2600/2600 A
VCS DOMESTIC (M/N)
Field Service Manual

ATARI

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ATARI

VIDEO COMPUTER SYSTEM™

FIELD SERVICE MANUAL

MODEL 2600/2600A DOMESTIC (M/N)

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INTRODUCTION

The Video Computer System™ (VCS) Field Service Manual is organized in nine sections:

- **THEORY OF OPERATION** - overview of how the VCS works and what the basic assemblies look like.
- **SILKSCREENS AND SCHEMATICS** - electrical drawings and layouts of the printed circuit boards.
- **TESTING AND TROUBLESHOOTING** - overview of the procedures for testing and repairing the VCS unit.
- **2600 DIAGNOSTIC FLOWCHART** - thorough flowchart enabling the technician to test and troubleshoot a defective 2600 unit.
- **SYMPTOM CHECKLIST** - for the experienced technician, a list of the high failure parts and the flowchart entry point for that particular problem.
- **2600A DIAGNOSTIC FLOWCHART** - thorough flowchart enabling the technician to test and troubleshoot a defective 2600A unit.
- **GAME CONTROLLERS** - overview of hand controller construction with electrical schematics and recommended test and repair procedures.
- **PARTS LIST** - detailed breakdown of all parts used in both the 2600 and 2600A .
- **SERVICE BULLETINS** - section to be used to hold service bulletins released by the Manager of Technical Support. These bulletins will include changes in recommended repair procedures and required modifications for units in the field.

The manual is designed for use by both experienced and inexperienced service personnel. The Diagnostic Flowcharts (Sections 4 and 6) provide detailed diagnostic and repair procedures for technicians who are not yet completely familiar with the VCS. The Symptom Checklist (Section 5) provides a fast repair reference for the more experienced technician.

SECTION 1

THEORY OF OPERATION

INTRODUCTION

There are currently four types of ATARI Video Computer Systems. The original model (2600) is composed of two PC Boards connected by a 12-pin ribbon cable with the motherboard surrounded by a heavy aluminum casting.

The other models (2600A: Revisions 1-13, Revisions 14-15, and Revisions 16 and up) are composed of a single board with a light aluminum shield. The single board models differ slightly in the video output circuitry. Component differences are:

- Revisions 1-13 have no diodes on TIA lines LM1 and Sync.
- Revisions 14-15 have diodes and pull-up resistors on TIA lines LM1 and Sync.
- Revisions 16 and up include the above mentioned diodes and resistors as well as a timer chip.

The revision level is etched directly on the PC board.

OVERVIEW

The ATARI Video Computer System (VCS) Models 2600/2600A are state-of-the-art microcomputers. They receive instructions for the operation of different games from individual Read-Only-Memory game cartridges and interpret data from the players' hand-held controllers. They also allow game players to select both a specific version of each game and the player difficulty (on a per player basis). Figure 1-1 is a block diagram of the functional flow of the VCS Model 2600. Section 7 describes the player controllers.

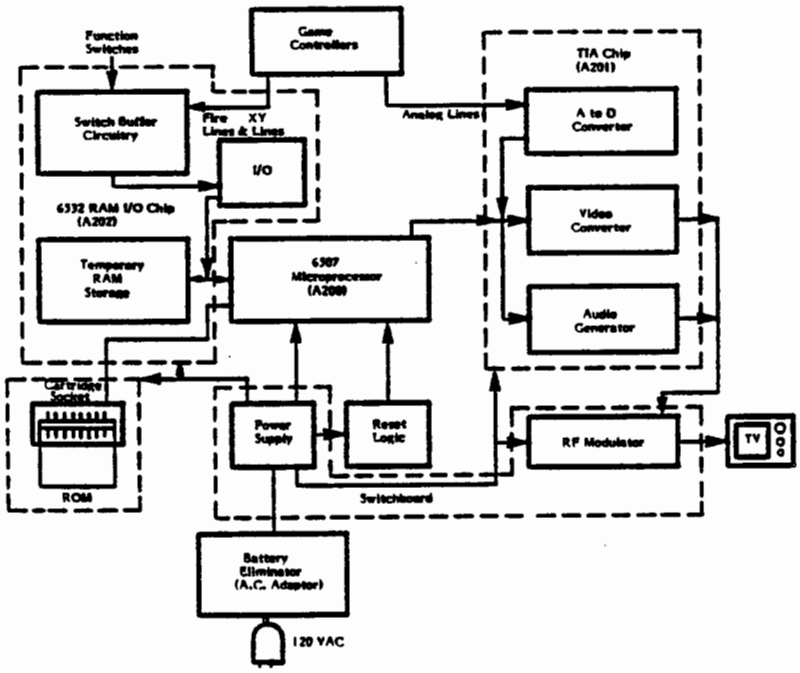


Figure 1-1. 2600 Functional Diagram

GAME CONSOLE

The VCS game console is composed of an outercasting that houses the switchboard and the RF radiation shielded motherboard.

Outer Casting

The casting consists of three pieces of plastic (see Figure 1-2). The pieces include the base, which holds the switchboard and motherboard assembly; the top; and the bezel.

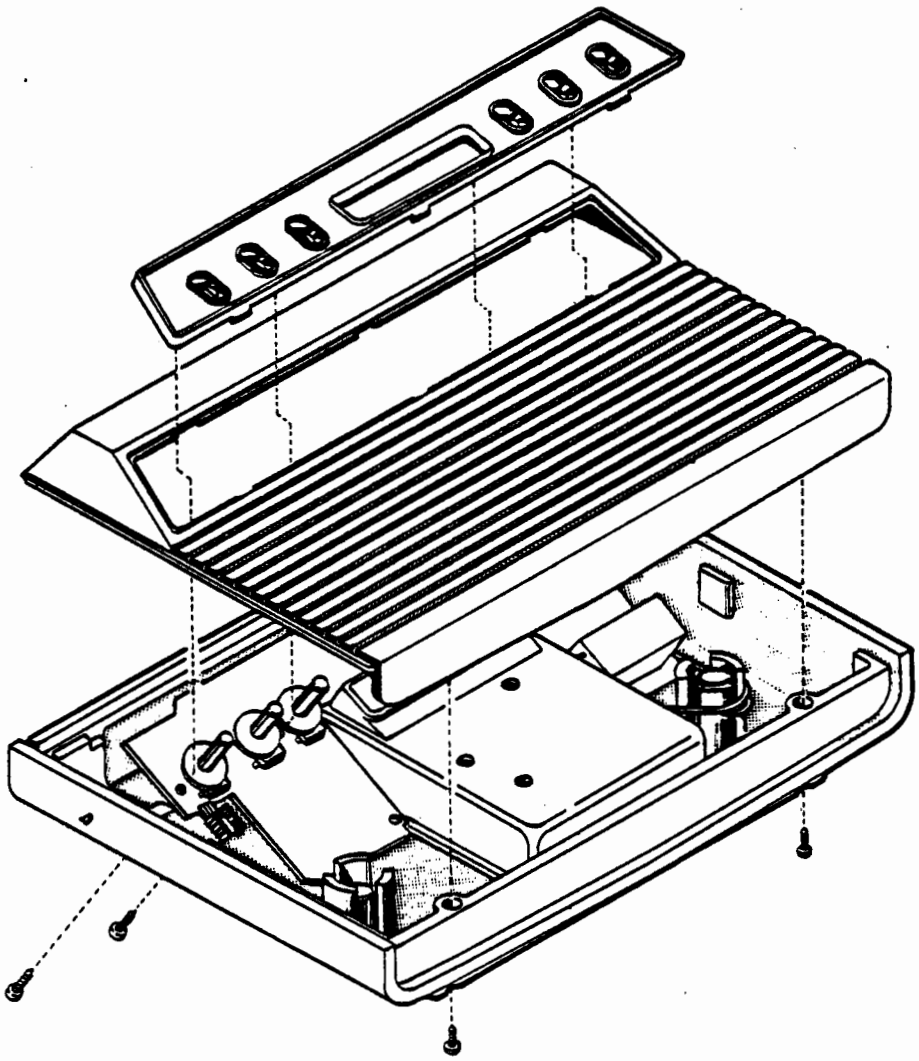


Figure 1-2. 2600 Game Console

Switchboard

The switchboard assembly holds the player option switches, the power supply, and the RF modulator (See Figure 1-3).

- PLAYER OPTION SWITCHES
  Switches S101 thru S104 are double-pole, single-throw. Switches S105 and S106 are double-pole, double-throw. All switches are connected between the switchboard and the motherboard by 12-conductor flexible ribbon cable.

- POWER SUPPLY
  The power supply is composed of a +5 voltage regulator, filter capacitors, and the power on/off switch. Unregulated DC is supplied to the board from the battery eliminator. A supply of +5 volts is routed through a filter circuit to the RF modulator. The motherboard also receives its power (+5 volts Vcc) from the switchboard via the same 12-conductor ribbon cable referenced above.

- RF MODULATOR
  The RF modulator converts the signal received from the Television Interface Adaptor chip on the motherboard to a frequency that a television can receive and interpret. Data between the RF module and the Television Interface Adaptor chip is passed via the 12-conductor ribbon cable which connects the motherboard to the switchboard. A coaxial cable passes this signal from the RF module to the switch box mounted on the back of the television.

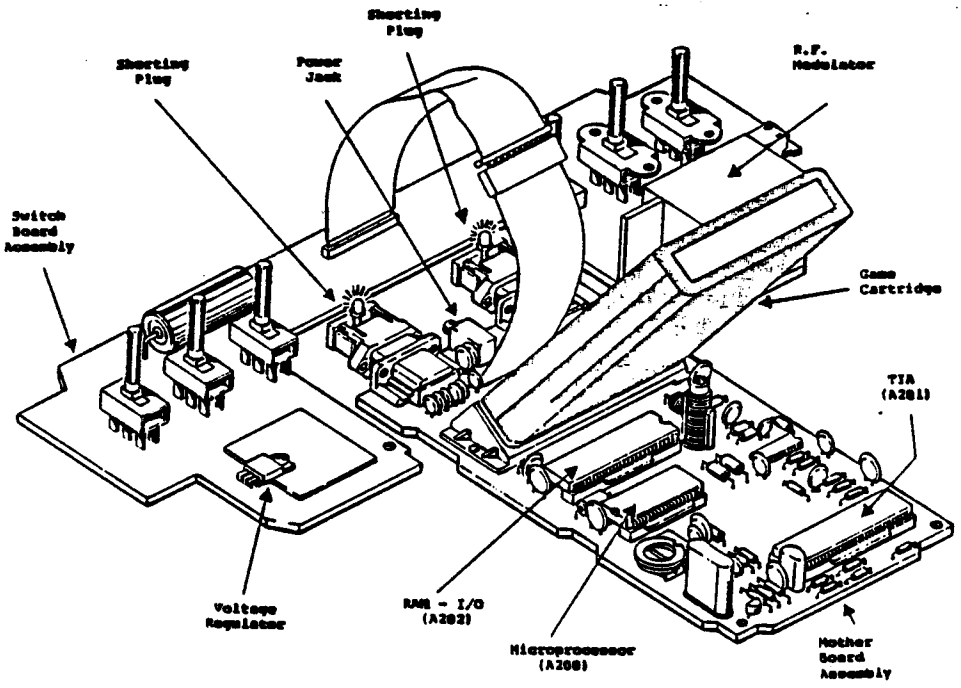


Figure 1-3. 2600 Switchboard and Motherboard Assembly

Motherboard

The motherboard is composed of a PC board containing a microprocessor (MPU) chip, a combination Random Access Memory - Input/Output (RAM-I/O) chip, and a Television Interface Adaptor (TIA) chip (see Figure 1-3). The board also contains numerous capacitors, resistors, transistors, and other assorted electronic components. These parts are all listed in Section 8, PARTS LIST.

- MICROPROCESSOR CHIP
  The heart of the VCS is the 6507 microprocessor chip (MPU). This device makes decisions for the VCS based upon information it receives from the game cartridge and the RAM-I/O (discussed in the next paragraph).

- 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 also scans the option switches and the joystick I/O lines for information and maintains time accounting for the MPU.

- TELEVISION INTERFACE ADAPTOR CHIP
  This ATARI proprietary chip generates audio and video signals which are required by the RF modulator. The Television Interface Adaptor (TIA) chip also contains the analog-to-digital converter circuitry that allows the MPU to understand signals originating in the hand-held paddle controllers.

  TIA outputs are processed by additional circuitry into a composite video, sound, and color signal which is routed to the RF module on the switchboard via the 12-conductor ribbon cable. The RF module converts the composite signal to a RF signal acceptable to the television. A coaxial cable transmits this RF signal from the console to a selection box that can be mounted on the T.V. This switchbox (Figure 1-4) allows you to display either a signal received by the antenna (for normal T.V. viewing) or a signal from the VCS (for playing a game).

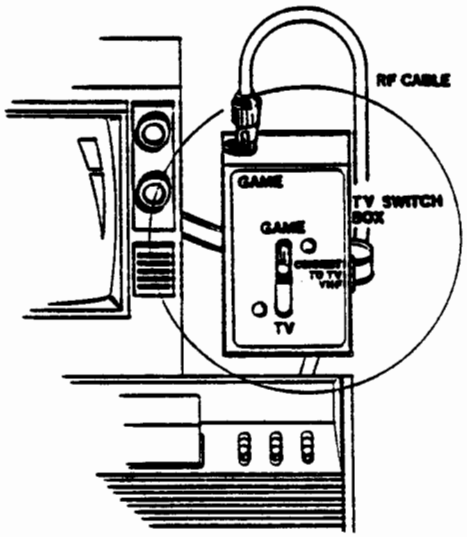


Figure 1-4. TV Switchbox

2600A MODEL DIFFERENCES - ALL REVISIONS

The major difference between the newer single board VCS (2600A) and the original VCS (2600) is that all of the components formerly on the switchboard are now located on the motherboard (See Figure 1-5). This includes the player control function switches (Power ON/OFF, COLOR/BW, GAME SELECT and GAME RESET), RF modulator and power supply circuitry. The single board design eliminates the need for the ribbon cable, which connected the switchboard to the motherboard on the 2600 VCS.

Gone, too, are the luminescence and RF output buffers and the two TIA input buffers, all of which were contained in chip A203. In the oscillator circuit, one of the transistors and its associated network has been eliminated and R227-R230 (paddle control lines) are no longer present. C239, going to pin 7 on J202 and J203, has been replaced by C236 and C237 (See Figure 1-6).

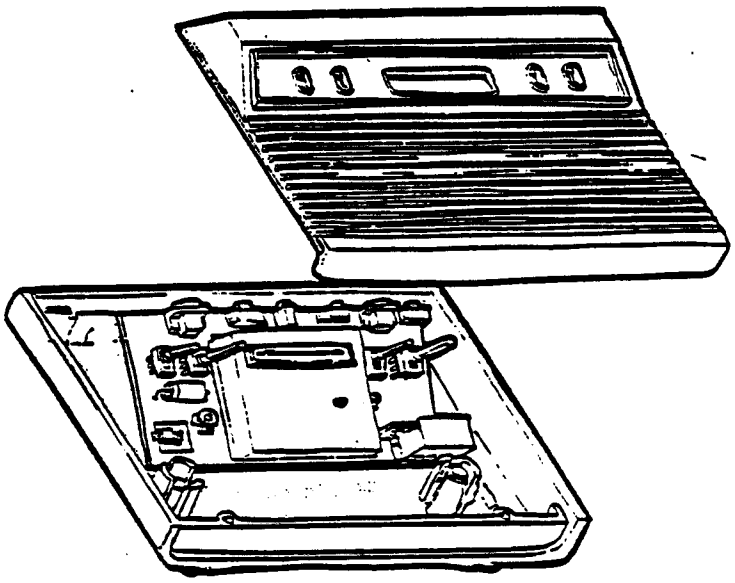


Figure 1-5. 2600A Game Console

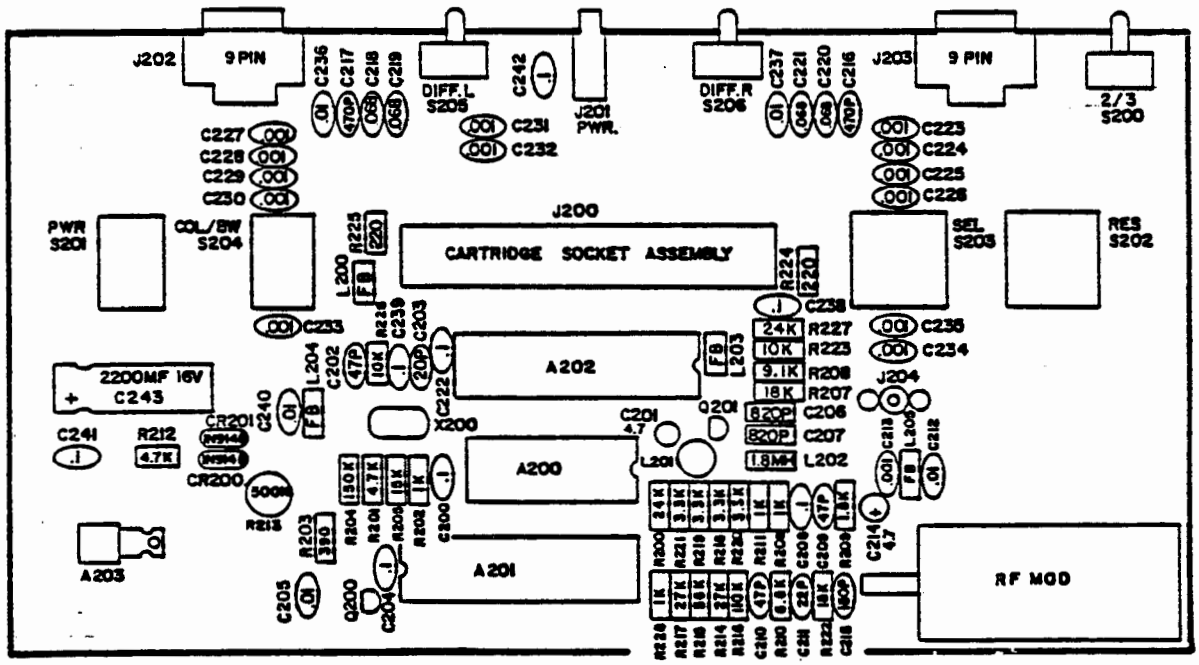


Figure 1-6. 2600A Board Layout (Revs 1-13)

In addition to the component changes, the physical location of several parts has also been changed. Instead of having the right and left difficulty switches placed on top of the game, they are located at the rear of the console next to the game controller plugs. The channel selector switch is also located at the rear of the console. The game cartridge socket is no longer angled, but is mounted vertically on the board.

2600A MODEL DIFFERENCES - REVISIONS 14 AND 15

Revisions 14 and 15 contain the model differences described above, and in addition have new components on the TIA lines, LM1 and Sync. There are two 1N914 diodes to prevent feedback on the lines and two additional pull-up resistors to insure the signal is at +5v. To compensate for any signal loss, R215 and 217 have been changed to 47K (R215) and 24K (R217).

2600A MODEL DIFFERENCES - REVISIONS 16 AND UP

Revisions 16 and up contain the model differences described above; they also include a timer chip (A205) added to the reset circuitry of the MPU chip. This chip eliminates the problem of power-on reset failures.

SUMMARY

The VCS is a microcomputer that receives its operational instructions from game cartridges, the game console, and player controllers. The 2600 switchboard and motherboard assemblies are housed within an outer casting and are the principle assemblies addressed in the remainder of this manual. The boards are connected by a 12-conductor ribbon cable which passes not only power, but also data between the two boards.

Three chips of the motherboard 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 Adapter (TIA) chips.

The 2600A model differs primarily in the location of the components formerly located on the switchboard. They are attached directly to the motherboard and eliminate the need for the switchboard and the ribbon cable. The 2600A Revisions 14 and up include even further additional components to improve the performance of the output circuitry.

SECTION 2

SILKSCREENS AND SCHEMATICS

On the following pages are representative silkscreens and switchboard schematics for the ATARI Video Computer System. The motherboard schematics for all 2600/2600A VCS models are located in the pocket at the front of this binder. Minor variations in design may be encountered depending on the production date of the game, but these schematics provide all details required for an in-depth understanding of all 2600 units, including the various 2600A model revisions..

NOTES

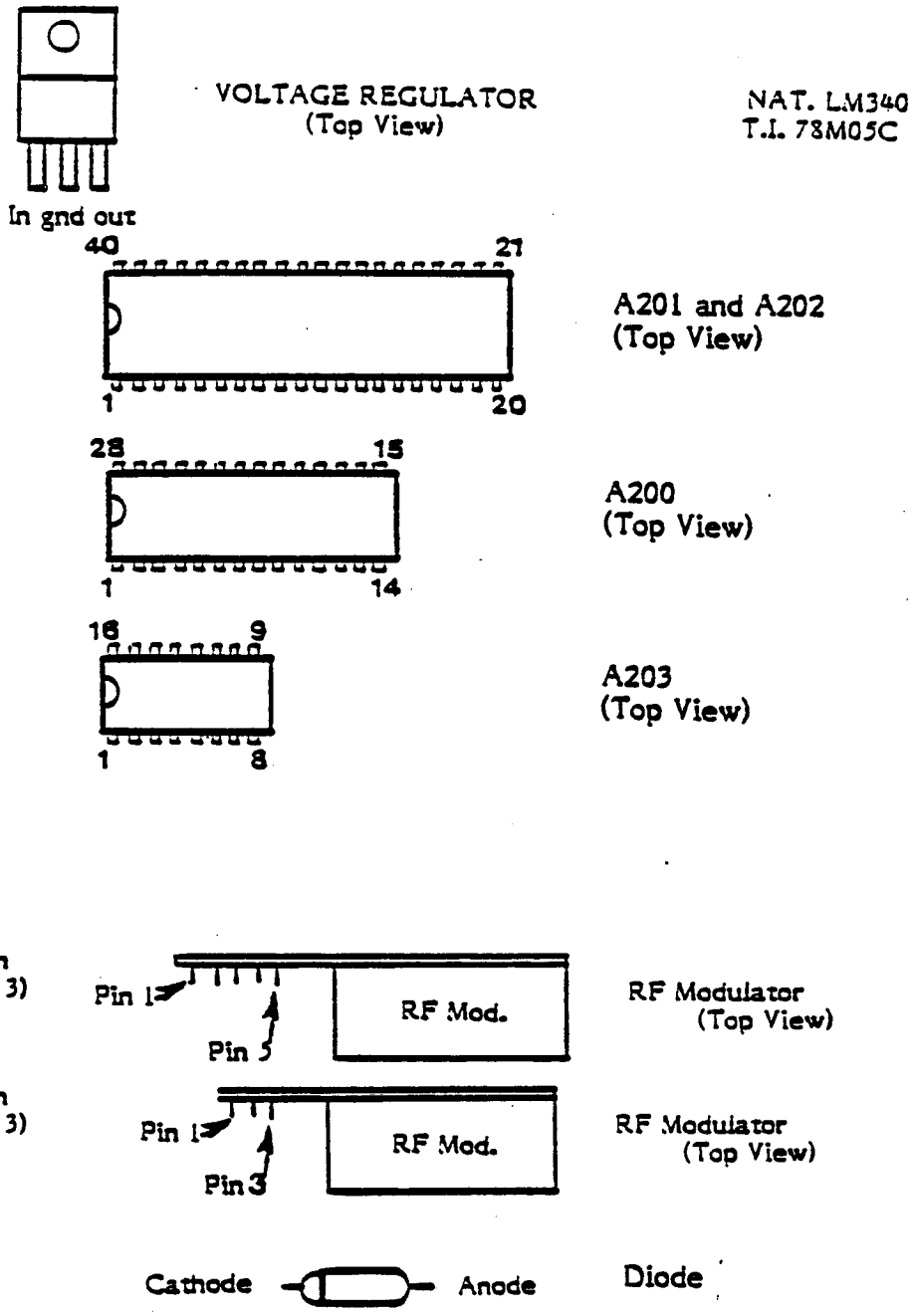


Figure 2-1. 2600/2600A IC Pinouts

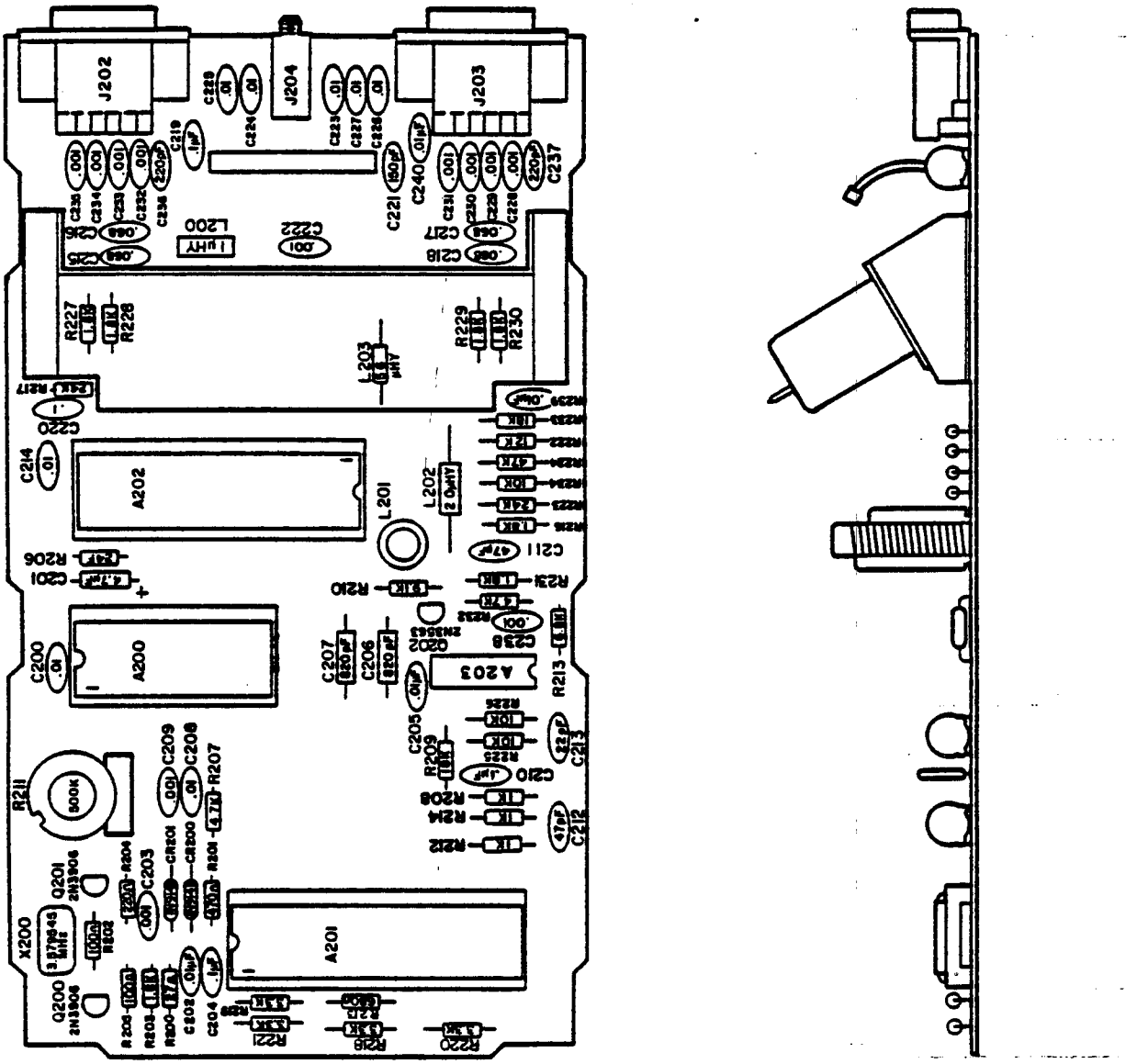


Figure 2-2. 2600 Motherboard Silkscreen

The following variations may appear on the 2600 switchboard:

CHANNEL 3 SWITCHBOARD:

C102 may or may not be in place.
C103 and/or C104 may or may not be in place.
C103 and/or C104 may be mylar dipped .22 uf.
C103 and/or C104 may be ceramic .01uf (See Figures 2-3 and 2-4).

CHANNEL 2 OR 3 SWITCHBOARD:

The holes on the PC board for the GAME RESET and GAME SELECT switches may not be wide enough apart for the switch legs. To correct this the legs of the switch must be bent in so they fit into the holes (See Figures 2-5 and 2-6).

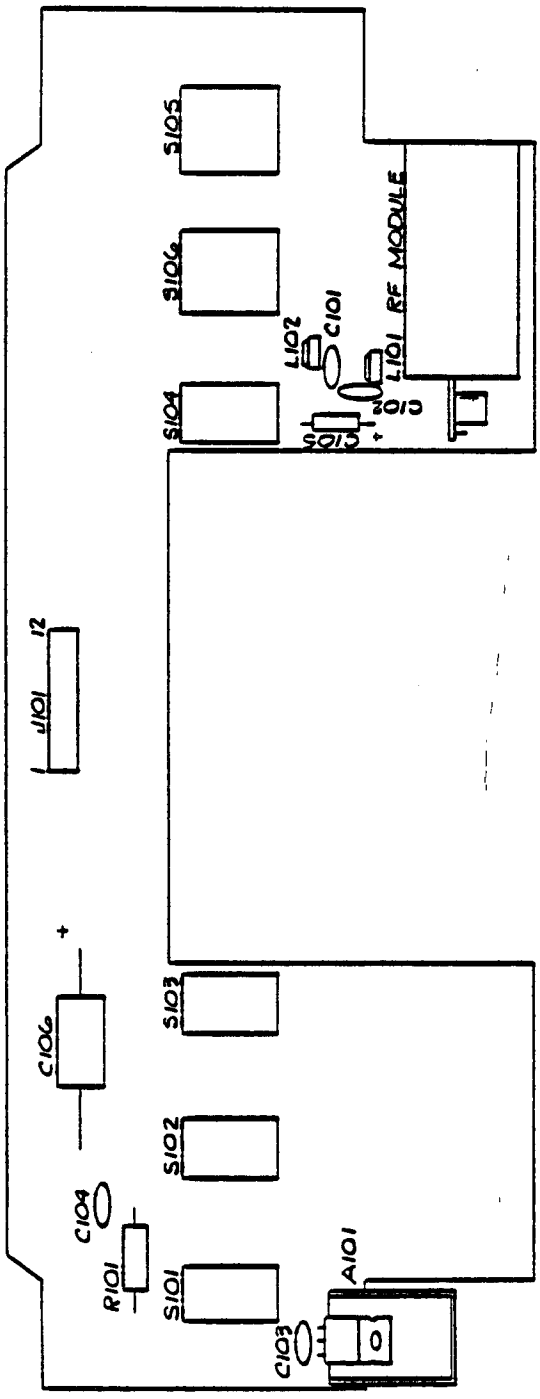


Figure 2-3. 2600 Channel 3 Switchboard Silkscreen

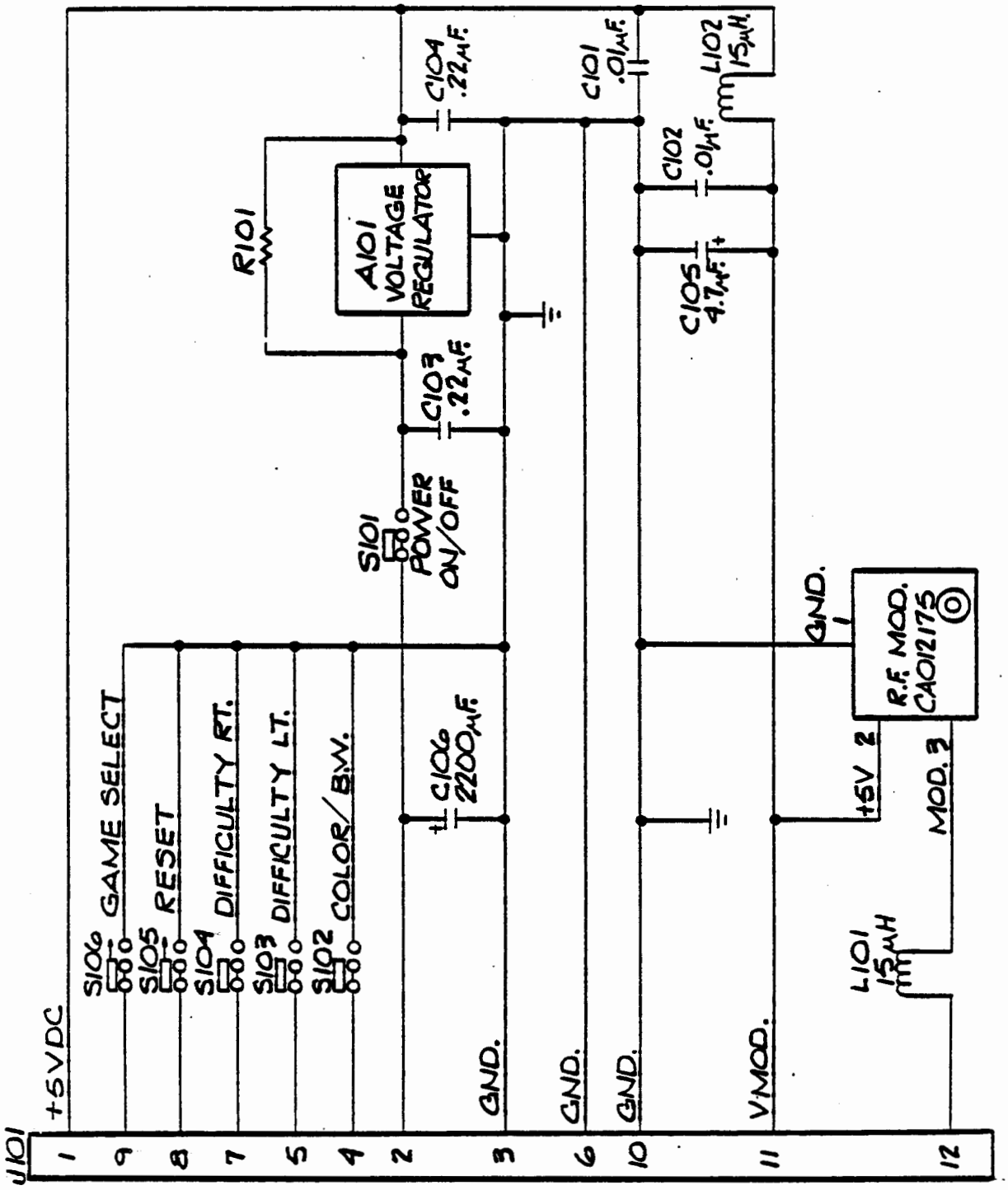


Figure 2-4. 2600 Channel 3 Switchboard Schematic

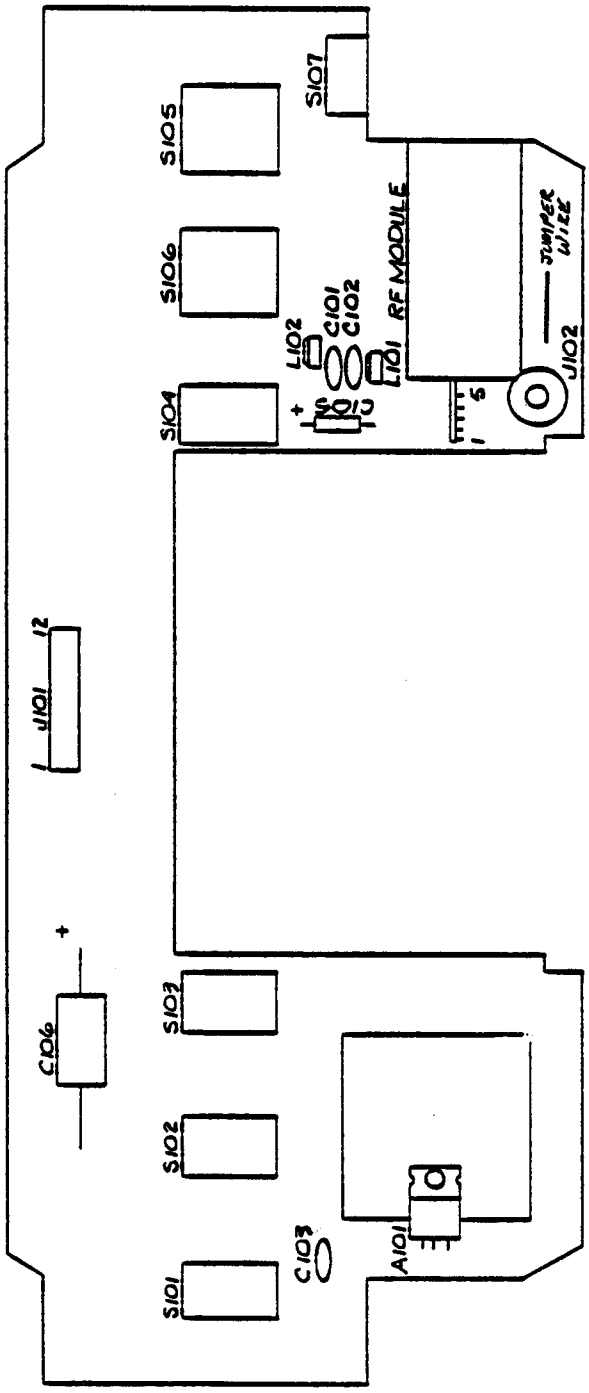


Figure 2-5. 2600 Channel 2-3 Switchboard Silkscreen

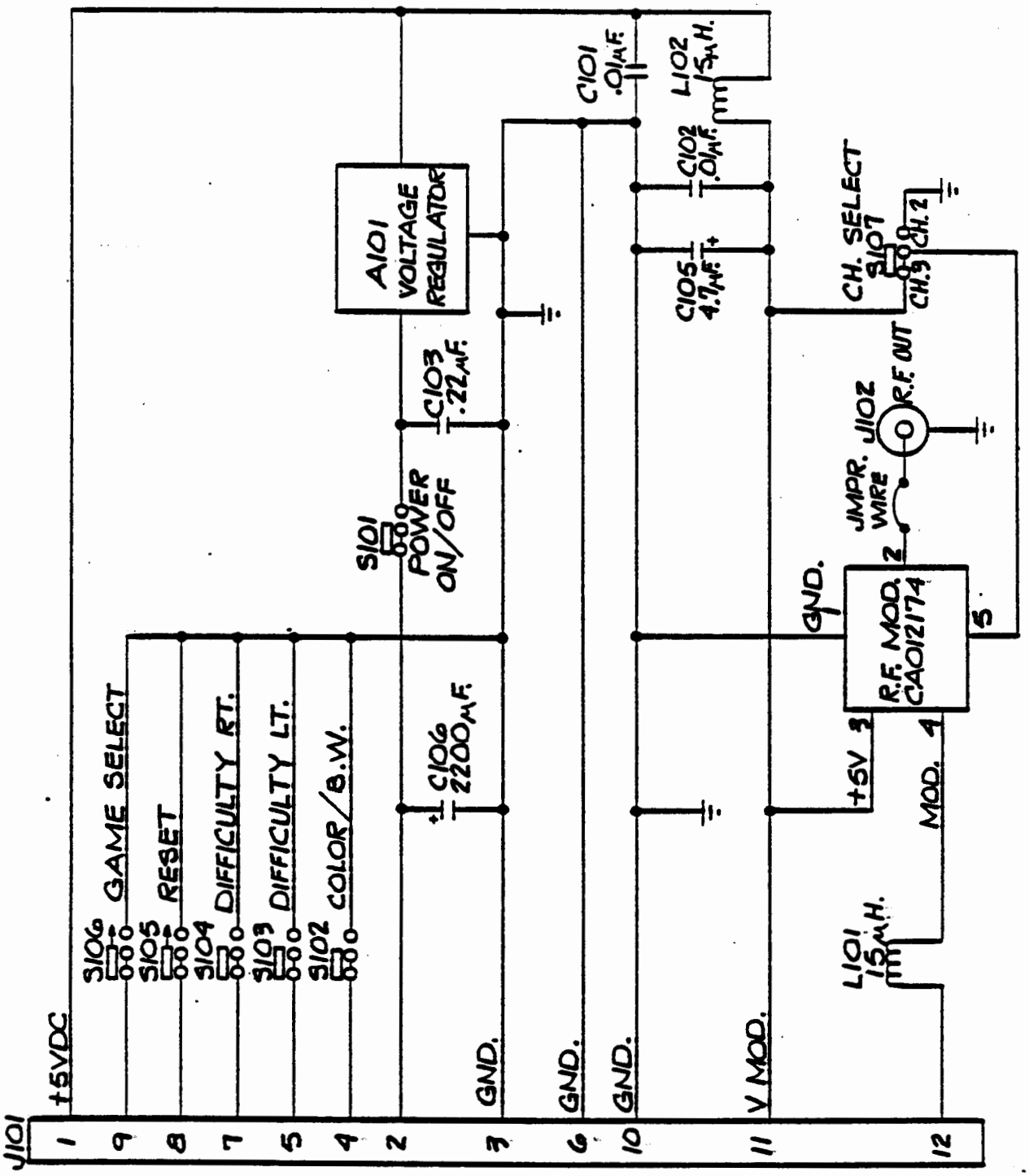


Figure 2-6. 2600 Channel 2-3 Switchboard Schematic

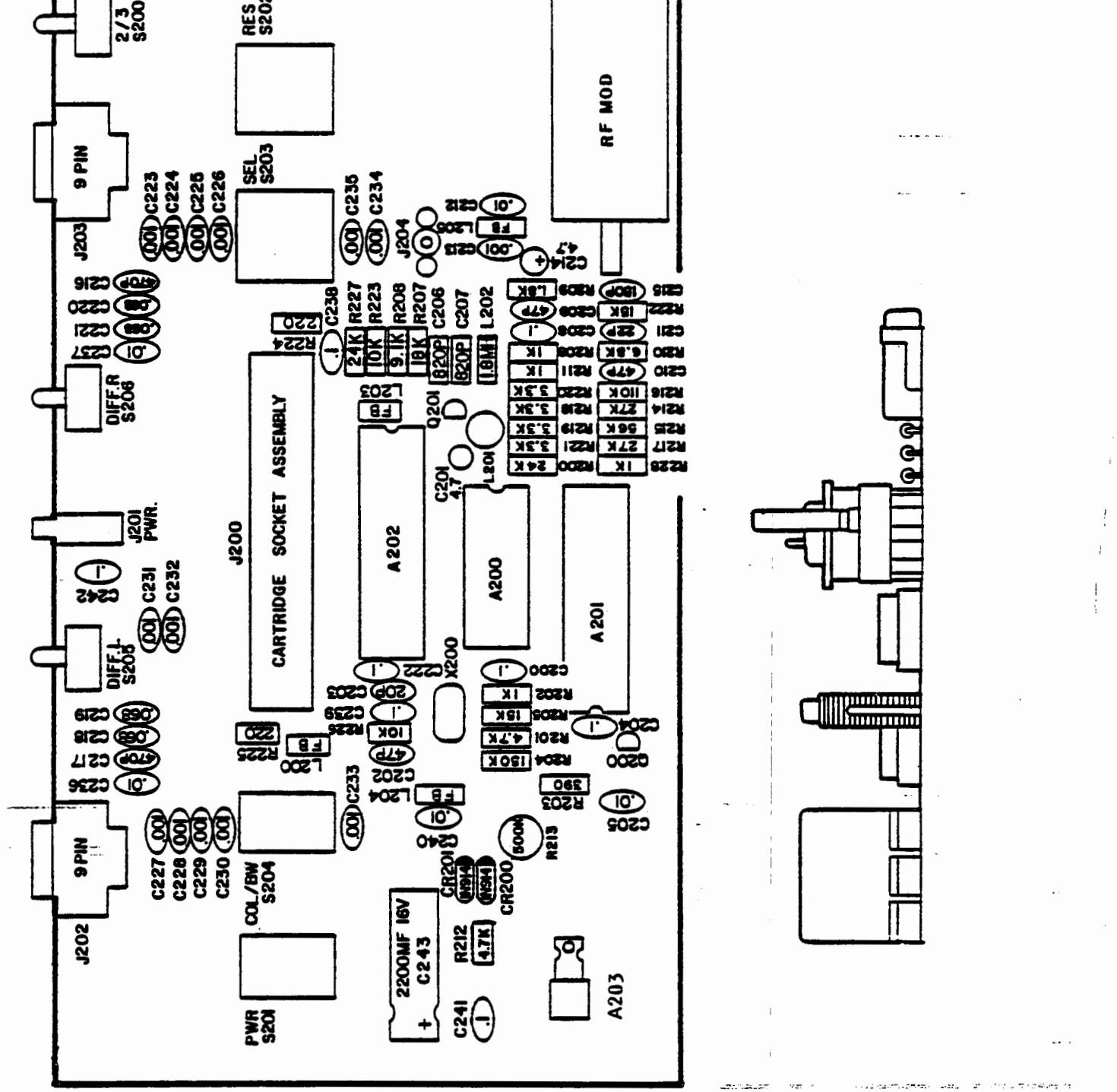


Figure 2-7. 2600A Motherboard Silkscreen (Revs. 1-13)

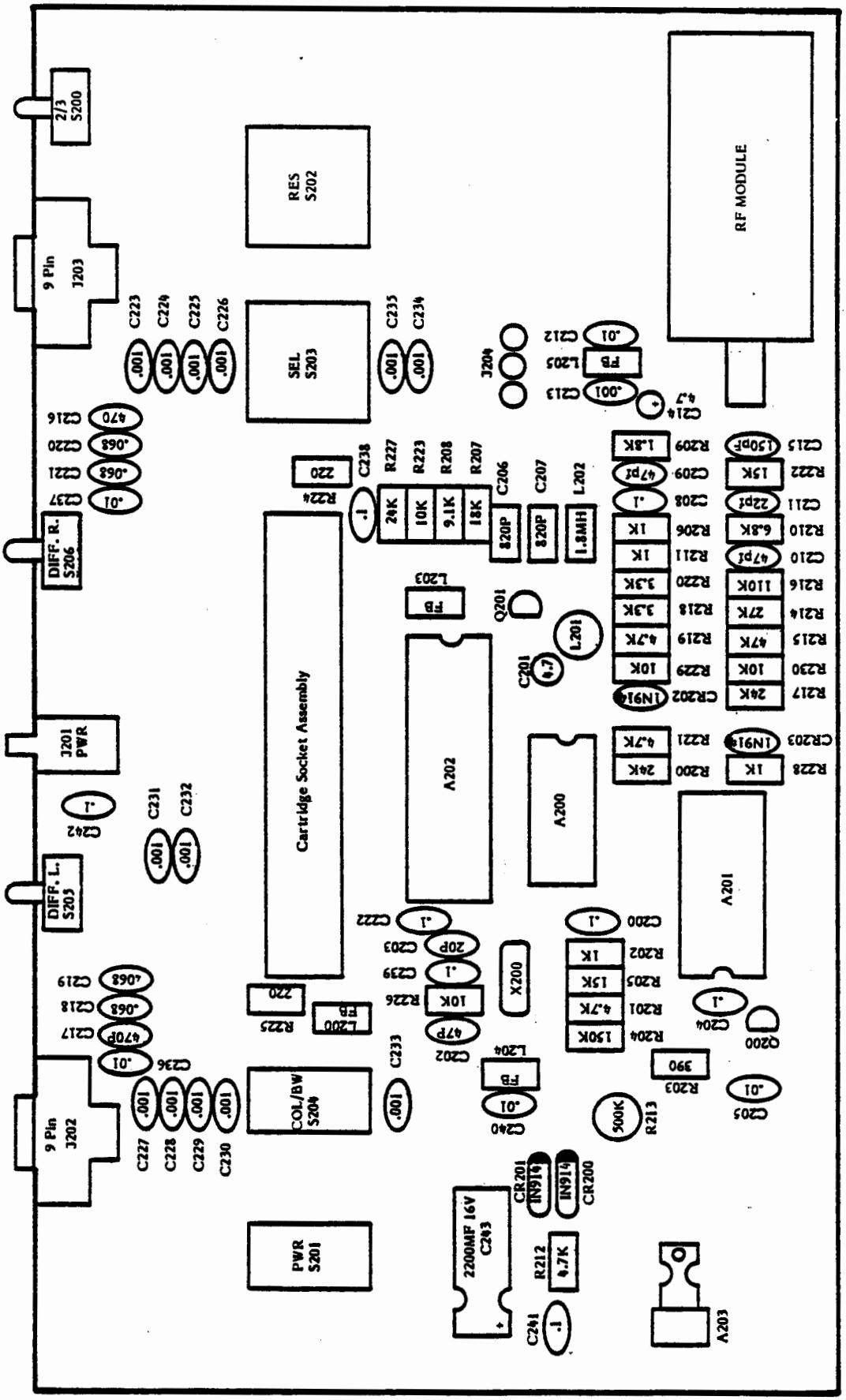


Figure 2-8. 2600A Motherboard Silkscreen (Revs. 14 and 15)

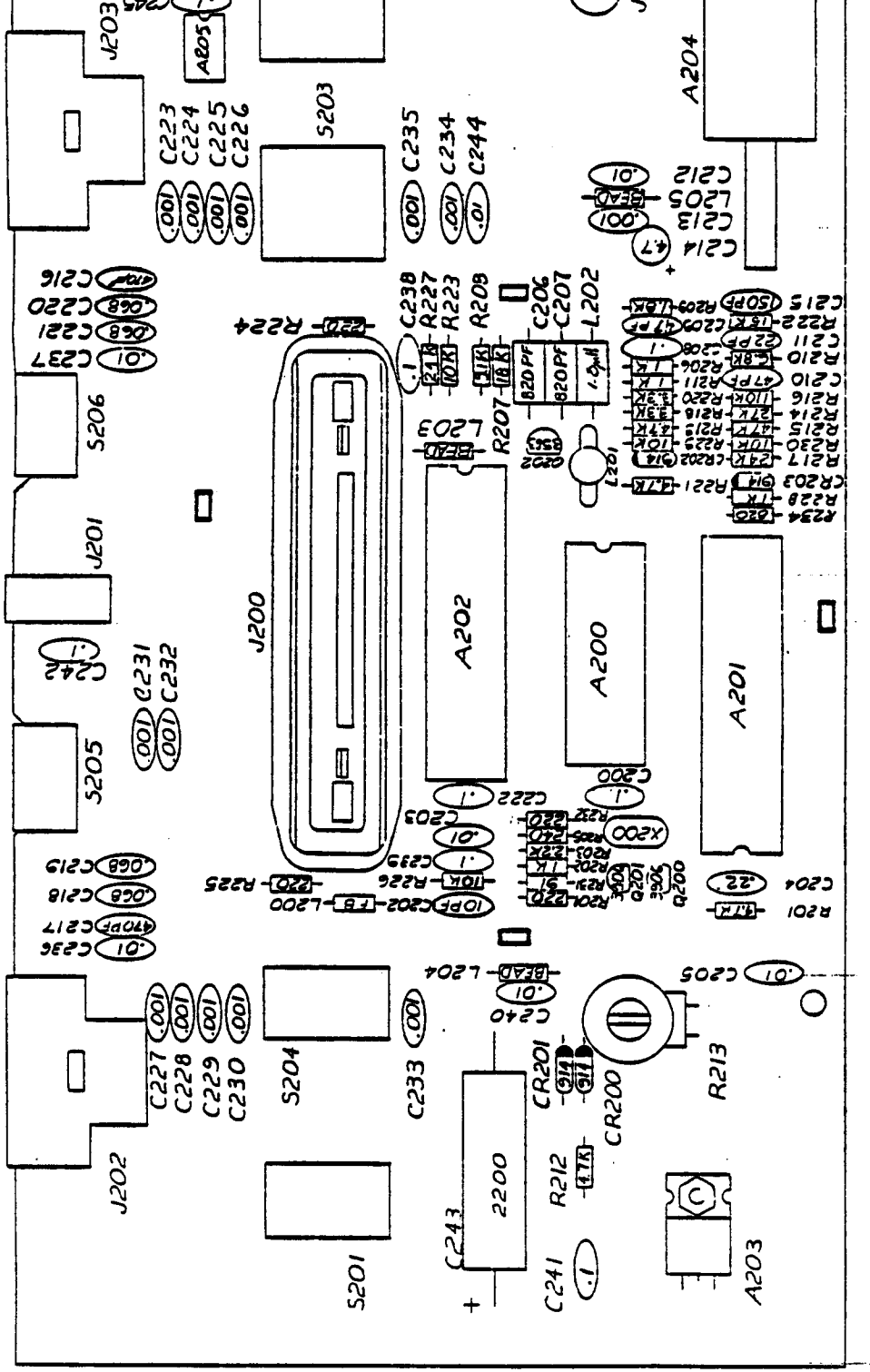


Figure 2-9. 2600A Motherboard Silkscreen (Revs. 16 and up)

SECTION 3

TESTING AND TROUBLESHOOTING

EQUIPMENT REQUIREMENTS

You require eight basic pieces of equipment in order to analyze failures in the 2600/2600A Video Computer Systems (VCS). These items include:

- A 15 MHz oscilloscope
- A Video Computer System switchboard assembly that is known to be operating properly (not required for repairing 2600A units)
- A Video Computer System diagnostic test cartridge, version 2.6 (DTC)
- Two blue controller port shorting plugs for use with the 2.6 (DTC) diagnostic cartridge
- Signal Tracing Cartridge (STC or KLUGE)
- VCS Field Service Manual for Domestic Model 2600/2600A
- Color television set (properly adjusted)
- Frequency Counter

TEST PROCEDURES AND METHODS

Atari requires each 2600/2600A model returned for service to be checked for certain conditions. In some instances, a unit must be modified to conform to Atari standards. These changes are summarized below.

