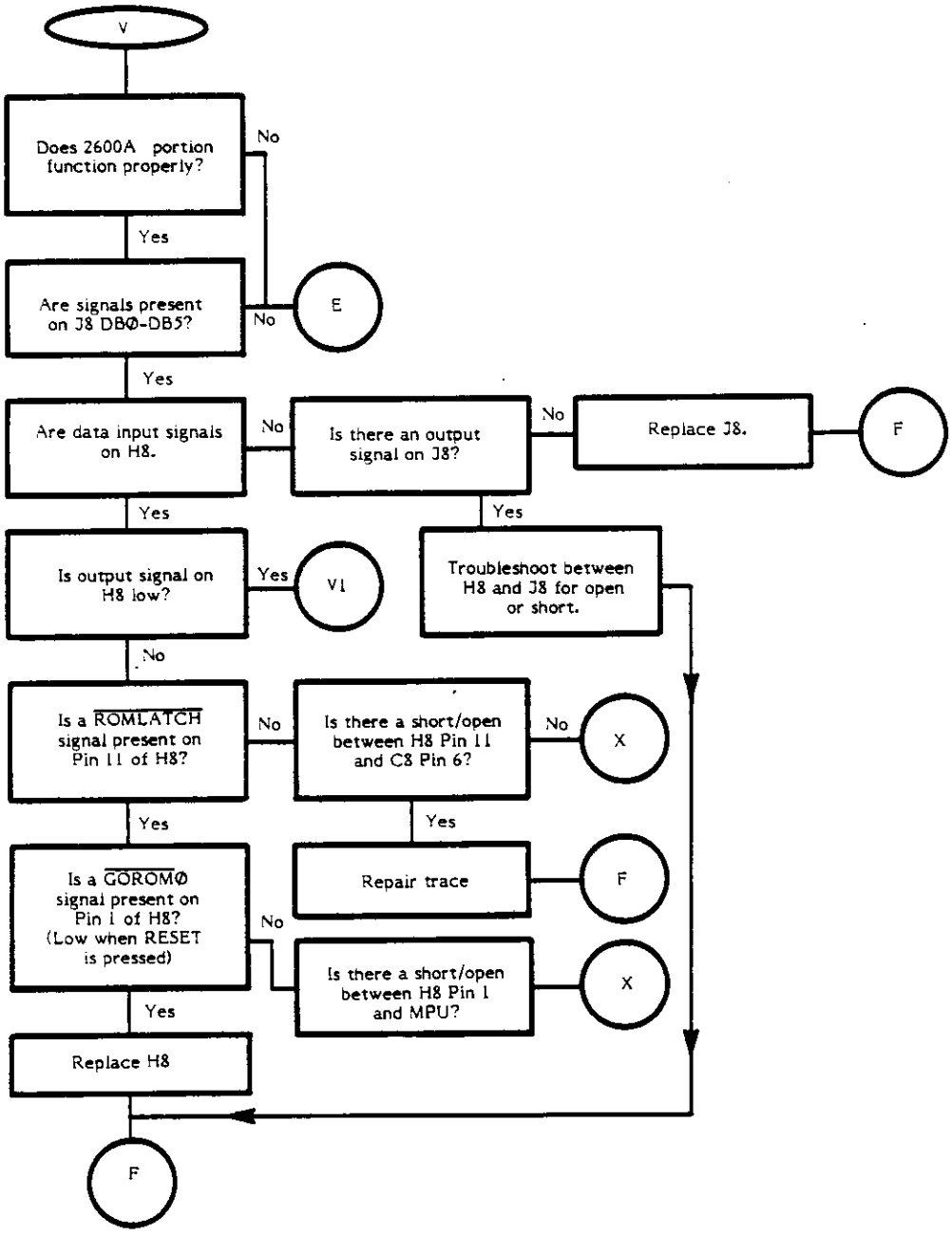
SINGLE COLUMN FAULTY (Cont)



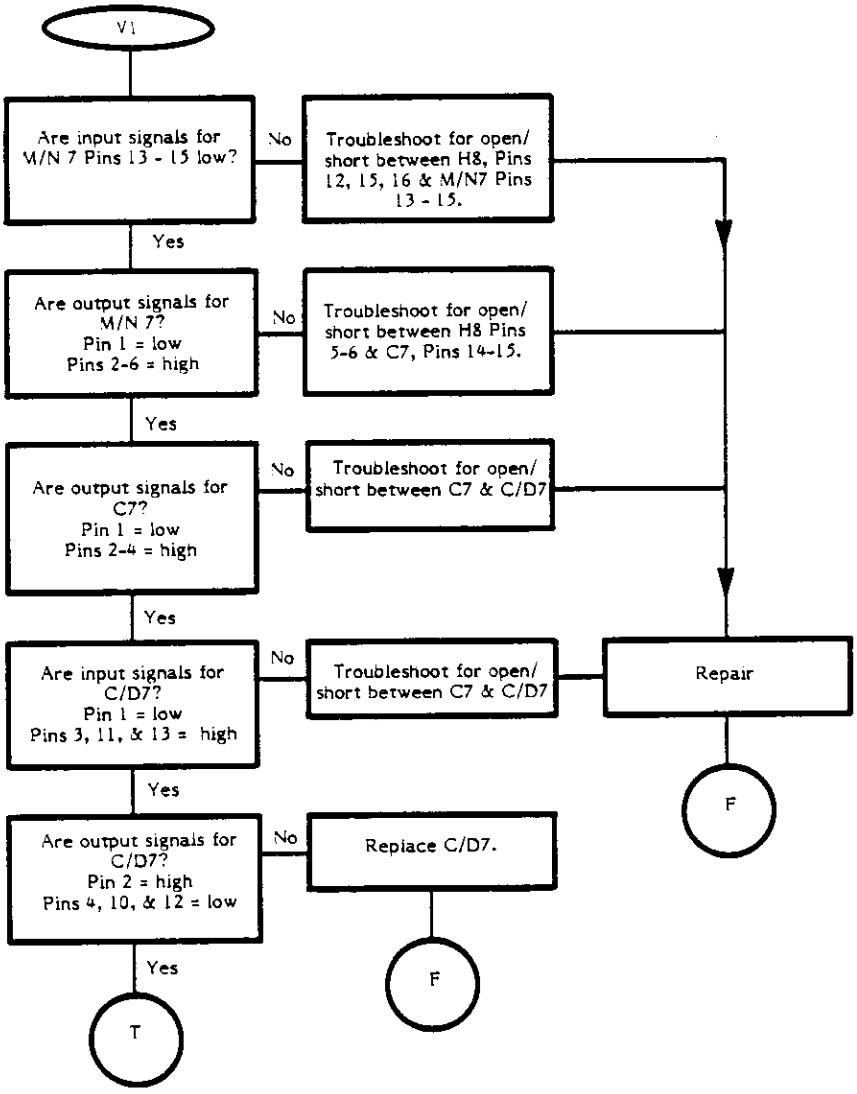
SINGLE COLUMN FAULTY (Cont)



