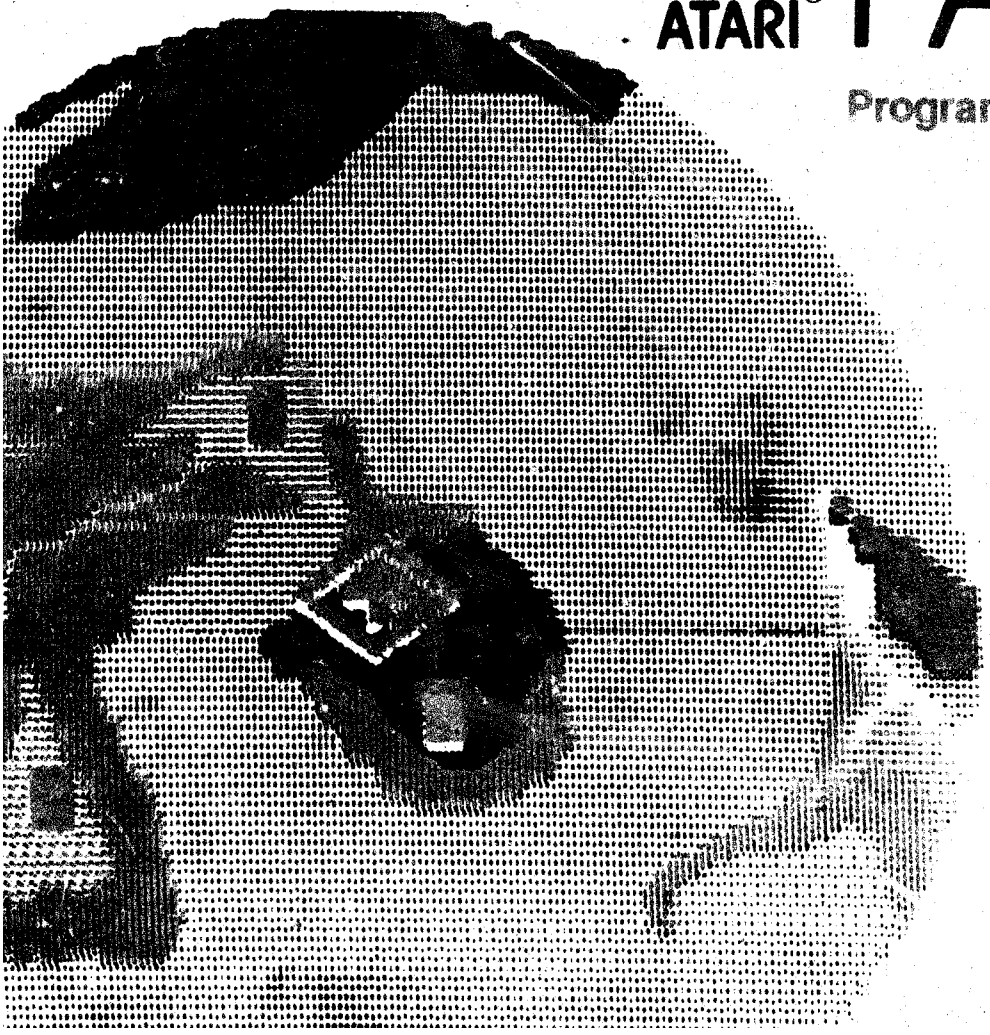
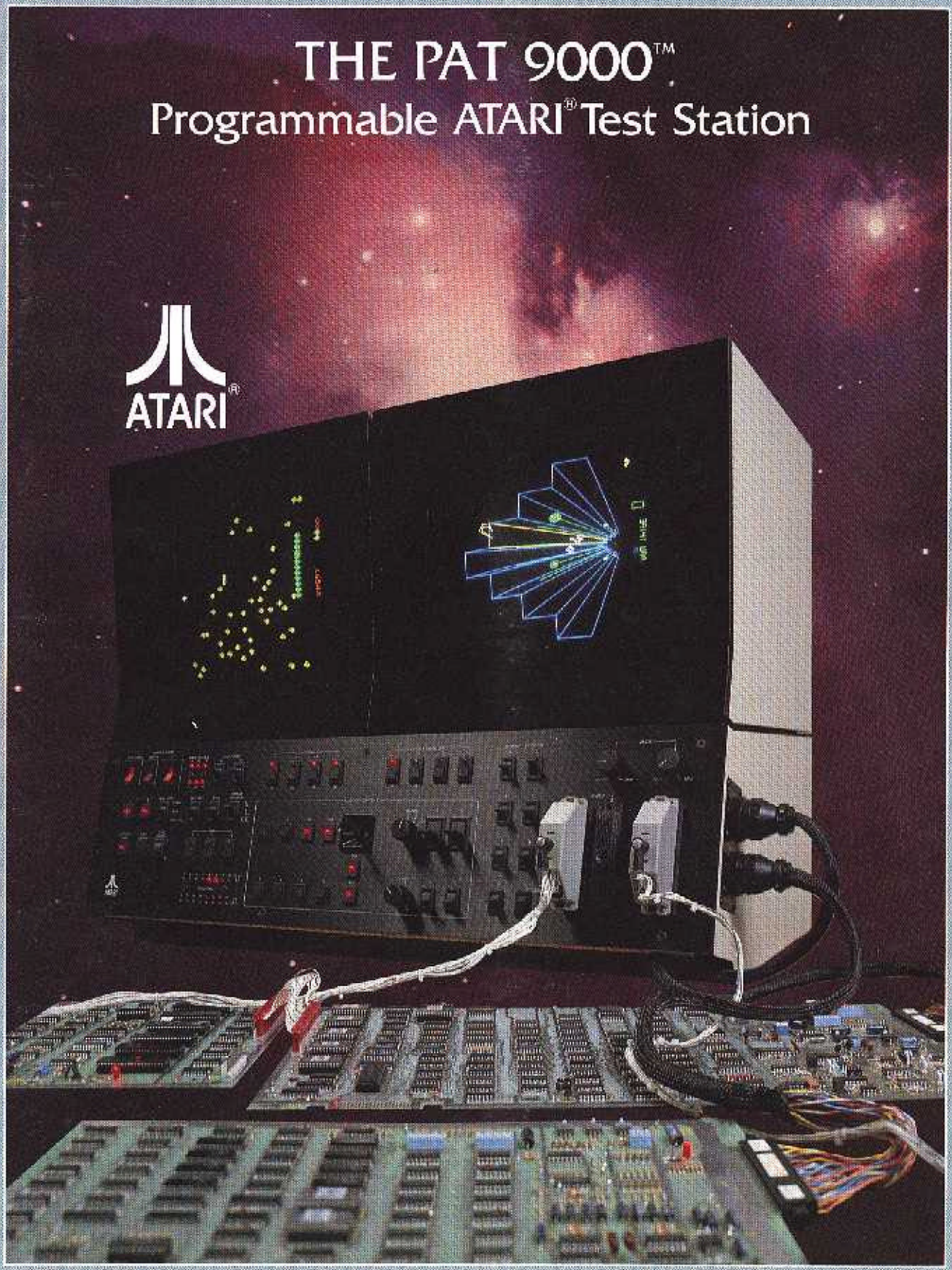
ATARI®

PAT 9000

Programmable ATARI Test Station



THE PAT 9000™
Programmable ATARI® Test Station



THE PAT 9000™

Programmable ATARI® Test Station

- **Individual monitor On/Off switches with "power-on" light and overload protection**
- **Power up and control of two games at the same time**
- **Simulates all normal controls for up to four players**
- **Color raster and QuadraScan™ Color monitors**
- **Color or black and white video**
- **Easily expanded for new controls**
- **Electronic fault sensing and protection on all game power supplies**
- **Dual audio amplifiers with individual volume controls**
- **Game RESET signal display with memory feature**
- **Troubleshooting feature on all game control switches**
- **Tests Regulator/Audio printed circuit boards and Trak Ball™ steering PC boards**

The PAT 9000 is designed to allow the technician to power up and test the operation of ATARI coin-operated video games without the game cabinet itself. The PAT 9000 provides all the necessary power supplies and controls required for normal game operation. It also has some unique features to simplify troubleshooting faulty logic boards.

For instance, two logic boards can be powered up at the same time. This allows the service technician to compare the signals from a faulty board with those from a known good board without the trouble and possible damage of constantly swapping boards. This is particularly useful with today's signature analysis troubleshooting techniques. Alternately, a second logic board can quickly be tested without having to disturb the setup of the original board being tested.

Another feature of the PAT 9000 is its ability to automatically send a stream of pulses along a switch input. This frees the technician's hands to manipulate the logic board while trying to follow one of the switch input traces by providing an easily recognizable signal on this input.

The PAT 9000 can also "babysit" a logic board without the technician having to be present all the time. The PAT 9000 will store any pulses that appear on the game RESET trace. An LED indicates whether the RESET trace has pulsed or not.

The PAT 9000 can facilitate the testing of PCBs other than the main logic board. The audio amplifiers and voltage regulators on the Regulator/Audio boards can be powered up and checked without the main logic board. Trak Ball™ steering boards can also be tested with or without the mechanical Trak Ball unit itself.

A single, 156-position plug provides the interface between the game logic board and the PAT 9000 for most games. Some games (usually those with controls for four players) will require a dual interface plug set. It should be noted that in order to power up two logic boards of the same type at the same time, the technician must use a second identical interface plug.

Service and adjustment of the PAT 9000 is easy due to the modular nature and ease of access to the internal components. Double protection is provided on the game power circuits by an electronic trip circuit with a fuse backup.

The PAT 9000 is a very complete game testing unit, adaptable to any ATARI coin-operated video game. It is the answer to a technician's dream of an efficient, easy to operate, game testing system.

ATARI Coin-Op Customer Service
1105 N. Fair Oaks Avenue
Sunnyvale, CA 94086

ATARI®

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

NOTE: See page 99 for Table of Contents for diagrams in Chapter 11

LIST OF TABLES

OPERATORS SAFETY SUMMARY

The general safety information in this part of the summary is for both operating and servicing personnel. Specific warnings and cautions will be found throughout the manual where they apply, but may not appear in this summary.

TERMS

CAUTION statements identify conditions or practices that could result in damage to the equipment or other property.

WARNING statements identify conditions or practices that could result in personal injury or loss of life.

WARNINGS

POWER SOURCE

The PAT 9000 is intended to operate from a power source that will not apply more than 240 volts, rms ±10% between the supply conductors or between either supply conductor and ground.

GROUNDING THE PAT 9000

Connect the PAT 9000 only to a grounded 3-wire outlet. If you have only a 2-wire outlet, we recommend you hire a licensed electrician to install a grounded outlet. Players may receive an electrical shock if this game is not properly grounded!

REMOVING COVERS OR PANELS

Do not normally operate the PAT 9000 without the covers and panels properly installed. Remove the product covers or panels only when making control adjustments.

CAUTIONS

USE THE PROPER FUSE

To avoid fire hazard, use only the fuse specified in the parts list for the PAT 9000, and which is identical in type, voltage rating, and current rating.

Refer fuse replacement to qualified service personnel.

USE THE PROPER POWER CORD

Use only the power cord and connector specified for your line voltage. Use only a power cord that is in good condition.

For detailed information on power cords, refer to Chapter 1, Power Cord Information.

Refer cord and connector changes to qualified service personnel..

CHAPTER 1

INTRODUCTION

The PAT 9000™ (Programmable ATARI® Test Station) is designed to allow the technician to power up and test the operation of ATARI coin-operated video games without the game cabinet itself. The PAT 9000 provides all the necessary power supplies and controls required for normal game operation. It also has some unique features to simplify troubleshooting faulty logic printed-circuit boards.

FEATURES OF THE PAT 9000

The main features of the PAT 9000 are as follows:

- Two printed-circuit boards (PCB) can be powered up simultaneously. This allows the service technician to compare signals from a faulty PCB with those from a known good PCB without the trouble and possible damage of swapping PCB. Alternately, a second PCB can quickly be tested without disturbing the setup of the original PCB.

- It can automatically send a stream of pulses along a switch input. This frees the technician's hands to manipulate the PCB while following one of the switch input traces by providing an easily recognizable signal on this input.

- It also "babysits" a PCB. The PAT 9000 will store any pulses that appear on the game RESET trace. An LED indicates whether the RESET trace has pulsed or not.

- The audio amplifiers and voltage regulators on the Regulator/Audio II PCB can be powered up and checked without the game PCB. Trak-Ball™ steering boards can also be tested with or without the mechanical Trak Ball unit itself.

- A 156-position plug provides the interface between the game PCB and the PAT 9000 for most games. Some games (usually those with controls for four players) will require a dual interface plug set.

- It can test the video for color raster, color X-Y, and black and white games.

- It has individual display on and off switches with power-on light and overload protection.

- It has electronic fault sensing and protection on all game power supplies.

- It can be easily expanded for new controls.

- Service and adjustment of the PAT 9000 is easy due to the modular nature and ease of access to the internal components. Overcurrent protection is provided on the game power circuits by an electronic trip circuit with a fuse backup.

HOW TO USE THIS MANUAL

Chapter 1 of this operator's manual describes the procedures for unpacking, inspecting, and installing the PAT 9000. Chapter 2 illustrates and briefly describes each of the controls, connectors, and indicators of the PAT 9000. Chapter 3 explains how to turn on the PAT 9000, set the control panel switches, and connect a game PCB to the PAT 9000. Chapter 4 describes how to use the game play controls on the control panel while operating one or two games at a time. Chapter 5 describes using the auxiliary connectors on the PAT 9000 left-side panel. Chapter 6 includes information on testing a game PCB in both one- and two- game modes. Chapter 7 describes the testing of a Regulator/Audio II PCB. Chapter 8 contains removal and replacement information for those assemblies that require special procedures. Chapter 9 provides instructions for assembling the Program-Plug and Auxiliary-Control Interface Cables. Chapter 10 provides an illustrated parts list, and Chapter 11 provides schematic diagrams. Appendix A provides a location to store program-plug data sheets.

UNPACKING AND INSPECTING YOUR PAT 9000

The PAT 9000 is shipped in a specially designed heavy-duty crate. Since the weight is approximately 250 pounds (113 kilograms), use a forklift to lift the crate.

UNPACKING THE PAT 9000

1. Pry the metal climps (crimped metal fasteners) off the container top with a prybar (see Figure 1-1).

2. Lift off the top cover of the container.

3. Remove the polyethylene foam separator located between the displays.

4. Remove the foam packing forms located on the side of each display.

5. Lift out each display (wrapped in a plastic bag) and place in a protected location.

6. Remove the cardboard separator covering the PAT 9000 console.

7. Lift out the PAT 9000 console (wrapped in a plastic bag) and set it in a protected location.

8. We suggest you place the packing materials back in the shipping crate, reinstall the cover, and retain this valuable crate for future repacking.

9. Remove the plastic shipping bags from each display and from the PAT 9000 console.

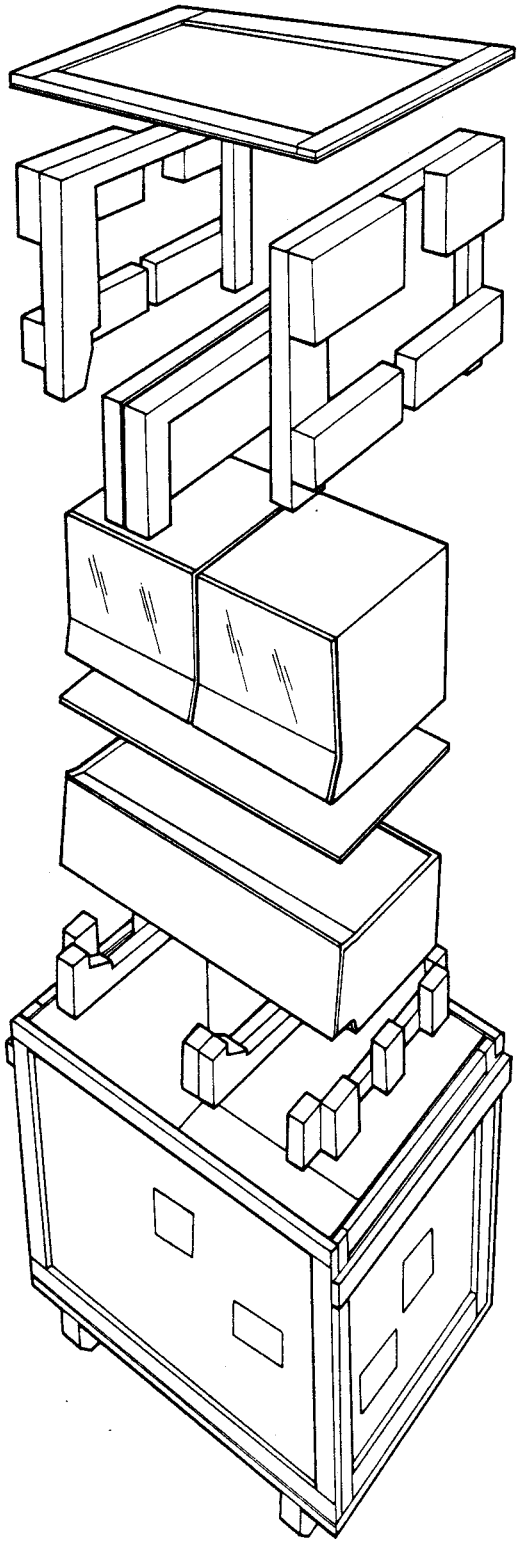


Figure 1-1 Unpacking the PAT 9000

10. Open the control panel of the PAT 9000 by using a Phillips-head screwdriver to unlatch the three spring-loaded quarter-turn fasteners.

11. Remove the following items (each wrapped in a plastic bag) from the interior of the PAT 9000 packing container:

- Game Interconnect Cables
- Color Raster Display Harness
- Color X-Y Display Harness
- Trak-Ball Adapter Harness

INSPECTING THE PAT 9000

The PAT 9000 was inspected both mechanically and electrically before shipment from the factory to be free of mars or scratches and to meet or exceed all electrical specifications. Upon receipt, inspect the PAT 9000 for any physical damage which may have been incurred in transit. If mechanical damage or performance deficiencies are found, contact your local Atari Field Office or representative.

INSTALLING THE PAT 9000

WARNING

To avoid electrical shock, do not touch internal parts of the PAT 9000 with metal objects held in your hands!

SETTING THE LINE-VOLTAGE SELECTORS

The power supplies in the PAT 9000 operate on the line voltage of most countries. These power supplies come with either one, two, or three different voltage-selection plugs (see Figure 1-2). Plug voltages and wire colors are as follows: 100 VAC (violet wire color), 120 VAC (yellow wire color), 220 VAC (blue wire color), and 240 VAC (brown wire color). To set the PAT 9000 to operate on the proper line voltage:

1. Open the control panel of the PAT 9000 by using a Phillips-head screwdriver to unlatch the three spring-loaded quarter-turn fasteners.

2. Check your line voltage. Then, check the wire color on the voltage-selection plugs in the PAT 9000 power supplies. Make sure the voltage-selection plugs are correct for your location's line voltage.

CAUTION

To avoid damage to the instrument, be sure to change the voltage-selection plug on both PAT 9000 power supplies. These voltage-selection plugs are located in the center of the metal power supply plates.

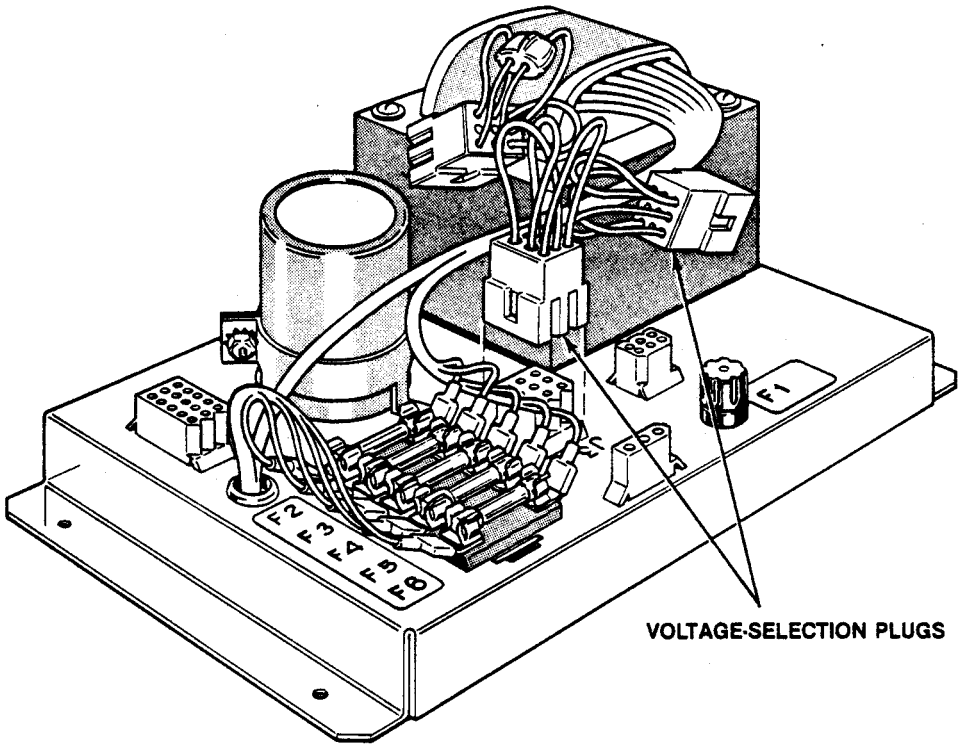


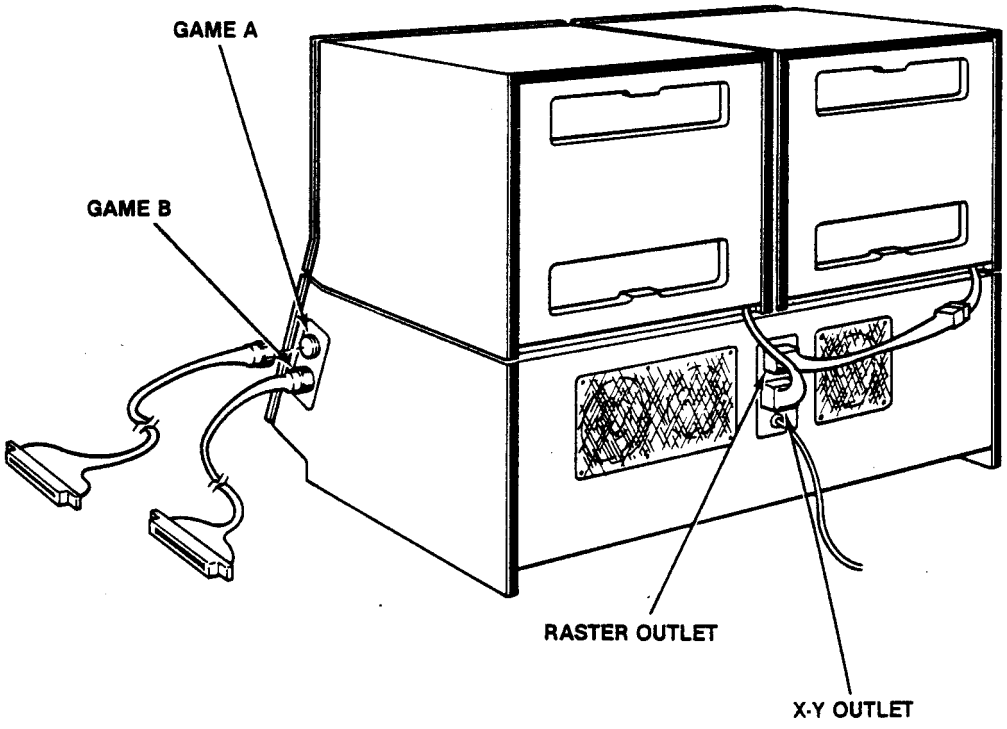
Figure 1-2 PAT 9000 Power Supplies

3. Make sure that all PCB and connectors within the PAT 9000 are properly seated.

4. Close the control panel of the PAT 9000 by tightening the three spring-loaded quarter-turn fast

CONNECTING THE DISPLAYS TO THE CONSOLE

To connect the displays to the console, attach the 12-pin raster display cable and the 15-pin X-Y display cable to the appropriate outlets located in the center of the back panel (see Figure 1-3). These connectors are keyed for proper orientation.



CAUTION

Be sure to turn off power to the PAT 9000 before connecting the video displays.

Figure 1-3 Connecting the Displays and the Game Interconnect Cables to the Console

POWER CORD INFORMATION

A power cord with the appropriate plug configuration for 120-volt power source is supplied with each PAT 9000. If you require a power cord other than that supplied, the color-coding of the power-cord conductors is given in Table 1-1 for your convenience.

WARNING

This instrument operates from a single-phase power source, and has a three-wire power cord with a two-pole,three-terminal grounding-type plug. The voltage to ground (earth) from either pole of the power source must not exceed the maximum rated operating voltage of 250 volts.

Before making connection to the power source, determine that the PAT 9000 is adjusted to match the voltage of the power source and has a suitable plug (two-pole, three-terminal, grounding type). Refer any changes to qualified service personnel.

For electrical shock protection, the grounding connection must be made before making connection to the PAT 9000's input or output terminals.

Table 1-1

POWER-CORD CONDUCTOR IDENTIFICATION

Conductor	Color	Alternate Color
Ungrounded (Line)	Brown	Black
Grounded (Neutral)	Light Blue	White
Grounding (Earthing)	Green/Yellow	Green/Yellow

CONNECTING THE GAME INTERCONNECT CABLES TO THE CONSOLE

To connect the game interconnect cable(s) to the GAME A and GAME B (optional) circular connector(s) on the right side of the PAT 9000 console, attach the end of the cable by matching its locating lug to the proper location in the circular connector(s) (see Figure 1-3). Turn the outer ring of the circular connector until it locks securely in place.

Refer to Chapter 3 for preliminary set-up procedures.

Table 1-2

INSTALLATION SPECIFICATIONS

Power	120V, 60hz, 4A
Temperature	0° to +38° C (+32° to +100° F)
Humidity	Not over 95% relative

CHAPTER 2

CONTROLS, CONNECTORS, AND INDICATORS

Chapter 2 provides descriptions of controls, connectors, and indicators located on the PAT 9000 control panel (see Figures 2-1 through 2-4), left and right side panels (see Figure 2-5), rear panel (see Figure 2-5), and interior controls (see Figure 2-6).

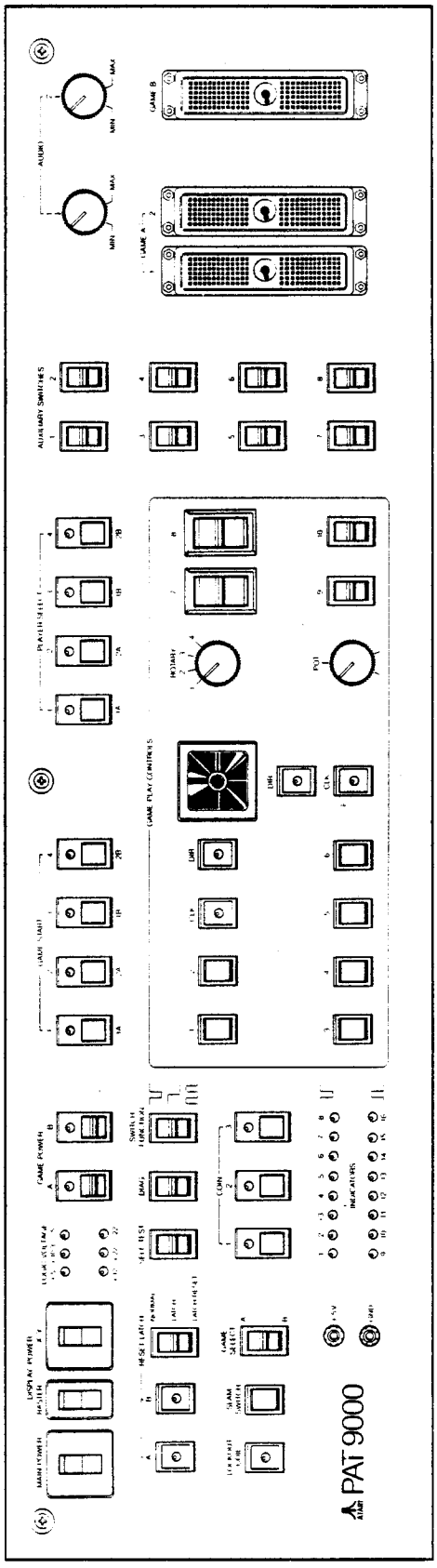
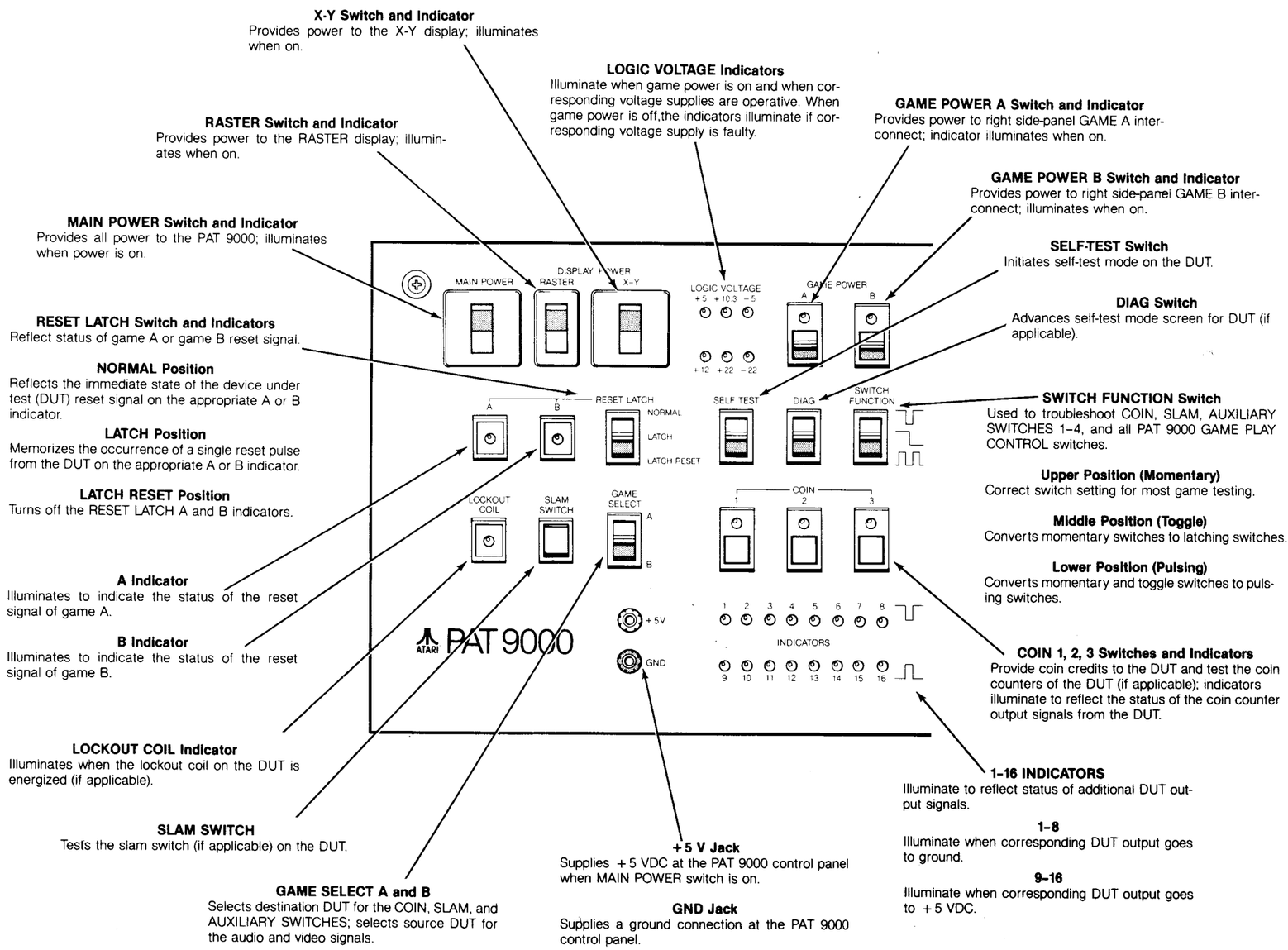


Figure 2-1 Control Panel



X-Y Switch and Indicator
Provides power to the X-Y display; illuminates when on.

LOGIC VOLTAGE Indicators
Illuminate when game power is on and when corresponding voltage supplies are operative. When game power is off,the indicators illuminate if corresponding voltage supply is faulty.

GAME POWER A Switch and Indicator
Provides power to right side-panel GAME A interconnect; indicator illuminates when on.

RASTER Switch and Indicator
Provides power to the RASTER display; illuminates when on.

GAME POWER B Switch and Indicator
Provides power to right side-panel GAME B interconnect; illuminates when on.

MAIN POWER Switch and Indicator
Provides all power to the PAT 9000; illuminates when power is on.

SELF-TEST Switch
Initiates self-test mode on the DUT.

DIAG Switch
Advances self-test mode screen for DUT (if applicable).

RESET LATCH Switch and Indicators
Reflect status of game A or game B reset signal.

NORMAL Position
Reflects the immediate state of the device under test (DUT) reset signal on the appropriate A or B indicator.

LATCH Position
Memorizes the occurrence of a single reset pulse from the DUT on the appropriate A or B indicator.

LATCH RESET Position
Turns off the RESET LATCH A and B indicators.

SWITCH FUNCTION Switch
Used to troubleshoot COIN, SLAM, AUXILIARY SWITCHES 1–4, and all PAT 9000 GAME PLAY CONTROL switches.

Upper Position (Momentary)
Correct switch setting for most game testing.

Middle Position (Toggle)
Converts momentary switches to latching switches.

Lower Position (Pulsing)
Converts momentary and toggle switches to pulsing switches.

A Indicator
Illuminates to indicate the status of the reset signal of game A.

B Indicator
Illuminates to indicate the status of the reset signal of game B.

COIN 1, 2, 3 Switches and Indicators
Provide coin credits to the DUT and test the coin counters of the DUT (if applicable); indicators illuminate to reflect the status of the coin counter output signals from the DUT.

LOCKOUT COIL Indicator
Illuminates when the lockout coil on the DUT is energized (if applicable).

1–16 INDICATORS
Illuminate to reflect status of additional DUT output signals.

1–8
Illuminate when corresponding DUT output goes to ground.

9–16
Illuminate when corresponding DUT output goes to +5 VDC.

SLAM SWITCH
Tests the slam switch (if applicable) on the DUT.

+5 V Jack
Supplies +5 VDC at the PAT 9000 control panel when MAIN POWER switch is on.

GND Jack
Supplies a ground connection at the PAT 9000 control panel.

GAME SELECT A and B
Selects destination DUT for the COIN, SLAM, and AUXILIARY SWITCHES; selects source DUT for the audio and video signals.

CAUTION

When any COIN indicator remains lit, the corresponding coin-counter output signal from the game is shorted to ground. To avoid damage to the DUT and/or the coin counter in the PAT 9000, immediately turn GAME POWER A switch to the off (down) position.

Figure 2-2 Control Panel, Left Side

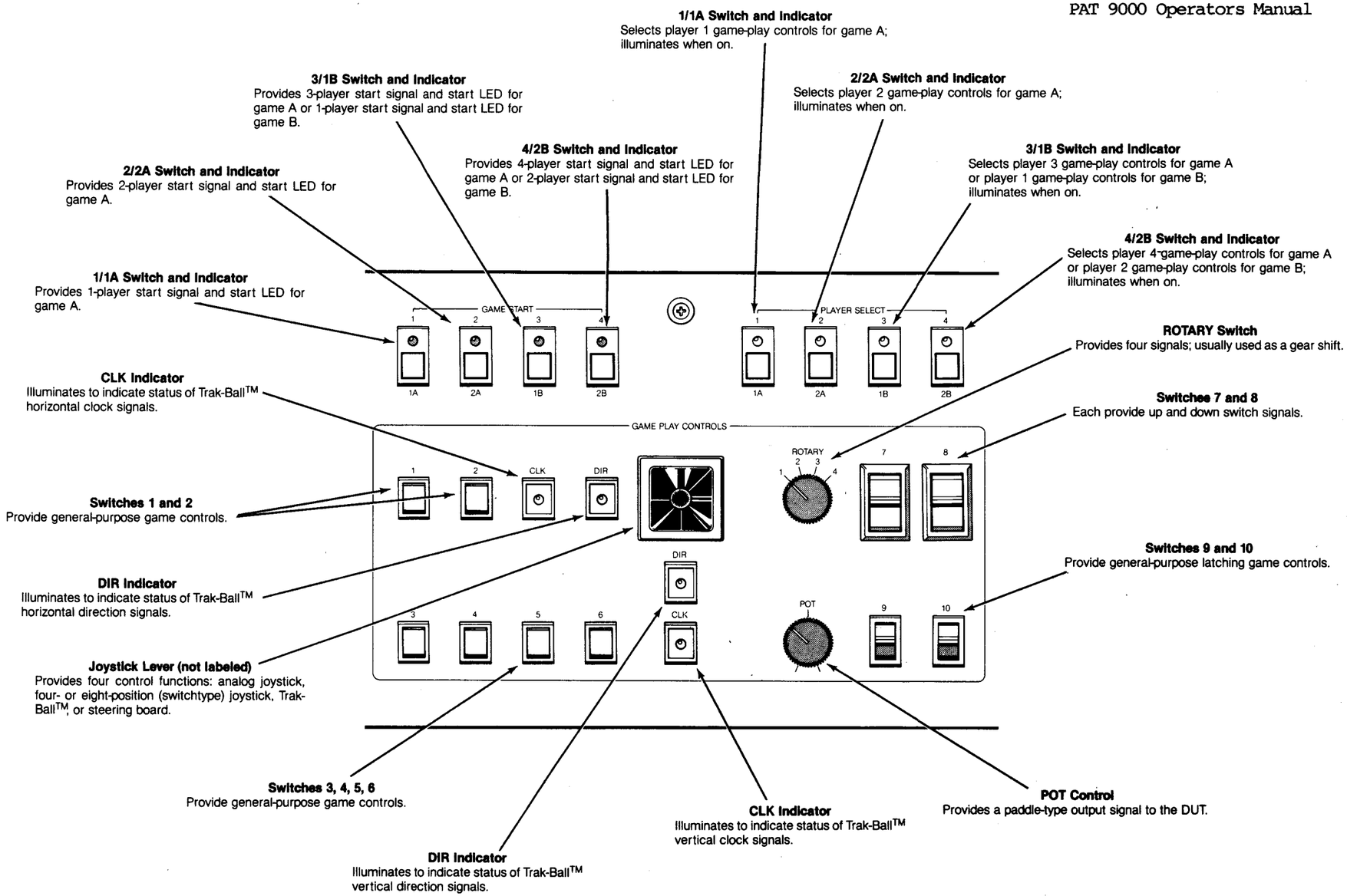


Figure 2-3 Control Panel, Control Group

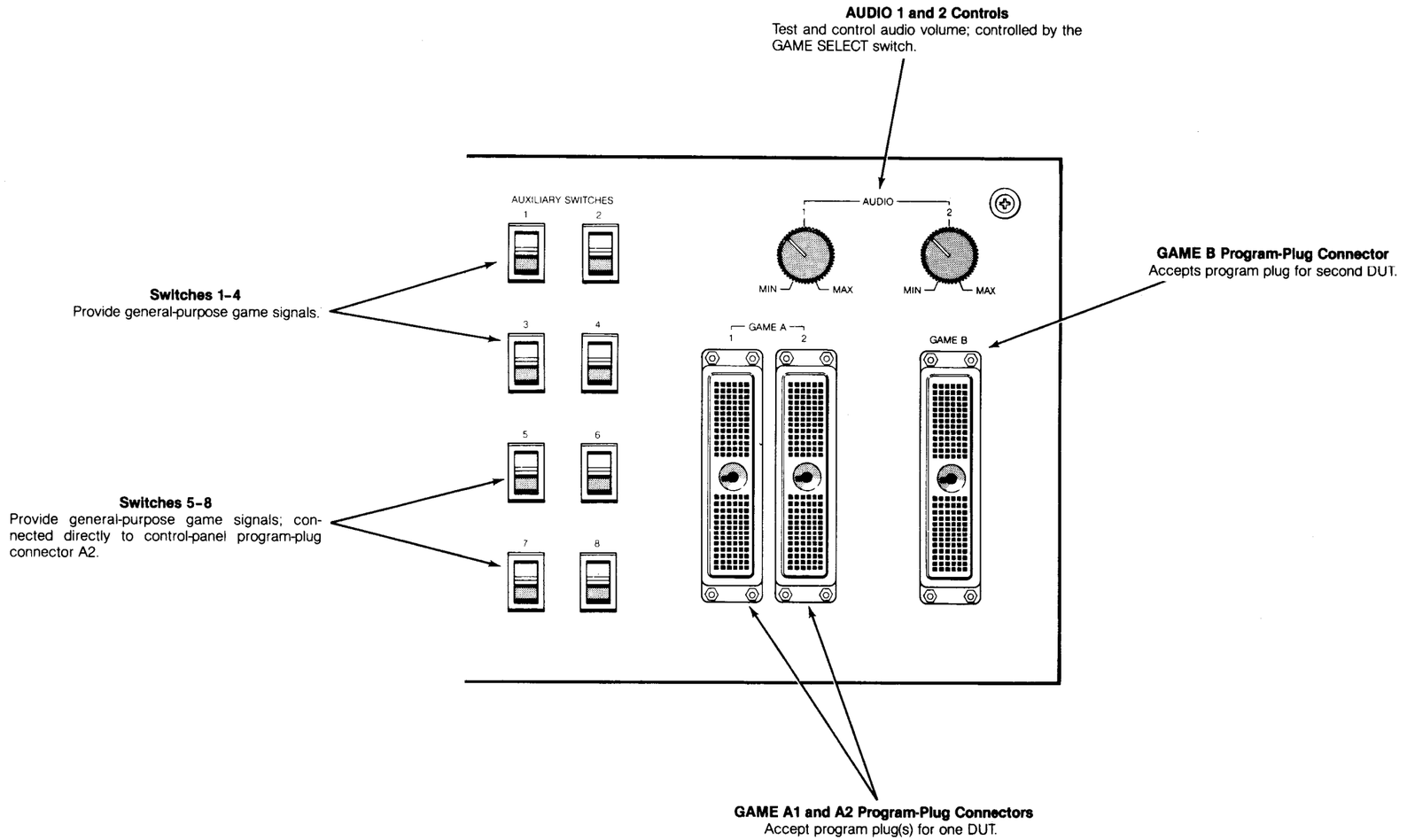
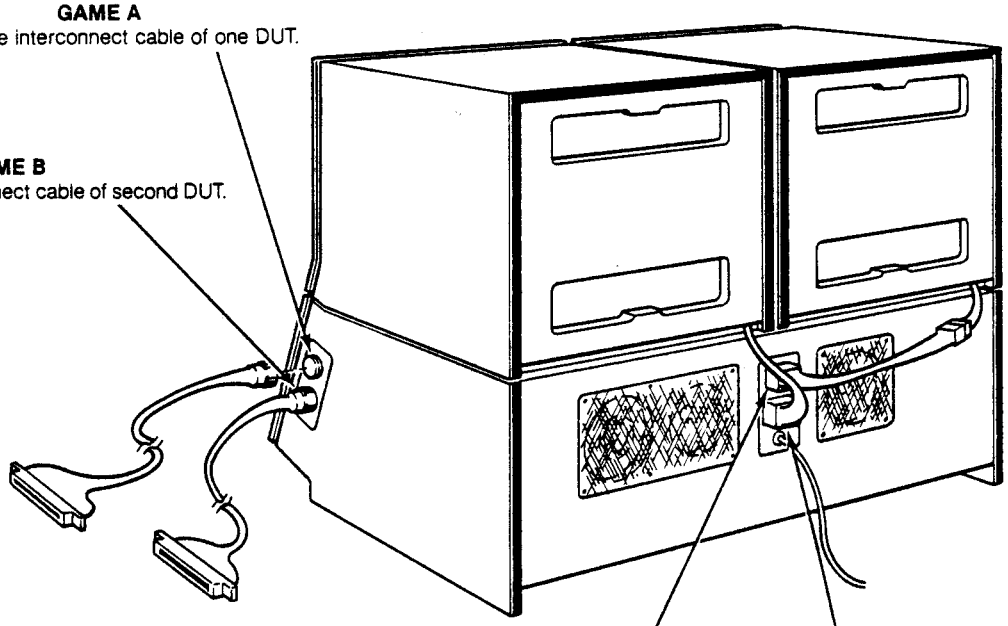


Figure 2-4 Control Panel, Right Side



GAME A
Accepts game interconnect cable of one DUT.