2600 MODEL MODIFICATIONS

- Each 2600 model opened must be modified as shown in Figure 3-1 to provide additional protection from static discharge. A Zener diode is connected between the trigger lines and ground, and static strips are placed on the switches on the switchboard (See Figures 3-1, 3-2 and 3-4). These modifications are crucial to prevent component damage due to static discharge.

- Each connector and plug should be checked for a tight, secure fit. Intermittent failures frequently result from a loose connector or plug.

- Connectors J202 and J203 should be checked for pushed or broken pins.

- If the unit has a green J200 connector, insert cartridge and wiggle it. If the unit shows intermittent problems, replace J200.

- Each board with Molex chip sockets with insertion aids should have the insertion aids removed and the chip reinserted.

- Check that all components (especially those on the perimeter of the motherboard) are properly soldered. Check for broken or shorted trace lines.

- Check for an inductor and capacitor over C201 and R206. Cut the inductor and cap out, being careful not to cut the C201 or R206 leads.

- If unit has a standup regulator and heatsink, inspect for hairline fractures between the regulator and switchboard. Also ensure that the regulator is firmly secured to the heatsink by a Tinnerman clip or rivet.

- Ensure that motherboards (Rev. 8 or lower) have a colored dot over the trace on the upper-left corner of the board. This prevents shorting the board and the casting (See Figure 3-3).

- Two types of 12-conductor cable assemblies have been used on 2600 model units, the flat-wire type and the ribbon type. When a defect is found in the flat-wire type cable assembly or its male connector on the switchboard, the flat-wire cable assembly should be replaced with the ribbon cable assembly and the 12-pin male switchboard connector should be replaced with the 12-pin female switchboard socket.

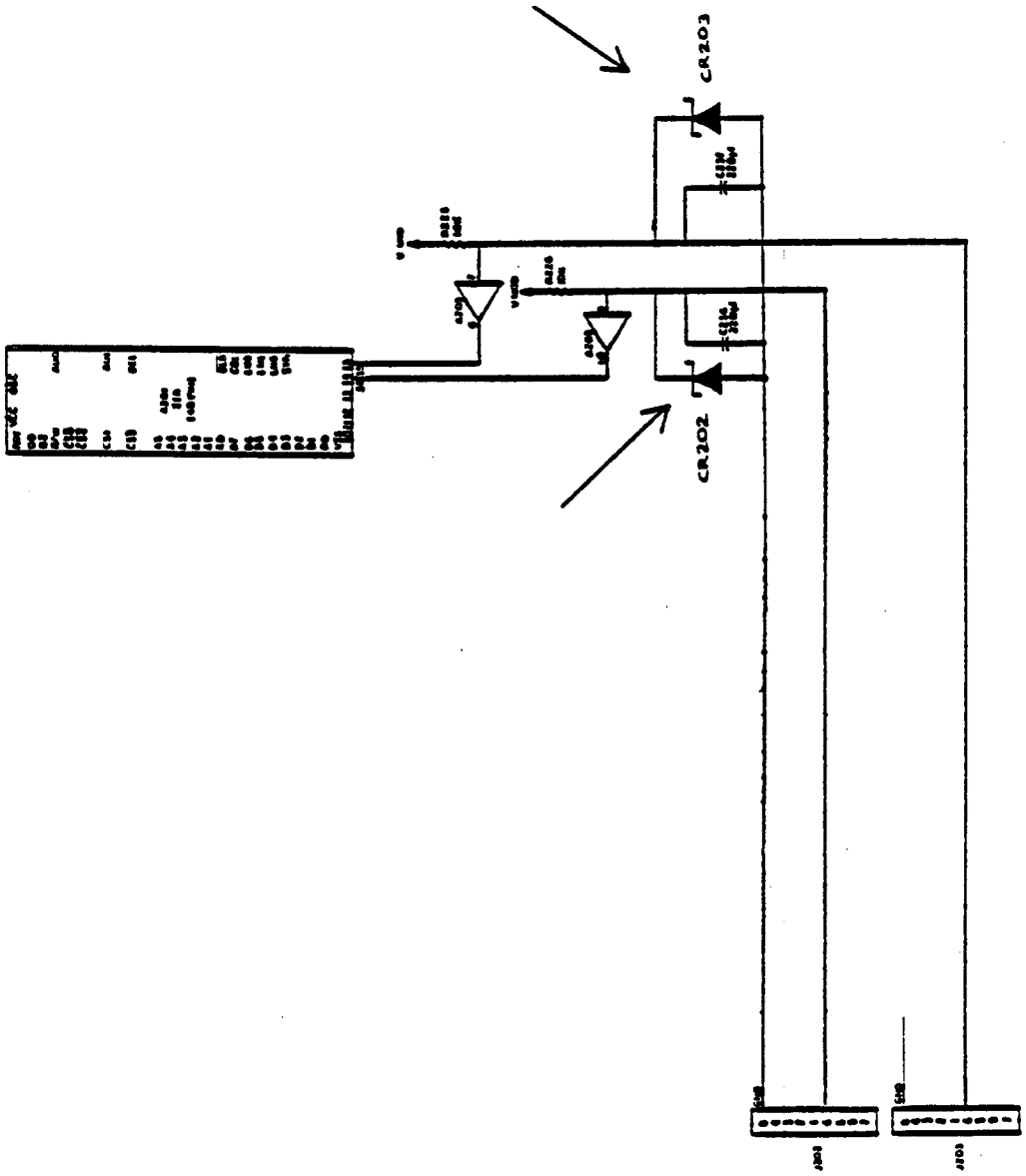


Figure 3-1. 2600 Trigger Circuitry with Static Modification

Install the static modification on all 2600 units. Install CR202 nd CR203 by removing C236 and C237 and inserting the C236/CR202 and C237/CR203 assemblies in their place (See Figure 3-2). CAUTION: Observe the polarity on CR202 and CR203 (the dark band must be toward the J202/J203 connectors). On the switchboard, install the static strips as shown in Figure 3-4.

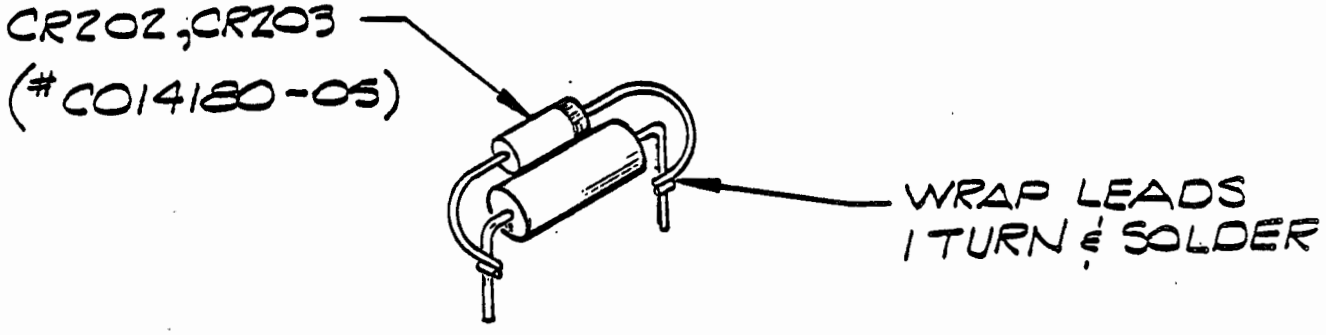


Figure 3-2. 2600 Static Modification Zener Diode

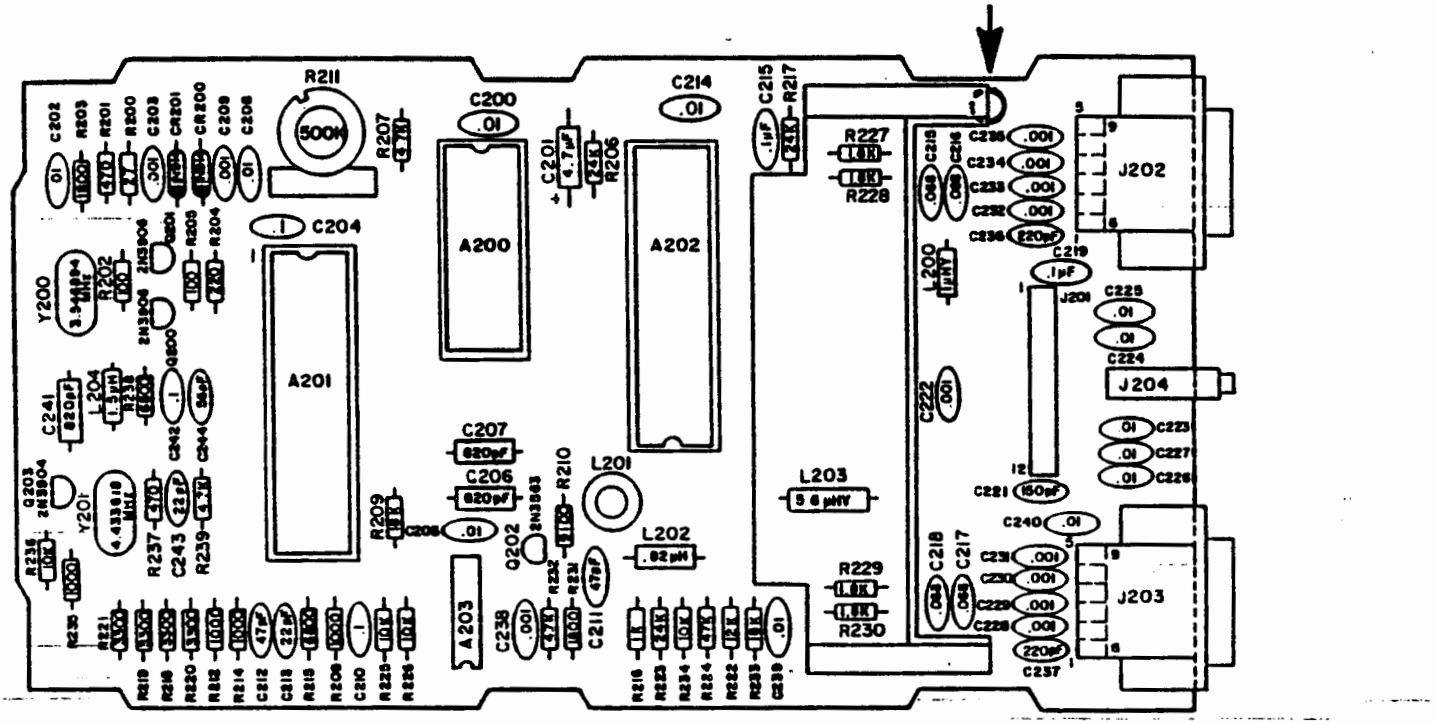


Figure 3-3. Location of Colored Dot Over Trace

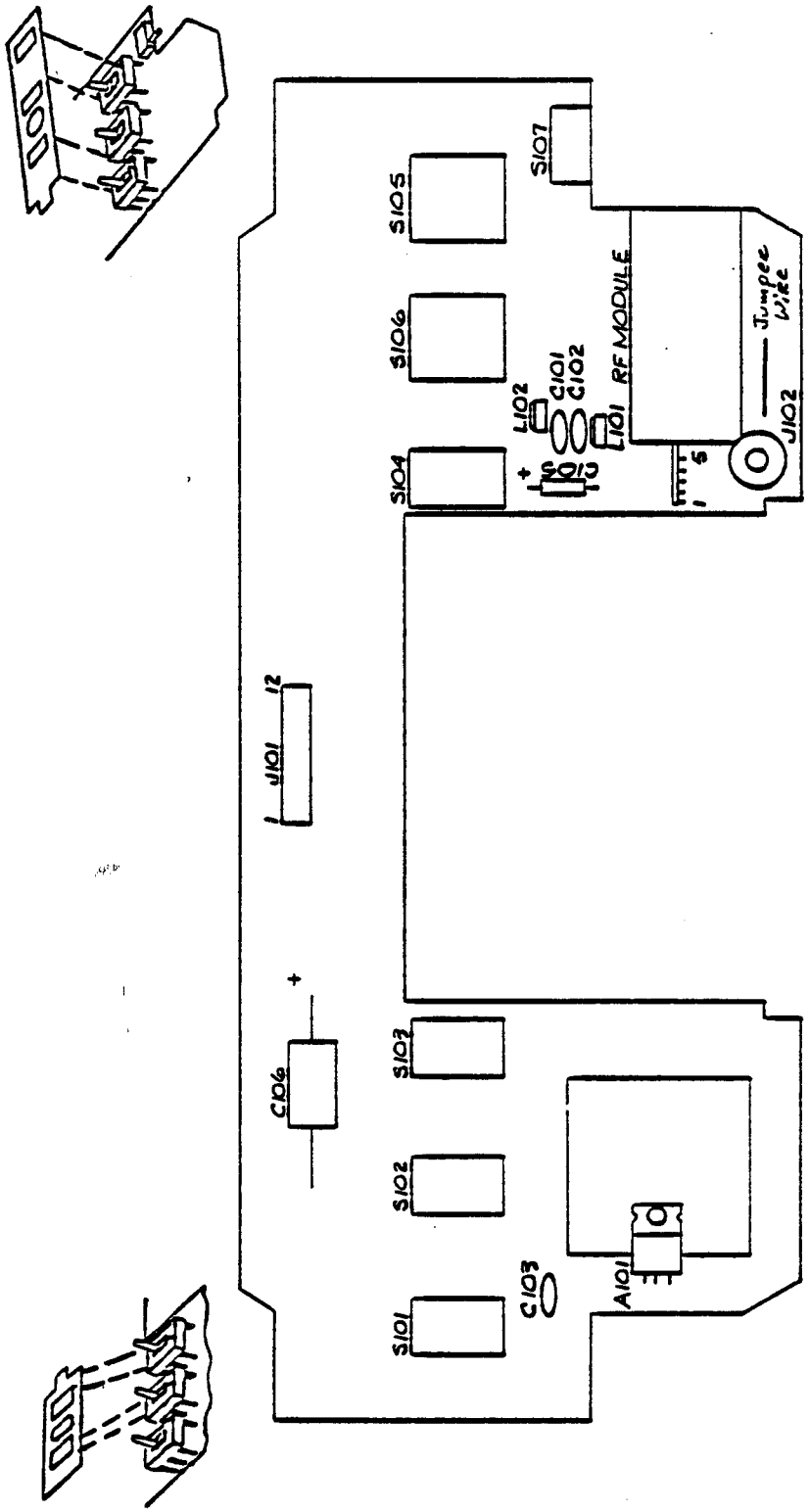


Figure 3-4. 2600 Switchboard Static Modification

2600A MODEL MODIFICATIONS

- Each 2600A (Revs 1-13) model must have static strips placed on the front panel switches (See Figure 3-5).
- Check each connector and plug for a tight, secure fit. Intermittent failures frequently result from a loose connector or plug.
- Check that all componenets are properly soldered, and check for broken or shorted trace lines.
- If a unit exhibits RF interference that does not clean up using normal adjustment methods, or if a series of lines and bright grid distortions on the screen are accompanied by a loud hum even when properly adjusted, a defective or leaking capacitor may be at fault. Replace C241 (.1 microfarad) and/or C242 (.1 microfarad) located respectively between the power jack and voltage regulator.

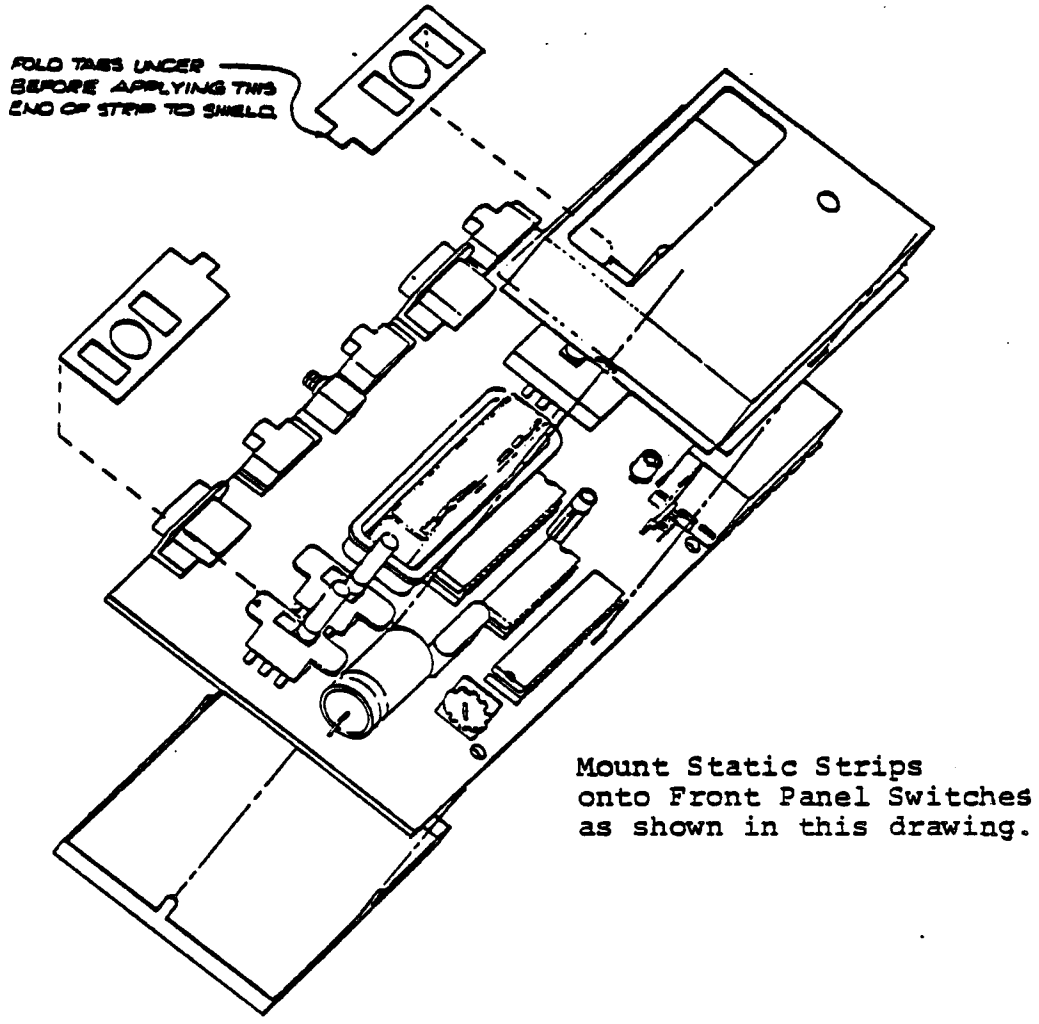


Figure 3-5. 2600A (Revs. 1-13) Static Modifications

TESTING WITH THE DIAGNOSTIC TEST CARTRIDGE (VERSION 2.6)

The 2600 Diagnostic Test Cartridge (version 2.6 DTC) contains a variety of tests to assist the service technician in identifying the source of problems within the VCS switchboard and motherboard hardware. The test cartridge is used in conjunction with the equipment listed at the beginning of this section. Each test is reviewed in the remainder of this section. Detailed procedures for use of the tests are described in Section 4, 2600 Diagnostic Flowchart, and Section 6, 2600A Diagnostic Flowchart. The tests available in the cartridge are:

- RAM Test
- Color Bar Test
- Gray Bar Test
- Diagnostic Matrix Test
- Audio Tones Test
- Paddle Control Lines Test

The technician also has a Signal Trace Cartridge (STC or KLUGE) available for tracking motherboard problems that are not repairable with the Diagnostic Test Cartridge.

INITIALIZATION

- Purpose: To prepare the VCS unit for testing by the diagnostic cartridge.
- Format: Connect VCS unit to television and battery eliminator. Set television to proper channel (channel 3). Plug in the 2.6 diagnostic cartridge. Set all 2600 switches to the up position. On the 2600A, set all front panel switches up and rear panel switches to the left (See Figure 3-6).

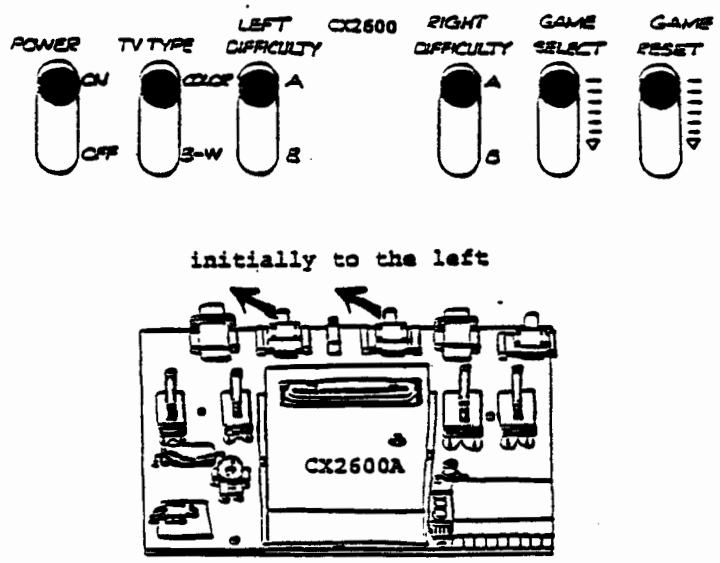


Figure 3-6. Switch Initialization Positions

RAM TEST

- Purpose: To test the 6532 RAM chip for proper operation.
- Format: On power-up the television displays diagonal lines of some type if the RAM is defective. See Figure 3-7 for examples of screens indicating a defective RAM.

  NOTE: The absence of defective patterns is no assurance that the entire chip is sound, only the RAM. The operation of the I/O and Timer functions is not verified by this test.

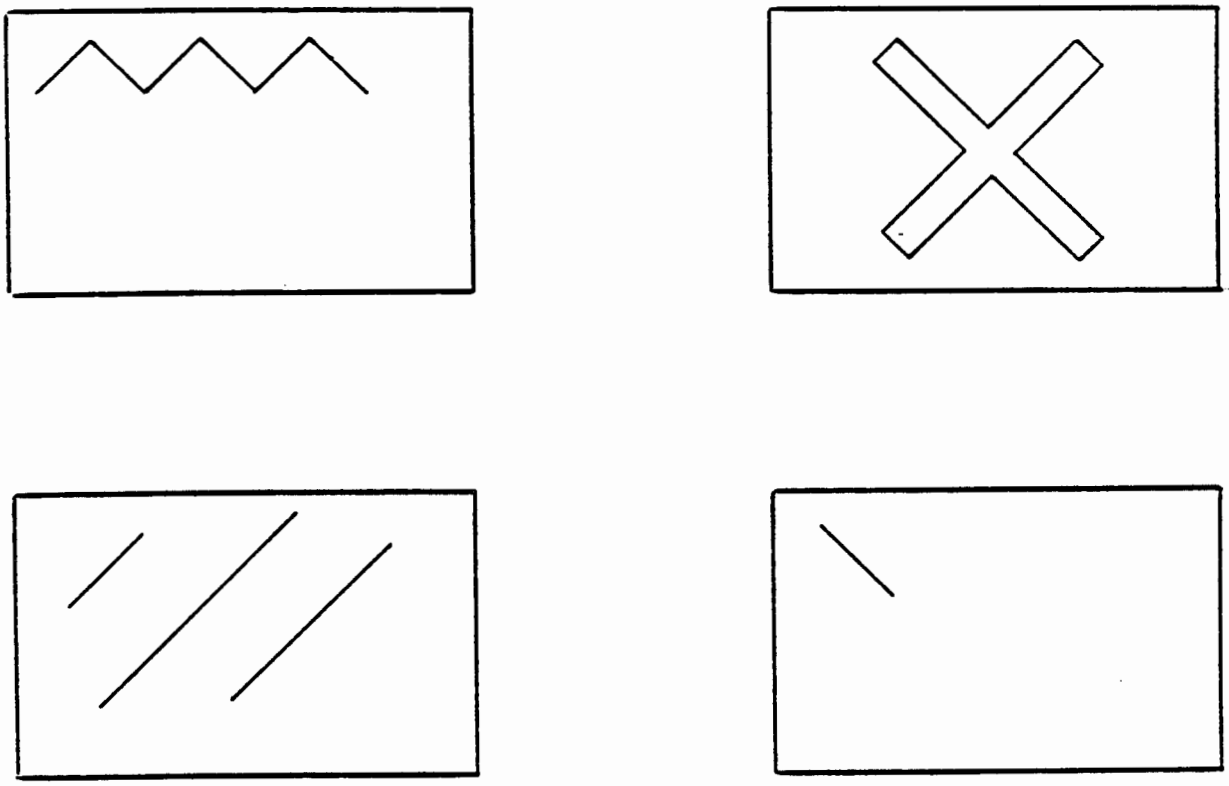


Figure 3-7. Defective RAM Patterns

COLOR BAR TEST

- Purpose: To test the 6507 microprocessor, 6532 RAM - I/O chip, and TIA chip for correct operation.

- Format: Set all switches to initialization position. A screen of horizontal color bars is displayed (See Figure 3-8). The screen should be steady and unchanging. A gray or blue horizontal reference line runs across the screen about three bars from its bottom. This reference line is thinner than the bars around it. R211 (R213 on the 2600A board) should be adjusted so the bars immediately above and below the reference line are within one shade of each other. 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 bars are acceptable. Leave this test on for at least ten seconds in order to catch any intermittent problems, such as a bar momentarily changing colors or blanking out.

NOTE: This figure is a black and white representation of a color television screen.

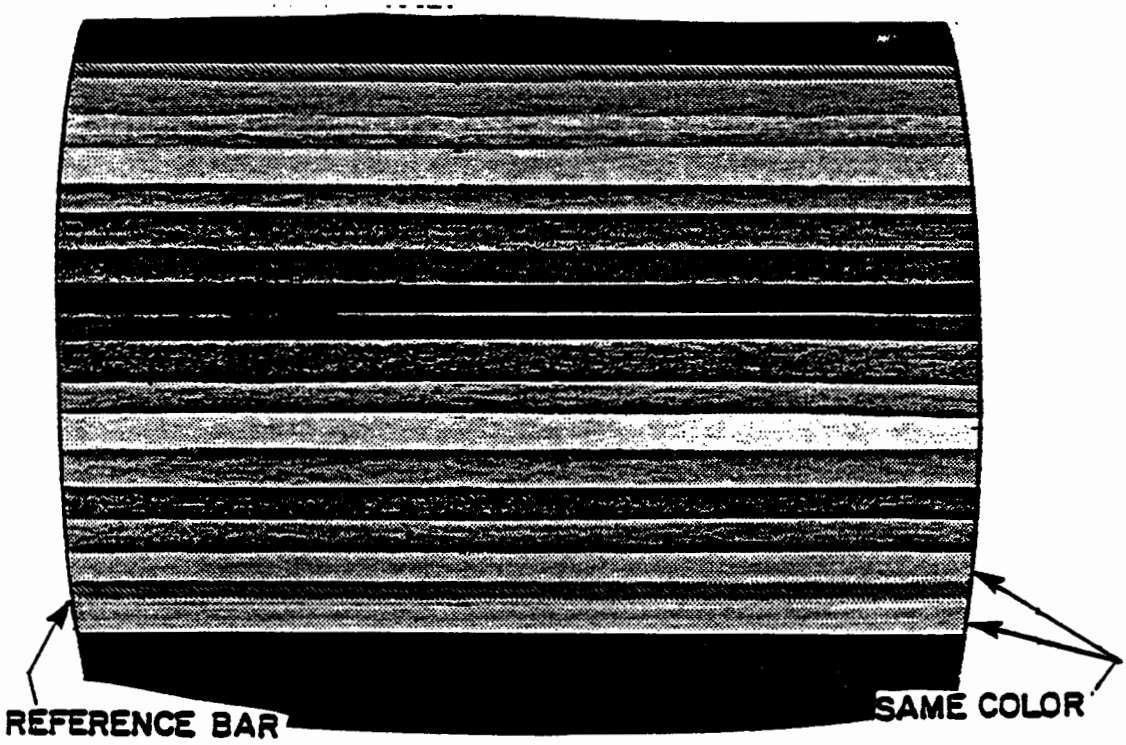


Figure 3-8. Color Bars Screen

GRAY BAR TEST

- Purpose: To test the function of the luminescence lines (LMO, LM1, LM2) from the TIA chip to the RF Module.

- Format: Move the Color/Black & White switch to the Black and White position. There should be eight horizontal gray bars displayed, going from black at the top to white at the bottom in even gradations (See Figure 3-9). The screen should be steady and unchanging. These 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 ten seconds to ensure that there is no "flashing" of any color or shifting of the gray bars.

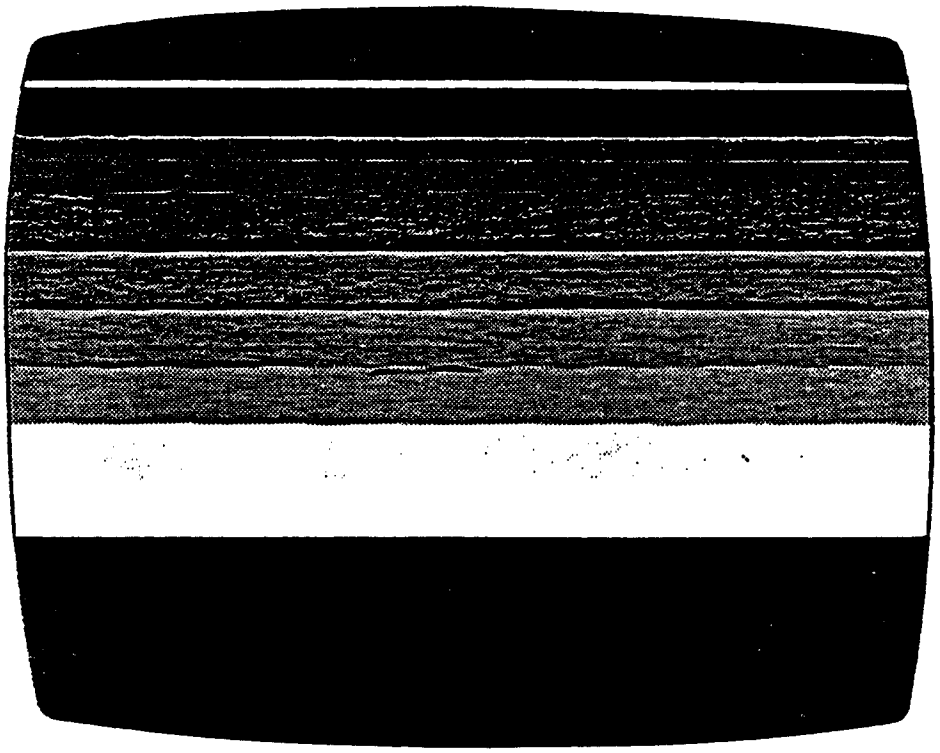


Figure 3-9. Gray Bars Screen

DIAGNOSTIC MATRIX TEST

- Purpose: To test the proper function of the Input-Output ports of the VCS unit.

- Format: Set all switches to the initialized position, then move the Left Difficulty switch to the "B" position. The test is performed in two parts:

  1. With the blue shorting plugs removed, the matrix of nine rectangles on the screen should look like Figure 3-10.

  2. The shorting plugs are then inserted and the pattern should look like Figure 3-11.

  3. Press the GAME SELECT switch. If the switch is properly functioning, that area of the matrix will black out. Release the GAME SELECT switch and repeat the procedure with the GAME RESET switch.

  The Matrix jumps once every second.

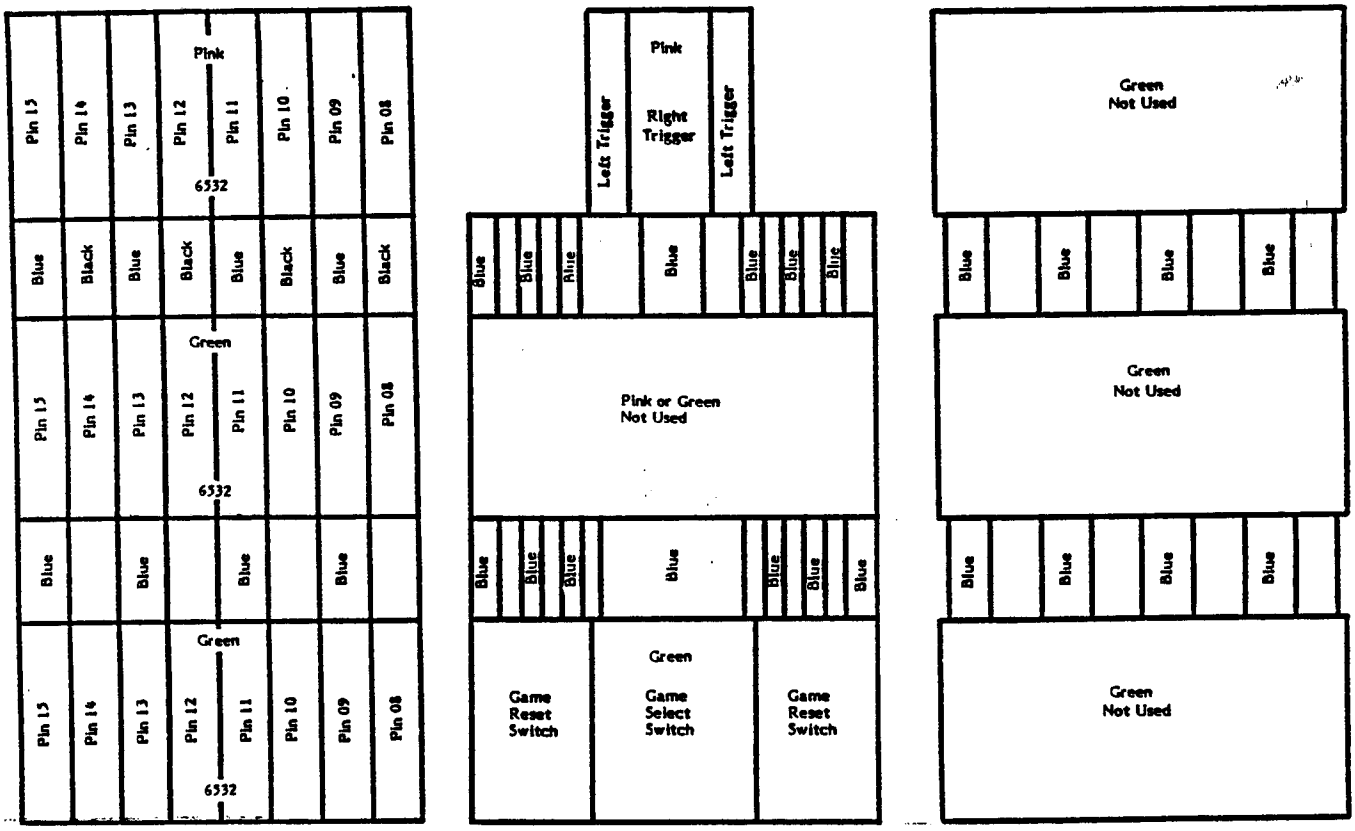


Figure 3-10. Diagnostic Matrix Screen
(Shorting Plugs OUT)

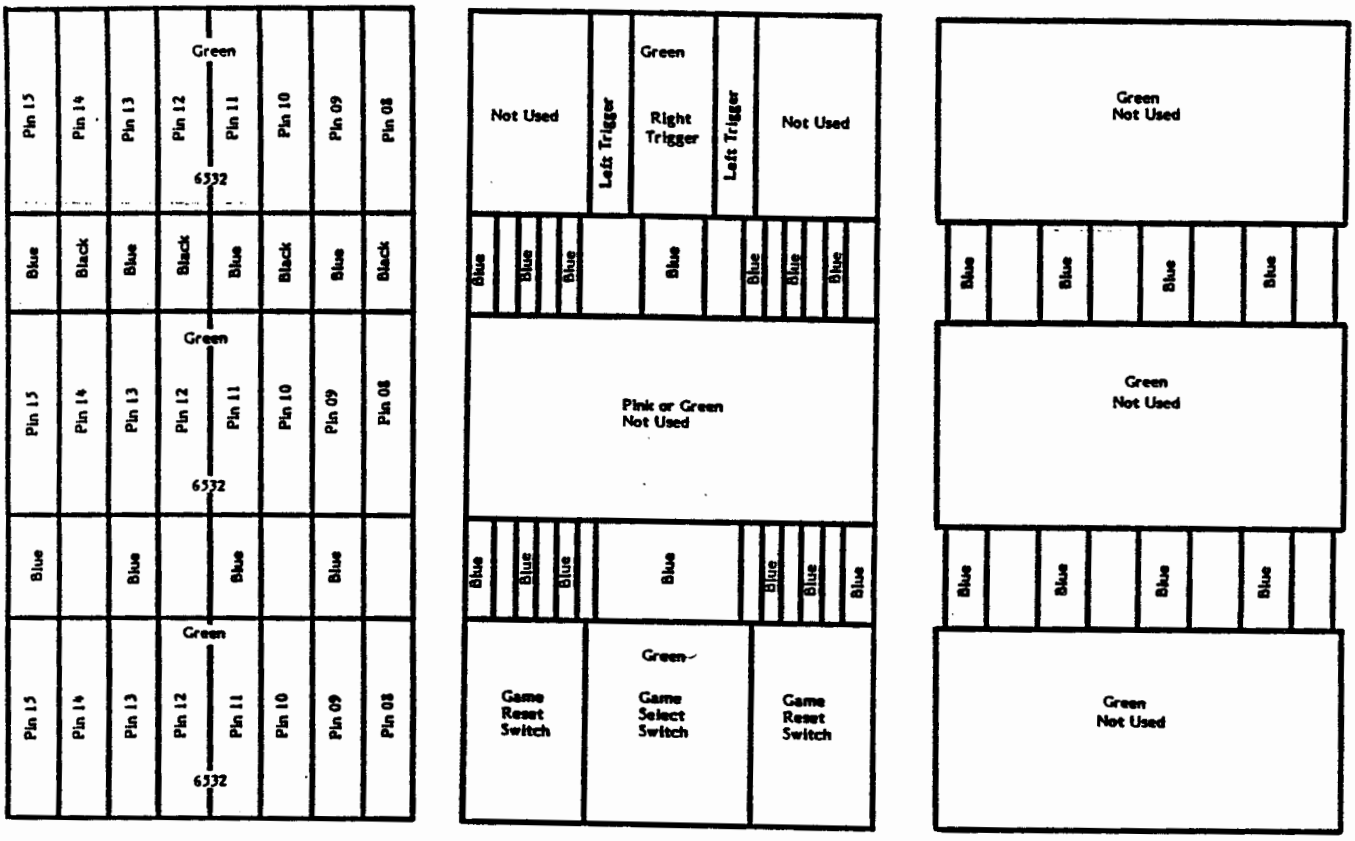


Figure 3-11. Diagnostic Matrix Screen (Shorting Plugs IN)

AUDIO TONES TEST

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

- Format: The VCS unit should be in the initialized mode. Move the Right Difficulty switch to the "B" position. The test displays two alternating patterns on the screen (as shown in Figure 3-12) while two alternating tones are heard. The tones change in sync with the screen. This test pattern continues for one full cycle after the Right Difficulty switch has been returned to the initialized position.

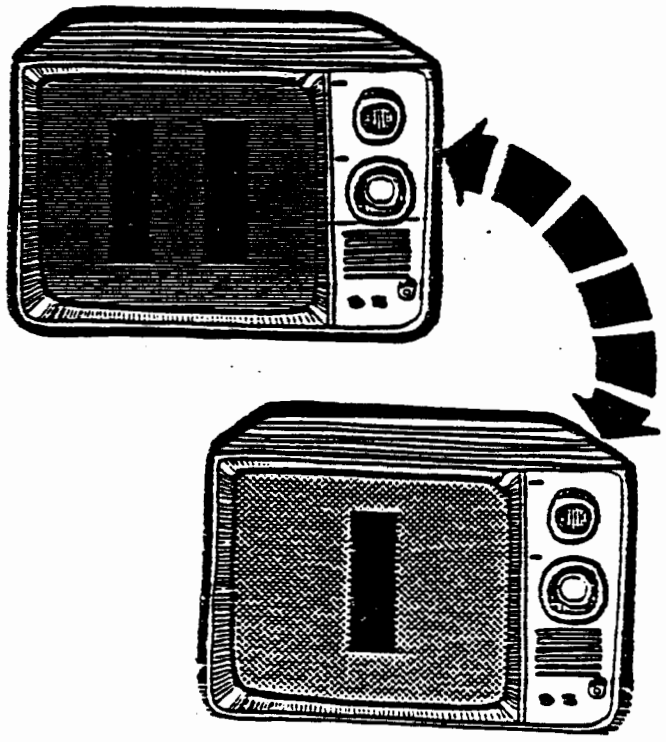


Figure 3-12. Audio Tone Test Screens

PADDLE CONTROL LINES TEST

- Purpose: To test the proper operation of the Paddle Control Lines by viewing the analog waveforms at the analog-to-digital conversion inputs of the TIA chip.

- Format: Pins 37, 38, 39, and 40 of the TIA chip are checked with the oscilloscope with the VCS unit in Diagnostic Matrix mode and with the shorting plugs in place. This test is required only if there is a problem with the hand controller lines. The procedure for this test is detailed in Section 4.

SECTION 4

2600 DIAGNOSTIC FLOWCHART

The Diagnostic Flowchart is intended to be easy to use and the primary aid when troubleshooting the 2600. 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 condition. The figures referenced in the flowcharts are located at the end of this section. When a line terminates with a letter inside a circle, note that a page number (i.e., pg. 4-3) is near it. Turn to that page, locate the letter in another circle, and continue the diagnosis. The flowchart leaves nothing to chance, it tells you when to perform a specific test, and when to replace components, and even when and how long to "burn-in" the unit. "Burn-in" the unit for at least two hours after completing repairs.

When a problem is extremely difficult to diagnose, the flowchart sends you to the Signal Tracing Cartridge (STC) routine, "D" page 4-47. Due to the repetitive nature of the STC routine, no flowchart is used. Read and follow the instructions as directed. Should the STC procedure fail to isolate the problem, after carefully inspecting the switchboard and motherboard assemblies for shorted and/or open trace lines, and solder bridges swap all three chips (6507, 6532, and TIA). Should the problem still persist, call ATARI, Techline Specialist: Inside California at (800) 672-1466 and Outside California at (800) 538-1535. Be certain to always burn-in the unit for two hours after completing repairs. This helps to ensure that intermittent problems are found and also greatly increases your customer's satisfaction with your repair work.

SWAP OUT PROCEDURES

Many places in the diagnostic flowchart, a box tells you to "swapout" a chip or a number of chips in a particular order. The "swapout" instruction means that you should replace the indicated components one at a time with a known good component of the same type. The VCS should then be tested with the new, known-good component in place to see whether the "swapout" solved the problem being checked. If the swapout did not fix the problem, the known-good component should be left in, and the next component inserted. Once the problem is solved, you then place the suspected bad chips one by one into the system to determine whether or not those you pulled out are truly defective. In this way, you avoid needlessly replacing good components.

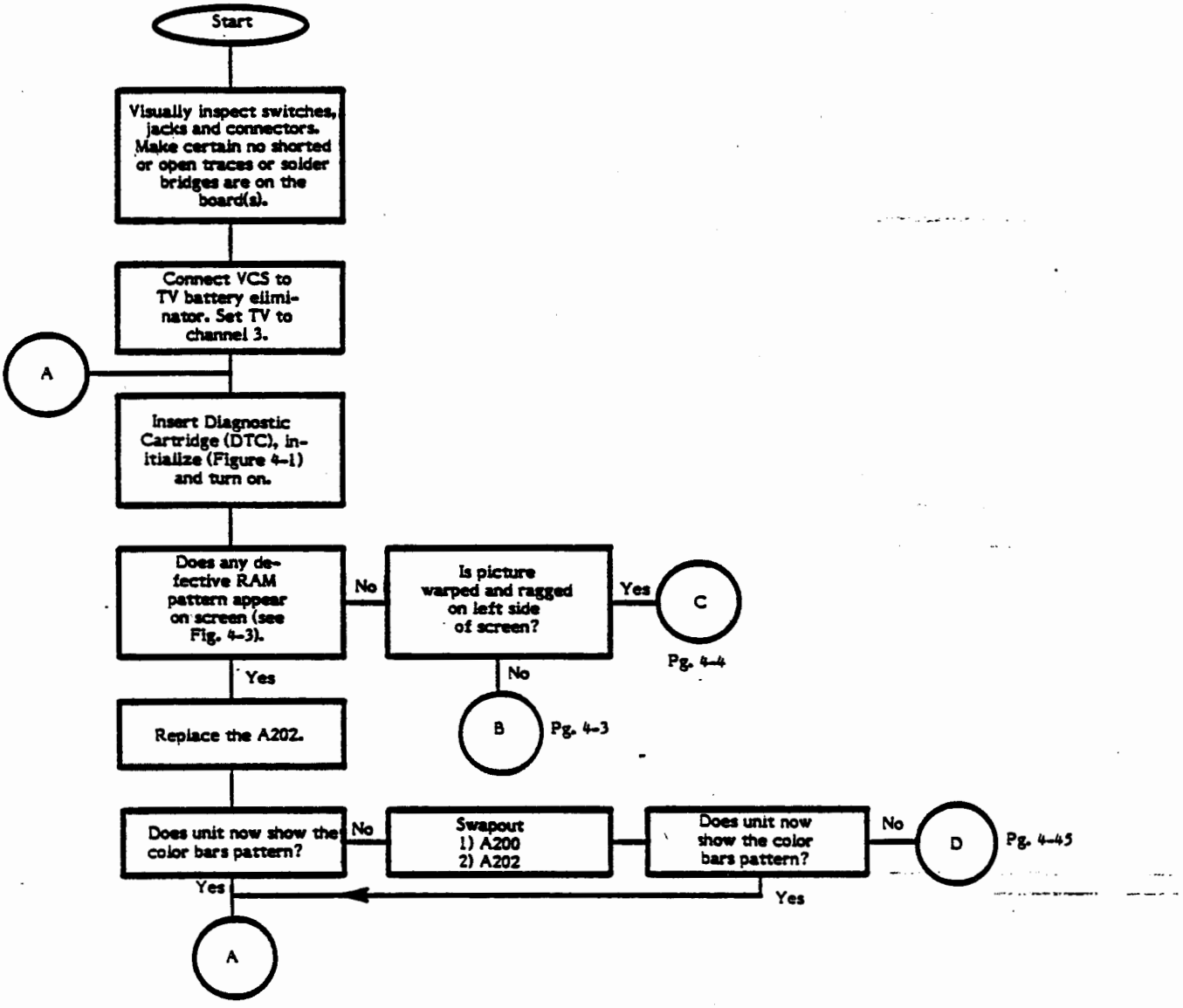
CAUTION

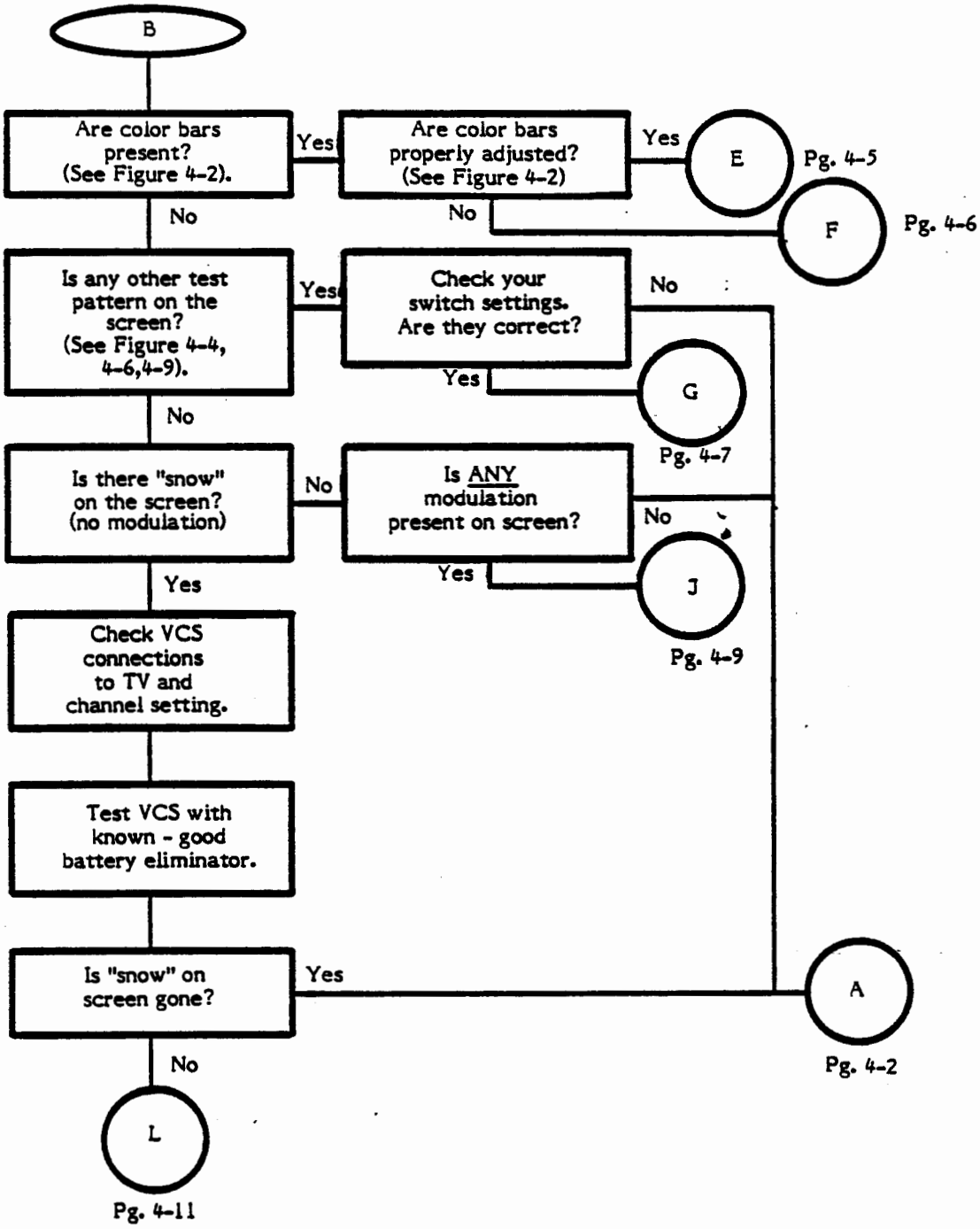
Extreme care should be taken when handling the integrated circuit chips (A200, A201, A202, A203). They are all very sensitive to static electricity and can easily be damaged by careless handling. Always keep the chips in their plastic carrier tubes or on conductive foam when not handling them. Make certain 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 chips out with a screwdriver or any other tool.

