June 27, 1983

Dear Servicer:

Enclosed in this order are one meg. pots. to be used for the P.O.P. displays. We are temporarily out of stock on the metal ones used in the P.O. P. displays. These plastic ones are not as durable but should be sufficient until the regular pots come in.

Should you have any further questions please do not hesitate to contact me at 201-469-5150 between 8am and 5pm, Monday through Friday.

Thank you for your continued co-operation.

Sincerely,

Judy Hamilton
P.O.P. Co-ordinator

jmh
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

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>INTRODUCTION</strong></td>
<td>v</td>
</tr>
<tr>
<td>1</td>
<td><strong>THEORY OF OPERATION</strong></td>
<td>1-1</td>
</tr>
<tr>
<td></td>
<td>Overview</td>
<td>1-1</td>
</tr>
<tr>
<td></td>
<td>Game Console</td>
<td>1-1</td>
</tr>
<tr>
<td></td>
<td>Mainboard</td>
<td>1-2</td>
</tr>
<tr>
<td></td>
<td>Summary</td>
<td>1-3</td>
</tr>
<tr>
<td>2</td>
<td><strong>SCHEMATICS</strong></td>
<td>(In packet accompanying this manual)</td>
</tr>
<tr>
<td>3</td>
<td><strong>TESTING AND TROUBLESHOOTING</strong></td>
<td>3-1</td>
</tr>
<tr>
<td></td>
<td>Equipment Requirements</td>
<td>3-1</td>
</tr>
<tr>
<td></td>
<td>Test</td>
<td>3-1</td>
</tr>
<tr>
<td></td>
<td>Static Modifications</td>
<td>3-1</td>
</tr>
<tr>
<td></td>
<td>Modifications Before Using The 2.6 Diagnostic Cartridge</td>
<td>3-3</td>
</tr>
<tr>
<td></td>
<td>Defective RAM Test</td>
<td>3-4</td>
</tr>
<tr>
<td></td>
<td>Color Bar Test</td>
<td>3-5</td>
</tr>
<tr>
<td></td>
<td>Gray Bar Test</td>
<td>3-6</td>
</tr>
<tr>
<td></td>
<td>Audio Tone Test</td>
<td>3-7</td>
</tr>
<tr>
<td>3A</td>
<td><strong>DISASSEMBLY FOR ADJUSTMENTS</strong></td>
<td>3A-1 *</td>
</tr>
<tr>
<td></td>
<td>Removing The Control Panel/Accessing the PCB</td>
<td>3A-1</td>
</tr>
<tr>
<td></td>
<td>Changing Gameplay Time</td>
<td>3A-2</td>
</tr>
<tr>
<td></td>
<td>Setting Channel Position</td>
<td>3A-3</td>
</tr>
<tr>
<td>4</td>
<td><strong>DIAGNOSTIC FLOWCHARTS</strong></td>
<td>4-1</td>
</tr>
<tr>
<td></td>
<td>Index of Flowcharts</td>
<td>4-2A *</td>
</tr>
<tr>
<td>5</td>
<td><strong>SYMPTOM CHECKLIST</strong></td>
<td>5-1</td>
</tr>
<tr>
<td></td>
<td>Overview</td>
<td>5-1</td>
</tr>
<tr>
<td></td>
<td>Controller Failures</td>
<td>5-2</td>
</tr>
<tr>
<td></td>
<td>Logic Failures</td>
<td>5-2</td>
</tr>
<tr>
<td></td>
<td>Video Failures</td>
<td>5-2</td>
</tr>
<tr>
<td></td>
<td>Color Failures</td>
<td>5-3</td>
</tr>
<tr>
<td></td>
<td>Audio Failures</td>
<td>5-3</td>
</tr>
<tr>
<td></td>
<td>ROM Failures</td>
<td>5-3</td>
</tr>
<tr>
<td>6</td>
<td><strong>CONTROL PANEL</strong></td>
<td>6-1 *</td>
</tr>
<tr>
<td>7</td>
<td><strong>PARTS LIST</strong></td>
<td>7-1</td>
</tr>
<tr>
<td>8</td>
<td><strong>SERVICE BULLETINS</strong></td>
<td>8-1</td>
</tr>
<tr>
<td>Figure</td>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>--------</td>
<td>------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>1-1</td>
<td>Functional Block Diagram</td>
<td>1-1</td>
</tr>
<tr>
<td>3-1</td>
<td>POP Static Modification (Zener Diode)</td>
<td>3-2</td>
</tr>
<tr>
<td>3-2</td>
<td>Assembly Installation</td>
<td>3-2</td>
</tr>
<tr>
<td>3-3</td>
<td>Mask Placement</td>
<td>3-3</td>
</tr>
<tr>
<td>3-4</td>
<td>F10 Switch Legend</td>
<td>3-4</td>
</tr>
<tr>
<td>3-5</td>
<td>Defective RAM I/O Patterns</td>
<td>3-5</td>
</tr>
<tr>
<td>3-6</td>
<td>Color Bar Screen</td>
<td>3-6</td>
</tr>
<tr>
<td>3-7</td>
<td>Gray Bar Screen</td>
<td>3-7</td>
</tr>
<tr>
<td>3-8</td>
<td>Audio Tone Screen</td>
<td>3-8</td>
</tr>
<tr>
<td>3A-1</td>
<td>PCB Location of A7, A8 and Channel Select</td>
<td>3A-2</td>
</tr>
<tr>
<td>6-1</td>
<td>Control Panel Schematic</td>
<td>6-1</td>
</tr>
<tr>
<td>6-2</td>
<td>Harness Cable Schematic</td>
<td>6-2</td>
</tr>
</tbody>
</table>
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.

![Block Diagram]

Figure 1-1. Functional 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 adapter. A supply 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 television 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.

![Diagram of components with labels](image1)

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

![Diagram of assembly installation](image2)

Figure 3-2. Assembly Installation
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.

![Defective RAM I/O Patterns](image)

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.
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](image)
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.