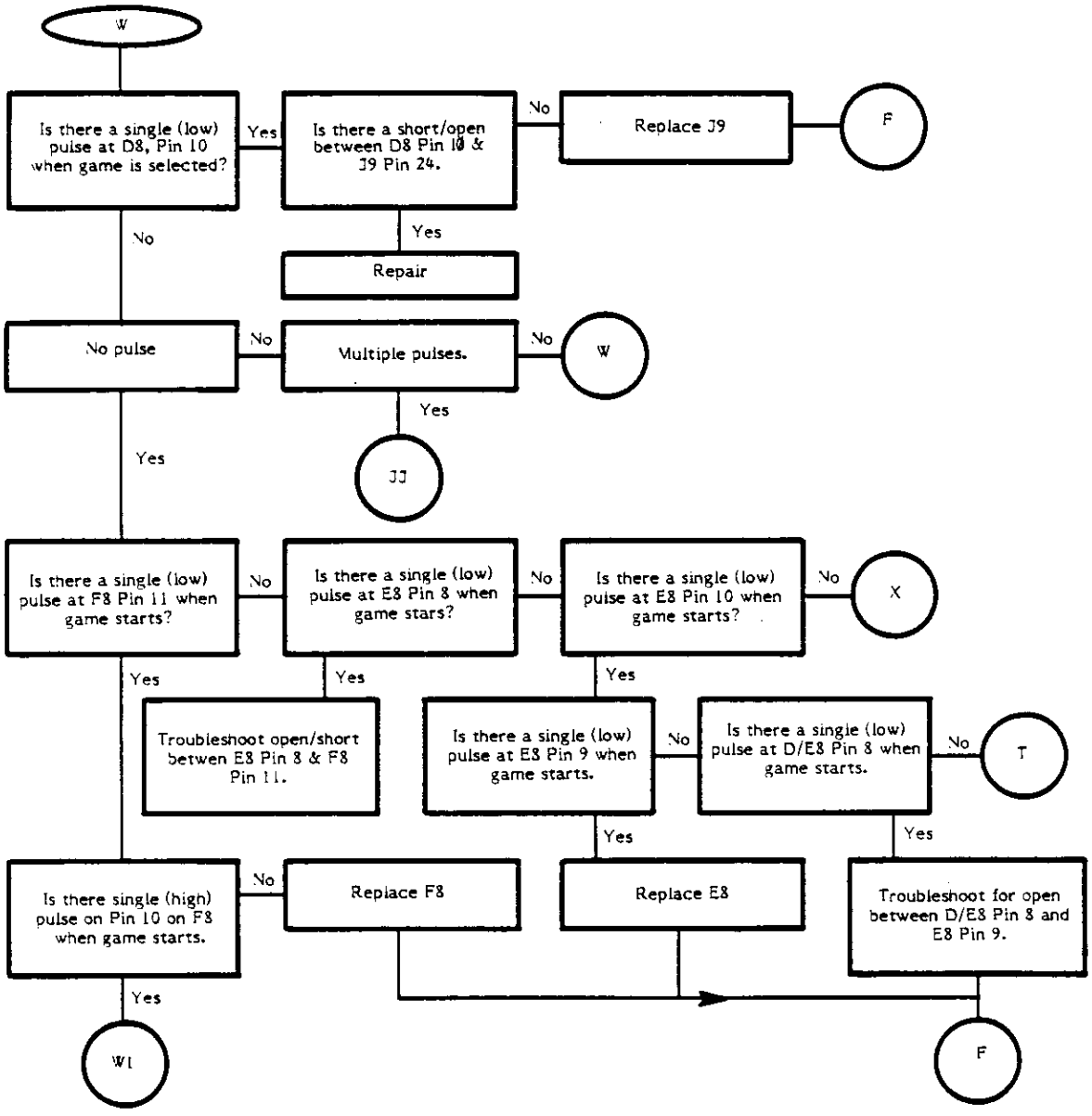
ENTIRE ROM SYSTEM FAULTY

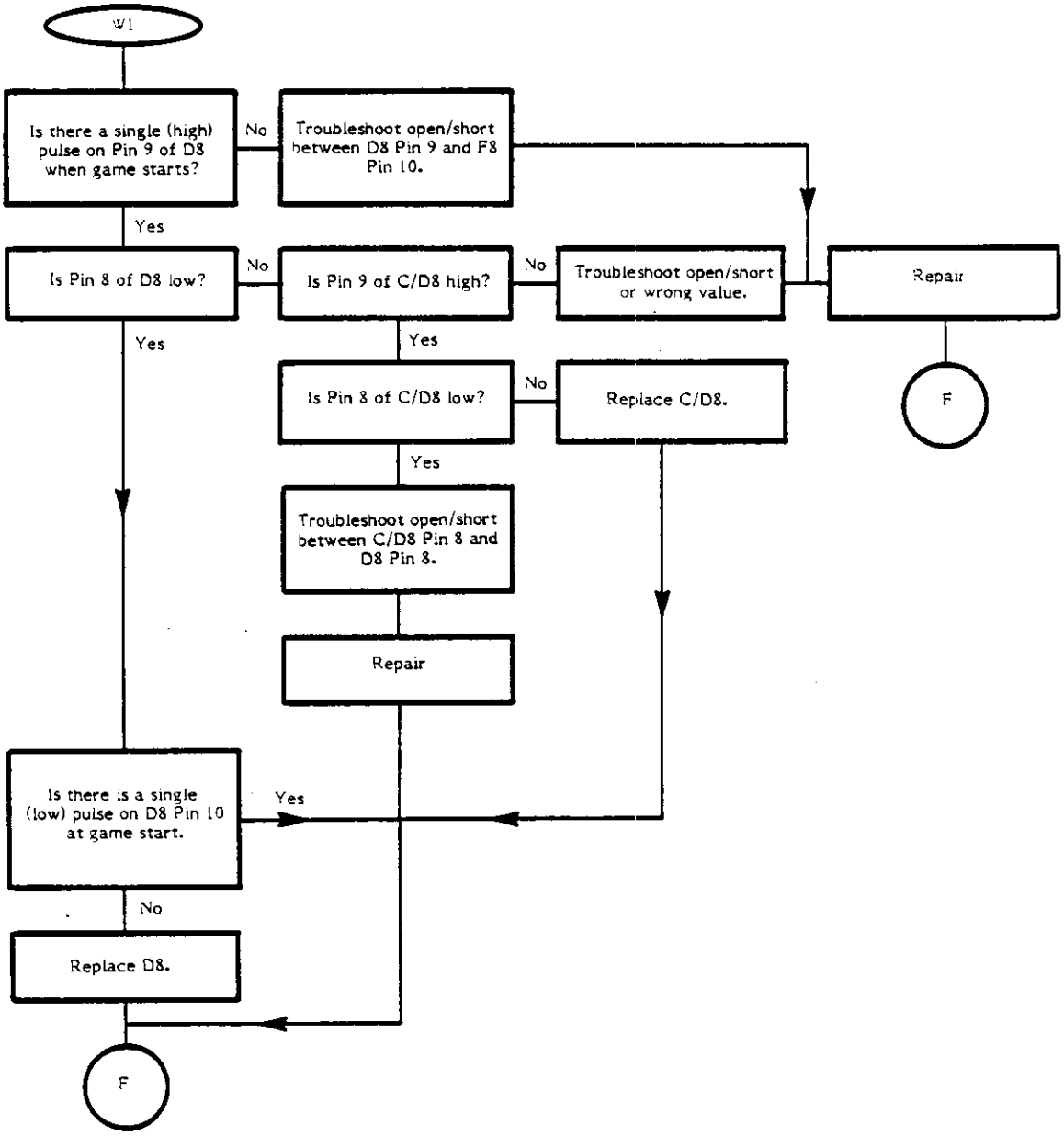


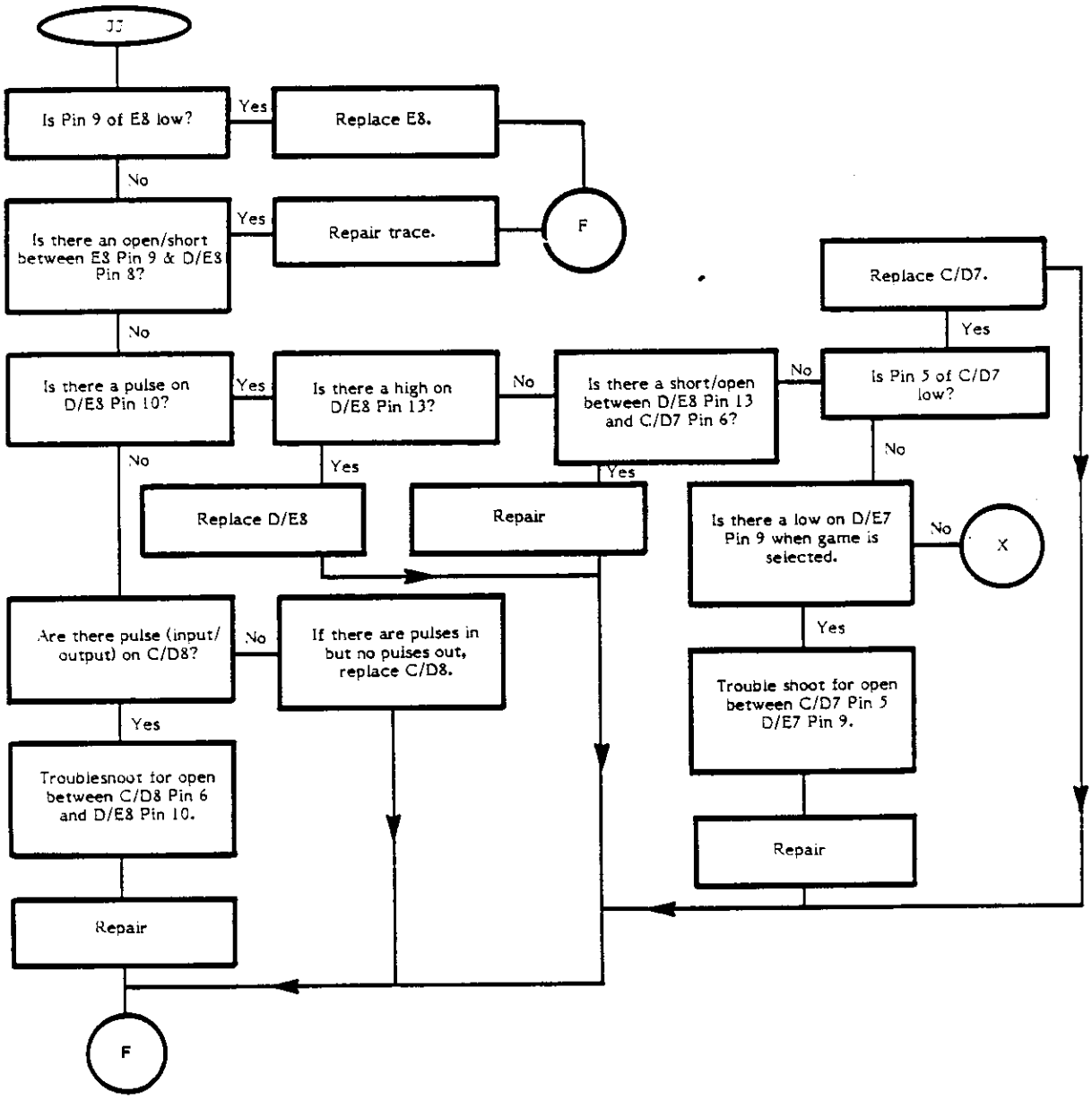
ENTIRE ROM SYSTEM FAULTY (Cont)