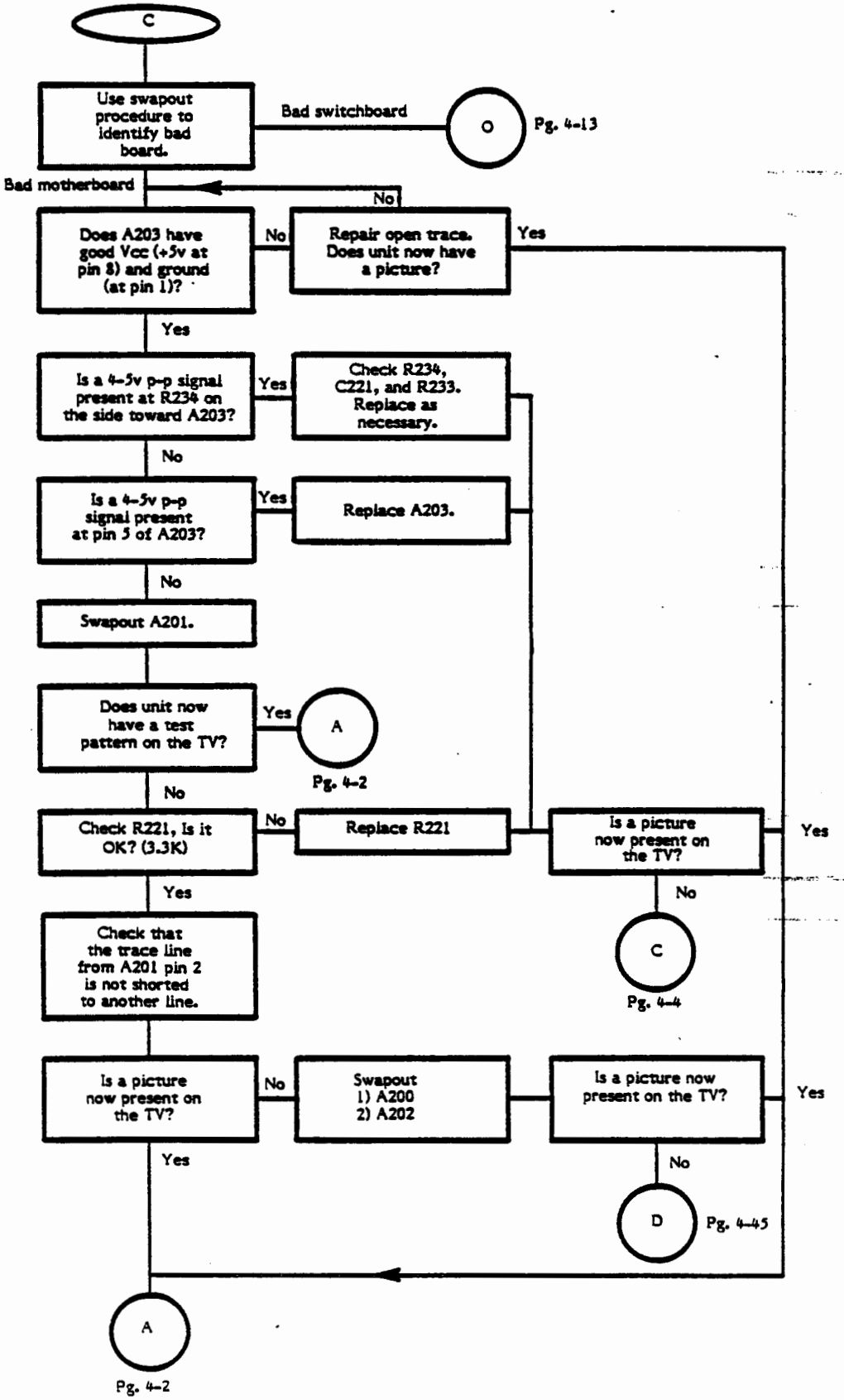
Failure to follow the above guidelines results in unusually high chip failure rates and extra expense.

2600 Diagnostic Flowchart

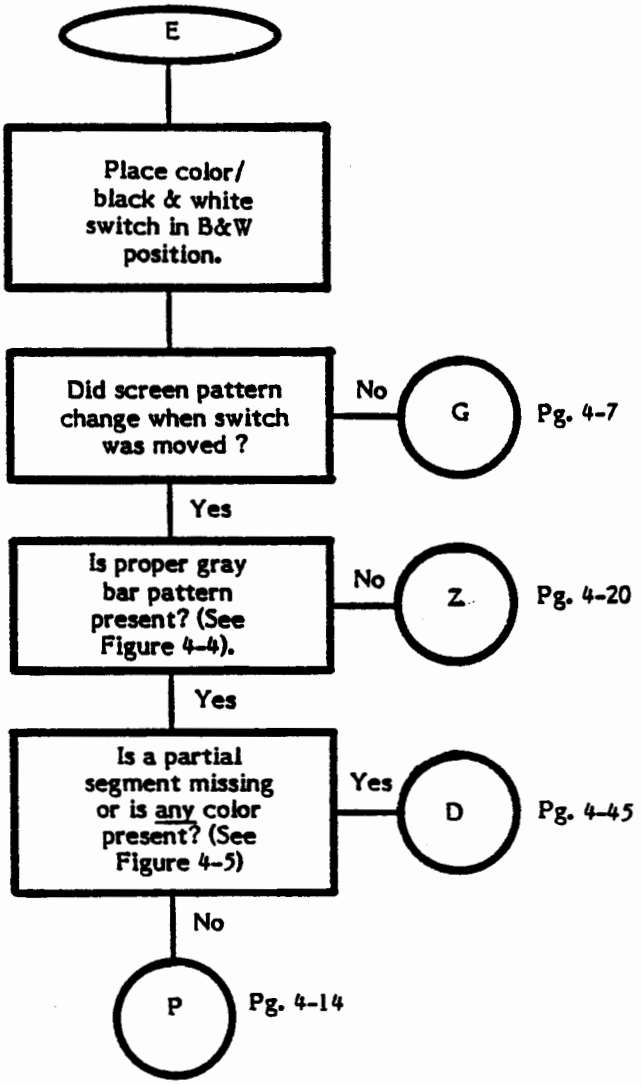



B
Are color bars present? (See Figure 4-2).
Yes
Are color bars properly adjusted? (See Figure 4-2)
Yes
E
Pg. 4-5
No
F
Pg. 4-6
Is any other test pattern on the screen? (See Figure 4-4, 4-6,4-9).
Yes
Check your switch settings. Are they correct?
No
Yes
G
Pg. 4-7
No
Is there "snow" on the screen? (no modulation)
No
Is ANY modulation present on screen?
No
Yes
J
Pg. 4-9
Yes
Check VCS connections to TV and channel setting.
Test VCS with known - good battery eliminator.
Is "snow" on screen gone?
Yes
A
Pg. 4-2
No
L
Pg. 4-11

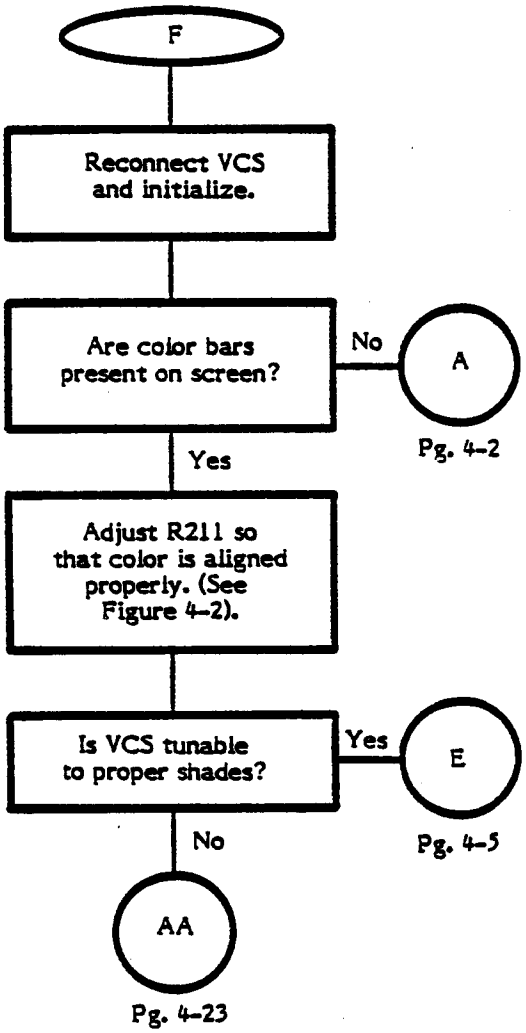
Bad Video Troubleshooting



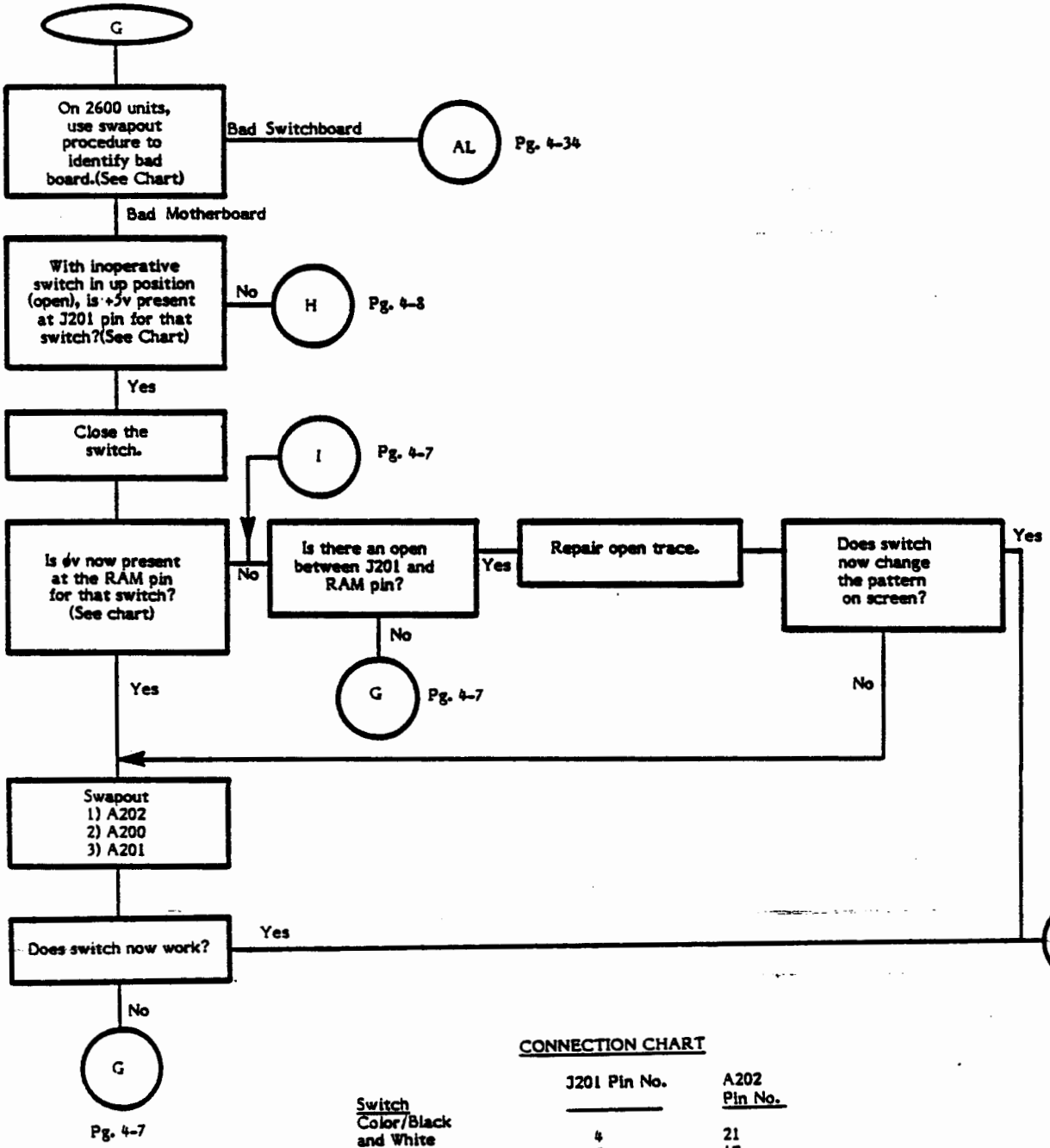
Gray Bars Test Procedure



Color Bars Test Procedure



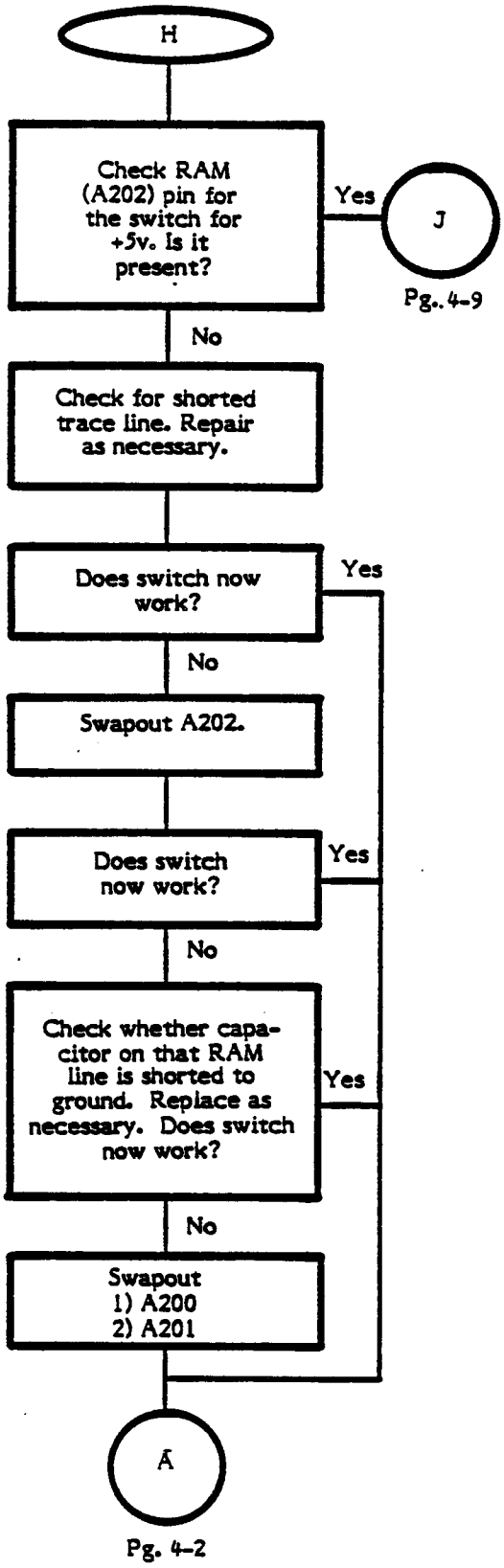
Defective Switch Troubleshooting Procedure



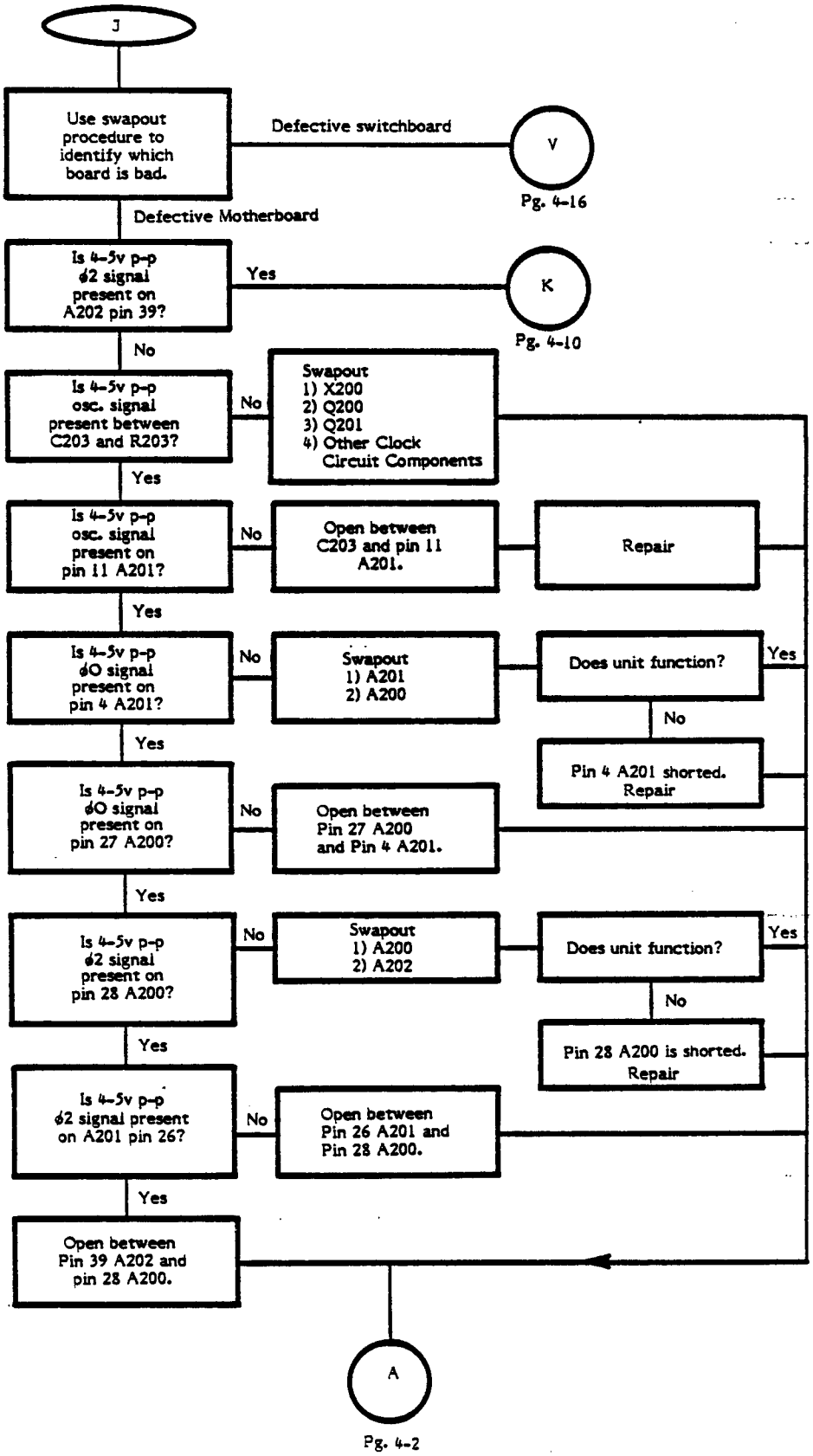
CONNECTION CHART

Switch	J201 Pin No.	A202 Pin No.
Color/Black and White	4	21
Left Difficulty	5	17
Right Difficulty	7	16
Select	9	23
Reset	8	24

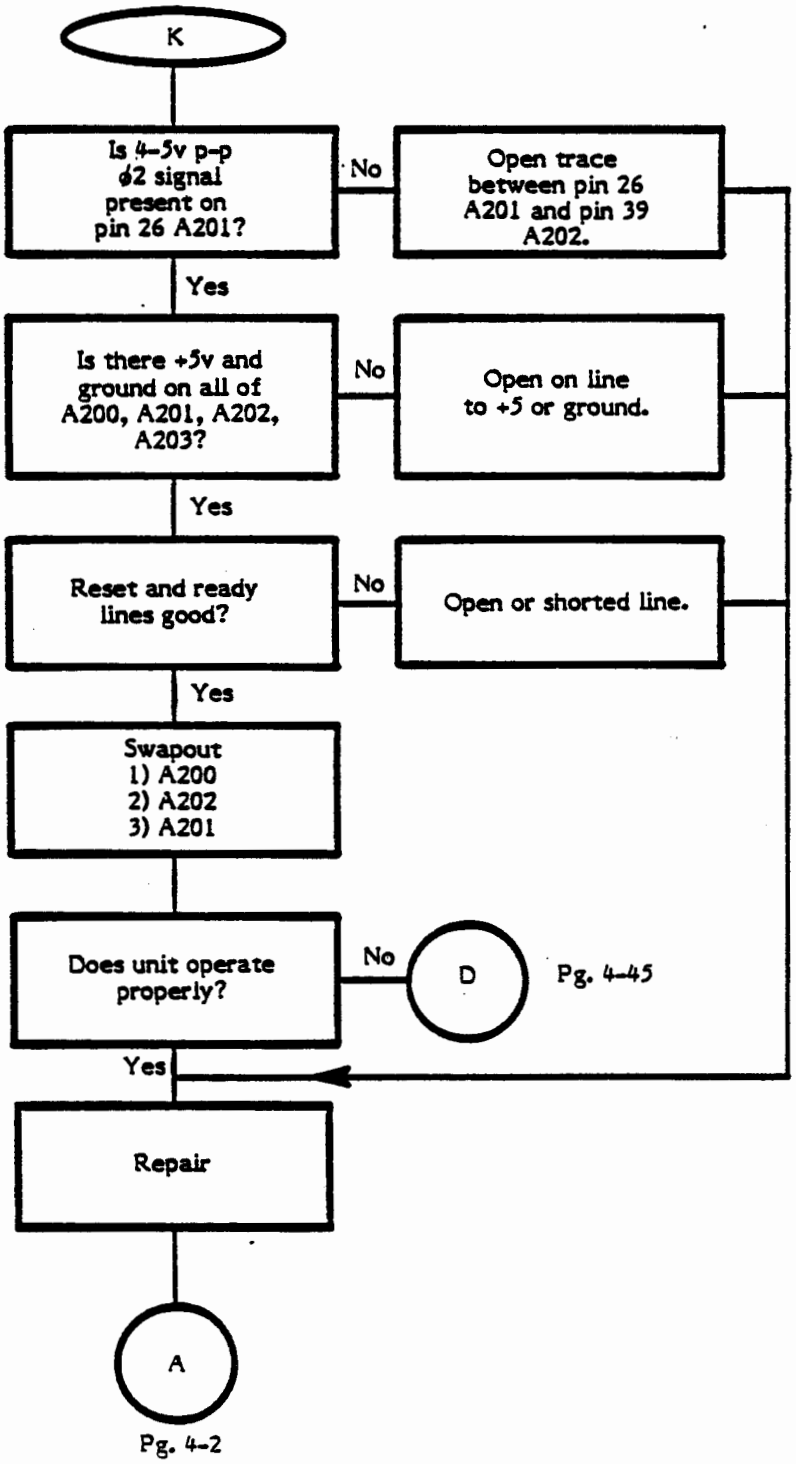
Defective Switch Troubleshooting Procedure (Continued)



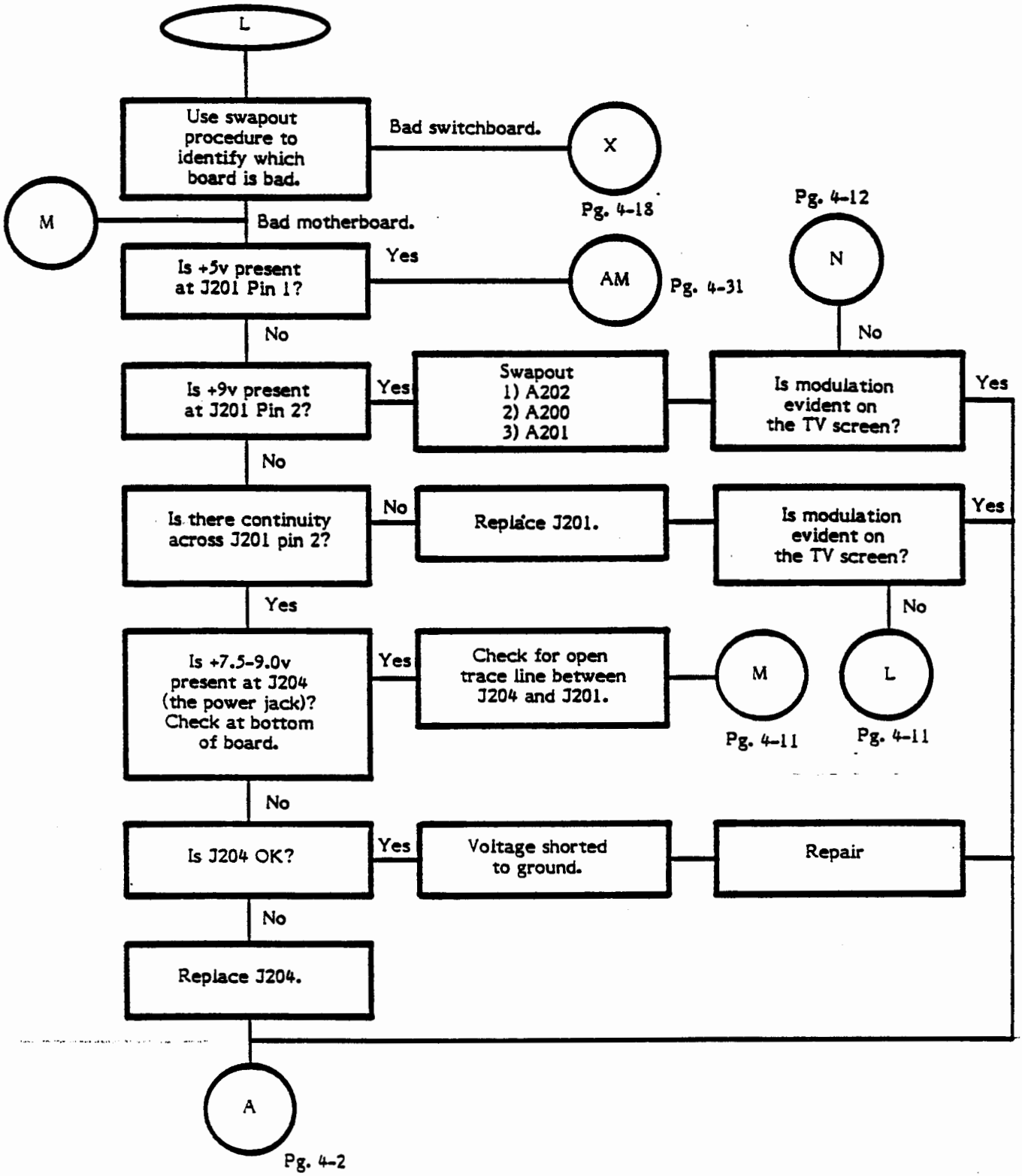
Black or Solid Colored Screen Troubleshooting



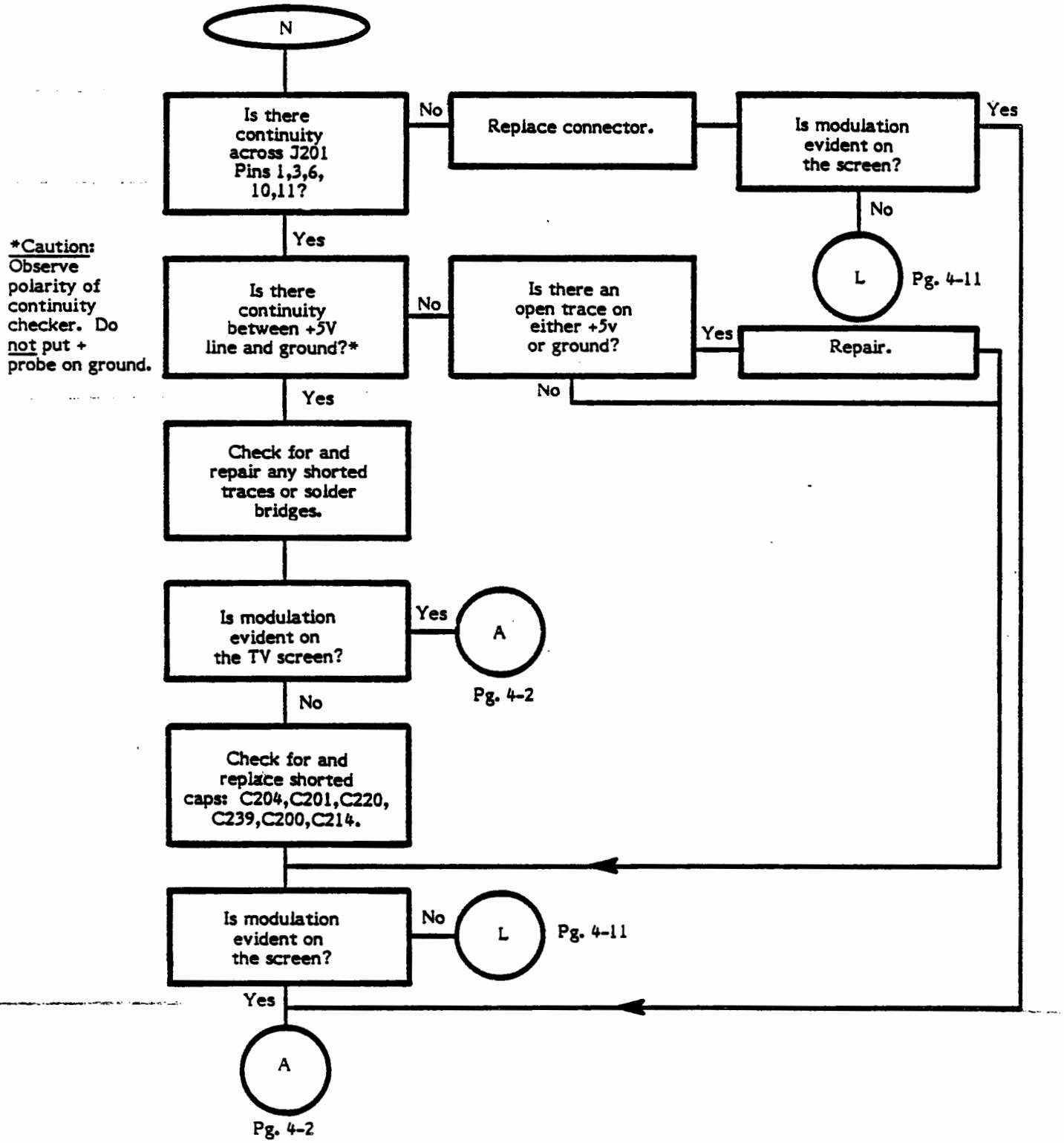
Black or Solid Colored Screen Troubleshooting (Continued)



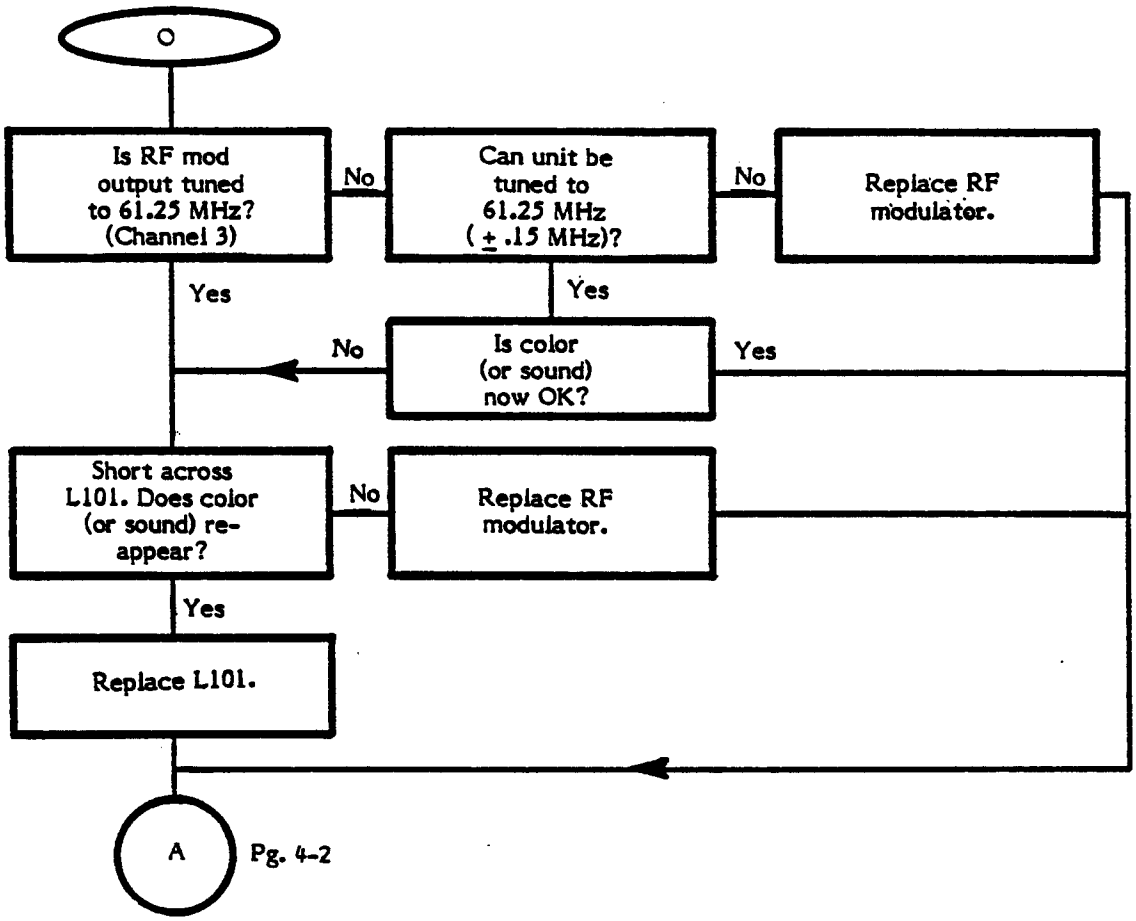
Snowy Screen Troubleshooting Procedure,
Motherboard



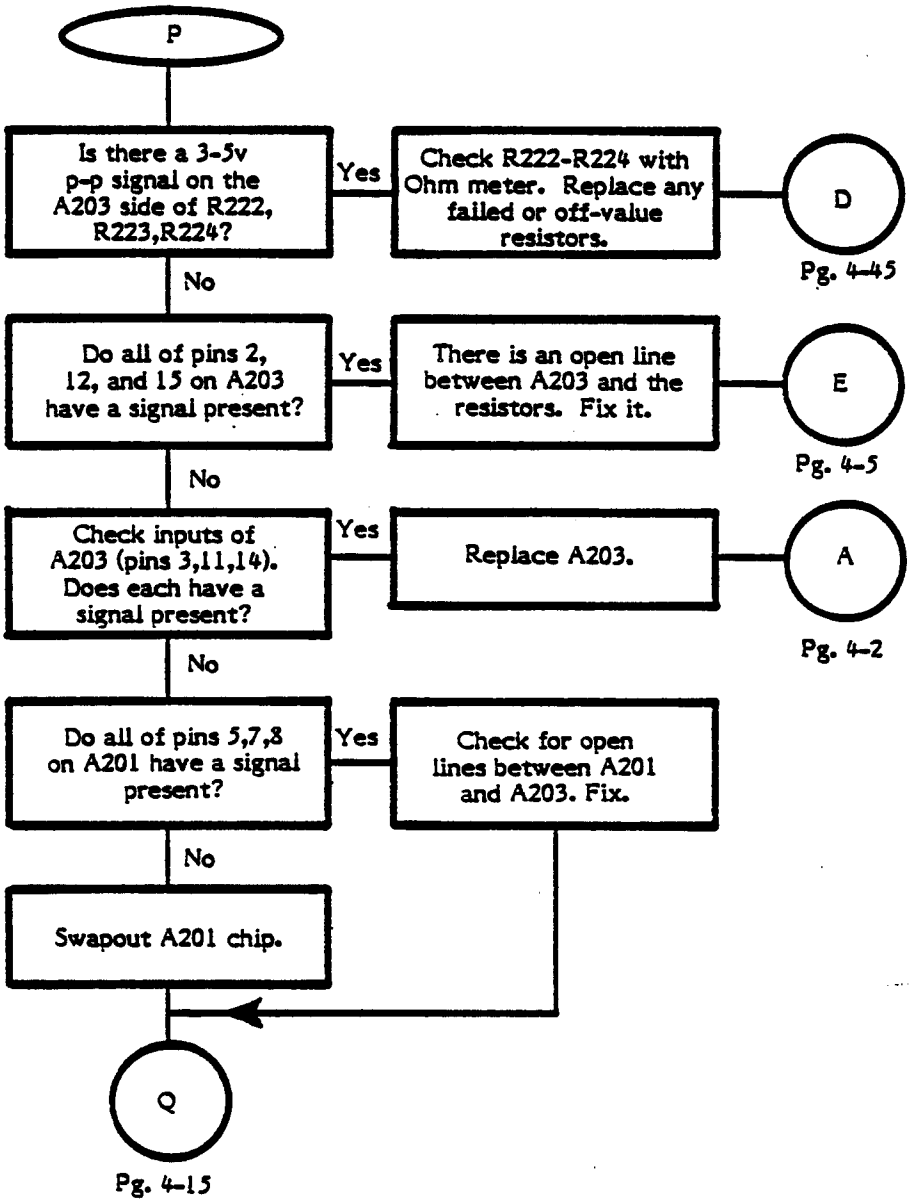
Snowy Screen Troubleshooting Procedure, Motherboard, (Continued)



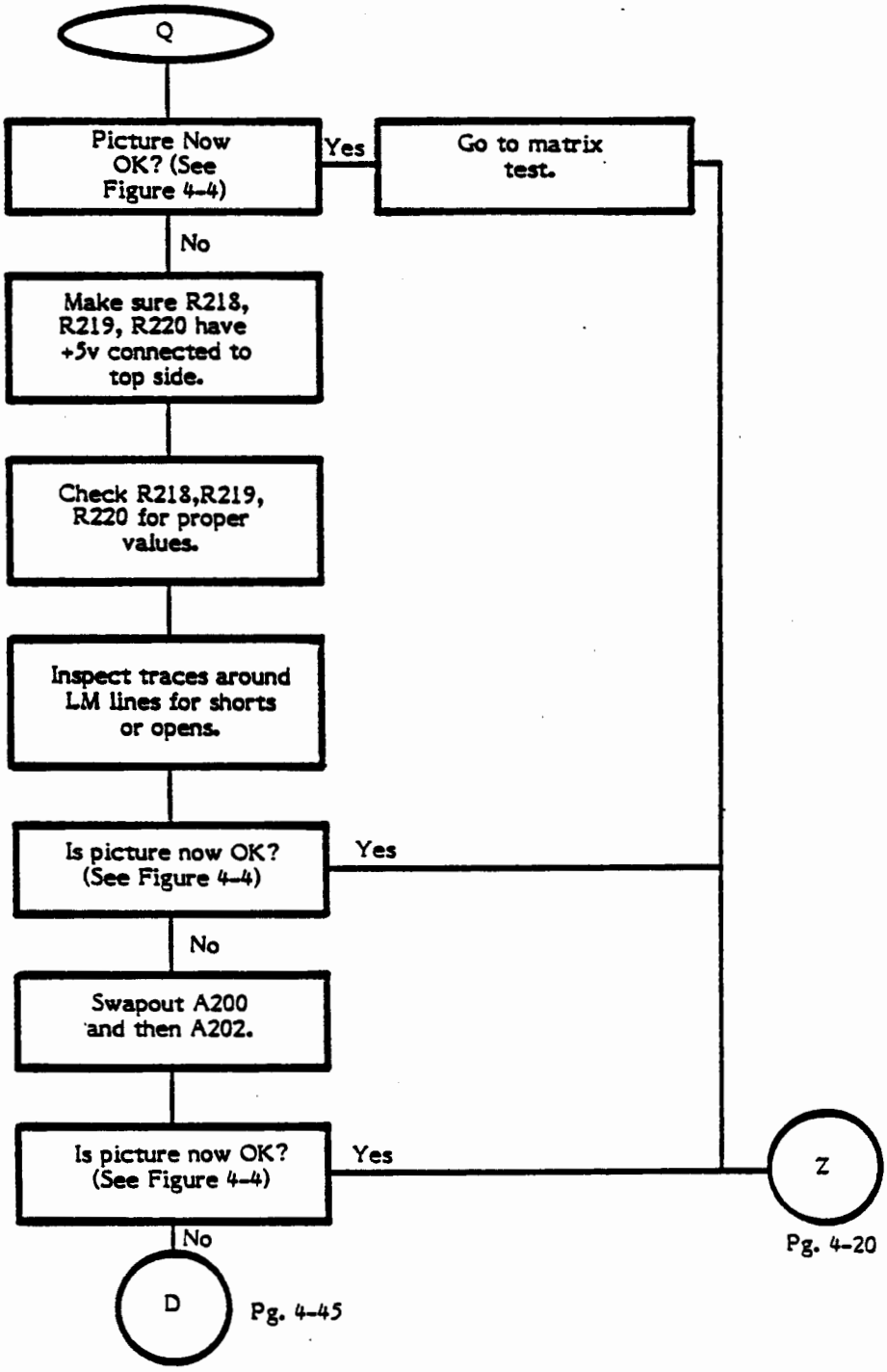
Bad/No Color, Bad/No Sound
Switchboard



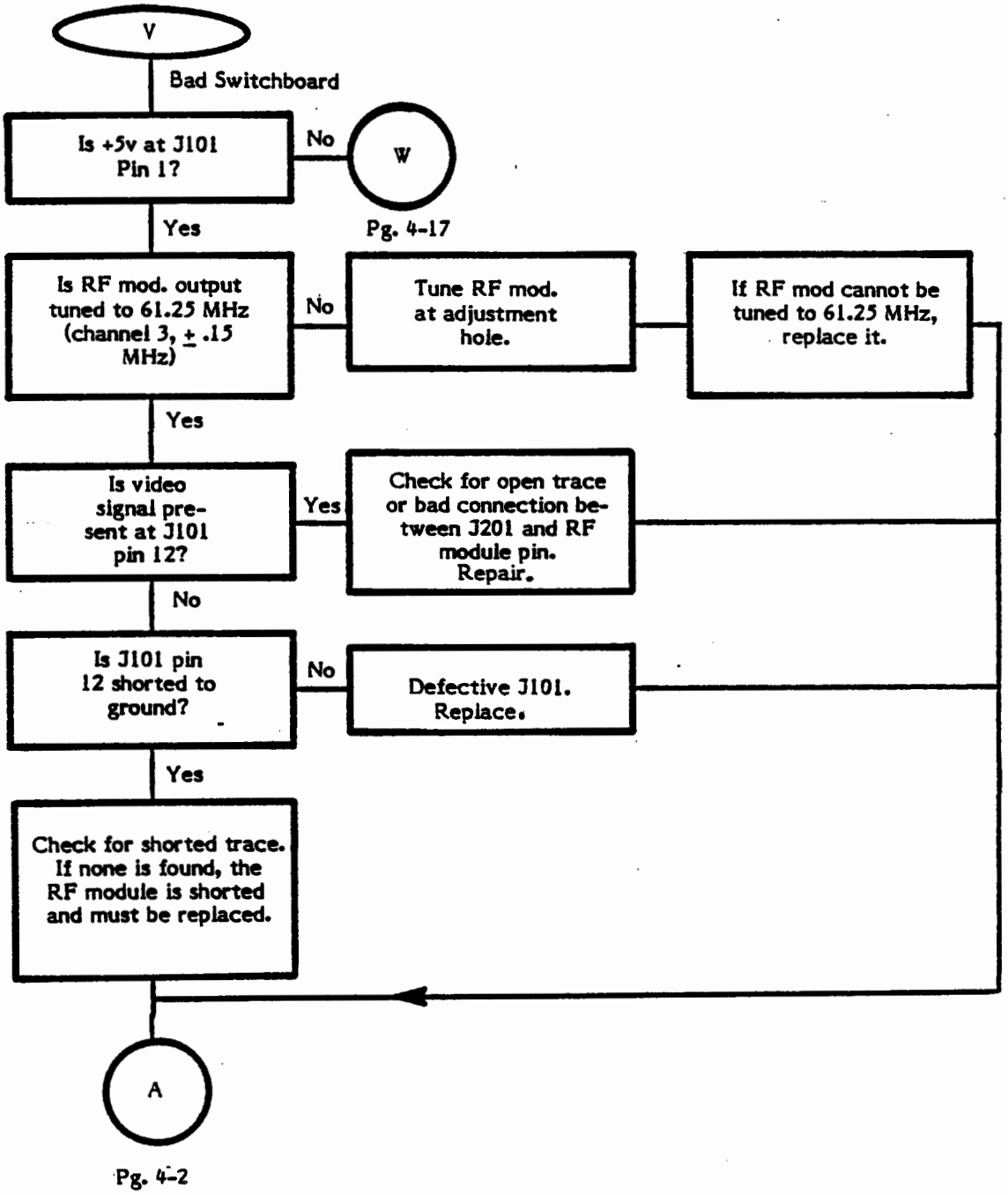
Gray Bars Troubleshooting Procedure



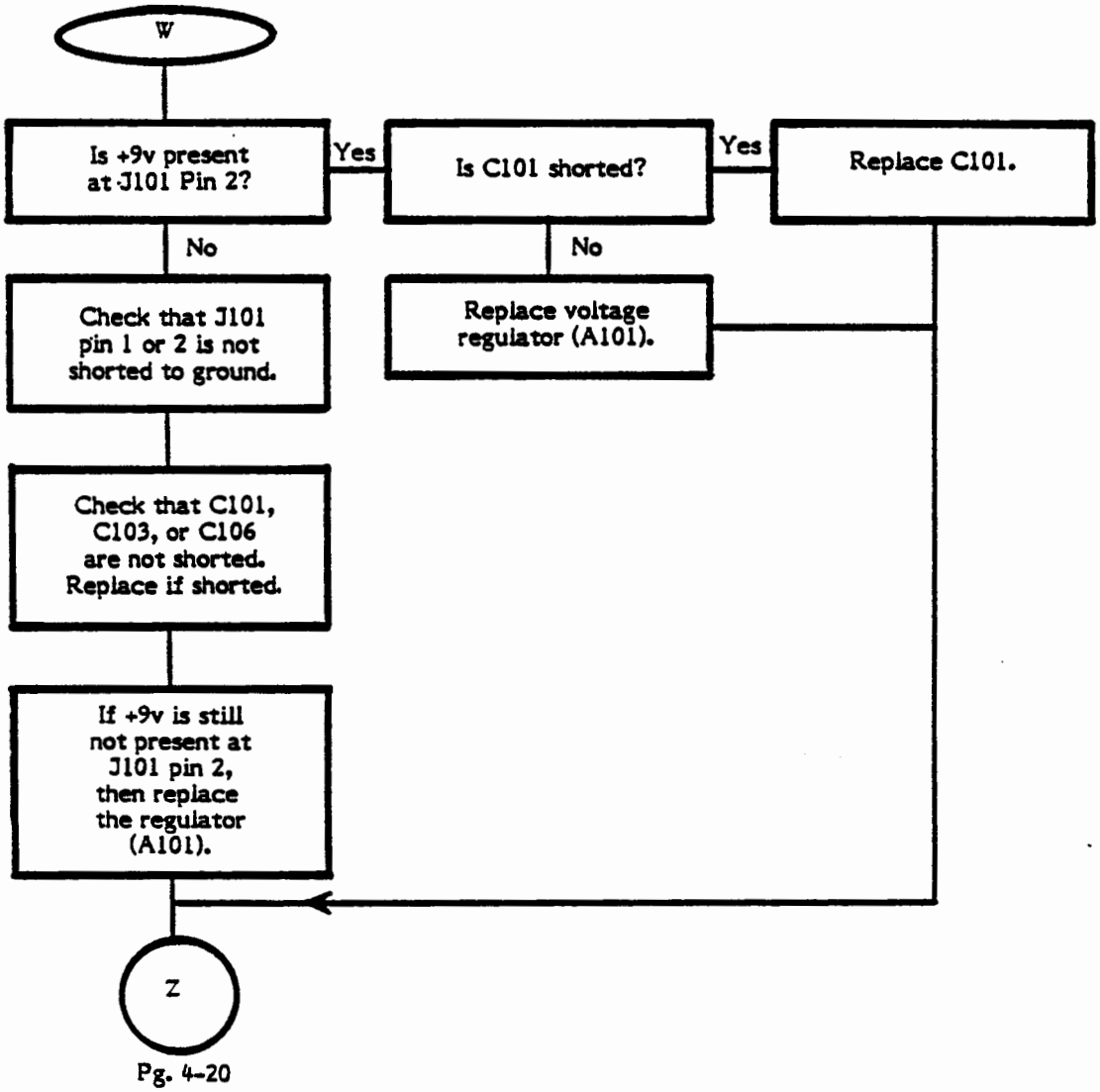
Gray Bars Troubleshooting Procedure (Continued)