![Audio Tone Screen](image)

*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 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

Gene P.O.P. Repair Tech.
(201) 560-920

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.
## INDEX OF FLOWCHARTS

<table>
<thead>
<tr>
<th>LETTER</th>
<th>TITLE</th>
<th>PAGE NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Single ROM Faulty</td>
<td>4-22</td>
</tr>
<tr>
<td>B</td>
<td>Game ROM Test</td>
<td>4-3</td>
</tr>
<tr>
<td>B1</td>
<td>Game ROM Test (Cont.)</td>
<td>4-4</td>
</tr>
<tr>
<td>B2</td>
<td>Game ROM Test (Cont.)</td>
<td>4-4</td>
</tr>
<tr>
<td>C</td>
<td>Defective ROM Troubleshooting</td>
<td>4-21</td>
</tr>
<tr>
<td>D</td>
<td>Snowy Screen Troubleshooting Procedures</td>
<td>4-9</td>
</tr>
<tr>
<td>D1</td>
<td>Snowy Screen Troubleshooting Procedures</td>
<td>4-9</td>
</tr>
<tr>
<td>E</td>
<td>Solid Colored Screen Troubleshooting</td>
<td>4-15</td>
</tr>
<tr>
<td>E1</td>
<td>Solid Colored Screen Troubleshooting (Cont.)</td>
<td>4-16</td>
</tr>
<tr>
<td>F</td>
<td>POP Diagnostic Flowcharts</td>
<td>4-2</td>
</tr>
<tr>
<td>G</td>
<td>Color Troubleshooting</td>
<td>4-10</td>
</tr>
<tr>
<td>G1</td>
<td>Color Troubleshooting (Cont.)</td>
<td>4-11</td>
</tr>
<tr>
<td>G2</td>
<td>Color Troubleshooting (Cont.)</td>
<td>4-12</td>
</tr>
<tr>
<td>H</td>
<td>Defective I/O Line Troubleshooting</td>
<td>4-20</td>
</tr>
<tr>
<td>I</td>
<td>Trigger Line Troubleshooting</td>
<td>4-43</td>
</tr>
<tr>
<td>J</td>
<td>Paddle Line Troubleshooting</td>
<td>4-44</td>
</tr>
<tr>
<td>JJ</td>
<td>Game Will Not RESET Troubleshooting (Cont.)</td>
<td>4-33</td>
</tr>
<tr>
<td>K</td>
<td>Gray Bar Troubleshooting</td>
<td>4-13</td>
</tr>
<tr>
<td>K1</td>
<td>Gray Bar Troubleshooting (Cont.)</td>
<td>4-14</td>
</tr>
<tr>
<td>M</td>
<td>2.6 Cartridge Test</td>
<td>4-5</td>
</tr>
<tr>
<td>N</td>
<td>Color Bar Test</td>
<td>4-6</td>
</tr>
<tr>
<td>O</td>
<td>Defective Switch Troubleshooting</td>
<td>4-17</td>
</tr>
<tr>
<td>O1</td>
<td>Defective Switch Troubleshooting (Cont.)</td>
<td>4-18</td>
</tr>
<tr>
<td>P</td>
<td>Gray Bar Test</td>
<td>4-7</td>
</tr>
<tr>
<td>Q</td>
<td>Audio Test Procedure</td>
<td>4-8</td>
</tr>
<tr>
<td>R</td>
<td>ATARI, Techline Specialist</td>
<td>4-1</td>
</tr>
<tr>
<td>S</td>
<td>One Row - One Section Faulty, A Group of 4 Chips</td>
<td>4-23</td>
</tr>
<tr>
<td>T</td>
<td>Single Row Faulty, A Group of 8 Chips</td>
<td>4-24</td>
</tr>
<tr>
<td>T1</td>
<td>Single Row Faulty (Cont.)</td>
<td>4-25</td>
</tr>
<tr>
<td>U</td>
<td>Single Column Faulty, Column 1 As Example</td>
<td>4-26</td>
</tr>
<tr>
<td>U1</td>
<td>Single Column Faulty (Cont.)</td>
<td>4-27</td>
</tr>
<tr>
<td>U2</td>
<td>Single Column Faulty (Cont.)</td>
<td>4-28</td>
</tr>
<tr>
<td>V</td>
<td>Entire ROM System Faulty</td>
<td>4-29</td>
</tr>
<tr>
<td>V1</td>
<td>Entire ROM System Faulty (Cont.)</td>
<td>4-30</td>
</tr>
<tr>
<td>W</td>
<td>Game Will Not RESET Troubleshooting Procedures</td>
<td>4-31</td>
</tr>
<tr>
<td>W1</td>
<td>Game Will Not RESET Troubleshooting (Cont.)</td>
<td>4-32</td>
</tr>
<tr>
<td>X</td>
<td>Game Does Not RESET on ATARI Logo</td>
<td>4-34</td>
</tr>
<tr>
<td>X1</td>
<td>Game Does Not RESET on ATARI Logo (Cont.)</td>
<td>4-35</td>
</tr>
<tr>
<td>X2</td>
<td>Game Does Not RESET on ATARI Logo (Cont.)</td>
<td>4-36</td>
</tr>
<tr>
<td>Y</td>
<td>Bad SYNC Troubleshooting</td>
<td>4-19</td>
</tr>
<tr>
<td>Z</td>
<td>RESET Troubleshooting (Cont.)</td>
<td>4-40</td>
</tr>
<tr>
<td>AA</td>
<td>RESET Problem</td>
<td>4-37</td>
</tr>
<tr>
<td>AD</td>
<td>RESET Troubleshooting (Cont.)</td>
<td>4-38</td>
</tr>
<tr>
<td>AD1</td>
<td>RESET Troubleshooting (Cont.)</td>
<td>4-39</td>
</tr>
<tr>
<td>AE</td>
<td>Timer Failure</td>
<td>4-41</td>
</tr>
<tr>
<td>AE1</td>
<td>Timer Failure (Cont.)</td>
<td>4-42</td>
</tr>
<tr>
<td>AE2</td>
<td>Timer Failure (Cont.)</td>
<td>4-42</td>
</tr>
</tbody>
</table>
GAME ROM TEST (Cont)

B1

Swapout
1) ROM
2) MPU
3) TIA
4) RAM

Is video now correct?

No → M

Yes → F

B2

Do the joysticks function properly?

Yes → H

No → I

Do the joysticks fire buttons function properly?

Yes → J

No → I

Do the paddles function properly?

Yes → H

No → J

Do the paddle buttons function properly?

Yes → End

No → H
2.6 CARTRIDGE TEST

Remove the two jumper wires in position F10.

Remove ROM #7 & insert 2.6 cartridge in cartridge socket.