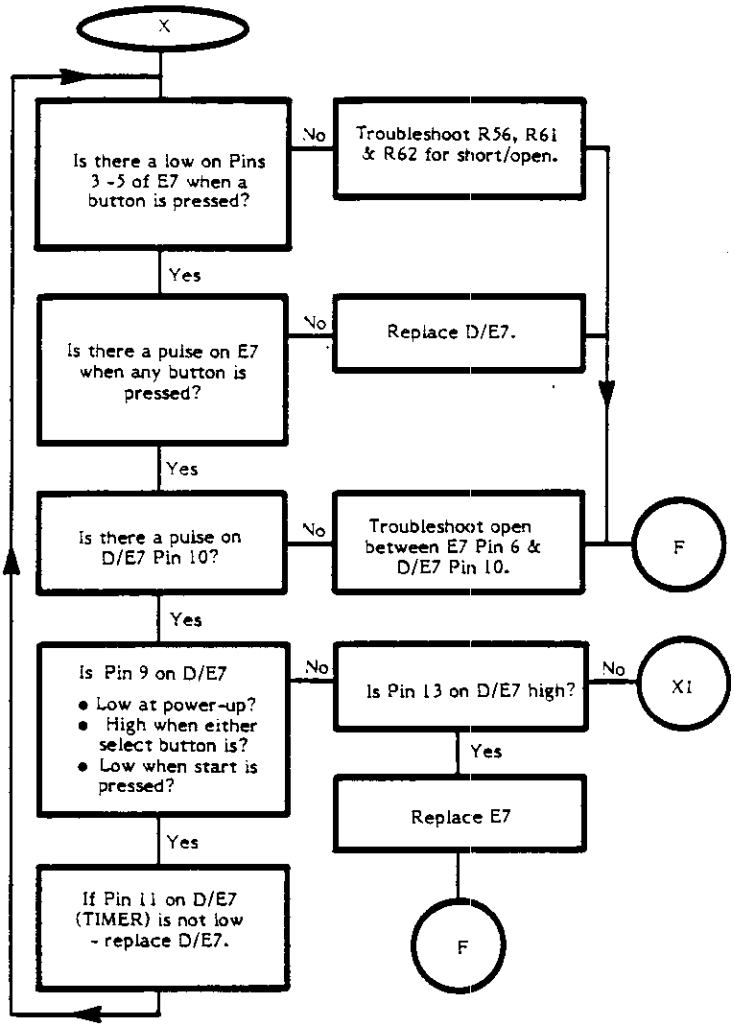
GAME WILL NOT RESET TROUBLESHOOTING PROCEDURES



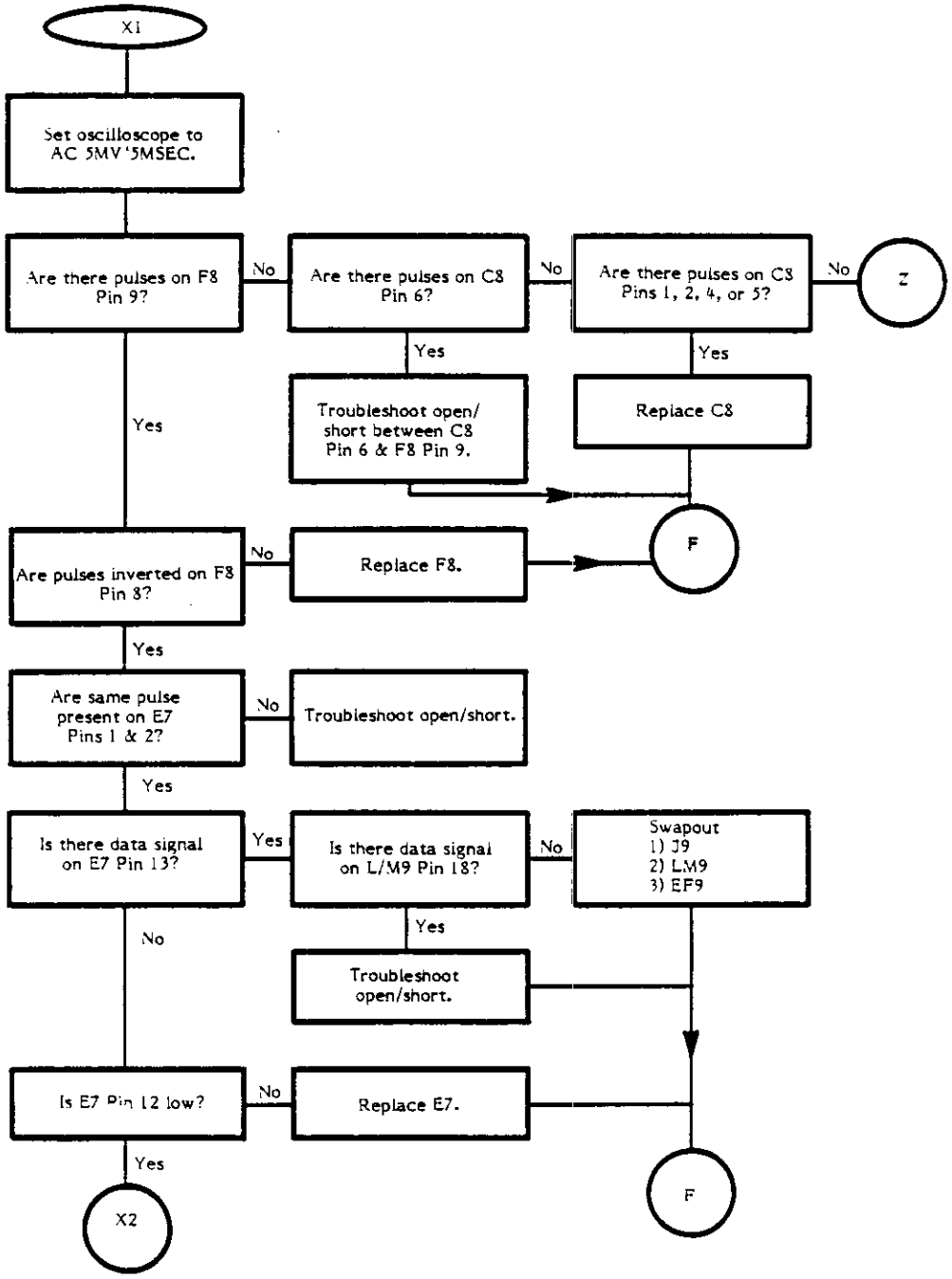

W1
Is there a single (high) pulse on Pin 9 of D8 when game starts?
No
Troubleshoot open/short between D8 Pin 9 and F8 Pin 10.
Yes
Is Pin 8 of D8 low?
No
Is Pin 9 of C/D8 high?
No
Troubleshoot open/short or wrong value.
Repair
F
Yes
Yes
Is Pin 8 of C/D8 low?
No
Replace C/D8.
Yes
Troubleshoot open/short between C/D8 Pin 8 and D8 Pin 8.
Repair
Is there is a single (low) pulse on D8 Pin 10 at game start.
Yes
No
Replace D8.
F


JJ
Is Pin 9 of E8 low?
Yes
Replace E8.
No
Is there an open/short between E8 Pin 9 & D/E8 Pin 8?
Yes
Repair trace.
F
No
Is there a pulse on D/E8 Pin 10?
Yes
Is there a high on D/E8 Pin 13?
No
Is there a short/open between D/E8 Pin 13 and C/D7 Pin 6?
No
Is Pin 5 of C/D7 low?
Replace C/D7.
Yes
No
Yes
Yes
Replace D/E8
Repair
Is there a low on D/E7 Pin 9 when game is selected.
No
X
Yes
Trouble shoot for open between C/D7 Pin 5 D/E7 Pin 9.
Repair
Are there pulse (input/output) on C/D8?
No
If there are pulses in but no pulses out, replace C/D8.
Yes
Troublesnoot for open between C/D8 Pin 6 and D/E8 Pin 10.
Repair
F