Colored Screen Troubleshooting Procedure
Switchboard

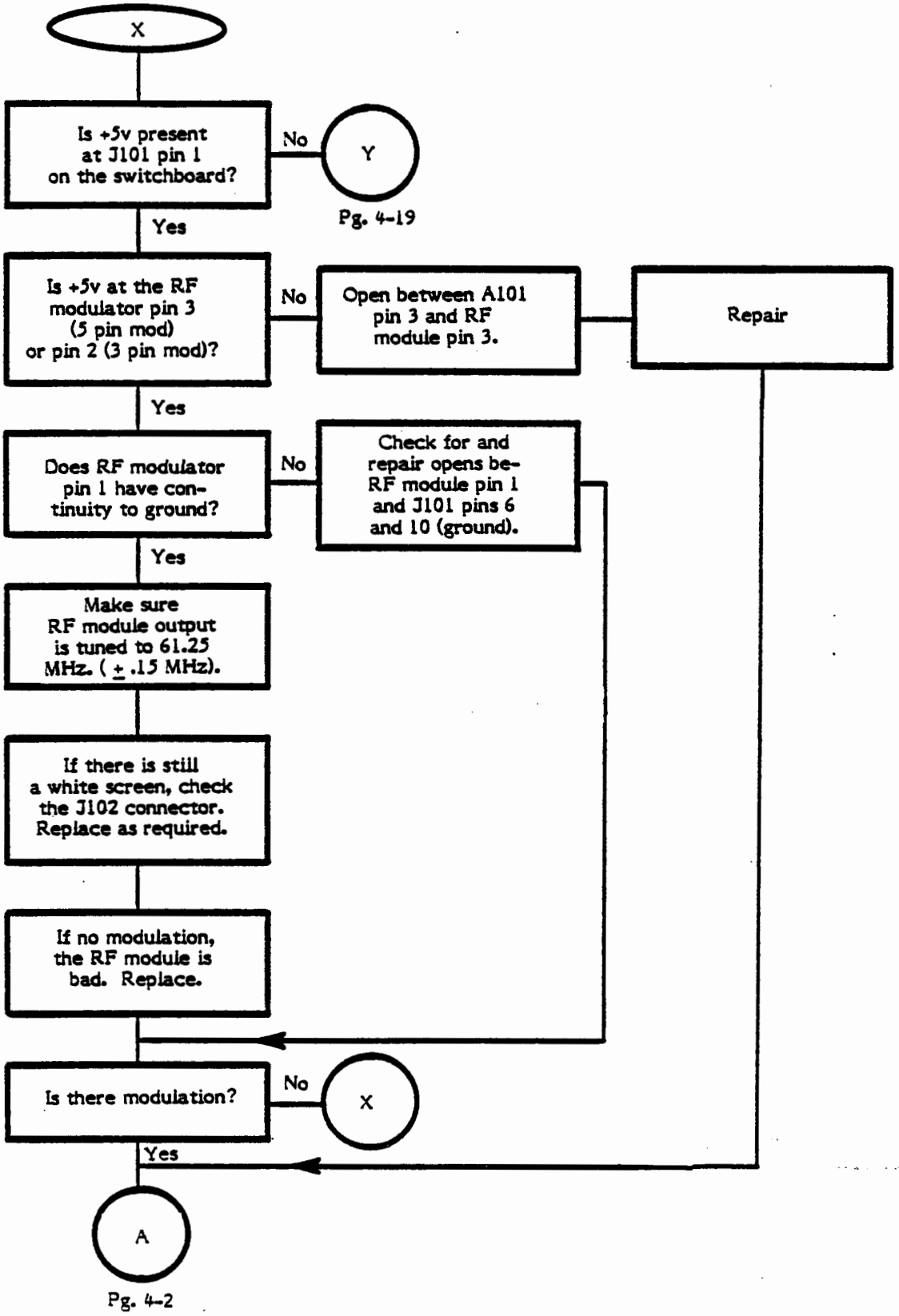


Colored Screen Troubleshooting Procedure,
Switchboard, (Continued)

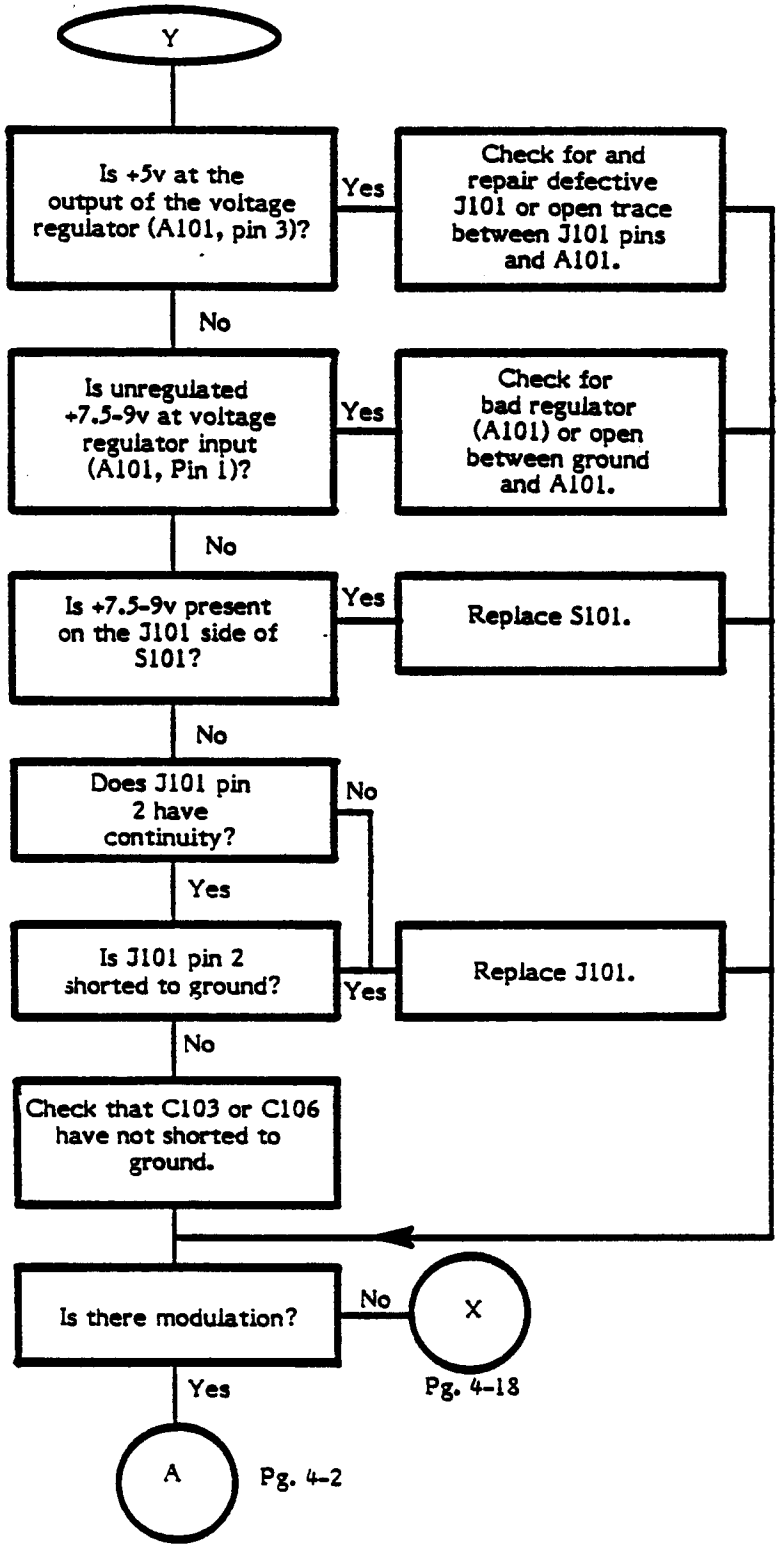


Pg. 4-20

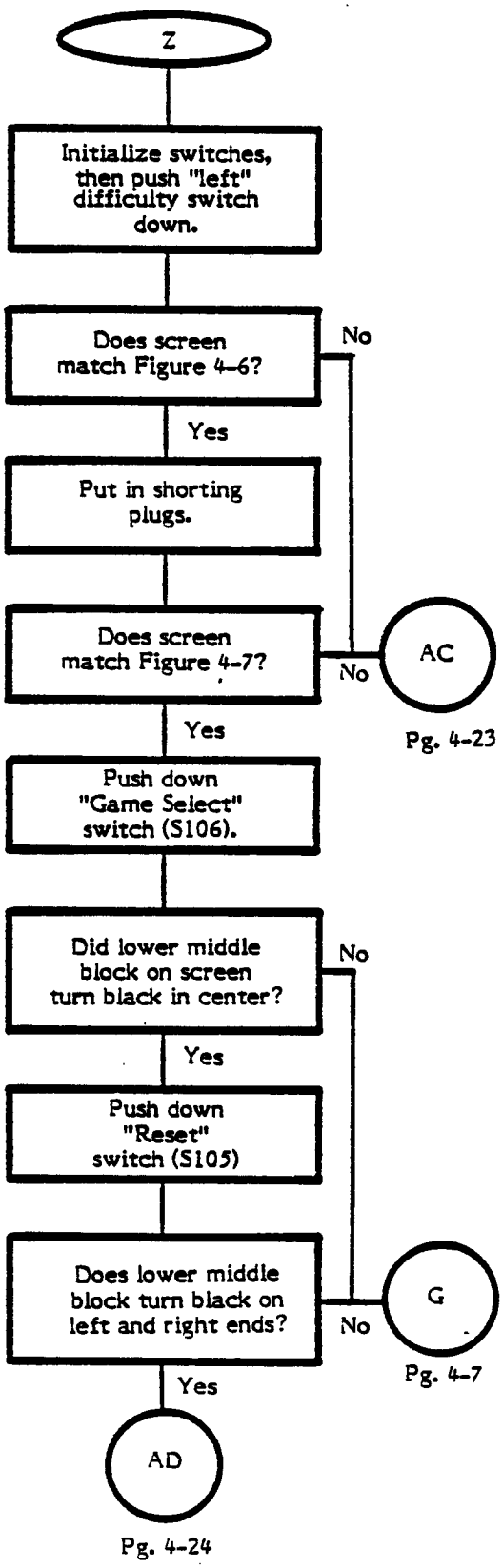
Snowy Screen Troubleshooting Procedure, Switchboard



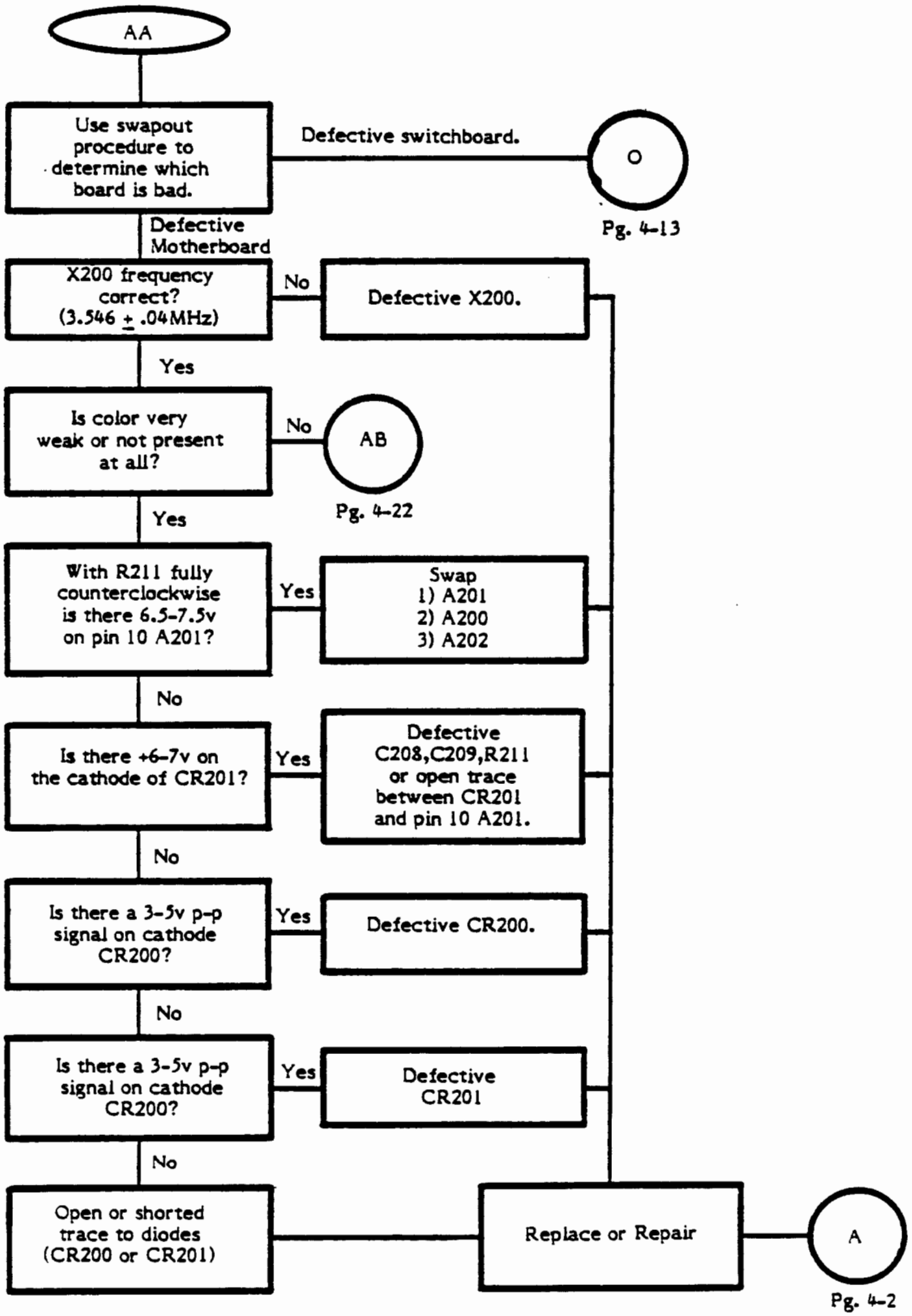
Snowy Screen Troubleshooting Procedure,
Switchboard, (Continued)



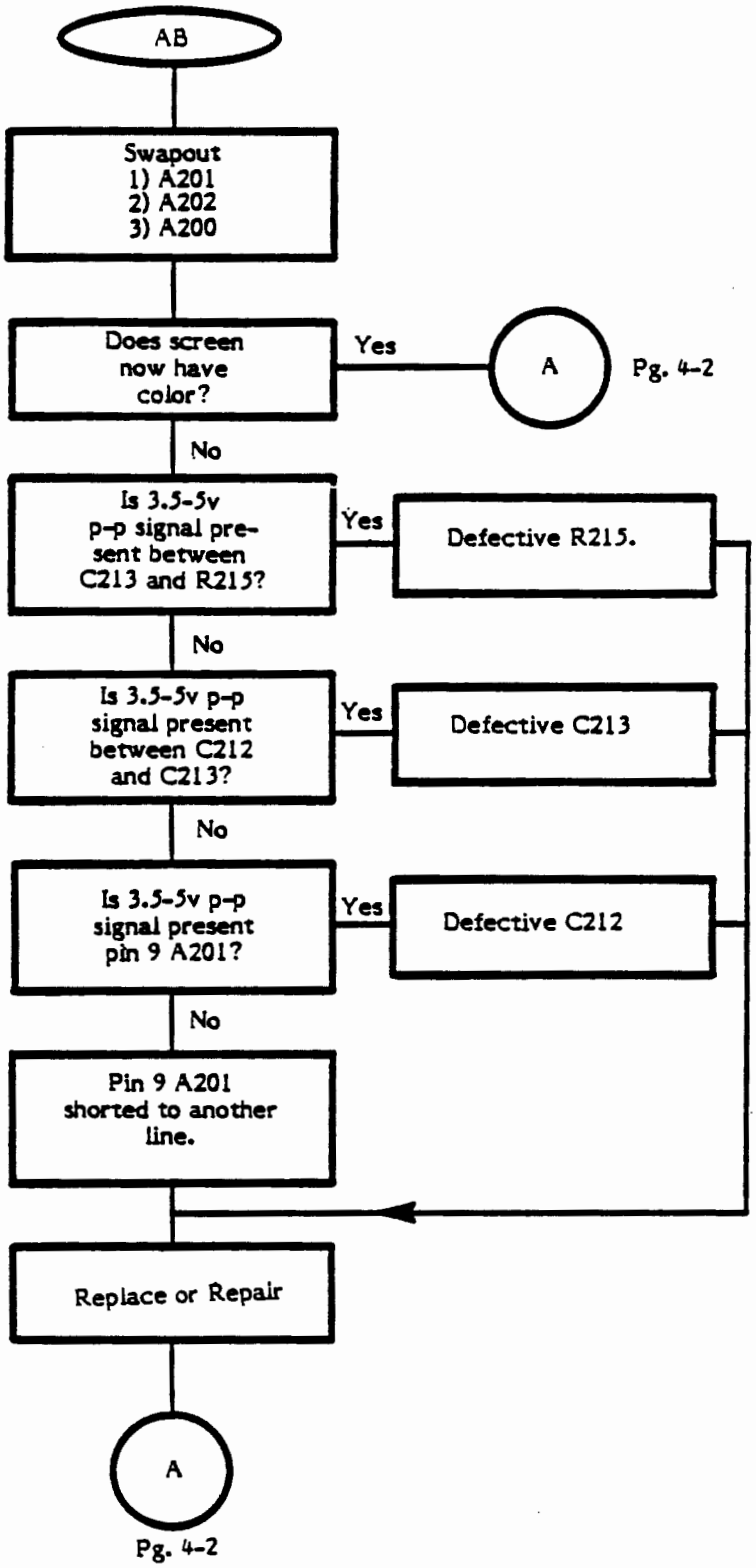
Matrix Test Procedure



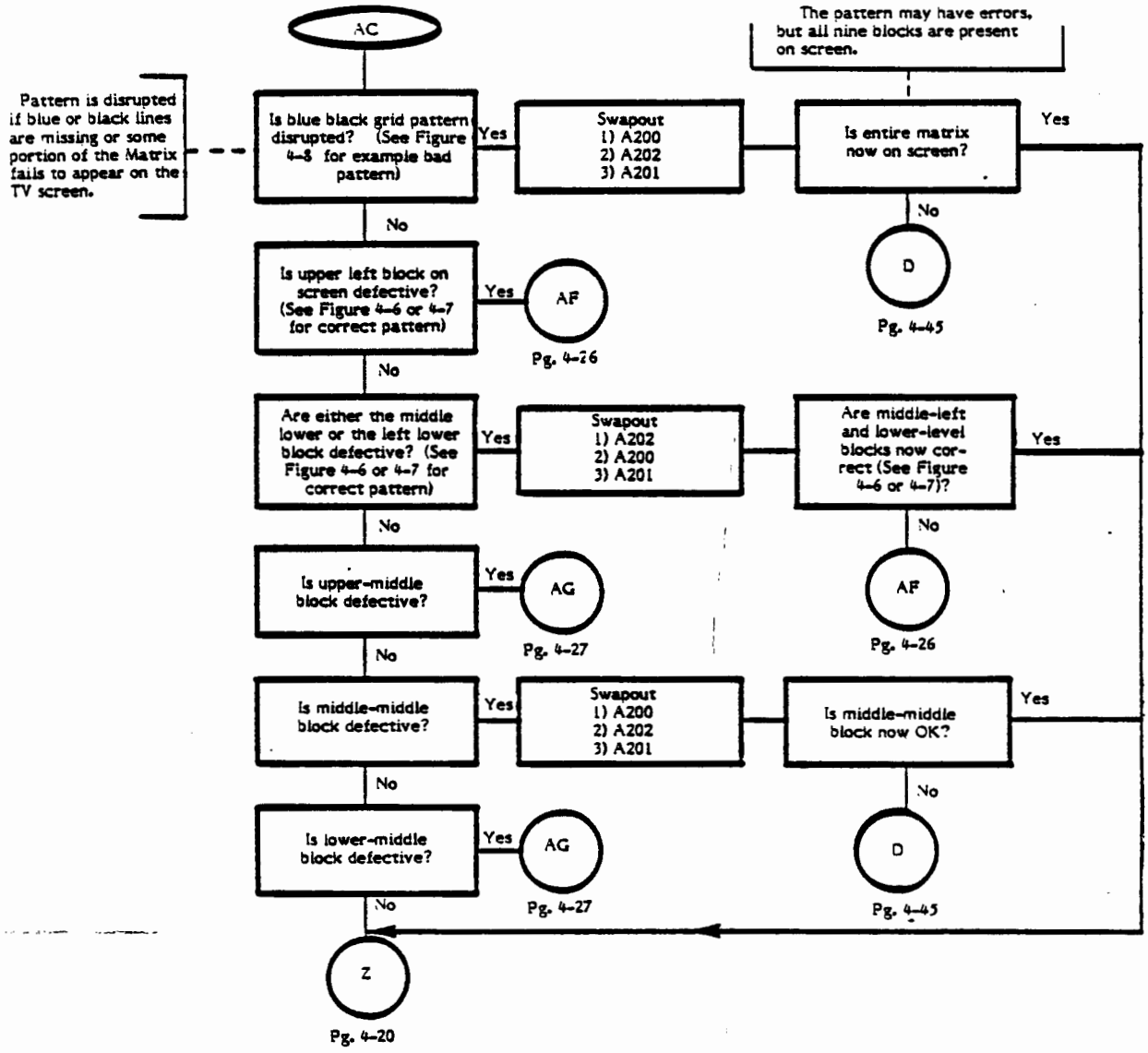
Color Troubleshooting Procedure, Motherboard



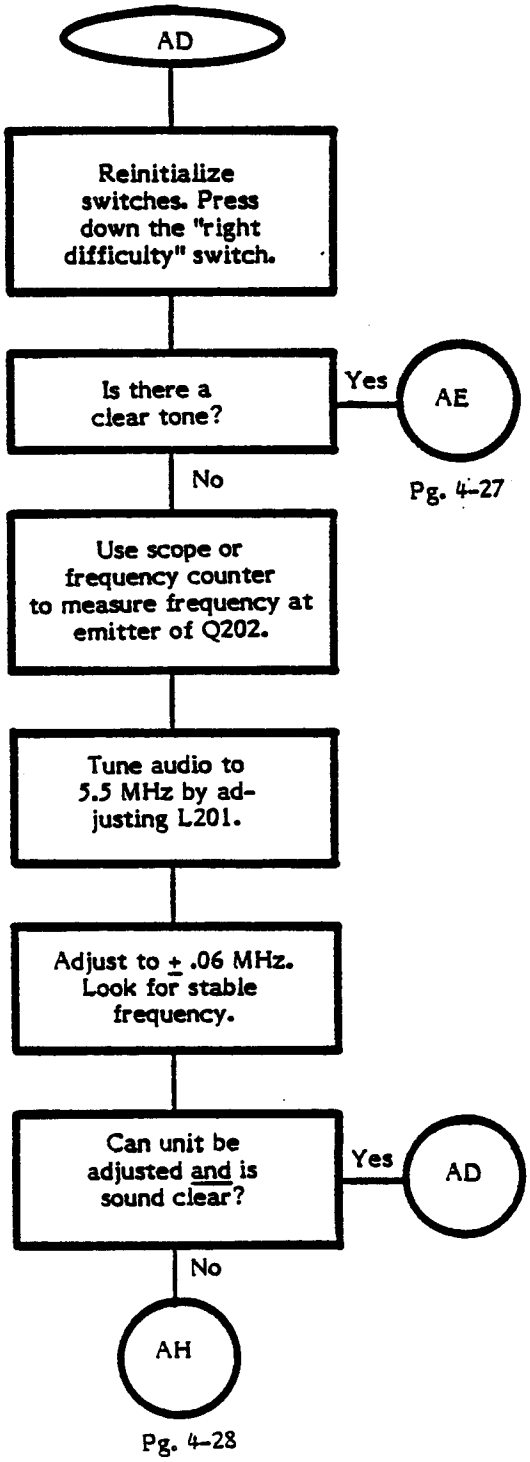
Color Troubleshooting Procedure,
Motherboard, (Continued)

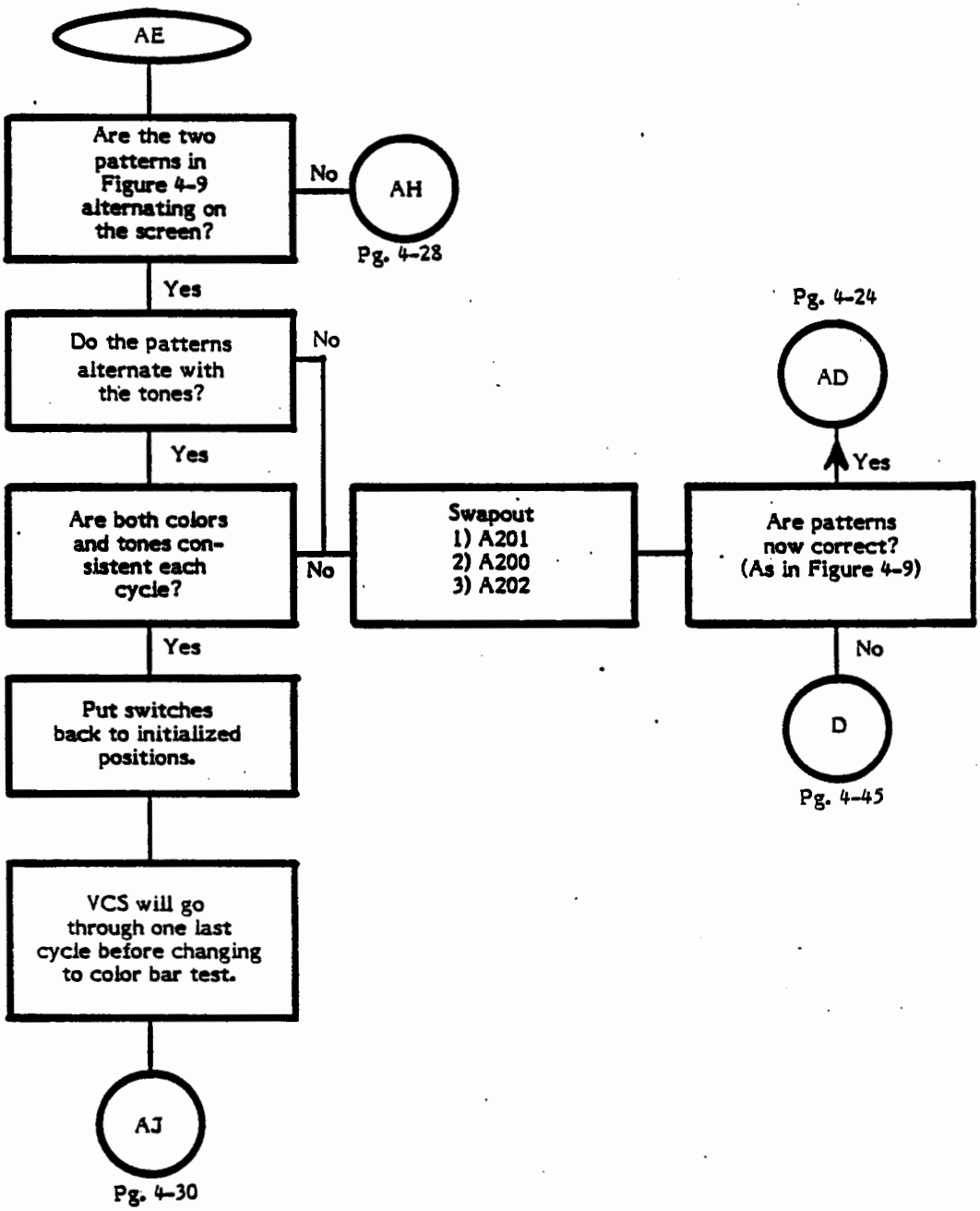


Defective Matrix Troubleshooting Procedure

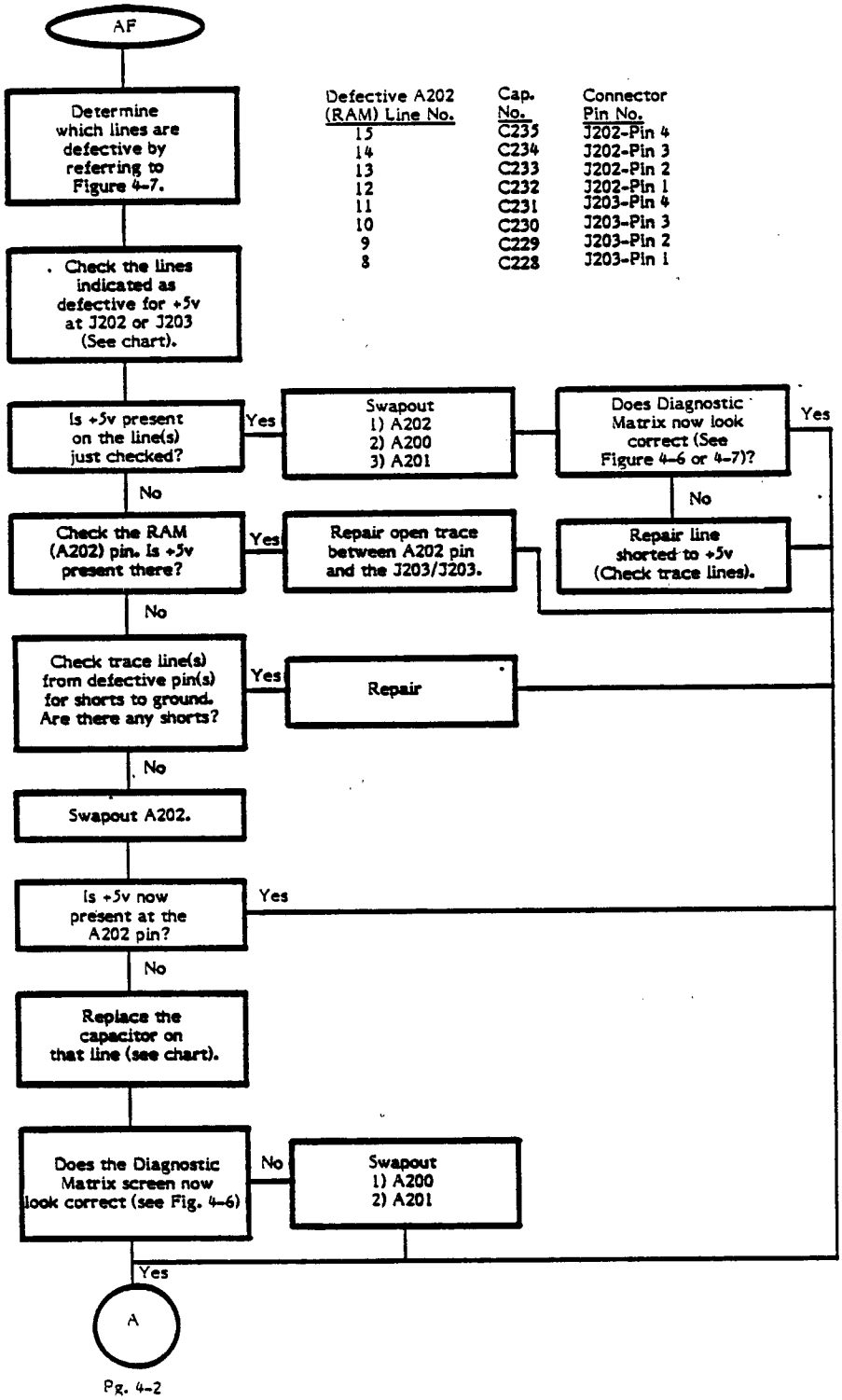


Audio Test Procedure




AE
Are the two patterns in Figure 4-9 alternating on the screen?
No
AH
Pg. 4-28
Yes
Do the patterns alternate with the tones?
No
Yes
Are both colors and tones consistent each cycle?
No
Swapout
1) A201
2) A200
3) A202
Are patterns now correct? (As in Figure 4-9)
Yes
Pg. 4-24
AD
No
D
Pg. 4-45
Yes
Put switches back to initialized positions.
VCS will go through one last cycle before changing to color bar test.
AJ
Pg. 4-30

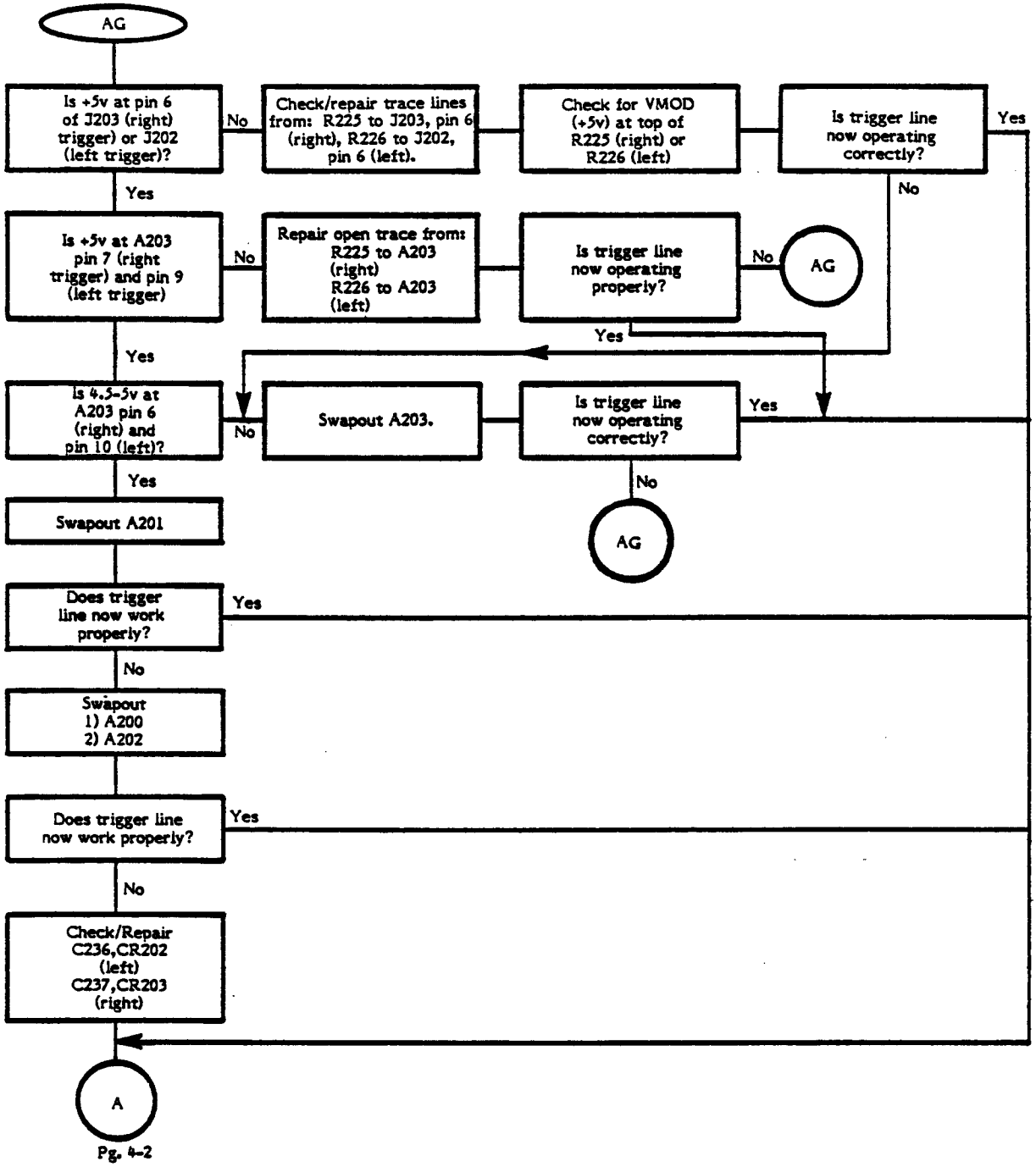
Defective I/O Lines Troubleshooting Procedure



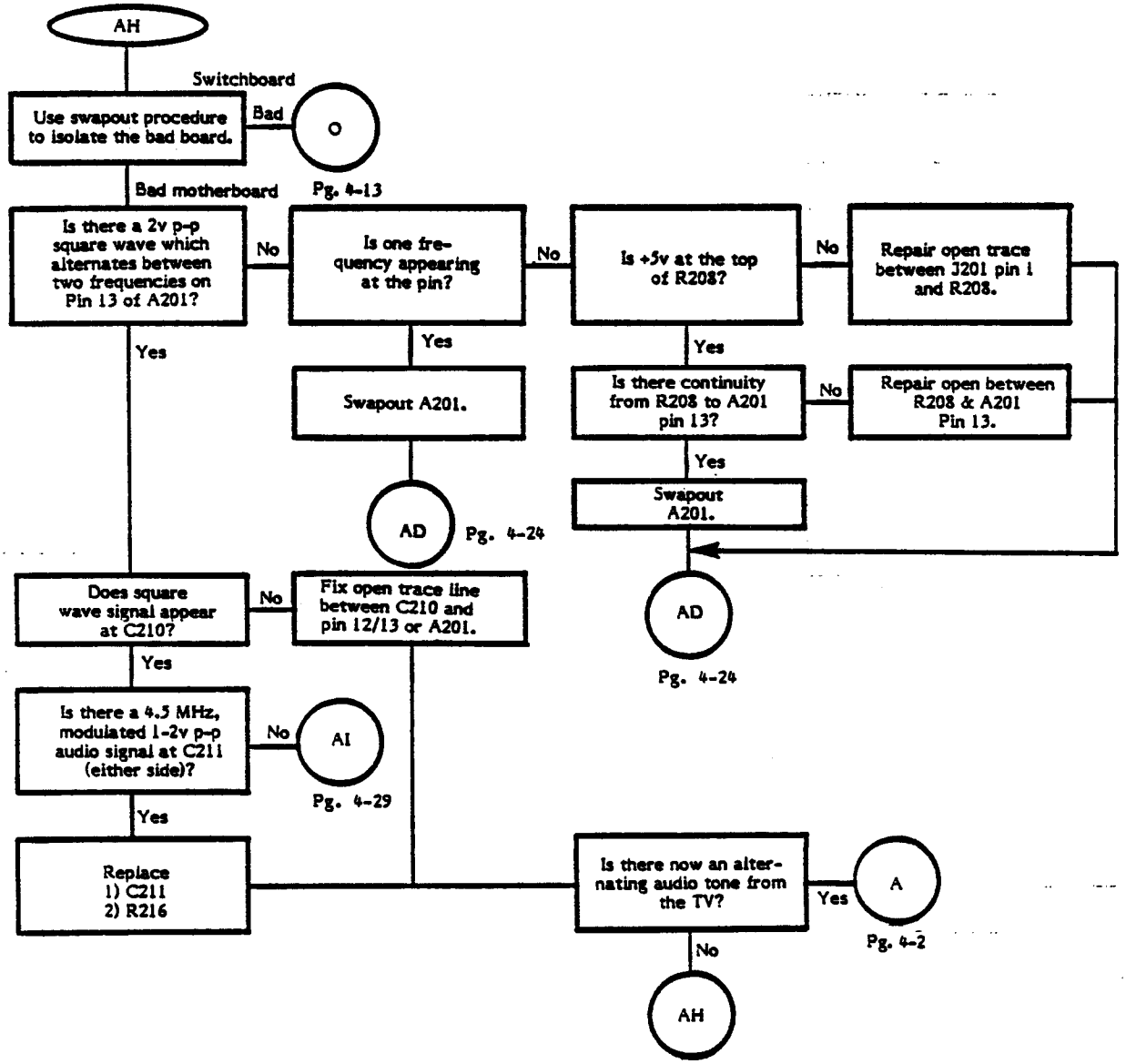
Defective A202 (RAM) Line No.	Cap. No.	Connector Pin No.
15	C235	J202-Pin 4
14	C234	J202-Pin 3
13	C233	J202-Pin 2
12	C232	J202-Pin 1
11	C231	J203-Pin 4
10	C230	J203-Pin 3
9	C229	J203-Pin 2
8	C228	J203-Pin 1

Pg. 4-2

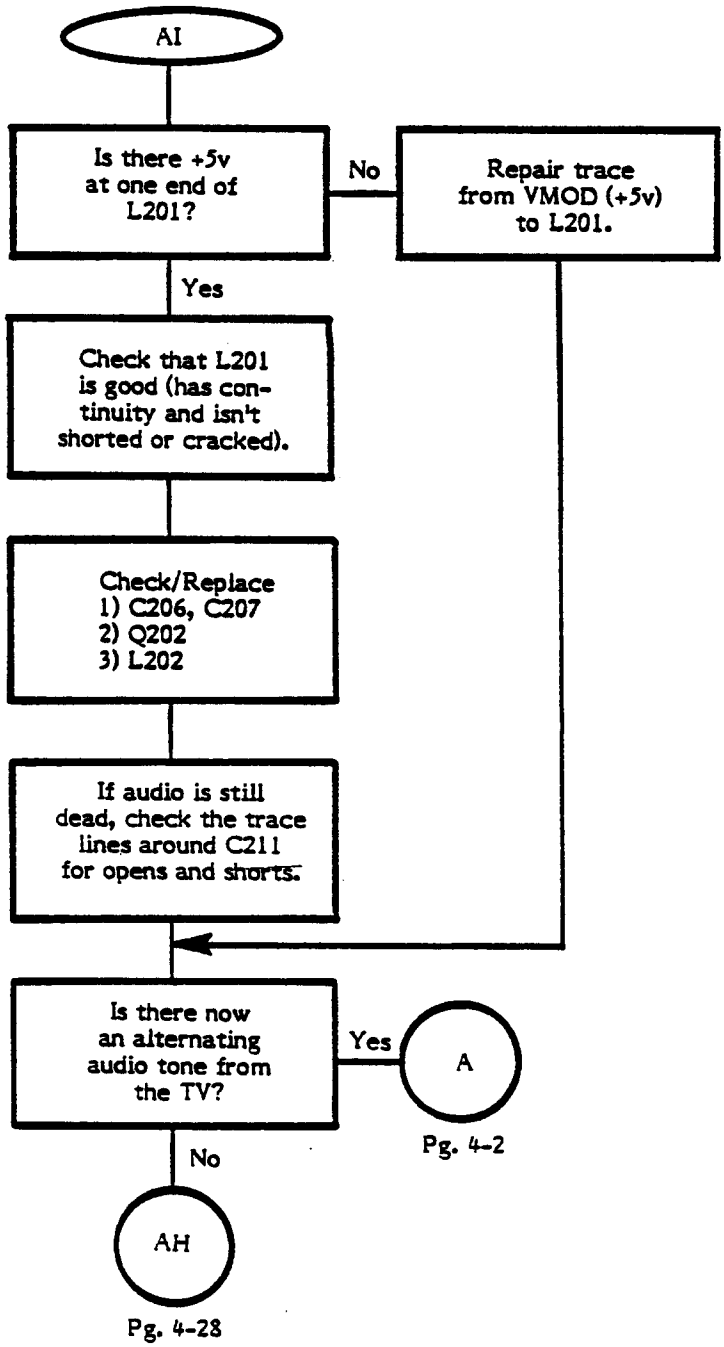
Trigger Line Troubleshooting Procedure



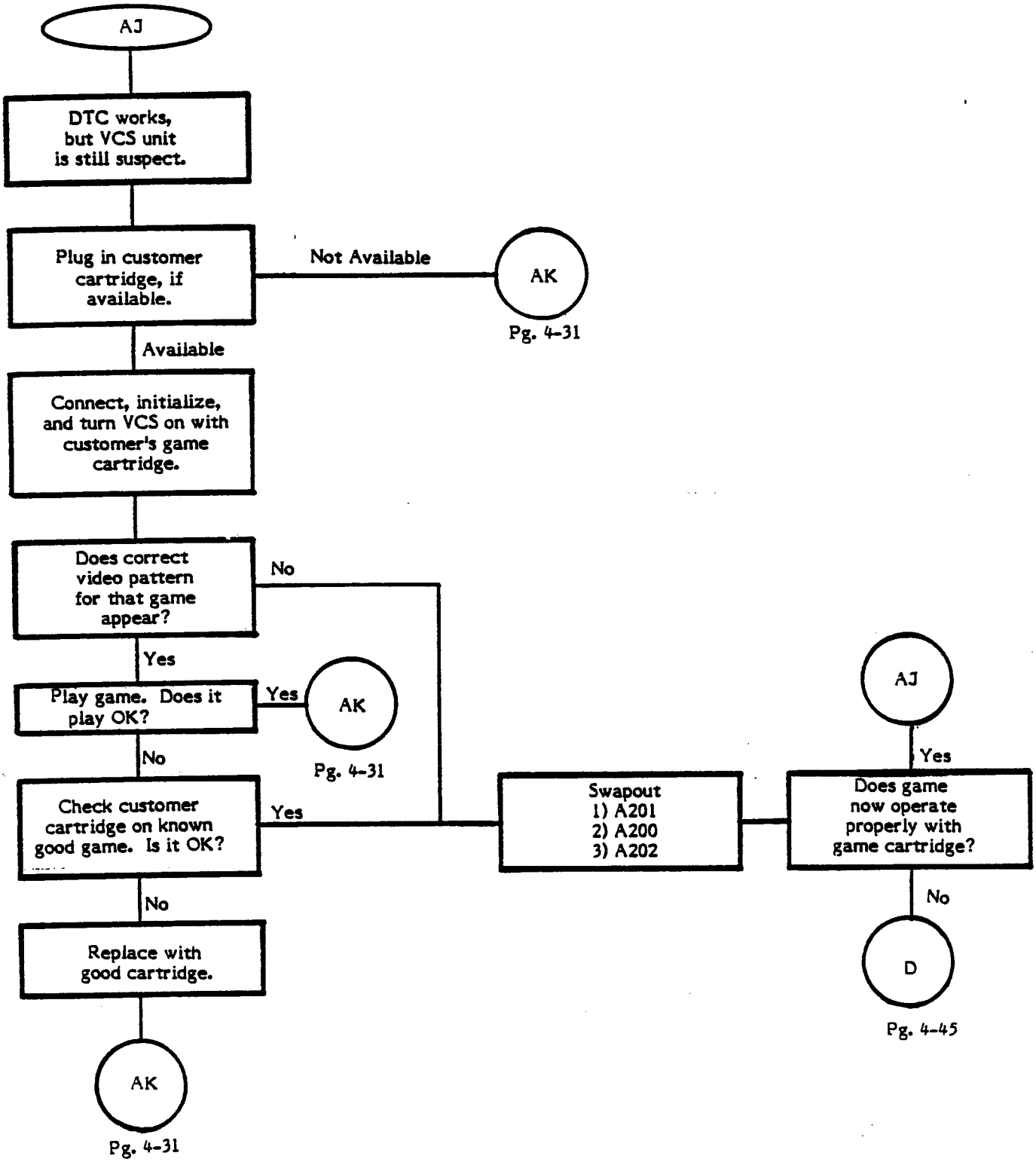
Audio Troubleshooting Procedure, Motherboard

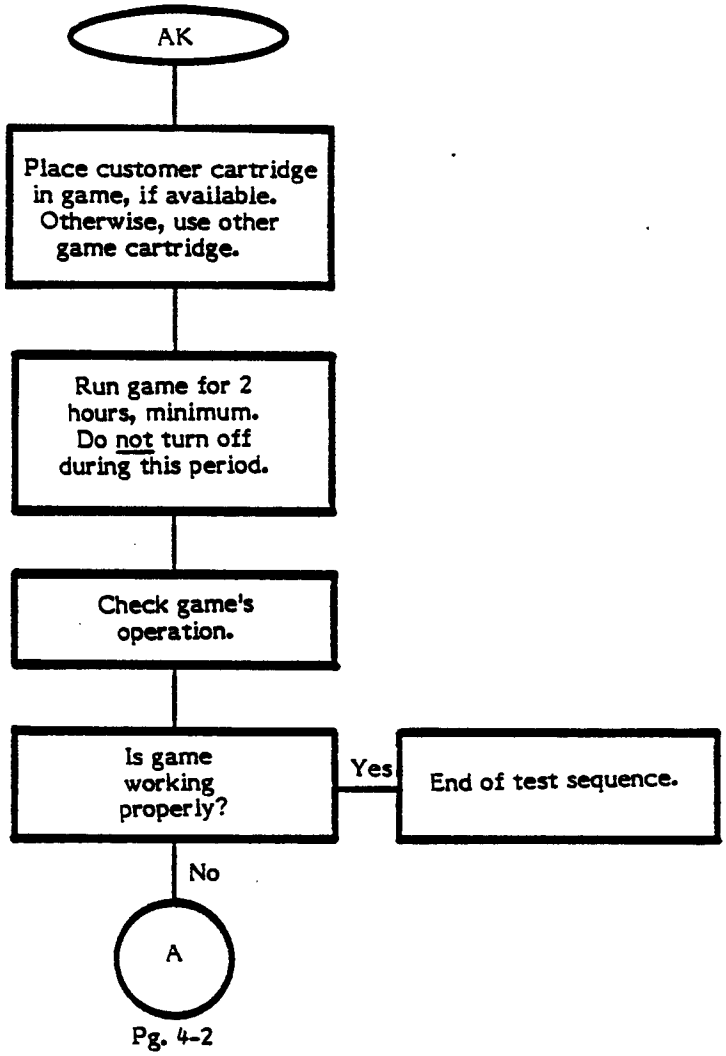


Audio Troubleshooting Procedure,
Motherboard, (Continued)

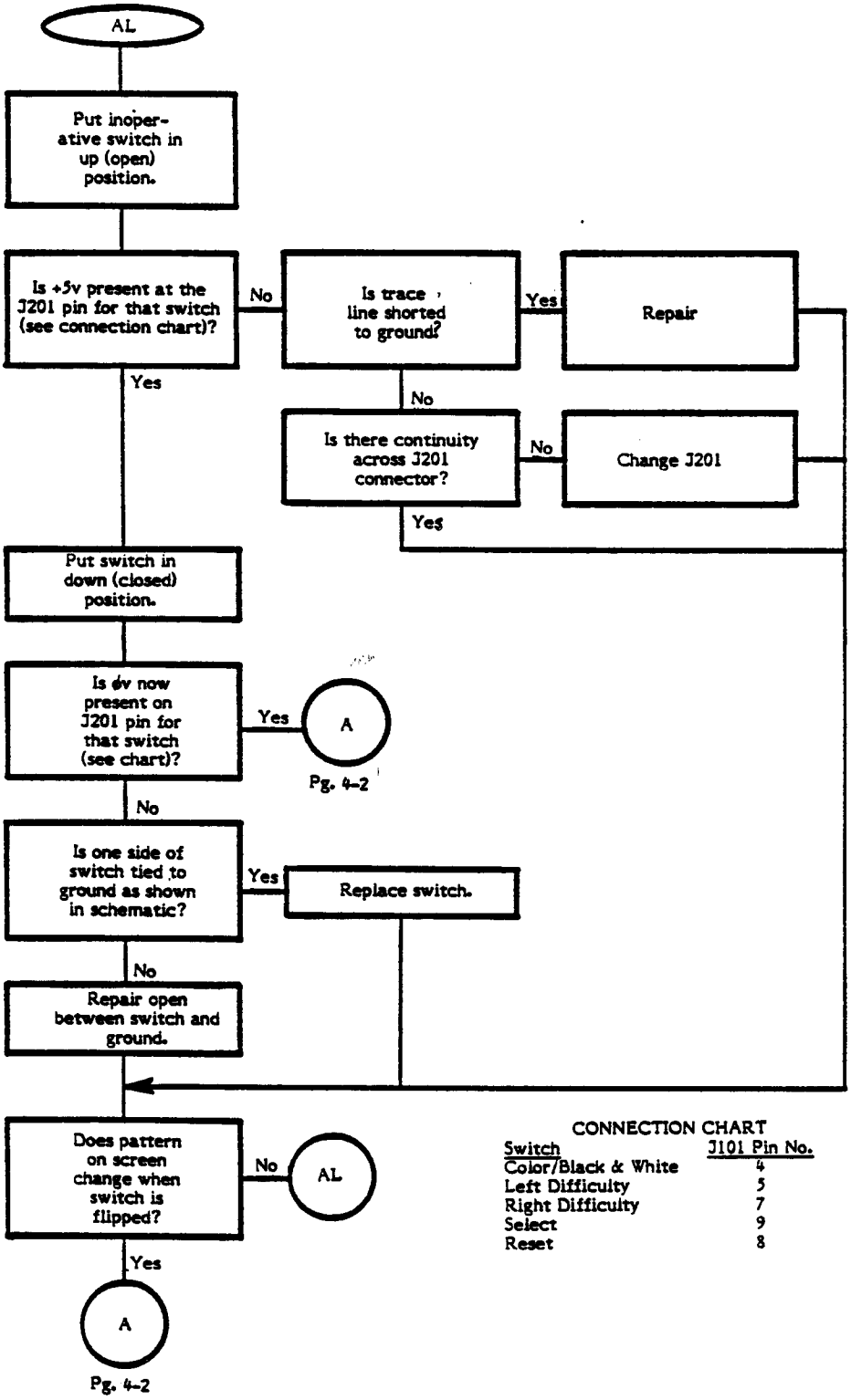


Cartridge Test Procedure




AK
Place customer cartridge in game, if available. Otherwise, use other game cartridge.
Run game for 2 hours, minimum. Do not turn off during this period.
Check game's operation.
Is game working properly?
Yes
End of test sequence.
No
A
Pg. 4-2