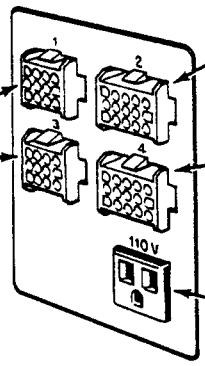
GAME B
Accepts game interconnect cable of second DUT.

RASTER Connector
Accepts 12-pin color raster display interconnect harness.

X-Y Connector
Accepts 15-pin color X-Y display interconnect harness.

CAUTION

Be sure to turn off power to the PAT 9000 before changing the voltage plugs or connecting the video displays.



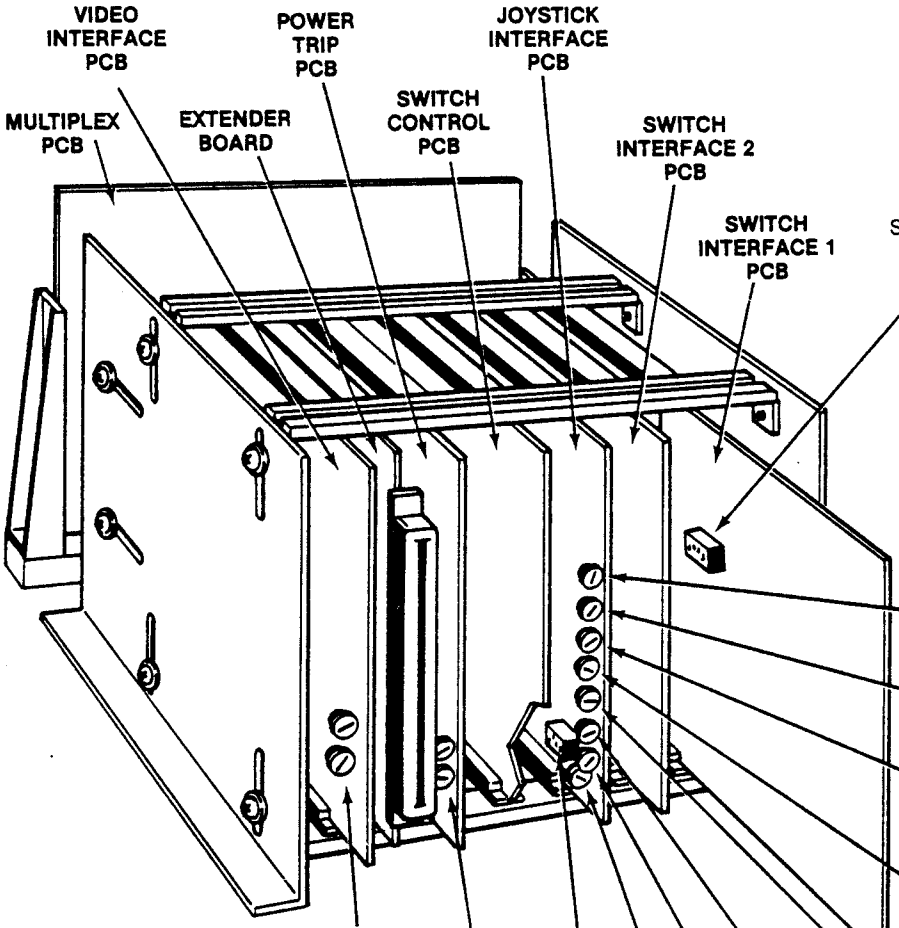
Connector 2
Provides game A power-supply voltages at the PAT 9000 side panel.

Connector 4
Accepts 15-pin Trak-Ball™ harness connector (supplied) and similar analog-type signal connectors.

Connectors 1 and 3
Accept 12-pin harness connectors for digital (pushbutton switch-type) signals.

110 V Power Cord Input
Accepts power cord for Atari CAT Box™, soldering iron, or oscilloscope.

Figure 2-5 Left-, Right-Side Panel & Rear Panel Connectors



SWITCH INTERFACE 1 ADJUSTMENTS

C5
DIP Switch
Switch-enable select for external digital controls.

JOYSTICK INTERFACE BOARD ADJUSTMENTS

VOL1
Adjusts volume from PAT 9000 audio amplifiers (split pads must be open—not shown).

VOL2
Adjusts volume from PAT 9000 audio amplifiers (split pads must be open—not shown).

Horizontal ZERO
Adjusts the center position of the PAT 9000 control-panel joystick to zero volts at the horizontal zero and vertical zero test points.

(Horizontal) H GAIN
(Affects only the analog joystick outputs); adjusts the voltage swing for the analog-joystick output.

Horizontal OFFSET
(Affects only the analog joystick outputs); adjusts the midpoint voltage of the analog-joystick output.

Horizontal FREQ
Adjusts the maximum clock rate output by the Trak-Ball™ simulation circuit.

Vertical OFFSET
(Affects only the analog joystick outputs); adjusts the midpoint voltage of the analog-joystick output.

Vertical ZERO
Adjusts the center position of the PAT 9000 control-panel joystick to zero volts at the horizontal zero and vertical zero test points.

(Vertical) V GAIN
(Affects only the analog joystick outputs); adjusts the voltage swing for the analog-joystick output.

Vertical FREQ
Adjusts the maximum clock rate output by the Trak-Ball™ simulation circuit.

F2
DIP Switch
Switch-enable select for external analog controls.

VIDEO INTERFACE BOARD ADJUSTMENTS

BRIGHTNESS
Adjusts brightness on display for black and white raster video only.

CONTRAST
Adjusts contrast on display for black and white raster video only.

POWER TRIP BOARD ADJUSTMENTS

+ VAR
Adjusts positive variable power supply.

– VAR
Adjusts negative variable power supply.

Figure 2-6 Interior Controls

CHAPTER 3

PRELIMINARY SET-UP PROCEDURES

This chapter provides information on preliminary set-up procedures to be performed when the PAT 9000 is installed. Switches and controls not specifically mentioned are in their nominal settings.

TURNING ON THE PAT 9000

1. Press the MAIN POWER rocker switch to the on position (illuminated). See Figure 2-1.

> **NOTE**
>
> The MAIN POWER switch should not be turned off and on several times each day. Leave it in the on position for the entire work day.

2. Press RASTER and X-Y MONITOR POWER switches to the on position (illuminated). See Figure 2-1.

SETTING THE CONTROL PANEL SWITCHES

Set the following control panel switches as indicated:

GAME POWER A	Down (off)
RESET LATCH	NORMAL
SELF-TEST	Center (off)
DIAG	Center (off)
SWITCH FUNCTION	Up (momentary)
GAME SELECT	A (up)
PLAYER SELECT	1/1A
AUXILIARY SWITCHES 1-8	Center (off)

CONNECTING THE GAME PCB TO THE PAT 9000

For purposes of illustration, the Space Duel™ game PCB is used in this procedure and is referred to as the device under test (DUT).

1. Connect the game program plug to the GAME A1 program plug receptacle (leftward program plug receptacle of the three) on the control panel. Rotate the locking lever clockwise to lock in place.

2. Connect the GAME INTERCONNECT cable A from the PAT 9000 right side panel to the 44-position edge connector on the DUT.

3. Connect the cable from the game's program plug to the 24-position edge connector on the DUT. (If a game has more than one game PCB, put the edge connector on the second PCB).

TURNING ON THE GAME PCB

Press GAME POWER A toggle-up latch-down switch to the on (up) position (illuminated) and release immediately; it will return to the center position. This switch should not be held in the up position.

CAUTION

The automatic trip circuit in the power supply is not enabled until this switch returns to the center position. The six LOGIC VOLTAGE LED should illuminate, indicating that all six power supplies are operative (see Figure 2-1).If one or more of the power supplies has an overload or fault, the automatic trip circuit will remove all power from the DUT and some LED will go off. Those LED that remain illuminated after power is removed indicate the supply or supplies in which the fault occurred. The cause of the fault should be checked and repaired before reapplying power.

The game video should appear on the appropriate display.

You are now ready to test or troubleshoot the DUT.

CHAPTER 4

USING THE GAME PLAY CONTROLS ON THE CONTROL PANEL

This chapter of the manual demonstrates, in the form of self-teaching exercises, the operation of the game-play controls on the PAT 9000 control panel. Preliminary set-up procedures are covered in Chapter 3.

OPERATING ONE GAME AT A TIME

For illustrative purposes, the Space Duel™ game PCB is used in the following exercises (unless otherwise noted) and is referred to as the DUT.

ENTERING COIN CREDITS

The PAT 9000 COIN 1, 2, and 3 switches provide coin credits to the DUT. They also test the coin counter of the DUT (see Figure 2-2). The three PAT 9000 COIN LED illuminate to reflect the status of the coin-counter output signals from the DUT. Some games do not use all three coin-switch inputs and coin-counter outputs; some games have fewer coin-counter outputs than coin-switch inputs. Refer to the game manual schematics of the DUT for the amount of coin-switch input signals and coin-counter output signals.

One coin counter is mounted in the PAT 9000 and acts as a load for all three coin-counter output signals.

The LOCKOUT COIN indicator (on the left side of the PAT 9000 front panel) illuminates when the lockout coil on the DUT is energized (if applicable). Some games provide control of the lockout coil from the DUT; some games wire it directly between the +10.3-volt supply and ground. A resistor in the PAT 9000 provides the lockout-coil load.

Momentarily press COIN 1 and 3 switches in sequence to test the DUT coin-switch input circuits. The PAT 9000 COIN 1 and 3 switches simulate the left and right game coin-input signals, respectively. The COIN 2 switch simulates the auxiliary coin switch and, consequently, does not activate the coin counter.

NOTE

Some games will not credit the coin counter if the coin switch is held on too long; a quick tap will usually work.

The indicators mounted above the COIN switches illuminate briefly when the corresponding game coin-counter output signals are activated. The coin counter mounted in the PAT 9000 produces an audible click when these game coin-counter output signals are activated.

CAUTION

When any COIN indicator remains lit, the corresponding coin-counter output signal from the game is shorted to ground. To avoid damage to the DUT and/or the coin-counter in the PAT-9000, immediately turn GAME POWER A switch to the off (down) position.

STARTING THE GAME

1. Press the GAME START 1/1A switch (see Figure 2-3). This tests the DUT player-1 start switch and starts a one-player game. The indicator above the switch will illuminate to reflect the status of the DUT player-1 start indicator.

NOTE

If you press the GAME START 1/1A switch and start game A, pressing the GAME START 2/2A switch will have no effect until game A ends.

2. Press the GAME START 2/2A switch (see Figure 2-3). This tests the DUT player-2 start switch and starts a two-player game. The indicator above the switch will illuminate to reflect the status of the DUT player-2 start indicator.

3. If you are testing a four-player game, use GAME START switches 3/1B and 4/2B switches in a similar fashion (see Figure 2-3).

SELECTING THE PLAYER

The PAT 9000 provides the controls necessary for up to four players to play a game (one player at a time). Two players can not play a game simultaneously, since the PAT 9000 front panel has only one set of game play controls. The PLAYER SELECT switches determine which one of the four sets of game-play controls is tested (see Figure 2-3). The setting of these switches may be changed at any time.

1. Press the PLAYER SELECT 1/1A switch. This selects the player-1 game controls. The indicator above the switch will illuminate to indicate that the player-1 game controls have been selected.

2. Press the PLAYER SELECT 2/2A switch. This selects the player-2 game controls. The indicator above the switch will illuminate to indicate that the player-2 game controls have been selected.

3. If you are testing a four-player game (such as SPRINT 4™), press the PLAYER SELECT switches 3/1B and 4/2B to select the player-3 and player-4 game controls.

4. If you are testing a cocktail cabinet game, press the PLAYER SELECT 1/1A switch to select the player-1 game controls; press the PLAYER SELECT 2/2A switch to select the player-2 game controls.

USING THE GAME PLAY CONTROL PUSHBUTTON SWITCHES

Pushbutton Switches 1 through 6

The pushbutton switches 1 through 6 used in these exercises are located to the left of the joystick lever in the GAME PLAY CONTROLS section of the PAT 9000 front panel (see Figure 2-3).

Use general-purpose momentary pushbutton switches 1 through 6 to test DUT-switch input signals such as FIRE, THRUST, SHIELDS, ROTATE LEFT, and ROTATE RIGHT.

1. Connect the SPACE DUEL™ game PCB to the PAT 9000, using the preliminary set-up procedures in Chapter 3 of this manual.

2. Set the PAT 9000 SELF TEST switch to the on (up) position.

3. Press pushbutton 1. This tests the Space Duel™ FIRE input signal.

4. Press pushbutton 2. This tests the Space Duel™ SHIELDS input signal.

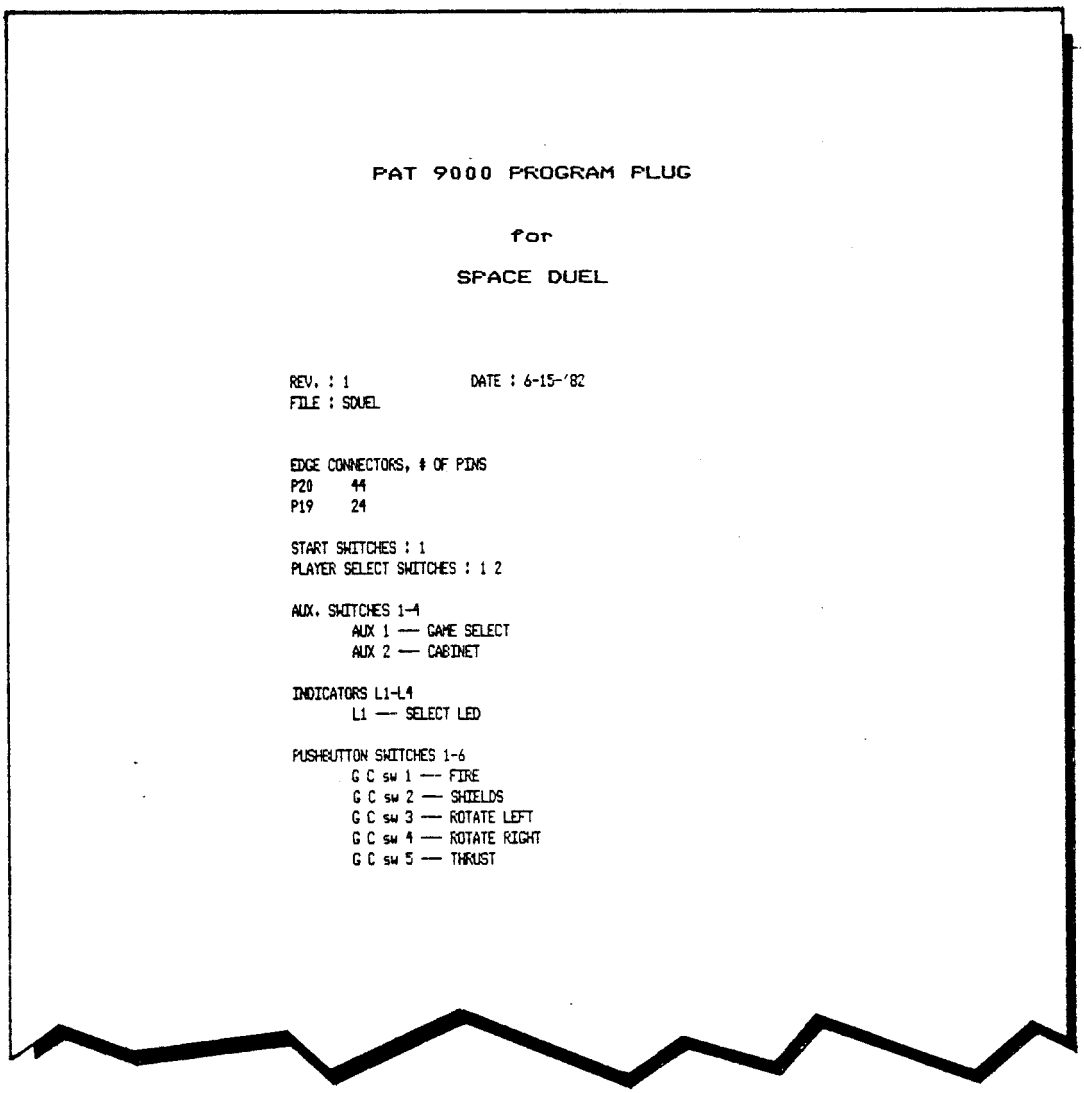
5. Press pushbutton 3. This tests the Space Duel™ ROTATE LEFT input signal.

6. Press pushbutton 4. This tests the Space Duel™ ROTATE RIGHT input signal.

7. Press pushbutton 5. This tests the Space Duel™ THRUST input signal.

NOTE

The actual DUT input signals tested depends upon the DUT. Refer to the data sheet provided with the DUT program plug (see Figure 4-1). For example, Centipede™ uses pushbutton 1 for FIRE; Tempest™ uses pushbuttons 1 and 2 for FIRE and ZAP, respectively (see Figure 2-3). See Appendix A for program plug data sheets.



PAT 9000 PROGRAM PLUG

for

SPACE DUEL

REV. : 1 DATE : 6-15-'82
FILE : SDUEL

EDGE CONNECTORS, # OF PINS
P20 44
P19 24

START SWITCHES : 1
PLAYER SELECT SWITCHES : 1 2

AUX. SWITCHES 1-4
AUX 1 — GAME SELECT
AUX 2 — CABINET

INDICATORS L1-L4
L1 — SELECT LED

PUSHBUTTON SWITCHES 1-6
G C sw 1 — FIRE
G C sw 2 — SHIELDS
G C sw 3 — ROTATE LEFT
G C sw 4 — ROTATE RIGHT
G C sw 5 — THRUST

Figure 4-1 Program Plug Data Sheet

Return-to-Center Switches 7 and 8

Return-to-Center switches 7 and 8 are located to the right of the joystick lever in the GAME PLAY CONTROLS section of the PAT 9000 control panel (see Figure 2-3).

Use switches 7 and 8 as general-purpose momentary switches or as the controllers in a tank-style game such as Battlezone™. Switch 7 and switch 8 each have two output signals. One output signal is energized when the lever is in the up position; the second is energized when the toggle lever is in the down position. No output signal is generated when the toggle lever is in the center position. The effect of these switch settings is related to the switch-type joystick (see Table 4-1).

Setting both of these switches to the up position has the same effect as pushing an eight-position joystick lever to its top left position; setting both switches to the down position has the same effect as pushing an eight-position joystick lever to its bottom right position.

Table 4-1
SWITCHES 7 AND 8 CONNECTION TO JOYSTICK

Switch No.	Switch Position	Joystick Position
7	Up	Left
7	Down	Right
8	Up	Up
8	Down	Down

1. For this exercise, connect a Battlezone™ auxiliary PCB and analog vector-generator PCB to the PAT 9000, using the preliminary set-up procedures in Chapter 3 of this manual.

2. Set the GAME PLAY CONTROLS switch 7 to the up position. This tests the left up input signal of the DUT control handle.

3. Set the GAME PLAY CONTROLS switch 7 to the down position. This tests the left down input signal of the DUT control handle.

4. Set the GAME PLAY CONTROLS switch 8 to the up position. This tests the right up input signal of the DUT control handle.

5. Set the GAME PLAY CONTROLS switch 8 to the down position. This tests the right down input signal of the DUT control handle.

Latch Switches 9 and 10

Latch-up/latch-down switches 9 and 10 are general-purpose game-play control switches for an individual player. These switches may be used in future cocktail-cabinet games where each player will require a toggle switch.

USING THE JOYSTICK

The PAT 9000 joystick (not labeled) is the most versatile of the game-play controls (see Figure 2-3). An interface board in the PAT 9000 converts the control-panel joystick signals to the following four signal types: analog joystick control, four- or eight-position switch-type joystick control, Trak-Ball™ control, and steering control. The joystick is an analog, two-dimensional lever with an analog output range of 1 volt peak-to-peak in both x and y directions.

NOTE

In order that the joystick functions work properly, horizontal and vertical ZERO potentiometer adjustments must be correct. These adjustments will be needed any time the joystick lever or Joystick Interface PCB on the PAT 9000 is replaced or repaired. ZERO adjustments should be performed prior to any other joystick adjustments (see Figure 2-6).

1. ZERO potentiometers (1 horizontal and 1 vertical)—The center pin of the potentiometers on the PAT 9000 joystick control should be between 2 and 3 volts when the DUT joystick lever is in the center position. After replacing one of these potentiometers, rotate the body of the potentiometer with your fingers until this condition is achieved. Take care not to break the tabs on the potentiometer when it is under adjustment.

2. Measure the voltage on the horizontal and vertical (as appropriate) test point on the Joystick Interface PCB in the PAT 9000 (see Figure 2-6).

3. Adjust the horizontal and vertical ZERO potentiometers for 0 volts at the appropriate test point.

The same instructions apply to horizontal and vertical potentiometer adjustments.

Analog Joystick Control

The analog joystick control is used where proportional directional control is required by the DUT. The peak-to-peak range and the dc center of the DUT x and y output signals are adjusted on the Joystick Interface PCB in the PAT 9000 console.

If potentiometer adjustment is necessary (rarely), first adjust the vertical and horizontal OFFSET potentiometers (with the joystick lever in the

center position) until the DUT indicates that the joystick is centered (see Figure 2-6). Then adjust the vertical and horizontal GAIN potentiometers so that moving the joystick has maximum effect on the DUT.

1. Connect a Red Baron™ game PCB to the PAT 9000. Refer to preliminary set-up procedures in Chapter 3 of this manual.

2. Set the PAT 9000 SELF-TEST switch to the on (up) position.

> NOTE
>
> Refer to the DUT manual for self-test and trouble-shooting procedure.

3. Adjust the vertical OFFSET potentiometer until the lower left number on the display reads approximately 80 hexadecimal notation.

4. Adjust the vertical GAIN potentiometer until the lower left number on the display varies from approximately 20 to approximately E0 hexadecimal notation as the joystick moves from the fully forward position to the fully down position.

5. Adjust the horizontal OFFSET potentiometer until the lower left number on the display reads approximately 80 hexadecimal notation.

6. Adjust the horizontal GAIN potentiometer until the lower left number on the display varies from approximately 20 to approximately E0 hexadecimal notation as the joystick moves from the fully right position to the fully left position.

Four- or Eight-Position Switch-Type Joystick Control

Pushing the PAT 9000 joystick lever in a vertical or horizontal direction generates one of four directional signals: up, down, left, or right. Pushing the joystick lever in a diagonal direction has the same effect as closing two of these switches simultaneously (for eight-position joystick).

To reduce circuitry and wiring these four joystick-switch signals have been gated with the four switch signals originating from return-to-center switches 7 and 8 as shown in Table 4-1. For example, when used as an eight-position joystick, pushing the joystick lever diagonally to the top left has the same effect as pushing both return-to-center switches 7 and 8 to the up position.

1. For this exercise, connect a Dig Dug™ game PCB to the PAT 9000, using the preliminary set-up procedures in Chapter 3 of this manual.

2. Set the PAT 9000 SELF-TEST switch to the on (up) position.

3. Push the joystick to the up, down, left, and right positions. A different audible signal will be produced for each position.

Trak-Ball™/Steering Control

Pushing the PAT 9000 joystick lever in any direction has the same effect as rotating a DUT Trak-Ball™/steering control in that direction. In addition, the farther the joystick lever is pushed, the faster the apparent Trak-Ball™/steering motion will be. The frequency range of the Trak-Ball™ output signals for horizontal and vertical directions can be adjusted on the PAT 9000 joystick interface board.

NOTE

The steering control uses the horizontal Trak-Ball™ signals only. FREQ potentiometer adjustments are specific to the Trak-Ball™/ steering control.

The two FREQ potentiometers (vertical and horizontal) adjust the maximum clock rate output by the Trak-Ball™ simulation circuit (see Figure 2-6). These potentiometers should normally be set to the center position, but can be adjusted to increase or decrease the Trak-Ball™ clock rate as required by the DUT.

1. For this exercise, connect a Centipede™ game PCB to the PAT 9000, using the preliminary set-up procedures in Chapter 3 of this manual.
2. Set the PAT 9000 SELF-TEST switch to the on (up) position.

NOTE

Refer to the DUT manual for self-test and trouble shooting procedure. Tempest™, Missile Command®, and Millipede™ use the Trak-Ball™ game control.

3. Adjust both FREQ potentiometers until the shooter moves at a suitable speed both horizontally and vertically when the joystick lever is pushed.

USING THE POT (PADDLE) CONTROL

The PAT 9000 POT control provides a paddle-type +0- to +5-volt output signal to the DUT.

1. For this exercise, connect a Super Breakout™ (or Warlords™) game PCB to the PAT 9000, using the preliminary set-up procedures in Chapter 3 of this manual.

2. Set the PAT 9000 SELF-TEST switch to the on (up) position.

> NOTE
>
> Refer to the DUT manual for self-test and troubleshooting procedure.

3. Rotate the POT control in a clockwise direction to change the numbers on the display from 00 to FF hexadecimal notation.

USING THE ROTARY CONTROL

The PAT 9000 ROTARY control provides four output signals to the DUT (usually used as gear shift positions).

1. For this exercise, connect a Sprint 1™ (or Night Driver™) game PCB to the PAT 9000, using the preliminary set-up procedures in Chapter 3 of this manual.

2. Set the PAT 9000 SELF-TEST switch to the on (up) position.

> NOTE
>
> Refer to the DUT manual for self-test and trouble-shooting procedure.

3. Turn the ROTARY control to position 1; audio screech will be heard.

4. Turn the ROTARY control to position 2; audio screech will be heard.

5. Turn the ROTARY control to position 3; audio screech will be heard.

6. Turn the ROTARY control to position 4; no audible will be heard.

> NOTE
>
> To avoid damage to the control, do not force the ROTARY control below position 1 or above position 4.

USING THE AUXILIARY SWITCHES

AUXILIARY SWITCHES 1 through 8 are located on the right side of the PAT 9000 control panel (see Figure 2-4).

AUXILIARY SWITCHES 1, 2, 3, and 4 can be used interchangeably, depending upon the wiring of the DUT program plug.

1. For this exercise, connect Space Duel™ game PCB to the PAT 9000, using the preliminary set-up procedures in Chapter 3 of this manual.

2. Set the PAT 9000 SELF-TEST switch to the on (up) position.

3. Toggle switch 1 to the down position repeatedly to advance through the four game versions of Space Duel™. This tests the Space Duel™ game-select input signal.

4. Press switch 2 to the up position to select a Space Duel™ cocktail-type game; leave the switch in the center position to select a Space Duel™ upright-type game. When game control passes from player 1 to player 2, the video will switch for proper player orientation.

5. Switches 3 and 4 are not used in the Space Duel™ game, but they operate in a similar manner to switches 1 and 2. For example, these switches could be used for watchdog disable, cabinet select, or game select.

6. Switches 5 through 8 are connected to program plug receptacle A2 with no interface electronics.

OPERATING TWO GAMES AT A TIME

The PAT 9000 has separate GAME POWER switches and separate RESET LATCH indicators; all other PAT 9000 controls affect both games in the same way.

Operating two games at the same time allows the technician to compare the output signals from a faulty game PCB to those of a known good game PCB without the trouble and possible damage of constantly swapping PCB. Alternatively, a second PCB may be tested without disturbing the set-up of the first PCB.

NOTE

A separate program plug is required for each game, even if both PCB are of the same type. Any game that requires a dual program-plug set (usually those with controls for four players) should not be operated in this mode.

Preliminary set-up procedures are covered in Chapter 3 of this manual.

CONNECTING THE GAME PCB TO THE PAT 9000

1. Connect the program plug(s) from game A to the GAME A1 program plug receptacle(s), using the preliminary set-up procedures in Chapter 3 of this manual.

2. Connect the program plug from game B to the GAME B program plug receptacle located on the right side of the PAT 9000 control panel.

3. Connect the GAME INTERCONNECT cable A from the PAT 9000 right-side panel to the 44-pin edge connector on game A's PCB (see Figure 2-5).

4. Connect the GAME INTERCONNECT cable B from the PAT 9000 right-side panel to the 44-pin edge connector on game B's PCB.

5. Connect the cable(s) from the game A program plug to the auxiliary edge connector on game A, if applicable.

6. Connect the cable from the game B program plug to the auxiliary edge connector on game B, if applicable.

STARTING THE GAMES

1. Press GAME POWER B switch to the on (up) position (illuminated) and release immediately; it will return to the center position (see Figure 2-2). This switch should not be held in the up position.

CAUTION

The automatic trip circuit in the power supply is not enabled until this switch returns to the center position. The six LOGIC VOLTAGE LED should illuminate, indicating that all six power supplies are operative. If one or more of the power supplies has an overload or fault, the automatic trip circuit will remove all power from the DUT and some LED will go off. Those LED that remain illuminated after power is removed indicate the supply or supplies in which the fault occurred. The cause of the fault should be checked and repaired before reapplying power. Some games draw an exceptionally high amount of current and, consequently, should not be operated in conjunction with another game PCB.

NOTE

GAME POWER A switch will turn off power to both game A and game B interface outlets located on the PAT 9000 right hand side panel. GAME POWER B switch will turn on power to both game interface outlets, since game A must be powered on before game B will work. A power supply overload on either game will remove power from both games.

Testing 1 or 2 four-player games simultaneously is not suited to this mode of operation.

2. Press GAME START 1/1A switch to start game A as a one-player game.

3. Press GAME START 2/2A switch to start game A as a two-player game.

4. Press GAME START 3/1B switch to start game B as a one-player game.

5. Press GAME START 4/2B switch to start game B as a two-player game.

SELECTING THE GAME TO BE DISPLAYED

The COIN, SLAM, AUXILIARY SWITCHES, audio, and video output signals for each game are controlled by the GAME SELECT switch (see Figure 2-2). For example, setting the GAME SELECT switch to the B (down) position means that pressing the appropriate COIN switch will credit game B and that the video displayed will be from game B.

NOTE

Only one game video will be displayed at a time if one game uses black and white raster video and the other game uses an X-Y video display. Remember, both video displays can be left on at all times.

1. To display game A, press the GAME SELECT switch to the A (up) position.

2. To display game B, press the GAME SELECT switch to the B (down) position.

USING THE GAME PLAY CONTROLS

The PAT 9000 has separate GAME POWER switches and separate RESET LATCH indicators; all other PAT 9000 controls affect both games in the same way (see Figure 2-2).

The three COIN counter output signals, the LOCKOUT COIL, SELF TEST, and DIAG switch output signals for each game are tied together; consequently, pressing the PAT 9000 SELF TEST switch to the up (on) position will put both game A and game B in the self-test mode (see Figure 2-2).

1. Press PLAYER SELECT 1/1A switch to test game A player-1 controls.
2. Press PLAYER SELECT 2/2A switch to test game A player-2 controls.
3. Press PLAYER SELECT 3/1B switch to test game B player-1 controls.
4. Press PLAYER SELECT 4/2B switch to test game B player-2 controls.

CHAPTER 5

USING EXTERNAL GAME-PLAY CONTROLS

External game-play controls can be connected to the game through the PAT 9000 in place of the existing front-panel game-play controls by completing two steps:

1. An interconnect cable must be constructed to connect external controls to the AUXILIARY CONNECTORS on the left-hand side panel of the PAT 9000 console. See Chapter 9 for instructions on making your own cables. AUXILIARY CONNECTORS 1 and 3 accept 12-pin harness connectors for digital (pushbutton switch) signals. AUXILIARY CONNECTOR 2 provides GAME A power-supply voltages at the PAT 9000 side panel. AUXILIARY CONNECTOR 4 accepts the 15-pin Trak-Ball™ harness connector and similar analog-type signal connectors.

2. The appropriate PAT 9000 front-panel controls must be disabled by using the DIP switches on the Joystick Interface PCB and/or the Switch Interface 1 PCB.

A Trak-Ball™ adapter harness (part no. A038994-01) is supplied with the PAT 9000. Any Trak-Ball™, steering board, or encoder wheel assembly can be connected to the PAT 9000 with the adapter harness. To disable the internal Trak-Ball™ circuitry, set switch 1 of the DIP switch on the Joystick Interface PCB to the closed (on) position. Connect the Trak-Ball™ adapter harness to AUXILIARY CONNECTOR 4 (see Figure 5-1).

NOTE

Since the internal control (joystick) is disabled only when an external harness is physically connected, switch 1 of the DIP switch on the Joystick Interface PCB can be left in the closed (on) position at all times.

Refer to Chapter 11, Figure 11-16 for a listing of the controls that are available at the AUXILIARY CONNECTORS and the corresponding switch enable on the Joystick Interface or Switch Interface 1 PCB . To disable an internal control, the appropriate switch on the DIP switch must first be in the closed (on) position. Next, the switch-enable wire at the AUXILIARY CONNECTORS must be connected to +5 volts in the interconnect cable. Then, every time the interconnect cable is hooked up, the front-panel control will be disabled. When there is nothing connected to the AUXILIARY CONNECTORS, the front-panel control is once more enabled.

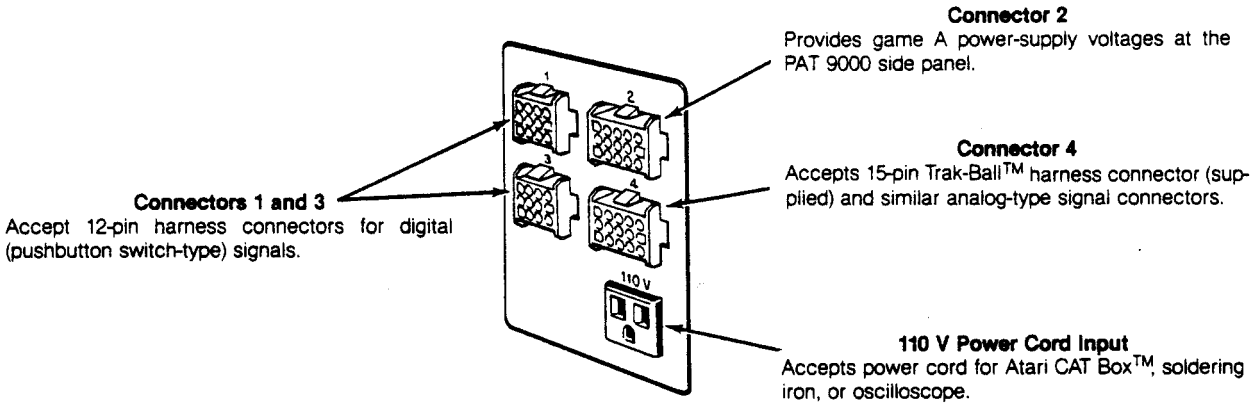


Figure 5-1 Auxiliary Connectors (Left Side-Panel)

For illustrative purposes, the Centipede™ game PCB is used in the following exercise.

1. Press the MAIN POWER rocker switch to the off position.

2. Open the front panel of the PAT 9000 by using a Phillips-head screwdriver to unlatch the three spring-loaded quarter-turn fasteners.

3. Pull the Joystick Interface PCB approximately 2 inches out of the card cage. Make sure you do not disturb the settings of the potentiometers. (See Chapter 4, Trak-Ball™/Steering Control, for FREQ potentiometer adjustment.)

4. Set switch 1 on the DIP switch to the closed (on) position.

5. Push the Joystick Interface PCB back into the card cage. Make sure it is seated securely.

6. Close the front panel of the PAT 9000 by tightening the three spring-loaded quarter-turn fasteners.

7. Press the MAIN POWER rocker switch to the on position (illuminated).

8. Connect the Trak-Ball™ adapter harness (part no. A038994-01) to AUXILIARY CONNECTOR 4 on the PAT 9000 left-side panel.

9. Connect a spare Trak-Ball™ control to the appropriate Trak-Ball™ adapter harness connector.

10. Connect the Centipede™ game PCB to the PAT 9000, using the preliminary set-up procedures in Chapter 3 of this manual.

You are now ready to test or troubleshoot the Trak-Ball™ movements or the game play.

CHAPTER 6

TROUBLESHOOTING A GAME BOARD

Refer to Chapter 3 of this manual for the preliminary set-up procedures for connecting the game board to the PAT 9000. The video game logic board composes many interactive circuits. On a faulty board, the source of the problem can best be isolated by testing and repairing each section of the game board in a logical troubleshooting sequence.

TROUBLESHOOTING SEQUENCE

The following troubleshooting sequence is recommended for locating a problem in the game board.

CHECK POWER SUPPLIES

Verify that all power supplies are at their proper voltage levels.

CHECK VIDEO AND AUDIO OUTPUT STAGES

Verify that the video and audio output buffers are not shorted.

CHECK $\overline{\text{RESET}}$

Check $\overline{\text{RESET}}$ at pin 40 of the microprocessor socket (6502 and 6800 microprocessors only) or use the RESET LATCH switch and reset LED outputs on the PAT 9000 control panel. During normal operation, the $\overline{\text{RESET}}$ signal should be at logic 1 (LED off). If the $\overline{\text{RESET}}$ signal is stuck in the logic 0 condition, then suspect the watchdog circuitry. If the $\overline{\text{RESET}}$ signal is toggling between logic 1 and logic 0, then suspect a problem associated with RAM, ROM, address bus, data bus or microprocessor.

CHECK RAM, ROM, ADDRESS BUS AND DATA BUS

Check that the RAM, ROM, address bus and data bus are all operational using the CAT Box. See Chapter 5 in the CAT Box Users Guide.

CHECK INPUT CONTROLS

Verify that all input controls are functional by performing a self-test and checking each switch and control individually. Refer to the game manual for self-test procedures.

CHECK GAME OUTPUTS

Verify that the game outputs, i.e., coin counter outputs, LED outputs, etc., are all operational.

USING THE SELF-TEST CONTROLS

The game board is placed in the self-test mode by setting the SELF-TEST switch to the up position. The self-test pattern should be displayed on

the appropriate video display. The video and audio output power reset, RAM, ROM, address bus, data bus, input controls, and game outputs can be tested in this mode.

Setting the SELF-TEST switch to the down position and then releasing it will have the effect of momentarily placing the game board in the self-test mode. On many games, this has the same effect as pressing the reset button.

When using the PAT 9000 to operate two game boards simultaneously, the self-test signal for both games is tied together. Setting the SELF-TEST switch to the up position places both game boards in the self-test mode.

USING THE DIAGNOSTIC CONTROL

Some games have a diagnostic control input at the edge connector. This is used to advance the self-test display from one screen to the next. Check the schematics or program-plug wiring diagram in the game manual to see if diagnostic is used with the particular game you are troubleshooting. The DIAG switch can be operated as a momentary (down) or latching toggle (up) switch.

When operating two game boards with the PAT 9000 , the DIAG switch affects both game boards simultaneously.

USING THE RESET LATCH CONTROL

Some games have a RESET output at the game edge connector. Under normal operation, this output will remain in the logic 1 condition while the game is powered up. If this output goes low anytime after the game has been powered up, this indicates that a fault exists in the game board. The PAT 9000 can monitor this output with either a normal or stand-by mode.

NORMAL Position. When the RESET LATCH switch is set to the NORMAL position, the reset LED reflect the state of the corresponding reset output from the game board. If the reset output is high, the LED will be off. If the reset output is low, the LED will be on.

LATCH and LATCH RESET Positions. When the RESET LATCH switch is set to the LATCH position, the reset LED will remain off as long as the reset signal remains at logic 1. However, if the reset signal goes to logic 0 momentarily, the reset LED will light and remain lit until reset by the operator. The LED is reset by momentarily placing the RESET LATCH switch in the LATCH RESET position.

USING THE SWITCH FUNCTION SELECT CONTROL

The SWITCH FUNCTION switch is used to troubleshoot the switch inputs on the game board. It affects the GAME START switches, GAME PLAY CONTROLS switches 1 through 10, COIN switches 1 through 3, SLAM switch and AUXILIARY switches 1 through 4.

Normal (Up) Position. The SWITCH FUNCTION switch should be in the up position for normal testing and operating of the game.

Toggle (Center) Position. This switch position only affects the momentary pushbutton switches and can be used to hold down any or all of the momentary switches. Set the SWITCH FUNCTION switch to the center position. Press and release one of the momentary switches, e.g., GAME START 1. The game switch input will be held in the on state until this switch is pressed and released again.

Pulsing (Down) Position. This switch position affects all the momentary toggle switches previously mentioned. Set the SWITCH FUNCTION switch to the momentary (down) position. Press and release one of the momentary switches, e.g., GAME START 1, or set one of the toggle switches, e.g., AUXILIARY SWITCHES 1, to the on position. The PAT 9000 will now send a stream of pulses along that switch input until the momentary switch is pressed and released again, or the toggle switch is set to the off position. This makes it easier to follow a switch input trace along the double-sided printed circuit board while locating a shorted or open circuit switch input.

NOTE

Changing the position of the SWITCH FUNCTION switch automatically resets all momentary switches to their normal off state. Thus, on entering either toggle or pulsing mode of operation all momentary switches will start in the off state.

USING THE CAT BOX

Refer to Chapter 5 of the CAT Box Users Guide for preliminary set-up procedures. The CAT Box can be used in all of its modes of operation on a game board that is connected to the PAT 9000. In addition, by connecting a known working board to the GAME B edge connector on the PAT 9000, the signals from the faulty board can be compared to those on the good board. This technique can be particularly useful when using signature analysis troubleshooting methods. Be careful that the part numbers for the program ROM's in each game set are the same. Otherwise, the signatures from each board may be different.

CHAPTER 7

TESTING A REGULATOR/AUDIO II BOARD

The PAT 9000 can be used to test the operation of the game Regulator/Audio II board circuitry. A special test cable is required to connect the board to the PAT 9000. Contact your Atari Customer Service office for test cable information.

The regulator circuitry is tested by measuring the output voltages at each test point on the Regulator/Audio II PCB. Refer to the Regulator/Audio II PCB schematic diagram in the game manual for test point locations.

NOTE

The 36 VAC input to J9 is rectified in the PAT 9000. Thus, the voltage at the 36 VAC test points on the Regulator/Audio II PCB will measure about 22 VDC.

The audio circuitry on the Regulator/Audio II PCB is tested by performing the following procedure:

1. Connect the test cable from the PAT 9000 GAME A1 connector to J6, J7, J8, and J9 on the Regulator/Audio II PCB. Make sure the proper test cable connectors are plugged into J6 and J9.

2. Set the PAT 9000 controls as follows:

GAME POWER A	on
GAME SELECT A	
PLAYER SELECT 1A	on

3. Turn on the PAT 9000 MAIN POWER switch.

4. Move the PAT 9000 Joystick Lever to the right and listen for an audible tone. Verify that the tone frequency increases as the Joystick Lever is moved to the right. Rotate the PAT 9000 AUDIO 1 control and note that the tone level varies.

5. Move the Joystick Lever upward and listen for an audible tone. Verify that the tone frequency increases proportionately as the Joystick Lever is moved upward. Rotate the PAT 9000 AUDIO 2 control and note that the tone level varies.

CHAPTER 8

MAINTENANCE

This chapter contains removal and replacement information for those assemblies that require special procedures. Refer to Chapter 10, Illustrated Parts List, for assembly and component locations and descriptions.

NOTE

An Extender Board Assembly is included in the PCB cage toprovide a convenient extension for troubleshooting the Multiplex PCB Assembly or any of the cage-mounted PCB.

REMOVAL AND REPLACEMENT

WARNING

Dangerous potentials exist inside the PAT 9000 console. Remove power before removing or replacing assemblies or components.

Remove the PAT 9000 top cover and lower the hinged control panel for access to the following assemblies.

MULTIPLEX PCB ASSEMBLY

CAUTION

The Multiplex PCB Assembly contains static-sensitive devices. Be sure to provide adequate grounding before touching the integrated circuit component leads.

Remove and replace the Multiplex PCB Assembly as follows:

1. Remove the Multiplex PCB Assembly, with interconnecting cables attached, by grasping the top edge of the board and lifting straight up.

2. Remove the connectors and cables from the board.

3. Reinstall in reverse order. Make sure the connectors are properly plugged in. Note that the connectors are keyed to fit one way only.

POWER AND INDICATOR LED PCB ASSEMBLIES

NOTE

The connectors on the Power and Indicator LED PCB Assemblies are not keyed. Before removing, note the proper orientation of the connectors to insure proper reconnection.

Remove and replace the Power and Indicator LED PCB Assemblies as follows:

1. Remove the connectors from the board.
2. Use a Phillips-head screwdriver to hold the mounting screws on the front of the control panel, and remove the two mounting nuts, lock washers, and insulating washers.
3. Carefully lift the board straight up from the control panel.
4. Reinstall in reverse order. Make sure an insulating washer is installed on each side of the board.