Select Game #7.

Does color bars pattern come up on screen?

Yes N

No

Does gray bars, matrix or audio pattern appear?

Yes O

No

Is screen either solidly colored or vertically lined?

Yes E

No F
COLOR BAR TEST

N

Reconnect POP and initialize.

Are color bars present on screen? No F

Yes

Adjust R70 so color is aligned properly.

Is unit tunable to proper shades? Yes P

No G
GRAY BAR TEST

P

Short out color/black & white switch.

Did screen pattern change when switch removed? No

Color/black & white line is bad.

Yes

Is proper gray bar pattern present?

Q

No

Is a partial segment missing or is any color present?

No

K

Yes

Swapout

1) EP9 (TIA)
2) LM4 (CPU)
3) J9 RAM

Proper gray bar pattern.

No

R

Yes

F

ATARI VCS POP Field Service Manual 4-7
SNOWY SCREEN TROUBLESHOOTING PROCEDURES

n

Is there +5v on Pin 4 RF module? Yes

Is FB4 Defective? Yes

Replace FB4.

No

Is +5v present on output of VR1? No

DI

7.5 unreg. on VR1 input? Yes

Defective VR1, or short output VR1 to ground.

No

7.5 unreg. on J4? Yes

Open between J4 and input VR1.

No

+5v shorted to ground? Yes

Swap
1) TIA
2) MPU
3) RAM

No

Any modulation? Yes

F

No

Defective J4.

Repair

F

Open between A203 output and RF module Pin 4.

Repair

F

ATARI VCS POP Field Service Manual 4-9
COLOR TROUBLESHOOTING

G

Is any color visible (including reference bar)?
Yes G1

Is there a 2.5 to 3v p-p signal on a 3 3/4 volt level between C64 and R77?
Yes G2

Is there a 4.5 3v p-p signal on Pin 9 of TIA?
Yes Open between TIA Pin 9 and C64.

No

Is R72 good?
Yes

Is R71 good?
Yes

Swapout
1) TIA
2) RAM
3) MPU

Replace

F

ATARI VCS POP Field Service Manual 4-10
COLOR TROUBLESHOOTING (Cont)

G1

Is color constantly rolling (cycling)?
Yes    Defective
   1) C63
   2) TIA
    Repair

No

Does voltage vary between 0 & 6u on Pin 10 of TIA when R70 is rotated?
Yes    Is Y1 frequency
   3.2793 MHz?
   Yes    Swapout
   1) TIA
   2) MPU
   3) RAM
    Repair
   No    Replace Y1.

No

Turn R70 fully clockwise.

Is there 6V on anode of CR15?
Yes    Defective R7 or open
   between CR2 - R7-UG.
    Repair
   No    Replace.

No

5.5V on anode of CR14.
Yes    Is R67 good?
   No

Defective CR14.
   Yes    +5 on cathode of
   CR14.
   No

+5 on cathode of CR14.
   Yes    Defective CR15.
   No

Open between +5 & CR 14.

Replace

F

ATARI VCS POP Field Service Manual. 4-11
GRAY BAR TROUBLESHOOTING

Is there a 4.5v p-p signal on leads of R73, R79 and R80 on the side of the TIA?

Yes K1

Is there a 4.5v p-p signal on the TIA (EEF9) Pin for that line see chart.

No

Open between TIA (EEF9) and summing resistor (see chart).

No

Replace TIA (EEF9)

Pass?

Yes F

No

Same failure.

No K

Yes

Check pullup resistors (see chart)

Pullups good?

No

Yes Line in question is shorted or open.

Repair

F
GRAY BAR TROUBLESHOOTING (Cont)

1) TIA
2) MPU
3) RAM

Same Problem?

Yes

Defective
1) R75, R79 or R80
2) RF module or shorted or open LM line.

Repair.

F
SOLID COLORED SCREEN TROUBLESHOOTING

1. Is there a 1.19 MHz signal on RAM Pin 39?
   - Yes: E1
   - No: Change
     1) Y1
     2) Q9
     3) Other clock components or open between osc. circuit and TIA Pin 11.

2. Is there a 3.5795 MHz signal on Pin 11 of TIA?
   - Yes: Swapout
     1) TIA
     2) MPU or Pin 4 of TIA is shorted.
   - No: Yes

3. Is there a 1.19 MHz signal on Pin 4 of TIA?
   - Yes: Open between Pin 4 of TIA and pin 27 of MPU.
   - No: Swapout
     1) MPU
     2) TIA
     3) RAM or Pin 28 of MPU is shorted.

4. Is there a 1.19 MHz signal on MPU Pin 27?
   - Yes: Open between Pin 4 of TIA and pin 27 of MPU.
   - No: Yes

5. Is there a 1.19 MHz signal on MPU Pin 28?
   - Yes: Open between TIA Pin 26 MPU Pin 28 and RAM Pin 39.
   - No: Open between pin 39 of RAM and pin 28 of MPU.

F
DEFECTIVE SWITCH TROUBLESHOOTING

<table>
<thead>
<tr>
<th>SWITCH</th>
<th>Pin #</th>
<th>CAP #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right Diff.</td>
<td>16</td>
<td>C30</td>
</tr>
<tr>
<td>Left Diff.</td>
<td>17</td>
<td>C35</td>
</tr>
<tr>
<td>Color/B&amp;W</td>
<td>21</td>
<td>C83</td>
</tr>
<tr>
<td>Game Reset</td>
<td>24</td>
<td>C91</td>
</tr>
<tr>
<td>Game Select</td>
<td>23</td>
<td>C90</td>
</tr>
<tr>
<td>POP Game Reset</td>
<td>18</td>
<td>C36</td>
</tr>
<tr>
<td>POP 1's Select</td>
<td>19</td>
<td>C87</td>
</tr>
<tr>
<td>POP 10's Select</td>
<td>22</td>
<td>C39</td>
</tr>
</tbody>
</table>

With inoperative switch in open position, is there +5v present at the A202 side of it?

- **Yes**
  - Close the switch.

- **No**
  - Is switch internally shorted?
    - **Yes**
      - Replace switch.
    - **No**
      - Is switch connected to ground on one side?
        - **Yes**
          - Repair trace.
        - **No**
          - Repair trace.

Does switch now work?

- **Yes**
  - Replace switch.