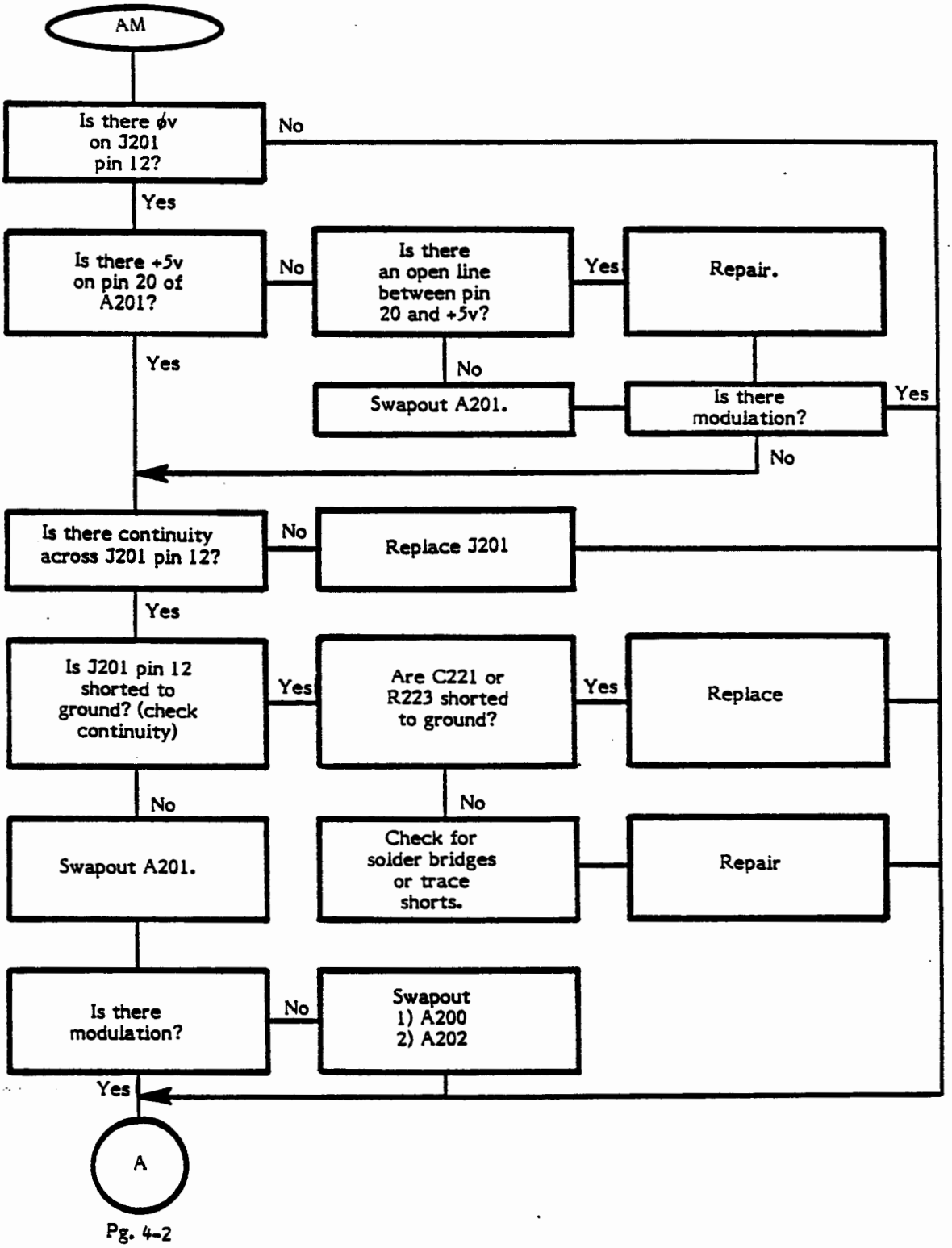
Defective Switch Troubleshooting Procedure



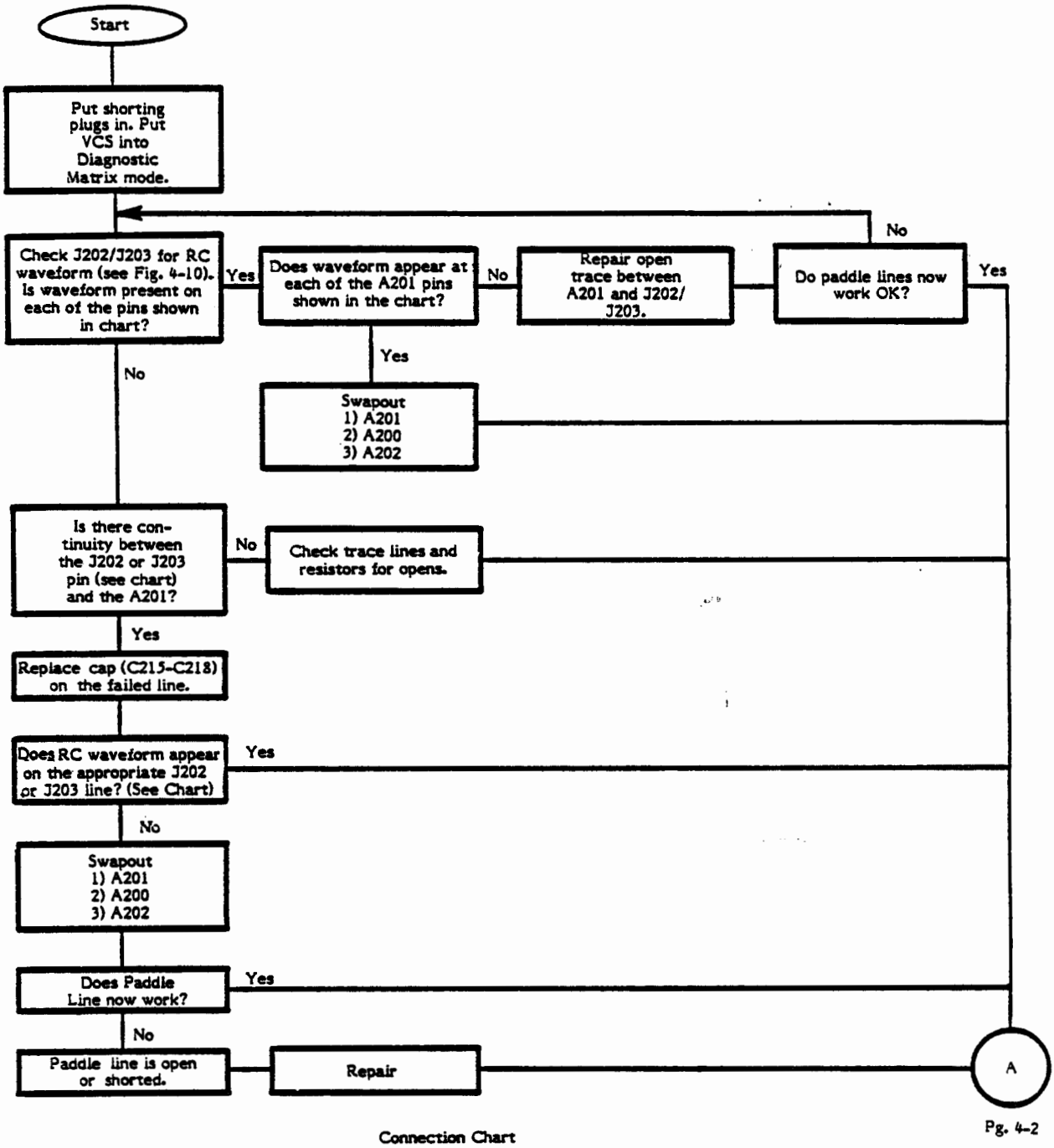
CONNECTION CHART

Switch	J101 Pin No.
Color/Black & White	4
Left Difficulty	5
Right Difficulty	7
Select	9
Reset	8

Snowy Screen Troubleshooting Procedure



Paddle Lines Test



Pg. 4-2

Connection Chart

Player	Pin A201	Pin J202	Pin 203	Cap No.
1	40	5	—	C215
2	39	9	—	C216
3	38	—	5	C217
4	37	—	9	C218

NOTE: The following figures are referenced in the 2600/2600A Diagnostic Flowcharts, Sections 4 and 6, and are included here for your convenience. They can also be found in Section 3, where the tests are described in more detail.

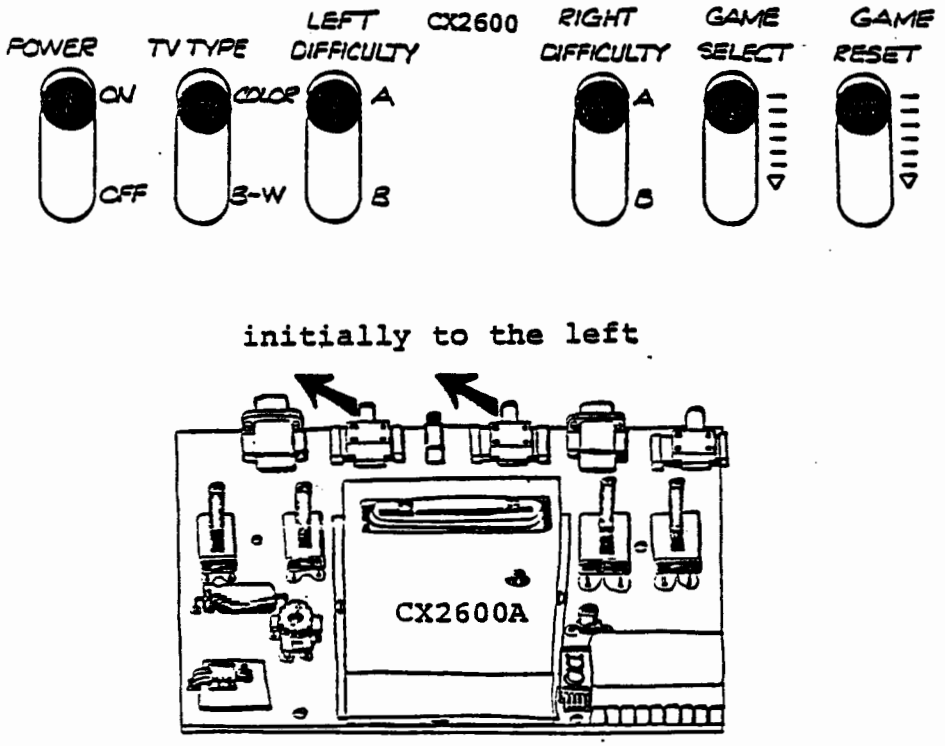


Figure 4-1. Switch Initialization Positions

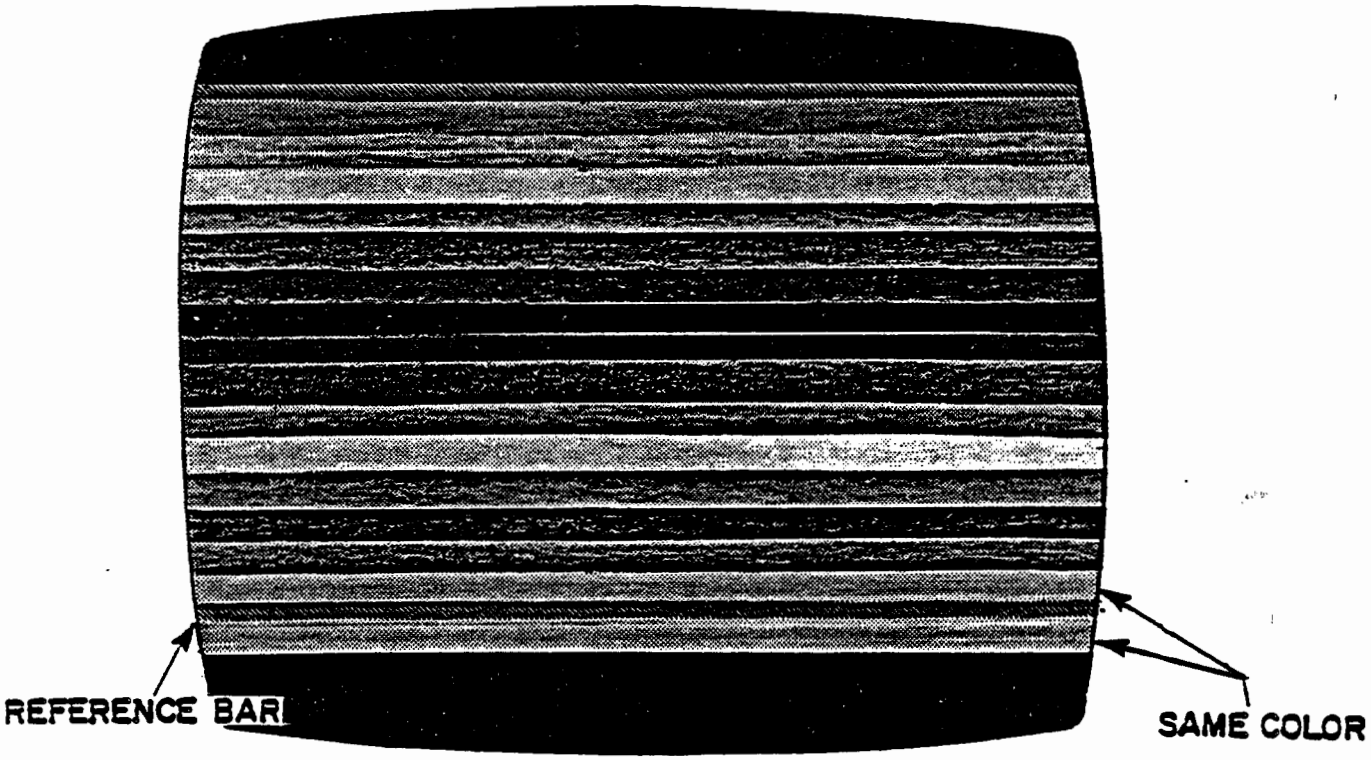
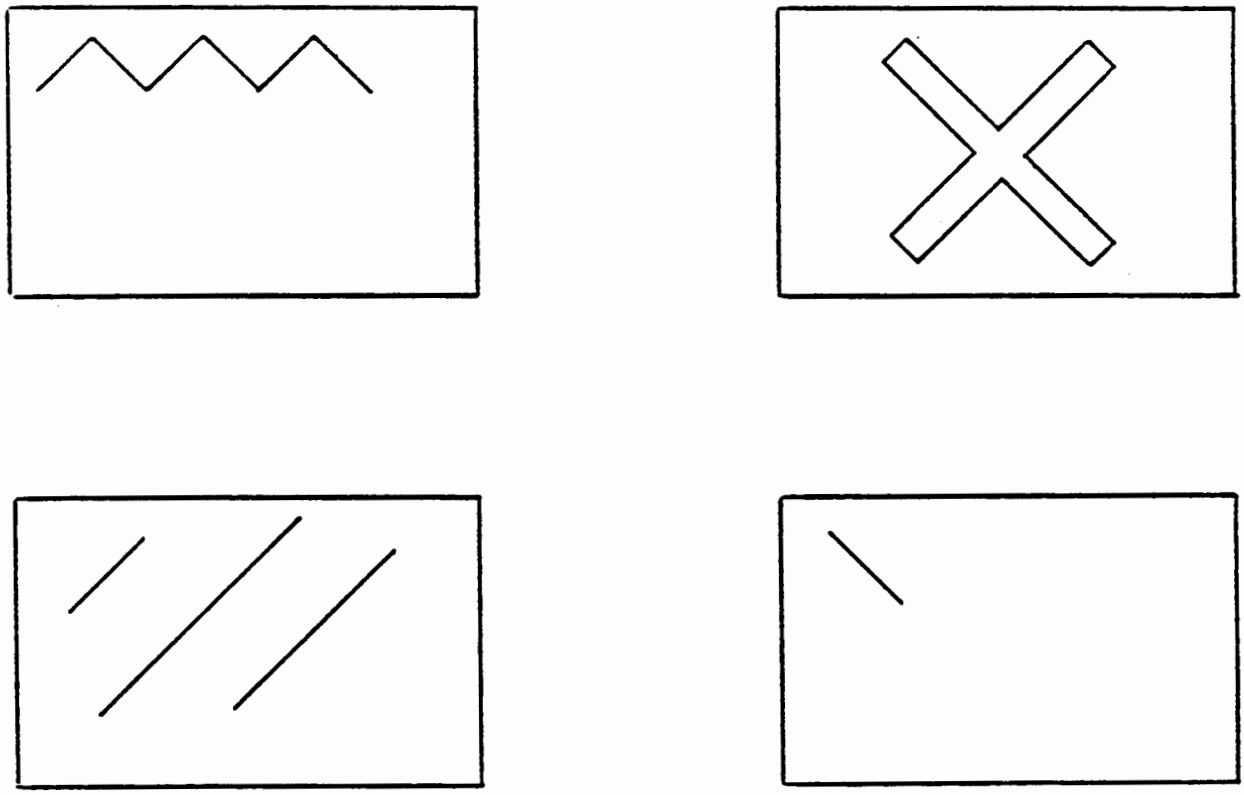


Figure 4-2. Color Bars Screen

NOTE: Set all switches to initialized position. A screen of horizontal color bars is displayed (see Figure 4-2). The screen should be steady and unchanging. A gray or blue horizontal reference line runs across the screen about three bars from its bottom. This reference line is thinner than the bars around it. R211 (R213 on the 2600A board) should be adjusted so the bars immediately above and below the reference line are within one shade of each other. 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 bars are acceptable. Leave this test on for at least ten seconds in order to catch any intermittent problems, such as a bar momentarily changing colors or blanking out.



ANY DIAGONAL LINES ON THE SCREEN INDICATE A FAILURE IN THE RAM CHIP (A202).

Figure 4-3. Defective RAM Patterns

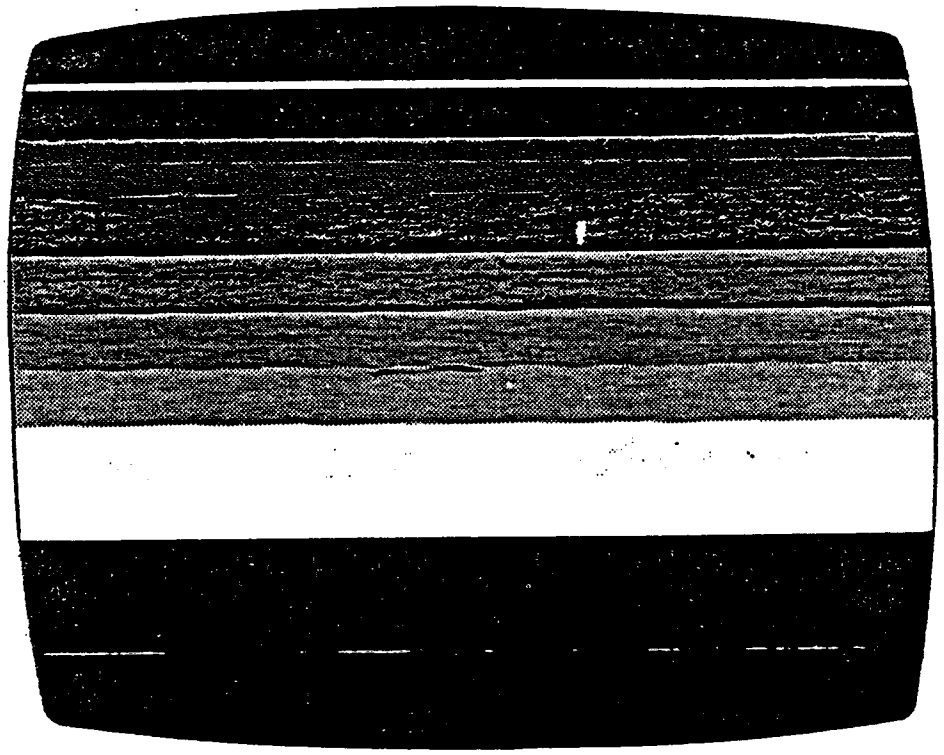


Figure 4-4. Gray Bars Screen

The gray bars screen has eight horizontal shaded bars. It is normal for the bars to have some uneven areas on their upper and lower edges. The bars must appear (in descending order) as going from black to white in even steps. The screen may not have any color in it. All eight bars must be consistent in their shade across the entire bar. The area of the screen outside the bars is irrelevant. The white line immediately above the top bar (black) is normal. This screen tests the operation of the chip set, especially the TIA (A202).

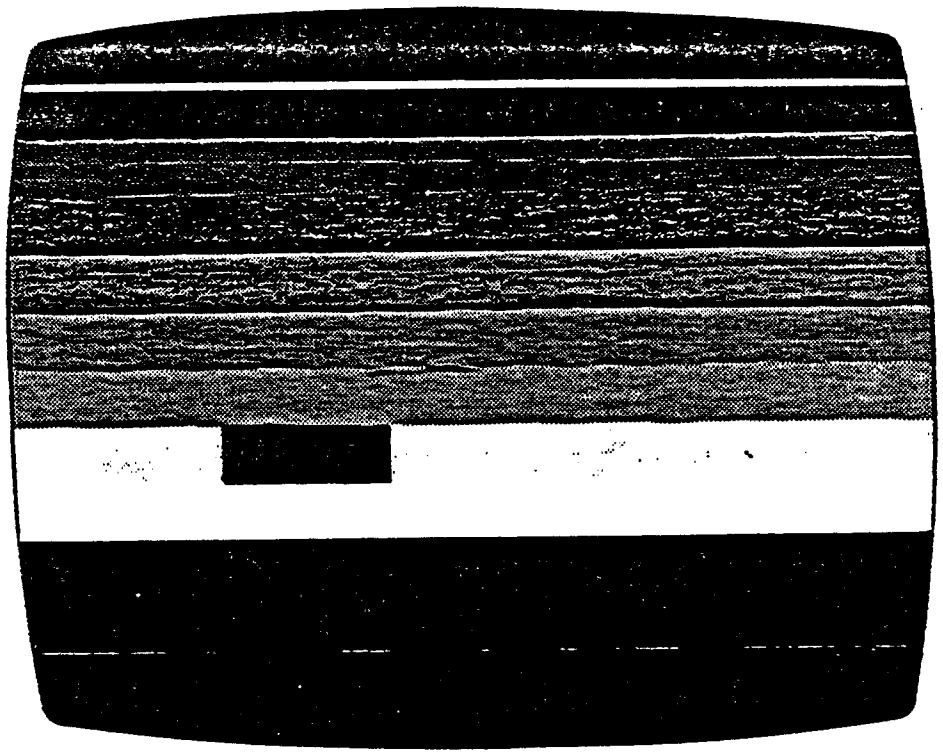


Figure 4-5. Defective Gray Bars Screen

This screen shows an example of a defective gray bars test screen. The appearance of a black rectangle in the middle of a light gray bar means that the data for that part of the screen has failed to be translated properly to the TV. Any disruption of the standard gray bars pattern (See Figure 4-4) or any color in the gray bars screen indicates a failure.

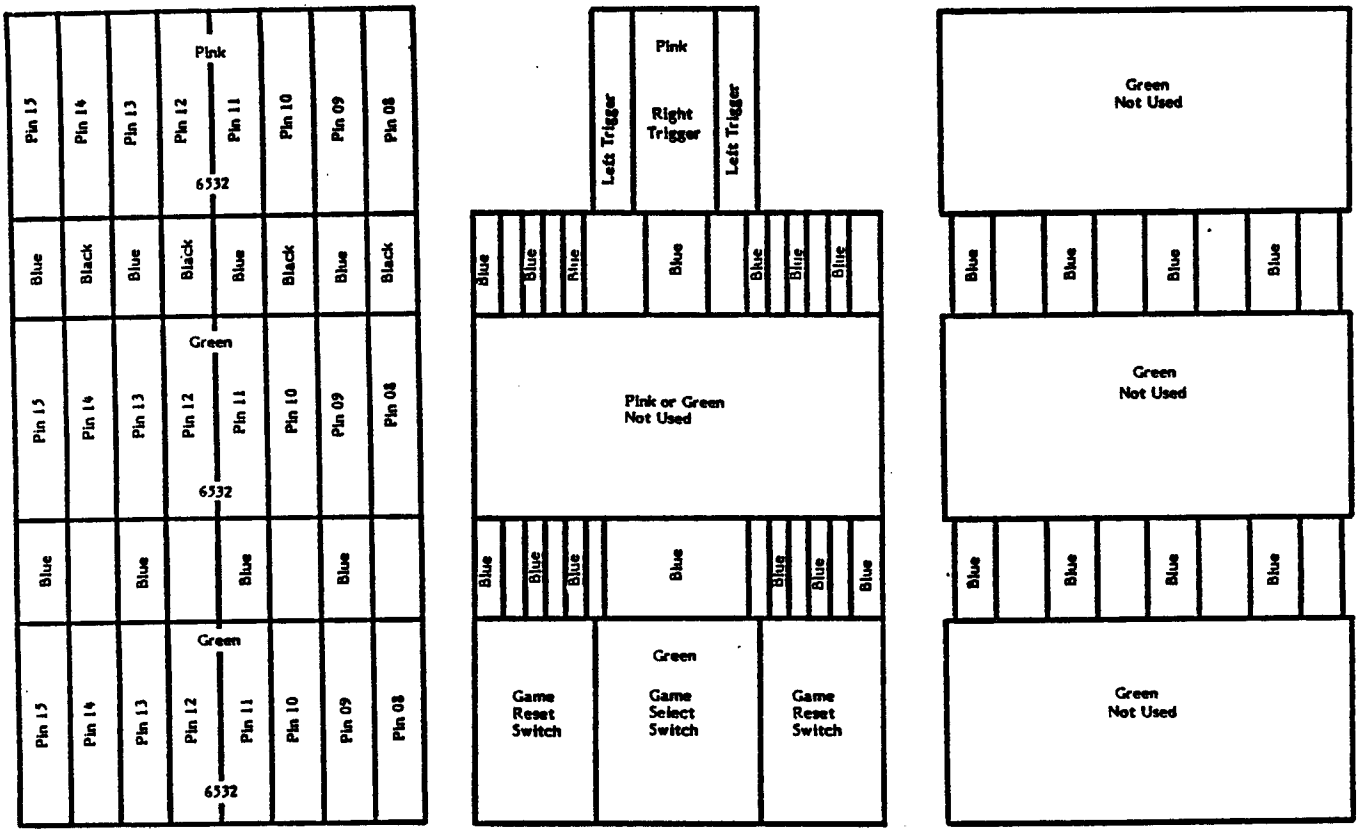


Figure 4-6. Diagnostic Matrix Screen
(Shorting Plugs OUT)

The Diagnostic Matrix Screen appears as above, on a black background, when the shorting plugs are not inserted. The three left rectangles and the blue/black grid joining them indicate the status of the I/O line connections to the 6532 RAM chip (A202).

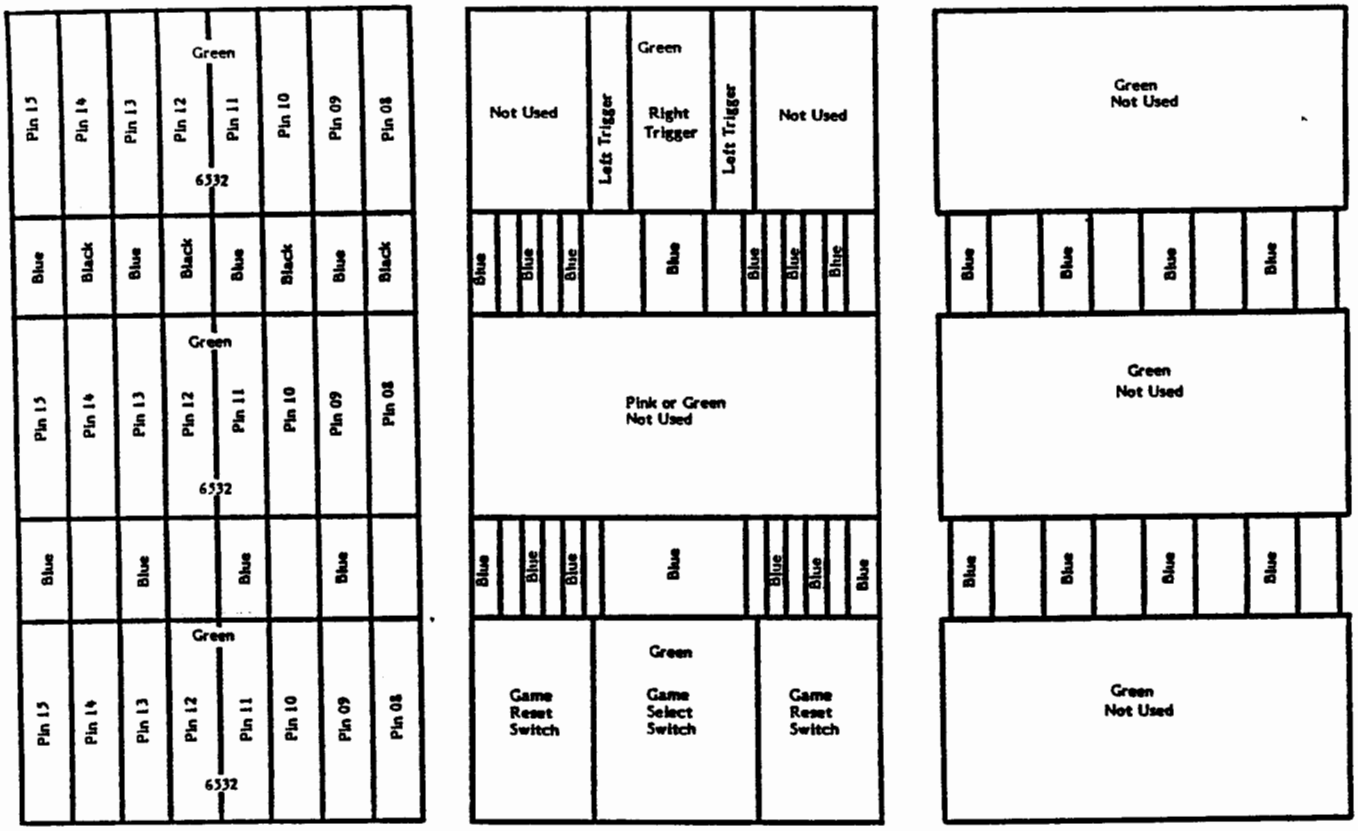


Figure 4-7. Diagnostic Matrix Screen
(Shorting Plugs IN)

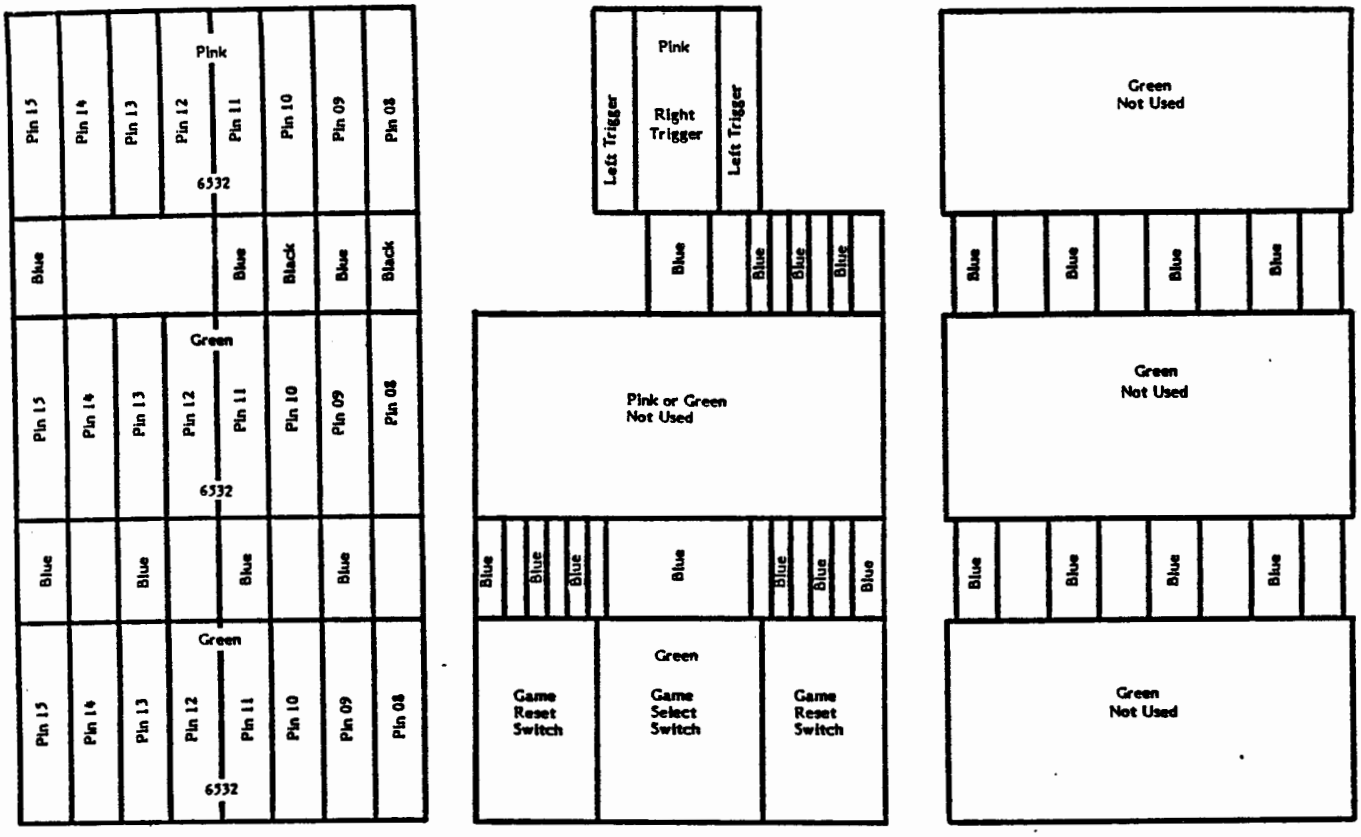


Figure 4-8. Diagnostic Matrix Screen with Defective Pattern

Any missing grid lines or disrupted rectangles indicate an I/O line failure (see page 4-26). Any missing or disrupted blue or black reference lines indicate that there has probably been a microprocessor failure (see page 4-23).

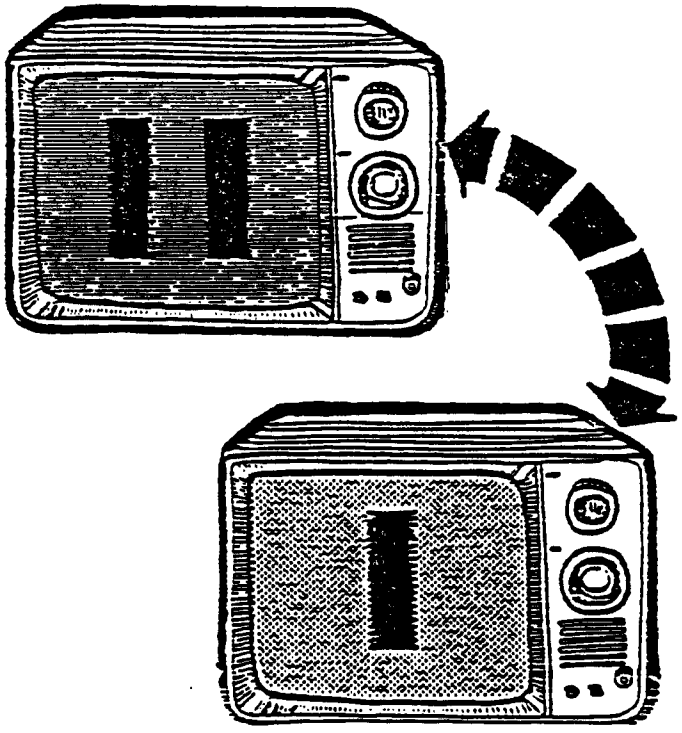
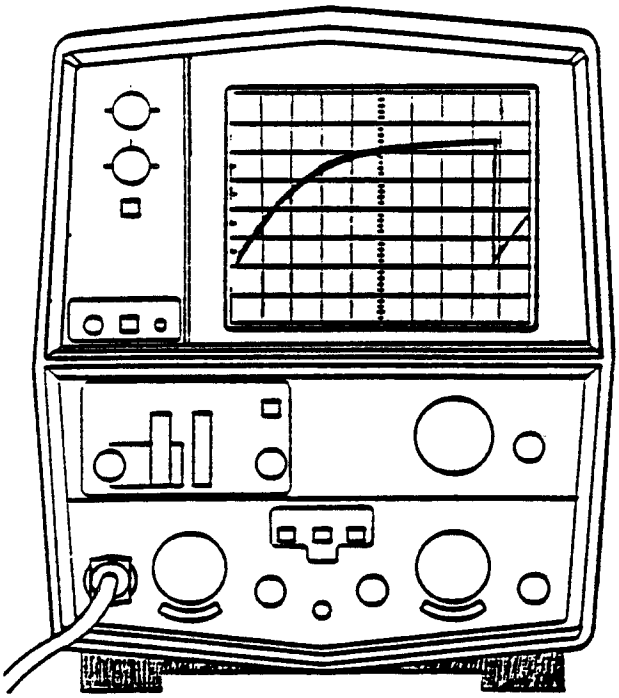
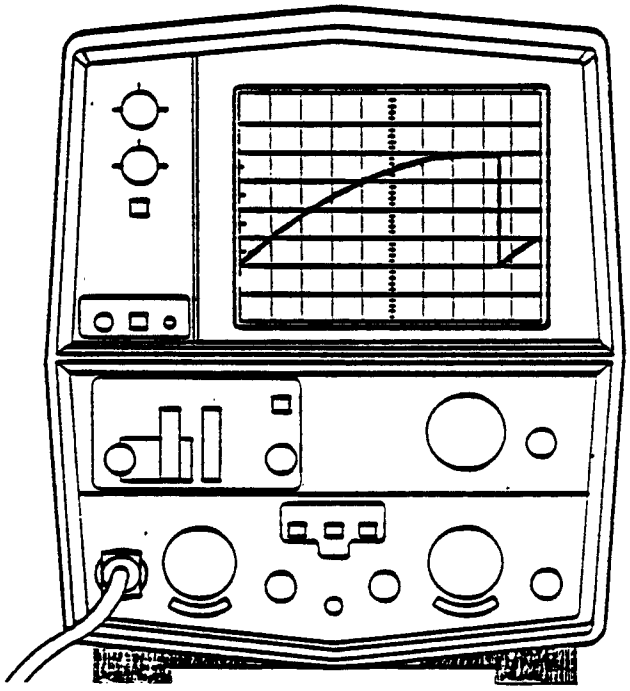


Figure 4-9. Audio Tone Test Screens

The test displays two alternating patterns on the screen (as shown in Figure 4-9) while two alternating tones are heard. The tones change in sync with the screen. This test pattern continues for one full cycle after the Right Difficulty switch has been switched to stop the test.



2ms/div.
1v/div.
Pin 37 and Pin 39



2ms/div.
1v/div.
Pin 38 and Pin 40

Figure 4-10. RC Waveforms

SIGNAL TRACING CARTRIDGE (KLUGE) PROCEDURE

The Signal Tracing Cartridge (STC) is used to locate easily open or shorted traces in the address and data lines of the 2600/2600A. The STC causes the 6507 microprocessor (A200) to cycle through the entire memory space while executing "no operation" instructions. This is valuable because it puts a known signal on each address and data line. Then the signal can be traced through to the J200 connector, the TIA and RAM-I/O chips.

Since the STC procedure is not easily reduced to a flowchart, it is presented as a series of written instructions and illustrations on the following pages.

CAUTION: The STC procedure requires three known-good chips and a working clock circuit. The STC should only be used after all other procedures have been tried.

GETTING STARTED

Insert the STC into the 2600/2600A. Turn on the unit. The television screen should be gray or black. If it is "snowy" it indicates that you should return to the start of the Diagnostic Flowchart. Set the scope sweep to .5 microsec/division and set the vertical to 1 volt/division.

ADDRESS LINES ABØ- AB12

Check the address lines at the microprocessor (A200). Check address lines, starting with pin 5. A signal with a waveform similar to those shown in Figure 4-11 should be seen on the address lines, with each succeeding address line's waveform having a frequency half that of the line before it. For example, A1 should be half the frequency of AØ. If one or more of the address lines shows no signal, it is likely that the line is either open or shorted to ground or +5v. Check all traces and pins for shorts.

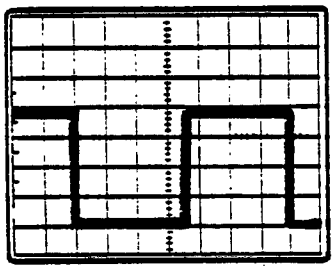
If you have a defective address line and it is not open or shorted, swapout the A200, A202 and A201, in that order.

If all address lines have signals, trace those signals to the J200 and the other chips. Table 4-1 illustrates which address lines connect to which pins on J200, 6532, and the TIA. The signal present on each address line of the microprocessor should also be present on each pin of J200, 6532, and the TIA connected to that line. If the same signal is not found, the trace line and/or solder joints between the microprocessor and the dead pin(s) is (are) broken. Check the trace lines carefully to locate the break.

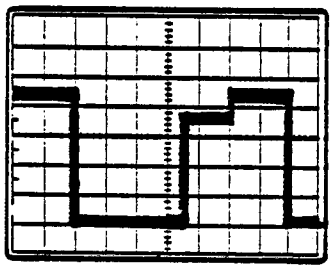
DATA LINES DBØ-7

Set the vertical on your scope to 2v/division. The data lines are tested very much like the address lines. The only difference is that the waveform seen on the data lines is different. The signals you should see are illustrated in Figure 4-12. If any data lines are completely inactive (simply remaining a constant voltage), it probably means that the line is either open or shorted to ground or +5v. Check the traces and pins for shorts. If none are found, one of the three chips or the STC itself probably has an internal short. Try swapping out the 6532, TIA, and the microprocessor. Also carefully check J200 for shorts between pins.

If all data lines have signals, trace those signals to J200 and the other chips. Table 4-1 illustrates which lines connect to which pins of J200, 6532 and the TIA. The signal present on each data line of the microprocessor should also be present on each pin of J200, 6532 and the TIA connected to that line. If the same signal is not found, the trace line and/or solder joints between the microprocessor and the dead pin(s) is(are) broken. Check the trace lines carefully to locate the break.

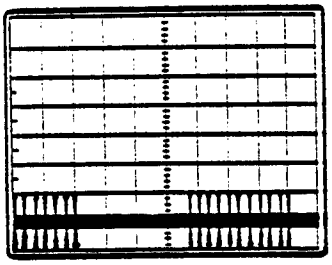


Address lines Ø, 7-12
1v/division

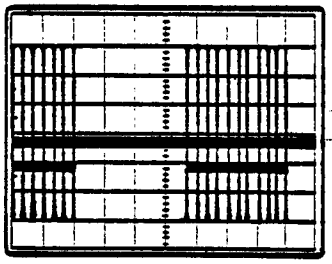


Address Lines 1-6
1v/division

Figure 4-11. STC Address Line Waveforms



Data Lines 0,2, and 4
2v/division
2ms./division



Data Lines 1,3,5-7
2v/division
2ms./division

Figure 4-12. STC Data Line Waveforms

TABLE 4-1

Connected Pins on Motherboard

ADDRESS LINES	A200 (MPU)	A201 (TIA)	A202 (RAM)	J200 Connector
AB0	5	32	7	8
AB1	6	31	6	7
AB2	7	30	5	6
AB3	8	29	4	5
AB4	9	28	3	4
AB5	10	27	2	3
AB6	11	--	40	2
AB7	12	21 (CS3)	38 (CS1)	1
AB8	13	--	--	22
AB9	14	--	36 (RS)	21
AB10	15	--	--	19
AB11	16	--	--	20
AB12	17	24 (CS0)	37 (CS0)	18
DATA LINES:				
DB0	25	14	33	9
DB1	24	15	32	10
DB2	23	16	31	11
DB3	22	17	30	13
DB4	21	18	29	14
DB5	20	19	28	15
DB6	19	33	27	16
DB7	18	34	26	17

-- Indicates no connection on that line

SECTION 5

SYMPTOM CHECKLIST

The Symptom Checklist is designed to assist the experienced technician arrive at a rapid diagnosis of VCS problems. The checklist is not intended to replace the Diagnostic Flowchart as the primary troubleshooting guide, but is designed to supplement the flowchart.

Symptoms have been divided into six general categories of failure:

- Logic
- Video
- Color
- Audio
- Controller
- Other

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

2600 FAILURES

LOGIC FAILURES

SYMPTOM	POSSIBLE CAUSE (motherboard)	POSSIBLE CAUSE (switchboard)	DIAGNOSTIC FLOWCHART ENTRY POINT
Solid colored screen	A200, A202, TIA X200, Q200, Q201, open or shorted Address or Data line	A101, RF Module	J, pg. 4-9
Vertical lines	A200, A201, A202, J200, open or shorted Address or Data line	N/A	J, pg. 4-9

VIDEO FAILURES

SYMPTOM	POSSIBLE CAUSE (motherboard)	POSSIBLE CAUSE (switchboard)	DIAGNOSTIC FLOWCHART ENTRY POINT
Snowy screen	no power, A203 J201, J204	A101, L101, RF Module, J101	L, pg. 4-11
Weak picture	N/A	L101, RF Module, RF Cable	X, pg. 4-18
Wrong Gray Bars	A201, A203, R218-R220	N/A	P, pg. 4-14

2600 FAILURES (Continued)

COLOR FAILURES

SYMPTOM	POSSIBLE CAUSE (motherboard)	POSSIBLE CAUSE (switchboard)	DIAGNOSTIC FLOWCHART ENTRY POINT
No color	X200, A201	L101, RF Module RF Cable	AA, pg. 4-21
Only the reference bar appears	C208, R211	N/A	AA, pg. 4-21
Color won't adjust	R211, C208, C209	N/A	AA, pg. 4-21
Weak color	C212, C213, R215	RF Module, L101 RF Cable	AA, pg. 4-21

AUDIO FAILURES

SYMPTOM	POSSIBLE CAUSE (motherboard)	POSSIBLE CAUSE (switchboard)	DIAGNOSTIC FLOWCHART ENTRY POINT
No audio	C206, C207, L201 adjustment, Q202	RF module adjustment	AH, pg. 4-28
Weak audio	A201, C206, C207, L201 adjustment, C201	RF module adjustment	AH, pg. 4-28
DTC audio test fails	A201, A200, A202	N/A	AD, pg. 4-24

2600 FAILURES (Continued)

CONTROLLER FAILURES

SYMPTOM	POSSIBLE CAUSE (motherboard)	POSSIBLE CAUSE (switchboard)	DIAGNOSTIC FLOWCHART ENTRY POINT
Fire button does not work	A203, J202, J203, defective Controller	N/A	AG, pg. 4-27
Joystick does not work	A202, J202, J203, defective Joystick	N/A	AF, pg. 4-26
Driving Controllers	A202, J202, J203 defective Controller	N/A	AF, pg. 4-26
Paddle Controllers	A201, C215-C218, J202 - J203, defective controller	N/A	pg. 4-34

OTHER FAILURES

SYMPTOM	POSSIBLE CAUSE (motherboard)	POSSIBLE CAUSE (switchboard)	DIAGNOSTIC FLOWCHART ENTRY POINT
Switches not working	A202, C222-C227	S102-S106, J101	AL, pg. 4-32

2600A FAILURES

LOGIC FAILURES (2600A)

SYMPTOM	POSSIBLE CAUSE	DIAGNOSTIC FLOWCHART ENTRY POINT
Solid colored screen	A200, A202, A201, X200, Q200, RF Module	I, pg. 6-10
Vertical lines	A200, A201, A202, J200, open or shorted Address or Data line	I, pg. 6-10

VIDEO FAILURES (2600A)

SYMPTOM	POSSIBLE CAUSE	DIAGNOSTIC FLOWCHART ENTRY POINT
Snowy screen	A203, S201, RF Module, L205	K, pg. 6-12
Weak picture	RF Module, RF Cable	K, pg. 6-12
Wrong Gray Bars Revisions 1-13	A201, R218-221, R214-R217	M, pg. 6-14
Wrong Gray Bars Revision 14	A201, R218-R221, R229, R230, CR202, CR203, R214-R217	N, pg. 6-15
Warped picture Revisions 1-13	A201, R221, R217	C, pg. 6-4
Warped picture Revision 14	A201, R217, R221,R230, R203	C1, pg. 6-5

2600A FAILURES (Continued)

COLOR FAILURES (2600A)

SYMPTOM	POSSIBLE CAUSES	DIAGNOSTIC FLOW CHART ENTRY POINT
No color	X200, A201, C210, C211 RF Cable	P, pg. 6-16
Only the reference bar appears	R213, C205, A201	P, pg. 6-16
Color won't adjust	R213, C205, CR200 CR201	P, pg. 6-16
Weak color	RF Module, C210, C211, R210, RF Cable	P, pg. 6-16

AUDIO FAILURES (2600A)

SYMPTOM	POSSIBLE CAUSES	DIAGNOSTIC FLOW CHART ENTRY POINT
No audio	C206, C207, Q201, RF Module adjustment	X, pg. 6-24
Weak audio	A201, C208, R207, C206, C207, RF Module adjustment	X, pg. 6-24
Diagnostic test cartridge audio test fails	A201, A200, A202	X, pg. 6-24

CONTROLLER FAILURES (2600A)

SYMPTOM	POSSIBLE CAUSES	DIAGNOSTIC FLOW CHART ENTRY POINT
Fire Button does not work	J202, J203 Defective Controller	W, pg. 6-23
Joystick does not work	A202, J202, J203, Defective Joystick	V, pg. 6-22
Driving Controllers	A202, J202, J203, Defective Controller	V, pg. 6-22
Paddle Controllers	A201, C218-C221, J202, J203, Defective Controller	pg. 6-29

OTHER FAILURES (2600A)

SYMPTOM	POSSIBLE CAUSES	DIAGNOSTIC FLOW CHART ENTRY POINT
Switches not working	A202, C231-C235 S202-S206	G, pg. 6-8

SECTION 6

2600A DIAGNOSTIC FLOWCHART

The Diagnostic Flowchart is intended to be easy to use and the primary aid when troubleshooting the 2600A. Follow the prompts in the order presented. The figures referenced in the flowcharts are located at the end of Section 4, beginning on page 4-37. When a question is asked, follow the line from that box which best applies to the unit's situation. When a line terminates with a letter inside a circle, note that a page number (i.e., pg. 6-3) is near it. Turn to that page, locate the letter in another circle, and continue the diagnosis. The flowchart leaves nothing to chance, it tells you when to perform a specific test, and when to replace components, and even when and how long to "burn-in" the unit. "Burn-in" the unit for at least two hours after completing repairs.