JOYSTICK CONTROL ASSEMBLY

Remove and replace the Joystick Control Assembly as follows:

1. Note the approximate position of the potentiometer adjustment tabs (see Figure 8-1 for adjustment tab locations), e.g., 12 o'clock, 1 o'clock, etc., before removing the Joystick Control Assembly.
2. Unsolder the potentiometer leads.
3. Remove the four slotted mounting screws from the back of the Joystick Control Assembly (the joystick front plate will fall free), and lift the joystick from the control panel.
4. Reinstall in reverse order. Make sure the potentiometer adjustment tabs are positioned as noted in step 1.

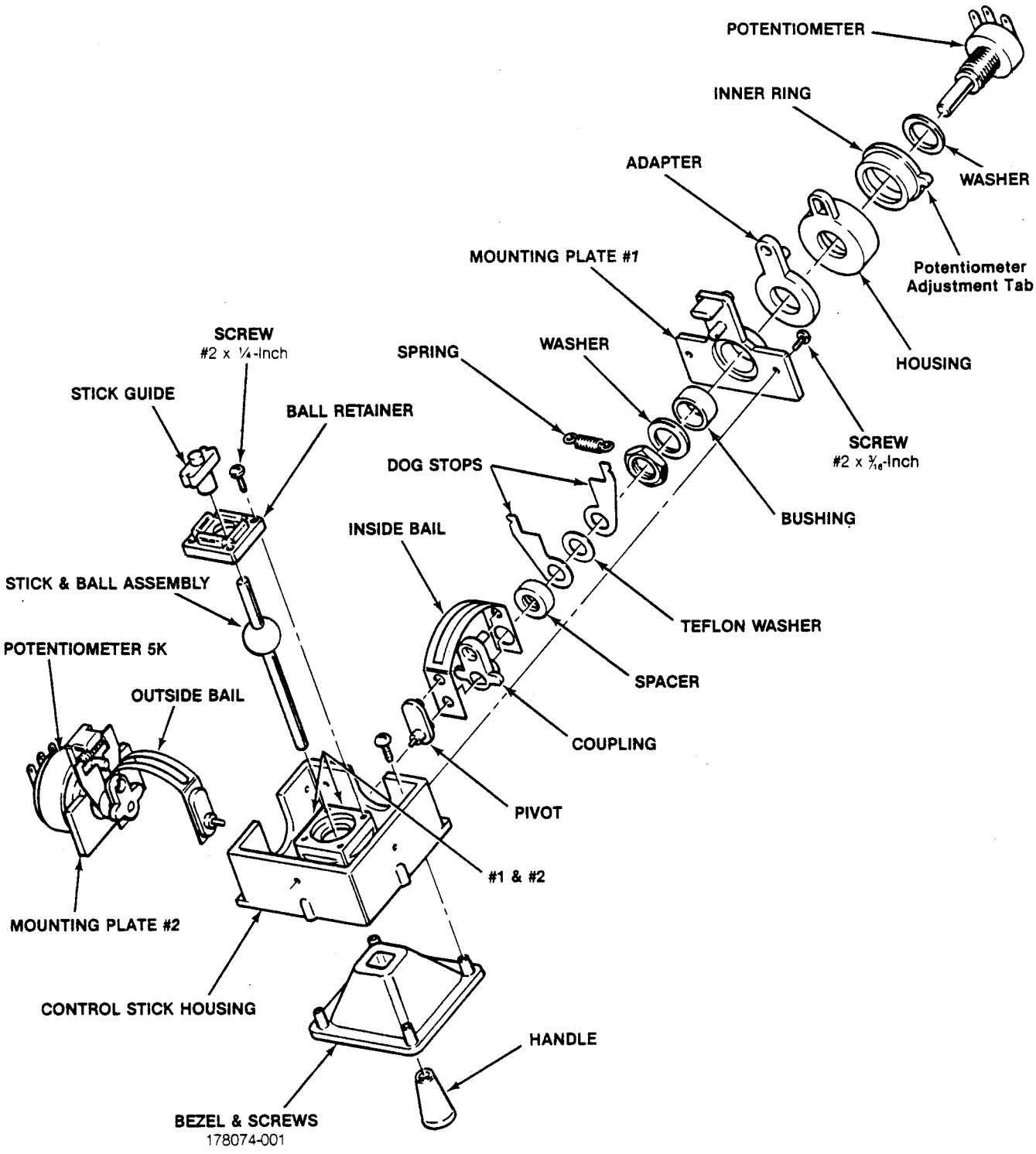


Figure 8-1 Joystick Control Assembly
71-6102

CHAPTER 9

MAKING YOUR OWN PROGRAM-PLUG AND AUXILIARY-CONTROL INTERFACE CABLE

This chapter provides instructions for assembling the Program-Plug and Auxiliary-Control Interface Cables. Parts for assembling these cables are available in kit form from your Atari Customer Service office. Refer to Appendix A for the program plug assembly parts list.

MAKING A PROGRAM-PLUG INTERFACE CABLE

Program-Plug Pin Assignments tables, which include signal designations for the PAT 9000, are provided in Chapter 11, Figure 11-16. The following Table 9-1 provides game-board to PAT 9000 signal interface information to aid in determining which program-plug pins are used to check the game board.

Table 9-1

PROGRAM-PLUG SIGNAL FUNCTIONS

SIGNAL	FUNCTION
	SWITCHES
S1 A	Switch 1, Player 1 or Digital Joystick Output
S7 UP	Joystick Left B, Switch 7 UP and Digital Joystick Left Outputs, Player 2
S11 A,B	S11 (Rotary Switch) Position 1, Player 2 Output
COIN 1 (L) GAME A	COIN Switch 1 (Left) Output, Game A
SELF TEST	Game Self-Test Output
DIAGNOSTIC	Game Diagnostic Output (if any)
START 2	GAME START 2 Switch Output
	TRAK-BALL™
H CLK A	Horizontal Clock Signal, Player 1 Output
V DIR C	Vertical Direction Signal, Player 3 Output
	POTENTIOMETERS
H POT A	Analog Joystick Horizontal Pot, Player 1 Output
PADDLE B	Paddle, Player 2 Output
	AUDIO
AUDIO 1, GAME A	Audio 1 Signal
AUDIO 1, PWR GND, GAME A	Audio 1 Power Ground. Grounded only if Logic board has power audio amplifier, otherwise open circuit.
	VIDEO
CRV, GAME A	Color Raster Video Select Flag, Game A. Grounded only if DUT uses color raster video display,

	otherwise open circuit if game uses X-Y video or black and white raster video.
RED, GAME A	Red Video Signal (Raster or X-Y)
H SYNC/X, GAME A	Horizontal Sync., if CRV is grounded, otherwise X signal for X-Y video.
CSYNC/COMP VIDEO A	Composite Sync Signal (active low) if CRV is grounded, otherwise composite video signal black and white.
VIDEO GND	Game Video Ground must be connected here.
X RETURN	If X-Y video is used, connect X RETURN signal here.

MISCELLANEOUS

COIN COUNTER 1 (L)	Coin Counter 1 (Left) Input, Game 1 or 2
LOCKOUT COIL	Lockout Coil Input
L1 INDICATOR	LED Indicator 1 Input (Active Low)
L9 INDICATOR	LED Indicator 9 Input (Active High)
START 1 LED	GAME START Switch 1 LED Input
SWITCH POLARITY	Ground this input to invert all switch outputs, i.e., make them active high, except SELF-TEST and DIAG switches.
GND (PAT 9000)	Signal Ground. Use this point to ground CRV, SWITCH POLARITY, as required, or as a signal ground for audio.

POWER/POWER RETURN

+5 V REG.*	+5-Volts Regulated Output (5 pins supplied). Distribute the 5-volt load equally among these pins. Each pin should carry no more than 2 amps.
GND (10.6 V, 5 V RETURN)*	Main Power Ground (6 pins supplied) Do not bring audio or video return to these pins. Use separate signal grounds provided. Distribute power-return current equally between these pins. Each pin should carry no more than 2 amps.
10.6 V UNREG.*	Unregulated 10.6-Volt Supply (3 pins supplied)
SIG GND (+/- 22 V RETURN)	Use these pins as low-noise return point for +22-volt supply, +12-volt supply, -5-volt supply, -22-volt supply, or for grounding AUDIO 1 or 2 power ground pins.
+VAR VOLTS	Variable Positive Voltage Supply. Adjustable from 1.5 volts to 20 volts at Switch Control PCB. Limited to 0.5 amperes.
-VAR VOLTS	Variable Negative Voltage Supply. Adjustable from -1.5 volts to -20 volts at Switch Control PCB. Limited to -0.5 amperes.

* Only one wire should be crimped to each of these pins. Do not double-crimp wires since they can weaken the pins or the plug and cause overheating.

MAKING AN AUXILIARY-CONTROL INTERFACE CABLE

Refer to Chapter 11, Figure 11-16, for Auxiliary Connector Pin Assignments tables which contain signal designations and switch enable information.

Detailed instructions for using the auxiliary-control interface cable to operate external controls with the PAT 9000 are included in Chapter 5.

CHAPTER 10

ILLUSTRATED PARTS LIST

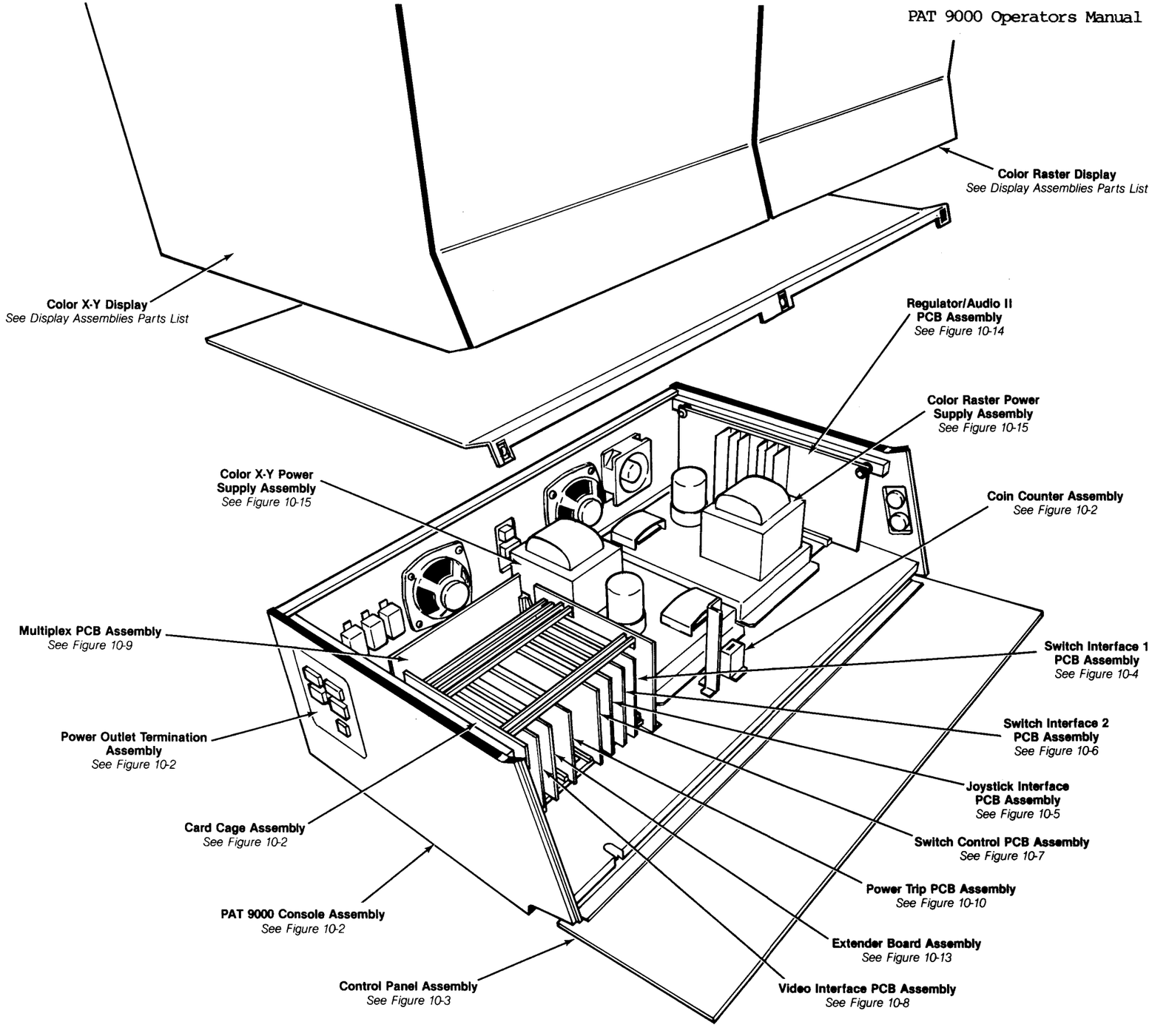


Figure 10-1 PAT 9000 Overview

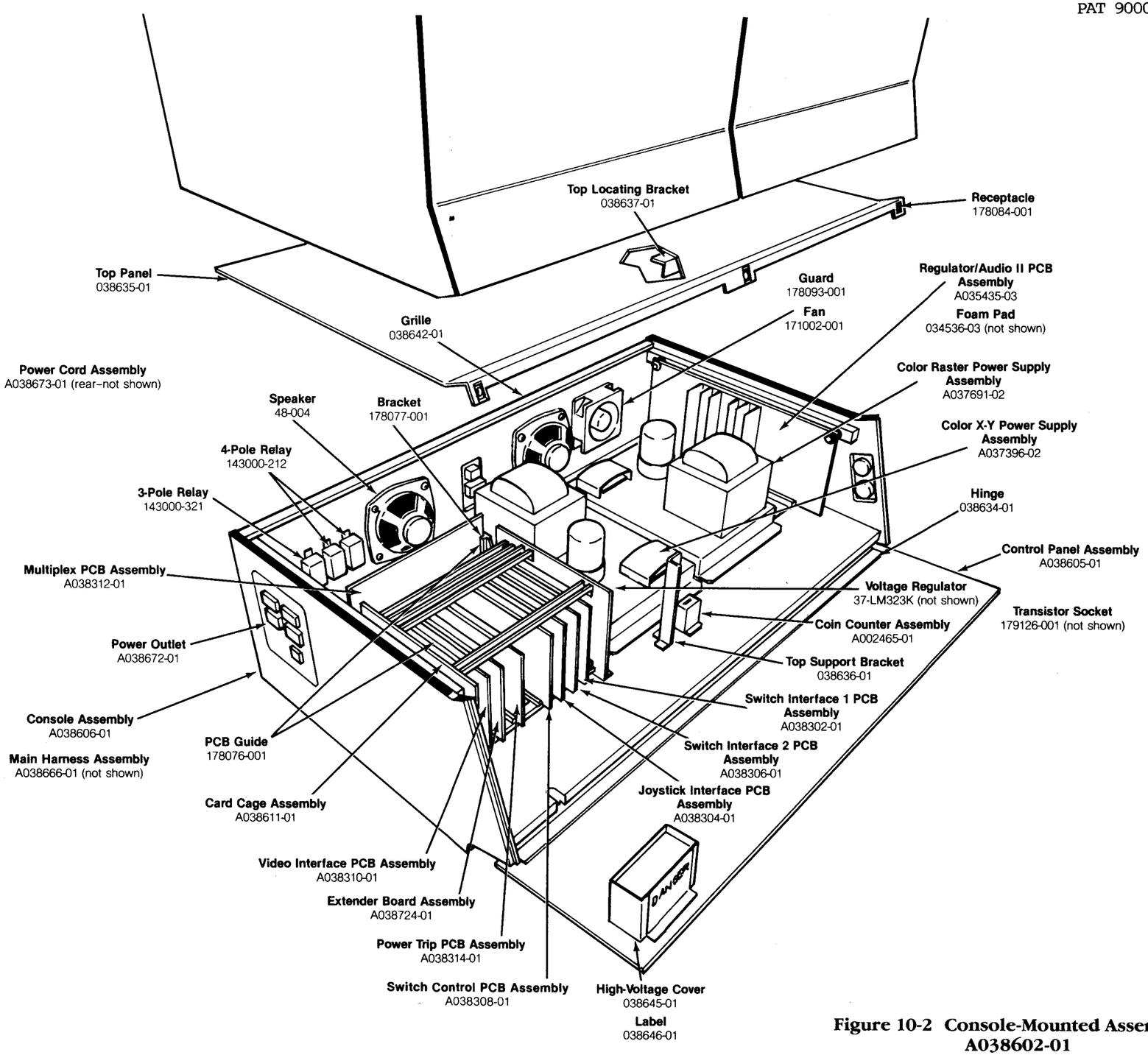


Figure 10-2 Console-Mounted Assemblies A038602-01

Console-Mounted Assemblies

Parts List

Coin Counter Assembly	A002465-01
Regulator/Audio II Printed-Circuit-Board Assembly	A035435-03
Color X-Y Power Supply Assembly	A037396-02
Color Raster Power Supply Assembly	A037691-02
Joystick Interface Printed-Circuit-Board Assembly	A038304-01
Interface 1 Printed-Circuit-Board Assembly	A038302-01
Interface 2 Printed-Circuit-Board Assembly	A038306-01
Control Switch Printed-Circuit-Board Assembly	A038308-01
Video Interface Printed-Circuit-Board Assembly	A038310-01
Multiplex Printed-Circuit-Board Assembly	A038312-01
Power Trip Printed-Circuit-Board Assembly	A038314-01
Control Panel Assembly	A038605-01
Console Assembly	A038606-01
Card Cage Assembly	A038611-01
Main Harness Assembly (not shown)	A038666-01
Game Interconnect Cable Assembly (not shown)	A038667-01
Power Outlet Termination Assembly	A038672-01
Power Cord Assembly	A038673-01
Extender Board Assembly	A038724-01
Trak-Ball™ Adapter Harness Assembly (not shown)	A038994-01
5 V, 3 A Voltage Regulator Integrated Circuit (located in transistor socket)	37-LM323K
5-Inch, 8-Ohm Speaker	48-004
Foam Pad	034536-03
Control Panel Hinge	038634-01
Console Top Panel	038635-01
Top Support Bracket	038636-01
Top Locating Bracket	038637-01
Fan/Speaker Grille	038642-01
Circuit Board High Voltage Cover	038645-01
Label	038646-01
4-Pole Relay	143000-212
3-Pole Relay	143000-321
110 V Exhaust Fan	171002-001
Printed-Circuit-Board Guide	178076-001
Card Guide Bracket	178077-001
1/4-Turn Fastener Receptacle	178084-001
Fan Blade Guard	178093-001
Transistor Socket (located on right side of card cage)	179126-001

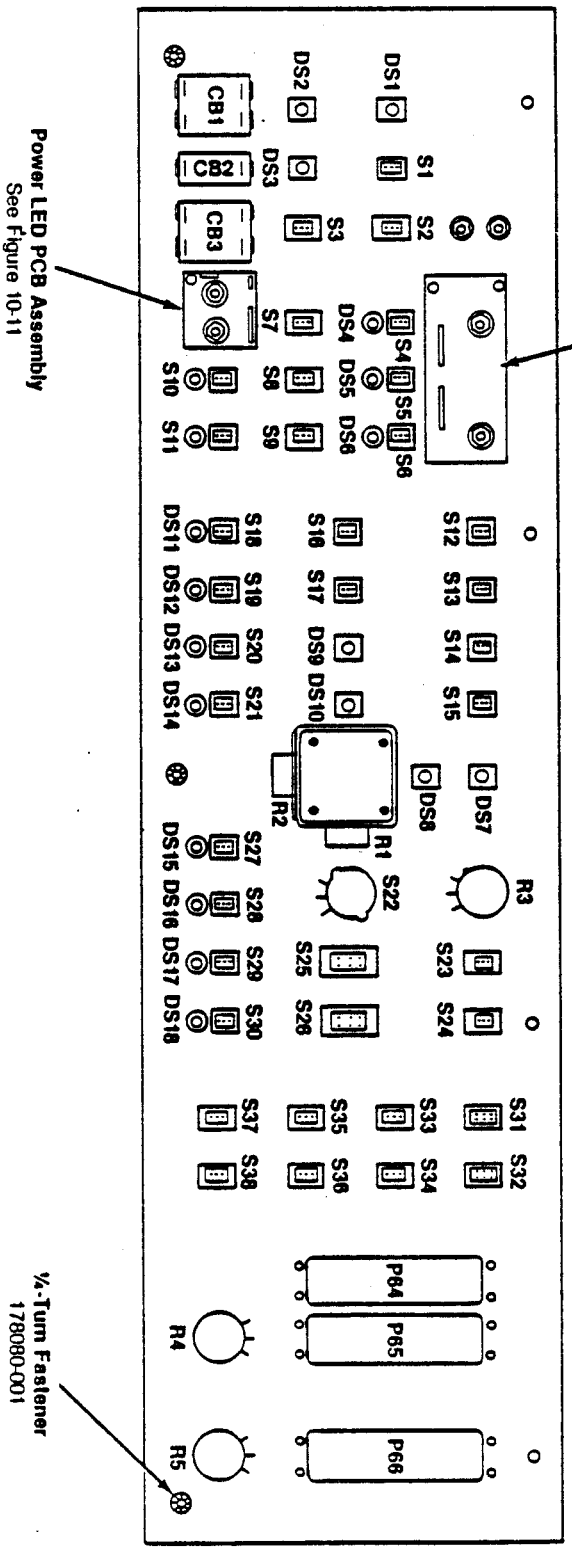


Figure 10-3 Control Panel Assembly
A038605-01

Control Panel Assembly

Parts List

CB1	Circuit Breaker Light-Emitting-Diode Termination Assembly, 8A	A038670-01
CB2	Circuit Breaker Neon Termination Assembly, 3A	A038671-01
CB3	Circuit Breaker Light-Emitting-Diode Termination Assembly, 5A	A038670-02
DS1-DS10	Red Light-Emitting-Diode	38-MV5053
DS1-DS3	Black Switch Bezel	178072-001
DS1-DS3	Black LED Insert Switch Panel	178073-001
DS7-DS10	Black Switch Bezel	178072-001
DS7-DS10	Black LED Insert Switch Panel	178073-001
DS11-DS14	5 V, Current-Limited Light-Emitting Diode	131010-001
DS15-DS18	Red Light-Emitting-Diode	38-MV5053
R2	Joystick Assembly	71-6102
R2	Joystick Bezel (with screws)	178074-001
R3-R5	5 kΩ Potentiometer (with nut)	19-9022
S1	Black with Black Frame, Momentary Pushbutton SPDT Switch	160019-201
S2	Black with Black Frame, ON/ON SPDT Switch Lever	160017-210
S3	Black with Black Frame, ON/OFF/Momentary ON SPDT Switch Lever	160017-213
S4-S6	Black with Black LED Frame, Momentary Pushbutton SPDT Switch	160019-211
S7, S8	Black with Black Frame, ON/OFF/Momentary ON SPDT Switch Lever	160017-213
S9	Black with Black Frame, ON/OFF/ON SPDT Switch Lever	160017-211
S10, S11	Red Light-Emitting-Diode	38-MV5053
S10, S11	Black with Black LED Frame, ON/OFF/Momentary ON SPDT Switch Lever	160017-233
S12-S17	Black with Black Frame, Momentary Pushbutton SPDT Switch	160019-201
S18-S21	Black with Black LED Frame, Momentary Pushbutton SPDT Switch	160019-211
S22	Control Knob	178082-001
S22	Rotary Switch (with nut)	160020-001
S23, S24	Black with Black Frame, ON/ON SPDT Switch Lever	160017-210
S25, S26	Black with Black Frame, Momentary ON/ON/Momentary ON DPDT Switch Lever	160018-228
S27-S30	Black with Black LED Frame, Momentary Pushbutton SPDT Switch	160019-211
S31-S34	Black with Black Frame, ON/OFF/Momentary ON SPDT Switch Lever	160017-213
S35-S38	Black with Black Frame, ON/OFF/Momentary ON DPDT	

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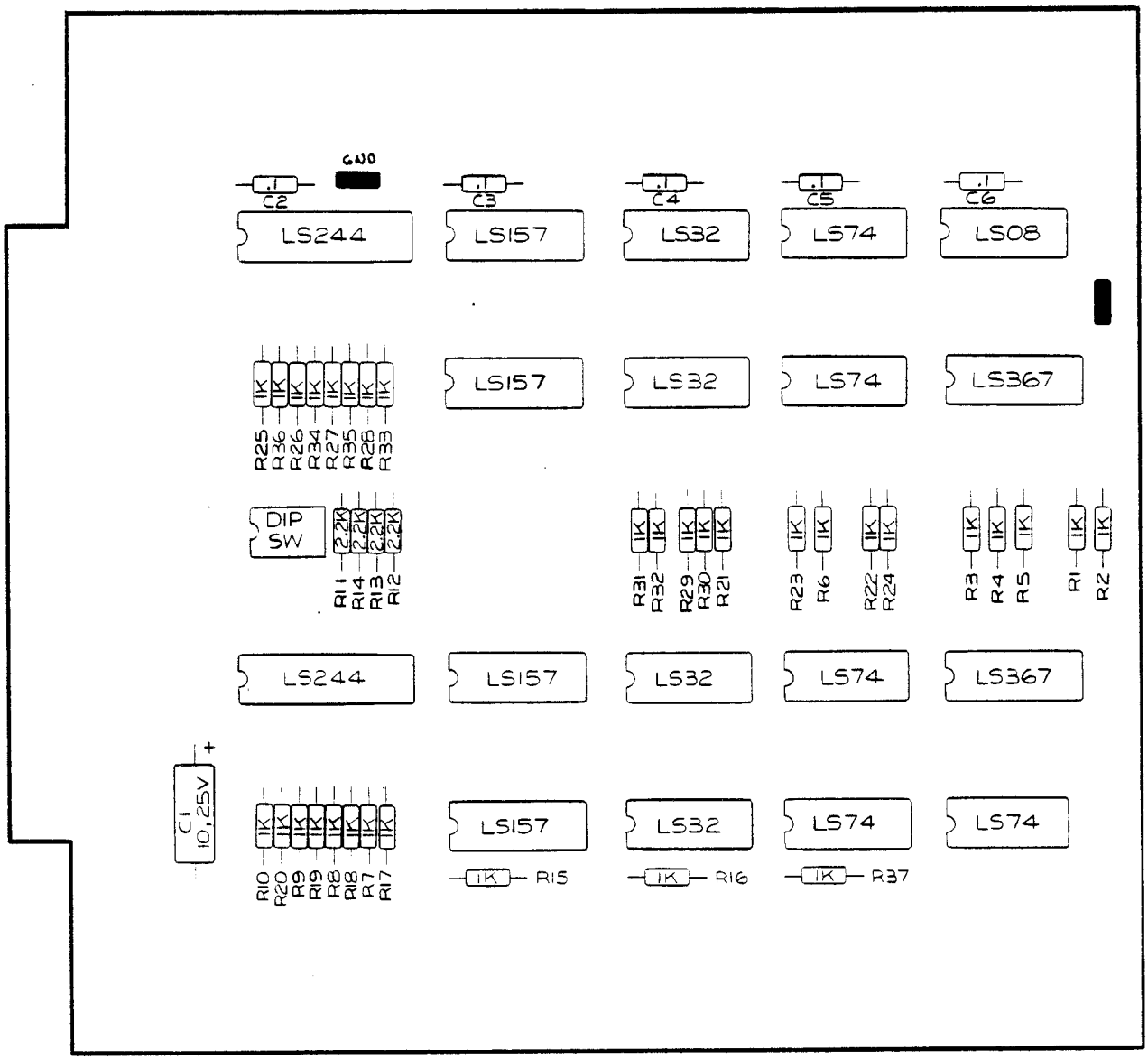


Figure 10-4 Switch Interface 1 PCB Assembly A038302-01

Switch Interface 1 PCB Assembly

Parts List

Capacitors

C1	10 µF, 25 V Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-250106
C2-6	0.1 µF, +80%,-20%, 50 V Ceramic-Disc Axial-Lead Capacitor	122002-104

Integrated Circuits

A1	Type-74LS08 Integrated Circuit	37-74LS08
A2	Type-74LS74 Integrated Circuit	37-74LS74
A3	Type-74LS32 Integrated Circuit	37-74LS32
A4	Type-74LS157 Integrated Circuit	37-74LS157
A5	Type-74LS244 Integrated Circuit	37-74LS244
B1	Type-74LS367 Integrated Circuit	37-74LS367
B2	Type-74LS74 Integrated Circuit	37-74LS74
B3	Type-74LS32 Integrated Circuit	37-74LS32
B4	Type-74LS157 Integrated Circuit	37-74LS157
D1	Type-74LS367 Integrated Circuit	37-74LS367
D2	Type-74LS74 Integrated Circuit	37-74LS74
D3	Type-74LS32 Integrated Circuit	37-74LS32
D4	Type-74LS157 Integrated Circuit	37-74LS157
D5	Type-74LS244 Integrated Circuit	37-74LS244
E1,E2	Type-74LS74 Integrated Circuit	37-74LS74
E3	Type-74LS32 Integrated Circuit	37-74LS32
E4	Type-74LS157 Integrated Circuit	37-74LS157

Resistors

R1-R10	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R11-R14	2.2 kΩ, ±5%, 1/4 W Resistor	110000-222
R15-R37	1 kΩ, ±5%, 1/4 W Resistor	110000-102

Miscellaneous

C5	4-Station, Single-Throw, Dual-Inline-Package Bit Switch	66-114P1T
	Test Point (Acceptable substitute is part no. 020670-01)	179051-002

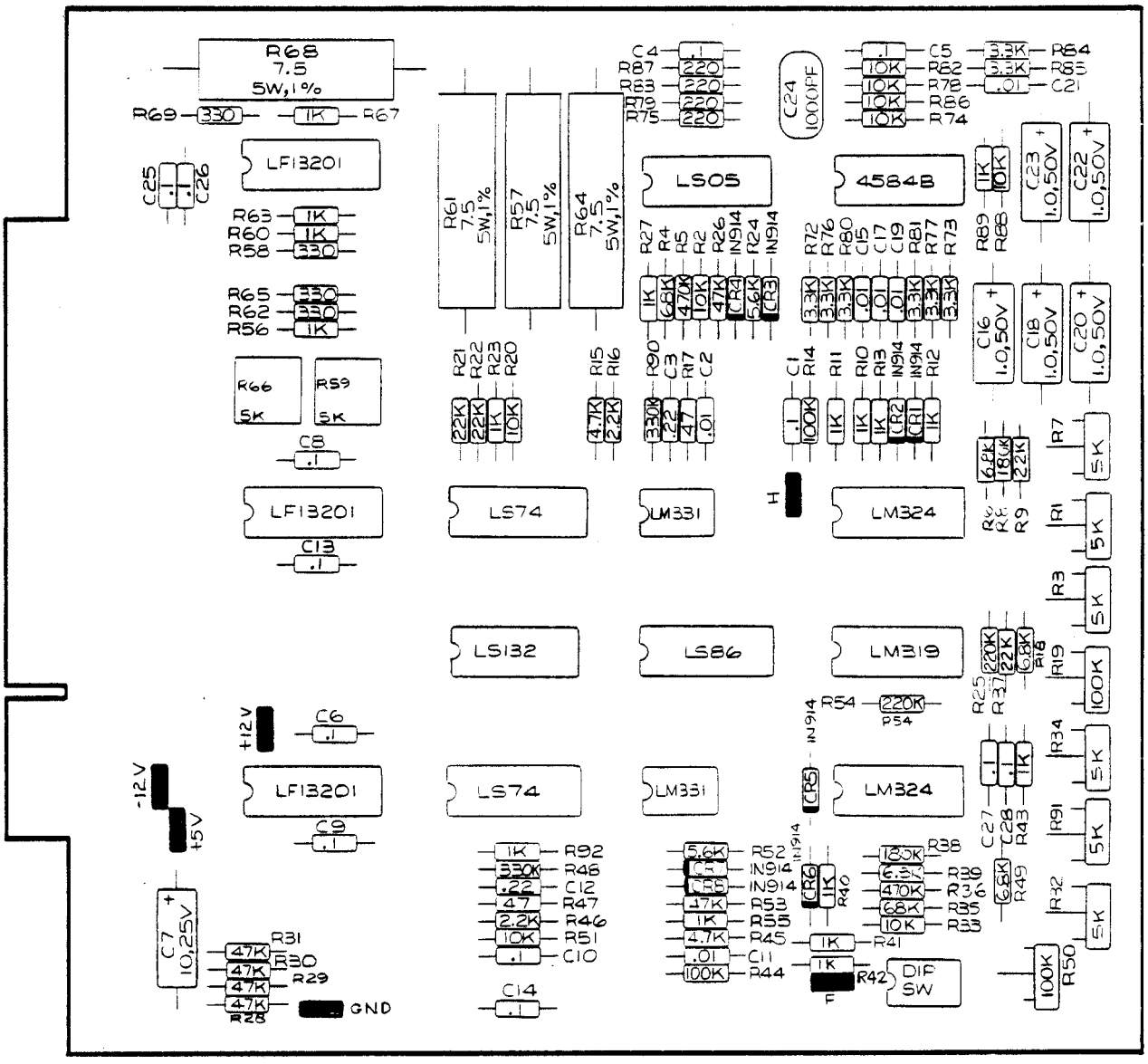


Figure 10-5 Joystick Interface PCB Assembly
A038304-01

Joystick Interface PCB Assembly

Parts List

Capacitors

C1	0.1 µF, +80%,-20%, 50 V Ceramic-Disc Axial-Lead Capacitor	122002-104
C2	0.01 µF, +80%,-20%, 25 V Ceramic-Disc Axial-Lead Capacitor	122005-103
C3	0.22 µF, ±20%, 25 V Ceramic-Disc Axial-Lead Capacitor	122004-224
C4-6	0.1 µF, +80%,-20%, 50 V Ceramic-Disc Axial-Lead Capacitor	122002-104
C7	10 µF, 25 V Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-250106
C8-10	0.1 µF, +80%,-20%, 50 V Ceramic-Disc Axial-Lead Capacitor	122002-104
C11	0.01 µF, +80%,-20%, 25 V Ceramic-Disc Axial-Lead Capacitor	122005-103
C12	0.22 µF, ±20%, 25 V Ceramic-Disc Axial-Lead Capacitor	122004-224
C13-14	0.1 µF, +80%,-20%, 50 V Ceramic-Disc Axial-Lead Capacitor	122002-104
C15	0.01 µF, +80%,-20%, 25 V Ceramic-Disc Axial-Lead Capacitor	122005-103
C16	1.0 µF, 50 V Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-500105
C17	0.01 µF, +80%,-20%, 25 V Ceramic-Disc Axial-Lead Capacitor	122005-103
C18	1.0 µF, 50 V Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-500105
C19	0.01 µF, +80%,-20%, 25 V Ceramic-Disc Axial-Lead Capacitor	122005-103
C20	1.0 µF, 50 V Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-500105
C21	0.01 µF, +80%,-20%, 25 V Ceramic-Disc Axial-Lead Capacitor	122005-103
C22-23	1.0 µF, 50 V Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-500105
C24	1000 pF, 100V, Epoxy-Dipped Mica Radial-Lead Capacitor	128002-102
C25-26	0.1 µF, +80%,-20%, 50 V Ceramic-Disc Axial-Lead Capacitor	122002-104

Diode

CR1-CR8	Type-1N914, 75 V Switching Diode	31-1N914

Integrated Circuits

A2	Hex Schmitt Trigger Integrated Circuit	37-4584B
A3	Type-74LS05 Integrated Circuit	137167-001
A5	Quad Analog Switch Integrated Circuit	37-13201
C2	Type-LM324 Integrated Circuit	37-LM324
C3	Voltage-to-Frequency Converter Integrated Circuit	137230-001
C4	Type-74LS74 Integrated Circuit	37-74LS74
C5	Quad Analog Switch Integrated Circuit	37-13201
D2	Type-LM319 Integrated Circuit	37-LM319
D3	Type-74LS86 Integrated Circuit	37-74LS86
D4	Type-74LS132 Integrated Circuit	37-74LS132
E2	Type-LM324 Integrated Circuit	37-LM324
E3	Voltage-to-Frequency Converter Integrated Circuit	137230-001
E4	Type-74LS74 Integrated Circuit	37-74LS74
E5	Quad Analog Switch Integrated Circuit	37-13201

Resistors

R1	5 kΩ Vertical Trimming Potentiometer	19-315502
R2	10k Ω, ±5%, 1/4 W Resistor	110000-103
R3	5 kΩ Vertical Trimming Potentiometer	19-315502
R4	68k Ω, ±5%, 1/4 W Resistor	110000-683
R6	6.8k Ω, ±5%, 1/4 W Resistor	110000-682
R7	5 kΩ Vertical Trimming Potentiometer	19-315502
R8	180k Ω, ±5%, 1/4 W Resistor	110000-184
R9	22k Ω, ±5%, 1/4 W Resistor	110000-223
R10-13	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R14	100k Ω, ±5%, 1/4 W Resistor	110000-104
R15	4.7k Ω, ±5%, 1/4 W Resistor	110000-472
R16	2.2 kΩ, ±5%, 1/4 W Resistor	110000-222
R17	47 Ω, ±5%, 1/4 W Resistor	110000-470
R18	6.8k Ω, ±5%, 1/4 W Resistor	110000-682
R19	100 kΩ Vertical Trimming Potentiometer	19-315104
R20	10k Ω, ±5%, 1/4 W Resistor	110000-103
R21-22	22k Ω, ±5%, 1/4 W Resistor	110000-223
R23	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R24	5.6k Ω, ±5%, 1/4 W Resistor	110000-562
R25	220k Ω, ±5%, 1/4 W Resistor	110000-224
R26	47k Ω, ±5%, 1/4 W Resistor	110000-473
R27	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R28-31	47k Ω, ±5%, 1/4 W Resistor	110000-473
R32	5 kΩ Vertical Trimming Potentiometer	19-315502

R33	10k Ω, ±5%, 1/4 W Resistor	110000-103
R34	5 kΩ Vertical Trimming Potentiometer	19-315502
R35	68k Ω, ±5%, 1/4 W Resistor	110000-683
R36	470k Ω, ±5%, 1/4 W Resistor	110000-474
R37	22k Ω, ±5%, 1/4 W Resistor	110000-223
R38	180k Ω, ±5%, 1/4 W Resistor	110000-184
R39	6.8k Ω, ±5%, 1/4 W Resistor	110000-682
R40-43	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R44	100k Ω, ±5%, 1/4 W Resistor	110000-104
R45	4.7k Ω, ±5%, 1/4 W Resistor	110000-472
R46	2.2 kΩ, ±5%, 1/4 W Resistor	110000-222
R47	47 Ω, ±5%, 1/4 W Resistor	110000-470
R48	330k Ω, ±5%, 1/4 W Resistor	110000-334
R49	6.8k Ω, ±5%, 1/4 W Resistor	110000-682
R50	100 kΩ Vertical Trimming Potentiometer	19-315104
R51	10k Ω, ±5%, 1/4 W Resistor	110000-103
R52	5.6k Ω, ±5%, 1/4 W Resistor	110000-562
R53	47k Ω, ±5%, 1/4 W Resistor	110000-473
R54	220k Ω, ±5%, 1/4 W Resistor	110000-224
R55	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R56	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R57	7.5 Ω, ±5%, 5 W Resistor	116001-075
R58	330 Ω, ±5%, 1/4 W Resistor	110000-331
R59	5 kΩ Horizontal Trimming Potentiometer	119002-502
R60	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R61	7.5 Ω, ±5%, 5 W Resistor	116001-075
R62	330 Ω, ±5%, 1/4 W Resistor	110000-331
R63	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R64	7.5 Ω, ±5%, 5 W Resistor	116001-075
R65	330 Ω, ±5%, 1/4 W Rsistor	110000-331
R66	5 kΩ Horizontal Trimming Potentiometer	119002-502
R67	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R68	7.5 Ω, ±5%, 5 W Resistor	116001-075
R69	330 Ω, ±5%, 1/4 W Resistor	110000-331
R70-71	10k Ω, ±5%, 1/4 W Resistor	110000-103
R72-73	3.3k Ω, ±5%, 1/4 W Resistor	110000-332
R74	10k Ω, ±5%, 1/4 W Resistor	110000-103
R75	220 Ω, ±5%, 1/4 W Resistor	110000-221
R76-77	3.3k Ω, ±5%, 1/4 W Resistor	110000-332
R78	10k Ω, ±5%, 1/4 W Resistor	110000-103
R79	220 Ω, ±5%, 1/4 W Resistor	110000-221
R80-81	3.3k Ω, ±5%, 1/4 W Resistor	110000-332

R82	10k Ω, ±5%, 1/4 W Resistor	110000-103
R83	220 Ω, ±5%, 1/4 W Resistor	110000-221
R84-85	3.3k Ω, ±5%, 1/4 W Resistor	110000-332
R86	10k Ω, ±5%, 1/4 W Resistor	110000-103
R87	220 Ω, ±5%, 1/4 W Rsistor	110000-221
R88	10k Ω, ±5%, 1/4 W Resistor	110000-103
R89	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R90	330k Ω, ±5%, 1/4 W Resistor	110000-334
R91	5 kΩ Vertical Trimming Potentiometer	19-315502

Miscellaneous

F2	4-Station, Single-Throw, Dual-Inline-Package Switch	66-114PIT
	Test Point (Acceptable substitute is part no. 020670-01)	179051-002

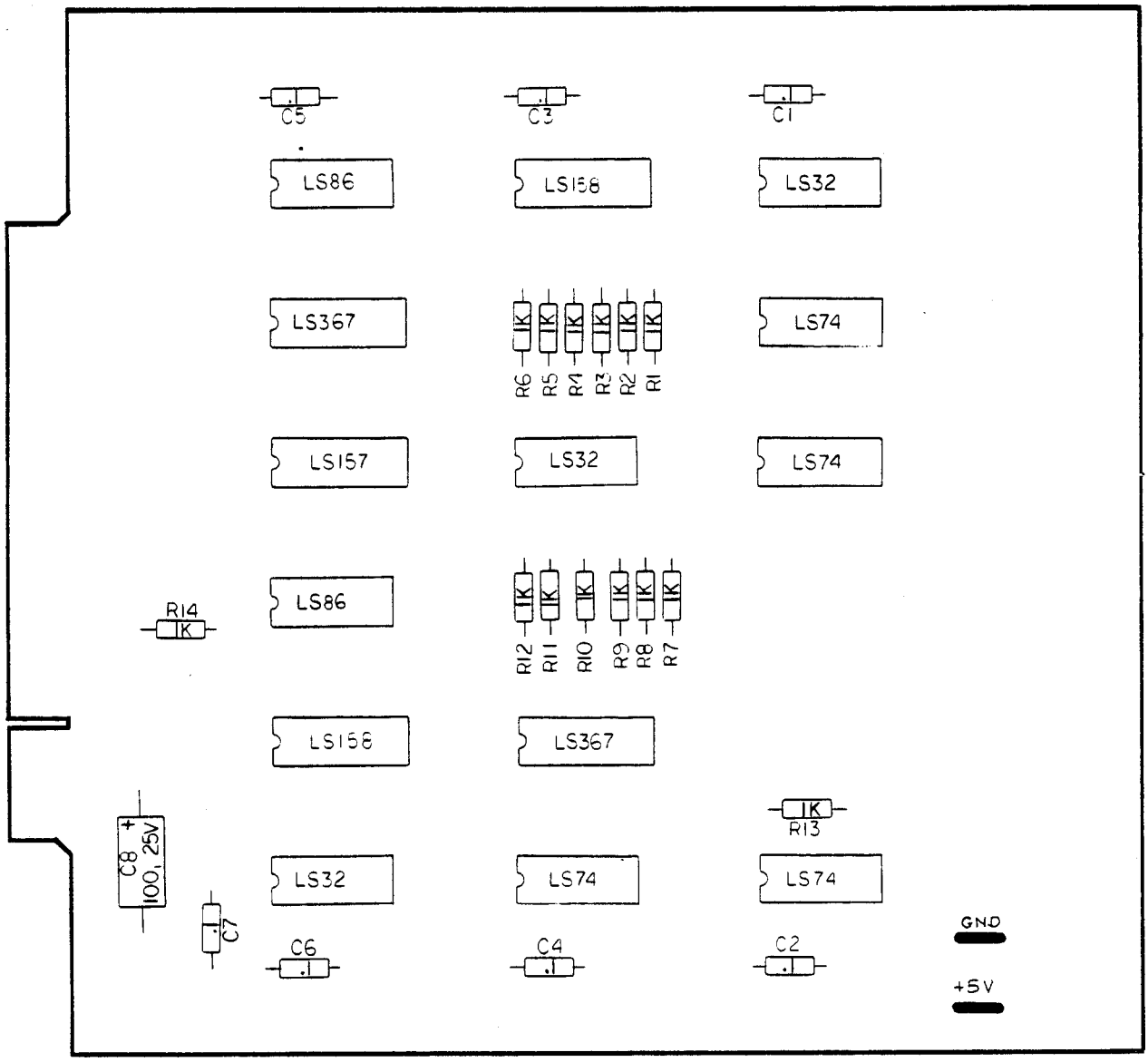


Figure 10-6 Switch Interface 2 PCB Assembly
A038306-01

Switch Interface 2 PCB Assembly

Parts List

Capacitors

C1-C7	0.1 µF, +80%,-20%, 50 V Ceramic-Disc Axial-Lead Capacitor	122002-104
C8	10 µF, 25 V Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-250106