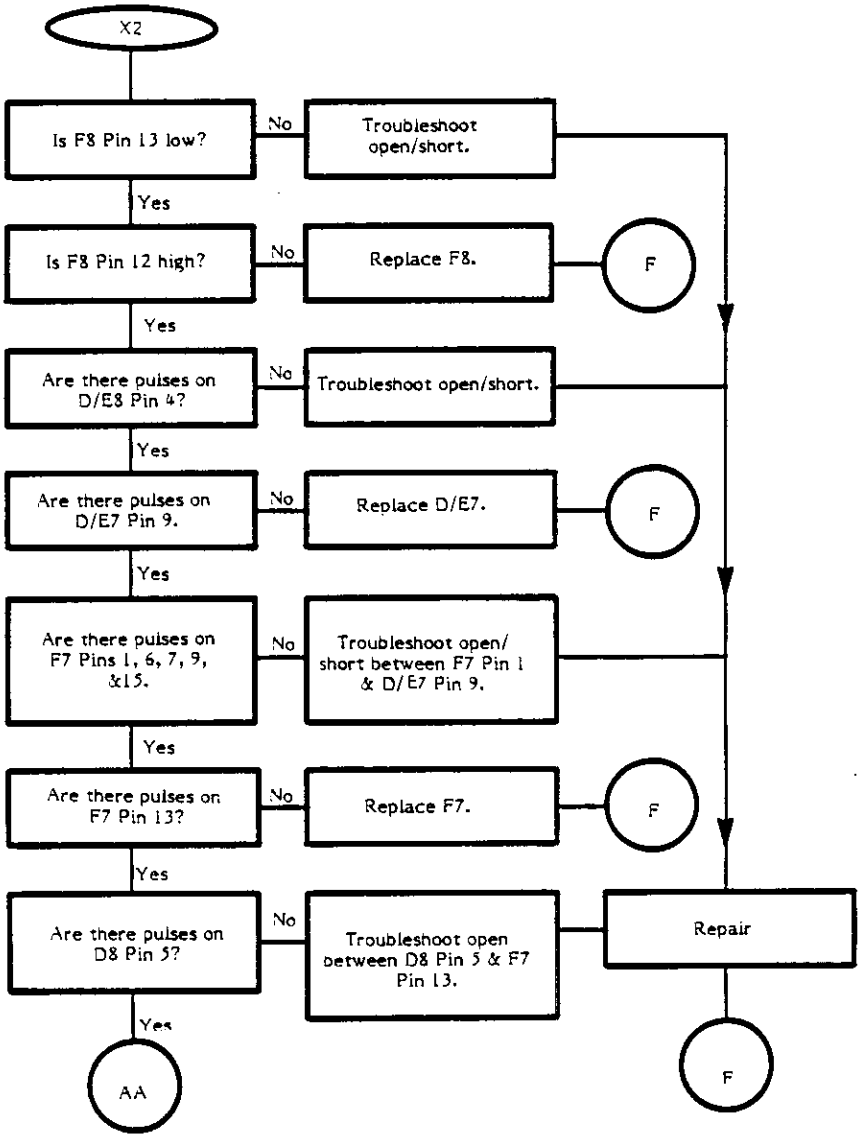
GAME DOES NOT RESET ON ATARI LOGO



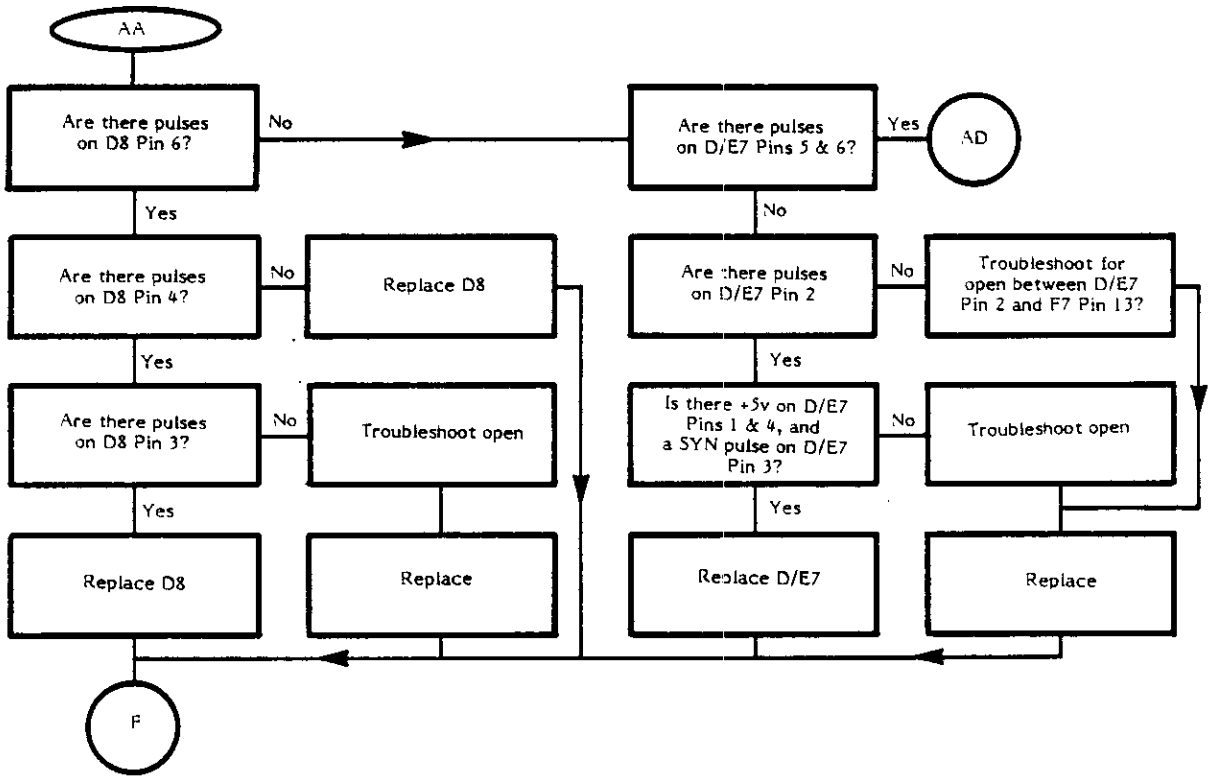
GAME DOES NOT RESET ON ATARI LOGO (Cont)



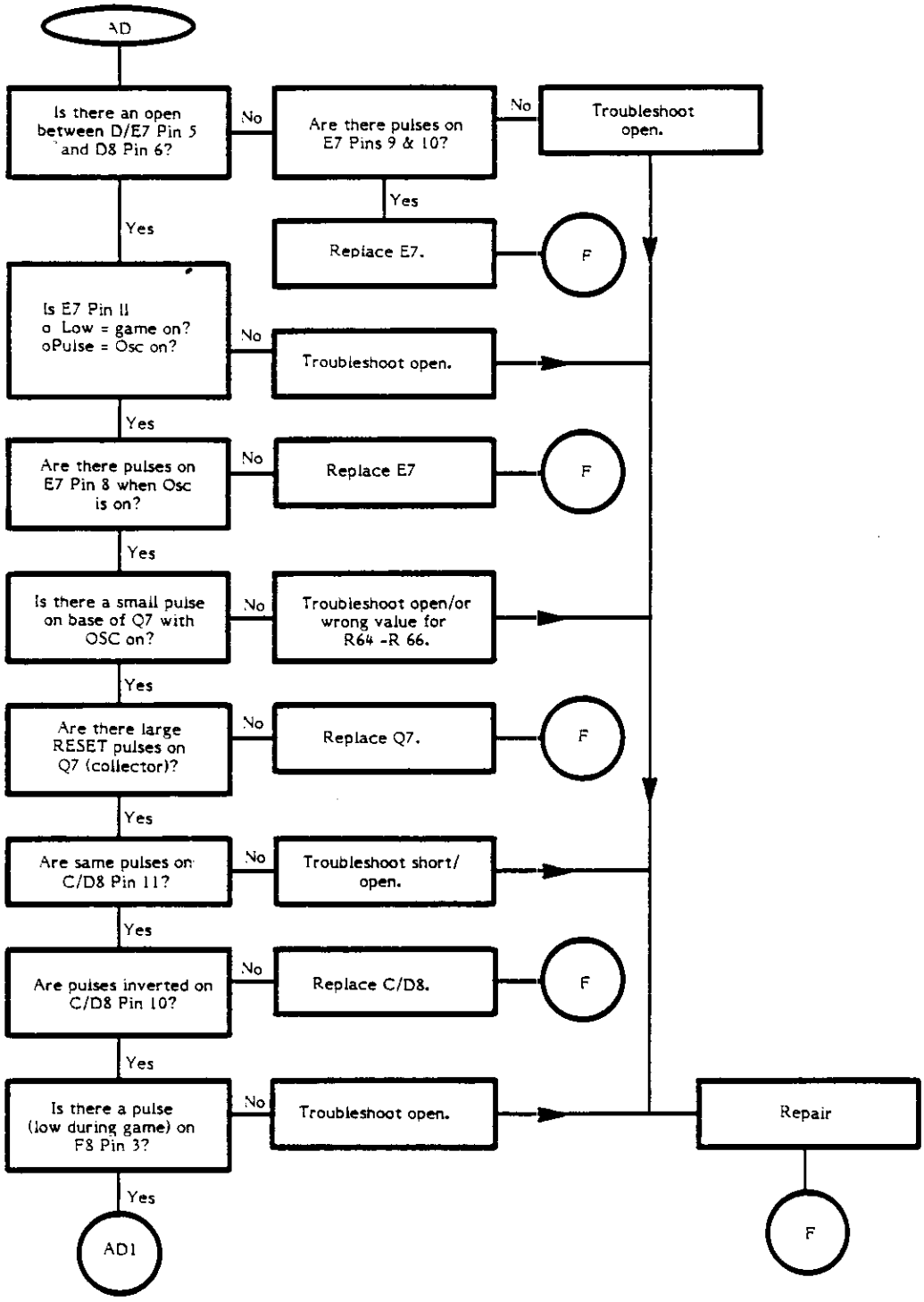
GAME DOES NOT RESET ON ATARI LOGO (Cont)