- **No**
  - Repair trace.

Swapout
1) 29
2) LM/9
3) EP/9

Is 0v now present at the RAM Pin for that switch?

- **Yes**
  - Repair trace.

- **No**
  - Is there an open between A201 and that switch?
    - **Yes**
      - Repair trace.
    - **No**
      - Repair trace.
DEFECTIVE SWITCH TROUBLESHOOTING (Cont)

Is cap on that line shorted to ground?

Yes
Replace Cap.

No
Is there +5v on the RAM Pin for that switch? (see chart).

Yes
Swapout
1) 39
2) LM/9
3) EF/9

No
Open between RAM Pin and inoperative switch.

Repair

<table>
<thead>
<tr>
<th>SWITCH</th>
<th>39 Pin #</th>
<th>CAP #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right Diff.</td>
<td>16</td>
<td>C54</td>
</tr>
<tr>
<td>Left Diff.</td>
<td>17</td>
<td>C55</td>
</tr>
<tr>
<td>Color/B&amp;W</td>
<td>21</td>
<td>C58</td>
</tr>
<tr>
<td>Game Reset</td>
<td>24</td>
<td>C91</td>
</tr>
<tr>
<td>Game Select</td>
<td>23</td>
<td>C90</td>
</tr>
<tr>
<td>POP Game Reset</td>
<td>18</td>
<td>C36</td>
</tr>
<tr>
<td>POP 1's Select</td>
<td>19</td>
<td>C37</td>
</tr>
<tr>
<td>POP 10's Select</td>
<td>22</td>
<td>C89</td>
</tr>
</tbody>
</table>

ATARI VCS POP Field Service Manual 4-18
BAD SYNC TROUBLESHOOTING

Y

RF module tuned to 61.25 MHz.? (Channel 3)

No

Replacing RF module

Yes

Can RF module be properly tuned?

No

Defective R81 or bad EF9?

Yes

3.5-5v p-p signal on A201 side of R81.

No

Swapout
1) EF9
2) LM9
3) J9

Swapout

Yes

Good Video?

No

Defective R76.

Repair

F

Yes

Tune RF module.
DEFECTIVE I/O LINE TROUBLESHOOTING

Determine which line(s) to look at by consulting chart below.

Is there +5v on the J9 Pin for that line?

Yes

Close the circuit (move joystick).

No

Unhook POP panel from board.

Is there 0v on that Pin?

No

Swapout
1) J9
2) LM9
3) EF9

Yes

Defective panel: that line is shorted.

Repair

Replace J9

F

Is there +5v on the J9 Pin for that line?

No

Paddle Fire
Left
Right
Left
Right
Left
Right
Left
Right

Joystick Down
Up
Left
Right
Up
Down
Left
Right

Direction

J9 Pin
12
13
14
15
16
17
18
19

Cap #
C35
C36
C37
C38
C39
C40
C41
C42

Either shorted or open trace on that line or shorted cap (see chart).

Repair

F
DEFECTIVE ROM TROUBLESHOOTING

C

Is only one ROM bad? Yes A

Is there a one row/one section failure? (ex. C6,D6,F6, and F1) (4 chips) Yes S

No

Is there a single row (8 chip) failure? (ex. C5,D5,E5,F5,36, K5,15,6,56) Yes T

No

Is there a single column failure? (6 locations ex. C1 6) Yes U

No

Is the entire ROM system faulty? Yes V

No

Does the game reset correctly? No W

Yes

Does the game time out correctly? No X

Yes

F
SINGLE ROM FAULTY (ei ROM 1, DEVICE D6)

1. Is the ROM correct? Yes → Insert the correct ROM. No → Is jumper in place? Yes → Put jumper on connector. No → Is a signal on Pin 18? Yes → Repair Open trace. No → Troubleshoot R54 for opens and shorts.
3. F

ATARI VCS POP Field Service Manual 4-22
ONE ROW - ONE SECTION FAULTY, A GROUP OF FOUR CHIPS
(i.e., ROW 0, SECTION X, DEVICES C6, 06, E6, & F1)

Are Pins 1 & 19 on H6 low?
Yes

Are data signals present on H6?
Yes

Are there signals on DX0 - DX7 on H6?
Yes

Are there data signals on Pins 13-17 on K8?
Yes

Troubleshoot for open/short Pin 1 of M/N7 to Pins 1 & 19 of H6.

Troubleshoot for open/short on data lines between H6 & C6.

Replace H6.

Troubleshoot data lines H6 - K8 for opens/shorts.

Troubleshoot for open/short Pin 1 of M/N7 to Pins 1 & 19 of H6.

ATARI VCS POP Field Service Manual 4-23
SINGLE ROW FAULTY, A GROUP OF 8 CHIPS (i.e., ROW 0 DEVICES C6, D6, E6, F6, J6, K6, L6 AND M6)

1. **T**
   - Does Q6 B = +7V C = +10V? No
     - Are CR11, CR12, and R31 the right value? No
       - Replace component.
     - Yes
       - Does Q6 E = +5V No
         - Check for open/short.
       - Yes
         - Troubleshoot open along +5 line.
   - Is Pin 1 of M/N7 low? No
     - Are PIns 13 to 15 of M/N7 low? No
       - Replace M/N7.
     - Yes
       - Troubleshoot open/short.
   - Is Pin 1 on N/P and Pins 1 & 19 on A6, B6, H6, & N6 low? No
     - Do signals A6 - AB8 = AB 11 B6 - AB8 = AB 7 No
       - Troubleshoot open/short.
     - Yes
       - T1
   - Do AB8 - AB11 at MPU have signals on them? No
     - R
     - Yes
     - Troubleshoot open/short.
SINGLE ROW FAULTY (Cont)

T1

Are address signals at output of A6, B6, C6, & N/P??

No → Replace faulty chip.

Yes →

Do COL 9-3 input = outputs on A6?

No → Replace A6.

Yes →

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

Is Pin 16 on A6 high?

Yes

Are Pins 20 & 21 on D6 high?

Yes

Are Pins 20 & 21 on K6 high?

Yes

Are jumpers properly set?

Yes

Replace D6 & K6.

No

No

Troubleshoot for opens from Pin 16 on A6 - Pins 20 & 21 on affected chips.

Replace A6.

Yes

Propriety installed jumpers.