When a problem is extremely difficult to diagnose, the flowchart sends you to the Signal Tracing Cartridge (STC) routine, "D", page 4-47. Due to the repetitive nature of the STC routine, no flowchart is used. Read and follow the instructions as directed. Should the STC procedure fail to isolate the problem, after carefully inspecting the motherboard assembly for shorted and/or open trace lines and solder bridges, swap all three chips (6507, 6532, and TIA). Should the problem still persist, call ATARI, Techline Specialist: Inside California at (800) 672-1466 and Outside California at (800) 538-1535. Be certain to always burn-in the unit for two hours after completing repairs. This helps to ensure that intermittent problems are found and also greatly increases your customer's satisfaction with your repair work.

SWAP OUT PROCEDURES

Many places in the diagnostic flowchart, a box tells you to "swapout" a chip or a number of chips in a particular order. The "swapout" instruction means that you should replace the indicated components one at a time with a known good component of the same type. The VCS should then be tested with the new, known-good component in place to see whether the "swapout" solved the problem being checked. If the swapout did not fix the problem, the known-good component should be left in, and the next component inserted. Once the problem is solved, you then place the suspected bad chips one by one into the system to determine whether or not those you pulled out are truly defective. In this way, you avoid needlessly replacing good components.

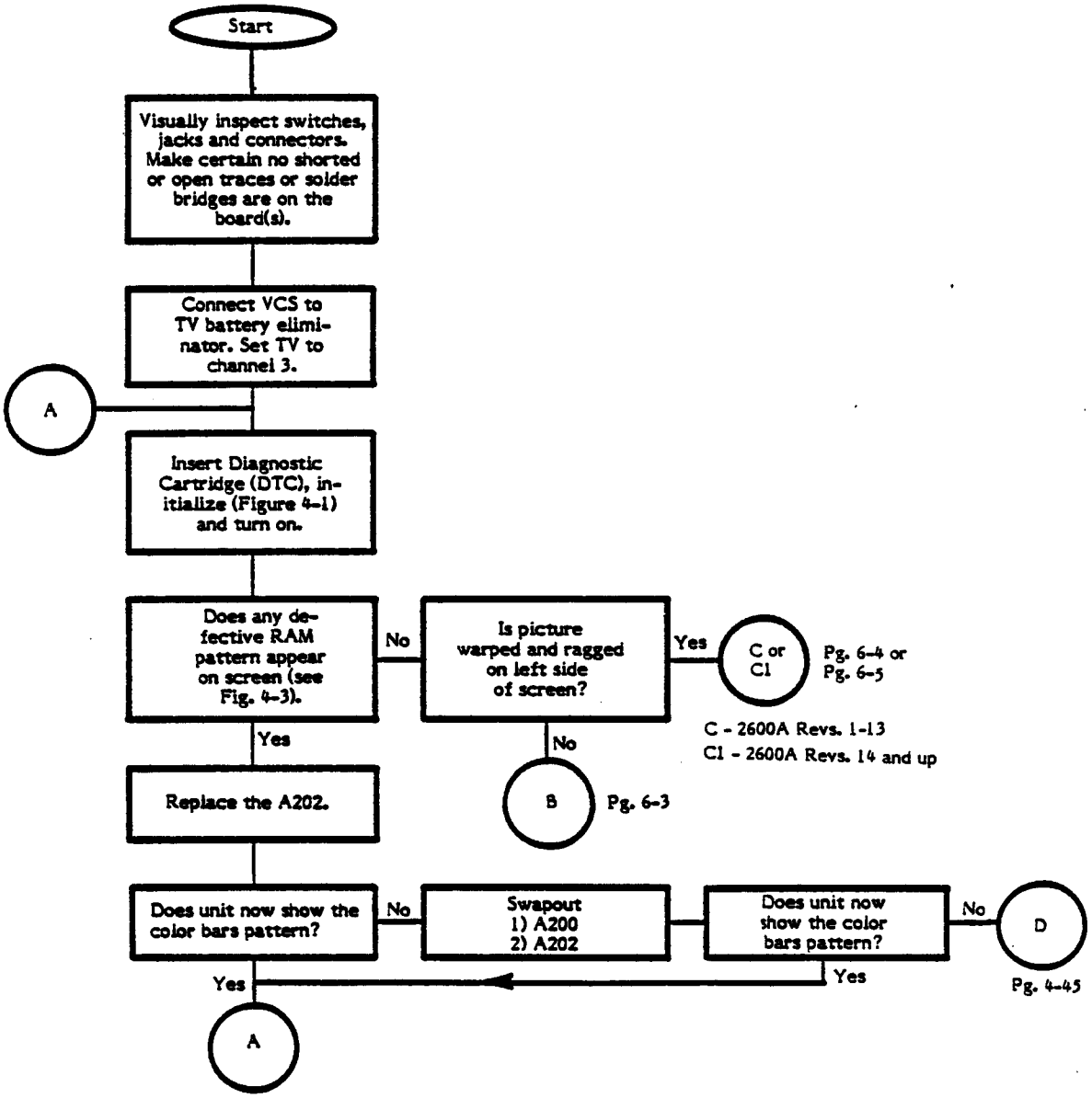
CAUTION:

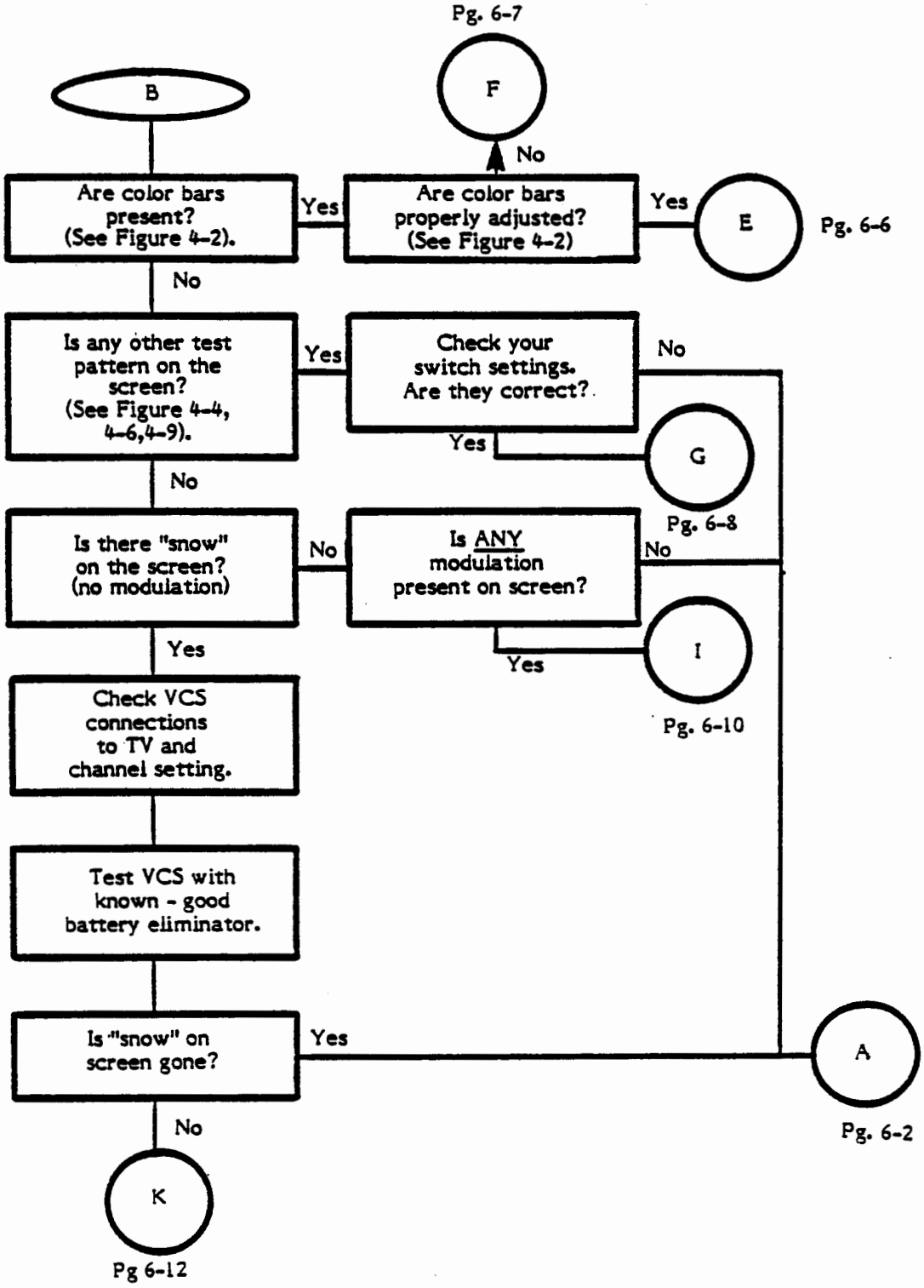
Extreme care should be taken when handling the intergrated circuit chips (A200, A201, A202, A203). They are all very sensitive to static electricity and can easily be damaged by careless handling. Always keep the chips in their plastic carrier tubes or on conductive foam when not handling them. Make 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 chips out with a screwdriver or any other tool.

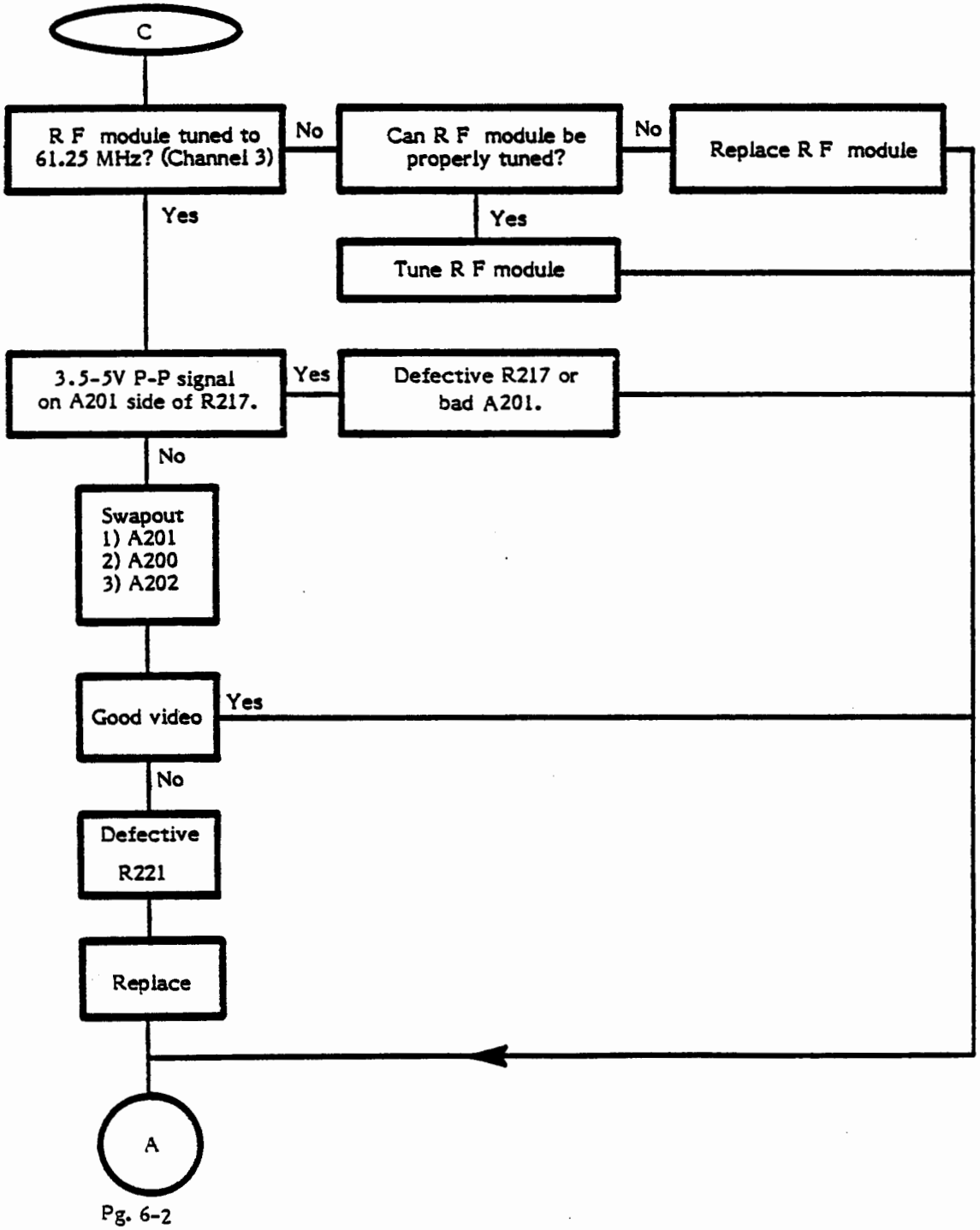
Failure to follow the above guidelines results in unusually high chip failure rates and extra expense.

2600A Diagnostic Flowchart



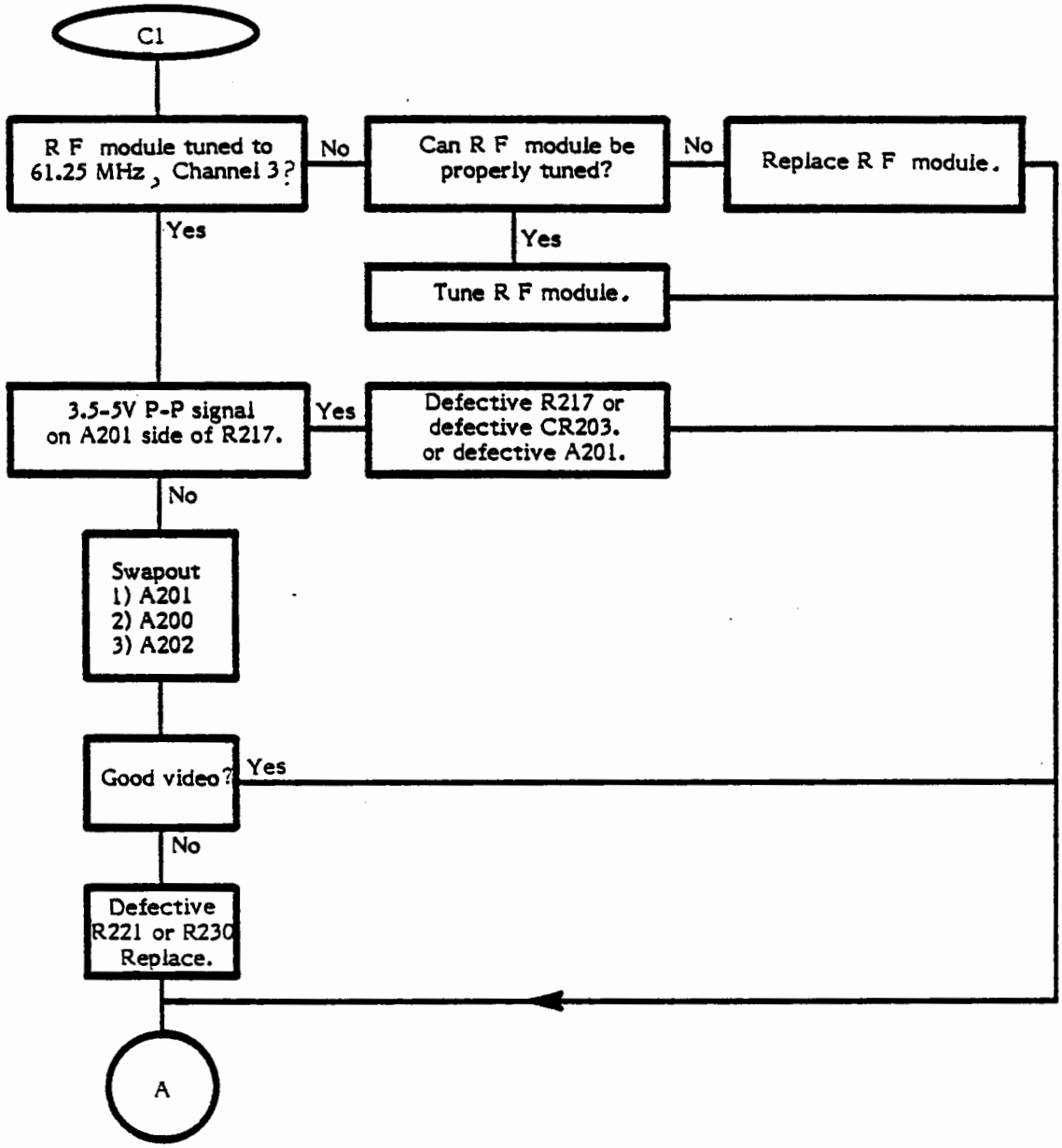

Pg. 6-7
F
B
No
Are color bars present? (See Figure 4-2).
Yes
Are color bars properly adjusted? (See Figure 4-2)
Yes
E
Pg. 6-6
No
Is any other test pattern on the screen? (See Figure 4-4, 4-6,4-9).
Yes
Check your switch settings. Are they correct?
No
Yes
G
Pg. 6-8
No
Is there "snow" on the screen? (no modulation)
No
Is ANY modulation present on screen?
No
Yes
I
Pg. 6-10
Yes
Check VCS connections to TV and channel setting.
Test VCS with known - good battery eliminator.
Is "snow" on screen gone?
Yes
A
Pg. 6-2
No
K
Pg 6-12

2600A Bad Video Troubleshooting (Loss of Sync.)
(Revisions 1-13)



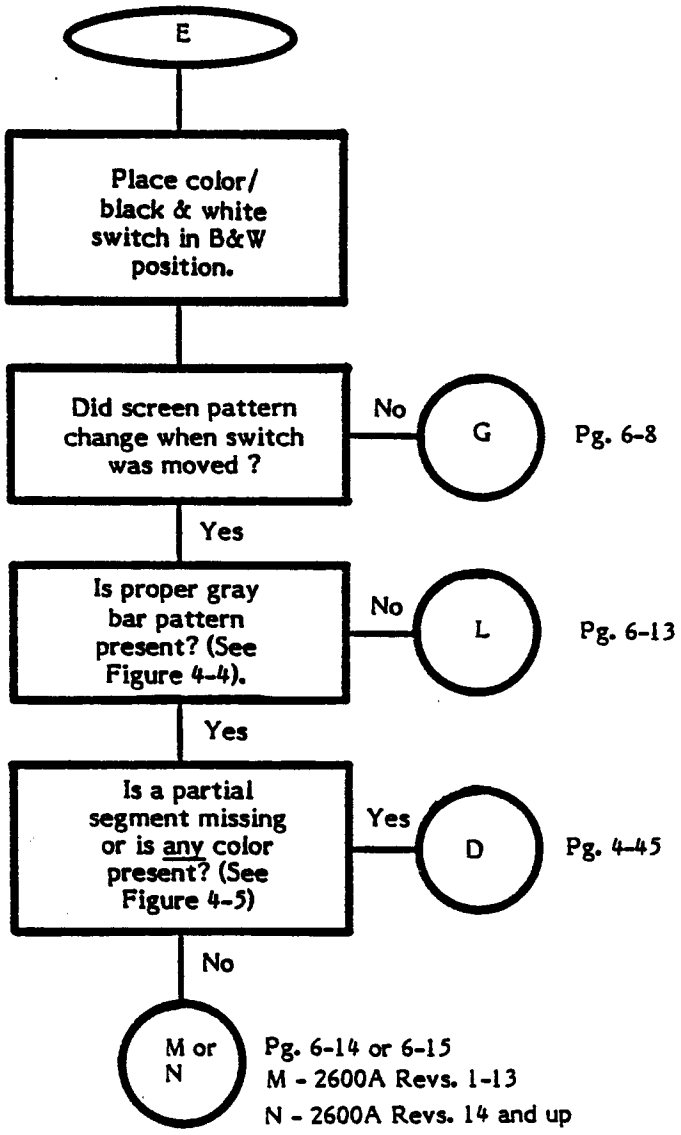
Pg. 6-2

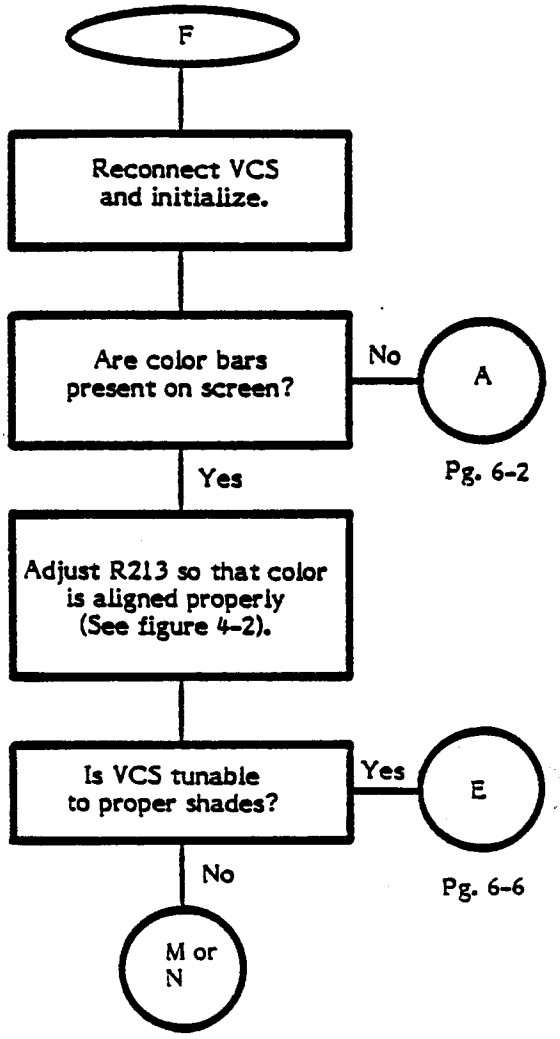
2600A Bad Video Troubleshooting (Loss of Sync.)
(Revisions 14 and up)



Pg. 6-2

2600A Gray Bars Test Procedure

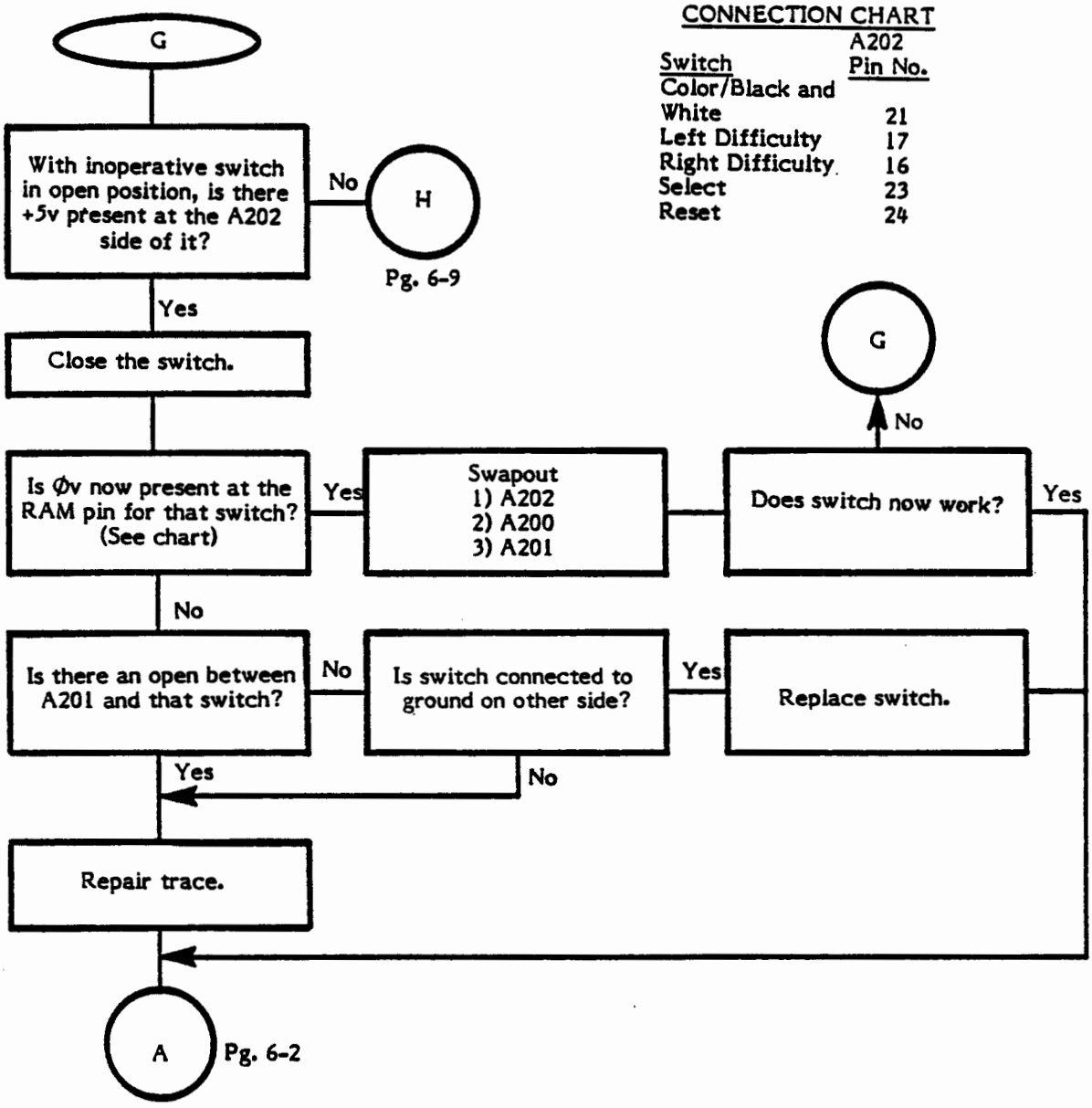




M - 2600A Revs. 1-13

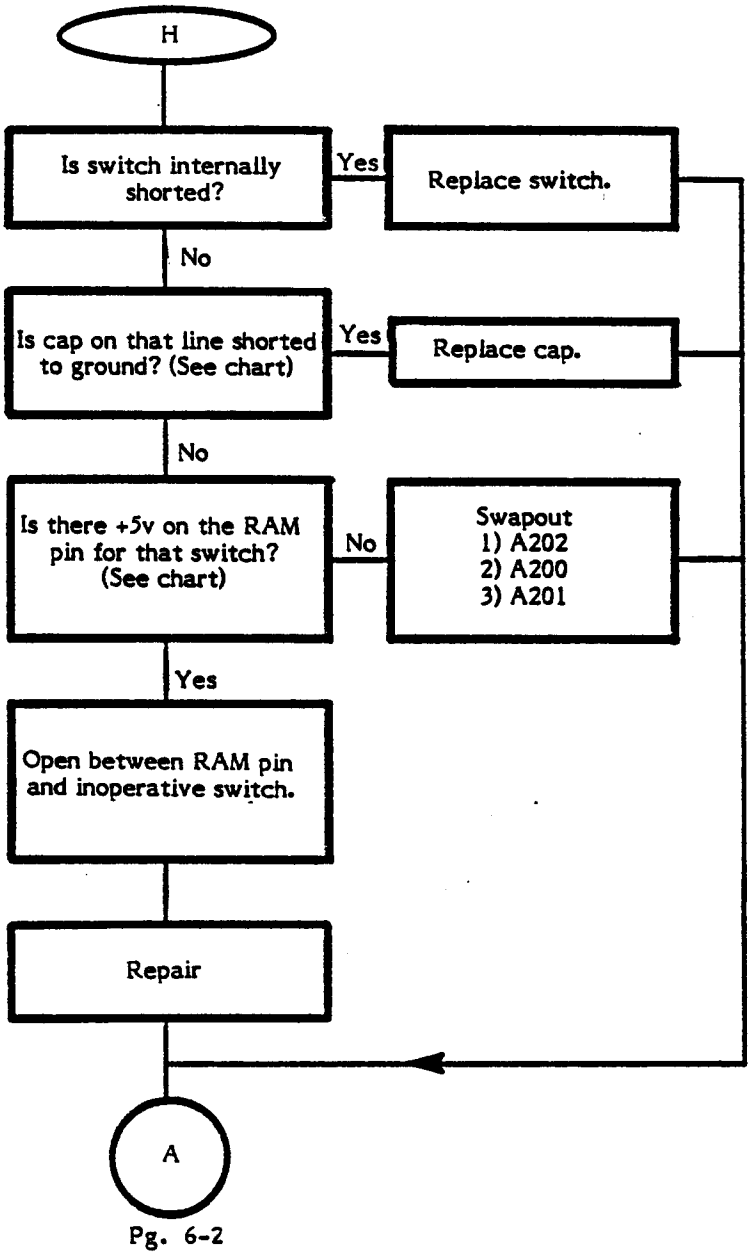
N - 2600A Revs. 14 and up

2600A Defective Switch Troubleshooting



CONNECTION CHART

Switch	A202 Pin No.
Color/Black and White	21
Left Difficulty	17
Right Difficulty	16
Select	23
Reset	24

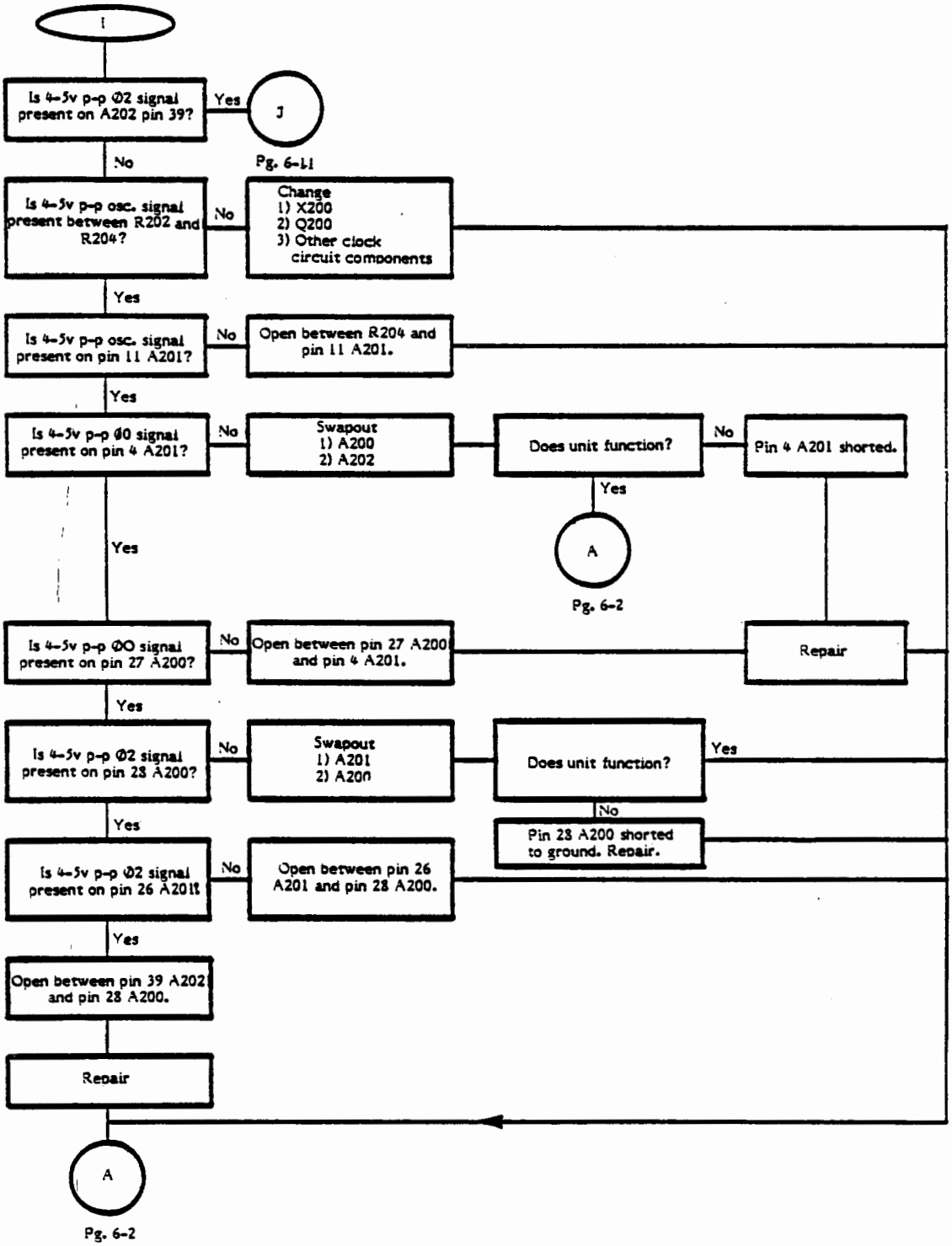


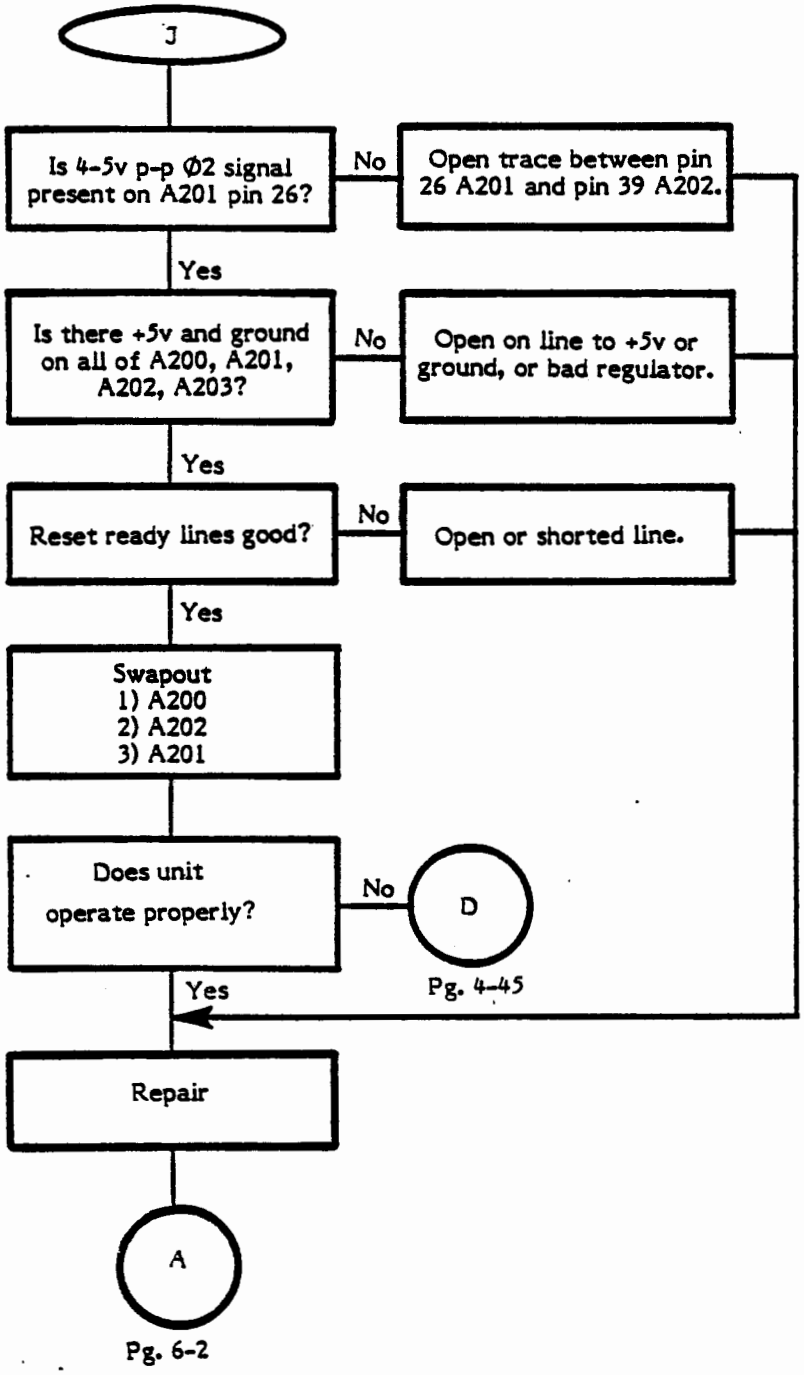
Pg. 6-2

CONNECTION CHART

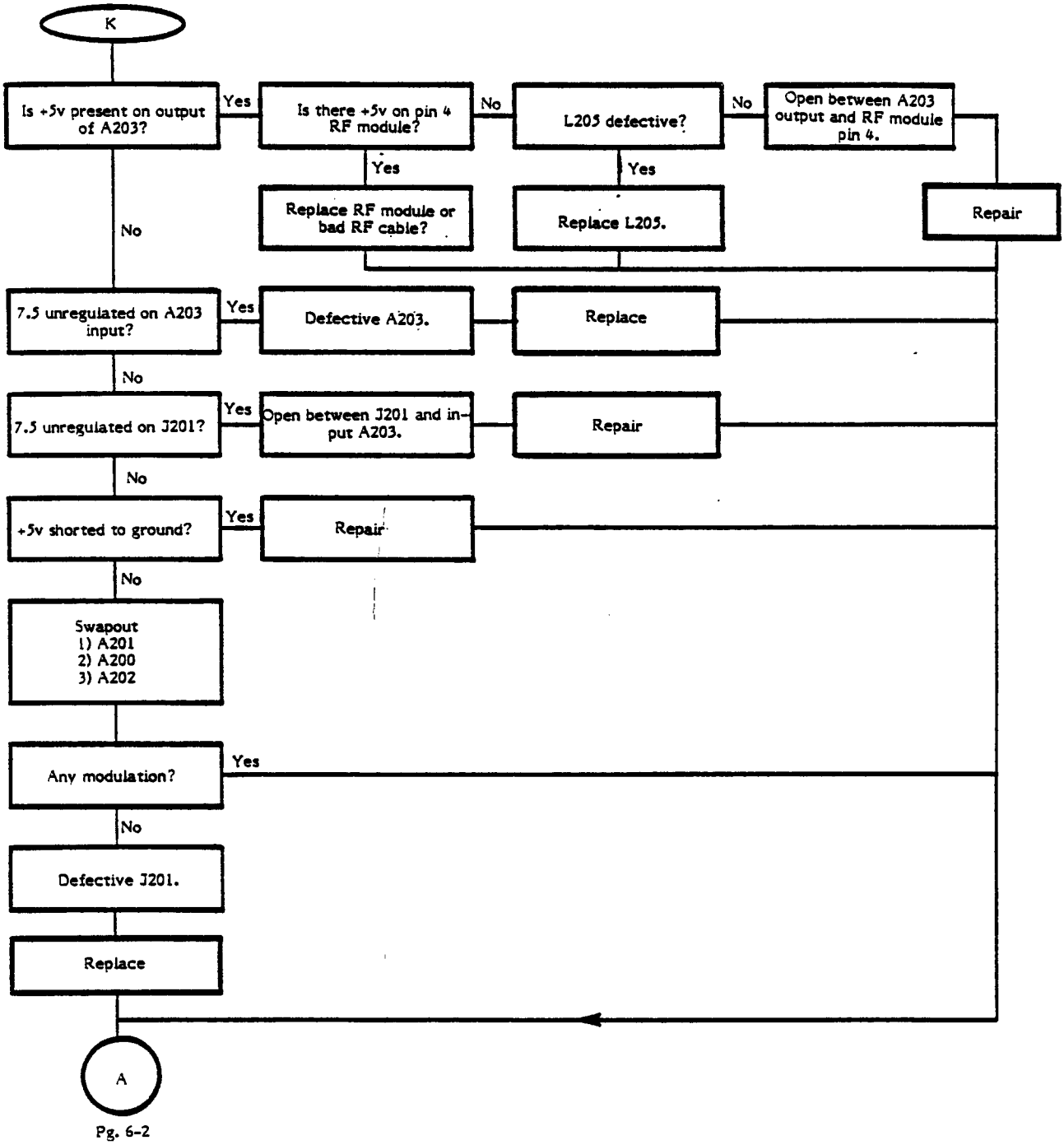
Switch	A202 Pin No.
Color/Black and White	21
Left Difficulty	17
Right Difficulty	16
Select	23
Reset	24

2600A Solid Colored Screen Troubleshooting

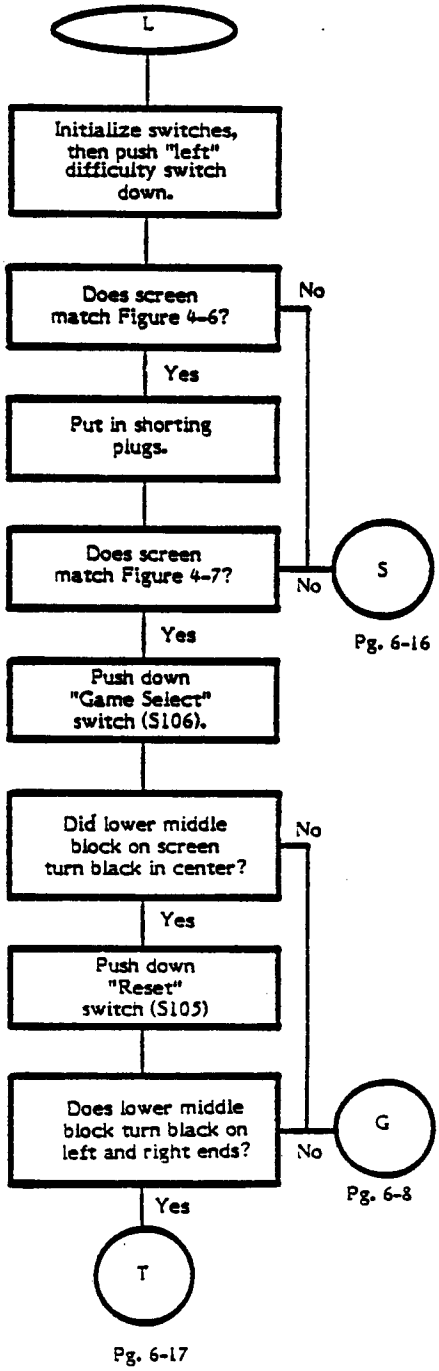



J
Is 4-5v p-p Ø2 signal present on A201 pin 26?
No
Open trace between pin 26 A201 and pin 39 A202.
Yes
Is there +5v and ground on all of A200, A201, A202, A203?
No
Open on line to +5v or ground, or bad regulator.
Yes
Reset ready lines good?
No
Open or shorted line.
Yes
Swapout
1) A200
2) A202
3) A201
Does unit operate properly?
No
D
Pg. 4-45
Yes
Repair
A
Pg. 6-2

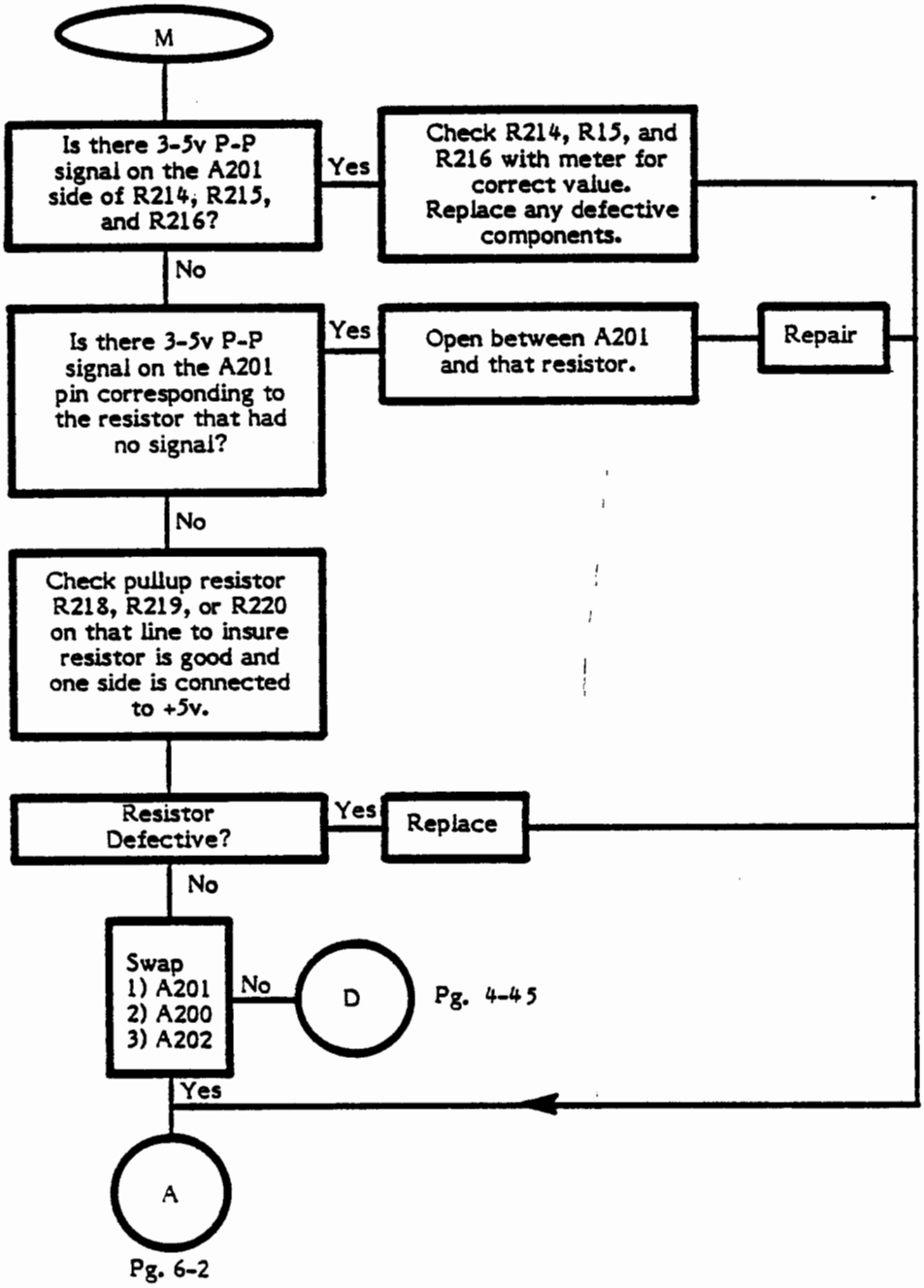
2600A Snowy Screen Troubleshooting Procedure

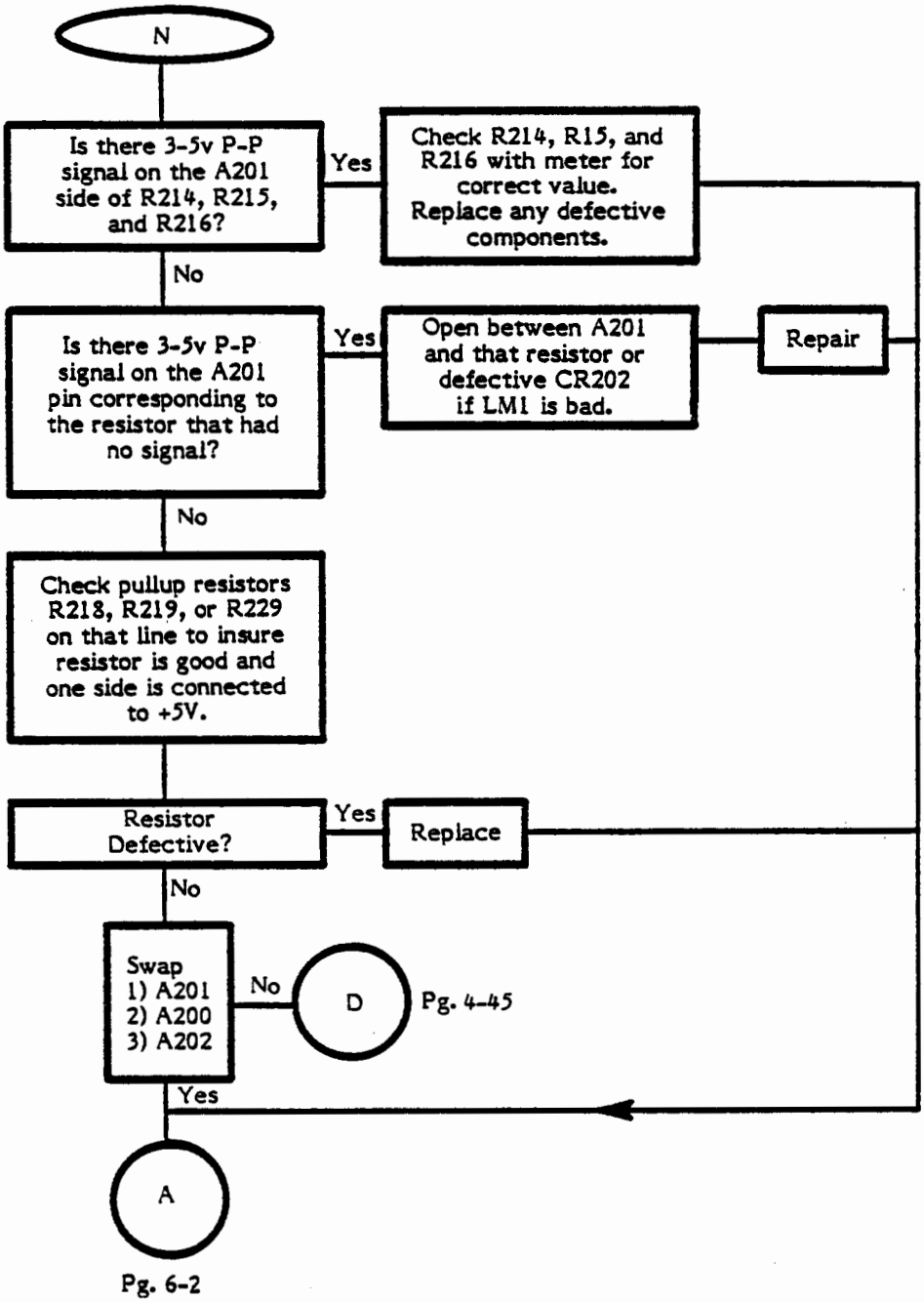


Pg. 6-2

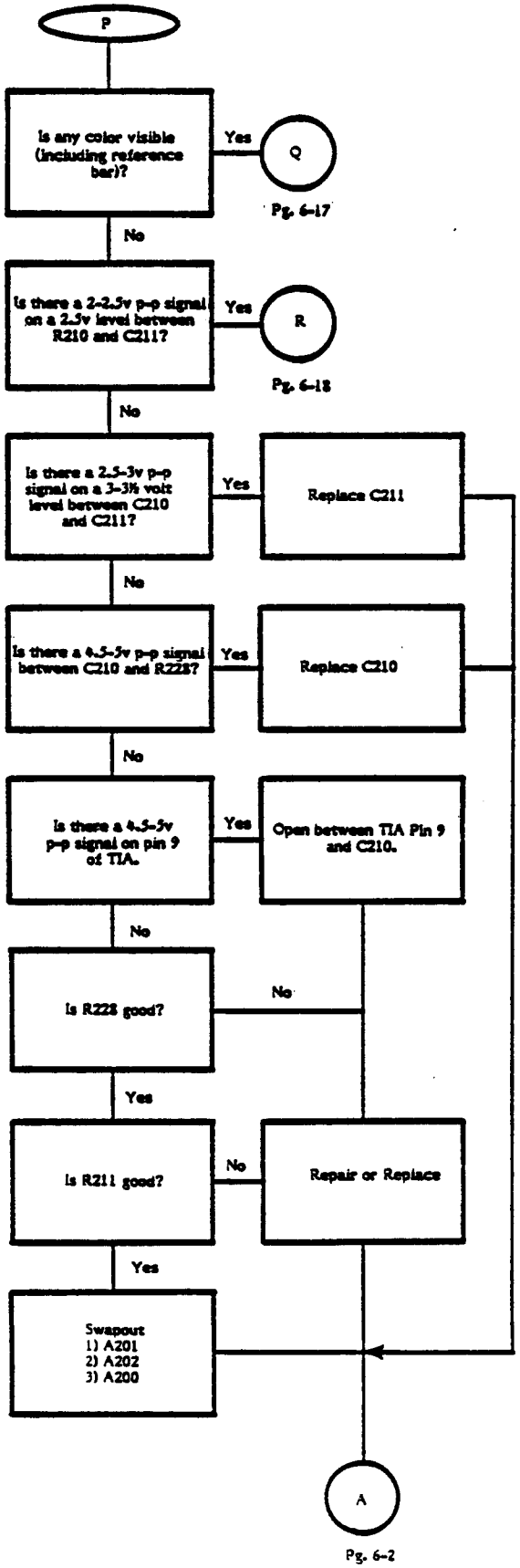

L
Initialize switches, then push "left" difficulty switch down.
Does screen match Figure 4-6?
No
Yes
Put in shorting plugs.
Does screen match Figure 4-7?
No
S
Pg. 6-16
Yes
Push down "Game Select" switch (S106).
Did lower middle block on screen turn black in center?
No
Yes
Push down "Reset" switch (S105)
Does lower middle block turn black on left and right ends?
No
G
Pg. 6-8
Yes
T
Pg. 6-17