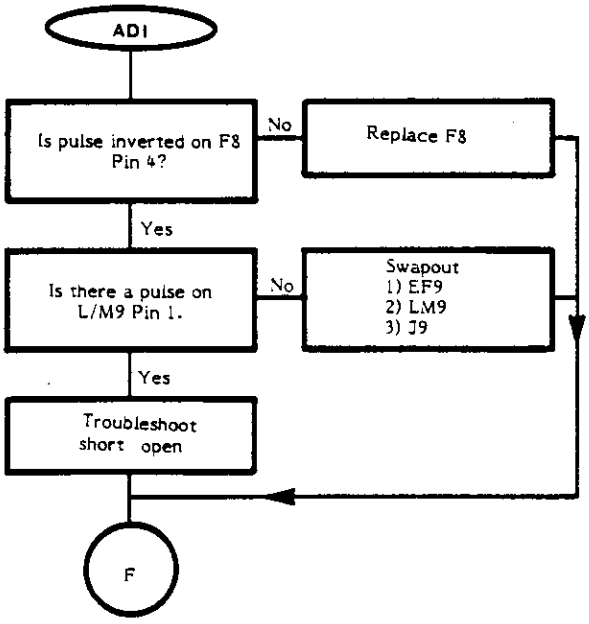


RESET PROBLEM

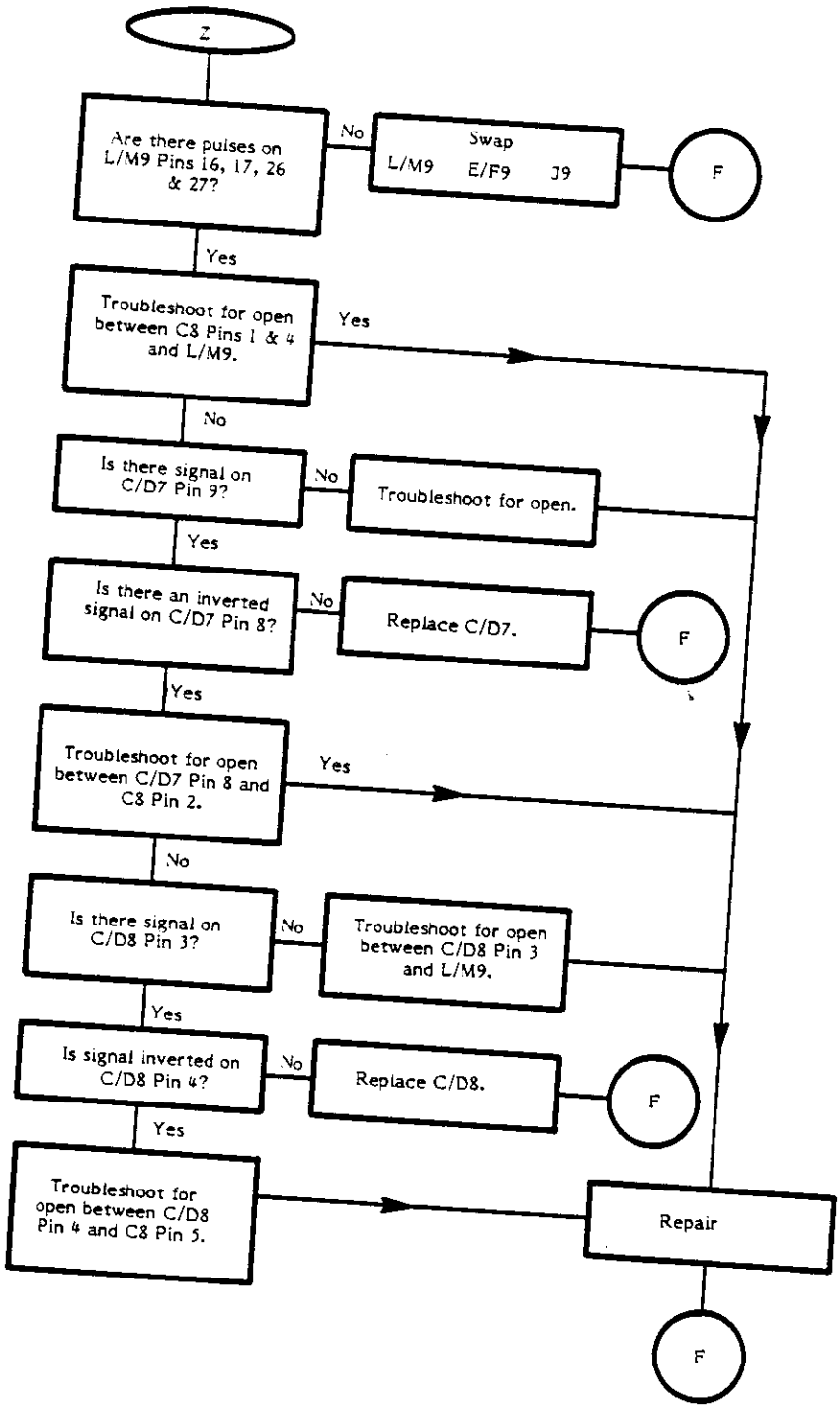


RESET TROUBLESHOOTING (Cont)

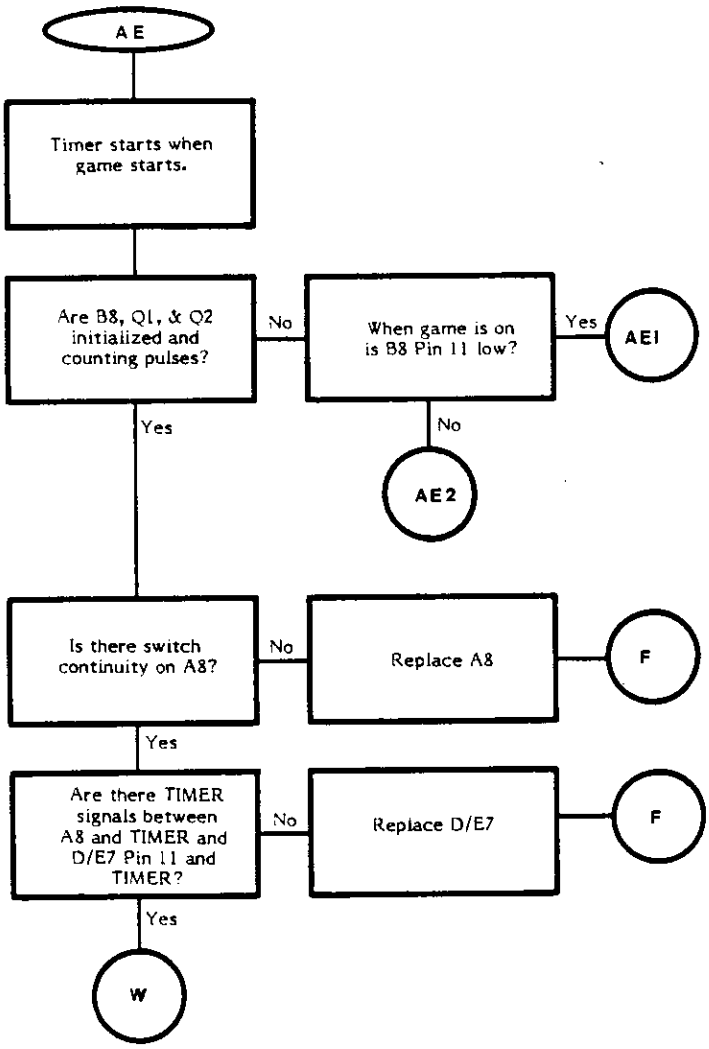



AD1
Is pulse inverted on F8 Pin 4?
No
Replace F8
Yes
Is there a pulse on L/M9 Pin 1.
No
Swapout
1) EF9
2) LM9
3) J9
Yes
Troubleshoot
short open
F