Resistors

R1-14	1k Ω, ±5%, 1/4W Resistor	110000-102

Integrated Circuits

A1	Type-74LS32 Integrated Circuit	37-74LS32
A2	Type-74LS158 Integrated Circuit	137203-001
A3	Type-74LS86 Integrated Circuit	37-74LS86
B1	Type-74LS74 Integrated Circuit	37-74LS74
B3	Type-74LS367 Integrated Circuit	37-74LS367
C1	Type-74LS74 Integrated Circuit	37-74LS74
C2	Type-74LS32 Integrated Circuit	37-74LS32
C3	Type-74LS157 Integrated Circuit	37-74LS157
D3	Type-74LS86 Integrated Circuit	37-74LS86
E3	Type-74LS158 Integrated Circuit	137203-001
F1, F2	Type-74LS74 Integrated Circuit	37-74LS74
F3	Type-74LS32 Integrated Circuit	37-74LS32

Miscellaneous

	Test Point (Acceptable substitute is part no. 020670-01)	179051-002

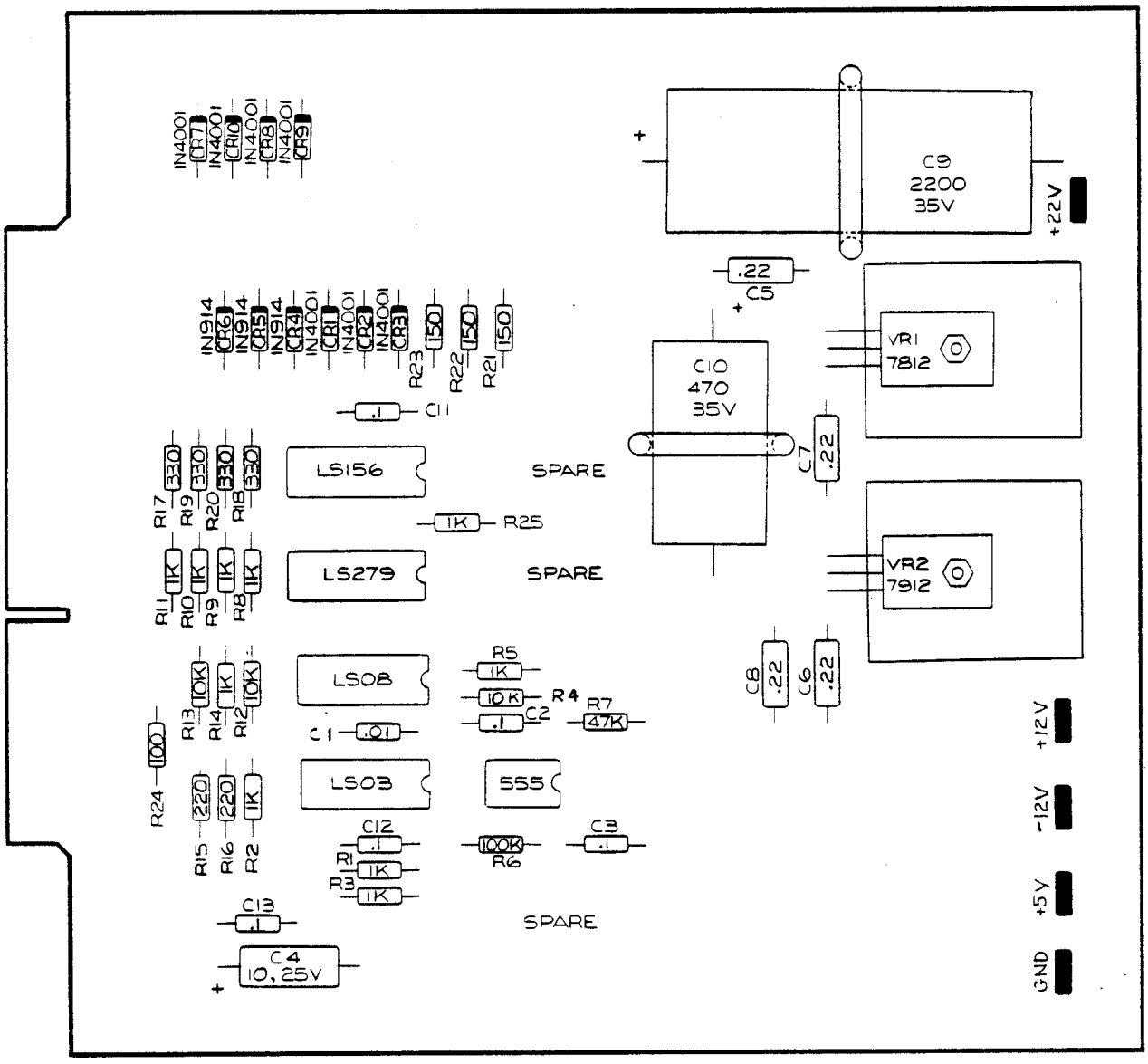


Figure 10-7 Switch Control PCB Assembly
A038308-01

Switch Control PCB Assembly

Parts List

Capacitors

C1	0.01 µF, +80%,-20%, 25 V Ceramic-Disc Axial-Lead Capacitor	122005-103
C2, C3	0.1 µF, +80%,-20%, 50 V Ceramic-Disc Axial-Lead Capacitor	122002-104
C4	10 µF, 25 V Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-250106
C5-C8	0.22 µF, +80%,-20%, 25 V Ceramic-Disc Axial-Lead Capacitor	122006-224
C9	220 µF, 35 V Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-350228
C10	470 µF, 35 V Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-350447
C11-C13	0.1 µF, +80%,-20%, 50 V Ceramic-Disc Axial-Lead Capacitor	122002-104

Diodes

CR1-CR3	Type-1N4001 50 V Switching Diode	31-1N4001
CR4-CR6	Type-1N914 75 V Switching Diode	31-1N914
CR7-CR10	Type-1N4001 50 V Switching Diode	31-1N4001

Integrated Circuits

A2	Type-555 Integrated Circuit	37-555
B2	Type-74LS03 Integrated Circuit	137219-001
B2/3	Type-74LS08 Integrated Circuit	37-74LS08
B3	Type-74LS279 Integrated Circuit	37-74LS279
B4	Type-74LS156 Integrated Circuit	137228-001
VR1	12 V, 1 A Fixed Regulator Integrated Circuit	37-7812
VR2	-12 V, 1 A Fixed Regulator Integrated Circuit	37-7912

Resistors

R1-R3	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R4	10 kΩ, ±5%, 1/4 W Resistor	110000-103
R5	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R6	100 kΩ, ±5%, 1/4 W Resistor	110000-104
R7	47 kΩ, ±5%, 1/4 W Resistor	110000-473
R8-R11	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R12, R13	10 kΩ, ±5%, 1/4 W Resistor	110000-103
R14	1 kΩ, ±5%, 1/4 W Resistor	110000-102

R15, R16	220 Ω, ±5%, 1/4 W Resistor	110000-221
R17-R20	330 Ω, ±5%, 1/4 W Resistor	110000-331
R21-R23	150 Ω, ±5%, 1/4 W Resistor	110000-151
R24	100 Ω, ±5%, 1/4 W Resistor	110000-101
R25	1 kΩ, ±5%, 1/4 W Resistor	110000-102

Miscellaneous

Test Point (Acceptable substitute is part no. 020670-011)	179051-002
Black Heatsink (TO-220)	178087-001
5.5 Inches Intermediate Tie Wrap	178065-111
#6-32 x 1/2-Inch Cross-Recessed Pan-Head Steel Machine Screw	72-1608S
#6-32 Nut/Washer Assembly	75-99516

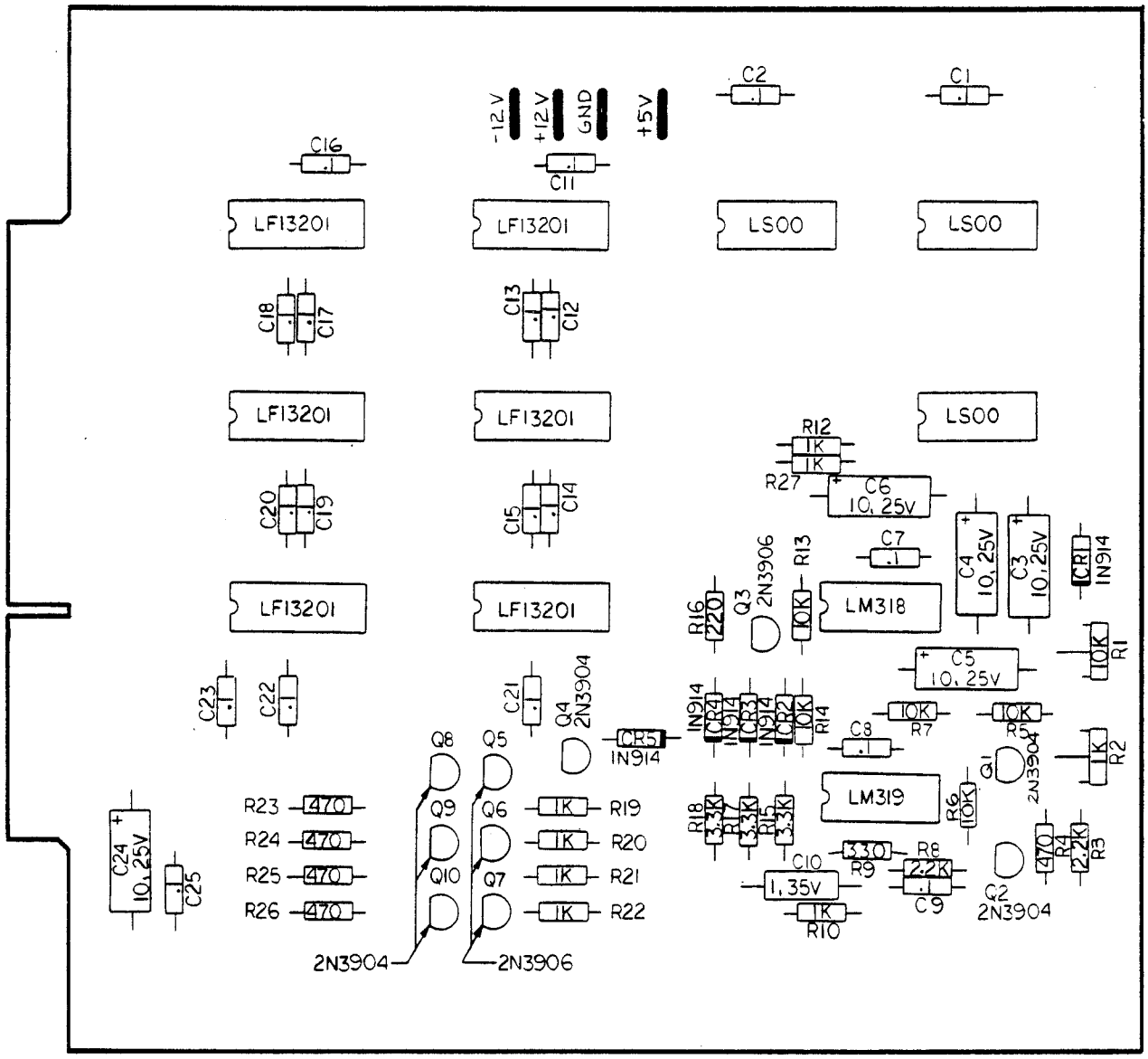


Figure 10-8 Video Interface PCB Assembly
A038310-01

Video Interface PCB Assembly

Parts List

Capacitors

C1, C2	0.1 µF, +80%,-20%, 50 V Ceramic-Disc Axial-Lead Capacitor	122002-104
C3-C6	10 µF, 25 V Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-250106
C7-C9	0.1 µF, +80%,-20%, 50 V Ceramic-Disc Axial-Lead Capacitor	122002-104
C10	1 µF, -10%, 35 V Tantalum Axial-Lead Capacitor	29-006
C11-C23	0.1 µF, +80%,-20%, 50 V Ceramic-Disc Axial-Lead Capacitor	122002-104
C24	10 µF, 25 V Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-250106
C25	0.1 µF, +80%,-20%, 50 V Ceramic-Disc Axial-Lead Capacitor	122002-104

Diodes

CR1-CR5	Type-1N914, 75 V Switching Diode	31-1N914

Integrated Circuits

A1, A2	Type-74LS00 Integrated Circuit	37-74LS00
A3, A4	Quad Analog Switch Integrated Circuit	37-13201
B1	Type-74LS00 Integrated Circuit	37-74LS00
B3, B4	Quad Analog Switch Integrated Circuit	37-13201
C2	Operational Amplifier Integrated Circuit	137231-001
C3, C4	Quad Analog Switch Integrated Circuit	37-13201
D2	Type-LM319 Integrated Circuit	37-LM319

Resistors

R1	10 kΩ Vertical Trimming Potentiometer	19-315103
R2	1 kΩ Vertical Trimming Potentiometer	19-315102
R3	2.2 kΩ, ±5%, 1/4 W Resistor	110000-222
R4	470 Ω, ±5%, 1/4 W Resistor	110000-471
R5-R7	10 kΩ, ±5%, 1/4 W Resistor	110000-103
R8	2.2 kΩ, ±5%, 1/4 W Resistor	110000-222
R9	3300 Ω, ±5%, 1/4 W Resistor	110000-331
R10	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R12	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R13, R14	10 kΩ, ±5%, 1/4 W Resistor	110000-103

R15	3.3 kΩ, ±5%, 1/4 W Resistor	110000-332
R16	220 Ω, ±5%, 1/4 W Resistor	110000-221
R17, R18	3.3 kΩ, ±5%, 1/4 W Resistor	110000-332
R19-R22	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R23-R26	470 Ω, ±5%, 1/4 W Resistor	110000-471
R27	1 kΩ, ±5%, 1/4 W Resistor	110000-102

Transistors

Q1, Q2	Type-2N3904, 60 V, 1 W, NPN Transistor	34-2N3904
Q3	Type-2N3906, 40 V, 1 W, PNP Transistor	33-2N3906
Q4	Type-2N3904, 60 V, 1 W, NPN Transistor	34-2N3904
Q5-Q7	Type-2N3906, 40 V, 1 W, PNP Transistor	33-2N3906
Q8-Q10	Type-2N3904, 60 V, 1 W, NPN Transistor	34-2N3904

Miscellaneous

Test Point (Acceptable substutute is part no. 020670-01)	179051-002

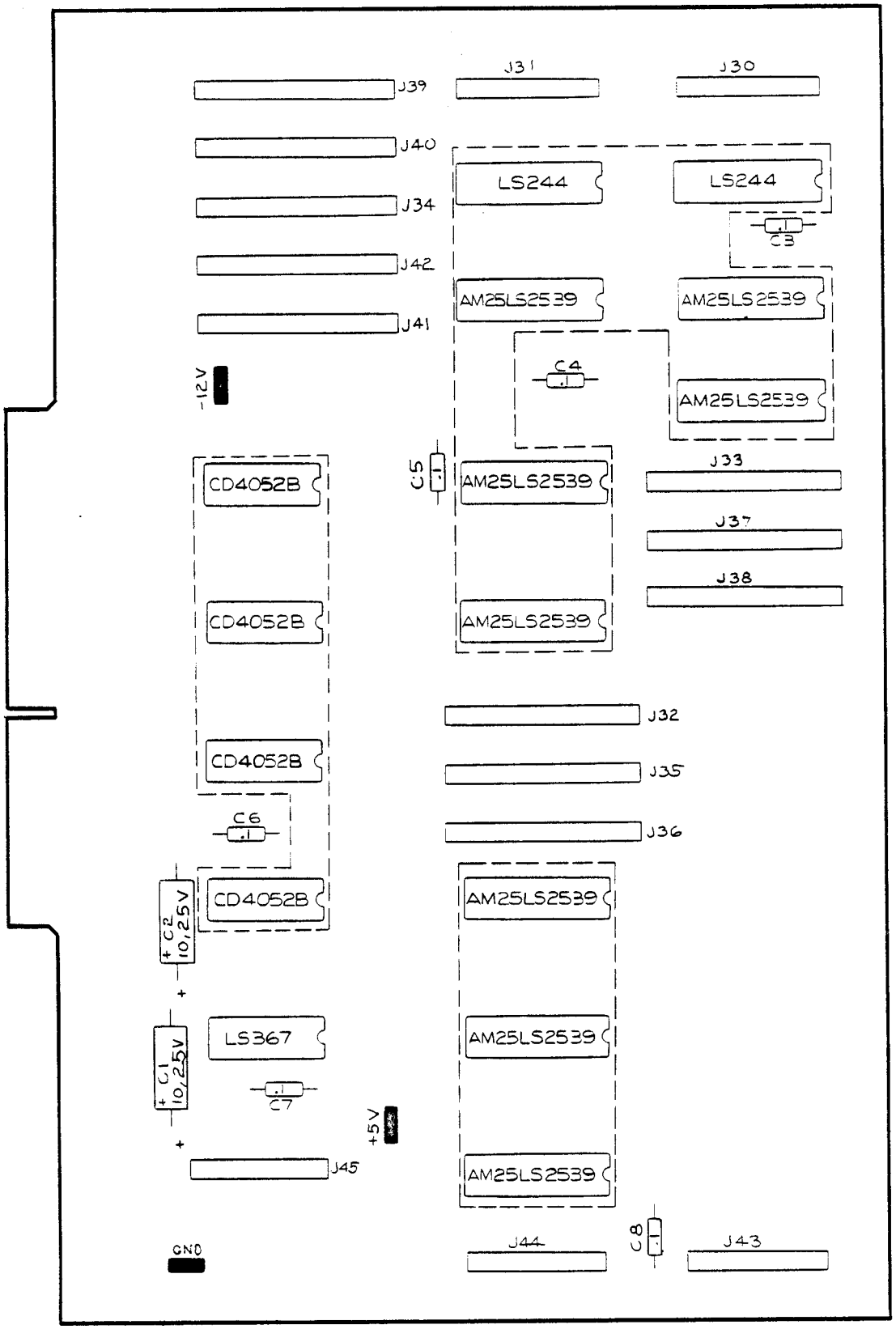


Figure 10-9 Multiplex PCB Assembly
A038312-01

Multiplex PCB Assembly

Parts List

Capacitors

C1, C2	10 µF, 25 V Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-250106
C3-C8	0.1 µF, +80%,-20%, 50 V Ceramic-Disc Axial-Lead Capacitor	122002-104

Integrated Circuits

A1, A2	Type-74LS244 Integrated Circuit	37-74LS244
B1, B2	Decoder/Demultiplexer Integrated Circuit	137229-001
C1	Decoder/Demultiplexer Integrated Circuit	137229-001
D2	Decoder/Demultiplexer Integrated Circuit	137229-001
D3	4-Channel Multiplexer/Demultiplexer Integrated Circuit	137218-001
E2	Decoder/Demultiplexer Integrated Circuit	137229-001
E3	4-Channel Multiplexer/Demultiplexer Integrated Circuit	137218-001
F3	4-Channel Multiplexer/Demultiplexer Integrated Circuit	137218-001
H2	Decoder/Demultiplexer Integrated Circuit	137229-001
H3	4-Channel Multiplexer/Demultiplexer Integrated Circuit	137218-001
J2	Decoder/Demultiplexer Integrated Circuit	137229-001
J3	Type-74LS367 Integrated Circuit	37-74LS367
K2	Decoder/Demultiplexer Integrated Circuit	137229-001

Sockets

A1, A2	20-Contact Medium-Insertion-Force Integrated Circuit Socket	79-42C20
B1,B2	20-Contact Medium-Insertion-Force Integrated Circuit Socket	79-42C20
C1	20-Contact Medium-Insertion-Force Integrated Circuit Socket	79-42C20
D2	20-Contact Medium-Insertion-Force Integrated Circuit Socket	79-42C20
D3	16-Contact Medium-Insertion-Force Integrated Circuit Socket	79-42C16
E2	20-Contact Medium-Insertion-Force Integrated Circuit Socket	79-42C20
E3	16-Contact Medium-Insertion-Force Integrated Circuit Socket	79-42C16
F3	16-Contact Medium-Insertion-Force Integrated Circuit Socket	79-42C16
H2	20-Contact Medium-Insertion-Force Integrated Circuit Socket	79-42C20
H3	16-Contact Medium-Insertion-Force Integrated Circuit Socket	79-42C16

J2	20-Contact Medium-Insertion-Force Integrated Circuit Socket	79-42C20
K2	20-Contact Medium-Insertion-Force Integrated Circuit Socket	79-42C20

Miscellaneous

J30, J31	9-Contact Square-Pin Header Connector	179118-009
J32-J42	13-Contact Square-Pin Header Connector	179118-013
J43-J45	9-Contact Square-Pin Header Connector	179118-009
	Test Point (Acceptable substitute is part no. 020670-01)	179051-002

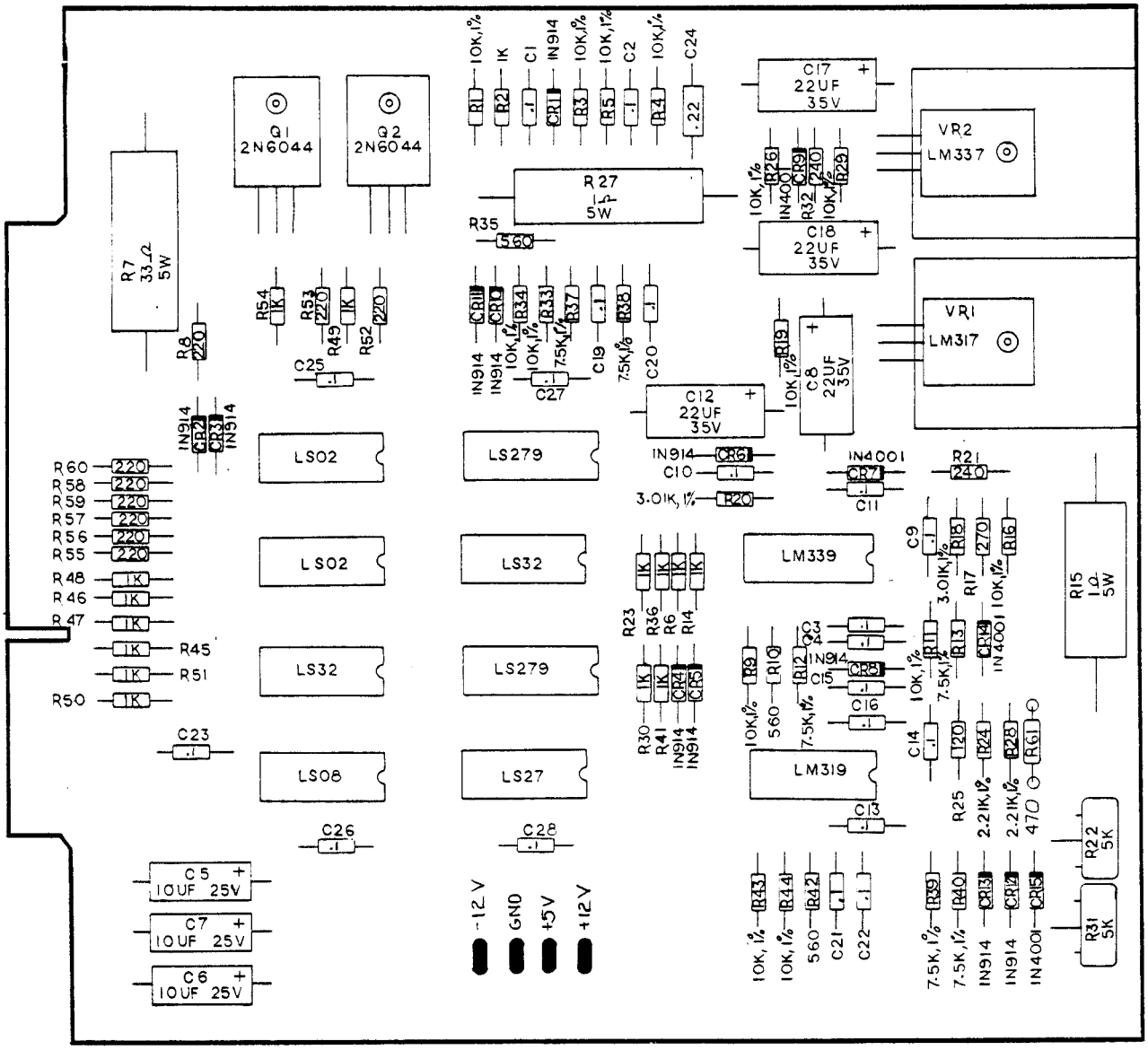


Figure 10-10 Power Trip PCB Assembly
A038314-01

Power Trip PCB Assembly

Parts List

Capacitors

C1-C4	0.1 µF 50 V Ceramic-Disc Radial-Lead Capacitor	122002-104
C5-C7	10 µF 25 V Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-250106
C8	22 µF 35 V Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-350226
C9-C11	0.1 µF 50 V Ceramic-Disc Radial-Lead Capacitor	122002-104
C12	22 µF 35 V Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-350226
C13-C16	0.1 µF 50 V Ceramic-Disc Radial-Lead Capacitor	122002-104
C17,C18	22 µF 35 V Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-350226
C19-C23	0.1 µF 50 V Ceramic-Disc Radial-Lead Capacitor	122002-104
C24	22 µF, ±20%, 25 V Ceramic-Disc Axial-Lead Capacitor	122004-224
C25-C28	0.1 µF 50 V Ceramic-Disc Radial-Lead Capacitor	122002-104

Diodes

CR1-CR6	Type-1N914 75 V Switching Diode	31-1N914
CR7	Type-1N4001 50 V Switching Diode	31-1N4001
CR8	Type-1N914 75 V Switching Diode	31-1N914
CR9	Type-1N4001 50 V Switching Diode	31-1N4001
CR10-CR13	Type-1N914 75 V Switching Diode	31-1N914
CR14, CR15	Type-1N4001 50 V Switching Diode	31-1N4001

Integrated Circuits

A2	Type-74LS279 Integrated Circuit	37-74LS279
A3	Type-74LS02 Integrated Circuit	37-74LS02
B1	Type-LM339 Voltage Comparator Integrated Circuit	37-LM339
B2	Type-74LS32 Integrated Circuit	37-74LS32
B3	Type-74LS02 Integrated Circuit	37-74LS02
C2	Type-74LS279 Integrated Circuit	37-74LS279
C3	Type-74LS32 Integrated Circuit	37-74LS32
D1	Type-LM319 Voltage Comparator Integrated Circuit	37-LM319
D2	Type-74LS27 Integrated Circuit	37-74LS27
D3	Type-74LS08 Integrated Circuit	37-74LS08
VR1, VR2	Adjustable 15 W Voltage Regulator Integrated Circuit	137233-001

Resistors

R1	10 kΩ, ±1%, 1/4 W Resistor	110011-103
R2	1.5 kΩ, ±5%, 1/4 W Resistor	110000-152
R3-R5	10 kΩ, ±1%, 1/4 W Resistor	110011-103
R6	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R7	33 Ω, ±5%, 5 W, Wirewound Resistor	116001-330
R8	220 Ω, ±5%, 1/4 W Resistor	110000-221
R9	10 kΩ, ±1%, 1/4 W Resistor	110011-103
R10	560 Ω, ±5%, 1/4 W Resistor	110000-561
R11	10 kΩ, ±1%, 1/4 W Resistor	110011-103
R12, R13	7.5 kΩ, ±1%, 1/8 W Resistor	110003-752
R14	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R15	1 Ω, ±5%, 5 W, Wirewound Resistor	116001-010
R16	10 kΩ, ±1%, 1/4 W Resistor	110011-103
R17	270 Ω, ±5%, 1/4 W Resistor	110000-271
R18	3.01 kΩ, ±1%, 1/4 W Resistor	110011-302
R19	10 kΩ, ±1%, 1/4 W Resistor	110011-103
R20	3.01 kΩ, ±1%, 1/4 W Resistor	110011-302
R21	240 Ω, ±5%, 1/4 W Resistor	110000-241
R22	5 kΩ Vertical PCB-Mounting Trimming Potentiometer	19-315502
R23	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R24	2.21 kΩ, ±1%, 1/4 W Resistor	110011-222
R25	120 Ω, ±5%, 1/4 W Resistor	110000-121
R26	10 kΩ, ±1%, 1/4 W Resistor	110011-103
R27	1 Ω, ±5%, 5 W, Wirewound Resistor	116001-010
R28	2.21 kΩ, ±1%, 1/4 W Resistor	110011-222
R29	10 kΩ, ±1%, 1/4 W Resistor	110011-103
R30	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R31	5 kΩ Vertical PCB-Mounting Trimming Potentiometer	19-315502
R32	240 Ω, ±5%, 1/4 W Resistor	110000-241
R33, R34	10 kΩ, ±1%, 1/4 W Resistor	110011-103
R35	560 Ω, ±5%, 1/4 W Resistor	110000-561
R36	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R37-R40	7.5 kΩ, ±1%, 1/8 W Resistor	110003-752
R41	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R42	560 Ω, ±5%, 1/4 W Resistor	110000-561
R43, R44	10 kΩ, ±1%, 1/4 W Resistor	110011-103
R45-R51	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R52, R53	220 Ω, ±5%, 1/4 W Resistor	110000-221
R54	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R55-R60	220 Ω, ±5%, 1/4 W Resistor	110000-221
R61	470 Ω, ±5%, 1/4 W Resistor	110000-471

Transistors

Q1, Q2	Type-2N6044 Darlington NPN Transistor	34-2N6044

Miscellaneous

Black Heat Sink	178087-001
Test Point (Acceptable substitute is part no.020670-01)	179051-002
Nylon Fastener	81-4302
#6-32 X 1/2-Inch Cross-Recessed Pan-Head Steel Machine Screw	72-1608S
#6-32 Nut/Washer Assembly	75-99516
Thermal Insulator	78-16014

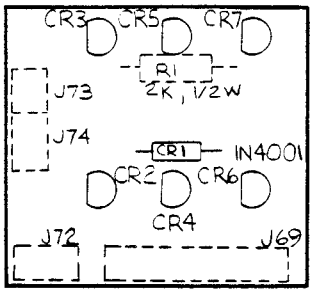


Figure 10-11 Power LED PCB Assembly A038316-01

Parts List

Connectors

J69	9-Contact Square-Pin Header Connector	179118-009
J72	3-Contact Square-Pin Header Connector	179118-003
J73/74	5-Contact Square-Pin Header Connector	179118-005

Diodes

CR1	Type-1N4001 50 V Switching Diode	31-1N4001
CR2-7	Type-MV5053 Light-Emitting Diode	38-MV5053

Resistor

R1	2 kΩ, ±5%, 1/2 W Resistor	110001-202

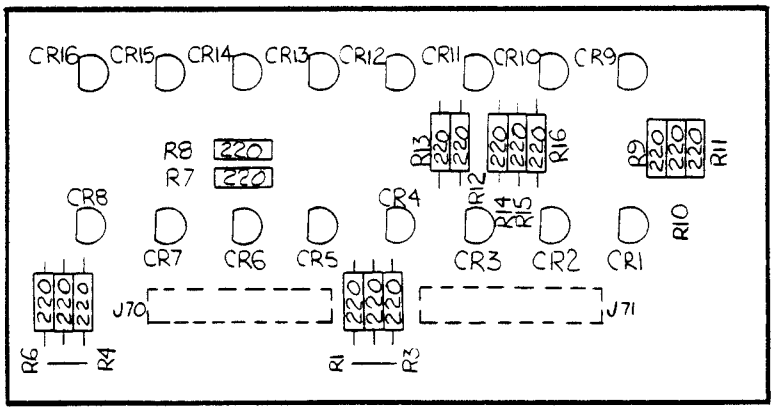


Figure 10-12 Indicator LED PCB Assembly A038465-01

Parts List

CR1-CR16	Type-MV5053 Light-Emitting Diode	38-MV5053
J70-J71	9-Contact Square-Pin Header Connector	179118-009
R1-R16	220 Ω, ±5%, 1/4 W Resistor	110000-221

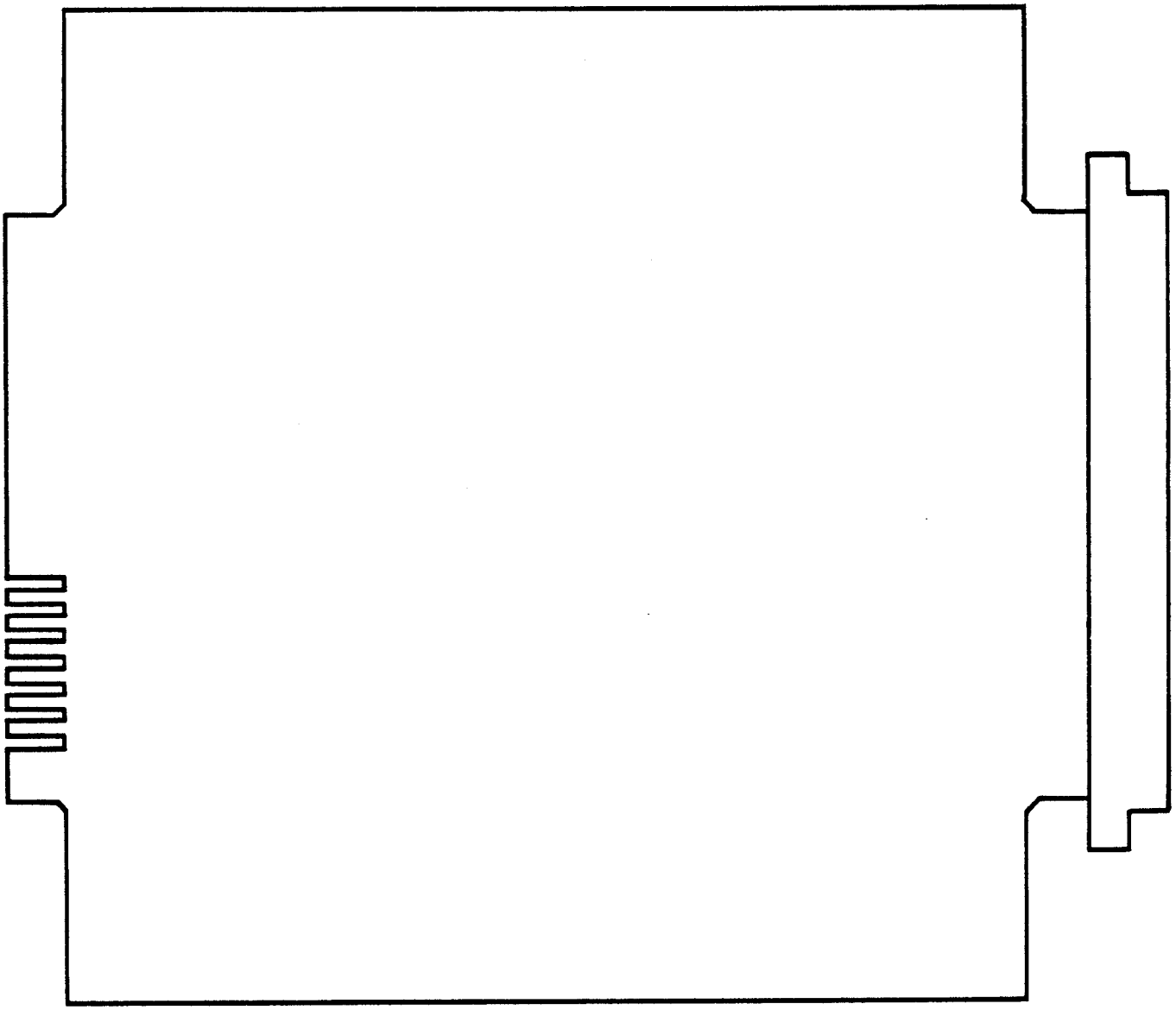


Figure 10-13 Extender Board Assembly A038724-01

Parts List

44-Position Edge Connector	179127-044
Extender Board	038725-01

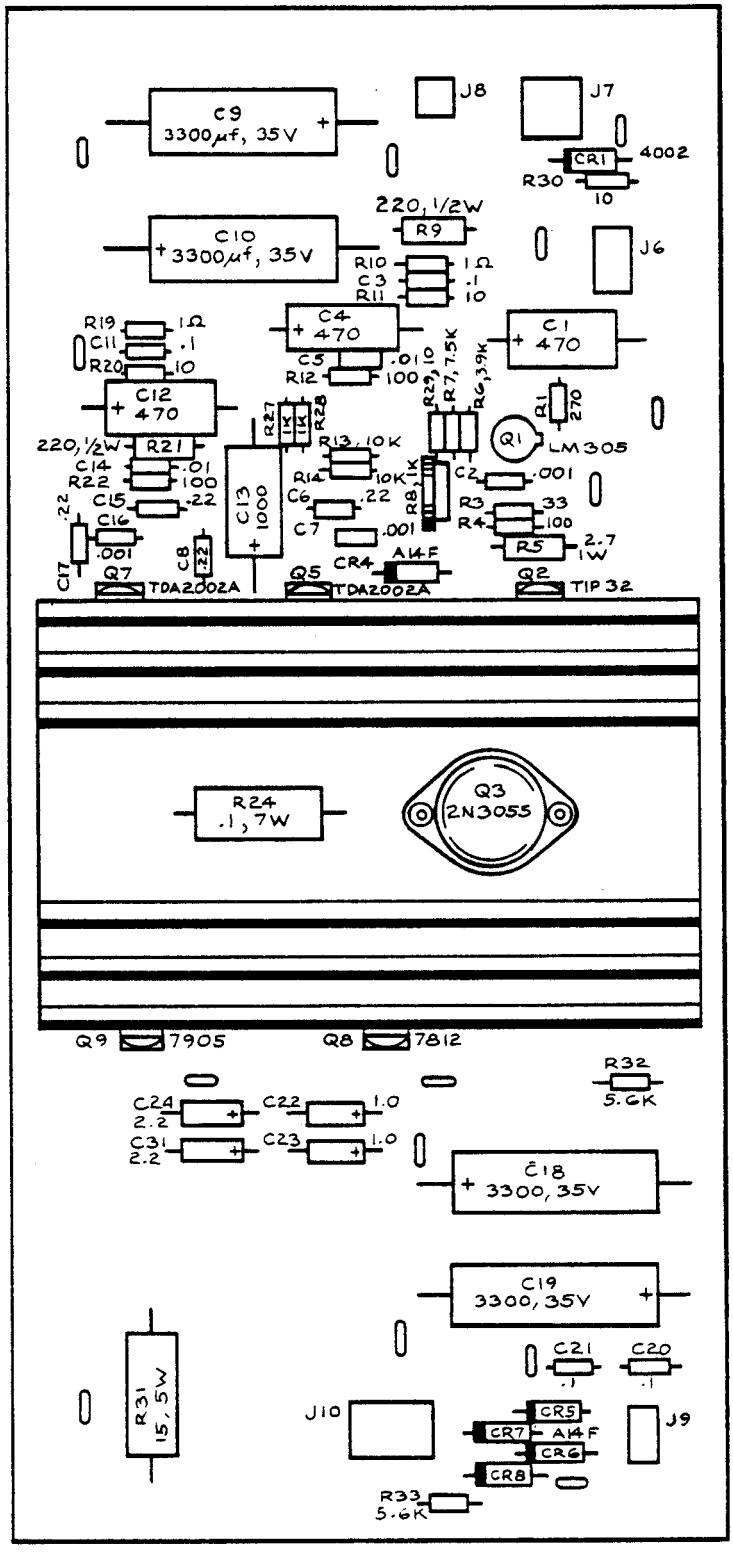


Figure 10-14 Regulator/Audio II PCB Assembly
A035435-03

Regulator/Audio II PCB Assembly

Parts List

Capacitors

C1	470 µF, 25 V, Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-250477
C2	0.001 µF, 50 V, Ceramic-Disc Axial-Lead Capacitor	122002-102
C3	0.1 µF, 50 V, Ceramic-Disc Axial-Lead Capacitor	29-088
C4	470 µF, 25 V, Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-250477
C5	0.01 µF, 25 V Minimum, Ceramic-Disc Axial-Lead Capacitor (Acceptable substitute is part no. 122005-103)	100015-103
C6	0.22 µF, 25 V, Ceramic-Disc Axial-Lead Capacitor	122004-224
C7	0.001 µF, 50 V, Ceramic-Disc Axial-Lead Capacitor	122002-102
C8	0.22 µF, 25 V, Ceramic-Disc Axial-Lead Capacitor	122004-224
C9, C10	3300 µF, 35 V, Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-350338
C11	0.1 µF, 50 V, Ceramic-Disc Axial-Lead Capacitor	29-088
C12	470 µF, 25 V, Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-250477
C13	1000 µF, 25 V, Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-250108
C14	0.01 µF, 25 V Minimum, Ceramic-Disc Axial-Lead Capacitor (Acceptable substitute is part no. 122005-103)	100015-103
C15	0.22 µF, 25 V, Ceramic-Disc Axial-Lead Capacitor	122004-224
C16	0.001 µF, 50 V, Ceramic-Disc Axial-Lead Capacitor	122002-102
C17	0.22 µF, 25 V, Ceramic-Disc Axial-Lead Capacitor	122004-224
C18, C19	3300 µF, 35 V, Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-350338
C20, C21	0.1 µF, 50 V, Ceramic-Disc Axial-Lead Capacitor	29-088
C22, C23	1 µF, 50 V, Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-500105
C24	22 µF, 35 V, Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-350226
C31	22 µF, 35 V, Aluminum Electrolytic Fixed Axial-Lead Capacitor	24-350226

Diodes

CR1	Type-1N4002, 1 A, 100 V Silicon Rectifier Diode	31-1N4002
CR4	Type-1N4002, 1 A, 100 V Silicon Rectifier Diode	31-1N4002
CR5 -CR8	Type-1N5401, 3 A, 100 V Silicon Rectifier Diode	31-1N5401

Integrated Circuits

Q1	Type-LM305, 5 V, Linear Voltage Regulator	37-LM305
Q5	Type-TDA2002A, 8 W, Linear Audio Amplifier Integrated Circuit	137151-002
Q7	Type-TDA2002A, 8 W, Linear Audio Amplifier Integrated Circuit	137151-002
Q8	Type-7812, +12 V, Voltage Regulator	37-7812
Q9	Type-7905, -5 V, Voltage Regulator	37-7905

Resistors

R1	270 Ω, ±5%, 1/4 W Resistor	110000-271
R3	33 Ω, ±5%, 1/4 W Resistor	110000-330
R4	100 Ω, ±5%, 1/4 W Resistor	110000-101
R5	2.7 Ω, ±5%, 1 W Resistor	110009-027
R6	3.9 kΩ, ±5%, 1/4 W Resistor	110000-392
R7	7.5 kΩ, ±5%, 1/4 W Resistor	110000-752
R8	1 kΩ Vertical PCB-Mounting Cermet Potentiometer (Acceptable substitute is part no. 119002-102)	19-315102
R9	220 Ω, ±5%, 1/2 W Resistor	110001-221
R10	1 Ω, ±5%, 1/4 W Resistor	110000-010
R11	10 Ω, ±5%, 1/4 W Resistor	110000-100
R12	100 Ω, ±5%, 1/4 W Resistor	110000-101
R13, R14	10 kΩ, ±5%, 1/4 W Resistor	110000-103
R19	1 Ω, ±5%, 1/4 W Resistor	110000-010
R20	10 Ω, ±5%, 1/4 W Resistor	110000-100
R21	220 Ω, ±5%, 1/2 W Resistor	110001-221
R22	100 Ω, ±5%, 1/4 W Resistor	110000-101
R24	0.1 Ω, ±3%, 7 W Wirewound Resistor	19-100P1015
R27, R28	1 kΩ, ±5%, 1/4 W Resistor	110000-102
R29, R30	10 Ω, ±5%, 1/4 W Resistor	110000-100
R31	15 Ω, ±5%, 5 W Wirewound Resistor	116001-150
R32, R33	5.6 kΩ, ±5%, 1/4 W Resistor	110000-562

Transistors

Q2	Type-TIP32 PNP Power Transistor	33-TIP32
Q3	Type-2N3055 NPN Silicon Transistor	34-2N3055