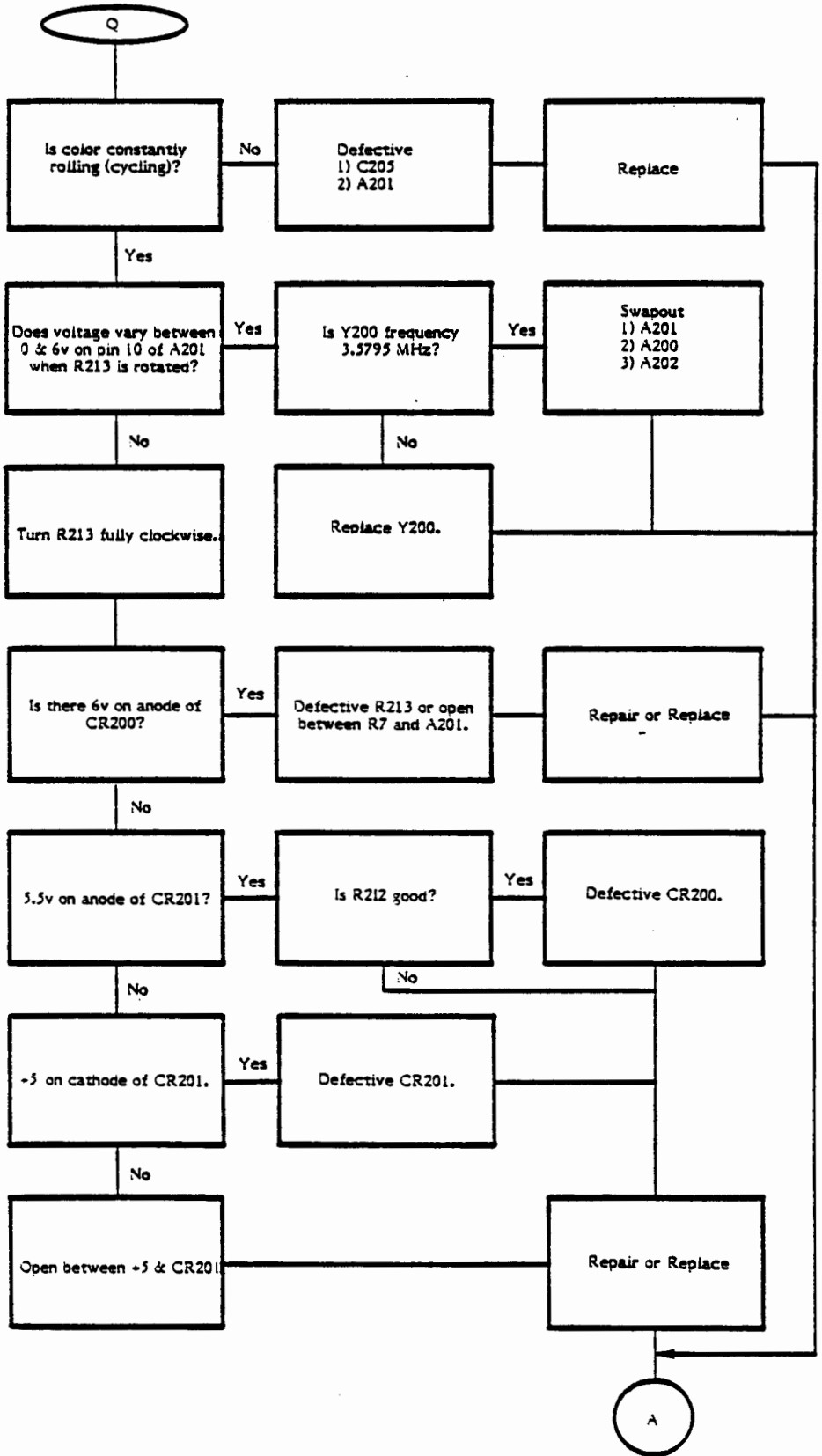
2600A Gray Bar Troubleshooting Procedure
(Revisions 1-13)

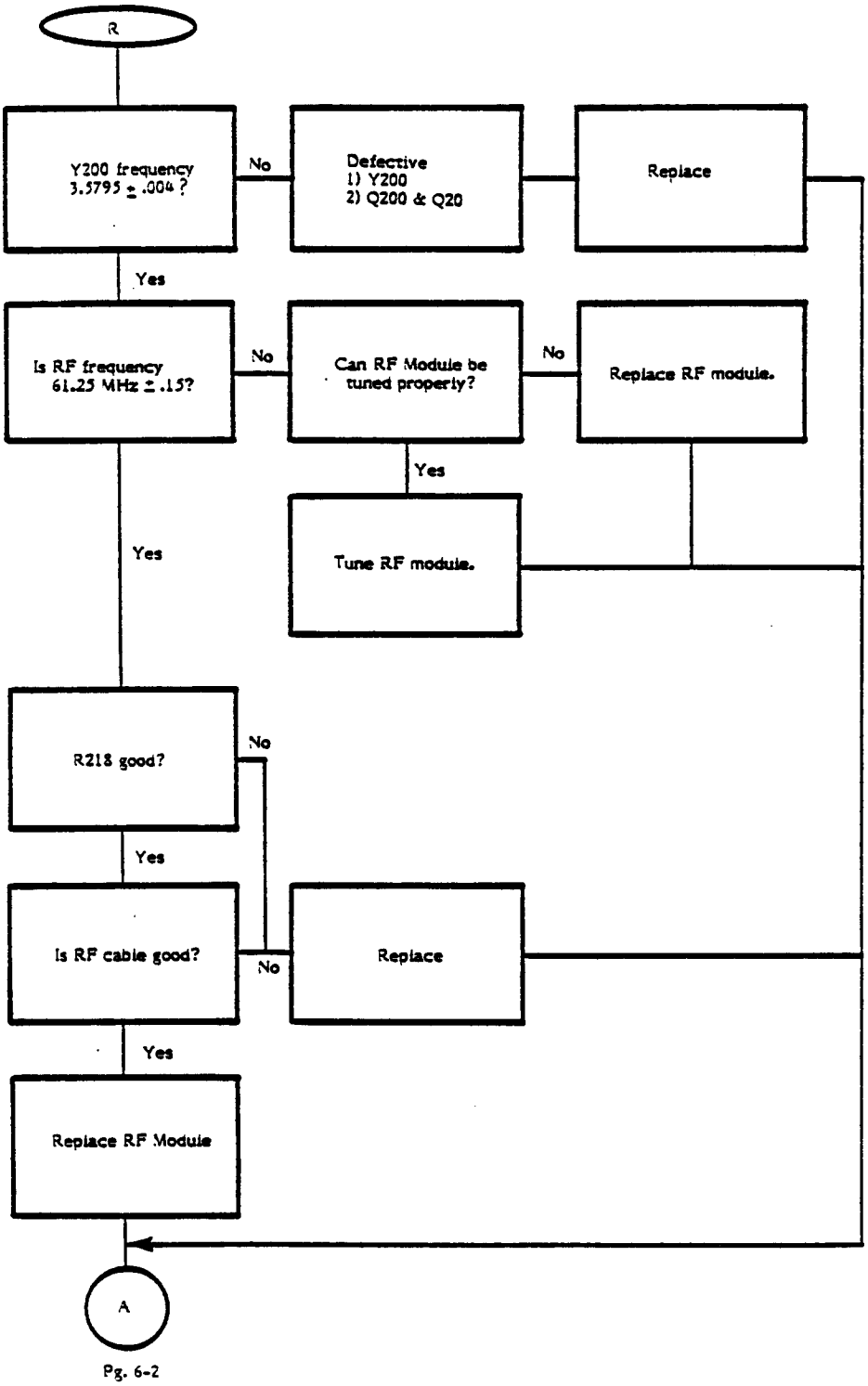



N
Is there 3-5v P-P signal on the A201 side of R214, R215, and R216?
Yes
Check R214, R15, and R216 with meter for correct value. Replace any defective components.
No
Is there 3-5v P-P signal on the A201 pin corresponding to the resistor that had no signal?
Yes
Open between A201 and that resistor or defective CR202 if LM1 is bad.
Repair
No
Check pullup resistors R218, R219, or R229 on that line to insure resistor is good and one side is connected to +5V.
Resistor Defective?
Yes
Replace
No
Swap
1) A201
2) A200
3) A202
No
D
Pg. 4-45
Yes
A
Pg. 6-2

2600A Color Troubleshooting

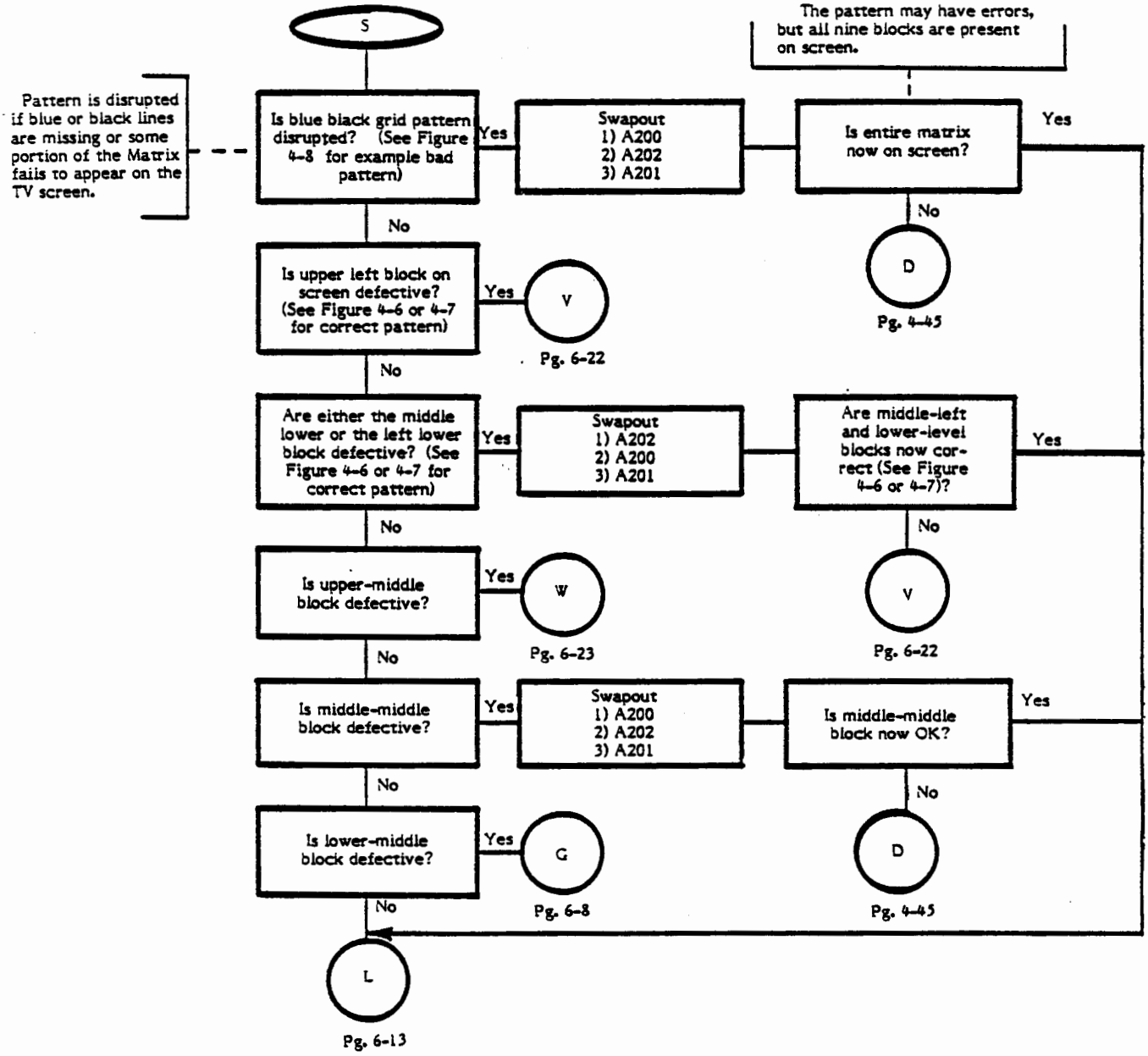


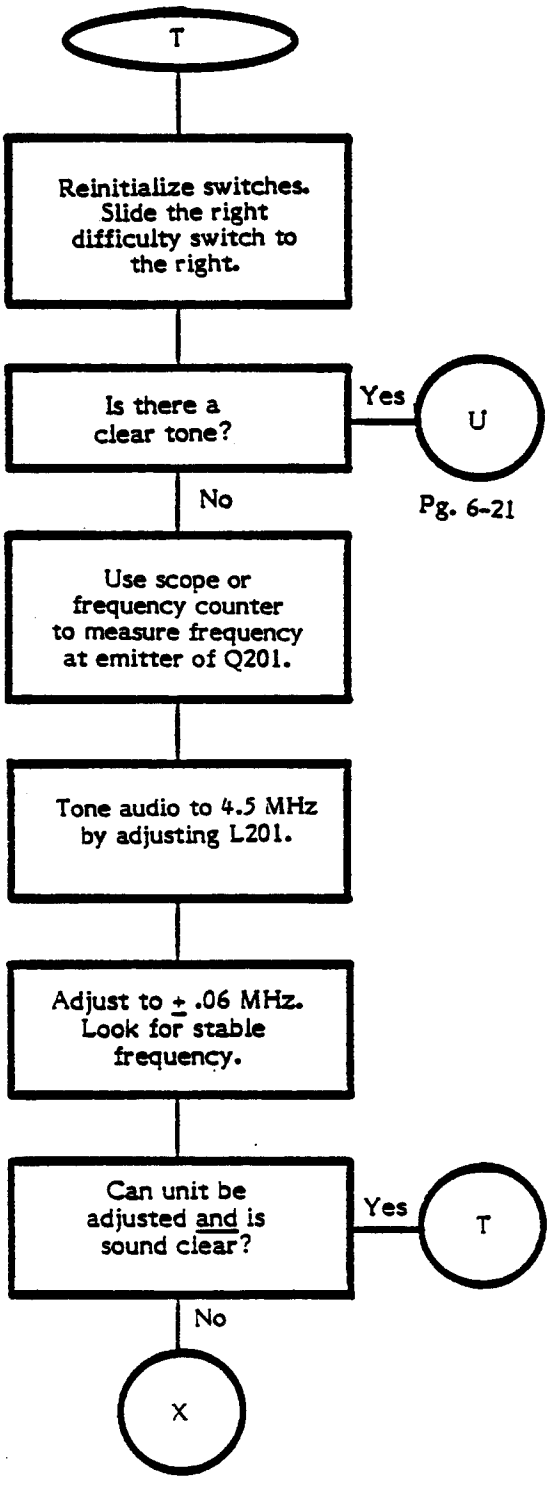

Q
Is color constantly rolling (cycling)?
No
Defective
1) C205
2) A201
Replace
Yes
Does voltage vary between 0 & 6v on pin 10 of A201 when R213 is rotated?
Yes
Is Y200 frequency 3.5795 MHz?
Yes
Swapout
1) A201
2) A200
3) A202
No
No
Turn R213 fully clockwise.
Replace Y200.
Is there 6v on anode of CR200?
Yes
Defective R213 or open between R7 and A201.
Repair or Replace
No
5.5v on anode of CR201?
Yes
Is R212 good?
Yes
Defective CR200.
No
No
+5 on cathode of CR201.
Yes
Defective CR201.
No
Open between +5 & CR201
Repair or Replace
A

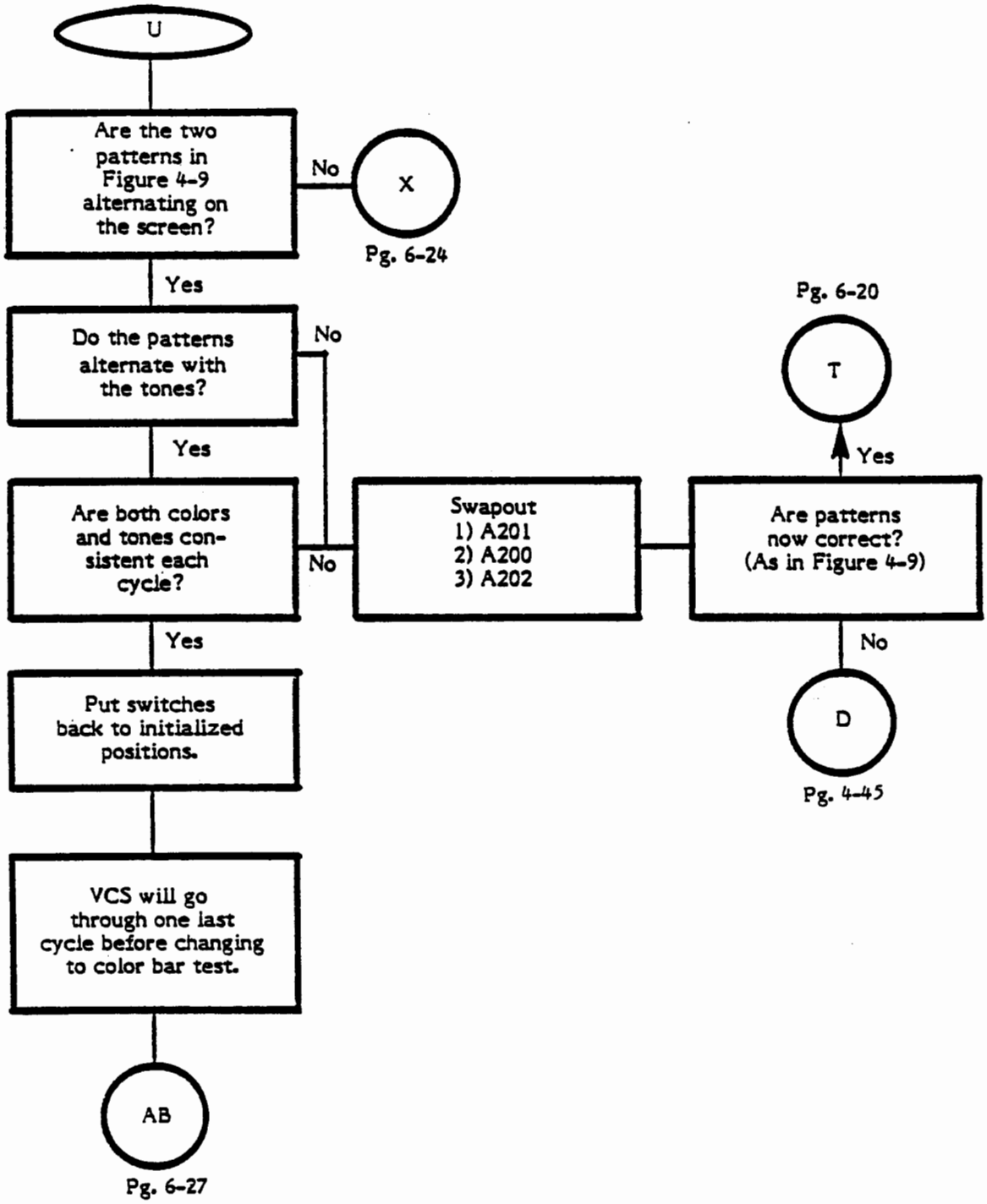

R
Y200 frequency 3.5795 ± .004 ?
No
Defective
1) Y200
2) Q200 & Q20
Replace
Yes
Is RF frequency 61.25 MHz ± .15?
No
Can RF Module be tuned properly?
No
Replace RF module.
Yes
Tune RF module.
Yes
R218 good?
No
Yes
Is RF cable good?
No
Replace
Yes
Replace RF Module
A

Pg. 6-2

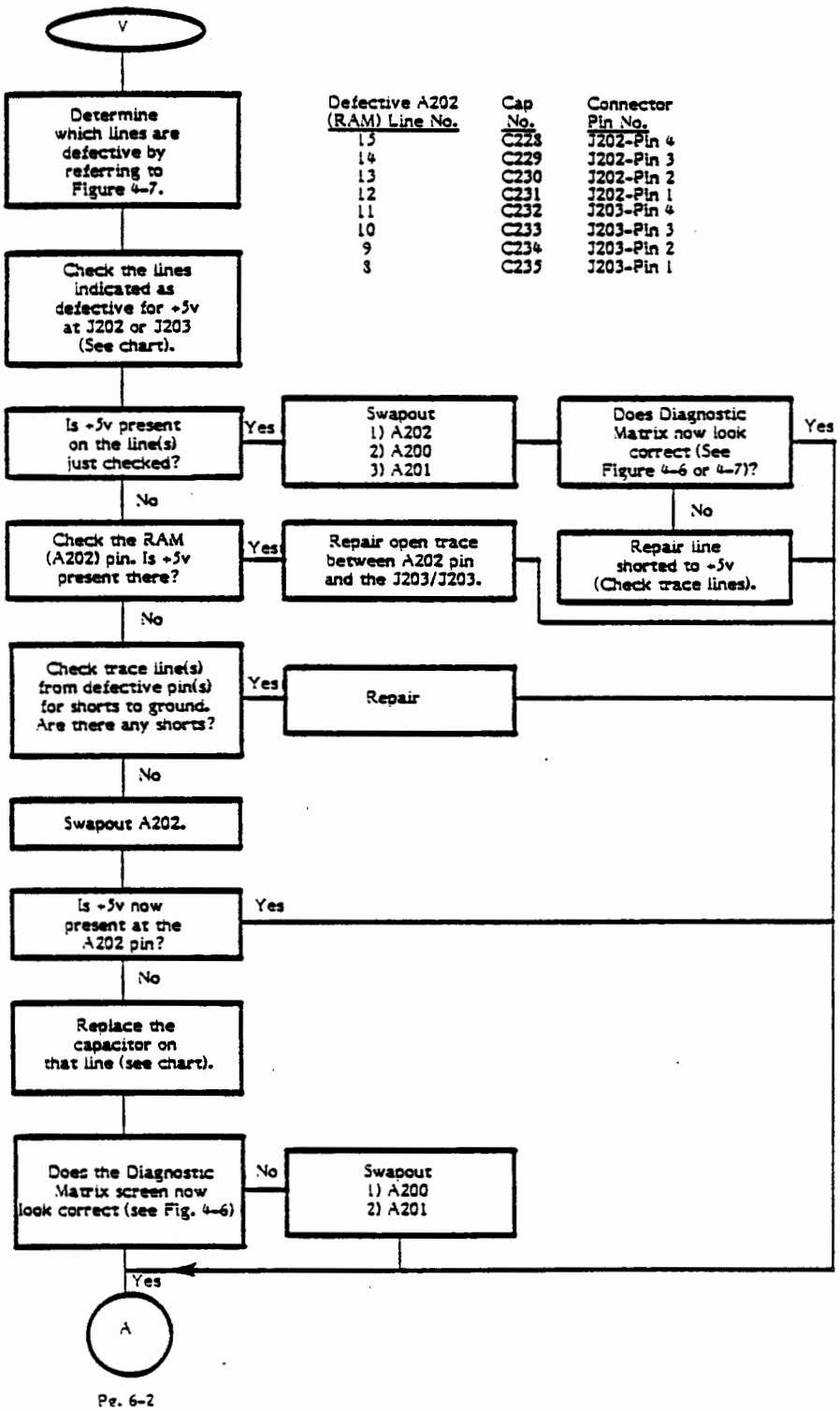
2600A Defective Matrix Troubleshooting Procedure




T
Reinitialize switches. Slide the right difficulty switch to the right.
Is there a clear tone?
Yes
U
Pg. 6-21
No
Use scope or frequency counter to measure frequency at emitter of Q201.
Tone audio to 4.5 MHz by adjusting L201.
Adjust to ± .06 MHz. Look for stable frequency.
Can unit be adjusted and is sound clear?
Yes
T
No
X
Pg. 6-24


U
Are the two patterns in Figure 4-9 alternating on the screen?
No
X
Pg. 6-24
Yes
Do the patterns alternate with the tones?
No
Yes
Are both colors and tones consistent each cycle?
No
Swapout
1) A201
2) A200
3) A202
Are patterns now correct? (As in Figure 4-9)
Pg. 6-20
T
Yes
No
D
Pg. 4-45
Yes
Put switches back to initialized positions.
VCS will go through one last cycle before changing to color bar test.
AB
Pg. 6-27

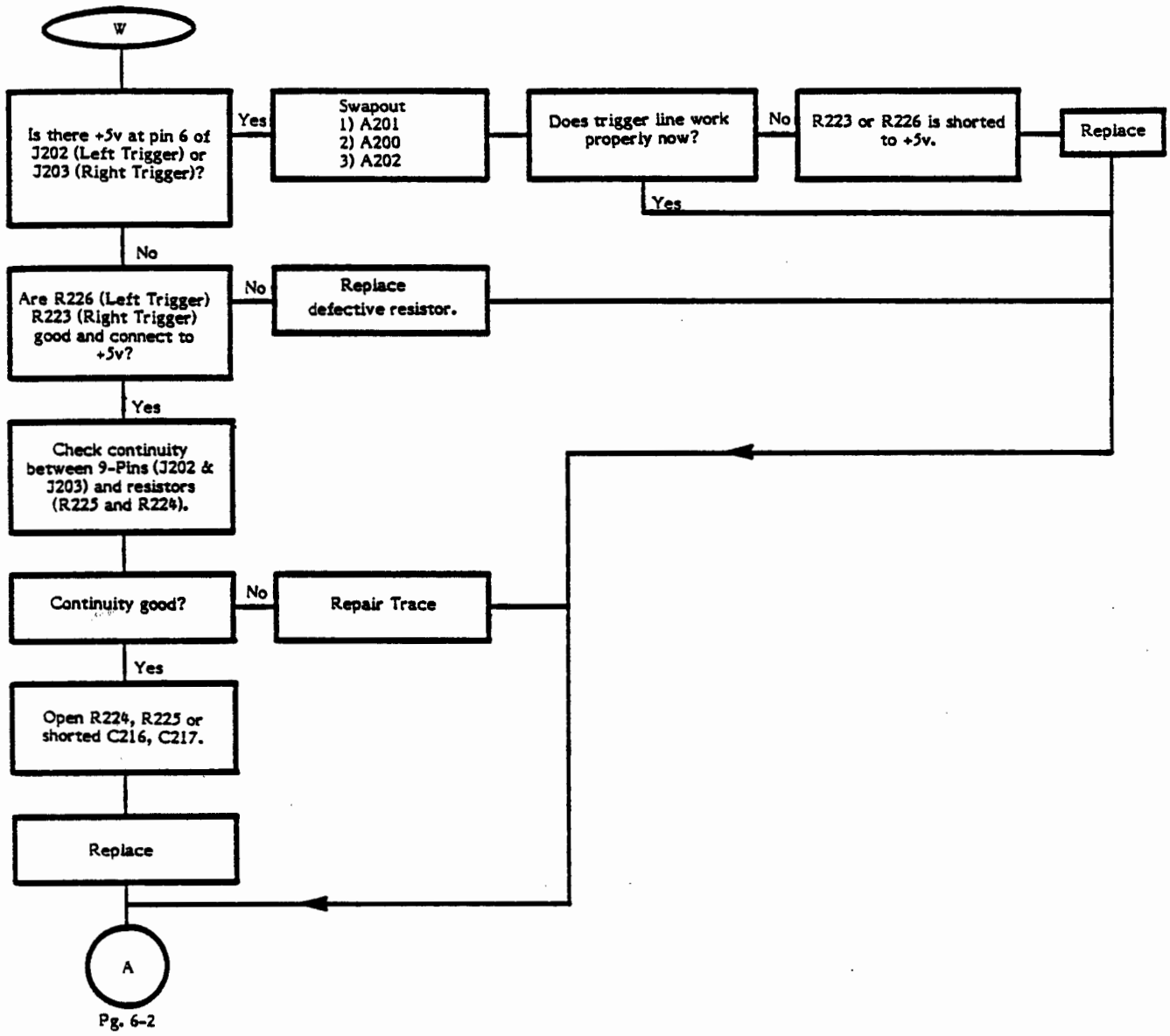
2600A Defective I/O Lines Troubleshooting Procedure



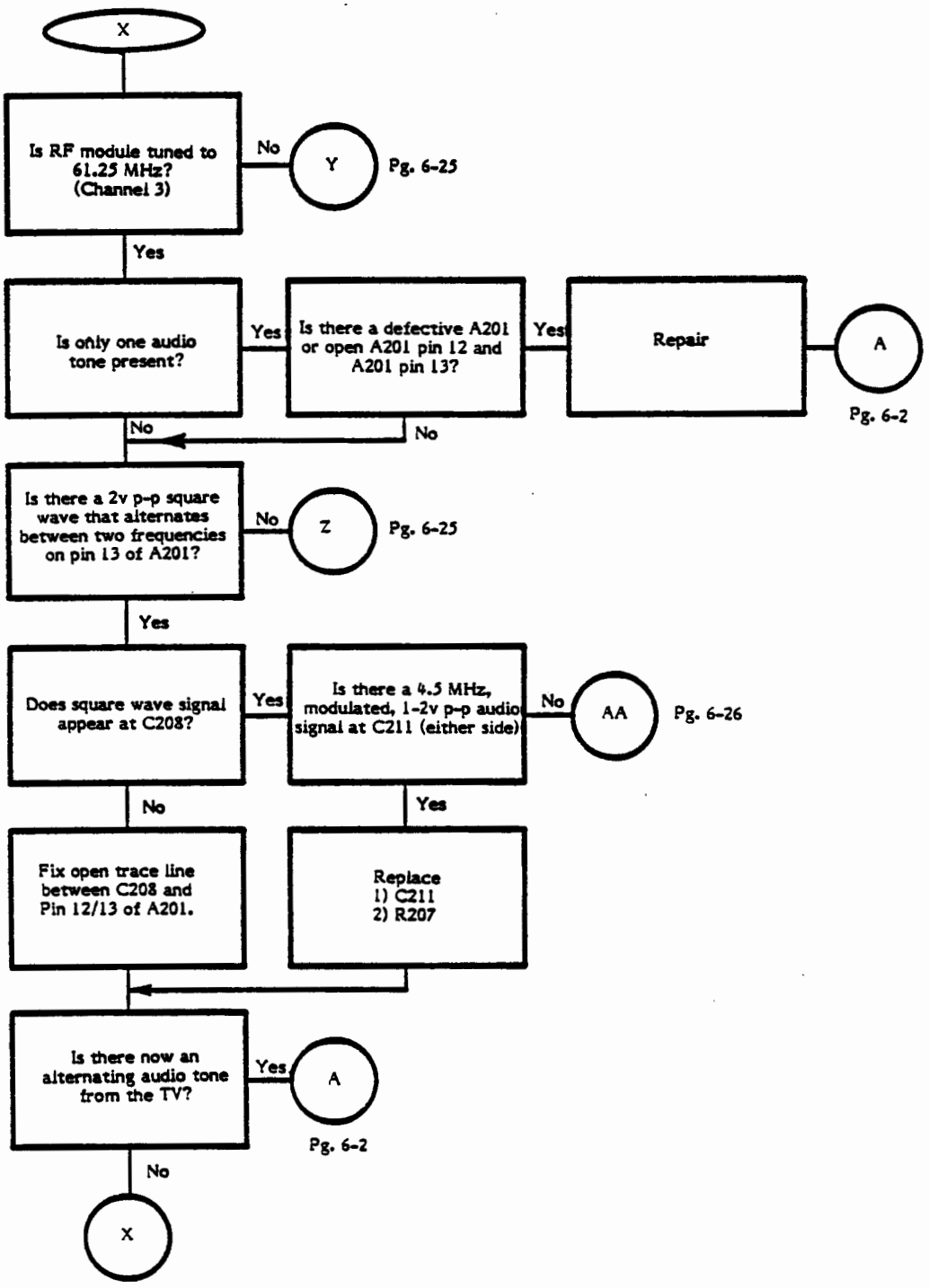
Defective A202 (RAM) Line No.	Cap No.	Connector Pin No.
15	C228	J202-Pin 4
14	C229	J202-Pin 3
13	C230	J202-Pin 2
12	C231	J202-Pin 1
11	C232	J203-Pin 4
10	C233	J203-Pin 3
9	C234	J203-Pin 2
8	C235	J203-Pin 1

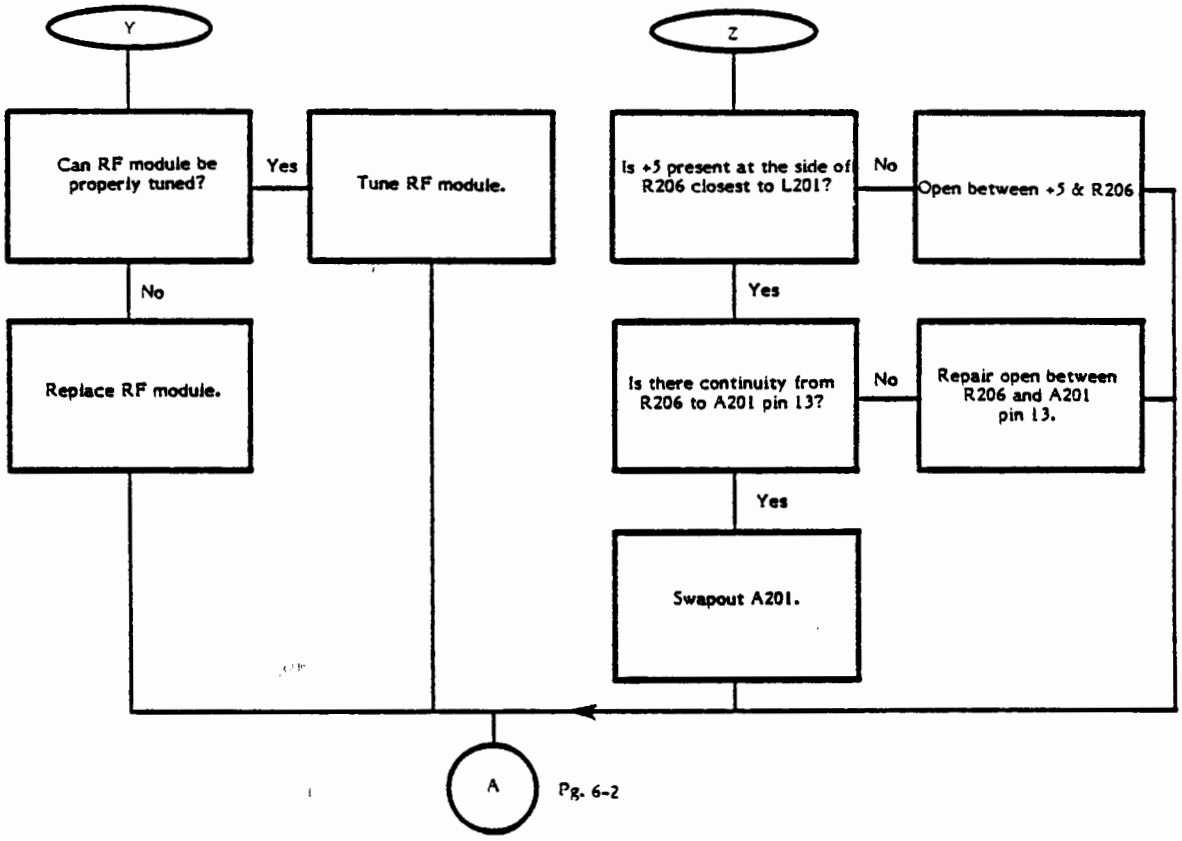
Pg. 6-2

2600A Trigger Line Troubleshooting Procedure

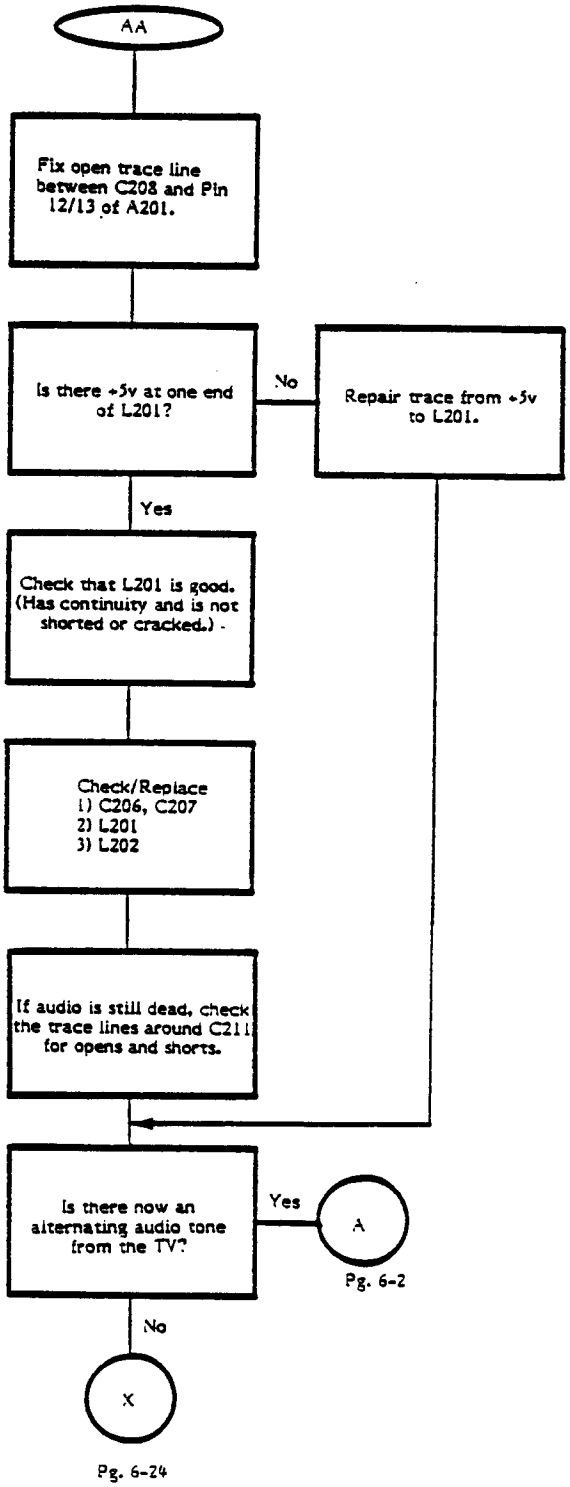


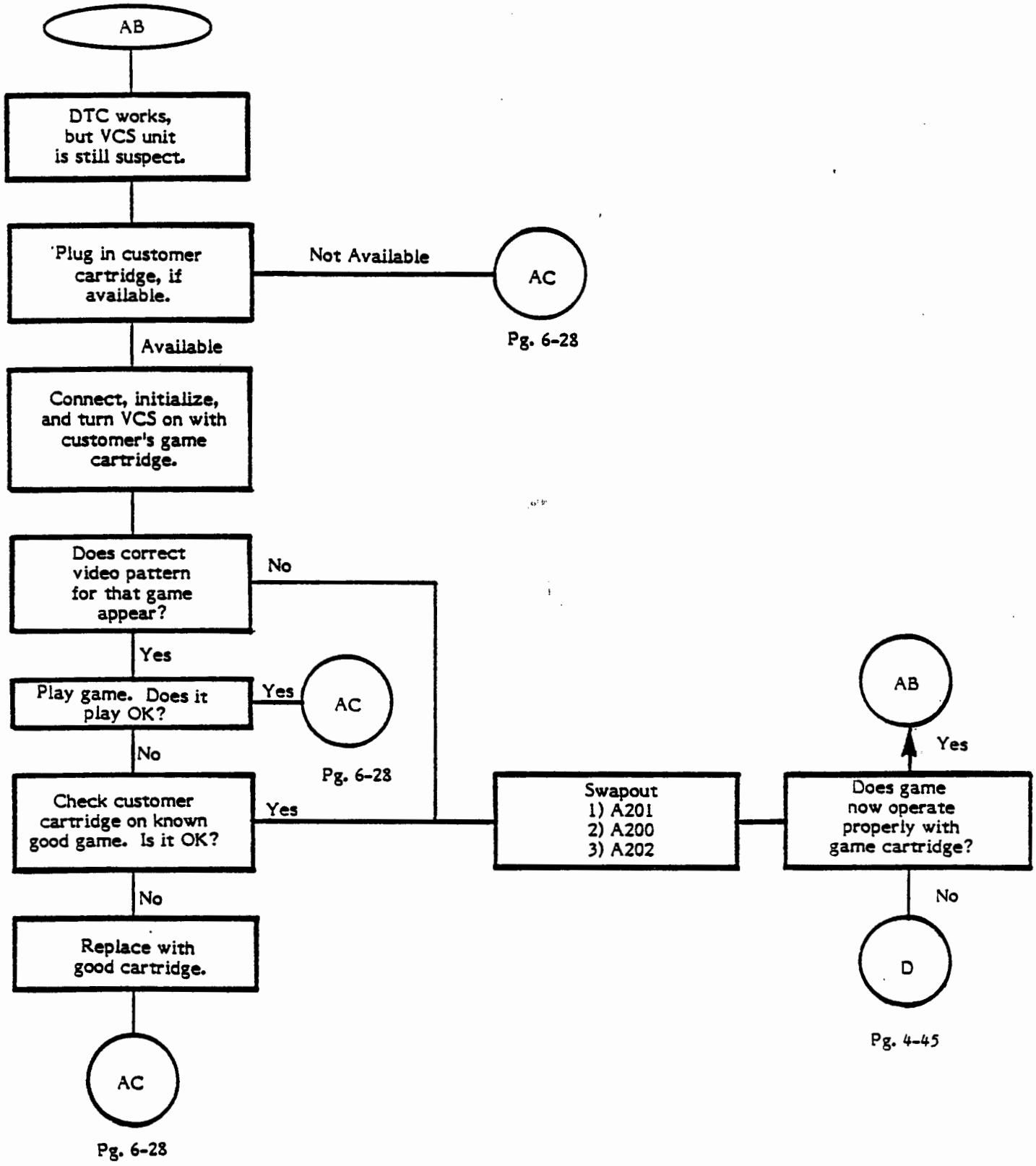
2600A Audio Troubleshooting



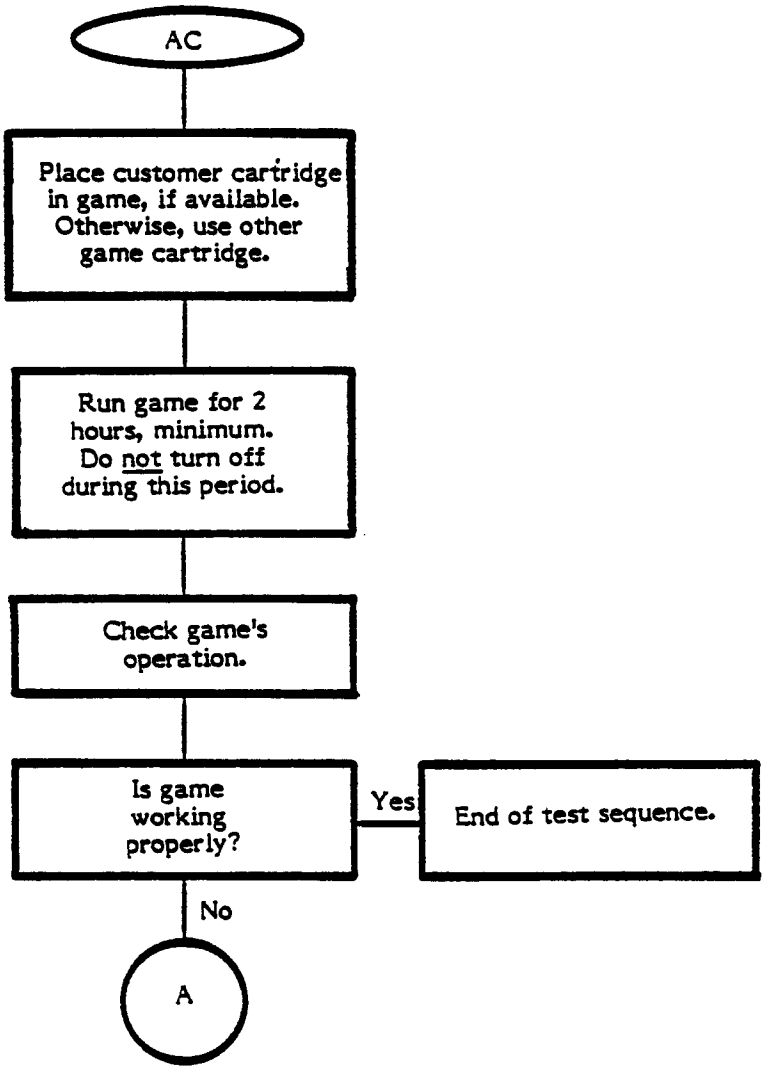

Y
Can RF module be properly tuned?
Yes
Tune RF module.
No
Replace RF module.
Z
Is +5 present at the side of R206 closest to L201?
No
Open between +5 & R206
Yes
Is there continuity from R206 to A201 pin 13?
No
Repair open between R206 and A201 pin 13.
Yes
Swapout A201.
A
Pg. 6-2

2600A Audio Troubleshooting (Continued)



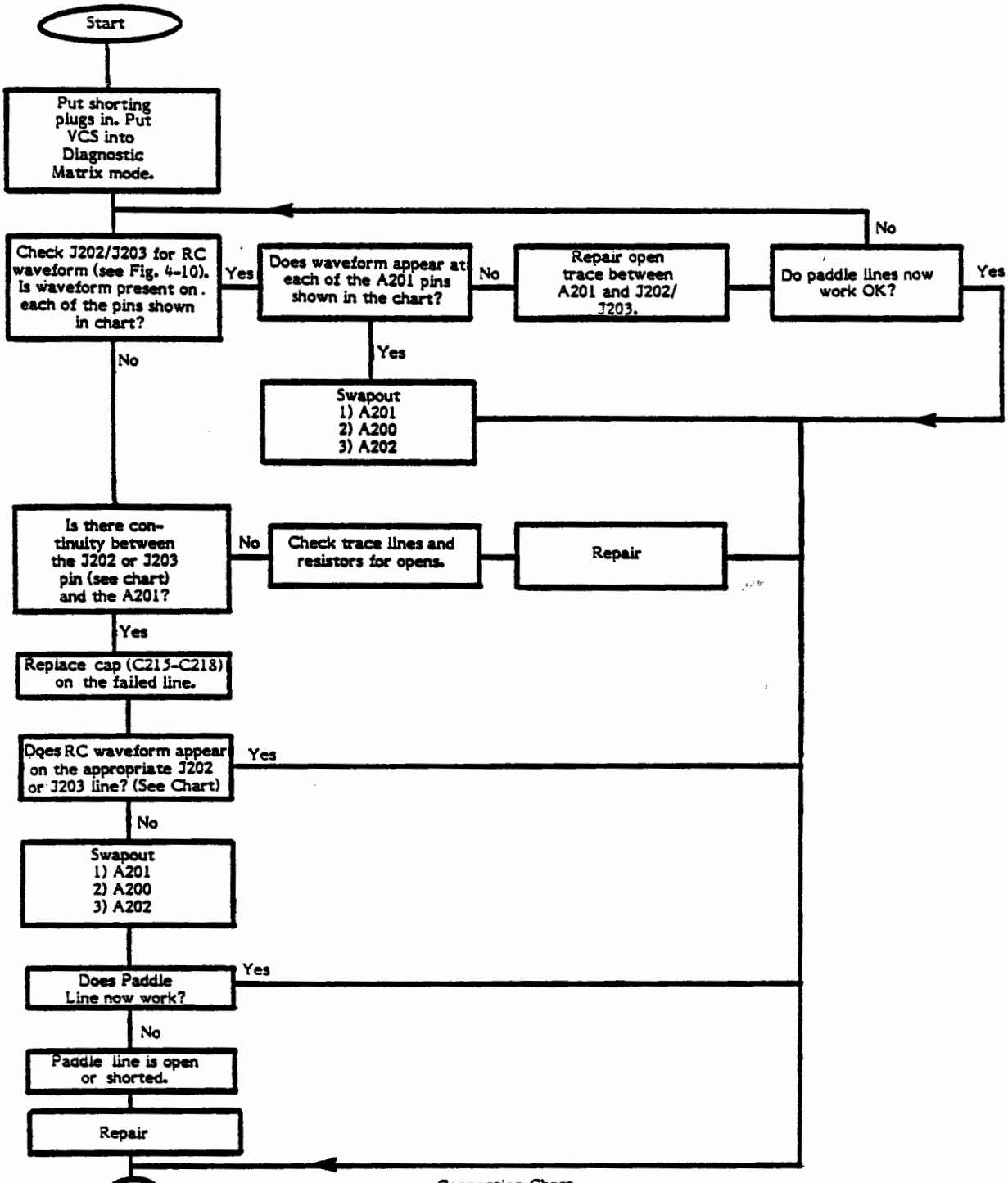

AB
DTC works, but VCS unit is still suspect.
Plug in customer cartridge, if available.
Not Available
AC
Pg. 6-28
Available
Connect, initialize, and turn VCS on with customer's game cartridge.
Does correct video pattern for that game appear?
No
Yes
Play game. Does it play OK?
Yes
AC
Pg. 6-28
No
Check customer cartridge on known good game. Is it OK?
Yes
Swapout
1) A201
2) A200
3) A202
Does game now operate properly with game cartridge?
AB
Yes
No
D
Pg. 4-45
No
Replace with good cartridge.
AC
Pg. 6-28

2600A Burn-In Procedure



Pg. 6-2

2600A Paddle Lines Test



Connection Chart

Player	Pin A201	Pin J202	Pin 203	Cap No.
1	40	5	—	C215
2	39	9	—	C216
3	38	—	5	C217
4	37	—	9	C218

SECTION 7

GAME CONTROLLERS

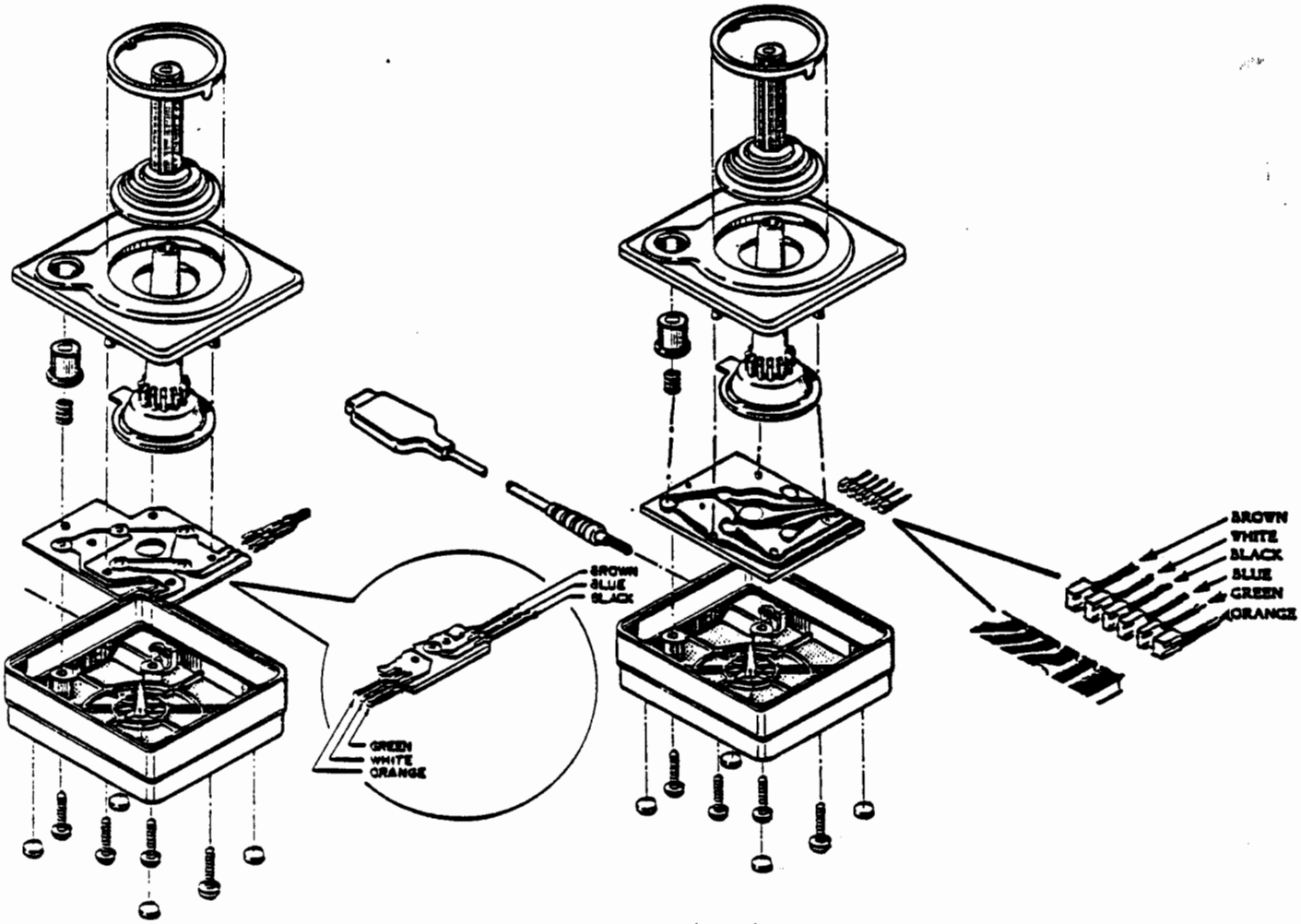
OVERVIEW

The following pages contain descriptions, schematics, and test procedures for the four game controllers used with the Video Computer System.