F
SINGLE COLUMN FAULTY (Cont)

U2

Does GROMM have input pulses when START is pressed?  
No → X
Yes →

Are input signals on Pins 4 & 7 of H8 high and low respectively?  
Yes → Replace H8.  
No →

Are Pins 2 & 4 on J8 high & low respectively?  
Yes → Check for open.  
No →

Do DB0 & DB1 of J8 match Pins 2 & 4?  
Yes → E  
No → Repair

F
ENTIRE ROM SYSTEM FAULTY

Does 2600A portion function properly?

Yes

Are signals present on J8 DQ0-DQ3?

Yes

Are data input signals on H8.

Yes

Is output signal on H8 low?

Yes

Is a ROMLATCH signal present on Pin 11 of H8?

No

Is there a short/open between H8 Pin 11 and C8 Pin 6?

Yes

Repair trace

No

Replace H8

No

Is there a short/open between H8 Pin 1 and MPU?

Yes

Troubleshoot between H8 and J8 for open or short.

No

Replace J8.
GAME WILL NOT RESET TROUBLESHOOTING PROCEDURES (Cont)

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.
No:

Is there a pulse on D/E8 Pin 10?
Yes: Is there a high on D/E8 Pin 13?
Yes: Is there a short/open between D/E8 Pin 13 and C/D7 Pin 6?
Yes: Replace C/D7.
No:

Is there a low on D/E7 Pin 9 when game is selected.
Yes: Troubleshoot for open between C/D7 Pin 5 and D/E7 Pin 9.
No: Repair

Are there pulses (input/output) on C/D8?
Yes: Troubleshoot for open between C/D8 Pin 6 and D/E8 Pin 10.
Repair

If there are pulses in but no pulses out, replace C/D8.

X

F
GAME DOES NOT RESET ON ATARI LOGO

X

Is there a low on Pins 3-5 of E7 when a button is pressed?

Yes

Is there a pulse on E7 when any button is pressed?

Yes

Is there a pulse on D/E7 Pin 10?

Yes

Is Pin 9 on D/E7
- Low at power-up?
- High when either select button is?
- Low when start is pressed?

Yes

If Pin 11 on D/E7 (TIMER) is not low - replace D/E7.

No

Troubleshoot R56, R61 & R62 for short/open.

F

No

Is Pin 13 on D/E7 high?

Yes

Replace E7

F

Replace D/E7.

No

Troubleshoot open between E7 Pin 6 & D/E7 Pin 10.

F

No

X1

Is Pin 13 on D/E7 high?
GAME DOES NOT RESET ON ATARI LOGO (Cont)

1. Set oscilloscope to AC 50V/5MSEC.

2. Are there pulses on F8 Pin 9? (Yes/No)
   - No: Are there pulses on C3 Pin 6? (Yes/No)
     - Yes: Replace C3.
     - No: Are there pulses on C3 Pins 1, 2, 4, or 5? (Yes/No)
       - Yes: Replace C3.
       - No: Replace F8.

3. Are pulses inverted on F8 Pin 8? (Yes/No)
   - Yes: Replace F8.
   - No: Are same pulse present on E7 Pins 1 & 2? (Yes/No)
     - Yes: Troubleshoot open/short.
     - No: Is there data signal on E7 Pin 13? (Yes/No)
       - Yes: Troubleshoot open/short.
       - No: Is E7 Pin 12 low? (Yes/No)
         - Yes: Replace E7.
         - No: Swapout 1) 39 2) LM9 3) EF9

X1

F
GAME DOES NOT RESET ON ATARI LOGO (Cont)

X2

Is F8 Pin 13 low?
- Yes
- No

Troubleshoot open/short.

Replace F8.

Is F8 Pin 12 high?
- Yes
- No

Are there pulses on D/E8 Pin 4?
- Yes
- No

Troubleshoot open/short.

Replace D/E7.

Are there pulses on D/E7 Pin 9.
- Yes
- No

Are there pulses on F7 Pins 1, 6, 7, 9, &15.
- Yes
- No

Troubleshoot open/short between F7 Pin 1 & D/E7 Pin 9.

Replace F7.

Are there pulses on F7 Pin 13?
- Yes
- No

Are there pulses on D8 Pin 37?
- Yes
- No

Troubleshoot open between D8 Pin 3 & F7 Pin 13.

Repair

AA

F

F
RESET TROUBLESHOOTING (Cont)

Is there an open between D/E7 Pin 5 and D8 Pin 6? No

Is E7 Pin 11 or Low game on? Pulse or Osc on? No

Are there pulses on E7 Pins 9 & 10? No

Troubleshoot open.

Yes

Is there a small pulse on base of Q7 with OSC on? No

Troubleshoot open/or wrong value for R64 - R 66.

Yes

Are there large RESET pulses on Q7 (collector)? No

Replace Q7.

Yes

Are same pulses on C/D8 Pin 11? No

Troubleshoot short/open.

Yes

Are pulses inverted on C/D8 Pin 10? No

Replace C/D8.

Yes

Is there a pulse (low during game) on F8 Pin 37? No

Troubleshoot open.

Yes

AD1

Repair

F
RESET TROUBLESHOOTING (Cont)

Is pulse inverted on F8 Pin #?  
No → Replace F8
Yes → Is there a pulse on L/M9 Pin 1.  
No → Swapout  
1) EF9  
2) LM9  
3) 39
Yes → Troubleshoot short open

F
RESET TROUBLESHOOTING (Cont)

1. Are there pulses on L/M9 Pins 16, 17, 26 & 27?
   - No: Swap L/M9 E/F9 J9
   - Yes: Troubleshoot for open between C3 Pins 1 & 4 and L/M9.

2. Troubleshoot for open between C3 Pins 1 & 4 and L/M9.
   - Yes: Is there signal on C/D7 Pin 9?
   - No: Troubleshoot for open.
   - Yes: Is there an inverted signal on C/D7 Pin 8?
     - No: Replace C/D7.
     - Yes: Troubleshoot for open between C/D7 Pin 8 and C3 Pin 2.

3. Troubleshoot for open between C/D7 Pin 8 and C3 Pin 2.
   - Yes: Is there signal on C/D8 Pin 3?
   - No: Troubleshoot for open between C/D8 Pin 3 and L/M9.
   - Yes: Is signal inverted on C/D8 Pin 4?
     - No: Replace C/D8.
     - Yes: Troubleshoot for open between C/D8 Pin 4 and C3 Pin 5.