Mechanical Parts

J6	6-Position Connector Receptacle	79-58306
J7	9-Position Connector Receptacle	79-58308
J8	4-Position Connector Receptacle	79-58354
J9	6-Position Connector Receptacle	79-58306
J10	12-Position Connector Receptacle	79-58346
Q3	#6-32 x 1/2-Inch Cross-Recessed Pan-Head Corrosion-Resistant Steel Machine Screw	72-1608C
Q5	#6-32 x 1/4-Inch Binder-Head Nylon Screw	75-F60405

Q8	#6 x 3/8-Inch Cross-Recessed Pan-Head Thread-Forming Type-AB Zinc-Plated-Steel Screw	72-6606S
	#6-32 Hex Nut	75-99516
	Heat Sink	034531-01
	Test Point Acceptable substitute is part no. 020670-01	179051-001

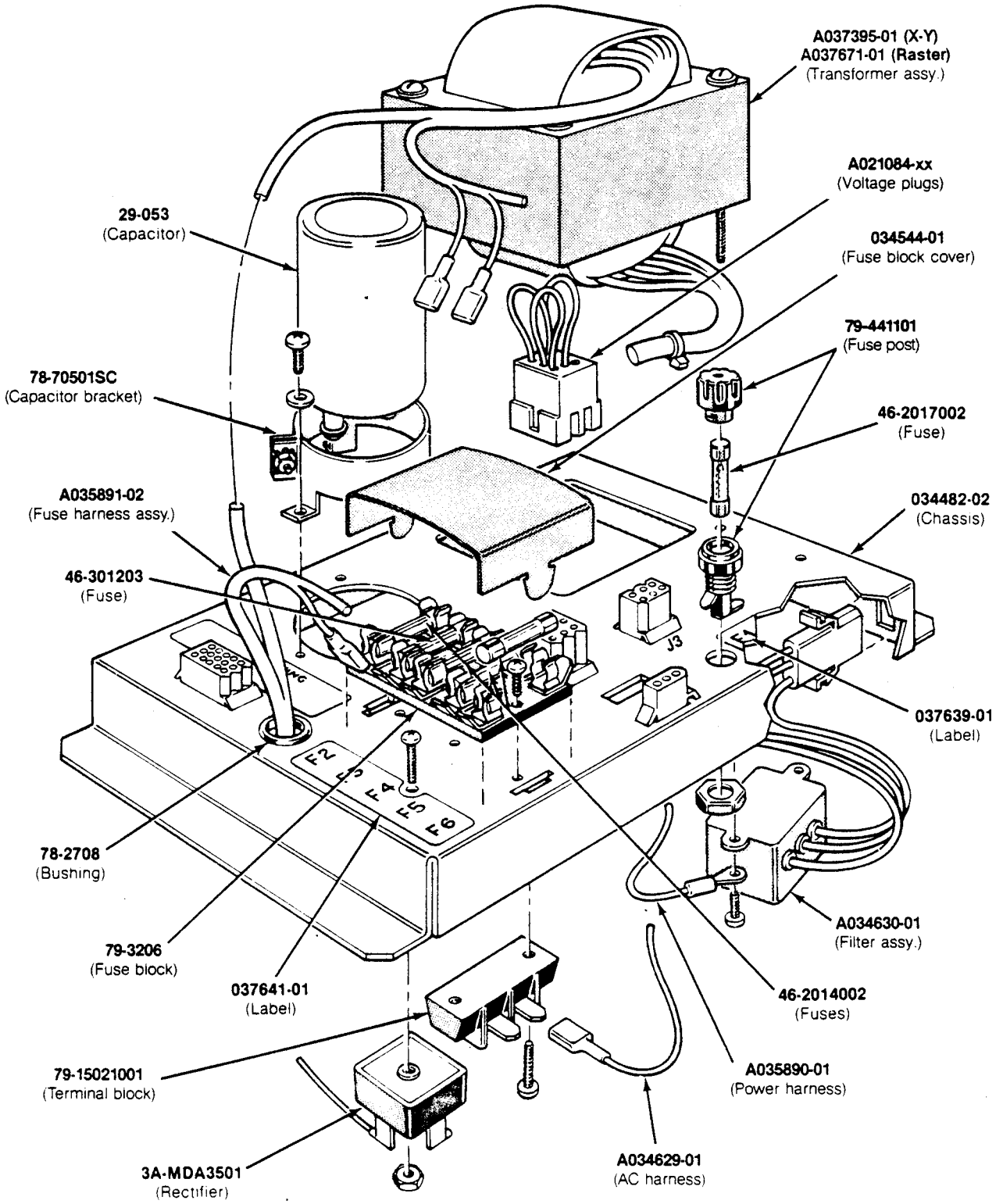


Figure 10-15 Power Supply
A037671-02 (Raster) & A037392-02 (X-Y)

Color Raster Power Supply Assembly

Parts List

Assemblies

F2-F6	Fuse Harness Assembly	A035891-02
FL1	RFI Filter Assembly (designation not marked)	A034630-01
J2	Power Harness Assembly	A035890-01
J3	Voltage Plug for 100 V (90-110 VAC) (violet wire color)	A021084-01
J3	Voltage Plug for 220 V (200-240 VAC) (blue wire color)	A021084-04
J3	Voltage Plug for 240 V (220-260 VAC) (brown wire color)	A021084-05
J4A	AC Harness Assembly	A034629-01
T1	Transformer Assembly (designation covered) (Acceptable substitute is part no. A035888-02)	A035888-01

Capacitor

C1	27, 000 µF, 15 VDC Electrolytic Capacitor	29-053

Diode

CR1	Type-MDA 3501 Bridge Rectifier	3A-MDA3501

Fuses

F1	7 A, 250 V, 3AG Slow-Blow Glass Cartridge-Type Fuse	46-2017002
F1	4 A, 250 V, 3AG Slow-Blow Glass Cartridge-Type Fuse(Ire)	46-2014002
F2	4 A, 250 V, 3AG Slow-Blow Glass Cartridge-Type Fuse	46-2014002
F3	20 A, 32 V, 3AG Slow-Blow Glass Cartridge-Type Fuse	46-301203
F4-F6	4 A, 250 V, 3AG Slow-Blow Glass Cartridge-Type Fuse	46-2014002

Mounting Hardware

C1	2-Inch Diameter Capacitor Mounting Bracket	78-70501SC
F1	Panel-Mounting Non-Indicating 3AG Cartridge-Type Fuse Post	79-441101
F2-F6	5-Position 3AG Fuse Block with 1/4-Inch Quick-Disconnect Terminals	79-3206
	Black Nylon Hole Bushing	78-2708
	2-Circuit Single-Row Terminal Block (located under F4)	79-15021001
	Power Supply Chassis Base	034482-02
	Metal Base Plate (not shown in illustration)	037243-01

Miscellaneous

F1	Label for Fuse Value	037639-02
F1	Label for Fuse Value (Ireland)	037639-01
F2-F6	Label for Fuse Values	037641-01
F2-F6	Fuse Block Cover	034544-01

NOTE: A037671-05 has the 100 V, 220 V and 240 V plugs.
A037671-06 has the 220 V and 240 V plugs.

Color X-Y Power Supply Assembly

Parts List

Assemblies

F2-F6	Fuse Harness Assembly	A035891-02
FL1	RFI Filter Assembly (designation not marked)	A034630-01
J2	Power Harness Assembly	A035890-01
J3	Voltage Plug for 100 V (90-110 VAC) (violet wire color)	A021084-01
J3	Voltage Plug for 220 V (200-240 VAC) (blue wire color)	A021084-04
J3	Voltage Plug for 240 V (220-260 VAC) (brown wire color)	A021084-05
J4A	AC Harness Assembly	A034629-01
T1	Transformer Assembly (designation covered)	A037395-01

Capacitor

C1	27, 000 µF, 15 VDC Electrolytic Capacitor	29-053

Diode

CR1	Type-MDA 3501 Bridge Rectifier	3A-MDA3501

Fuses

F1	7 A, 250 V, 3AG Slow-Blow Glass Cartridge-Type Fuse	46-2017002
F1	4 A, 250 V, 3AG Slow-Blow Glass Cartridge-Type Fuse(Ire)	46-2014002
F2	4 A, 250 V, 3AG Slow-Blow Glass Cartridge-Type Fuse	46-2014002
F3	20 A, 32 V, 3AG Slow-Blow Glass Cartridge-Type Fuse	46-301203
F4-F6	4 A, 250 V, 3AG Slow-Blow Glass Cartridge-Type Fuse	46-2014002

Mounting Hardware

C1	2-Inch Diameter Capacitor Mounting Bracket	78-70501SC
F1	Panel-Mounting Non-Indicating 3AG Cartridge-Type Fuse Post	79-441101
F2-F6	5-Position 3AG Fuse Block with 1/4-Inch Quick-Disconnect Terminals	79-3206
	Black Nylon Hole Bushing	78-2708
	2-Circuit Single-Row Terminal Block (located under F4)	79-15021001
	Power Supply Chassis Base	034482-02
	Metal Base Plate (not shown in illustration)	037243-01

Miscellaneous

F2-F6	Fuse Block Cover	034544-01
F1	Label for Fuse Value (Ireland)	037639-01

F1	Label for Fuse Value	037639-02
F2-F6	Label for Fuse Values	037641-01

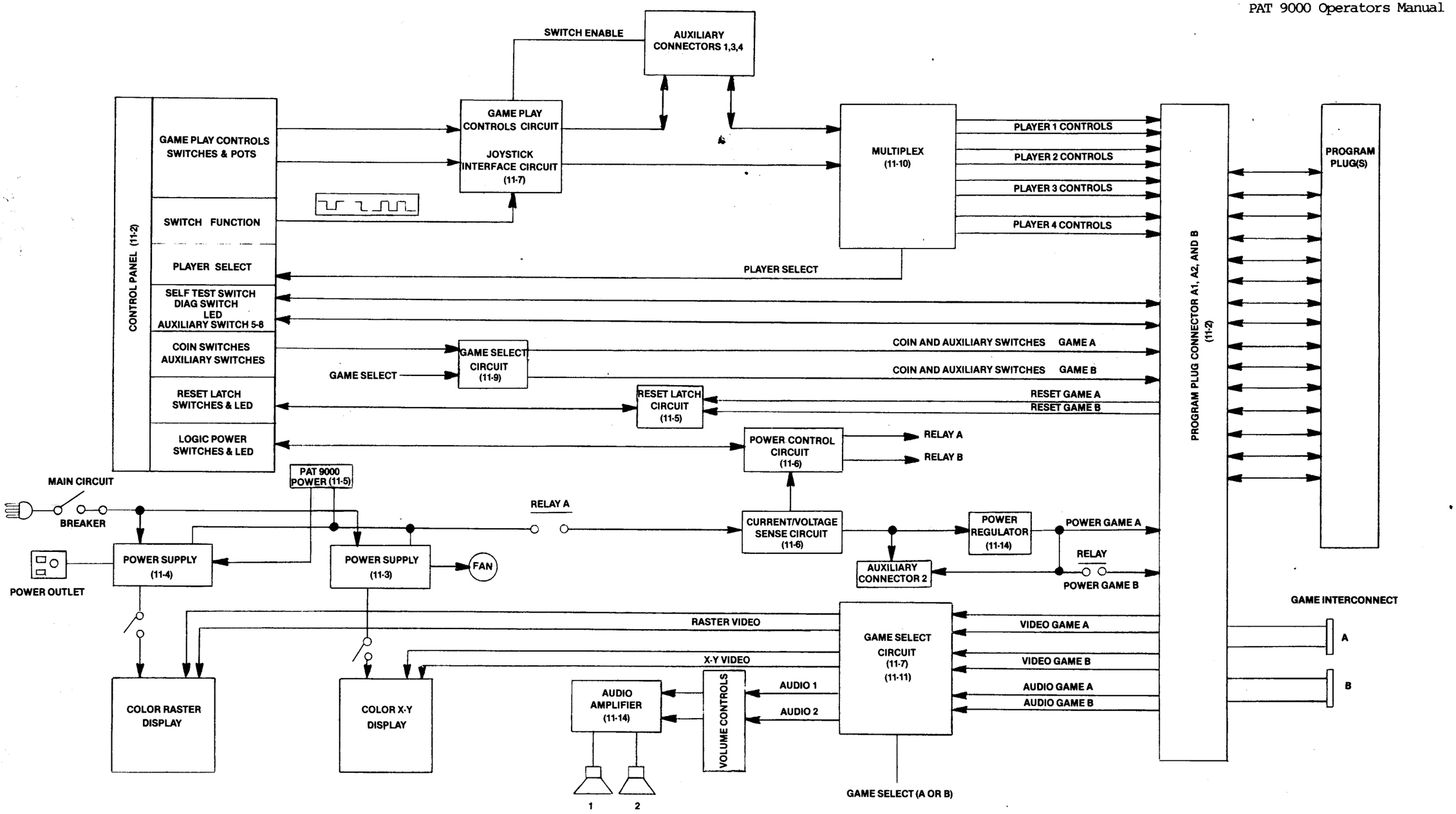
Display Assemblies

Parts List

A200003-01	13-Inch Atari Display (Color X-Y)
A038607-01	Color Raster Display Enclosure Assembly
A038668-01	Color X-Y Display Harness Assembly
A038669-01	Color Raster Display Harness Assembly
A038674-01	Display Adapter Harness Assembly (Electrohome)
TM-187	Service Manual for 13-Inch Electrohome Color Raster Display
TM-222	Service Manual for 13-Inch Atari Color X-Y Display
038627-02	Display Enclosure Door Panel
038644-01	Mounting Bracket
038645-02	High-Voltage Cover
038646-01	High-Voltage Label
038648-03	Display Shield
92-056	13-Inch Electrohome Display (Color Raster)

CHAPTER 11

DIAGRAMS



NOTE
Numbers in parenthesis inside the blocks refer to applicable schematic diagram figure numbers.

Figure 11-1 Functional Block Diagram

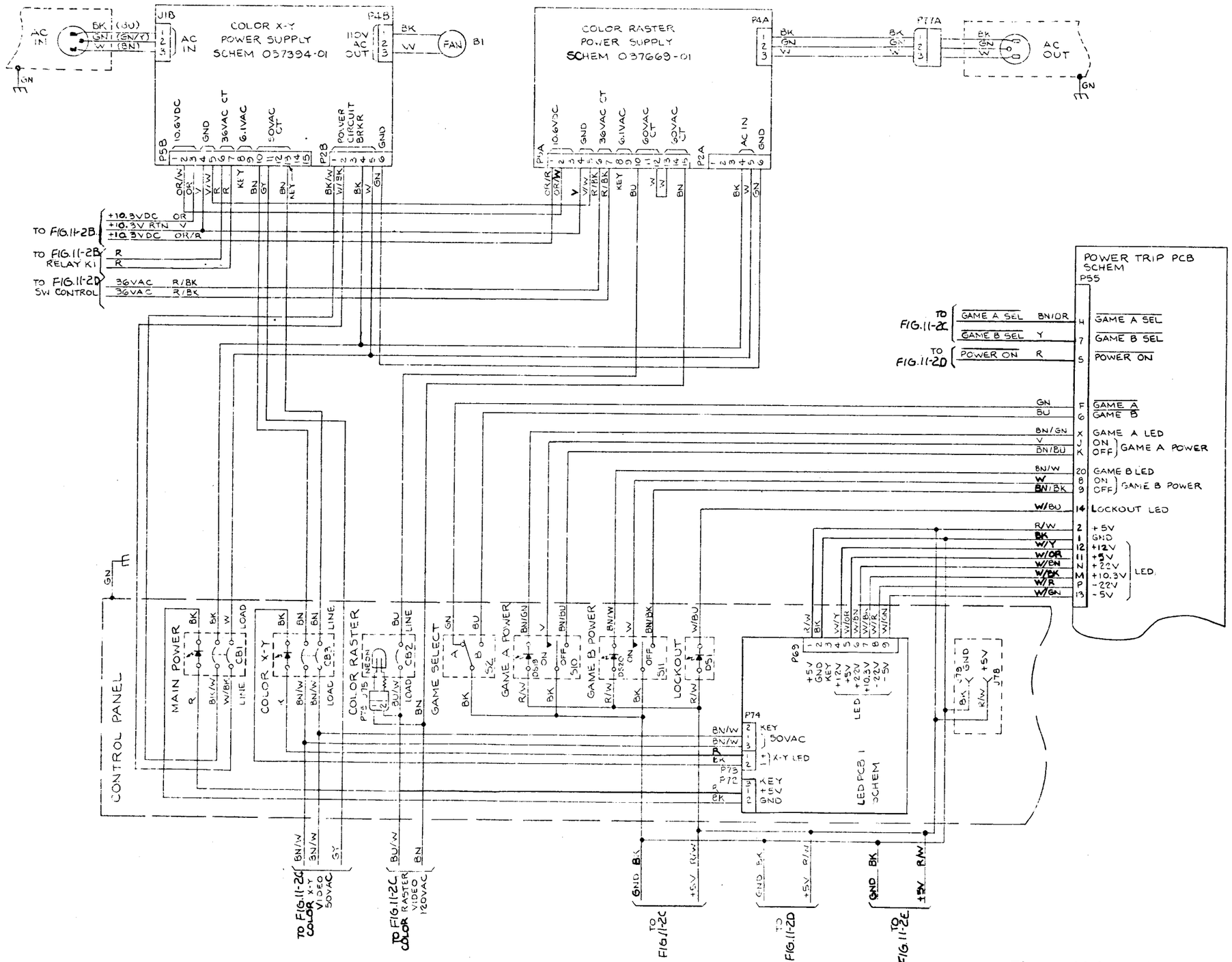


Figure 11-2A Wiring Diagram

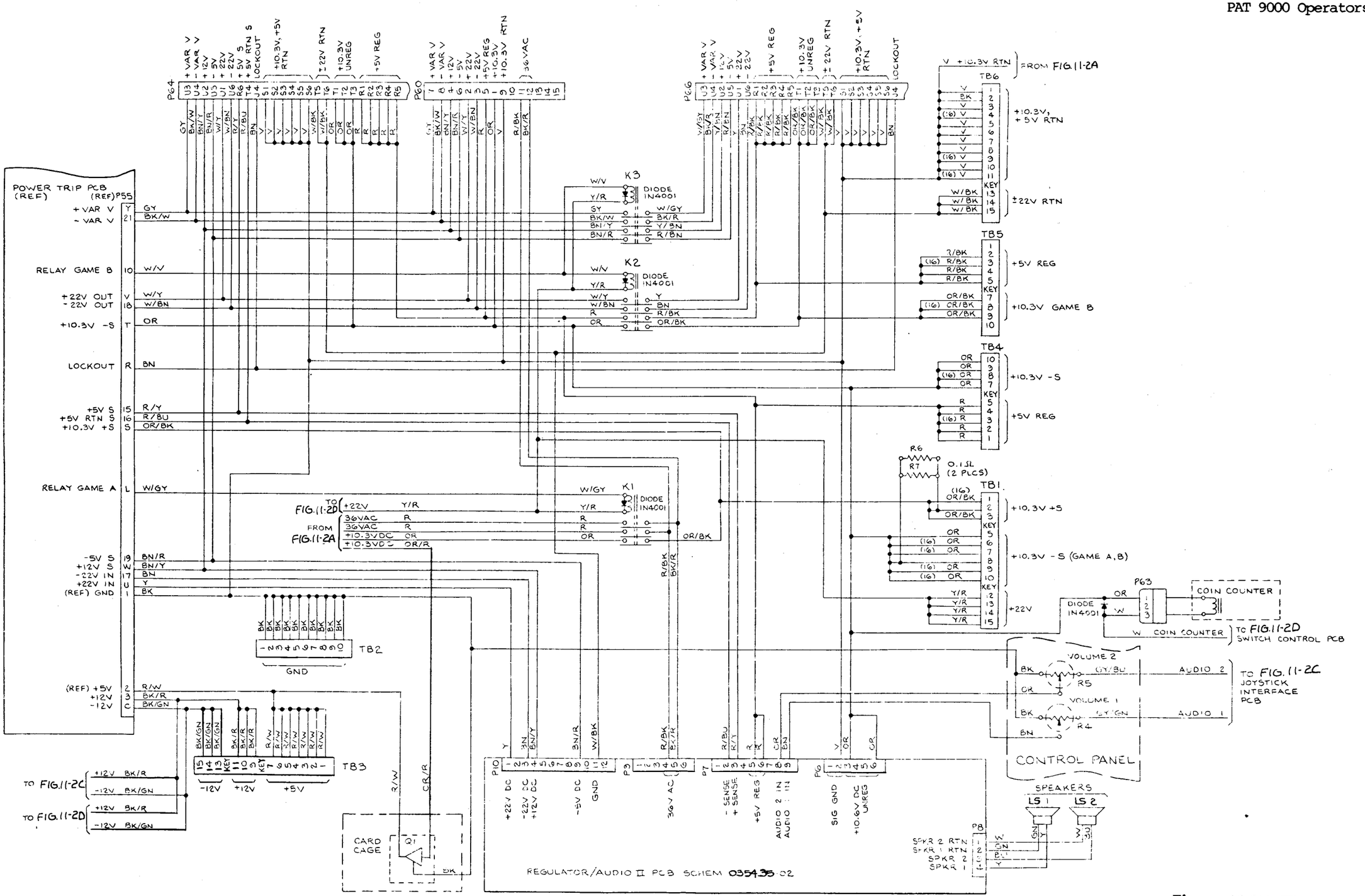


Figure 11-2B Wiring Diagram

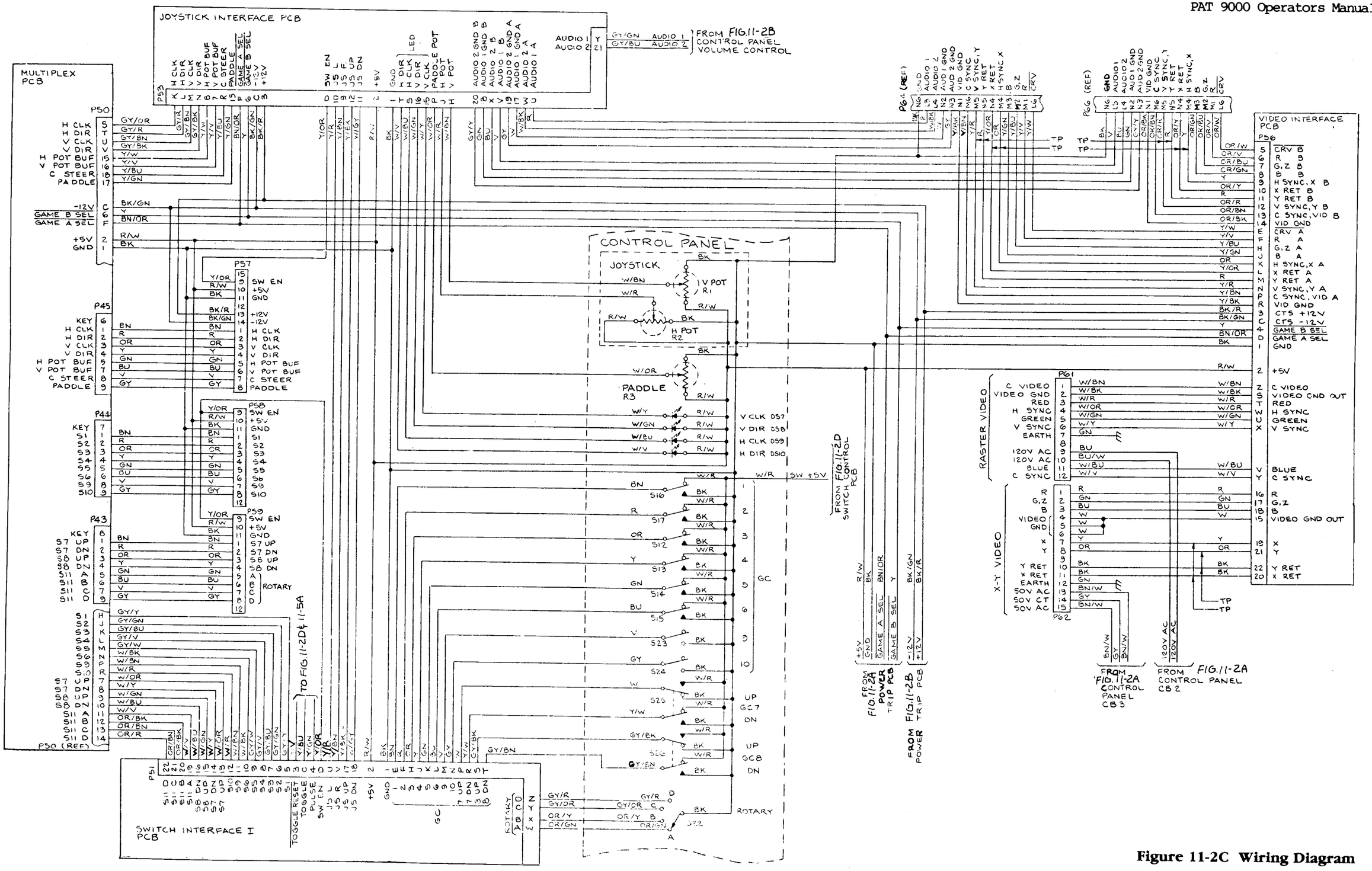


Figure 11-2C Wiring Diagram

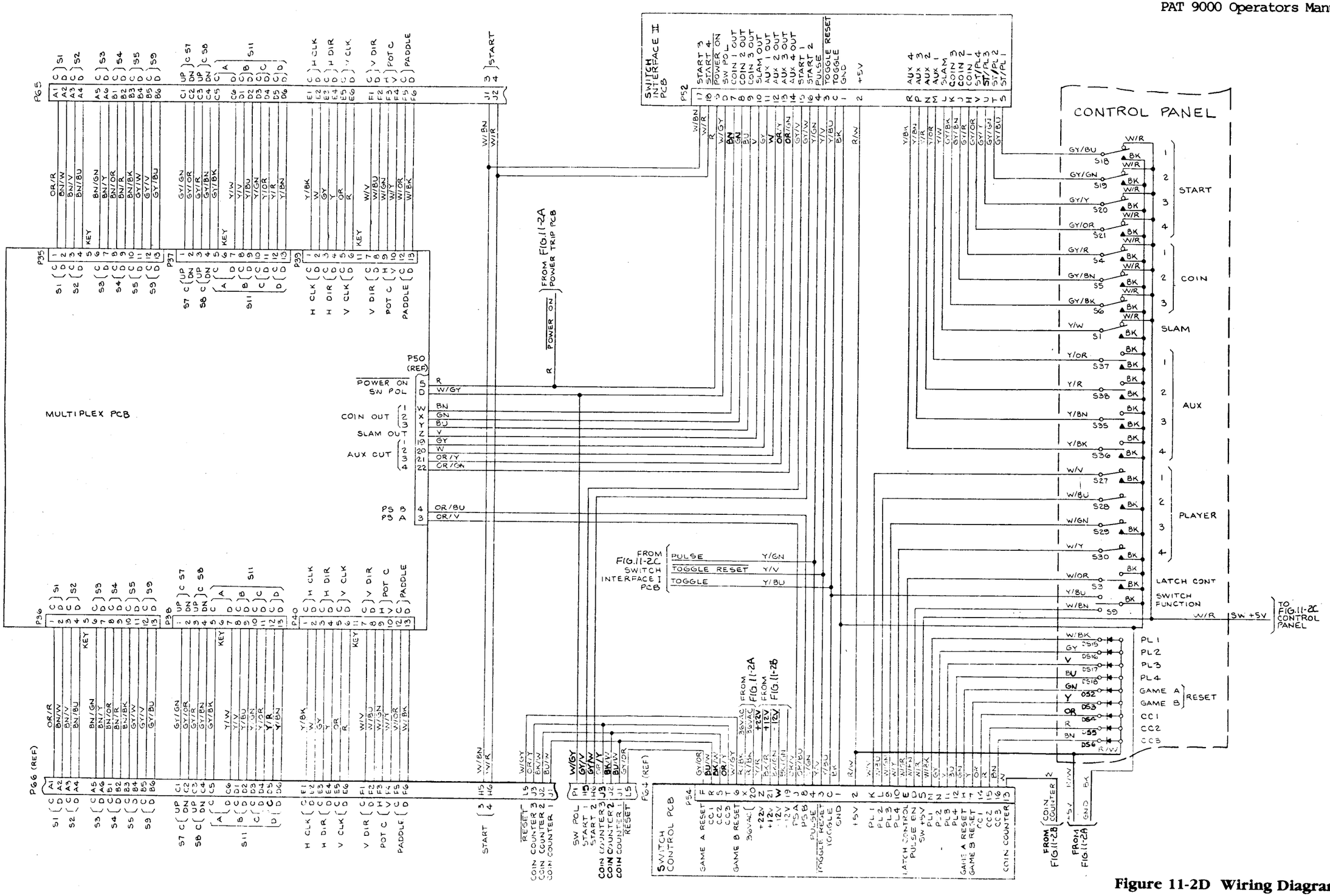


Figure 11-2D Wiring Diagram

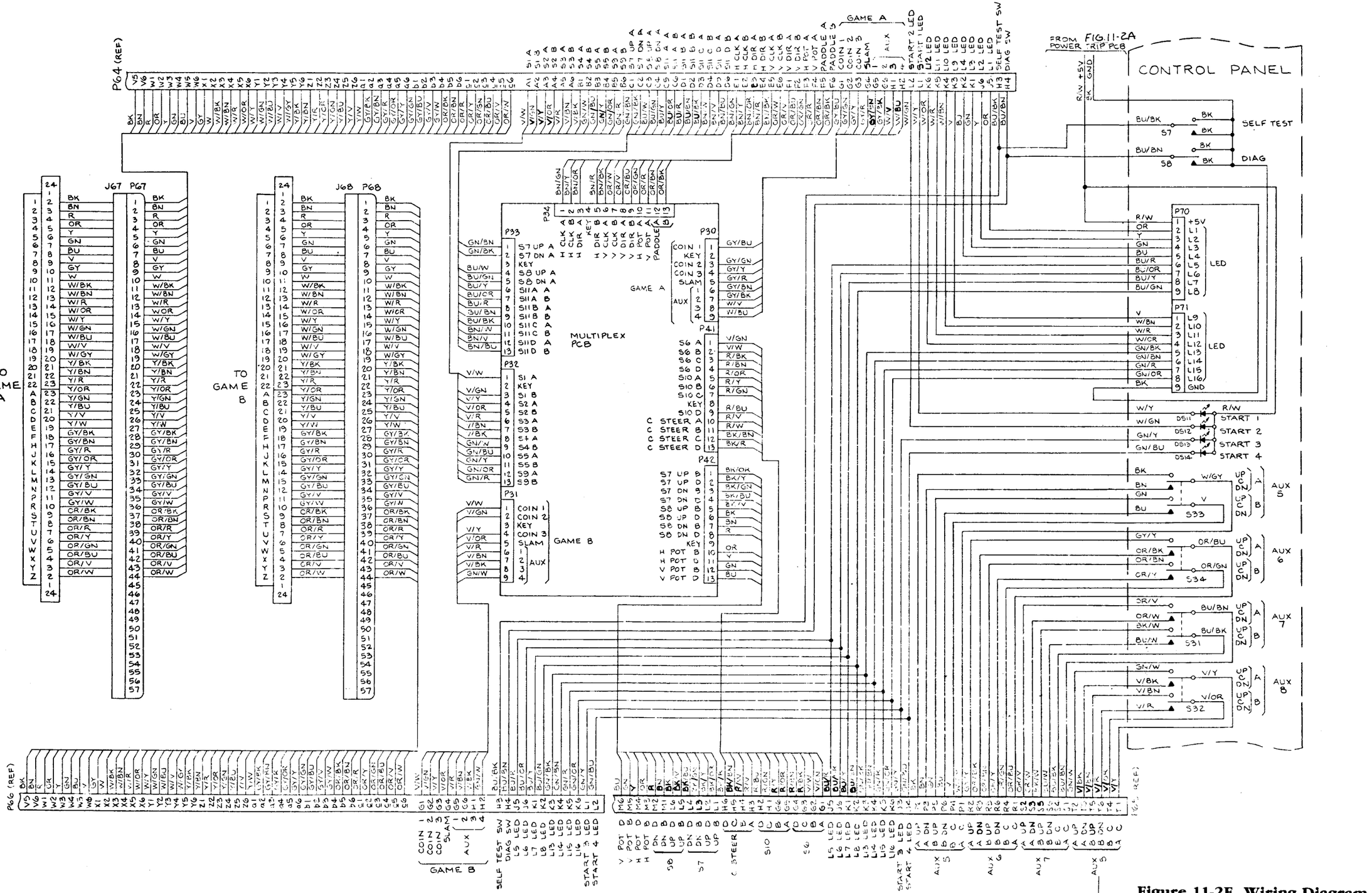
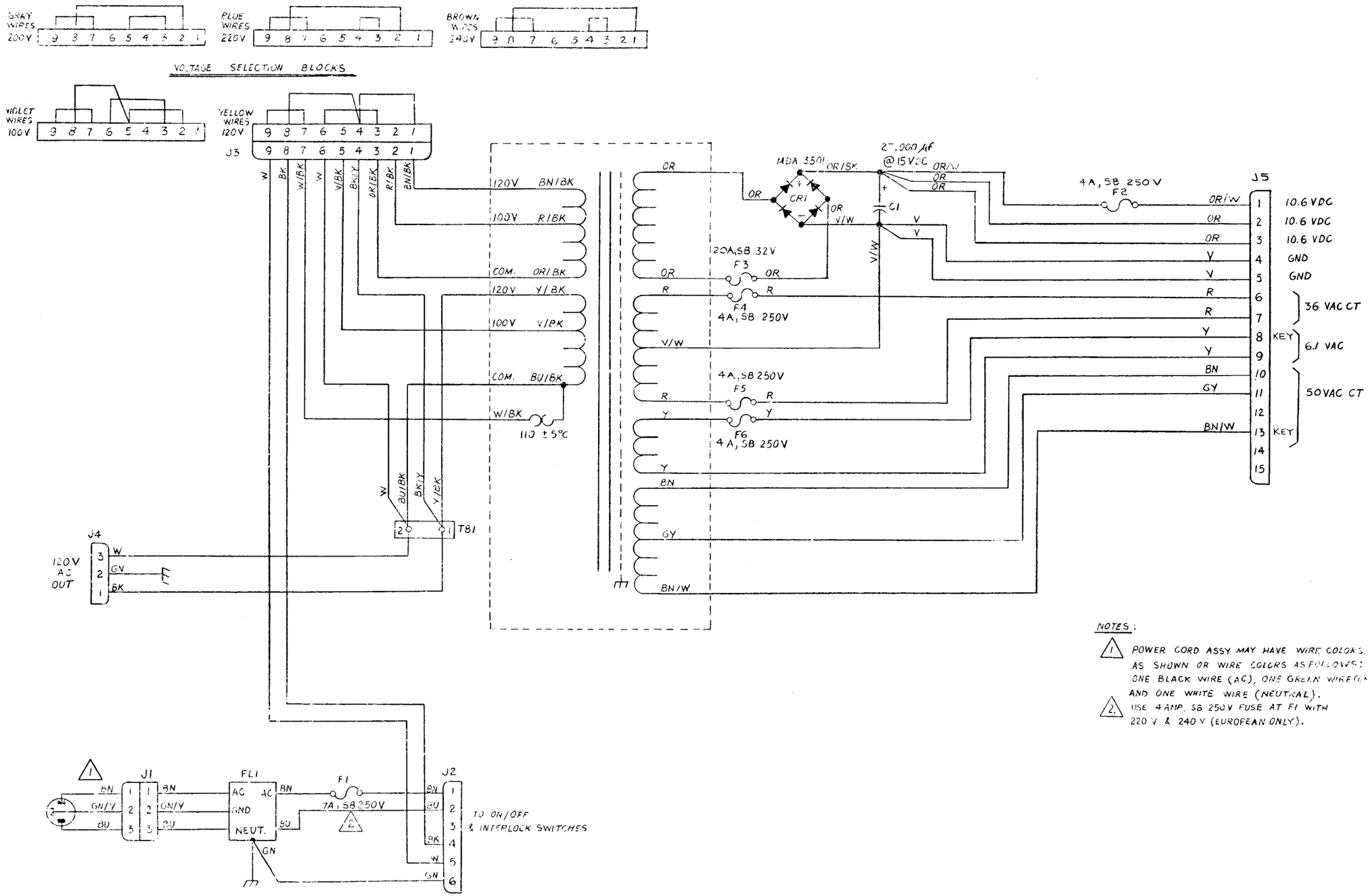


Figure 11-2E Wiring Diagram

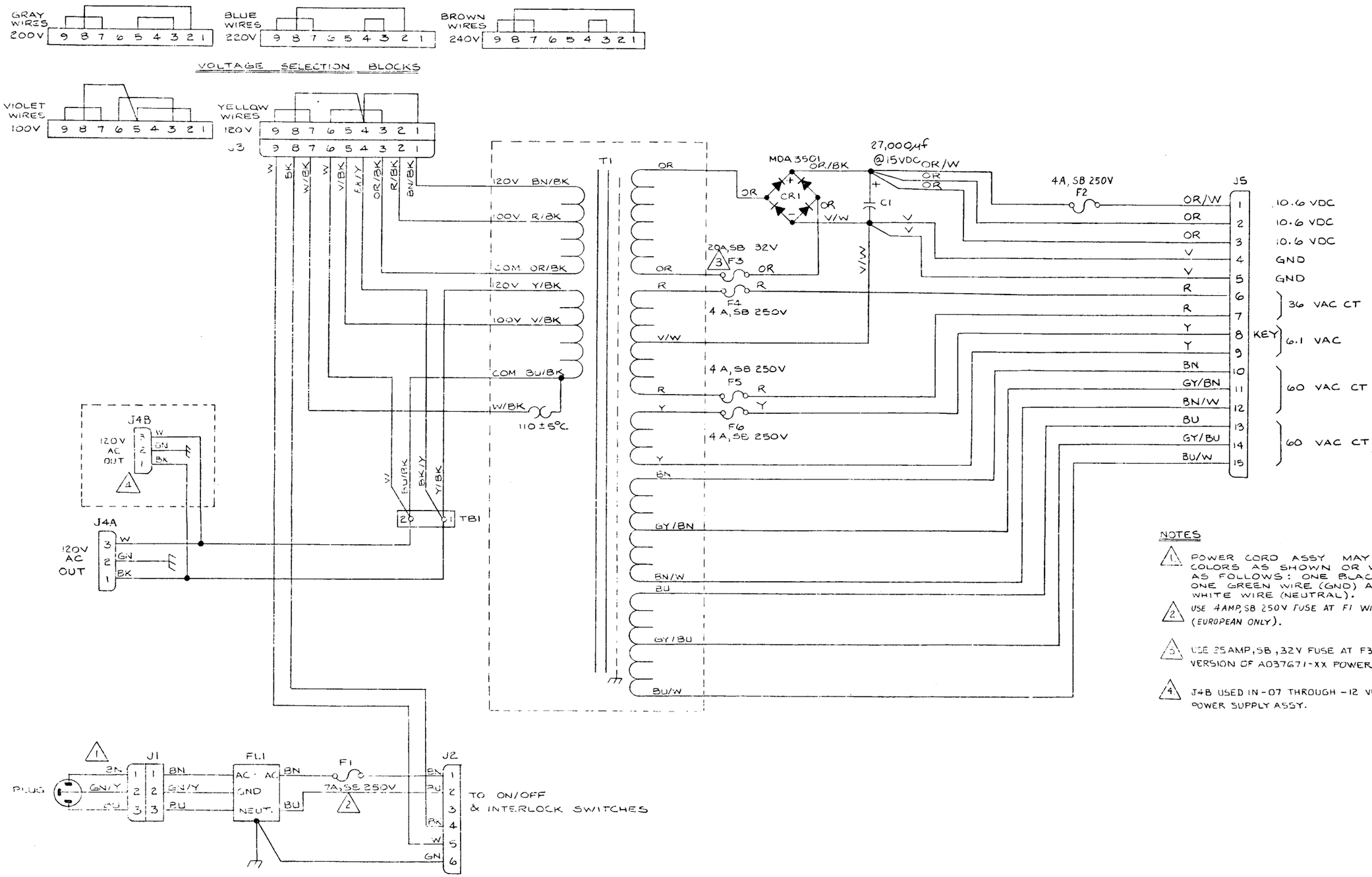
111/(112 blank)



NOTES:

1. POWER CORD ASSY MAY HAVE WIRE COLORS AS SHOWN OR WIRE COLORS AS FOLLOWS: ONE BLACK WIRE (AC), ONE GREEN WIRE (GND) AND ONE WHITE WIRE (NEUTRAL).
2. USE 4 AMP, SB 250V FUSE AT F1 WITH 220 V & 240 V (EUROPEAN ONLY).

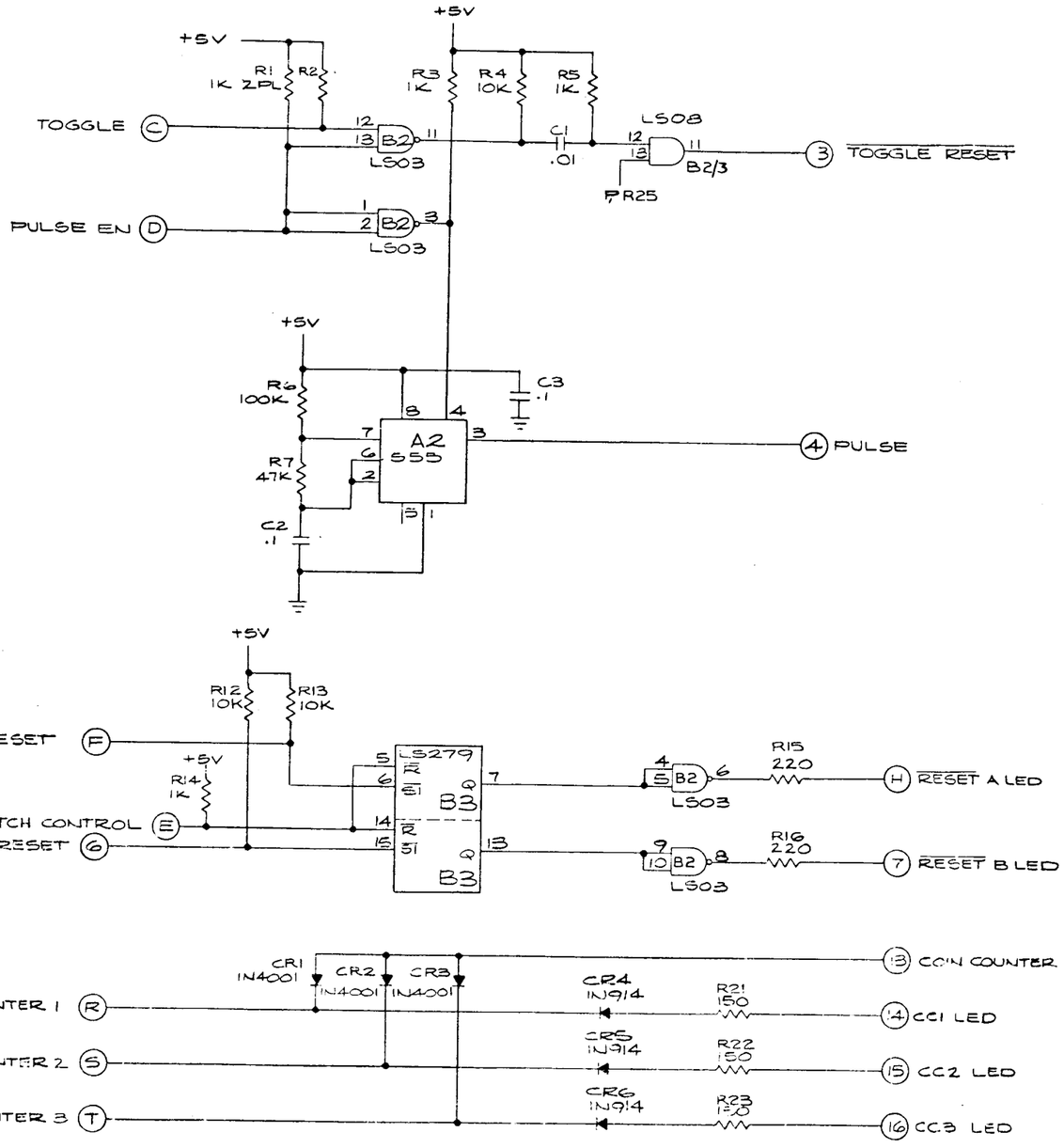
Figure 11-3 Color X-Y Power Supply Wiring Diagram

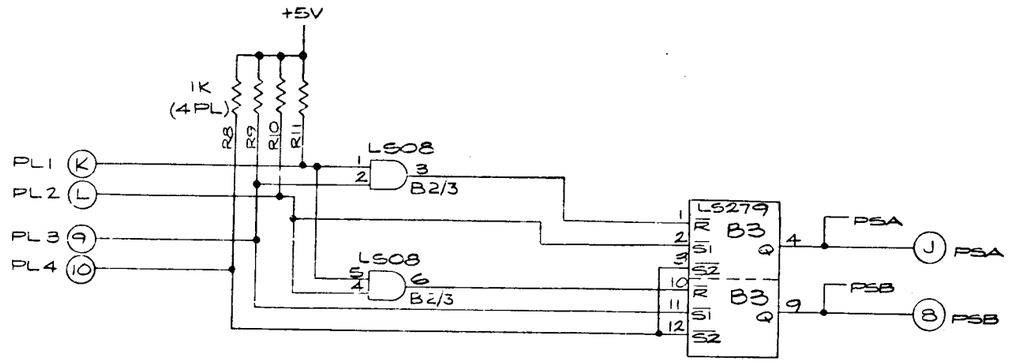


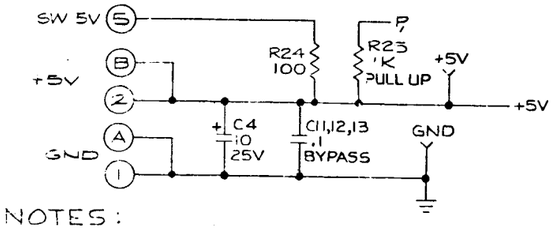
NOTES

1. POWER CORD ASSY MAY HAVE WIRE COLORS AS SHOWN OR WIRE COLORS AS FOLLOWS: ONE BLACK WIRE (AC), ONE GREEN WIRE (GND) AND ONE WHITE WIRE (NEUTRAL).
2. USE 4AMP, SB 250V FUSE AT F1 WITH 220V & 240V (EUROPEAN ONLY).
3. USE 25AMP, SB, 32V FUSE AT F3 FOR -04, -05; & -06 VERSION OF A037671-XX POWER SUPPLY.
4. J4B USED IN -07 THROUGH -12 VERSION OF A037671-XX POWER SUPPLY ASSY.