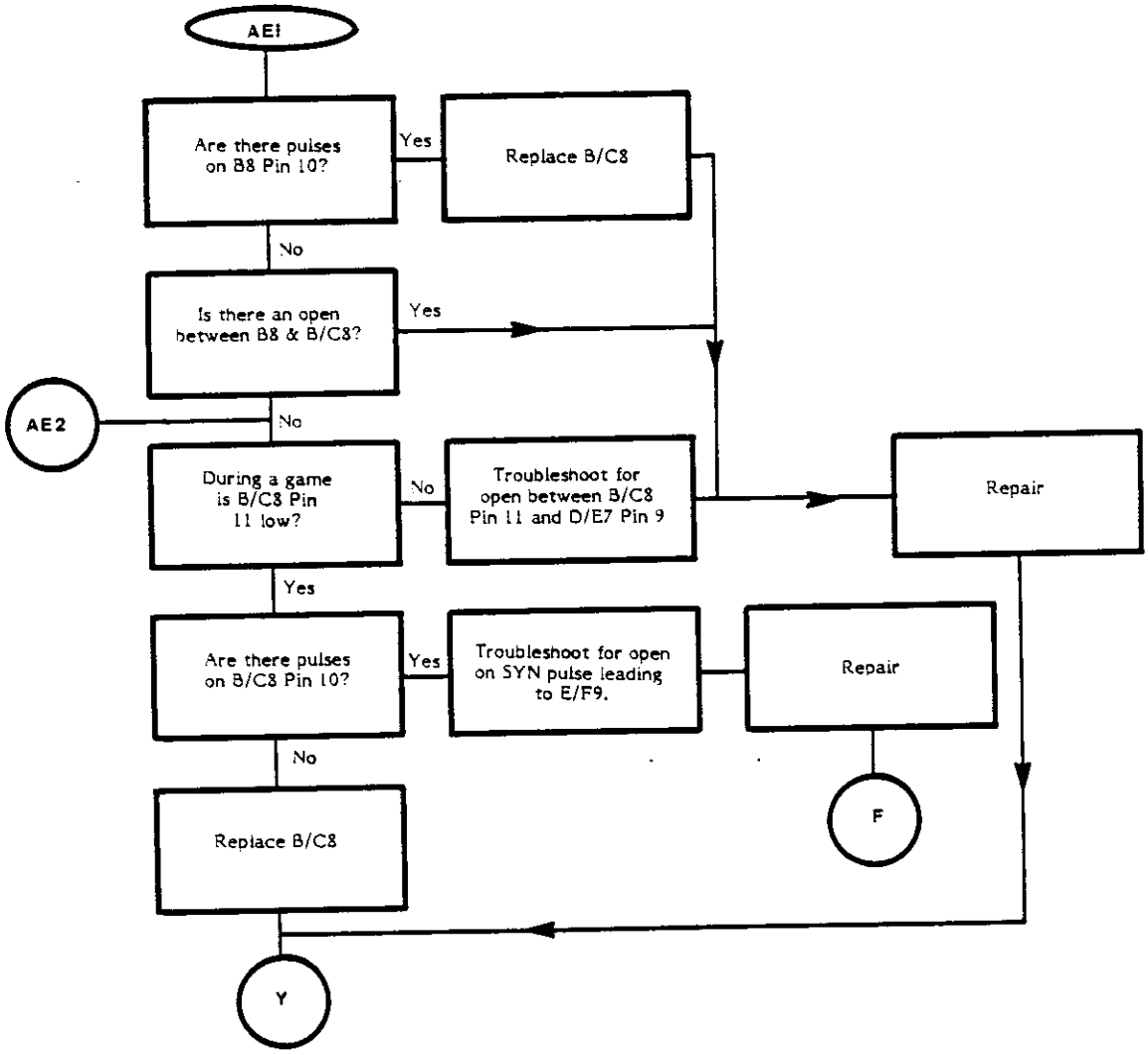
RESET TROUBLESHOOTING (Cont)



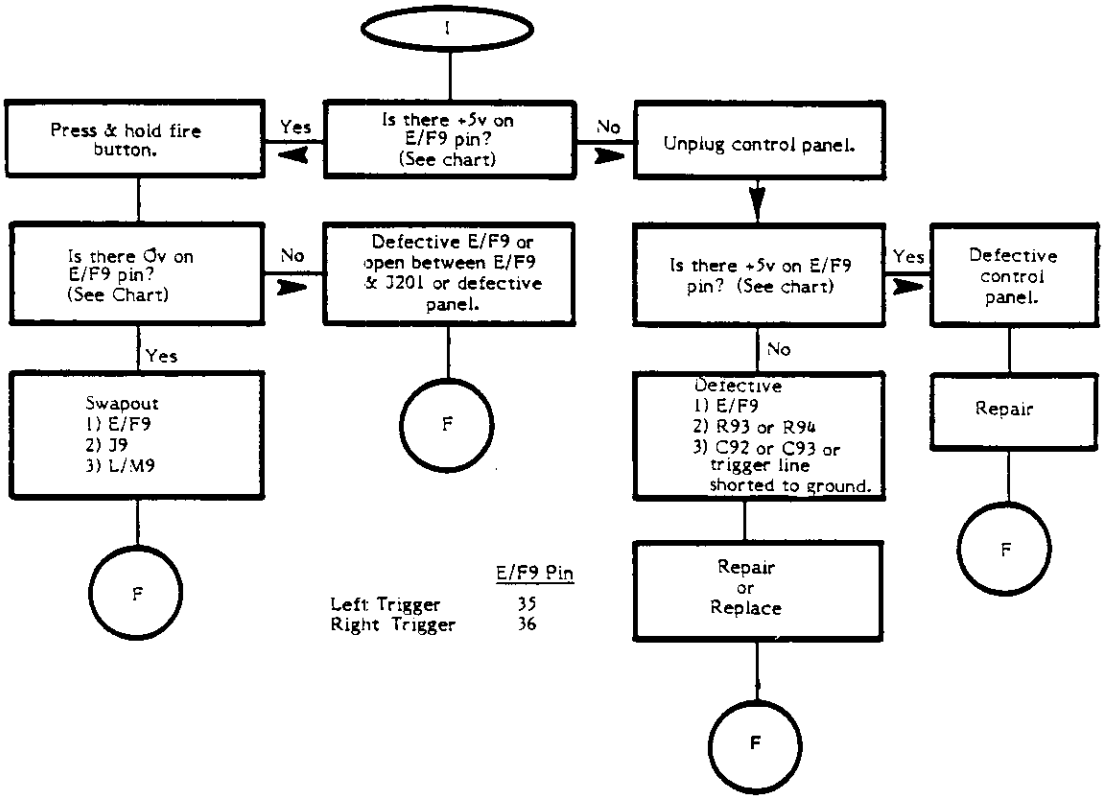
TIMER FAILURE



TIMER FAILURE (Cont)



TRIGGER LINE TROUBLESHOOTING



PADDLE LINE TROUBLESHOOTING

Because of the absence of 9 pin connectors, the diagnostic cartridge cannot be used to troubleshoot the POP. The steps to do so are:

1. Ensure that the control panel is good by:

   a. Measuring the pot with an OHM meter, it should read 0Ω with the pot in one direction and 1MΩ with the pot in the other direction.

   b. Ensure the lines are complete by ohming them out.

2. Ensure that the pot line on the board between E/F9 and J1 is complete by ohming it out. (See chart)

3. Swapout the component on that particular line. (See chart, left to right.)

			Swapout Components	
	E/F9 Pin	J1 Pin	#1	#2
Left Paddle	40	9	E/F9	C83
Right Paddle	39	L	E/F9	C82

SECTION 5

SYMPTOM CHECKLIST

The Symptom Checklist is designed to assist the experienced technician arrive at a rapid diagnosis for POP problems. The checklist is not intended to replace the Diagnostic Flowchart as the primary trouble-shooting guide, but rather, to supplement the flowchart.

Symptoms have been divided into six general categories of failure:

- Controller
- Logic
- Video
- Color
- Audio
- ROM Failures

Each symptom is accompanied by some possible causes and the best point to enter the Diagnostic Flowchart to locate the problem.

SYMPTOM CHECKLIST

CONTROLLER FAILURES

Symptom	Possible Cause	Flowchart Entry Point
Trigger Lines do not function	E/F9,C92,C93,Harness Control Panel	I, Pg. 4-43
Paddle Lines do not function	E/F9,C80-C83, Harness, Control Panel	J, Pg. 4-44
I/O (Joystick) Lines do not function or Paddle fire buttons do not work.	J9,C55-C62, Harness, Control Panel	H, Pg. 4-20

LOGIC FAILURES

Solid Colored Screen	E/F9,J9,L/M9,Q9 Y1, open or shorted address or data lines	E, Pg. 4-15
Vertically Lined Screen	E/F9,J9,L/M9, open or shorted address or data lines.	E, Pg. 4-15

VIDEO FAILURES

Snowy Screen	RF module, VR1, J4 CR16-CR19	D, Pg. 4-9
Weak Picture	RF module RF cable	
Wrong Gray Bars	E/F9,R73-R75	K, Pg. 4-13

SYMPTOM CHECKLIST (CONT)

COLOR FAILURES

Symptom	Possible Cause	Flowchart Entry Point
No Color at all	Y1, E/F9	G, Pg. 4-10
Only the reference bar appears	R70,Cr14,CR15	G, Pg. 4-10
Color will not adjust	R70,E/F9,C63	G, Pg. 4-10
Weak color	C64,C65,R77	G, Pg. 4-10

AUDIO FAILURES

No Audio	C68,C71,Q8,L2 Adjustment	Q, Pg. 4-8
Weak Audio	C68,C71,C66	Q, Pg. 4-8

ROM FAILURES

Because of the complexity of the ROM circuitry there is no symptom checklist for this failure. Instead proceed to the flowchart on Page 4-3.

SECTION 6

CONTROL PANEL

The Control Panel consists of a left and right joystick with fire buttons, and a left and right paddle with fire buttons. Figure 6-1 is a schematic of the control panel including the SELECT and START buttons. Figure 6-2 illustrates the harness cable schematic.

To troubleshoot the POP Panel determine which line is bad and replace the suspect defective parts.