JOYSTICK (X-Y) CONTROLLER

Inside each joystick is a small PC board that has five calculator-type keypads mounted on it. Two versions of the PC board exist in current joystick models; see Figure 7-1. Four of the keypads are positioned beneath the stick in a square shaped pattern, and the fifth is located beneath the pushbutton. When the stick is pushed forward, the bottom surface of the stick presses against the forward keypad, causing it to make contact, and complete the circuit that is connected to it. In the same way, pushing the stick back, left and right causes the respective keypad underneath that position to close and complete the circuit.

NOTE: The earliest models of the joystick had five spring-loaded buttons instead of the present configurations. These earlier models cannot be repaired.



Earlier Version

Figure 7-1. Joystick (X-Y) Controllers

If the stick is pushed forward and to the right at the same time (that is, in a northeastern direction), both the forward and right keypad close simultaneously, which causes the 6532 to see two switch closures happening at once. The result is that the object being controlled on the screen moves diagonally. With the four keypads, 8 different directions can be attained. The pushbutton determines whether the keypad beneath it is either open or closed. See Figure 7-2 for Joystick Schematics.

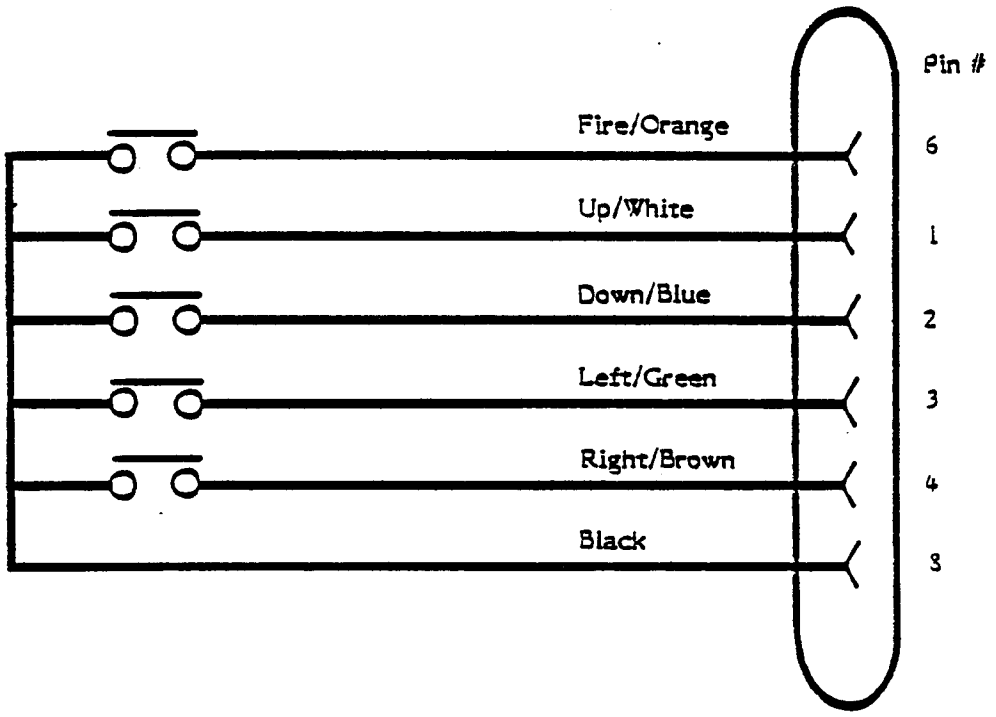


Figure 7-2. Joystick Schematic

JOYSTICK (X-Y CONTROLLER) CHECK

Equipment Needed

- T.V. set
- Known good VCS unit
- Combat cartridge

Procedure

1. Check for cosmetic damage.
2. Plug in cartridge and plug controller to be tested into the left player port.
3. Turn on unit and press GAME SELECT until game #18 appears.
4. Press GAME RESET.
5. Push the joystick handle away from you and the plane should go down.
6. Pull the joystick handle toward you and the plane should go up.
7. Move the joystick right and plane should speed up. Move it left and plane should slow down.
8. Push the Red button and the plane should fire.
9. This completes the (X-Y controller) check.

PADDLE CONTROLLER

Each game paddle consists of a 1 Megohm potentiometer that, when varied, causes different values to be seen and acted upon by the TIA. Also contained in the paddle is a simple spring loaded push-to-make pushbutton switch. There are two game paddles connected to each I/O plug. Figure 7-3 illustrates the paddle controller assembly and Figure 7-4 the paddle controller schematic.

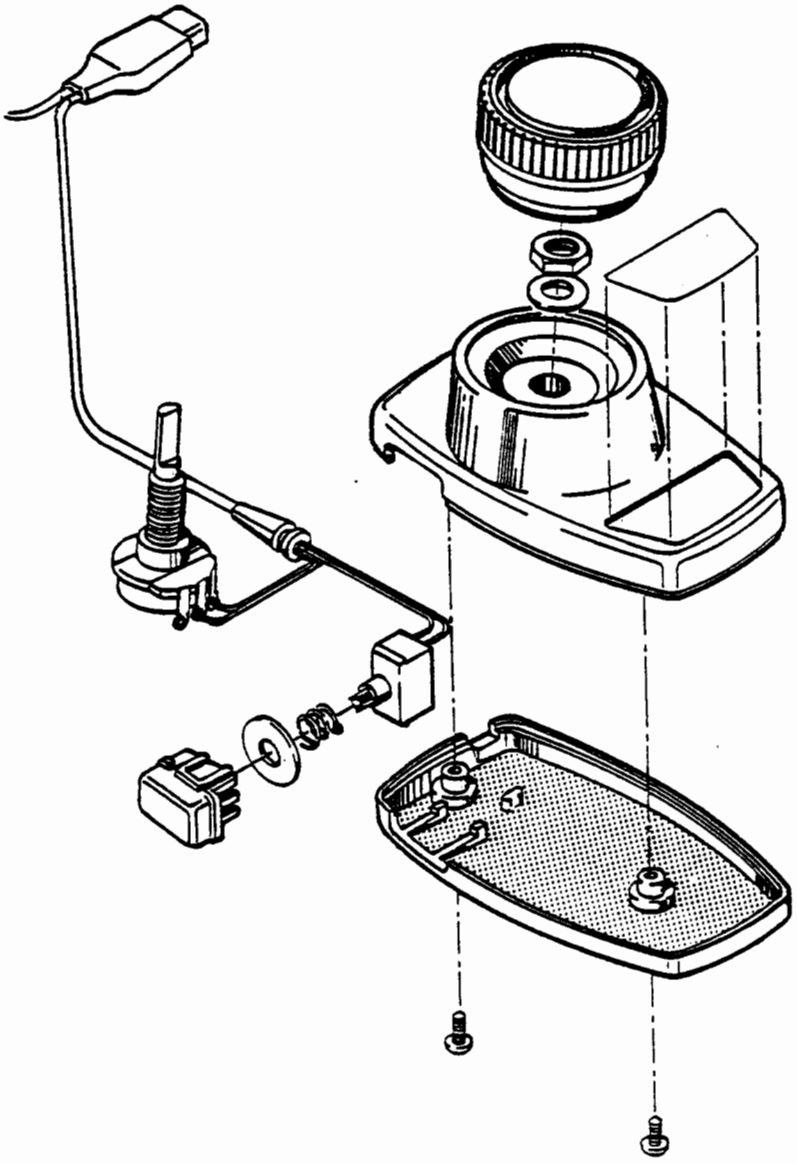


Figure 7-3. Paddle Controller

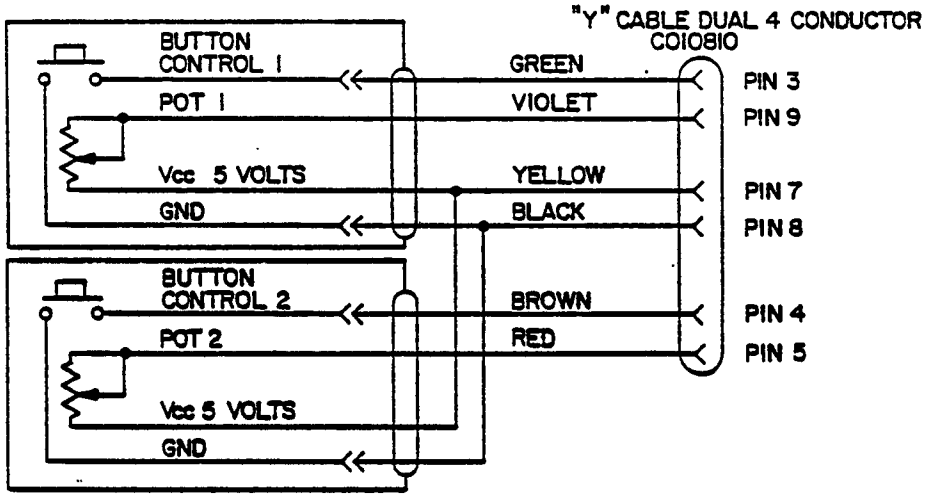


Figure 7-4. Paddle Controller Schematic

PADDLE CONTROLLER CHECK

Equipment Needed

- T.V. Set
- Known good VCS unit
- Casino™ cartridge

Procedure

1. Check for cosmetic damage.
2. Plug in cartridge and plug controllers to be tested into the left player port.
3. Press game reset.
4. Press the button on one of the controllers. A pair of numbers should appear.
5. When you turn the knob, one set of numbers should go between 20 and 200 by steps of 20. The numbers should not advance greater than a step of 20.
6. Repeat steps 3, 4, & 5 for the other controller.

DRIVING CONTROLLER

The heart of the driving controller is a switching device that generates a full two-bit gray code for each quarter turn of the controller knob. The output of both the gray code generator and the pushbutton switch is detected by the 6532, causing the program to respond accordingly. Unlike the non-linear resistive game paddles, the driving controller gives the user precise linear positional control over the complete turning range of the knob. As with the game paddles, there is a simple push-to-make pushbutton switch located on the side of the controller. The driving controller assembly is illustrated in Figure 7-5; the schematic in Figure 7-6.

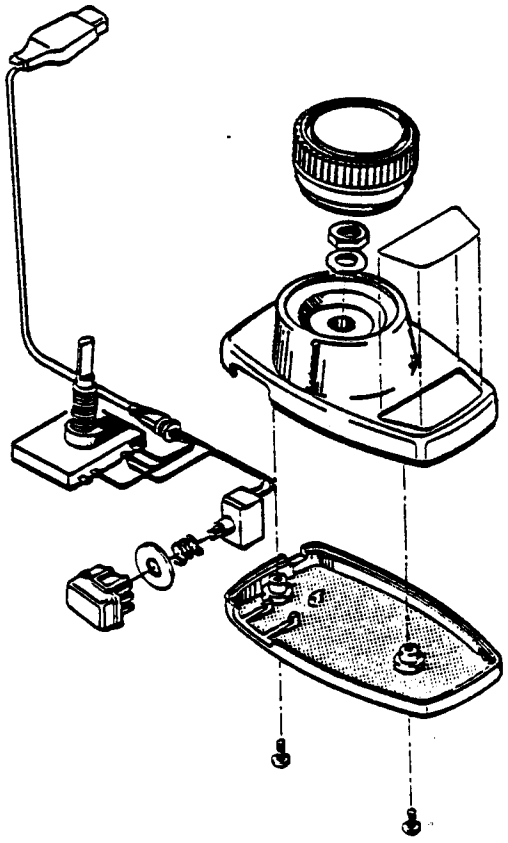


Figure 7-5. Driving Controller

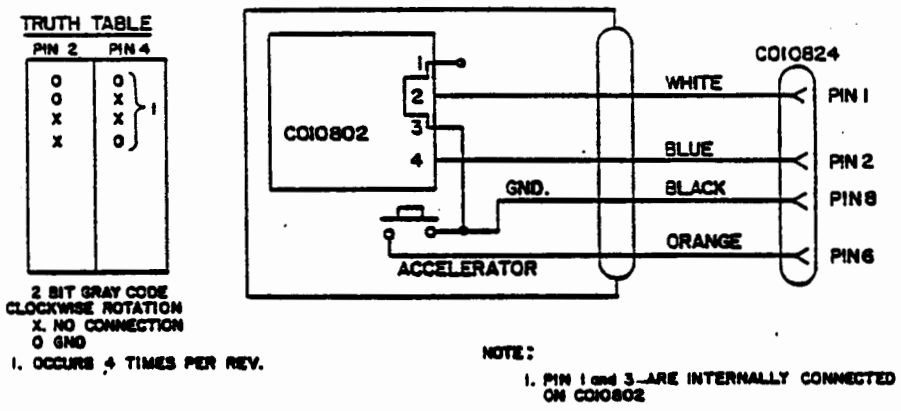


Figure 7-6. Driving Controller Schematic

DRIVING CONTROLLER CHECK

Equipment Needed

- T.V. set
- Known good VCS unit
- Indy 500 cartridge

Procedure

1. Plug in Indy 500 cartridge and plug in driving controller to be tested in left hand port.
2. Press game reset switch.
3. Turn controller knob and insure that car turns in the same direction as the knob. Insure that car doesn't skip position or wobble between positions. There should be 16 different positions for the car.
4. Press down on the knob and lightly wiggle it back and forth. The car should not move at all.
5. Press down on the red button. The car should move forward.
6. If the controller fails any of the above tests it is defective.

KEYBOARD CONTROLLER

The keyboard controller (Figure 7-7) is a 12 button calculator-type switch array that functions like a small computer keyboard. When one of the pushbuttons is pressed, the corresponding set of sense lines is closed, completing the circuit. The closure is detected by the 6532 and appropriate action is taken by the program. Figure 7-8 illustrates the keyboard wiring and Figure 7-9 the keyboard schematic.

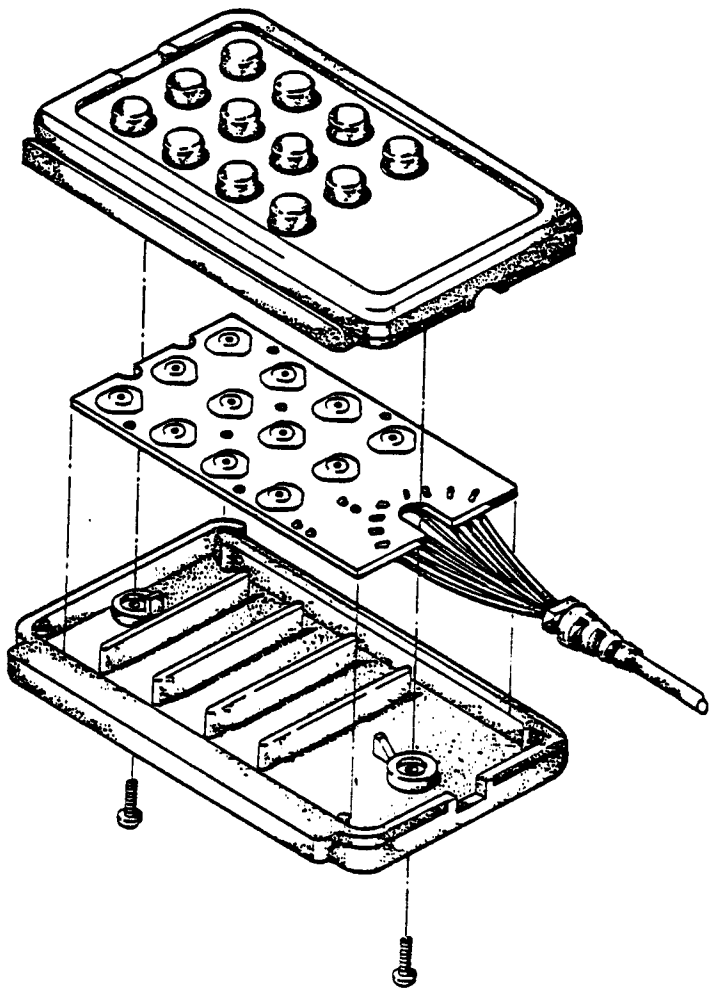


Figure 7-7. Keyboard Controller

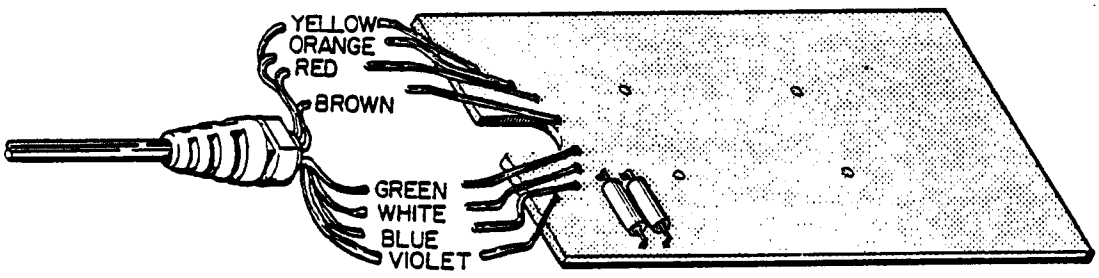


Figure 7-8. Keyboard Wiring Diagram

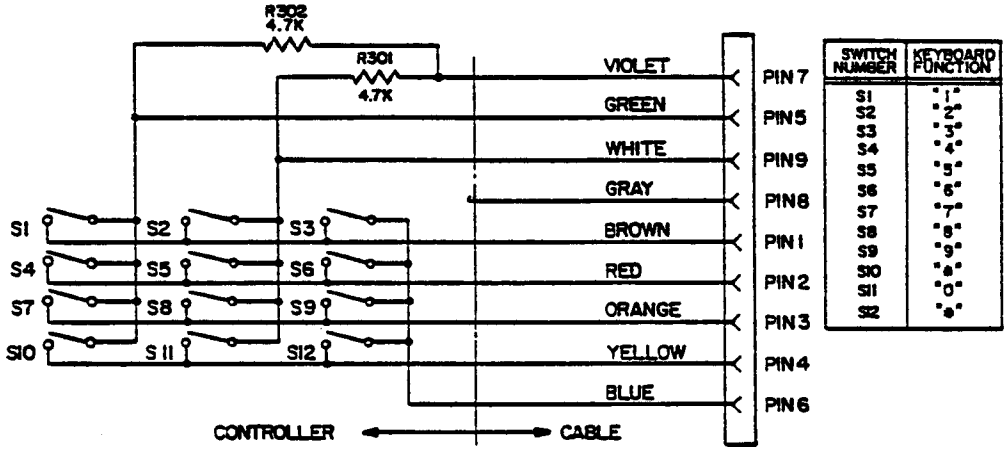


Figure 7-9. Keyboard Schematic

KEYBOARD CONTROLLER CHECK

Equipment Needed

- T.V. set
- Known good VCS unit
- Brain Games cartridge
- One good keyboard controller

Procedure

1. Check for cosmetic damage.
2. Plug in Brain Games cartridge and plug the known good keyboard into the right-hand plug.
3. Plug the controller to be tested into the left-hand plug.
4. Press game select until game #19 appears and press game reset.
5. If an audio tone sounds, the controller is defective.
6. Starting with the "1" key, press the keys in the following order: 1, 2, 3, 4, 5, 6, 7, 8, 9, *, 0, #. Each key should generate a tone lower than the key before it.
7. Test completed.

SECTION 8

CX2600 DOMESTIC (M/N) VCS

PARTS LIST

Assy	Part No.	Description	Locator
Bezel	CA010873	Bezel Assy	
Console	88-1004	Rubber Feet	
Console	C010307-01	Console Top	
Console	C011925	Console Base	
Console	CA010869	Console Base Assy	
Final	C016353	AC Power Adaptor	Not Packaged
Final	CA010112	TV Switch Box	Not Packaged
Final	CA010800	CX2600 VCS	Not packaged
Final	CA012758-01	Keyboard Controller	Packaged
Final	CA012759-03	Driving Controller	Packaged
Final	CA012760-06	Paddle Controller	Packaged
Final	CA012994-03	X-Y Controller	Packaged
Final	CA014034	AC Power Adaptor	Packaged (Alternate listed)
Final	CA018200-01	AC Power Adaptor	Packaged (Alternate for P/N CA014034)
Final	CA018201-01	TV Switch Box	Packaged (CX262 Pack)
Mother	14-5101	Resistor 1/4W 100 Ohm	R202,205
Mother	14-5102	Resistor 1/4W 1K	R208,212,214
Mother	14-5103	Resistor 1/4W 10K	R225,226,234
Mother	14-5123	Resistor 1/4W 12K	R222
Mother	14-5182	Resistor 1/4W 1800 Ohm	R203,216,227-321
Mother	14-5183	Resistor 1/4W 18K	R209,233
Mother	14-5221	Resistor 1/4W 220 Ohm	R204
Mother	14-5243	Resistor 1/4W 24K	R206,217,223
Mother	14-5270	Resistor 1/4W 27 Ohm	R200
Mother	14-5332	Resistor 1/4W 3300 Ohm	R218-221
Mother	14-5471	Resistor 1/4W 470 Ohm	R201
Mother	14-5472	Resistor 1/4W 4700 Ohm	R207,232
Mother	14-5473	Resistor 1/4W 47K	R224
Mother	14-5681	Resistor 1/4W 680 Ohm	R213
Mother	14-5682	Resistor 1/4W 6800 Ohm	R215
Mother	14-5912	Resistor 1/4W 9100 Ohm	R210
Mother	19-411504	Resistor Variable 500K	R211
Mother	21-101104M	Cap. Mylar Dipped .luF (100V)	C204
Mother	2A-008	Cap. Ceramic Disc 47pF (50V)	C211,212
Mother	2A-018	Cap. Ceramic Disc 22pF (50V)	C213
Mother	2B-004	Cap. Ceramic Disc 220pF (50V)	C236,237 (Alternate for P/N C014180-05)
Mother	2B-007	Cap. Ceramic Disc. 01uF (50V)	C200,202,205,208, 214,223-227,239,240

CX2600 DOMESTIC (M/N) VCS

PARTS LIST (Continued)

Assy	Part No.	Description	Locator
Mother	2B-008	Cap. Ceramic Disc .001uF (50V)	C203,209,222,228-235,238
Mother	2B-009	Cap. Ceramic Disc 150pF (50V)	C221
Mother	2C-001	Cap. Ceramic Disc. 1uF (50V)	C210,219,220
Mother	31-1N914	Diode 1N914	CR200,201
Mother	33-2N3906	Transistor 2N3906	Q200,201
Mother	34-2N3563	Transistor 2N3563	Q202 (Alternate Listed)
Mother	34-MPS3563	Transistor MPS3563	Q202 (Alternate for P/N 34-2N3563)
Mother	79-5918	Jack	J204
Mother	CA010434	CX2600 PC Board	
Mother	CA010808	Cartridge Socket Assy	J200
Mother	CA018263	Zener Diode/Axial Wrap Assy	
Mother	C010177	Crystal 3.579575 Mhz	X200 (Alternate Listed)
Mother	C010314	Socket Cartridge	
Mother	C010336	Cap. Electrolytic 4.7uF (35V)	C201
Mother	C010444	IC TIA	A201
Mother	C010448	Socket Controller (9 Pin)	J202,203 (Alternate Listed)
Mother	C010727	Socket Controller (9 Pin)	J202,203 (Alternate for P/N C010448)
Mother	C010745	IC CPU (6507)	A200
Mother	C010750	IC RAM (6532)	A202
Mother	C010776	Dust Cover Socket	
Mother	C010806	Connector (12/24)	J200
Mother	C010812	Pad Cartridge Socket	
Mother	C010816	IC Hex Buffer (4050B)	A203
Mother	C010821	Cap. Polystyrene 820pF (50V)	C206,207
Mother	C010822	Inductor 2uF	L202
Mother	C010823	Inductor 12 1/2 Turn	L201
Mother	C010887	Socket Assy (AID)	
Mother	C012776	Cable Ribbon (12 conductor)	
Mother	C014180-05	Cap. Axial 200pF (50V)	C236,237 (Alternate listed)
Mother	C014353	Cap. Epoxy Dipped .068uF (100V)	C215-218
Mother	C014384	Ferrite Bead	L200,203
Mother	C014386-08	Socket IC (28 Pin)	A200
Mother	C014386-09	Socket IC (40 Pin)	A201,202
Mother	C015510	Crystal 3.579575 Mhz	X200 (Alternate for P/N C010177)
Mother	C016035	Rivet	
Mother	C017654	Diode Zener 1N4736 (6.2V)	CR202,203
Mother	C018991	Transistor 2N3906	Q200,201
Mother	CA010434	CX2600 PC Board (MOTHER)	

PARTS LIST (Continued)

Assy	Part No.	Description	Locator
Mother	CA010798	Electronic Module Assy	
Mother	CA010808	Cartridge Socket Assy	J200
Mother	CA018263	Zener Diode/Axial Wrap Assy	CR202, 203
Paddle	81-4004	Speed Clip Fastener	
Paddle	C010416	Nut	
Paddle	C010417	Lockwasher	
Paddle	C010457	Knob	
Paddle	C010464	Resistor Variable 1 Meg	
Paddle	C010737	Top Cover	
Paddle	C010738	Bottom Cover	
Paddle	C010739	Fire Button	
Paddle	C010810	Cable Y Control	
Paddle	C010970	Sleeve	
Paddle	C012766	Paddle Label	
Paddle	CA010837	Control Knob Assy	
Paddle	CA010933	Control Cable Assy	
Paddle	CA010953-03	Paddle Control Assy	
Paddle	CA011620-01	Switch	
Switch	13-5680	Resistor 2W 680 Ohm	R101 (Ch 3 version)
Switch	21-101224M	Cap. Poly Film .22uF (100V)	C103,104
Switch	2B-007	Cap. Ceramic Disc .01uF (50V)	C101,102
Switch	78-06019	Heat Sink	(Ch 3 version)
Switch	79-5903	Socket Phono	J102
Switch	C010301-05	Jumper (11AWG)	
Switch	C010373	Switch Slide	S101-104 (Alternate listed)
Switch	C010388	Switch DPST - Spring Return	S105,106 (Alternate listed)
Switch	C010813	Switch Dust Cover	
Switch	C010820	Inductor 15uH	L101,102
Switch	C011695	Heat Sink	(Ch 2-3 version)
Switch	C012241	Switch SPDT	S107 (Alternate listed)
Switch	C012242	Switch SPDT	S107 (Alternate for P/N C012241) listed)
Switch	C014348	Regulator 78M05 (TO-220)	A101
Switch	C014372	Cap. Electrolytic 4.7uF (35V)	C105
Switch	C014373	Cap. Elect Axial 2200uF (16V)	C106
Switch	C014778-03	Socket (12 Pin in-line)	J101
Switch	C017294	3 Switch Static Strip	
Switch	C017297	2 Switch Static Strip	
Switch	C019025	Switch Slide	S101-104 (Alternate for P/N C010373)

CX2600 DOMESTIC (M/N) VCS

PARTS LIST (Continued)

Assy	Part No.	Description	Locator
Switch	C019026	Switch DPST	S105,106 (Alternate for P/N C010388)
Switch	CA012174	RF Module Assy	5 Pin (Ch 2-3 version)
Switch	CA012175	RF Module Assy	3 Pin (Ch 3 version)
Switch	CA012233	PC Board Assy (Switch)	
X-Y Cntl	C010726	Cable	
X-Y Cntl	C012107-02	Top Cover	
X-Y Cntl	C012108-02	Bottom Case	
X-Y Cntl	C012109	Boot	
X-Y Cntl	C012110	Retainer Ring	
X-Y Cntl	C012114	Fire Button	
X-Y Cntl	C012116	Handle	
X-Y Cntl	C012951	Spring	
■ X-Y Cntl	CA015396	PC Board (Two-Edged Connection)	
■ X-Y Cntl	CA016741	PC Board (Single-Edge Connection)	

CX2600A DOMESTIC (M/N) VCS

PARTS LIST

Assy	Part No.	Description	Locator
Bezel	C015572	Bezel	
Bezel	C015901	Bezel Label	
Bezel	CA015908-01	Bezel Assy	
Console	88-1004	Rubber Feet	
Console	C015570	Console Top	
Console	C016398	Console Base	(Alternate listed)
Console	C016398-01	Console Base	(Alternate for P/N C016398)
Console	CA015909-01	Console Base Assy	
Final	C016353	AC Power Adaptor	(Not Packaged)
Final	CA010112	TV Switch Box	(Not Packaged)
Final	CA012758-01	Keyboard Controller	(Packaged)
Final	CA012759-03	Driving Controller	(Packaged)
Final	CA012760-06	Paddle Controller	(Packaged)
Final	CA012994-03	X-Y Controller	(Packaged)
Final	CA014034	AC Power Adaptor	Packaged (Alternate listed)
Final	CA015799	CX2600A VCS	(Packaged)
Final	CA015907	CX2600A VCS	(Not packaged)
Final	CA018200-01	AC Power Adaptor	Packaged (Alternate for P/N CA014034)
Final	CA018201-01	TV Switch Box	Packaged (CX262 Pack)
Mother	14-5102	Resistor 1/4W 1K	R202,206,211,228
Mother	14-5103	Resistor 1/4W 10K	R223,226,229,230
Mother	14-5114	Resistor 1/4W 110K	R216
Mother	14-5153	Resistor 1/4W 15K	R222
Mother	14-5182	Resistor 1/4W 1.8K	R209
Mother	14-5183	Resistor 1/4W 18K	R207
Mother	14-5221	Resistor 14W 220 Ohm	R204,224,225,232
Mother	14-5222	Resistor 1/4W 2.2K	R203
Mother	14-5241	Resistor 1/4W 240 Ohm	R205
Mother	14-5243	Resistor 1/4W 24K	R217,227
Mother	14-5273	Resistor 1/4W 27K	R214
Mother	14-5332	Resistor 1/4W 3300 Ohm	R218,220
Mother	14-5472	Resistor 1/4W 4.7K	R201,212,219,221
Mother	14-5473	Resistor 1/4W 47 Ohm	R215
Mother	14-5474	Resistor 1/4W 470K	R233
Mother	14-5682	Resistor 1/4W 6800 Ohm	R210
Mother	14-5821	Resistor 1/4W 820 Ohm	R234
Mother	14-5910	Resistor 1/4W 91 Ohm	R231
Mother	14-5912	Resistor 1/4W 9100 Ohm	R208
Mother	19-411504	Resistor Variable 500K	R213
Mother	21-101104	Cap. Poly Film .luF (100V)	C241
Mother	21-101224M	Cap. Poly Film .22uF (100V)	C204
Mother	2A-003	Cap. Ceramic Disc 10pF (50V)	C202 (Alternate listed)

CX2600A DOMESTIC (M/N) VCS

PARTS LIST (Continued)

Assy	Part No.	Description	Locator
Mother	2A-008	Cap. Ceramic Disc 47pF (50V)	C209,210
Mother	2A-018	Cap. Ceramic Axial 22pF (50V)	C211 (Alternate listed)
Mother	2B-003	Cap. Ceramic Disc 470pF (50V)	C216,217 (Alternate listed)
Mother	2B-007	Cap. Ceramic Disc .01uF (50V)	C203,205,212,236, 237,240,244 (Alternate listed)
Mother	2B-008	Cap. Ceramic Disc .001uF (50V)	C213,223-235 (Alternate listed)
Mother	2B-009	Cap. Ceramic Disc 150pF (50V)	C215 (Alternate listed)
Mother	2C-001	Cap. Ceramic Disc .1uF (50V)	C200,208,222,238, 239,245 (Alternate listed)
Mother	31-1N914	Diode 1N914	CR200-203
Mother	34-2N3563	Transistor 2N3563	Q202
Mother	79-5903	Connector Phono Jack	J204
Mother	79-5918	Connector Jack (3.5mm)	J201
Mother	A003647	RF Cable Assy	
Mother	C010177	Crystal 3.579575 Mhz	X200 (Alternate for P/N C015510)
Mother	C010373	Switch Slide (DPDT)	S201,204
Mother	C010388	Switch Slide (DP Spring Return)	S202,203
Mother	C010444	IC TIA	A201
Mother	C010448	Socket Controller (9 Pin)	J202,203 (Alternate listed)
Mother	C010727	Socket Controller (9 Pin)	J202,203 (Alternate for P/N C010448)
Mother	C010745	IC MPU (6507)	A200
Mother	C010750	IC (6532)	A202
Mother	C010776	Dust Cover Socket	J200 (Part of)
Mother	C010812	Pad Cartridge Socket	J200 (Part of)
Mother	C010813	Dust Cover	Used on Switches
Mother	C010821	Cap. Polystyrene 820pF (50V)	C206,207
Mother	C010823	Inductor Variable 0.85-1.2uH	L201
Mother	C012241	Switch Slide (PCB)	S200,205,206
Mother	C014179-01	Cap. Ceramic Axial 22pF (50V)	C211 (Alternate for P/N 2A-018)
Mother	C014179-03	Cap. Ceramic Axial 10pF (50V)	C202 (Alternate for P/N 2A-003)
Mother	C014179-05	Cap. Ceramic Axial 47pF (50V)	C209,210 (Alternate for P/N 2A-008)
Mother	C014180-04	Cap. Ceramic Axial 150pF (50V)	C215 (Alternate for P/N 2B-009)

CX2600A DOMESTIC (M/N) VCS

PARTS LIST (Continued)

Assy	Part No.	Description	Locator
Mother	C014180-07	Cap. Ceramic Axial 470pF (50V)	C216,217 (Alternate for P/N 2B-003)
Mother	C014181-01	Cap. Ceramic Axial .001uF (25V)	C213,223-235 (Alternate for P/N 2B-008)
Mother	C014181-02	Cap. Ceramic Axial .01uF (25V)	C203,205,212,236, 237,240,244 (Alternate for P/N 2B-007)
Mother	C014181-03	Cap. Ceramic Axial .1uf (25V)	C200,208,222,238, 239,242,245 (Alternate for P/N 2C-001)
Mother	C014348	Voltage Regulator 78M05 (5V)	A203
Mother	C014353	Cap. Epoxy Dipped .068uF (100V)	C218-221
Mother	C014369	Cap. Elec 4.7uF (35V)	C214
Mother	C014373	Cap. Elec 2200uF (16V)	C243
Mother	C014384	Inductor Ferrite Bead	L200,203-205
Mother	C014386-08	Socket IC (28 Pin)	XA200
Mother	C014386-09	Socket IC (40 Pin)	XA201,202
Mother	C015510	Crystal 3.579575 Mhz	X200 (Alternate listed)
Mother	C015519	PC Board	(Use Rev 16 or above)
Mother	C015573	Socket Cartridge	J200 (Part of)
Mother	C015574	Shield Top	
Mother	C015575	Shield Bottom	
Mother	C015752	Inductor 1.8uH	L202
Mother	C015902	Connector 12/14	J200 (Part of)
Mother	C017297	2 Switch Static Strip	
Mother	C017549	Switch Slide (PCB)	S200,205,206, (Alternate for P/N C012241)
Mother	C018991	Transistor 2N3906	Q200,201
Mother	C019748	IC Timer (555)	A205
Mother	CA011824	Dust Cover Assy	
Mother	CA012174	RF Module	5 Pin Version
Mother	CA015796	Socket Assy (Cartridge)	J200
Mother	CA015911	CX2600A PC Board Assy	
Mother	CA015913-01	PCB/Shield Assy	
Mother	CA018263	Zener Diode/Axial Wrap Assy	
Paddle	81-4004	Speed Clip Fastener	
Paddle	C010416	Nut	
Paddle	C010417	Lockwasher	
Paddle	C010457	Knob	
Paddle	C010464	Resistor Variable 1 Meg	

CX2600A DOMESTIC (M/N) VCS

PARTS LIST (Continued)

	Assy	Part No.	Description	Locator
	Paddle	C010737	Cover Top	
	Paddle	C010738	Cover Bottom	
	Paddle	C010739	Fire Button	
	Paddle	C010810	Cable Y Control	
	Paddle	C010970	Sleeve	
	Paddle	C012766	Label Paddle	
	Paddle	CA010837	Control Knob Assy	
	Paddle	CA010933	Control Cable Assy	
	Paddle	CA010953-03	Paddle Control Assy	
	Paddle	CA011620-01	Switch	
	X-Y Cntl	C010726	Cable	
	X-Y Cntl	C012107-02	Cover Top	
	X-Y Cntl	C012108-02	Case Bottom	
	X-Y Cntl	C012109	Boot	
	X-Y Cntl	C012110	Retainer Ring	
	X-Y Cntl	C012114	Fire Button	
	X-Y Cntl	C012116	Handle	
	X-Y Cntl	C012951	Spring	
■	X-Y Cntl	CA015396	PC Board (Two-Edged Connection)	
■	X-Y Cntl	CA016741	PC Board (Single-Edge Connection)	

SECTION 9

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.

ATARI

Consumer Product Service
Manager of Tehnical Support
FIELD CHANGE ORDER number 1A

MODEL: 2600A ATARI Video Computer System	DATE: July 19, 1982

SUBJECT:

Changing 12V radial lead capacitors at C241 and C242.

DESCRIPTION:

Some capacitors for these locations are not rated at an acceptable voltage. The incorrect capacitors are 12 volt radial lead type (see Figure 1). An easy way to identify a problem at C241 or C242 is to look at the screen with the diagnostic cartridge running COLOR BAR. The color is very grainy with faint vertical bars. (COLOR BARS look like COLOR SQUARES.)

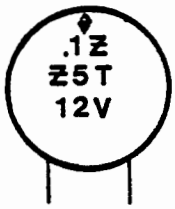


Figure 1. Incorrect Capacitor

PARTS:

LOCATION	OLD PART NUMBER	REPLACE WITH PART NUMBER	DESCRIPTION
C241	2C-001	21-101104	.1uf Axial Lead Polycap - 100v
C242	2C-001	C014181-03	.1uf Axial Lead Ceramic - 25v

INSTALLATION PROCEDURES:

Desolder and remove 2C-001 from C241. Insert and solder 21-101104 into C241.

Desolder and remove 2C-001 from C242. Insert and solder C014181-03 into C242.

TESTING PROCEDURES:

Use standard testing procedures as outlined in the 2600/2600A Field Service Manual (C018040).

ATARI

Consumer Product Service

Manager of Tehnical Support

FIELD CHANGE ORDER number_____

MODEL: 2600A ATARI Video Computer System	DATE:

PRIORITY LEVEL:

Mandatory on all 2600As received for service that have 12 volt capacitors in either C241 or C242. Replace all 12V capacitors at C241 and C242 even if no symptoms of failure are apparent.

DIFFICULTY REPORTING:

If you have any problems or questions concerning the implementation of this Field Change Order, contact the ATARI Tech Line Specialist.

Inside California
(800) 672-1466

Outside California
(800) 538-1535

ATARI®

Consumer Product Service
Manager of Tehnical Support
TECH TIP

number 1

MODEL: Atari Video Computer System 2600/2600A	DATE: April 23, 1982

SUBJECT:

Part Numbers, Diagnostic Tools

DESCRIPTION:

The following is a list of Atari supplied VCS diagnostic tools and their respective part numbers.

Use these part numbers when ordering.

Part Number	Description
MA017600	VCS 2.6 Stand Alone Test Cart. Dom.
MA017601	Signal Tracing Cart.
MA017602*	Blue Control Port Shorting Plug

*Make certain to order in multiples of two (2).

ATARI

Consumer Product Service
Manager of Tehnical Support
TECH TIP

number 2

MODEL: CX2800	DATE: 11/17/82

SUBJECT:

Blanking Resistor

DESCRIPTION:

The Rev. 4 CX2800 PCB has an 820 Ohm resistor soldered across pins 6 and 9 of U2 (TIA) on the soldered side (bottom). This resistor improves the game color and must not be removed. Rev. 5 and above CX2800 PCB have this resistor incorporated in their design.

DIFFICULTY REPORTING:

If you need further clarification concerning this Tech Tip, call the ATARI Tech-Line Specialist.

Inside California
(800) 672-1466

Outside California
(800) 538-1535

ATARI

Consumer Product Service
Manager of Tehnical Support
TECH TIP

number 3

MODEL: CX2800	DATE: 11/17/82

SUBJECT:

Switchcaps

DESCRIPTION:

If at power-up two switches are activated at the same time (indicated by both the Joystick and Paddle, or Novice and Expert LED's "on" at the same time), you must shorten the switchcap hand ends with sand paper, to eliminate binding.

If the switchcaps seem to be binding when activated on Rev. 4 PCBs, tilt the momentary switches (S2-S9) toward the player port side of the board so that there is a .030 inch gap between the board and the leading edge of the switch bottom (a manual approximation is usually successful). Some Rev. 4 PCB's have a shim glued to the PCB to correct this problem.

DIFFICULTY REPORTING:

If you need further clarification concerning this Tech Tip, call the ATARI Tech-Line Specialist:

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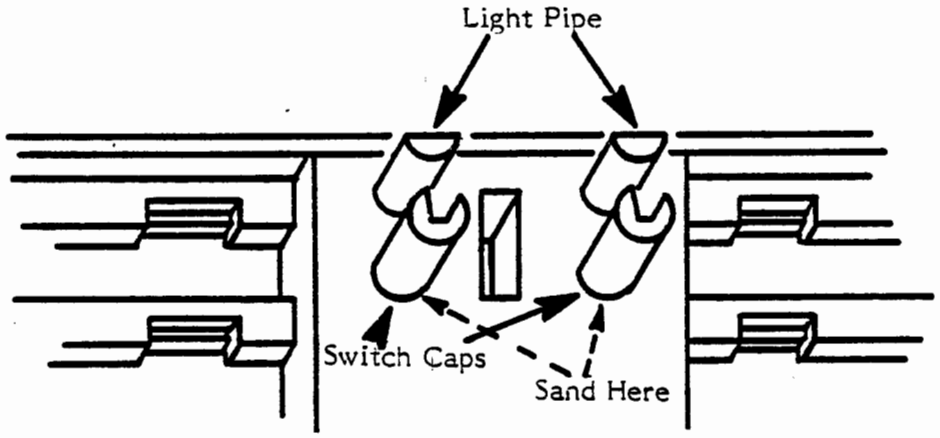
(800) 672-1466

Outside California
(800) 538-1535



ATARI

Consumer Product Service
Manager of Tehnical Support
TECH TIP

number 4

MODEL: 2600A	DATE: 11/17/82

SUBJECT:

Blanking Resistor

DESCRIPTION:

Some 2600A PCBs have an 820 1/4 W 5% resistor (P/N 14-5821) installed on the solder side (bottom). The resistor is located between pins 6 and 9 of A201 (TIA) and improves the color reproduction of the unit.

The resistor may be added to existing 2600A units at your discretion and the customer's expense. The addition will result in improved color saturation.

Rev. 16 PCBs and above will have the resistor incorporated into their design.

DIFFICULTY REPORTING:

If you need further clarification concerning this Tech Tip, call the ATARI Tech-Line Specialist:

Inside California
(800) 672-1466

Outside California
(800) 538-1535

ATARI

Consumer Product Service
Manager of Tehnical Support
TECH TIP

number 5

MODEL: CX2800	DATE: 11/17/82

SUBJECT:

Switch Shorting

DESCRIPTION:

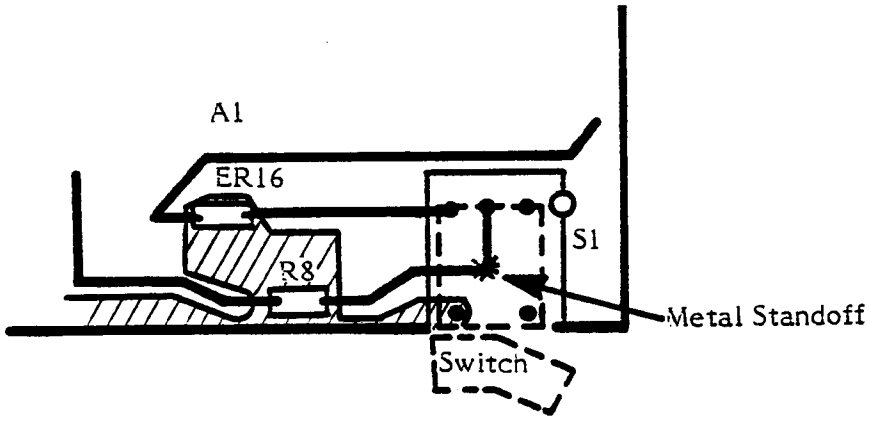
The Rev. 4 CX2800 PCB switch S1 (On/Off) has a metal standoff that may short to the trace beneath the switch. To prevent shorting, place a small piece of insulating tape on the board beneath the switch. PCB to Rev. 4 and above have the traces rerouted.

DIFFICULTY REPORTING;

If you need further clarification concerning this Tech Tip, call the ATARI Tech-Line Specialist:

Inside California
(800) 672-1466

Outside California
(800) 538-1535



ATARI

Consumer Product Service
Manager of Tehnical Support
TECH TIP

number 6

MODEL: ATARI CX5200	DATE: 11/17/82

SUBJECT:

CX5200 Power Adaptor

DESCRIPTION:

Do not use an HCD Power Adaptor with the CX5200 as it will damage both the HCD Power Adaptor and the CX5200 Switchbox.

The proper Power Adaptor to use with the CX5200 is:

CX521 AC/DC Power Adaptor, Part Number C018187

Output: 9.3 volts DC at 1.95 A.

TROUBLESHOOTING AND MAINTENANCE:

N/A

TESTING PROCEDURES:

N/A

ENCLOSURES:

N/A

ATARI®

Consumer Product Service
Manager of Technical Support
TECH TIP

TT VCS number 11

MODEL: 2600A ATARI Video Computer System	DATE: April 8, 1983

SUBJECT:

Capacitor at C241

DESCRIPTION

The capacitor at C241 may be of the incorrect rating. An easy way to identify a problem capacitor is to look at the screen with the diagnostic cartridge on the COLOR BARS. The screen is grainy with faint vertical bars. (The COLOR BARS look like color squares.)

SOLUTION:

Install part number 21-101224M at C241.

PARTS:

PART NUMBER	DESCRIPTION
21-101224M	.22uf Axial Lead Polycap - 100v.

INSTALLATION PROCEDURE:

Desolder and remove capacitor at C241, and insert and solder 21-101224M into its place.

TESTING PROCEDURES:

Use standard testing procedures as outlined in the 2600/2600A Field Service Manual (FD100133).

PROBLEM REPORTING:

If you have questions or require further explanation concerning this Field Change Order, contact your Atari Tech-line Specialist:

Inside California
(800) 672-1466

Outside California
(800)538-~~2535~~
1535

ATARI®

Consumer Product Service
Manager of Technical Support
TECH TIP

TT VCS number 16

MODEL:	DATE:
Atari 2600A Video Computer System (CA015911)	August 9, 1983

SUBJECT:

Power-On reset problem of the C010750 (I.C. #6502).

DESCRIPTION:

The unit displays a black screen after it is quickly turned off and then back on again.

SOLUTION:

On those 2600A units which display the problem described above the resistor at R227 must be changed from 24K Ohm (14-5243) to 110K Ohm (14-5114).

PROCEDURE:

Desolder and remove the 24K Ohm resistor from R227, and insert and solder the 110K Ohm (14-5114) into its place.

TESTING AND TROUBLESHOOTING:

This modification does not effect the testing procedures outlined in the 2600/2600A Field Service Manual (FD100133).

DIFFICULTY REPORTING:

If you have questions or require further explanation concerning this Tech Tip, Contact your Atari Techline Specialist:

Inside California
(800) 672-1466

Outside California
(800) 538-1535