Figure 11-4 Color Raster Power Supply Wiring Diagram







NOTES:
○ DENOTES J54 CONNECTOR

REFERENCE DESIGNATION	
LAST USED	NOT USED
R25	
C13	
CR10	
VR2	

Figure 11-5A Switch Control Schematic Diagram

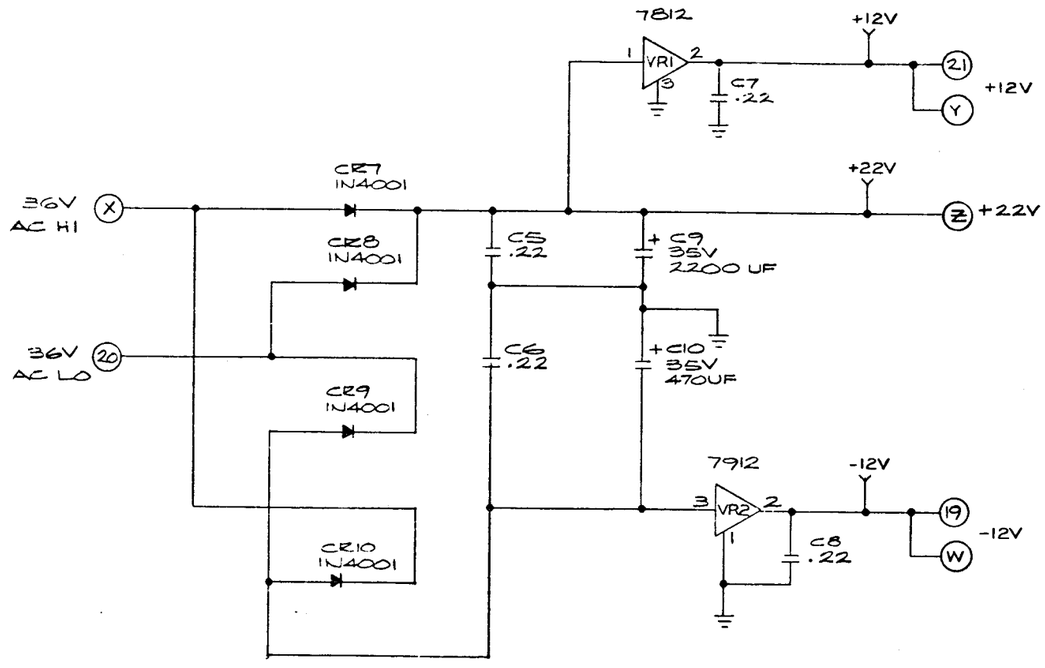
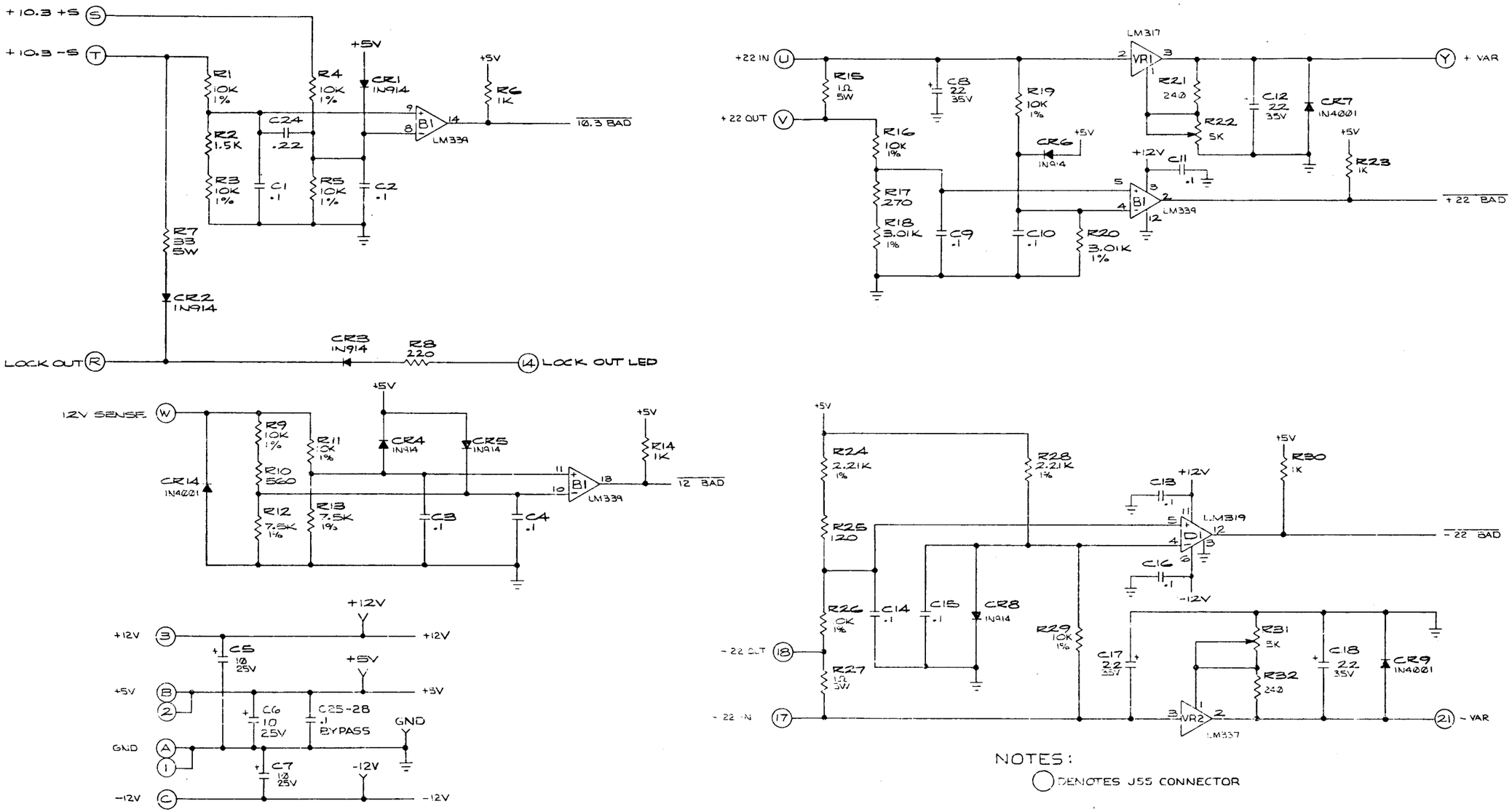


Figure 11-5B Switch Control Schematic Diagram



NOTES:

○ DENOTES J55 CONNECTOR

Figure 11-6A Power Trip Schematic Diagram

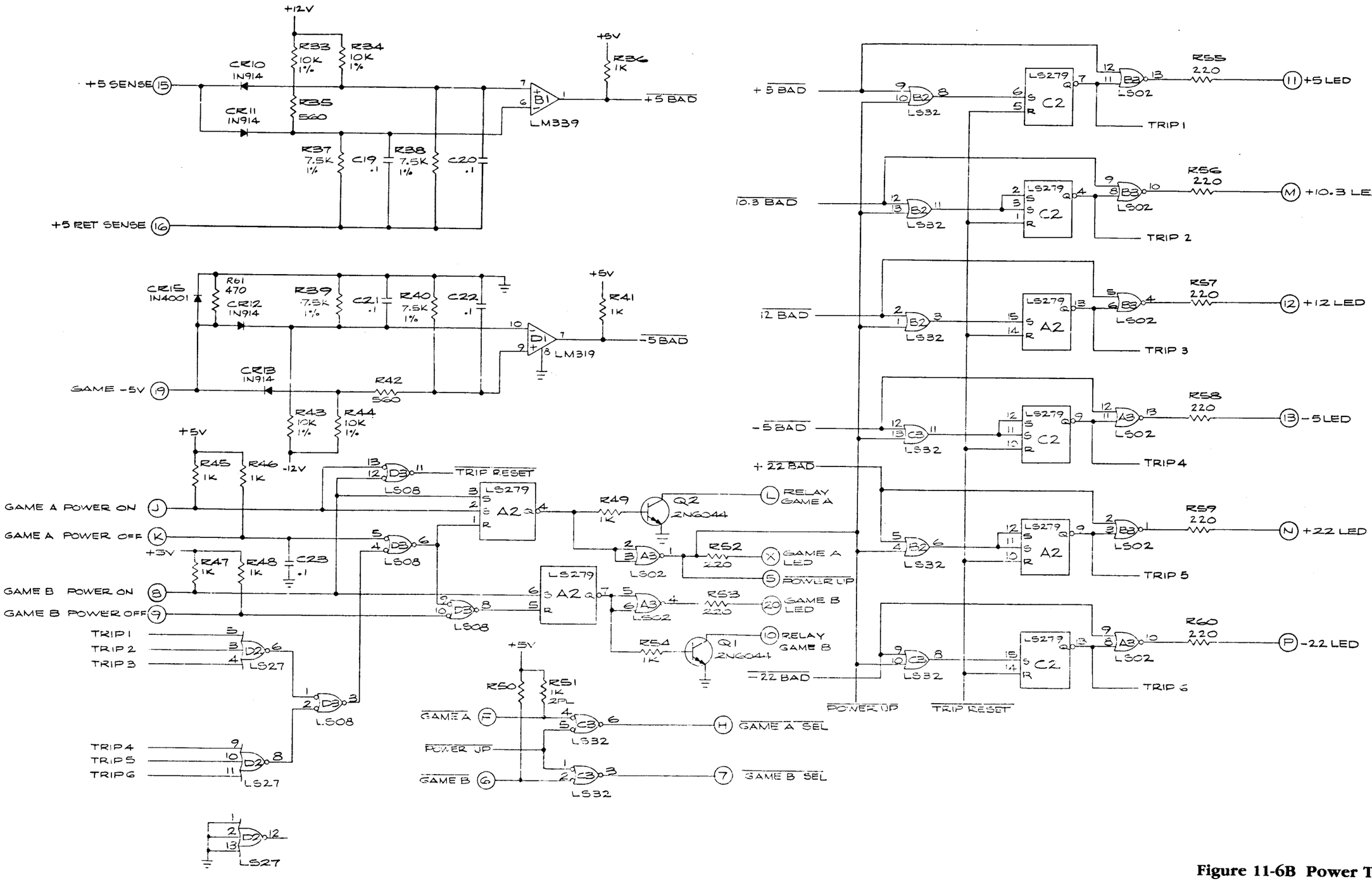


Figure 11-6B Power Trip Schematic Diagram

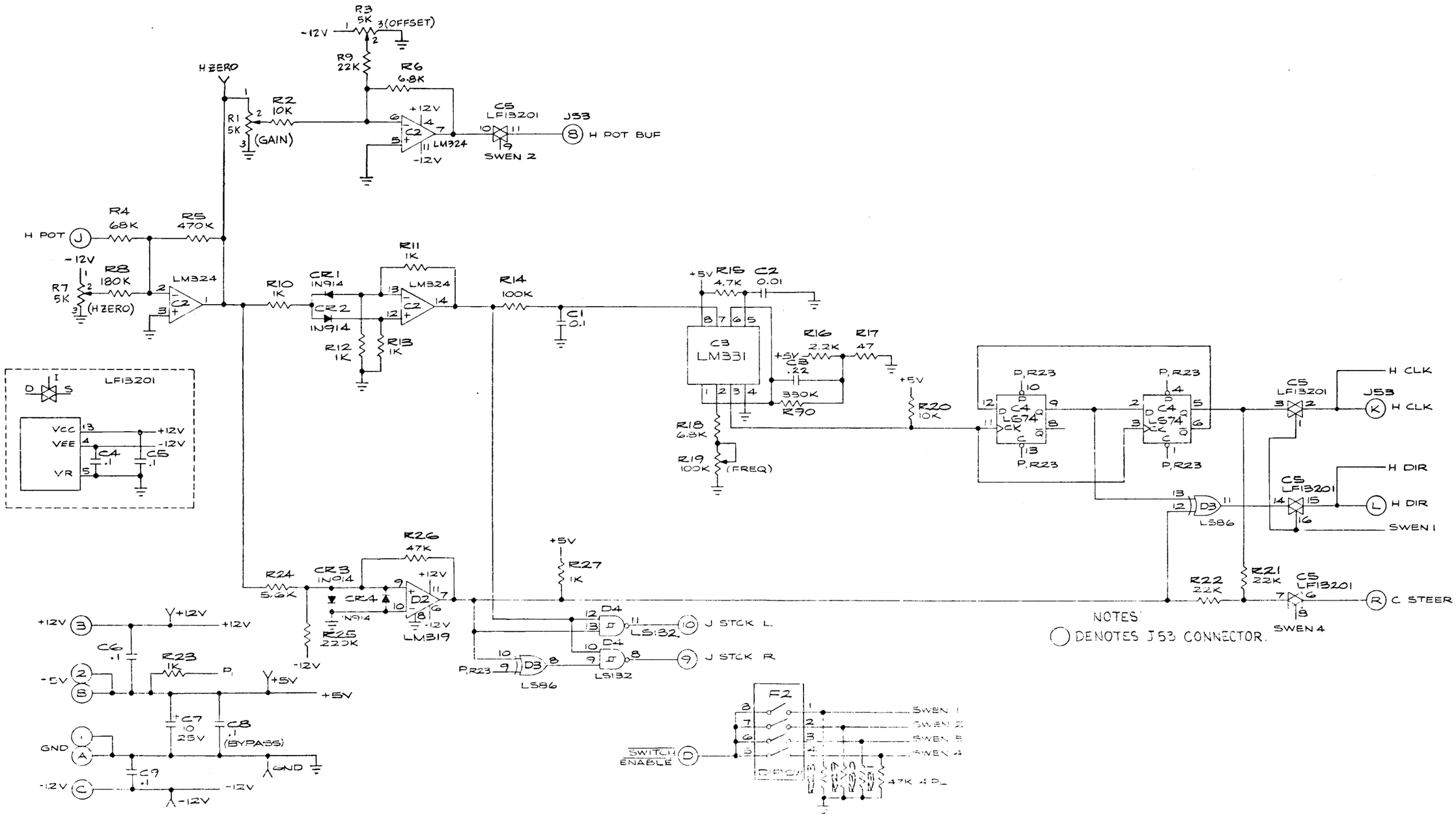


Figure 11-7A Joystick Interface Schematic Diagram

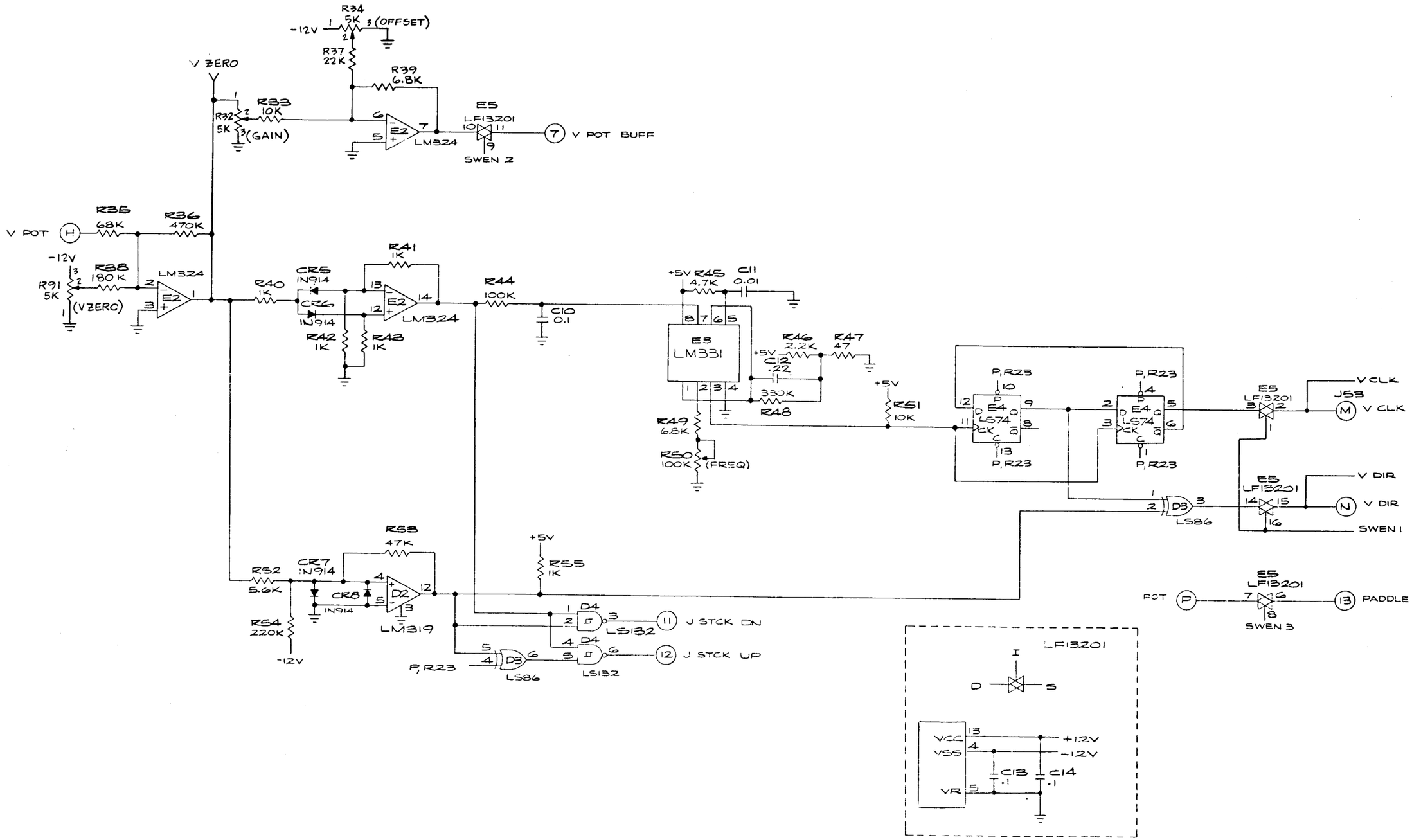


Figure 11-7B Joystick Interface Schematic Diagram

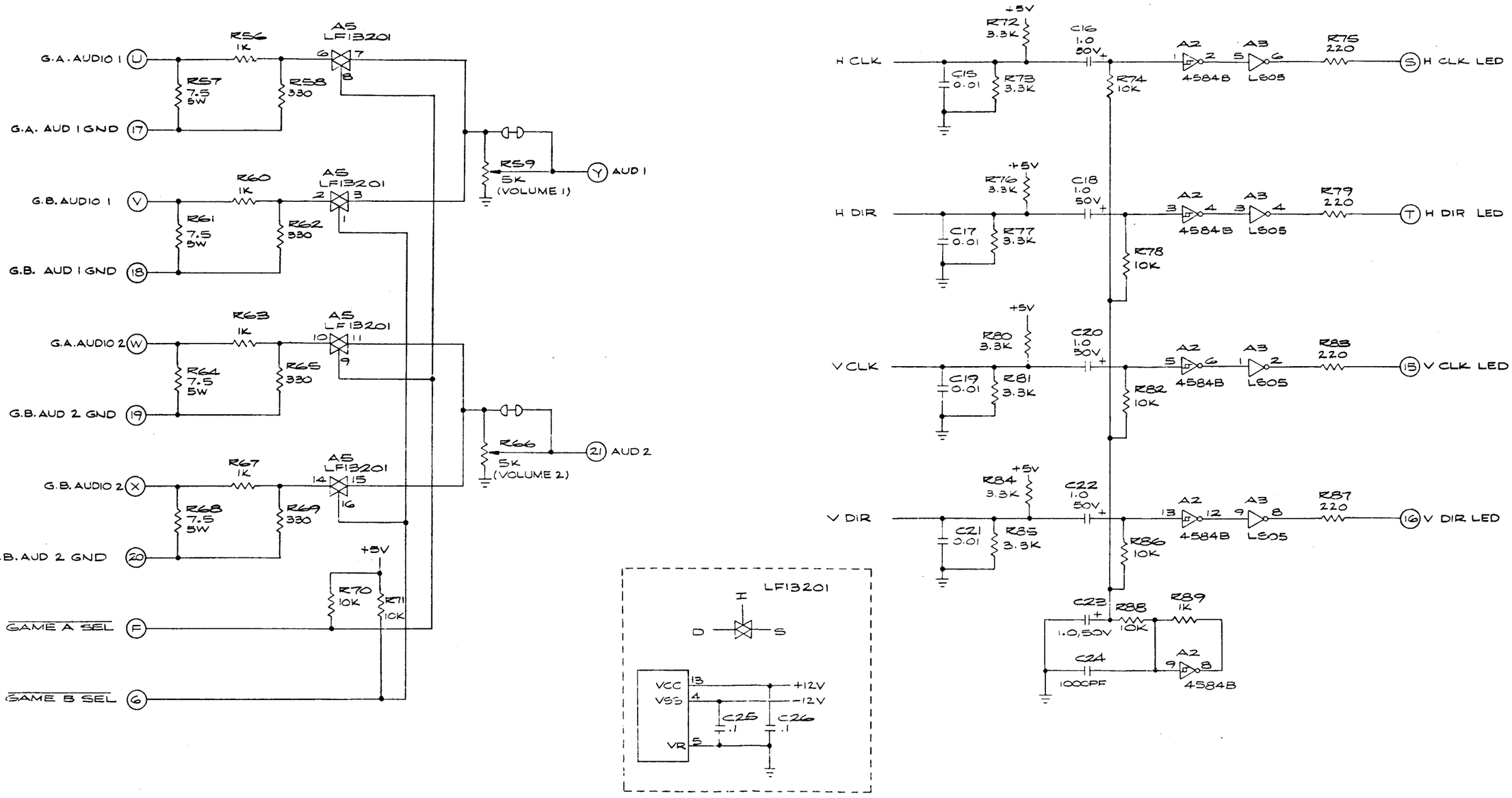


Figure 11-7C Joystick Interface Schematic Diagram

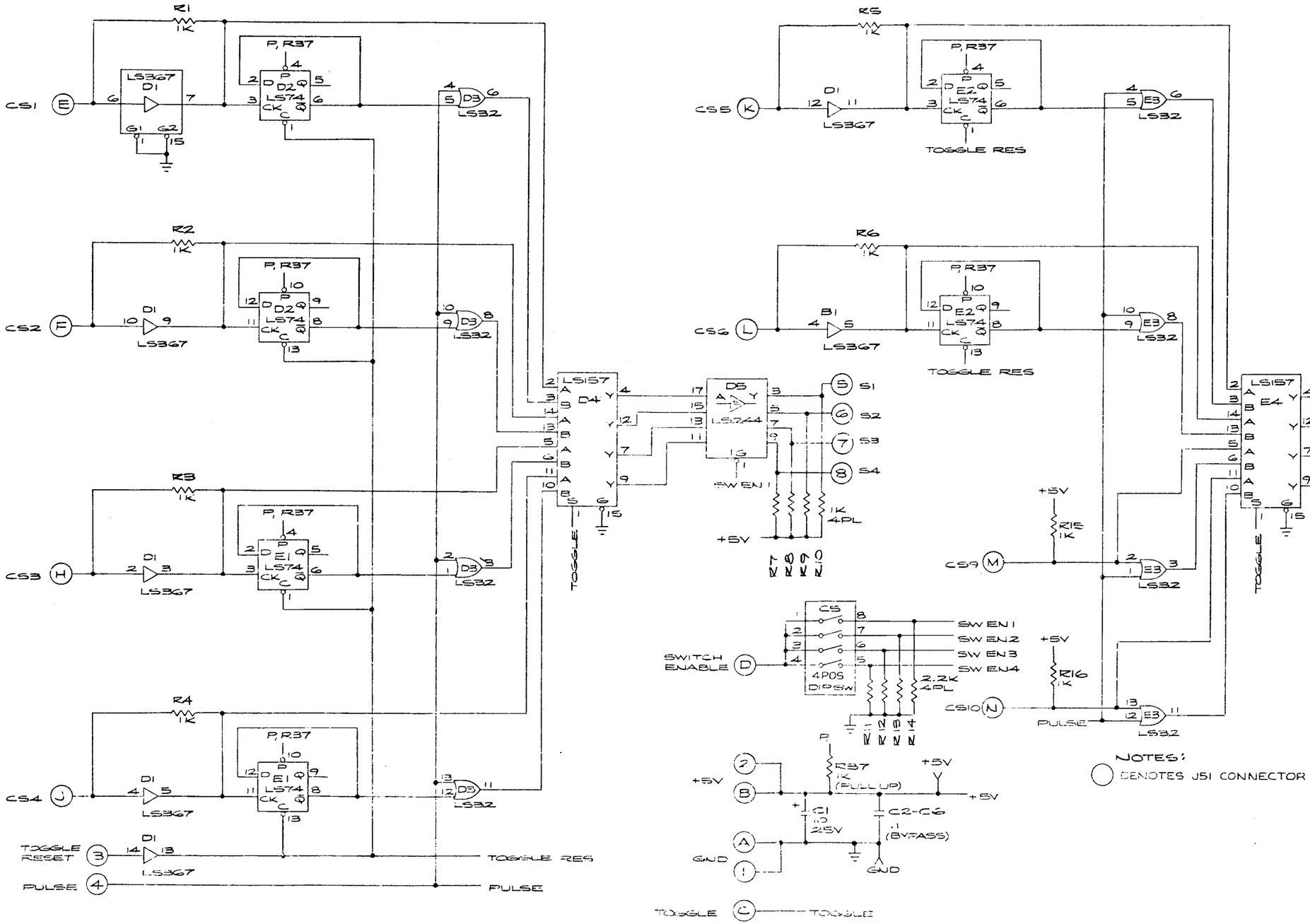


Figure 11-8A Switch Interface 1 Schematic Diagram

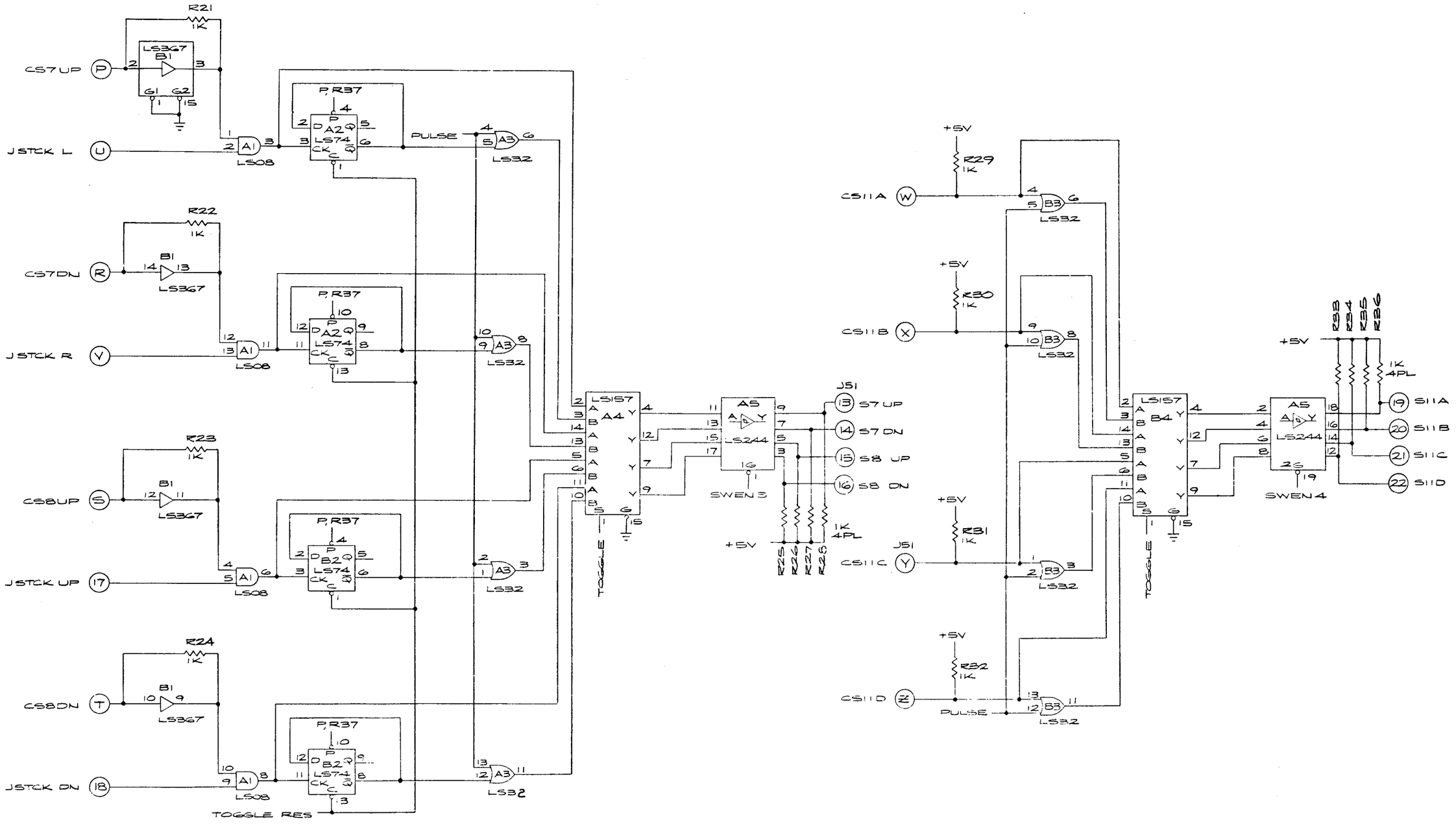


Figure 11-8B Switch Interface 1 Schematic Diagram

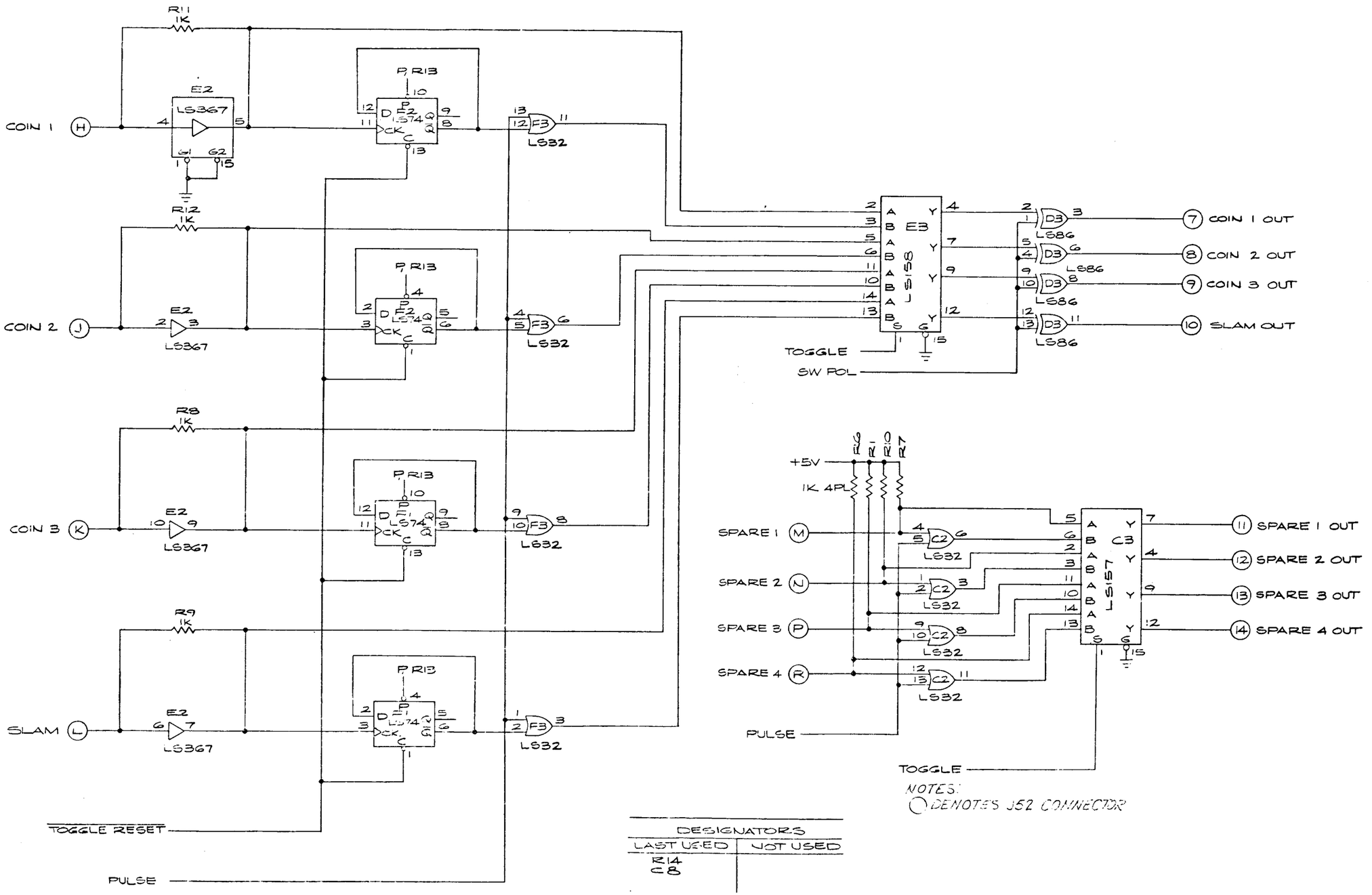


Figure 11-9A Switch Interface 2 Schematic Diagram

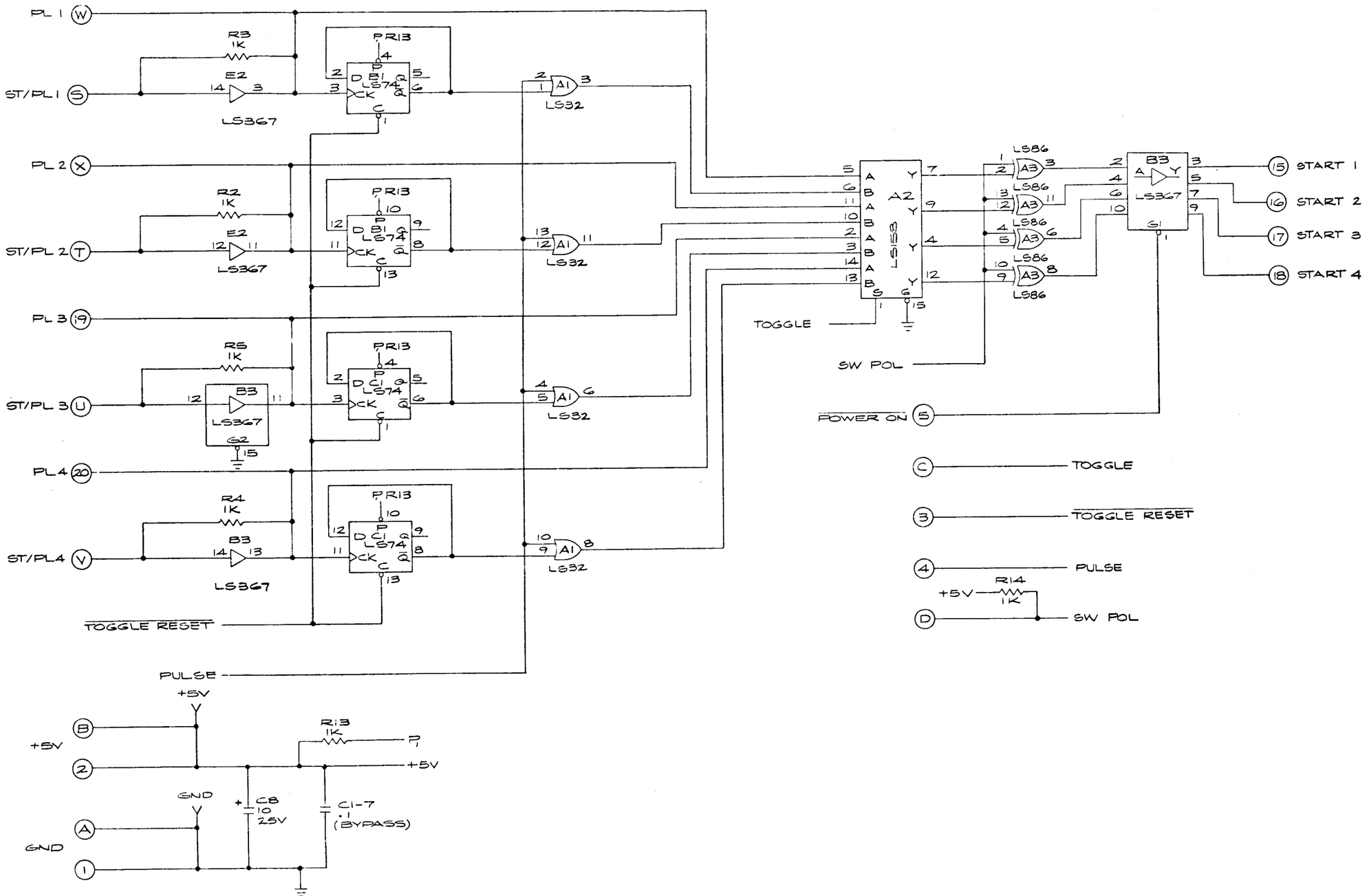
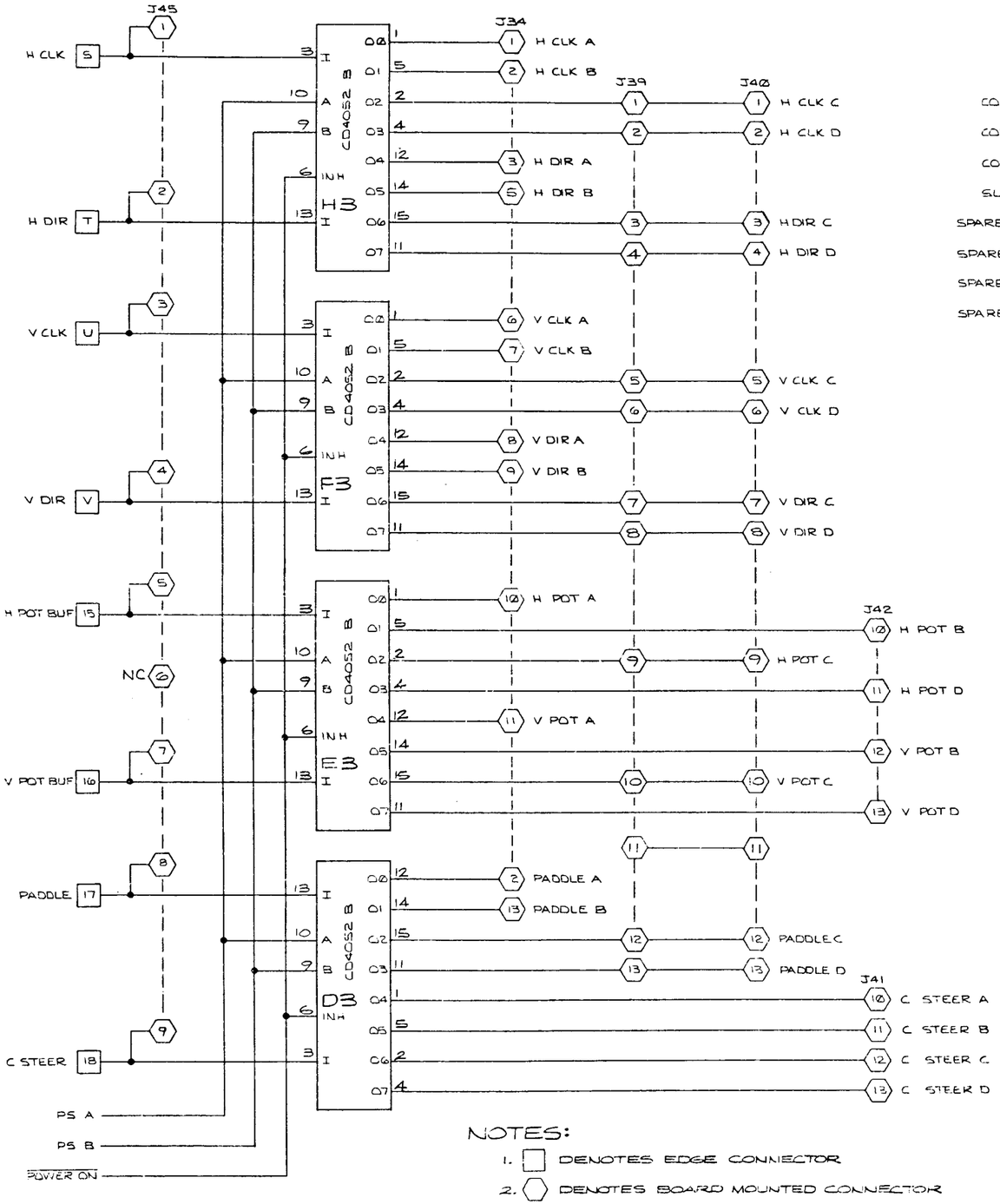
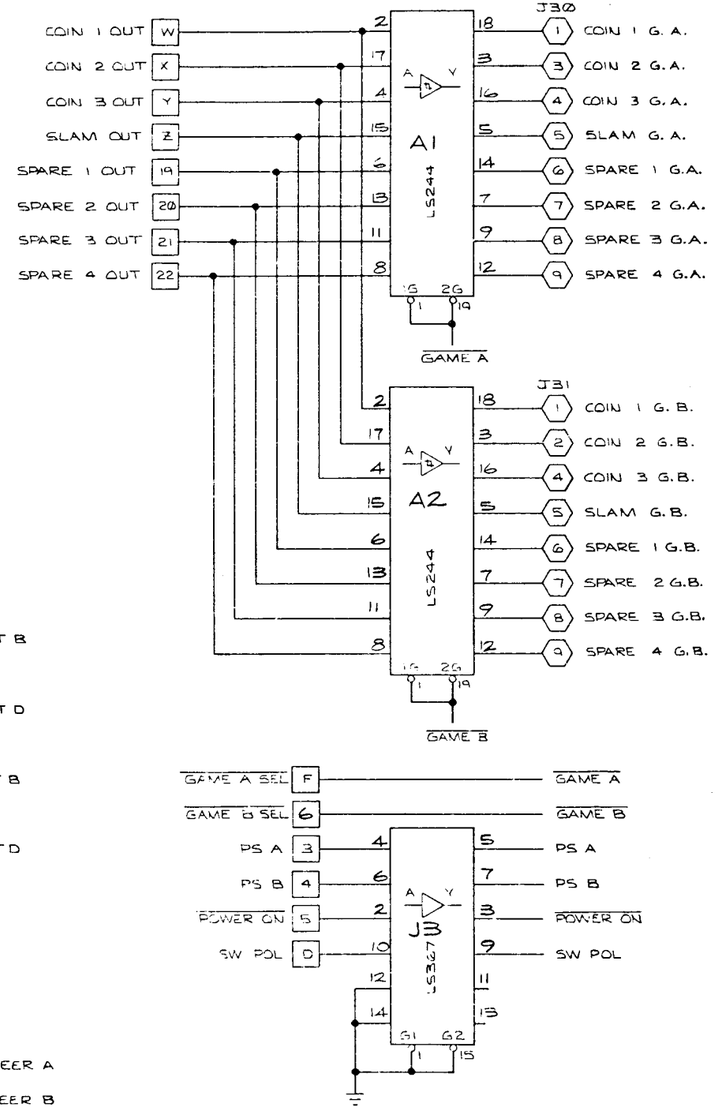