4. Repair
TIMER FAILURE

1. Are B8, Q1, & Q2 initialized and counting pulses?
   - Yes → Timer starts when game starts.
   - No → When game is on is B8 Pin 11 low?
     - Yes → AE1
     - No → AE2

2. Is there switch continuity on A8?
   - Yes → Replace A8
   - No → Are there TIMER signals between A8 and TIMER and D/E7 Pin 11 and TIMER?
     - Yes → Replace D/E7
     - No → F

W
TIMER FAILURE (Cont)

Are there pulses on B3 Pin 10?

Replace B/C3

Is there an open between B3 & B/C3?

Yes

Troubleshoot for open between B/C3 Pin 11 and 0/E7 Pin 9

Repair

No

Are there pulses on B/C3 Pin 10?

Yes

Troubleshoot for open on SYN pulse leading to 2/F.9.

Repair

No

Replace B/C3

F

Y
TRIGGER LINE TROUBLESHOOTING

1. Press & hold fire button.
   - Yes: Is there +5v on E/F9 pin? (See chart)
     - No: Unplug control panel
     - Yes: Defective E/F9 or open between E/F9 & 3201 or defective panel

2. Is there +5v on E/F9 pin? (See chart)
   - No: Defective E/F9 or open between E/F9 & 3201 or defective panel
   - Yes: Defective control panel

3. Defective or E/F9 shorted to ground
   - Repair

4. Repair or Replace

E/F9 Pin

Left Trigger 33
Right Trigger 36

F

ATARI VCS POP Field Service Manual  4-43
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

<table>
<thead>
<tr>
<th>E/F9 Pin</th>
<th>J1 Pin</th>
<th>#1</th>
<th>#2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left Paddle</td>
<td>40</td>
<td>9</td>
<td>E/F9</td>
</tr>
<tr>
<td>Right Paddle</td>
<td>39</td>
<td>L</td>
<td>E/F9</td>
</tr>
</tbody>
</table>
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

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

## LOGIC FAILURES

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Flowchart Entry Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid Colored Screen</td>
<td>E/F9,J9,L/M9,Q9, Y1, open or shorted address or data lines</td>
<td>E, Pg. 4-15</td>
</tr>
<tr>
<td>Vertically Lined Screen</td>
<td>E/F9,J9,L/M9, open or shorted address or data lines</td>
<td>E, Pg. 4-15</td>
</tr>
</tbody>
</table>

## VIDEO FAILURES

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Flowchart Entry Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snowy Screen</td>
<td>RF module, VR1, J4, CR16-CR19</td>
<td>D, Pg. 4-9</td>
</tr>
<tr>
<td>Weak Picture</td>
<td>RF module RF cable</td>
<td>K, Pg. 4-13</td>
</tr>
<tr>
<td>Wrong Gray Bars</td>
<td>E/F9,R73-R75</td>
<td></td>
</tr>
</tbody>
</table>
## SYMPTOM CHECKLIST (CONT)

### COLOR FAILURES

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

### AUDIO FAILURES

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Flowchart Entry Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Audio</td>
<td>C68, C71, Q8, L2 Adjustment</td>
<td>Q, Pg. 4-8</td>
</tr>
<tr>
<td>Weak Audio</td>
<td>C68, C71, C66</td>
<td>Q, Pg. 4-8</td>
</tr>
</tbody>
</table>