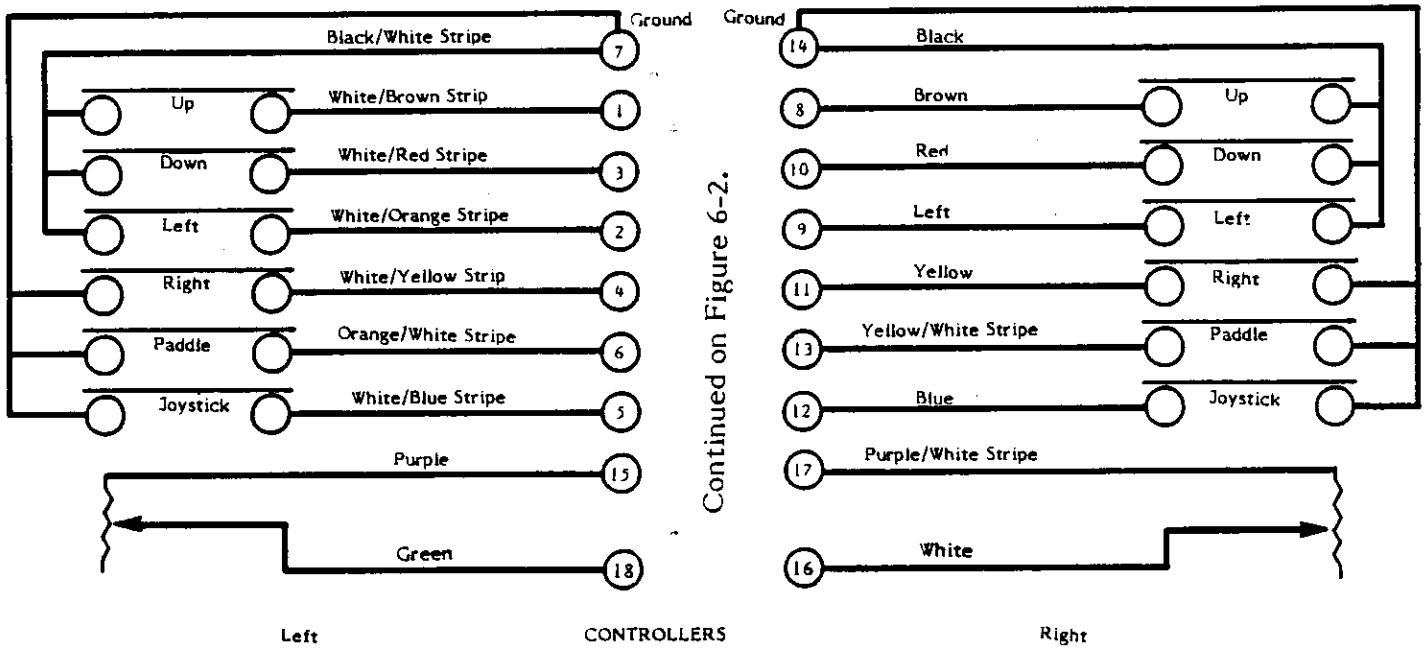
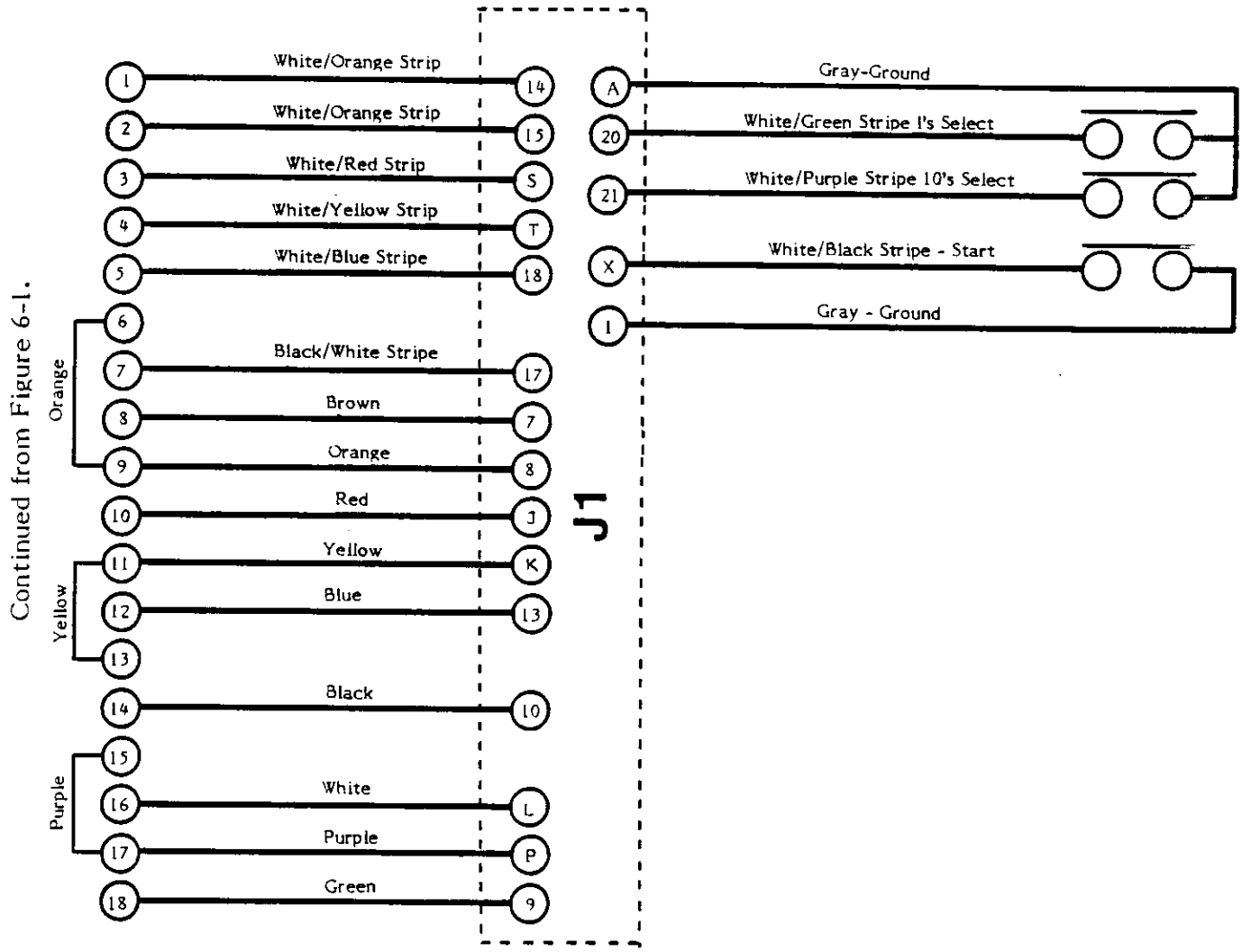


Figure 6-1. Control Panel Schematic.



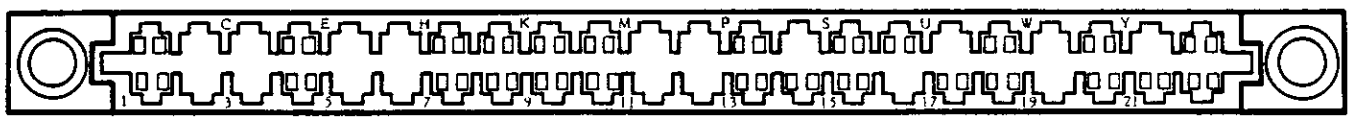


Figure 6-2. Harness Cable Schematic

SECTION 7

POP PARTS LIST

Assy.	Part No.	Description	Locator
Main	037752-01	PC Board (POP)	
Main	122012-103	Cap. Elec 10000UF (16V)	C74
Main	128002-151	Cap. Mica 150PF (50V)	C94
Main	128002-470	Cap. Mica 47PF (100V)	C64,67,70
Main	136003-101	Prog ROM 0 (137001-001)	C6
Main	137149-001	IC 74LS11	E7
Main	137176-001	IC 74C244	A1-6,B1-6,H1-6,K8,L8,N1-6
Main	14-5102	Resistor ¼W 1K	R1,16,25,34,43,51,55,64-66,71,72,82,85
Main	14-5103	Resistor ¼W 10K	R91,92
Main	14-5153	Resistor ¼W 15K	R79,81,86,95
Main	14-5154	Resistor ¼W 150K	R87
Main	14-5183	Resistor ¼W 18K	R83
Main	14-5221	Resistor ¼W 220 Ohm	R93,94
Main	14-5273	Resistor ¼W 27K	R68,80,89
Main	14-5332	Resistor ¼W 3.3K	R2-15,17-24,26-33,35-42 44-50,52,54,56-63,69,73-77
Main	14-5391	Resistor ¼W 390 Ohm	R88
Main	14-5471	Resistor ¼W 470 Ohm	R53
Main	14-5472	Resistor ¼W 4.7K	R67,90
Main	14-5563	Resistor ¼W 56K	R78
Main	14-5821	Resistor ¼W 820 Ohm	R96
Main	14-5912	Resistor ¼W 9.1K	R84
Main	179048-002	Square Terminal 2 position	
Main	179049-002	Mini Jumper 2 position	
Main	19-411504	Resistor Variable 500K	R70
Main	20670-01	Test Points	
Main	21-101474	Cap. Mylar .47UF (100V)	C76
Main	24-500225	Cap. Elec 2.2UF (50V)	C1,12,19,26,33,40
Main	24-500475	Cap. Elec 4.7UF (50V)	C72,97
Main	31-1N100	Diode 1N100	CR13
Main	31-1N5401	Diode 1N5401	CR16-19
Main	31-1N914	Diode 1N914	CR1-12,14,15,20
Main	33-2N3906	Transistor 2N3906	Q9
Main	34-2N3563	Transistor 2N3563	Q8
Main	34-2N3643	Transistor 2N3643	Q7
Main	34-2N6044	Transistor 2N6044 (T0220)	Q1-6
Main	37-4040	IC 4040B	B8,B/C8
Main	37-4584B	IC 4584B	C/D8
Main	37-7406	IC 7406	N/P7
Main	37-74LS166	IC 74LS166	F7
Main	37-74LS273	IC 74LS273	H8
Main	37-74LS367	IC 74LS367	B7
Main	37-LM323K	Regulator LM323K	VR1