Figure 11-9B Switch Interface 2 Schematic Diagram



NOTES:

1. ☐ DENOTES EDGE CONNECTOR
2. ⬡ DENOTES BOARD MOUNTED CONNECTOR



DESIGNATORS

LAST USED	NOT USED
C8	

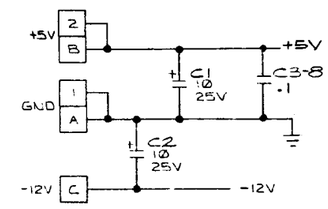


Figure 11-10A Multiplex Schematic Diagram

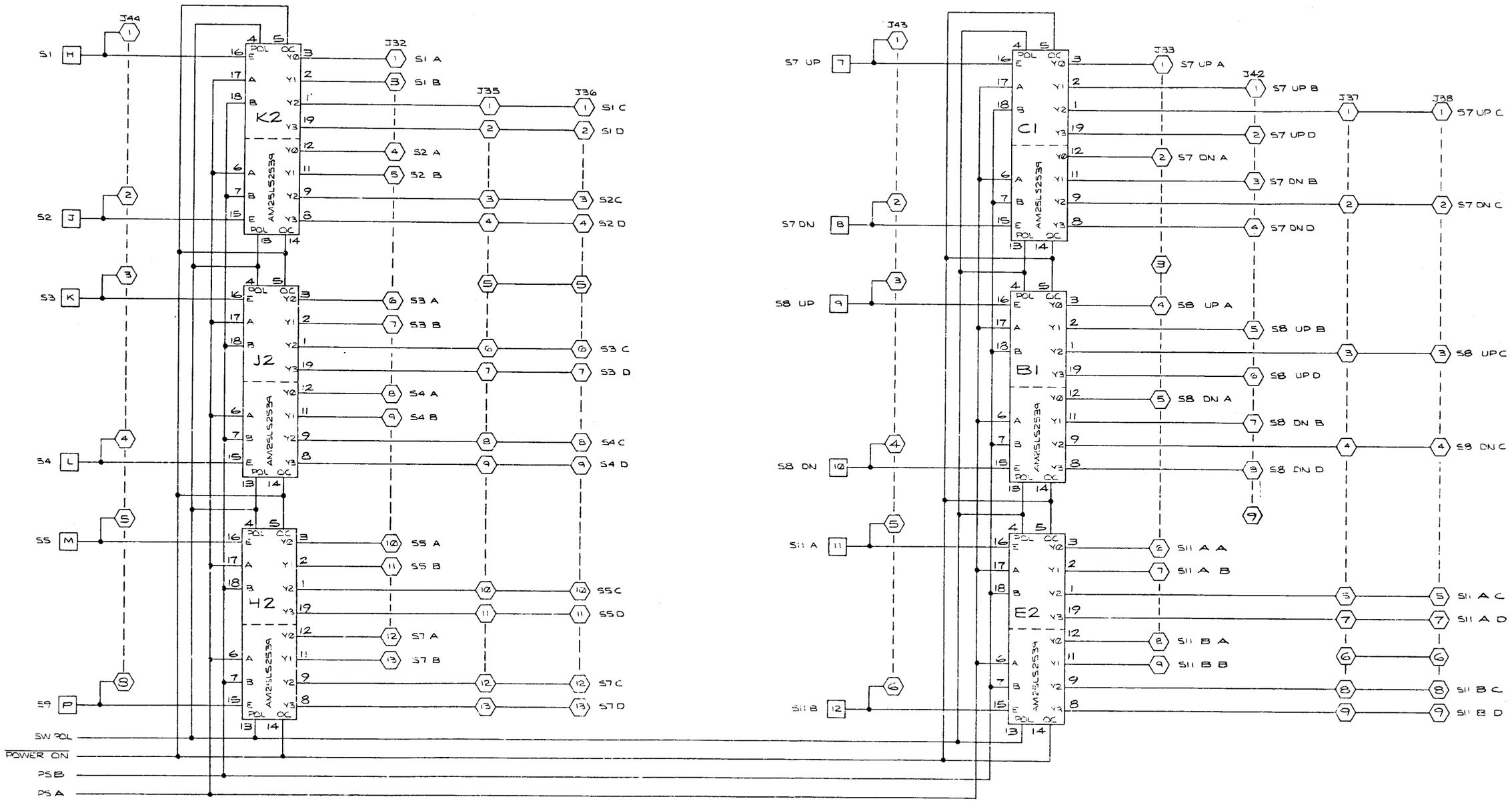


Figure 11-10B Multiplex Schematic Diagram

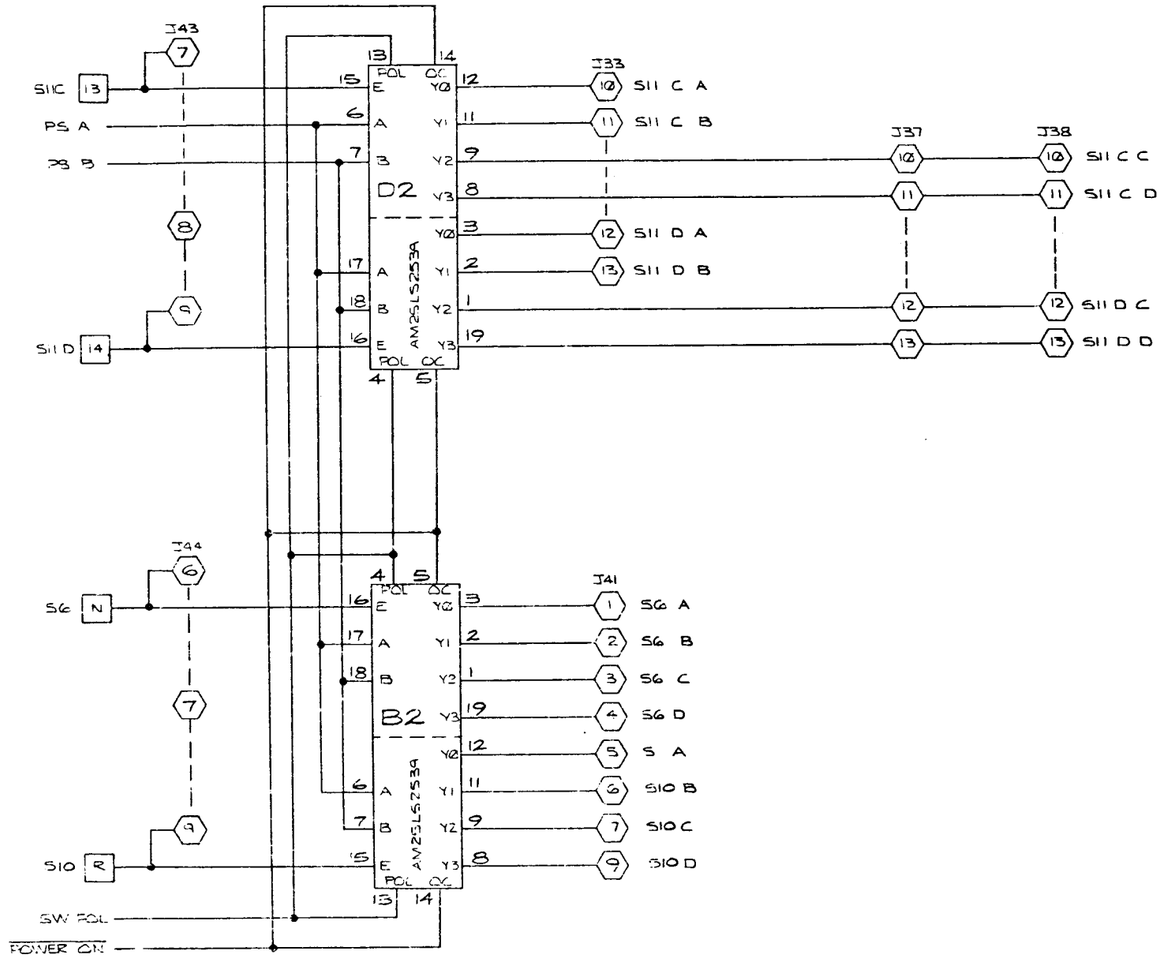
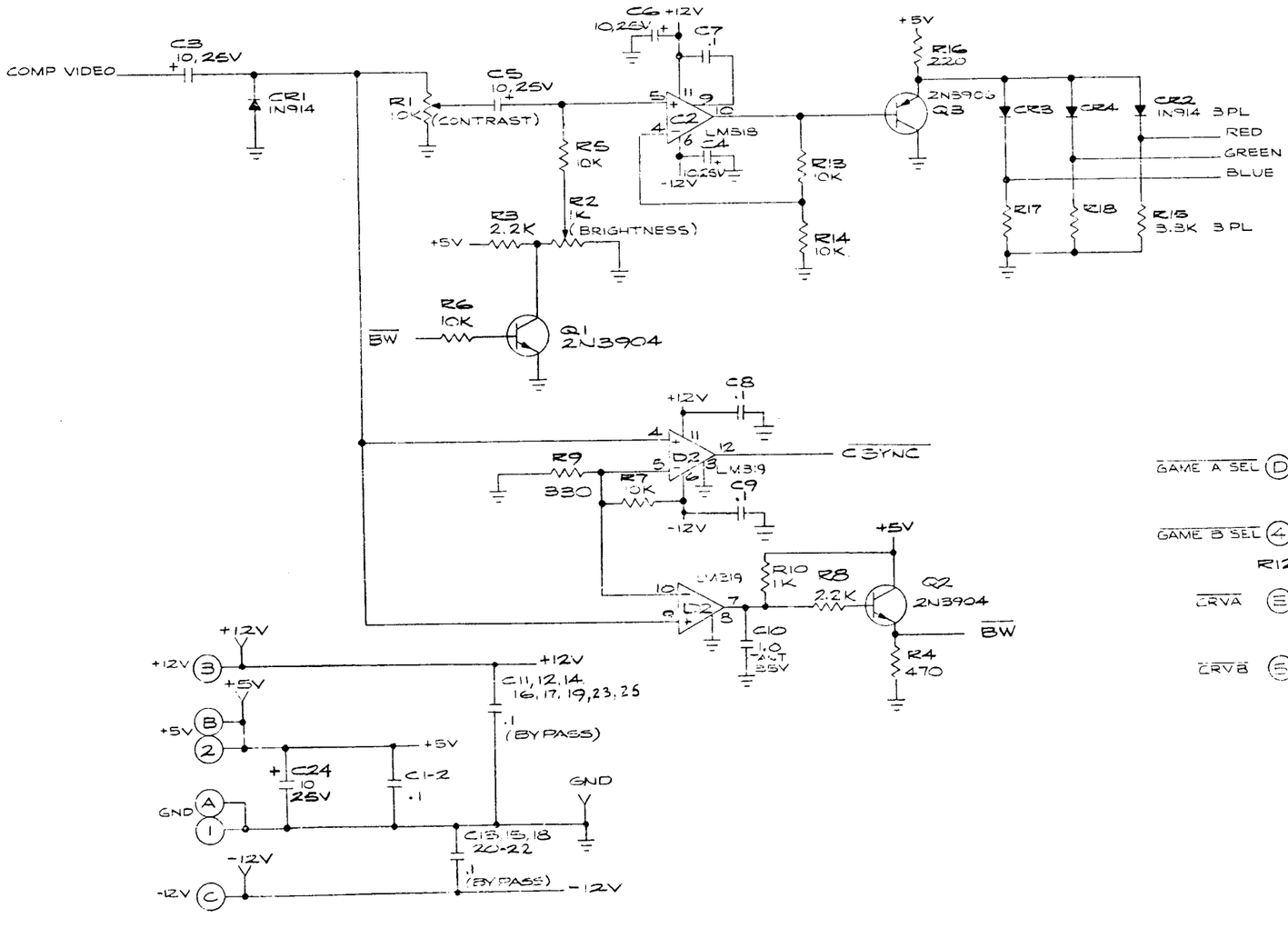
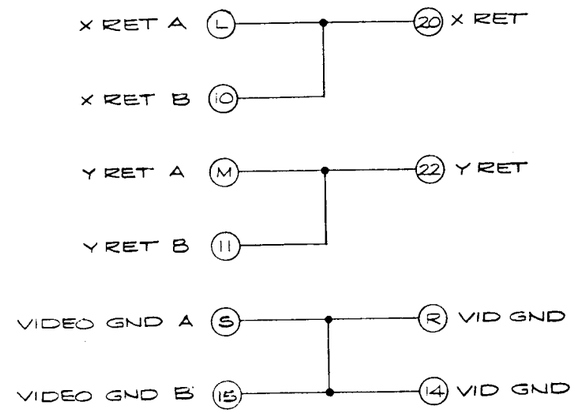
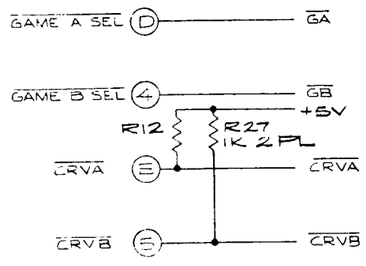


Figure 11-10C Multiplex Schematic Diagram







NOTES:

○ DENOTES J56 CONNECTOR.

Figure 11-11A Video Interface Schematic Diagram

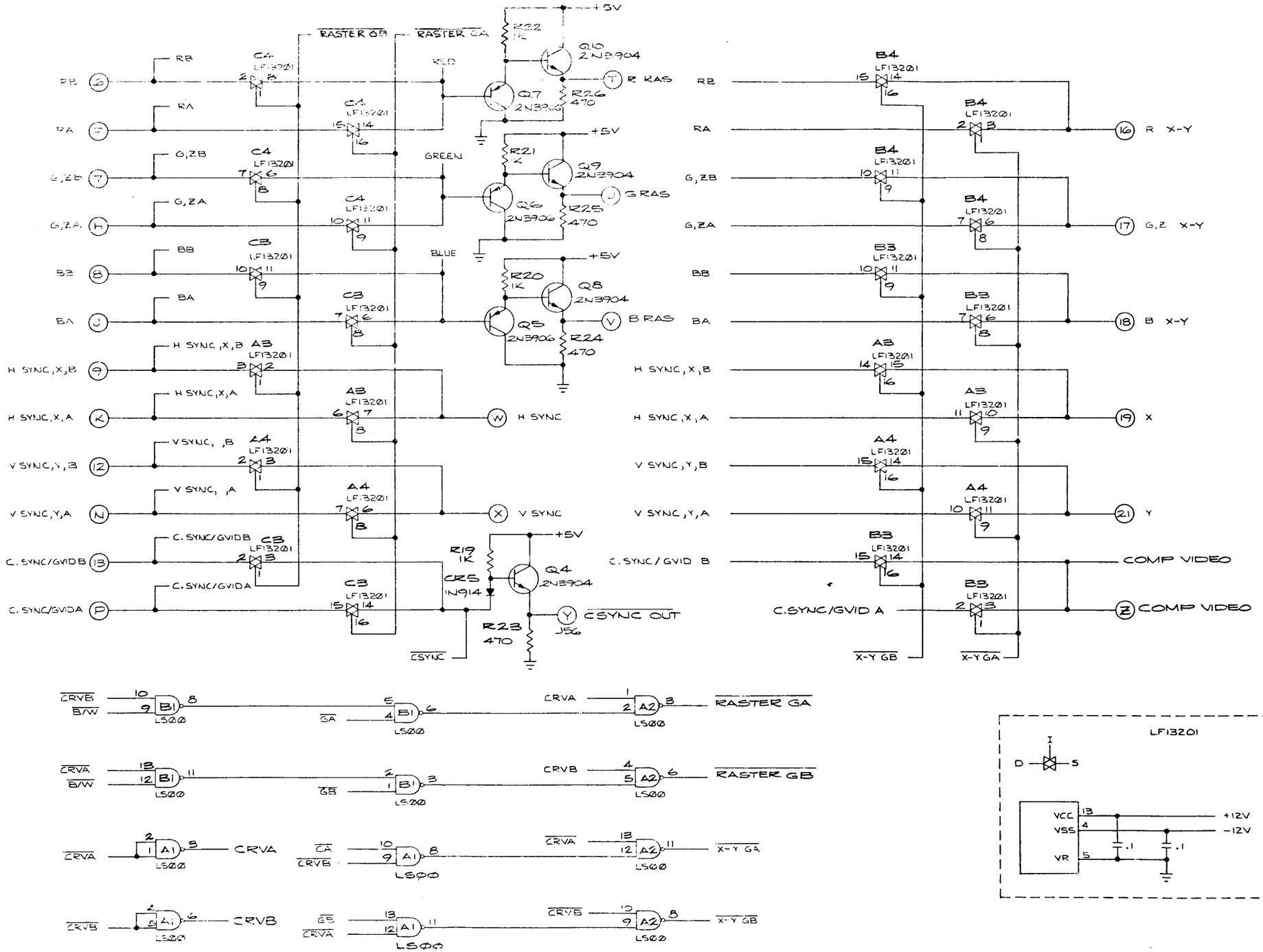


Figure 11-11B Video Interface Schematic Diagram

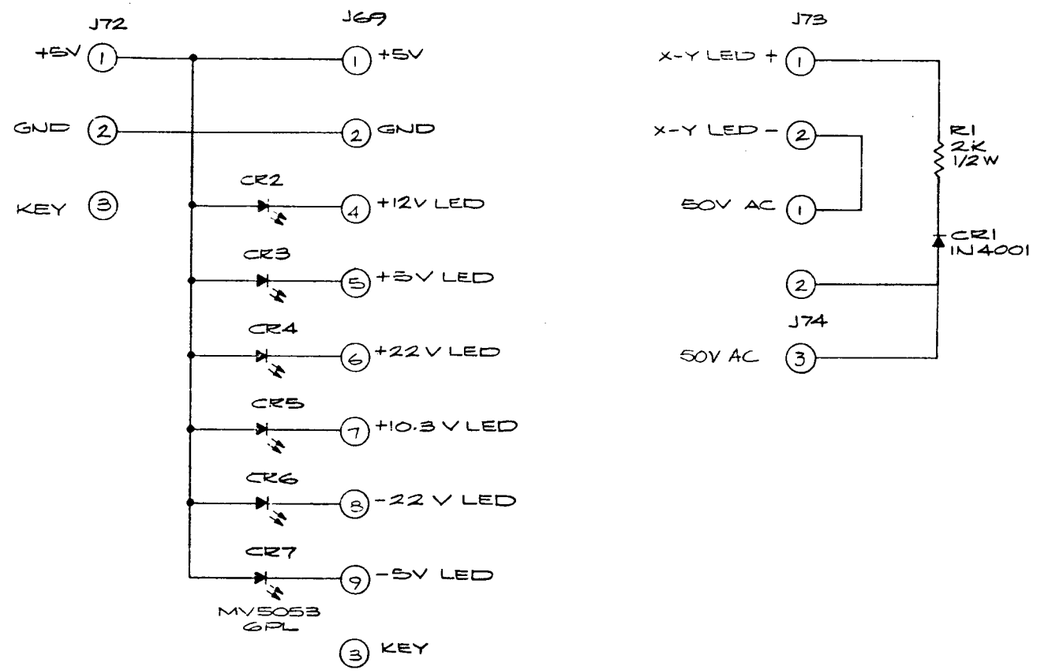


Figure 11-12 Power LED Schematic Diagram

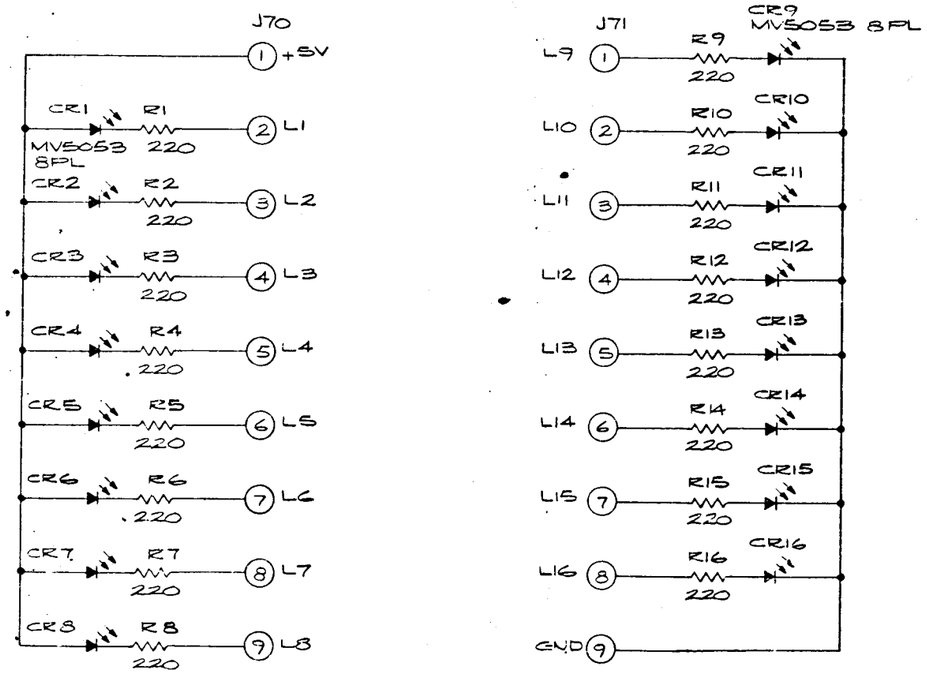


Figure 11-13 Indicator LED Schematic Diagram

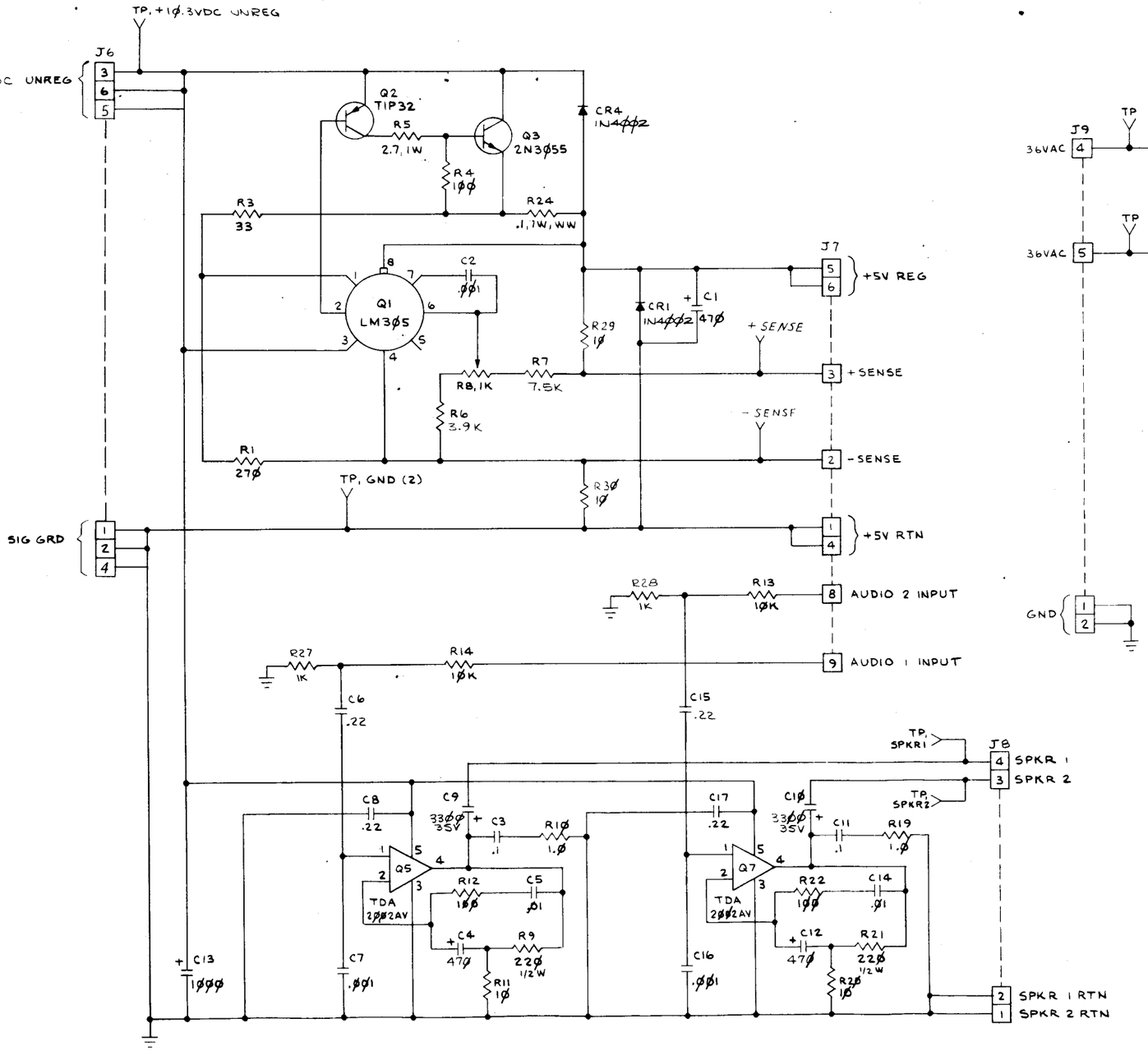
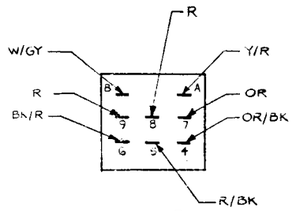
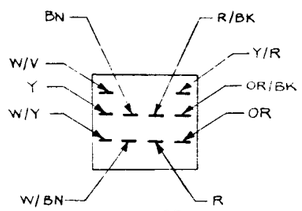


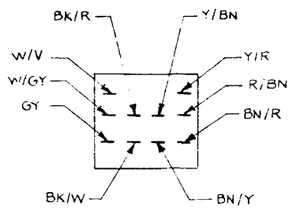
Figure 11-14 Regulator/Audio II Schematic Diagram



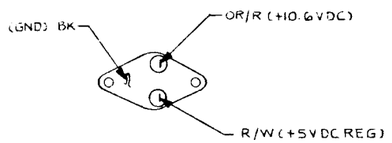
DETAIL A



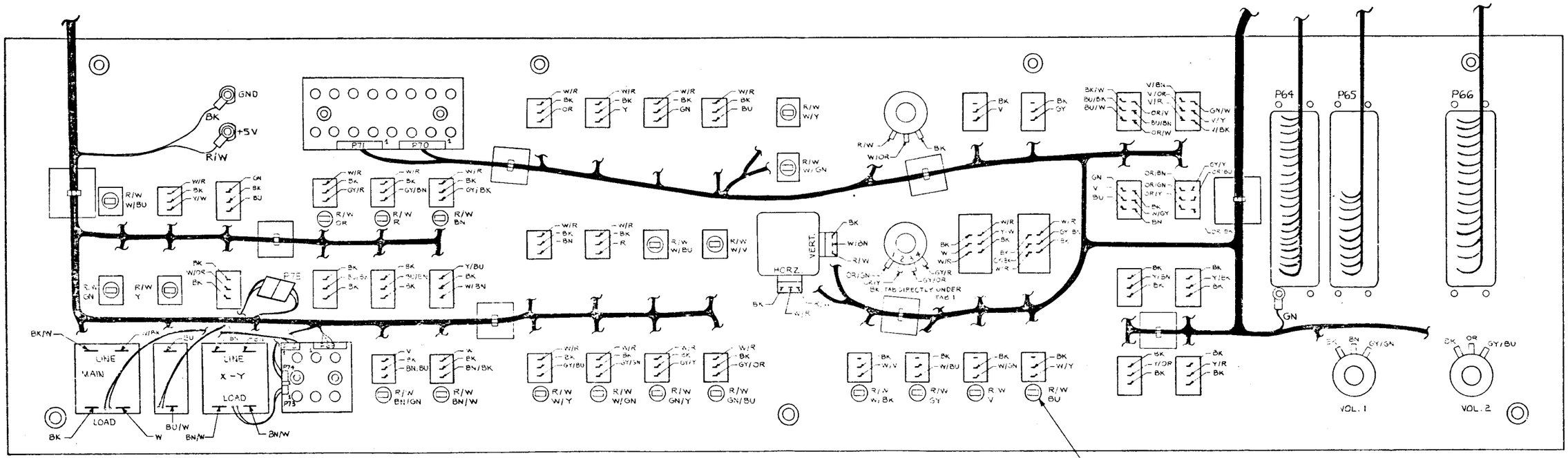
DETAIL B

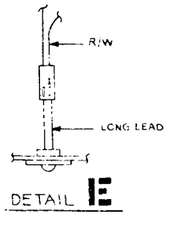


DETAIL C



DETAIL D





DETAIL E

Figure 11-15A Harness Installation Diagram

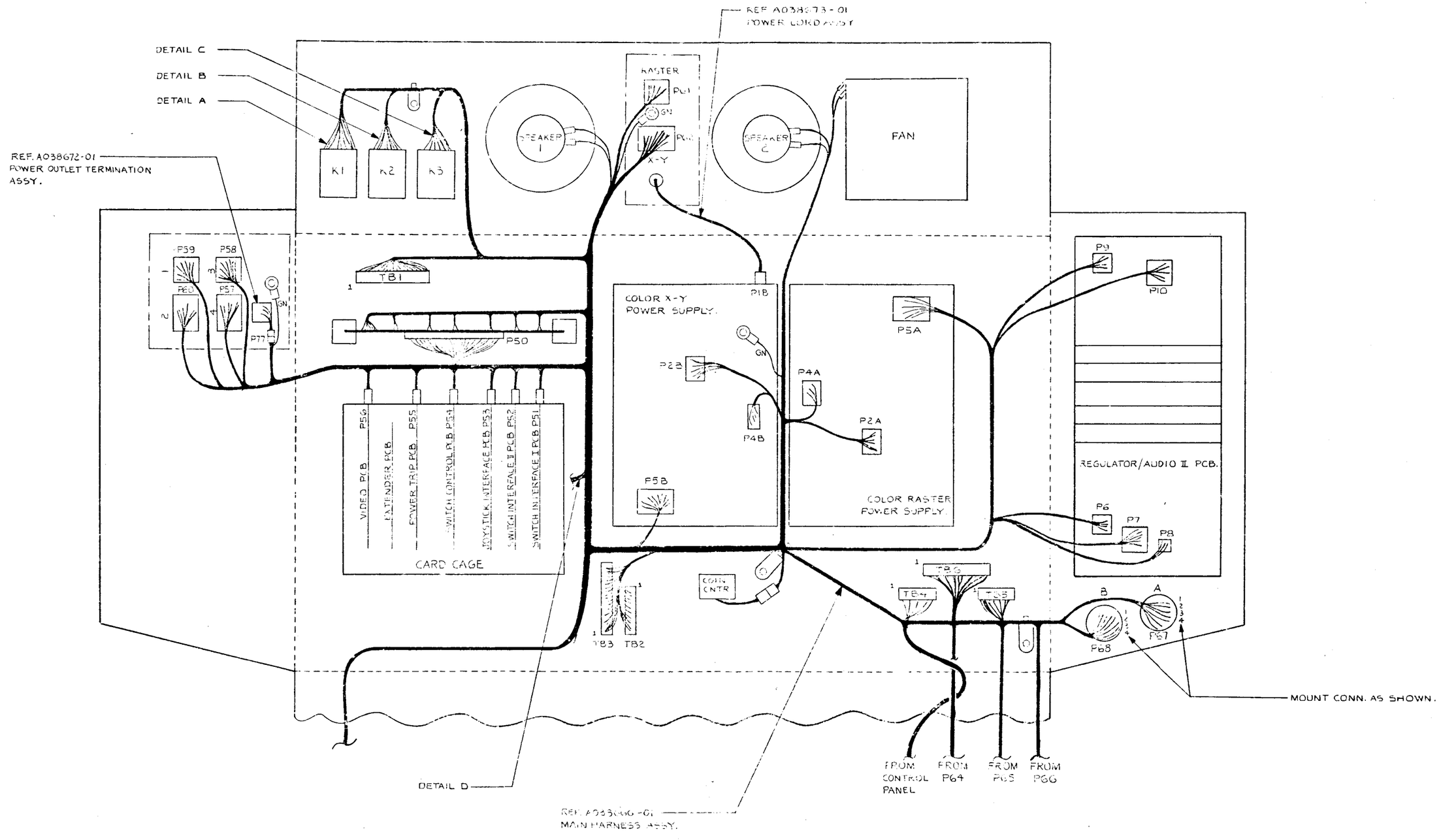


Figure 11-15B Harness Installation Diagram

DISPLAY CONNECTORS PIN ASSIGNMENTS

PIN	DESCRIPTION
	RASTER VIDEO CONNECTOR (P61)
1	COMPOSITE VIDEO (Positive black and white video, negative sync)
2	VIDEO RETURN (Signal ground)
3	RED VIDEO
4	HORIZONTAL SYNC (Not connected to monitor supplied)
5	GREEN VIDEO
6	VERTICAL SYNC (Not connected to monitor supplied)
7	GND
8	
9	120 VAC (Isolated winding)
10	120 VAC (Isolated winding)
11	BLUE VIDEO
12	COMPOSITE SYNC (Negative)
	X-Y VIDEO CONNECTOR (P62)
1	RED VIDEO
2	GREEN VIDEO (Z VIDEO in black and white systems)
3	BLUE VIDEO
4	VIDEO RETURN
5	VIDEO RETURN
6	VIDEO RETURN
7	X-AXIS DEFLECTION
8	Y-AXIS DEFLECTION
9	
10	Y RETURN
11	X RETURN
12	GND
13	50 VAC (25 VAC)
14	50 V CENTER TAP (25 VAC)
15	50 VAC (25 VAC)

AUXILIARY CONNECTORS PIN ASSIGNMENTS

PIN	SIGNAL	DIP SWITCH: SWITCH ENABLE	DIP SWITCH: SWITCH LOCATION
	AUXILIARY CONNECTOR 4 (P57)		
1	H CLK	Switch 1: on	Joystick Interface PCB
2	H DIR		
3	V CLK		
4	V DIR	Switch 2: on	
5	H POT		
6	V POT		
7	C STEER	Switch 4: on	
8	PADDLE	Switch 3: on	
9	SWITCH ENABLE		
10	+5 V		
11	GND		
12			
13	+12 V		
14	-12 V		
15			

AUXILIARY CONNECTORS PIN ASSIGNMENTS

PIN	SIGNAL	DIP SWITCH: SWITCH ENABLE	DIP SWITCH: SWITCH LOCATION
	AUXILIARY CONNECTOR 3 (P58)		
1	S1	Switch 1: on	Switch Interface 1 PCB
2	S2		
3	S3		
4	S4		
5	S5	Switch 2: on	
6	S6		
7	S9		
8	S10		
9	SWITCH ENABLE*		
10	+5V		
11	GND		
12			
	AUXILIARY CONNECTOR 1 (P59)		
1	S7 UP	Switch 3: on	Switch Interface 1 PCB
2	S7 DN		
3	S8 UP		
4	S8 DN		
5	ROTARY A	Switch 4: on	
6	ROTARY B		
7	ROTARY C		
8	ROTARY D		
9	SWITCH ENABLE*		
10	+5V		
11	GND		
12			

* Pin 9 of connector P58 and P59 are connected together.

PIN	SIGNAL	SWITCH	SWITCH LOCATION
	AUXILIARY CONNECTOR 2 (P60)		
1	+10.3V	GAME POWER A: on	Front Panel
2	+22V		
3	-22V		
4	+12V		
5	+5V REG.		
6	-5V		
7	+VAR V		
8	-VAR V		
9	+10.3V RET.		
10			
11	36VAC		
12	36VAC		
13			
14			
15			

Figure 11-16 Program Plug Pin Assignments

GAME A1 PROGRAM-PLUG PIN ASSIGNMENTS (P64)

PIN	SIGNAL	PIN	SIGNAL	PIN	SIGNAL
A1	S1 A*	K1	L3 INDICATOR	V1	
A2	S1 B*	K2	L4 INDICATOR	V2	
A3	S2 A	K3	L9 INDICATOR	V3	
A4	S2 B	K4	L10 INDICATOR	V4	
A5	S3 A	K5	L11 INDICATOR	V5	1
A6	S3 B	K6	L12 INDICATOR	V6	2
B1	S4 A	L1	START 1 LED	W1	3
B2	S4 B	L2	START 2 LED	W2	4
B3	S5 A	L3	AUDIO 1 GAME A	W3	5
B4	S5 B	L4	AUDIO 2 GAME A	W4	6
B5	S9 A	L5	RESET GAME A	W5	7
B6	S9 B	L6	CRV GAME A	W6	8
C1	S7 A UP/JOYSTICK LEFT	M1	RED	X1	9
C2	S7 A DN/JOYSTICK RIGHT	M2	GREEN/Z GAME A	X2	10
C3	S8 A UP/JOYSTICK UP	M3	BLUE GAME A	X3	11
C4	S8 A DN/JOYSTICK DOWN	M4	H SYNC/X GAME A	X4	12
C5	S11 A A	M5	V SYNC/Y GAME A	X5	13
C6	S11 A B	M6	C SYNC/COMP VIDEO A	X6	14
D1	S11 B A	N1	VIDEO GND	Y1	15
D2	S11 B B	N2	AUDIO 1 PWR GND GAME A	Y2	16
D3	S11 C A	N3	AUDIO 2 PWR GND GAME A	Y3	17
D4	S11 C B	N4	X RETURN	Y4	18
D5	S11 D A	N5	Y RETURN	Y5	19
D6	S11 D B	N6	GND (PAT 9000)	Y6	20
E1	H CLK A	P1	SWITCH POLARITY	Z1	21
E2	H CLK B	P2		Z2	22
E3	H DIR A	P3		Z3	A
E4	H DIR B	P4		Z4	B
E5	V CLK A	P5		Z5	C
E6	V CLK B	P6		Z6	D
F1	V DIR A	R1	+5 VOLTS REG.	a1	E
F2	V DIR B	R2	+5 VOLTS REG.	a2	F
F3	H POT A	R3	+5 VOLTS REG.	a3	H
F4	V POT A	R4	+5 VOLTS REG.	a4	J
F5	PADDLE A	R5	+5 VOLTS REG.	a5	K
F6	PADDLE B	R6	+5 VOLTS REG.	a6	L
G1	COIN 1 (L) GAME A	S1	GND (10.6 V, 5 V RET.)	b1	M
G2	COIN 2 (C) GAME A	S2	GND (10.6 V, 5 V RET.)	b2	N
G3	COIN 3 (R) GAME A	S3	GND (10.6 V, 5 V RET.)	b3	P
G4	SLAM GAME A	S4	GND (10.6 V, 5 V RET.)	b4	R
G5	AUX 1 GAME A	S5	GND (10.6 V, 5 V RET.)	b5	S
G6	AUX 2 GAME A	S6	GND (10.6 V, 5 V RET.)	b6	T
H1	AUX 3 GAME A	T1	10.6 V UNREG.	c1	U
H2	AUX 4 GAME A	T2	10.6 V UNREG.	c2	V
H3	SELF TEST	T3	10.6 V UNREG.	c3	W
H4	DIAGNOSTIC	T4	+5 V RETURN SENSE	c4	X
H5	START 1	T5	GND (+/- 22 V RET.)	c5	Y
H6	START 2	T6	GND (+/- 22 V RET.)	c6	Z
J1	COIN COUNTER 1 (L)	U1	+22 V		
J2	COIN COUNTER 2 (C)	U2	+12 V		
J3	COIN COUNTER 3 (R)	U3	+ VARIABLE VOLTS		
J4	LOCKOUT COIL	U4	- VARIABLE VOLTS		
J5	L1 INDICATOR	U5	-5 V		
J6	L2 INDICATOR	U6	-22 V		

* The A refers to Player 1 and B refers to Player 2 (e.g., S1 A).

GAME A2 PROGRAM-PLUG PIN ASSIGNMENTS (P65)

PIN	SIGNAL	PIN	SIGNAL	PIN	SIGNAL
A1	S1 C*	K1	L7 INDICATOR	V1	
A2	S1 D*	K2	L8 INDICATOR	V2	
A3	S2 C	K3	L13 INDICATOR	V3	
A4	S2 D	K4	L14 INDICATOR	V4	
A5	S3 C	K5	L15 INDICATOR	V5	
A6	S3 D	K6	L16 INDICATOR	V6	
B1	S4 C	L1	S7 UP B JOYSTICK LEFT	W1	
B2	S4 D	L2	S7 UP D JOYSTICK LEFT	W2	
B3	S5 C	L3	S7 DN B JOYSTICK RIGHT	W3	
B4	S5 D	L4	S7 DN D JOYSTICK RIGHT	W4	
B5	S9 C	L5	S8 UP B JOYSTICK UP	W5	
B6	S9 D	L6	S8 UP D JOYSTICK UP	W6	
C1	S7 C UP/JOYSTICK LEFT	M1	S8 DN B JOYSTICK DOWN	X1	
C2	S7 C DN/JOYSTICK RIGHT	M2	S8 DN D JOYSTICK DOWN	X2	
C3	S8 C UP/JOYSTICK UP	M3	H POT B	X3	
C4	S8 C DN/JOYSTICK DOWN	M4	H POT D	X4	
C5	S11 A C	M5	V POT B	X5	
C6	S11 A D	M6	V POT D	X6	
D1	S11 B C	N1		Y1	
D2	S11 B D	N2		Y2	
D3	S11 C C	N3		Y3	
D4	S11 C D	N4		Y4	
D5	S11 D C	N5		Y5	
D6	S11 D D	N6		Y6	
E1	H CLK C	P1	AUX 5 A C	Z1	
E2	H CLK D	P2	AUX 5 A UP	Z2	
E3	H DIR C	P3	AUX 5 A DN	Z3	
E4	H DIR D	P4	AUX 5 B C	Z4	
E5	V CLK C	P5	AUX 5 B UP	Z5	
E6	V CLK D	P6	AUX 5 B DN	Z6	
F1	V DIR C	R1	AUX 6 A C	a1	
F2	V DIR D	R2	AUX 6 A UP	a2	
F3	H POT C	R3	AUX 6 A DN	a3	
F4	V POT D	R4	AUX 6 B C	a4	
F4	PADDLE C	R5	AUX 6 B UP	a5	
F6	PADDLE D	R6	AUX 6 B DN	a6	
G1	S6 A	S1	AUX 7 A C	b1	
G2	S6 B	S2	AUX 7 A UP	b2	
G3	S6 C	S3	AUX 7 A DN	b3	
G4	S6 D	S4	AUX 7 B C	b4	
G5	S10 A	S5	AUX 7 B UP	b5	
G6	S10 B	S6	AUX 7 B DN	b6	
H1	S10 C	T1	AUX 8 A C	c1	
H2	S10 D	T2	AUX 8 A UP	c2	
H3	COMP STEER A	T3	AUX 8 A DN	c3	
H4	COMP STEER B	T4	AUX 8 B C	c4	
H5	COMP STEER C	T5	AUX 8 B UP	c5	
H6	COMP STEER D	T6	AUX 8 B DN	c6	
J1	START 3	U1			
J2	START 4	U2			
J3	START 3 LED	U3			
J4	START 4 LED	U4			
J5	L5 INDICATOR	U5			
J6	L6 INDICATOR	U6			

* The C refers to Player 3 and D refers to Player 4.