### 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

<table>
<thead>
<tr>
<th>Assy.</th>
<th>Part No.</th>
<th>Description</th>
<th>Locator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main</td>
<td>037752-01</td>
<td>PC Board (POP)</td>
<td>C74</td>
</tr>
<tr>
<td>Main</td>
<td>122012-103</td>
<td>Cap. Elec 10000UF (16V)</td>
<td>C94</td>
</tr>
<tr>
<td>Main</td>
<td>128002-151</td>
<td>Cap. Mica 150PF (50V)</td>
<td>C64,67,70</td>
</tr>
<tr>
<td>Main</td>
<td>12802470</td>
<td>Cap. Mica 47PF (100V)</td>
<td>C6</td>
</tr>
<tr>
<td>Main</td>
<td>136003-101</td>
<td>Prog ROM 0 (137001-001)</td>
<td>E7</td>
</tr>
<tr>
<td>Main</td>
<td>137149-001</td>
<td>IC 74LS11</td>
<td>A1-6,B1-6,H1-6,81,82,85</td>
</tr>
<tr>
<td>Main</td>
<td>137176-001</td>
<td>IC 74C244</td>
<td>R1,R2</td>
</tr>
<tr>
<td>Main</td>
<td>14-5102</td>
<td>Resistor 1/8W 1K</td>
<td>R91,92,R79,81,86,95</td>
</tr>
<tr>
<td>Main</td>
<td>14-5103</td>
<td>Resistor 1/8W 10K</td>
<td>R87</td>
</tr>
<tr>
<td>Main</td>
<td>14-5153</td>
<td>Resistor 1/8W 15K</td>
<td>R83</td>
</tr>
<tr>
<td>Main</td>
<td>14-5154</td>
<td>Resistor 1/8W 150K</td>
<td>R93,94,R68,80,89</td>
</tr>
<tr>
<td>Main</td>
<td>14-5183</td>
<td>Resistor 1/8W 18K</td>
<td>R4,R8,R87</td>
</tr>
<tr>
<td>Main</td>
<td>14-5221</td>
<td>Resistor 1/8W 220 Ohm</td>
<td>R1,R2</td>
</tr>
<tr>
<td>Main</td>
<td>14-5273</td>
<td>Resistor 1/8W 27K</td>
<td>R91,92,R79,81,86,95</td>
</tr>
<tr>
<td>Main</td>
<td>14-5332</td>
<td>Resistor 1/8W 3.3K</td>
<td>R87</td>
</tr>
<tr>
<td>Main</td>
<td>14-5391</td>
<td>Resistor 1/8W 390 Ohm</td>
<td>R67,90,R78</td>
</tr>
<tr>
<td>Main</td>
<td>14-5471</td>
<td>Resistor 1/8W 470 Ohm</td>
<td>R3</td>
</tr>
<tr>
<td>Main</td>
<td>14-5472</td>
<td>Resistor 1/8W 4.7K</td>
<td>R67,90,R78</td>
</tr>
<tr>
<td>Main</td>
<td>14-5563</td>
<td>Resistor 1/8W 56K</td>
<td>R3</td>
</tr>
<tr>
<td>Main</td>
<td>14-5821</td>
<td>Resistor 1/8W 820 Ohm</td>
<td>R96</td>
</tr>
<tr>
<td>Main</td>
<td>14-5912</td>
<td>Resistor 1/8W 9.1K</td>
<td>R5</td>
</tr>
<tr>
<td>Main</td>
<td>179048-002</td>
<td>Square Terminal 2 position</td>
<td>R70</td>
</tr>
<tr>
<td>Main</td>
<td>179049-002</td>
<td>Mini Jumper 2 position</td>
<td>R70</td>
</tr>
<tr>
<td>Main</td>
<td>19-411504</td>
<td>Resistor Variable 500K</td>
<td>R70</td>
</tr>
<tr>
<td>Main</td>
<td>20670-01</td>
<td>Test Points</td>
<td>R70</td>
</tr>
<tr>
<td>Main</td>
<td>21-101474</td>
<td>Cap. Mylar .47UF (100V)</td>
<td>C76</td>
</tr>
<tr>
<td>Main</td>
<td>24-500225</td>
<td>Cap. Elec 2.2UF (50V)</td>
<td>C1,12,19,26,33,40</td>
</tr>
<tr>
<td>Main</td>
<td>24-500475</td>
<td>Cap. Elec 4.7UF (50V)</td>
<td>C72,97,C13</td>
</tr>
<tr>
<td>Main</td>
<td>31-1N100</td>
<td>Diode 1N100</td>
<td>CR13</td>
</tr>
<tr>
<td>Main</td>
<td>31-1N5401</td>
<td>Diode 1N5401</td>
<td>CR16-19</td>
</tr>
<tr>
<td>Main</td>
<td>31-1N914</td>
<td>Diode 1N914</td>
<td>CR1-12,14,15,20</td>
</tr>
<tr>
<td>Main</td>
<td>33-2N3906</td>
<td>Transistor 2N3906</td>
<td>Q9</td>
</tr>
<tr>
<td>Main</td>
<td>34-2N3563</td>
<td>Transistor 2N3563</td>
<td>Q8</td>
</tr>
<tr>
<td>Main</td>
<td>34-2N3643</td>
<td>Transistor 2N3643</td>
<td>Q7</td>
</tr>
<tr>
<td>Main</td>
<td>34-2N6044</td>
<td>Transistor 2N6044 (T0220)</td>
<td>Q1-6</td>
</tr>
<tr>
<td>Main</td>
<td>37-4040</td>
<td>IC 4040B</td>
<td>B8,B/C8</td>
</tr>
<tr>
<td>Main</td>
<td>37-4584B</td>
<td>IC 4584B</td>
<td>C/D8</td>
</tr>
<tr>
<td>Main</td>
<td>37-7406</td>
<td>IC 7406</td>
<td>N/P7</td>
</tr>
<tr>
<td>Main</td>
<td>37-74LS166</td>
<td>IC 74LS166</td>
<td>F7</td>
</tr>
<tr>
<td>Main</td>
<td>37-74LS273</td>
<td>IC 74LS273</td>
<td>H8</td>
</tr>
<tr>
<td>Main</td>
<td>37-74LS367</td>
<td>IC 74LS367</td>
<td>B7</td>
</tr>
<tr>
<td>Main</td>
<td>37-LM323K</td>
<td>Regulator LM323K SG323K</td>
<td>VR1</td>
</tr>
</tbody>
</table>
### POP PARTS LIST (Continued)