POP PARTS LIST (Continued)

Assy.	Part No.	Description	Locator
Main	52-008	Jumper	
Main	66-114P1T	DIP Switch (4 position)	A7,A8
Main	72-1404C	Screw Philips #4 40 X ¼ LG	
Main	72-1608C	Screw Philips #6 32 X ½ LG	
Main	72-1808C	Screw Philips #8 32 X ½ LG	
Main	75-018C	Washer Flat #8	
Main	75-99514	Nut Washer Assy #4-40	
Main	75-99516	Nut Washer Assy #6-32	
Main	75-99518	Nut Washer Assy #8 32	
Main	78-06001	Heatsink	VR1
Main	78-22119	Cable Clamp	
Main	78-24010	Tie Wrap	
Main	79-5903	Connector Phono Jack	J6
Main	C010444	IC TIA	E/F9
Main	C010816	IC CD4050B	J8
Main	C010821	Cap. Poly 820PF (50V)	C68,71
Main	C010823	Inductor Variable 12 1/2 turns	L2
Main	C011201	Prog ROM 11 COMBAT (CX2601)	F5
Main	C011202A	Prog ROM 2 AIR-SEA BATTLE™ (CX2602)	E6
Main	C011205	Prog ROM 22 OUTLAW® (CX2605)	L4
Main	C011206	Prog ROM 25 SLOT RACERS™ (CX2606)	D3
Main	C011207	Prog ROM 8 CANYON BOMBER® (CX2607)	C5
Main	C011212	Prog ROM 27 STREET RACER™ (CX2612)	F3
Main	C011218	Prog ROM 29 3D TIC-TAC-TOE (CX2618)	K3
Main	C011221	Prog ROM 32 VIDEO OLYMPICS™ (CX2621)	C2
Main	C011222	Prog ROM 7 BREAKOUT® (CX2622)	M6
Main	C011223	PROG ROM 16 HOMERUN™ (CX2623)	C4
Main	C011224	Prog ROM 5 BASKETBALL (CX2624)	K6
Main	C011225	Prog ROM 13 FOOTBALL (CX2625)	K5
Main	C011227	Prog ROM 17 H. CANNONBALL (CX2627)	D4
Main	C011228	Prog ROM 6 BOWLING (CX2628)	L6
Main	C011229	Prog ROM 24 SKYDIVER® (CX2629)	C3

POP PARTS LIST (Continued)

Assy.	Part No.	Description	Locator
Main	C011233	Prog ROM 20 NIGHT DRIVER^{R} (CX2633)	J4
Main	C011234	Prog ROM 14 GOLF (CX2634)	L5
Main	C011239	Prog ROM 21 OTHELLO[1] (CX2639)	K4
Main	C012008	Prog ROM 41 SUPER BREAKOUT^{R} (CX2608)	D1
Main	C012009	Prog ROM 38 DEFENDER[2] (CX2609)	L2
Main	C012010	Prog ROM 34 WAR LORDS^{TM} (CX2610)	E2
Main	C012013	Prog ROM 1 ADVENTURE (CX2613)	D6
Main	C012015	Prog ROM 42 DEMON/ DIAMOND (CX2615)	E1
Main	C012016	Prog ROM 23 SOCCER^{TM} (CX2616)	M4
Main	C012017	Prog ROM 4 BACKGAMMON (CX2617)	J6
Main	C012030	Prog ROM 10 CIRCUS ATARI^{R} (CX2630)	E5
Main	C012031B	Prog ROM 28 SUPERMAN[3] (CX2631)	J3
Main	C012032	Prog ROM 26 SPACE INVADERS[4] (CX2632)	E3
Main	C012035	Prog ROM 18 MAZE CRAZE (CX2635)	E4
Main	C012036	Prog ROM 30 VIDEO CHECKERS^{TM} (CX2636)	L3
Main	C012037A	Prog ROM 12 DODGE'EM^{TM} (CX2637)	J5
Main	C012038	Prog ROM 19 MISSILE CMD^{TM} (CX2638)	F4
Main	C012045	Prog ROM 31 VIDEO CHESS^{TM} (CX2645)	M3
Main	C012046	Prog ROM 40 PAC-MAN[5] (CX2646)	C1
Main	C012048	Prog ROM 33 VIDEO PINBALL^{TM} (CX2648)	D2
Main	C012050	Prog ROM 35 BERZERK[6] (CX2650)	F2
Main	C012052	Prog ROM 9 CASINO^{TM} (CX2652)	D5

POP PARTS LIST (Continued)

Assy.	Part No.	Description	Locator
Main	C012054	Prog ROM 36 HAUNTED HOUSE (CX2654)	J2
Main	C012055	Prog ROM 39 YARS' REVENGE™ (CX2655)	M2
Main	C012058	Prog ROM 37 MATH GRAND PRIX (CX2658)	K2
Main	C012062	Prog ROM 15 HANGMAN (CX2662)	M5
Main	C014179-01	Cap. Ceramic Axial 22PF (50V)	C65
Main	C014179-13	Cap. Ceramic Axial 20PF (50V)	C69
Main	C014180-07	Cap. Ceramic Axial 470PF (50V)	C92,93
Main	C014180-07	Cap. Ceramic Axial .0047uF (50V)	ESD STATIC FIX
Main	C014181-01	Cap. Ceramic Axial .001uF (50V)	C55-62,84-91,95,98
Main	C014181-02	Cap. Ceramic Axial .01uF (25V)	C63,75,78,79,96
Main	C014181-03	Cap. Ceramic Axial .1uF (25V)	C2-11,13-18,20-25, 27-32,34-39,41-54, 66,73,77
Main	C014340	IC 74LS02	D8
Main	C014341	IC 74LS00	E8
Main	C014342	IC 74LS20	C8
Main	C014353	Cap. Epoxy Dipped .068uF (25V)	C80-83
Main	C014361	IC 74LS42	C7,M/N7
Main	C014384	Ferrite Bead	FB1-4
Main	C014386-07	IC Socket (24 pin)	C1-6,D1-6,E1-6,F1-6, J1-6,K1-6,L1-6,M1-6
Main	C014386-08	IC Socket (28 pin)	L/M9
Main	C014386-09	IC Socket (40 pin)	E/F9,J9
Main	C014715	Connector Power Jack	J4
Main	C014799	Heatsink	Q1-6
Main	C015752	Inductor 1.8MH	L1
Main	C016010	Crystal 3.579545 Mhz	Y1
Main	C016045	IC 74LS74	D/E7,D/E8
Main	C016145	IC MPU 6507 (2 Mhz)	L/M9
Main	C016150	IC RAM 6532A	J9
Main	C016449A	Prog ROM 3 ASTEROIDS™ (CX2649)	F6
Main	C017096	IC 74LS04	C/D7,F8
Main	C017654	Diode Zener (1N4736A)	ESD Static Fix
Main	CA012174	RF Module "B" Assy.	

1 - OTHELLO is a Trademark of CBS, Inc. for its strategy disc game and equipment.

2 - DEFENDER is a Trademark of Williams Electronics, Inc.

3 - SUPERMAN is a Trademark of DC Comics, Inc. 1979.

4 - SPACE INVADERS is a Trademark of Taito America, Corp.

5 - PAC-MAN is a Trademark of Midway Mfg. Co.

6 - BERZERK is a Trademark of Stern Electronics, Inc.

SECTION 8

SERVICE BULLETINS

This section is to be used by you to file the three classifications of service bulletins that are periodically released by the Manager of Technical Support.

The following are brief descriptions of each classification:

FIELD CHANGE ORDER

A Field Change Order describes hardware or software changes to ATARI Computer products and instructs how to implement these changes.

To indicate your **required** action, a Field Change Order is issued in one of the following two categories:

MANDATORY - This identifies a failure mode that affects reliability and describes a procedure to correct the failure. This procedure must be performed on **all units serviced or repaired.**

AS FAILS - This identifies a failure mode that affects reliability and describes a procedure to correct the failure mode. This procedure must be performed on **an As Fails basis.**

UPGRADE BULLETIN

An Upgrade Bulletin describes product improvements or modifications that the consumer may wish to purchase. These bulletins allow you to modify the customer's unit to add capabilities which may not have been available when the unit was originally manufactured.

TECH TIP

A Tech Tip is a document of a general nature which transmits routine service or repair information. By communicating methods developed since you attended training classes, Tech Tips aid to continuously improve repair skills and increase knowledge of ATARI Computer Products.

Other times, Tech Tips alert you to units that have been modified and are now standard for ATARI Manufacturing, but are different from many existing units and require different repair techniques.