<table>
<thead>
<tr>
<th>Assy.</th>
<th>Part No.</th>
<th>Description</th>
<th>Locator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main</td>
<td>52-008</td>
<td>Jumper</td>
<td>A7,A8</td>
</tr>
<tr>
<td>Main</td>
<td>66-114P1T</td>
<td>DIP Switch (4 position)</td>
<td></td>
</tr>
<tr>
<td>Main</td>
<td>72-1404C</td>
<td>Screw Philips #4 40 X ¾ LG</td>
<td></td>
</tr>
<tr>
<td>Main</td>
<td>72-1608C</td>
<td>Screw Philips #6 32 X ¾ LG</td>
<td></td>
</tr>
<tr>
<td>Main</td>
<td>72-1808C</td>
<td>Screw Philips #8 32 X ¾ LG</td>
<td></td>
</tr>
<tr>
<td>Main</td>
<td>75-018C</td>
<td>Washer Flat #8</td>
<td></td>
</tr>
<tr>
<td>Main</td>
<td>75-99514</td>
<td>Nut Washer Assy #4-40</td>
<td></td>
</tr>
<tr>
<td>Main</td>
<td>75-99516</td>
<td>Nut Washer Assy #6-32</td>
<td></td>
</tr>
<tr>
<td>Main</td>
<td>75-99518</td>
<td>Nut Washer Assy #8 32</td>
<td></td>
</tr>
<tr>
<td>Main</td>
<td>78-06001</td>
<td>Heatsink</td>
<td>VR1</td>
</tr>
<tr>
<td>Main</td>
<td>78-22119</td>
<td>Cable Clamp</td>
<td></td>
</tr>
<tr>
<td>Main</td>
<td>78-24010</td>
<td>Tie Wrap</td>
<td></td>
</tr>
<tr>
<td>Main</td>
<td>79-5903</td>
<td>Connector Phono Jack</td>
<td>J6</td>
</tr>
<tr>
<td>Main</td>
<td>C010444</td>
<td>IC TIA</td>
<td>E/F9</td>
</tr>
<tr>
<td>Main</td>
<td>C010816</td>
<td>IC CD4050B</td>
<td>J3</td>
</tr>
<tr>
<td>Main</td>
<td>C010821</td>
<td>Cap. Poly 820PF (50V)</td>
<td>C68,71</td>
</tr>
<tr>
<td>Main</td>
<td>C010823</td>
<td>Inductor Variable 12 1/2 turns</td>
<td>L2</td>
</tr>
<tr>
<td>Main</td>
<td>C011201</td>
<td>Prog ROM 11 COMBAT</td>
<td>F5</td>
</tr>
<tr>
<td>Main</td>
<td>C011201A</td>
<td>Prog ROM 2 AIR-SEA BATTLE</td>
<td>E6</td>
</tr>
<tr>
<td>Main</td>
<td>C011205</td>
<td>Prog ROM 22 OUTLAW</td>
<td>L4</td>
</tr>
<tr>
<td>Main</td>
<td>C011206</td>
<td>Prog ROM 25 SLOT RACERS</td>
<td>D3</td>
</tr>
<tr>
<td>Main</td>
<td>C011207</td>
<td>Prog ROM 3 CANYON BOMBER</td>
<td>C5</td>
</tr>
<tr>
<td>Main</td>
<td>C011212</td>
<td>Prog ROM 27 STREET RACER</td>
<td>F3</td>
</tr>
<tr>
<td>Main</td>
<td>C011218</td>
<td>Prog ROM 29 3D TIC-TAC-TOE</td>
<td>K3</td>
</tr>
<tr>
<td>Main</td>
<td>C011221</td>
<td>Prog ROM 32 VIDEO OLYMPICS</td>
<td>C2</td>
</tr>
<tr>
<td>Main</td>
<td>C011222</td>
<td>Prog ROM 7 BREAKOUT</td>
<td>M6</td>
</tr>
<tr>
<td>Main</td>
<td>C011223</td>
<td>PROG ROM 16 HOMERUN</td>
<td>C4</td>
</tr>
<tr>
<td>Main</td>
<td>C011224</td>
<td>Prog ROM 5 BASKETBALL</td>
<td>K6</td>
</tr>
<tr>
<td>Main</td>
<td>C011225</td>
<td>Prog ROM 13 FOOTBALL</td>
<td>K5</td>
</tr>
<tr>
<td>Main</td>
<td>C011227</td>
<td>Prog ROM 17 H. CANNONBALL</td>
<td>D4</td>
</tr>
<tr>
<td>Main</td>
<td>C011228</td>
<td>Prog ROM 6 BOWLING</td>
<td>L6</td>
</tr>
<tr>
<td>Main</td>
<td>C011229</td>
<td>Prog ROM 24 SKYDIVER</td>
<td>C3</td>
</tr>
<tr>
<td>Assy.</td>
<td>Part No.</td>
<td>Description</td>
<td>Locator</td>
</tr>
<tr>
<td>-------</td>
<td>----------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td>Main</td>
<td>C011233</td>
<td>Prog ROM 20 NIGHT DRIVER(\text{CX2633})</td>
<td>J4</td>
</tr>
<tr>
<td>Main</td>
<td>C011234</td>
<td>Prog ROM 14 GOLF(\text{CX2634})</td>
<td>L5</td>
</tr>
<tr>
<td>Main</td>
<td>C011239</td>
<td>Prog ROM 21 OTHELLO(\text{CX2639})</td>
<td>K4</td>
</tr>
<tr>
<td>Main</td>
<td>C012008</td>
<td>Prog ROM 41 SUPER BREAKOUT(\text{CX2608})</td>
<td>D1</td>
</tr>
<tr>
<td>Main</td>
<td>C012009</td>
<td>Prog ROM 38 DEFENDER(\text{CX2609})</td>
<td>L2</td>
</tr>
<tr>
<td>Main</td>
<td>C012010</td>
<td>Prog ROM 34 WAR LORDS(\text{CX2610})</td>
<td>E2</td>
</tr>
<tr>
<td>Main</td>
<td>C012013</td>
<td>Prog ROM 1 ADVENTURE(\text{CX2613})</td>
<td>D6</td>
</tr>
<tr>
<td>Main</td>
<td>C012015</td>
<td>Prog ROM 42 DEMON DIAMOND(\text{CX2615})</td>
<td>E1</td>
</tr>
<tr>
<td>Main</td>
<td>C012016</td>
<td>Prog ROM 23 SOCCER(\text{CX2616})</td>
<td>M4</td>
</tr>
<tr>
<td>Main</td>
<td>C012017</td>
<td>Prog ROM 4 BACKGAMMON(\text{CX2617})</td>
<td>J6</td>
</tr>
<tr>
<td>Main</td>
<td>C012030</td>
<td>Prog ROM 10 CIRCUS ATARI(\text{CX2630})</td>
<td>E5</td>
</tr>
<tr>
<td>Main</td>
<td>C012031B</td>
<td>Prog ROM 28 SUPERMAN(\text{CX2631})</td>
<td>J3</td>
</tr>
<tr>
<td>Main</td>
<td>C012032</td>
<td>Prog ROM 26 SPACE INVADERS(\text{CX2632})</td>
<td>E3</td>
</tr>
<tr>
<td>Main</td>
<td>C012035</td>
<td>Prog ROM 18 MAZE CRAZE(\text{CX2635})</td>
<td>E4</td>
</tr>
<tr>
<td>Main</td>
<td>C012036</td>
<td>Prog ROM 30 VIDEO CHECKERS(\text{CX2636})</td>
<td>L3</td>
</tr>
<tr>
<td>Main</td>
<td>C012037A</td>
<td>Prog ROM 12 DODGE’EM(\text{CX2637})</td>
<td>J5</td>
</tr>
<tr>
<td>Main</td>
<td>C012038</td>
<td>Prog ROM 19 MISSILE CMD(\text{CX2638})</td>
<td>F4</td>
</tr>
<tr>
<td>Main</td>
<td>C012045</td>
<td>Prog ROM 31 VIDEO CHESS(\text{CX2645})</td>
<td>M3</td>
</tr>
<tr>
<td>Main</td>
<td>C012046</td>
<td>Prog ROM 40 PAC-MAN(\text{CX2646})</td>
<td>C1</td>
</tr>
<tr>
<td>Main</td>
<td>C012048</td>
<td>Prog ROM 33 VIDEO PINBALL(\text{CX2648})</td>
<td>D2</td>
</tr>
<tr>
<td>Main</td>
<td>C012050</td>
<td>Prog ROM 35 BERZERK(\text{CX2650})</td>
<td>F2</td>
</tr>
<tr>
<td>Main</td>
<td>C012052</td>
<td>Prog ROM 9 CASINO(\text{CX2652})</td>
<td>D5</td>
</tr>
</tbody>
</table>

ATARI VCS POP Field Service Manual 7-3
### POP PARTS LIST (Continued)

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

*Main* 137001-001 **MN2716 Q PROM ATARI**
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.