GAME B PROGRAM-PLUG PIN ASSIGNMENTS (P66)

PIN	SIGNAL	PIN	SIGNAL	PIN	SIGNAL
A1	S1 C*	K1	L7 INDICATOR	V1	
A2	S1 D**	K2	L8 INDICATOR	V2	
A3	S2 C	K3	L13 INDICATOR	V3	
A4	S2 D	K4	L14 INDICATOR	V4	
A5	S3 C	K5	L15 INDICATOR	V5	1
A6	S3 D	K6	L16 INDICATOR	V6	2
B1	S4 C	L1	START 3 LED	W1	3
B2	S4 D	L2	START 4 LED	W2	4
B3	S5 C	L3	AUDIO 1 GAME B	W3	5
B4	S5 D	L4	AUDIO 2 GAME B	W4	6
B5	S9 C	L5	RESET GAME B	W5	7
B6	S9 D	L6	CRV GAME B	W6	8
C1	S7 C UP/JOYSTICK LEFT	M1	RED GAME B	X1	9
C2	S7 C DN/JOYSTICK RIGHT	M2	GREEN/Z GAME B	X2	10
C3	S8 C UP/JOYSTICK UP	M3	BLUE GAME B	X3	11
C4	S8 C DN/JOYSTICK DOWN	M4	H SYNC/X GAME B	X4	12
C5	S11 A C	M5	V SYNC/Y GAME B	X5	13
C6	S11 A D	M6	C SYNC/COMP VIDEO B	X6	14
D1	S11 B C	N1	VIDEO GND	Y1	15
D2	S11 B D	N2	AUDIO 1 PWR GND GAME B	Y2	16
D3	S11 C C	N3	AUDIO 2 PWR GND GAME B	Y3	17
D4	S11 C D	N4	X RETURN	Y4	18
D5	S11 D C	N5	Y RETURN	Y5	19
D6	S11 D D	N6	GND (PAT 9000)	Y6	20
E1	H CLK C	P1	SWITCH POLARITY	Z1	21
E2	H CLK D	P2		Z2	22
E3	H DIR C	P3		Z3	A
E4	H DIR D	P4		Z4	B
E5	V CLK C	P5		Z5	C
E6	V CLK D	P6		Z6	D
F1	V DIR C	R1	+5 VOLTS REG.	a1	E
F2	V DIR D	R2	+5 VOLTS REG.	a2	F
F3	H POT C	R3	+5 VOLTS REG.	a3	H
F4	V POT C	R4	+5 VOLTS REG.	a4	J
F5	PADDLE C	R5	+5 VOLTS REG.	a5	K
F6	PADDLE D	R6	+5 VOLTS REG.	a6	L
G1	COIN 1 (L) GAME B	S1	GND (10.6 V, 5 V RET.)	b1	M
G2	COIN 2 (C) GAME B	S2	GND (10.6 V, 5 V RET.)	b2	N
G3	COIN 3 (R) GAME B	S3	GND (10.6 V, 5 V RET.)	b3	P
G4	SLAM GAME B	S4	GND (10.6 V, 5 V RET.)	b4	R
G5	AUX 1 GAME B	S5	GND (10.6 V, 5 V RET.)	b5	S
G6	AUX 2 GAME B	S6	GND (10.6 V, 5 V RET.)	b6	T
H1	AUX 3 GAME B	T1	10.6 V UNREG.	c1	U
H2	AUX 4 GAME B	T2	10.6 V UNREG.	c2	V
H3	SELF TEST	T3	10.6 V UNREG.	c3	W
H4	DIAGNOSTIC	T4	+5 V RETURN SENSE	c4	X
H5	START 3	T5	GND (+/- 22 V RET.)	c5	Y
H6	START 4	T6	GND (+/- 22 V RET.)	c6	Z
J1	COIN COUNTER 1 (L)	U1	+22 V		
J2	COIN COUNTER 2 (C)	U2	+12 V		
J3	COIN COUNTER 3 (R)	U3	+ VARIABLE VOLTS		
J4	LOCKOUT COIL	U4	- VARIABLE VOLTS		
J5	L5 INDICATOR	U5	-5 V		
J6	L6 INDICATOR	U6	-22 V		

* The C refers to Player 3 Game A or Player 1 Game B.
** The D refers to Player 4 Game A or Player 2 Game B.

Figure 11-17 Auxiliary and Display Connectors Pin Assignments

APPENDIX A

PROGRAM PLUG ASSEMBLY PARTS LIST AND DATA SHEETS

Program Plug Assembly*
Parts List

178078-001	1/2-Inch Expandable Braided Sleeving
179006-002	Inter-contact Connector Polarizing Key
179041-xxx**	X-Position Card-Edge Connector
179072-191	Dummy Contact Terminal
179094-161	22-18 AWG Contact Terminal
179103-001	156-Position Plug Connector
179104-281	24-20 AWG Contact Terminal
179105-001	Shell Kit Connector
179106-001	Handle Kit Connector

* Note: The necessary parts for assembling a program plug are available in kit form (part no. 08-0301011).

** Valid suffixes: -020, -024, -030, -036, -044, -144

PAT 9000 PROGRAM PLUG

for

ASTEROIDS

REV. : 3 DATE : 2-11-83
FILE : AST

EDGE CONNECTORS, # OF PINS
P20 44

START SWITCHES : 1 2
PLAYER SELECT SWITCHES : 1

AUX. SWITCHES 1-4
AUX 1 --- COCKTAIL

PUSHBUTTON SWITCHES 1-6
G C sw 1 --- ROTATE LEFT
G C sw 2 --- ROTATE RIGHT
G C sw 3 --- FIRE
G C sw 4 --- THRUST
G C sw 5 --- HYPERSPACE

WIRE ROUTING LIST : ASTEROIDS

(description) conn-pin ◇ conn-pin ...						
(P20 - 1)	A1	- V5 ◇	A1	- S1	(+5V, 10.6V RET.)
(P20 - 2)	A1	- V6 ◇	A1	- R1	(+5 VOLT REG.)
(P20 - 4)	A1	- W2 ◇	A1	- J2	(COIN COUNTER 2 (C))
(P20 - 5)	A1	- W3 ◇	A1	- L3	(AUDIO 1)
(P20 - 6)	A1	- W4 ◇	A1	- L2	(START 2 LED)
(P20 - 8)	A1	- W6 ◇	A1	- L1	(START 1 LED)
(P20 - 9)	A1	- X1 ◇	A1	- G4	(SLAM)
(P20 - 10)	A1	- X2 ◇	A1	- B3	(S5 PL1)
(P20 - 11)	A1	- X3 ◇	A1	- N1	(VIDEO RET.)
(P20 - 12)	A1	- X4 ◇	A1	- G2	(COIN 2 (C))
(P20 - 13)	A1	- X5 ◇	A1	- G1	(COIN 1 (L))
(P20 - 14)	A1	- X6 ◇	A1	- B1	(S4 PL1)
(P20 - 15)	A1	- Y1 ◇	A1	- A1	(S1 PL1)
(P20 - 17)	A1	- Y3 ◇	A1	- M4	(H SYNC, X)
(P20 - 18)	A1	- Y4 ◇	A1	- M5	(V SYNC, Y)
(P20 - 20)	A1	- Y6 ◇	A1	- U1	(+22 VOLTS)
(P20 - 21)	A1	- Z1 ◇	A1	- R6	(+5V SENSE)
(P20 - 22)	A1	- Z2 ◇	A1	- T4	(+5V RET. SENSE)
(P20 - A)	A1	- Z3 ◇	A1	- S2	(5V, 10.6V RET.)
(P20 - B)	A1	- Z4 ◇	A1	- R2	(+5 VOLT REG.)
(P20 - D)	A1	- Z6 ◇	A1	- J1	(COIN COUNTER 1 (L))
(P20 - E)	A1	- a1 ◇	A1	- L4	(AUDIO 2)
(P20 - F)	A1	- a2 ◇	A1	- J3	(COIN COUNTER 3 (R))
(P20 - K)	A1	- a5 ◇	A1	- H4	(DIAGNOSTIC)
(P20 - L)	A1	- a6 ◇	A1	- H3	(SELF TEST)
(P20 - M)	A1	- b1 ◇	A1	- M2	(GREEN)
(P20 - N)	A1	- b2 ◇	A1	- H5	(START SW. 1)
(P20 - P)	A1	- b3 ◇	A1	- H6	(START SW. 2)
(P20 - R)	A1	- b4 ◇	A1	- G3	(COIN 3 (R))
(P20 - S)	A1	- b5 ◇	A1	- A3	(S2 PL1)
(P20 - T)	A1	- b6 ◇	A1	- A5	(S3 PL1)
(P20 - U)	A1	- c1 ◇	A1	- N4	(X RET.)
(P20 - V)	A1	- c2 ◇	A1	- N5	(Y RET.)
(P20 - X)	A1	- c4 ◇	A1	- U6	(-22 VOLTS)
(P20 - Y)	A1	- c5 ◇	A1	- R3	(+5 VOLT REG.)
(P20 - Z)	A1	- c6 ◇	A1	- S3	(5V, 10.6V RET.)

THE END

PAT 9000 PROGRAM PLUG

for

ASTEROIDSDLX

REV. : 2 DATE : 2-11-83
FILE : ASTDLX

EDGE CONNECTORS, # OF PINS
P20 44

START SWITCHES : 1 2
PLAYER SELECT SWITCHES : 1

PUSHBUTTON SWITCHES 1-6
G C sw 1 —— FIRE
G C sw 2 —— THRUST
G C sw 3 —— RIGHT
G C sw 4 —— LEFT
G C sw 5 —— SHIELD
G C sw 6 ——

WIRE ROUTING LIST : ASTEROIDSDLX

(description)	conn-pin	◇	conn-pin	...
(P20 - 1)	A1 - V5	◇	A1 - S1	(+5V, 10.6V RET.)
(P20 - 2)	A1 - V6	◇	A1 - R1	(+5 VOLT REG.)
(P20 - 4)	A1 - W2	◇	A1 - J2	(COIN COUNTER 2 (C))
(P20 - 5)	A1 - W3	◇	A1 - L3	(AUDIO 1)
(P20 - 6)	A1 - W4	◇	A1 - L2	(START 2 LED)
(P20 - 8)	A1 - W6	◇	A1 - L1	(START 1 LED)
(P20 - 9)	A1 - X1	◇	A1 - G4	(SLAM)
(P20 - 10)	A1 - X2	◇	A1 - B3	(S5 PL1)
(P20 - 12)	A1 - X4	◇	A1 - H5	(START SW. 1)
(P20 - 13)	A1 - X5	◇	A1 - H6	(START SW. 2)
(P20 - 14)	A1 - X6	◇	A1 - A3	(S2 PL1)
(P20 - 15)	A1 - Y1	◇	A1 - A5	(S3 PL1)
(P20 - 17)	A1 - Y3	◇	A1 - M4	(H SYNC, X)
(P20 - 18)	A1 - Y4	◇	A1 - M5	(V SYNC, Y)
(P20 - 20)	A1 - Y6	◇	A1 - U1	(+22 VOLTS)
(P20 - 21)	A1 - Z1	◇	A1 - R6	(+5V SENSE)
(P20 - 22)	A1 - Z2	◇	A1 - T4	(+5V RET. SENSE)
(P20 - A)	A1 - Z3	◇	A1 - S2	(5V, 10.6V RET.)
(P20 - B)	A1 - Z4	◇	A1 - R2	(+5 VOLT REG.)
(P20 - D)	A1 - Z6	◇	A1 - J1	(COIN COUNTER 1 (L))
(P20 - E)	A1 - a1	◇	A1 - L4	(AUDIO 2)
(P20 - F)	A1 - a2	◇	A1 - J3	(COIN COUNTER 3 (R))
(P20 - K)	A1 - a5	◇	A1 - H4	(DIAGNOSTIC)
(P20 - L)	A1 - a6	◇	A1 - H3	(SELF TEST)
(P20 - M)	A1 - b1	◇	A1 - M2	(GREEN)
(P20 - N)	A1 - b2	◇	A1 - G2	(COIN 2 (C))
(P20 - P)	A1 - b3	◇	A1 - G1	(COIN 1 (L))
(P20 - R)	A1 - b4	◇	A1 - G3	(COIN 3 (R))
(P20 - S)	A1 - b5	◇	A1 - B1	(S4 PL1)
(P20 - T)	A1 - b6	◇	A1 - A1	(S1 PL1)
(P20 - U)	A1 - c1	◇	A1 - N4	(X RET.)
(P20 - V)	A1 - c2	◇	A1 - N5	(Y RET.)
(P20 - W)	A1 - c3	◇	A1 - L5	(RESET)
(P20 - X)	A1 - c4	◇	A1 - U6	(-22 VOLTS)
(P20 - Y)	A1 - c5	◇	A1 - R3	(+5 VOLT REG.)
(P20 - Z)	A1 - c6	◇	A1 - S3	(5V, 10.6V RET.)

THE END

PAT 9000 PROGRAM PLUG

for

BATTLEZONE

REV. : 2 DATE : 3-14-'83
FILE : BZONE

EDGE CONNECTORS, # OF PINS
P20 44
P18 44

START SWITCHES : 1
PLAYER SELECT SWITCHES : 1

AUX. SWITCHES 1-4
AUX 1 --- X INVERT
AUX 2 --- Y INVERT

PUSHBUTTON SWITCHES 1-6
G C sw 1 --- FIRE

RETURN TO CENTER SWITCHES
G C sw 7 up --- LEFT FORWARD
G C sw 7 dn --- LEFT REVERSE
G C sw 8 up --- RIGHT FORWARD
G C sw 8 dn --- RIGHT REVERSE

WIRE ROUTING LIST : BATTLEZONE

(description)	conn-pin	◇	conn-pin	...
(P20 - 1)	A1 - V5	◇	A1 - S1	(+5V, 10.6V RET.)
(P20 - 2)	A1 - V6	◇	A1 - R1	(+5 VOLT REG.)
(P20 - 3)	A1 - W1	◇	A1 - U1	(+22 VOLTS)
(P20 - 4)	A1 - W2	◇	A1 - U6	(-22 VOLTS)
(P20 - 5)	A1 - W3	◇	A1 - H4	(DIAGNOSTIC)
(P20 - 6)	A1 - W4	◇	A1 - G4	(SLAM)
(P20 - 7)	A1 - W5	◇	A1 - H3	(SELF TEST)
(P20 - 8)	A1 - W6	◇	A1 - J1	(COIN COUNTER 1 (L))
(P20 - 9)	A1 - X1	◇	A1 - J2	(COIN COUNTER 2 (C))
(P20 - 15)	A1 - Y1	◇	A1 - N1	(VIDEO RET.)
(P20 - 16)	A1 - Y2	◇	A1 - N4	(X RET.)
(P20 - 17)	A1 - Y3	◇	A1 - M5	(V SYNC, Y)
(P20 - 19)	A1 - Y5	◇	A1 - U5	(-5 VOLTS)
(P20 - 21)	A1 - Z1	◇	A1 - R6	(+5V SENSE)
(P20 - 22)	A1 - Z2	◇	A1 - T4	(+5V RET. SENSE)
(P20 - A)	A1 - Z3	◇	A1 - S2	(5V, 10.6V RET.)
(P20 - B)	A1 - Z4	◇	A1 - R2	(+5 VOLT REG.)
(P20 - C)	A1 - Z5	◇	A1 - U2	(+12 VOLTS)
(P20 - E)	A1 - a1	◇	A1 - G1	(COIN 1 (L))
(P20 - F)	A1 - a2	◇	A1 - G2	(COIN 2 (C))
(P20 - H)	A1 - a3	◇	A1 - G3	(COIN 3 (R))
(P20 - J)	A1 - a4	◇	A1 - J3	(COIN COUNTER 3 (R))
(P20 - K)	A1 - a5	◇	A1 - G6	(AUX 2)
(P20 - L)	A1 - a6	◇	A1 - G5	(AUX 1)
(P20 - S)	A1 - b5	◇	A1 - M2	(GREEN)
(P20 - T)	A1 - b6	◇	A1 - M4	(H SYNC, X)
(P20 - U)	A1 - c1	◇	A1 - N5	(Y RET.)
(P20 - V)	A1 - c2	◇	P18 - V	◇ A1 - L5 (RESET)
(P20 - X)	A1 - c4	◇	P18 - 3	
(P20 - Y)	A1 - c5	◇	A1 - R3	(+5 VOLT REG.)
(P20 - Z)	A1 - c6	◇	A1 - S3	(5V, 10.6V RET.)
(S1 PL1)	A1 - A1	◇	P18 - 12	
(S7 UP PL1)	A1 - C1	◇	P18 - 15	
(S7 DN PL1)	A1 - C2	◇	P18 - 14	
(S8 UP PL1)	A1 - C3	◇	P18 - 17	
(S8 DN PL1)	A1 - C4	◇	P18 - 16	
(START SW. 1)	A1 - H5	◇	P18 - 13	
(START 1 LED)	A1 - L1	◇	P18 - 7	
(AUDIO 1)	A1 - L3	◇	P18 - 5	
(AUDIO 2)	A1 - L4	◇	P18 - 6	
(+5 VOLT REG.)	A1 - R4	◇	P18 - Z	
(+5 VOLT REG.)	A1 - R5	◇	P18 - B	
(5V, 10.6V RET.)	A1 - S4	◇	P18 - 1	
(5V, 10.6V RET.)	A1 - S5	◇	P18 - A	
(5V, 10.6V RET.)	A1 - S6	◇	P18 - Z	

THE END

PAT 9000 PROGRAM PLUG

for

CENTIPEDES

REV. : 1 DATE : 6-15-'82
FILE : CENTPDES

EDGE CONNECTORS, # OF PINS
P20 44
P19 24

START SWITCHES : 1 2
PLAYER SELECT SWITCHES : 1 2

1 2

AUX. SWITCHES 1-4
AUX 1 --- COCKTAIL
AUX 2 --- WATCHDOG DISABLE

PUSHBUTTON SWITCHES 1-6
G C sw 1 --- FIRE

TRAKBALL/STEERING
H CLK ---
H DIR ---
V CLK ---
V DIR ---

WIRE ROUTING LIST : CENTIPEDES

(description)	conn-pin	◇	conn-pin ...	
(P20 - 1)	A1 - V5	◇	A1 - S1	(+5V, 10.6V RET.)
(P20 - 2)	A1 - V6	◇	A1 - R1	(+5 VOLT REG.)
(P20 - 3)	A1 - W1	◇	A1 - U1	(+22 VOLTS)
(P20 - 4)	A1 - W2	◇	A1 - U6	(-22 VOLTS)
(P20 - 5)	A1 - W3	◇	A1 - J2	(COIN COUNTER 2 (C))
(P20 - 6)	A1 - W4	◇	A1 - J3	(COIN COUNTER 3 (R))
(P20 - 8)	A1 - W6	◇	A1 - L2	(START 2 LED)
(P20 - 9)	A1 - X1	◇	A1 - A2	(S1 PL2)
(P20 - 10)	A1 - X2	◇	A1 - A1	(S1 PL1)
(P20 - 11)	A1 - X3	◇	A1 - E2	(H CLK PL2)
(P20 - 12)	A1 - X4	◇	A1 - E6	(V CLK PL2)
(P20 - 13)	A1 - X5	◇	A1 - H3	(SELF TEST)
(P20 - 14)	A1 - X6	◇	A1 - G3	(COIN 3 (R))
(P20 - 15)	A1 - Y1	◇	A1 - G5	(AUX 1)
(P20 - 16)	A1 - Y2	◇	A1 - E4	(H DIR PL2)
(P20 - 17)	A1 - Y3	◇	A1 - F2	(V DIR PL2)
(P20 - 18)	A1 - Y4	◇	A1 - F1	(V DIR PL1)
(P20 - 21)	A1 - Z1	◇	A1 - R6	(+5V SENSE)
(P20 - 22)	A1 - Z2	◇	A1 - T4	(+5V RET. SENSE)
(P20 - A)	A1 - Z3	◇	A1 - S2	(5V, 10.6V RET.)
(P20 - B)	A1 - Z4	◇	A1 - R2	(+5 VOLT REG.)
(P20 - C)	A1 - Z5	◇	A1 - U2	(+12 VOLTS)
(P20 - D)	A1 - Z6	◇	A1 - U5	(-5 VOLTS)
(P20 - F)	A1 - a2	◇	A1 - J1	(COIN COUNTER 1 (L))
(P20 - J)	A1 - a4	◇	A1 - L1	(START 1 LED)
(P20 - K)	A1 - a5	◇	A1 - G6	(AUX 2)
(P20 - L)	A1 - a6	◇	A1 - H6	(START SW. 2)
(P20 - M)	A1 - b1	◇	A1 - H5	(START SW. 1)
(P20 - N)	A1 - b2	◇	A1 - E1	(H CLK PL1)
(P20 - P)	A1 - b3	◇	A1 - E5	(V CLK PL1)
(P20 - R)	A1 - b4	◇	A1 - G1	(COIN 1 (L))
(P20 - S)	A1 - b5	◇	A1 - G4	(SLAM)
(P20 - T)	A1 - b6	◇	A1 - G2	(COIN 2 (C))
(P20 - U)	A1 - c1	◇	A1 - E3	(H DIR PL1)
(P20 - V)	A1 - c2	◇	A1 - L5	(RESET)
(P20 - Y)	A1 - c5	◇	A1 - R3	(+5 VOLT REG.)
(P20 - Z)	A1 - c6	◇	A1 - S3	(5V, 10.6V RET.)
(AUDIO 1)	A1 - L3	◇	P19 - 1	
(AUDIO 2)	A1 - L4	◇	P19 - 2	
(CRV FLAG)	A1 - L6	◇	A1 - N6	(SIGNAL GND)
(RED)	A1 - M1	◇	P19 - K	
(GREEN)	A1 - M2	◇	P19 - 8	
(BLUE)	A1 - M3	◇	P19 - 9	
(COMP SYNC, COMP VID)	A1 - M6	◇	P19 - 12	
(VIDEO RET.)	A1 - N1	◇	P19 - L	

THE END

PAT 9000 PROGRAM PLUG

for

DIGDUG

REV. : 1 DATE : 8-24-'82
FILE : DIGDUG

EDGE CONNECTORS, # OF PINS
P20 44

START SWITCHES : 1 2
PLAYER SELECT SWITCHES : 1 2

AUX. SWITCHES 1-4
AUX 1 — COCKTAIL

PUSHBUTTON SWITCHES 1-6
G C sw 1 — PUMP

4 POS. JOYSTICK
JSTCK UP —
JSTCK DN —
JSTCK L —
JSTCK R —

WIRE ROUTING LIST : DIGDUG

(description)	conn-pin	◇	conn-pin ...	
(P20 - 1)	A1 - V5	◇	A1 - S1	(+5V, 10.6V RET.)
(P20 - 2)	A1 - V6	◇	A1 - R2	(+5 VOLT REG.)
(P20 - 6)	A1 - W4	◇	A1 - L2	(START 2 LED)
(P20 - 7)	A1 - W5	◇	A1 - J3	(COIN COUNTER 3 (R))
(P20 - 8)	A1 - W6	◇	A1 - G2	(COIN 2 (C))
(P20 - 9)	A1 - X1	◇	A1 - G1	(COIN 1 (L))
(P20 - 10)	A1 - X2	◇	A1 - H5	(START SW. 1)
(P20 - 11)	A1 - X3	◇	A1 - A1	(S1 PL1)
(P20 - 12)	A1 - X4	◇	A2 - L3	(S7 DN PL2)
(P20 - 13)	A1 - X5	◇	A2 - L1	(S7 UP PL2)
(P20 - 14)	A1 - X6	◇	A1 - C2	(S7 DN PL1)
(P20 - 15)	A1 - Y1	◇	A1 - C1	(S7 UP PL1)
(P20 - 16)	A1 - Y2	◇	A1 - J1	(COIN COUNTER 1 (L))
(P20 - 17)	A1 - Y3	◇	A1 - N1	(VIDEO RET.)
(P20 - 19)	A1 - Y5	◇	A1 - M1	(RED)
(P20 - 20)	A1 - Y6	◇	A1 - M2	(GREEN)
(P20 - 21)	A1 - Z1	◇	A1 - R6	(+5V SENSE)
(P20 - 22)	A1 - Z2	◇	A1 - T4	(+5V RET. SENSE)
(P20 - A)	A1 - Z3	◇	A1 - S2	(5V, 10.6V RET.)
(P20 - B)	A1 - Z4	◇	A1 - R1	(+5 VOLT REG.)
(P20 - C)	A1 - Z5	◇	A1 - L3	(AUDIO 1)
(P20 - D)	A1 - Z6	◇	A1 - L4	(AUDIO 2)
(P20 - E)	A1 - a1	◇	A1 - T1	(10.6 VOLT)
(P20 - F)	A1 - a2	◇	A1 - G5	(AUX 1)
(P20 - H)	A1 - a3	◇	A1 - H3	(SELF TEST)
(P20 - J)	A1 - a4	◇	A1 - G3	(COIN 3 (R))
(P20 - K)	A1 - a5	◇	A1 - H6	(START SW. 2)
(P20 - L)	A1 - a6	◇	A1 - A2	(S1 PL2)
(P20 - M)	A1 - b1	◇	A2 - L5	(S8 UP PL2)
(P20 - N)	A1 - b2	◇	A2 - M1	(S8 DN PL2)
(P20 - P)	A1 - b3	◇	A1 - C3	(S8 UP PL1)
(P20 - R)	A1 - b4	◇	A1 - C4	(S8 DN PL1)
(P20 - S)	A1 - b5	◇	A1 - L1	(START 1 LED)
(P20 - U)	A1 - c1	◇	A1 - M6	(COMP SYNC, COMP VID)
(P20 - V)	A1 - c2	◇	A1 - L5	(RESET)
(P20 - W)	A1 - c3	◇	A1 - M3	(BLUE)
(P20 - Y)	A1 - c5	◇	A1 - R3	(+5 VOLT REG.)
(P20 - Z)	A1 - c6	◇	A1 - S3	(5V, 10.6V RET.)
(CRV FLAG)	A1 - L6	◇	A1 - N6	(SIGNAL GND)

THE END

PAT 9000 PROGRAM PLUG

for

EXTENDER PLUG

REV. : 1 DATE : 1-20-'83
FILE : EXTNDR

EDGE CONNECTORS, # OF PINS
0
J500 15
J501 12

START SWITCHES : 1
PLAYER SELECT SWITCHES : 1 2

AUX. SWITCHES 5-8
AUX 5A-c ——
AUX 5A-up ——
AUX 5A-dn ——
AUX 5B-c ——
AUX 5B-up ——
AUX 5B-dn ——
AUX 6A-c ——
AUX 6A-up ——
AUX 6A-dn ——
AUX 6B-c ——
AUX 6B-up ——
AUX 6B-dn ——

PUSHBUTTON SWITCHES 1-6
G C sw 6 ——

TOGGLE SWITCHES
G C sw 10 ——

LINEAR JOYSTICK
VERT. POT ——
HORZ. POT ——

4 POS. JOYSTICK
JSTCK UP ——
JSTCK DN ——
JSTCK L ——
JSTCK R ——

WIRE ROUTING LIST : EXTENDER PLUG

(description)	conn-pin	◇	conn-pin ...
(S6 PL1)	A2 - G1	◇	J500- 1
(S6 PL2)	A2 - G2	◇	J500- 2
(S10 PL1)	A2 - G5	◇	J500- 3
(S10 PL2)	A2 - G6	◇	J500- 4
(S7 UP PL2)	A2 - L1	◇	J500- 5
(S7 DN PL2)	A2 - L3	◇	J500- 6
(S8 UP PL2)	A2 - L5	◇	J500- 7
(S8 DN PL2)	A2 - M1	◇	J500- 8
(H POT PL2)	A2 - M3	◇	J500- 9
(V POT PL2)	A2 - M5	◇	J500- 10
(AUX 5A C)	A2 - P1	◇	J501- 1
(AUX 5A UP)	A2 - P2	◇	J501- 2
(AUX 5A DN)	A2 - P3	◇	J501- 3
(AUX 5B C)	A2 - P4	◇	J501- 4
(AUX 5B UP)	A2 - P5	◇	J501- 5
(AUX 5B DN)	A2 - P6	◇	J501- 6
(AUX 6A C)	A2 - R1	◇	J501- 7
(AUX 6A UP)	A2 - R2	◇	J501- 8
(AUX 6A DN)	A2 - R3	◇	J501- 9
(AUX 6B C)	A2 - R4	◇	J501- 10
(AUX 6B UP)	A2 - R5	◇	J501- 11
(AUX 6B DN)	A2 - R6	◇	J501- 12

THE END

PAT 9000 PROGRAM PLUG

for

FOOD FIGHT

REV. : 1 DATE : 2-23-'83
FILE : FOOD

EDGE CONNECTORS, # OF PINS
P20 44

START SWITCHES : 1 2
PLAYER SELECT SWITCHES : 1

PUSHBUTTON SWITCHES 1-6
G C sw 1 —— THROW

LINEAR JOYSTICK
VERT. POT ——
HORZ. POT ——

WIRE ROUTING LIST : FOOD FIGHT

(description)	conn-pin	◇	conn-pin	...	
(P20 - 1)	A1 - V5	◇	A1 - S1		(+5V, 10.6V RET.)
(P20 - 2)	A1 - V6	◇	A1 - P1		(+5 VOLT REG.)
(P20 - 12)	A1 - X4	◇	A1 - L3		(AUDIO 1)
(P20 - 13)	A1 - X5	◇	A1 - G2		(COIN 2 (C))
(P20 - 14)	A1 - X6	◇	A1 - A1		(S1 PL1)
(P20 - 16)	A1 - Y2	◇	A1 - H3		(SELF TEST)
(P20 - 17)	A1 - Y3	◇	A1 - F3		(H POT PL1)
(P20 - 19)	A1 - Y5	◇	A1 - F4		(V POT PL1)
(P20 - 21)	A1 - Z1	◇	A1 - R6		(+5V SENSE)
(P20 - 22)	A1 - Z2	◇	A1 - T4		(+5V RET. SENSE)
(P20 - A)	A1 - Z3	◇	A1 - S2		(5V, 10.6V RET.)
(P20 - B)	A1 - Z4	◇	A1 - R2		(+5 VOLT REG.)
(P20 - C)	A1 - Z5	◇	A1 - T1		(10.6 VOLT)
(P20 - E)	A1 - a1	◇	A1 - N1		(VIDEO RET.)
(P20 - J)	A1 - a4	◇	A1 - M6		(COMP SYNC, COMP VID)
(P20 - K)	A1 - a5	◇	A1 - M2		(GREEN)
(P20 - L)	A1 - a6	◇	A1 - M3		(BLUE)
(P20 - M)	A1 - b1	◇	A1 - M1		(RED)
(P20 - N)	A1 - b2	◇	A1 - L4		(AUDIO 2)
(P20 - P)	A1 - b3	◇	A1 - H6		(START SW. 2)
(P20 - R)	A1 - b4	◇	A1 - H5		(START SW. 1)
(P20 - S)	A1 - b5	◇	A1 - G3		(COIN 3 (R))
(P20 - T)	A1 - b6	◇	A1 - G1		(COIN 1 (L))
(P20 - U)	A1 - c1	◇	A1 - L1		(START 1 LED)
(P20 - V)	A1 - c2	◇	A1 - L2		(START 2 LED)
(P20 - W)	A1 - c3	◇	A1 - J3		(COIN COUNTER 3 (R))
(P20 - X)	A1 - c4	◇	A1 - J1		(COIN COUNTER 1 (L))
(P20 - Y)	A1 - c5	◇	A1 - R3		(+5 VOLT REG.)
(P20 - Z)	A1 - c6	◇	A1 - S3		(5V, 10.6V RET.)
(CRV FLAG)	A1 - L6	◇	A1 - N6		(SIGNAL GND)

THE END

PAT 9000 PROGRAM PLUG

for

GRAVITAR

REV. : 1 DATE : 9 2 '82
FILE : GRAVITAR

EDGE CONNECTORS, # OF PINS
P20 44
P19 24

START SWITCHES : 1 2
PLAYER SELECT SWITCHES : 1 2

AUX. SWITCHES 1-4
AUX 1 --- CABINET

PUSHBUTTON SWITCHES 1-6
G C sw 1 --- FIRE
G C sw 2 --- THRUST
G C sw 3 --- ROT LEFT
G C sw 4 --- ROT RIGHT
G C sw 5 --- SHIELDS

WIRE ROUTING LIST : GRAVITAR

(description)	conn-pin ◇	conn-pin ...	
(P20 - 1)	A1 - V5 ◇	A1 - S2	(5V, 10.6V RET.)
(P20 - 2)	A1 - V6 ◇	A1 - R1	(+5 VOLT REG.)
(P20 - 3)	A1 - W1 ◇	A1 - U1	(+22 VOLTS)
(P20 - 4)	A1 - W2 ◇	A1 - U6	(-22 VOLTS)
(P20 - 5)	A1 - W3 ◇	A1 - G2	(COIN 2 (C))
(P20 - 6)	A1 - W4 ◇	A1 - J3	(COIN COUNTER 3 (R))
(P20 - 7)	A1 - W5 ◇	A1 - L1	(START 1 LED)
(P20 - 8)	A1 - W6 ◇	A1 - A6	(S3 PL2)
(P20 - 9)	A1 - X1 ◇	A1 - A2	(S1 PL2)
(P20 - 10)	A1 - X2 ◇	A1 - A4	(S2 PL2)
(P20 - 11)	A1 - X3 ◇	A1 - H6	(START SW. 2)
(P20 - 14)	A1 - X6 ◇	A1 - G4	(SLAM)
(P20 - 16)	A1 - Y2 ◇	A1 - G1	(COIN 1 (L))
(P20 - 21)	A1 - Z1 ◇	A1 - R6	(+5V SENSE)
(P20 - 22)	A1 - Z2 ◇	A1 - T4	(+5V RET. SENSE)
(P20 - A)	A1 - Z3 ◇	A1 - S1	(+5V, 10.6V RET.)
(P20 - B)	A1 - Z4 ◇	A1 - R2	(+5 VOLT REG.)
(P20 - E)	A1 - a1 ◇	A1 - T1	(10.6 VOLT)
(P20 - F)	A1 - a2 ◇	A1 - J4	(LOCKOUT COIL)
(P20 - H)	A1 - a3 ◇	A1 - J1	(COIN COUNTER 1 (L))
(P20 - J)	A1 - a4 ◇	A1 - L2	(START 2 LED)
(P20 - K)	A1 - a5 ◇	A1 - B2	(S4 PL2)
(P20 - L)	A1 - a6 ◇	A1 - B4	(S5 PL2)
(P20 - M)	A1 - b1 ◇	A1 - H5	(START SW. 1)
(P20 - R)	A1 - b4 ◇	A1 - G5	(AUX 1)
(P20 - T)	A1 - b6 ◇	A1 - H3	(SELF TEST)
(P20 - U)	A1 - c1 ◇	A1 - G3	(COIN 3 (R))
(P20 - V)	A1 - c2 ◇	A1 - L5	(RESET)
(P20 - Y)	A1 - c5 ◇	A1 - R3	(+5 VOLT REG.)
(P20 - Z)	A1 - c6 ◇	A1 - S3	(5V, 10.6V RET.)

(S1 PL1)	A1 - A1 ◇	P19 - 4
(S2 PL1)	A1 - A3 ◇	P19 - 6
(S3 PL1)	A1 - A5 ◇	P19 - E
(S4 PL1)	A1 - B1 ◇	P19 - 5
(S5 PL1)	A1 - B3 ◇	P19 - 3
(AUDIO 1)	A1 - L3 ◇	P19 - 12
(AUDIO 2)	A1 - L4 ◇	P19 - 11
(RED)	A1 - M1 ◇	P19 - 7
(GREEN)	A1 - M2 ◇	P19 - 8
(BLUE)	A1 - M3 ◇	P19 - 9
(H SYNC, X)	A1 - M4 ◇	P19 - A
(V SYNC, Y)	A1 - M5 ◇	P19 - B
(VIDEO RET.)	A1 - N1 ◇	P19 - J
(X RET.)	A1 - N4 ◇	P19 - 1
(Y RET.)	A1 - N5 ◇	P19 - 2
(+/-22V RET.)	A1 - T5 ◇	P19 - M

THE END

PAT 9000 PROGRAM PLUG

for

KANGAROO

REV. : 1 DATE : 7/8/82
FILE : R00

EDGE CONNECTORS, # OF PINS
PCN2 44
PCN4 20

START SWITCHES : 1 2
PLAYER SELECT SWITCHES : 1 2

AUX. SWITCHES 1-4
AUX 1 — INVERT VIDEO
AUX 2 — COCKTAIL
AUX 3 — HOPPING/MUSIC

PUSHBUTTON SWITCHES 1-6
G C sw 1 — PUNCH

4 POS. JOYSTICK
JSTCK UP — UP
JSTCK DN — DOWN
JSTCK L — LEFT
JSTCK R — RIGHT

WIRE ROUTING LIST : KANGAROO

(description)	conn-pin	◇	conn-pin	...	
(PCN2- 1)	A1 - V5	◇	A1 - H6		(START SW. 2)
(PCN2- 2)	A1 - V6	◇	A1 - G3		(COIN 3 (R))
(PCN2- 3)	A1 - W1	◇	A1 - G6		(AUX 2)
(PCN2- 4)	A1 - W2	◇	A1 - C4		(S8 DN PL1)
(PCN2- 5)	A1 - W3	◇	A1 - C1		(S7 UP PL1)
(PCN2- 6)	A1 - W4	◇	A1 - A1		(S1 PL1)
(PCN2- 8)	A1 - W6	◇	A2 - M1		(S8 DN PL2)
(PCN2- 9)	A1 - X1	◇	A2 - L1		(S7 UP PL2)
(PCN2- 10)	A1 - X2	◇	A1 - A2		(S1 PL2)
(PCN2- 14)	A1 - X6	◇	A1 - J1		(COIN COUNTER 1 (L))
(PCN2- 15)	A1 - Y1	◇	A1 - L3		(AUDIO 1)
(PCN2- 17)	A1 - Y3	◇	A1 - T4		(+5V RET. SENSE)
(PCN2- 18)	A1 - Y4	◇	A1 - S2		(5V, 10.6V RET.)
(PCN2- 19)	A1 - Y5	◇	A1 - S1		(+5V, 10.6V RET.)
(PCN2- 20)	A1 - Y6	◇	A1 - R6		(+5V SENSE)
(PCN2- 21)	A1 - Z1	◇	A1 - R2		(+5 VOLT REG.)
(PCN2- 22)	A1 - Z2	◇	PCN4- 9		
(PCN2- A)	A1 - Z3	◇	A1 - H5		(START SW. 1)
(PCN2- B)	A1 - Z4	◇	A1 - G1		(COIN 1 (L))
(PCN2- C)	A1 - Z5	◇	A1 - H1		(AUX 3)
(PCN2- D)	A1 - Z6	◇	A1 - G5		(AUX 1)
(PCN2- E)	A1 - a1	◇	A1 - C3		(S8 UP PL1)
(PCN2- F)	A1 - a2	◇	A1 - C2		(S7 DN PL1)
(PCN2- J)	A1 - a4	◇	A1 - H3		(SELF TEST)
(PCN2- K)	A1 - a5	◇	A2 - L5		(S8 UP PL2)
(PCN2- L)	A1 - a6	◇	A2 - L3		(S7 DN PL2)
(PCN2- S)	A1 - b5	◇	A1 - J3		(COIN COUNTER 3 (R))
(PCN2- Y)	A1 - c5	◇	A1 - R1		(+5 VOLT REG.)
(PCN2- Z)	A1 - c6	◇	A1 - U2		(+12 VOLTS)
(CRV FLAG)	A1 - L6	◇	A1 - N6		(SIGNAL GND)
(RED)	A1 - M1	◇	PCN4- A		
(GREEN)	A1 - M2	◇	PCN4- B		
(BLUE)	A1 - M3	◇	PCN4- C		
(COMP SYNC, COMP VID)	A1 - M6	◇	PCN4- D		
(VIDEO RET.)	A1 - N1	◇	PCN4- E		
(AUD 1 PWR GND)	A1 - N2	◇	A1 - T6		(+/-22V RET.)
(+5 VOLT REG.)	A1 - R3	◇	PCN4- J		
(+5 VOLT REG.)	A1 - R4	◇	PCN4- 8		
(5V, 10.6V RET.)	A1 - S3	◇	PCN4- 7		
(5V, 10.6V RET.)	A1 - S4	◇	PCN4- F		
(5V, 10.6V RET.)	A1 - S5	◇	PCN4- H		
(-5 VOLTS)	A1 - U5	◇	PCN4- L		

THE END

PAT 9000 PROGRAM PLUG

for

LIBERATOR

REV. : 1 DATE : 2-23-'83
FILE : LIBERAT

EDGE CONNECTORS, # OF PINS
P20 44
P19 24

START SWITCHES : 1 2
PLAYER SELECT SWITCHES : 1 2

AUX. SWITCHES 1-4
AUX 1 --- COCKTAIL

PUSHBUTTON SWITCHES 1-6
G C sw 1 --- FIRE
G C sw 2 --- SHIELD

TRAKBALL/STEERING
H CLK ---
H DIR ---
V CLK ---
V DIR ---

WIRE ROUTING LIST : LIBERATOR

(description)	conn-pin	◇	conn-pin ...	
(P20 - 1)	A1 - V5	◇	A1 - S1	(+5V, 10.6V RET.)
(P20 - 2)	A1 - V6	◇	A1 - R1	(+5 VOLT REG.)
(P20 - 4)	A1 - W2	◇	A1 - U6	(-22 VOLTS)
(P20 - 5)	A1 - W3	◇	A1 - L2	(START 2 LED)
(P20 - 6)	A1 - W4	◇	A1 - J1	(COIN COUNTER 1 (L))
(P20 - 7)	A1 - W5	◇	A1 - G1	(COIN 1 (L))
(P20 - 8)	A1 - W6	◇	A1 - G3	(COIN 3 (R))
(P20 - 9)	A1 - X1	◇	A1 - A2	(S1 PL2)
(P20 - 10)	A1 - X2	◇	A1 - A1	(S1 PL1)
(P20 - 11)	A1 - X3	◇	A1 - H6	(START SW. 2)
(P20 - 13)	A1 - X5	◇	A1 - H3	(SELF TEST)
(P20 - 21)	A1 - Z1	◇	A1 - R6	(+5V SENSE)
(P20 - 22)	A1 - Z2	◇	A1 - T4	(+5V RET. SENSE)
(P20 - A)	A1 - Z3	◇	A1 - S2	(5V, 10.6V RET.)
(P20 - B)	A1 - Z4	◇	A1 - R2	(+5 VOLT REG.)
(P20 - C)	A1 - Z5	◇	A1 - U2	(+12 VOLTS)
(P20 - D)	A1 - Z6	◇	A1 - U5	(-5 VOLTS)
(P20 - E)	A1 - a1	◇	A1 - T1	(10.6 VOLT)
(P20 - F)	A1 - a2	◇	A1 - L1	(START 1 LED)
(P20 - H)	A1 - a3	◇	A1 - J3	(COIN COUNTER 3 (R))
(P20 - J)	A1 - a4	◇	A1 - G4	(SLAM)
(P20 - K)	A1 - a5	◇	A1 - G2	(COIN 2 (C))
(P20 - L)	A1 - a6	◇	A1 - A3	(S2 PL1)
(P20 - M)	A1 - b1	◇	A1 - A4	(S2 PL2)
(P20 - N)	A1 - b2	◇	A1 - H5	(START SW. 1)
(P20 - P)	A1 - b3	◇	A1 - G5	(AUX 1)
(P20 - V)	A1 - c2	◇	A1 - L5	(RESET)
(P20 - Y)	A1 - c5	◇	A1 - R3	(+5 VOLT REG.)
(P20 - Z)	A1 - c6	◇	A1 - S3	(5V, 10.6V RET.)
(H CLK PL1)	A1 - E1	◇	P19 - M	
(H CLK PL2)	A1 - E2	◇	P19 - 9	
(H DIR PL1)	A1 - E3	◇	P19 - 11	
(H DIR PL2)	A1 - E4	◇	P19 - K	
(V CLK PL1)	A1 - E5	◇	P19 - 12	
(V CLK PL2)	A1 - E6	◇	P19 - 10	
(V DIR PL1)	A1 - F1	◇	P19 - N	
(V DIR PL2)	A1 - F2	◇	P19 - L	
(AUDIO 1)	A1 - L3	◇	P19 - 5	
(AUDIO 2)	A1 - L4	◇	P19 - 6	
(CRV FLAG)	A1 - L6	◇	A1 - N6	(SIGNAL GND)
(RED)	A1 - M1	◇	P19 - 3	
(GREEN)	A1 - M2	◇	P19 - C	
(BLUE)	A1 - M3	◇	P19 - 2	
(COMP SYNC, COMP VID)	A1 - M6	◇	P19 - 7	
(VIDEO RET.)	A1 - N1	◇	P19 - D	

THE END

PAT 9000 PROGRAM PLUG

for

MILLIPEDE

REV. : 2 DATE : 2-11-83
FILE : MILLIPED

EDGE CONNECTORS, # OF PINS
P20 44
P19 24

START SWITCHES : 1 2
PLAYER SELECT SWITCHES : 1 2

PUSHBUTTON SWITCHES 1-6
G C sw 1 —— FIRE

TRAKBALL/STEERING
H CLK —— HCLK
H DIR —— H DIR
V CLK —— V CLK
V DIR —— V DIR

WIRE ROUTING LIST : MILLIPEDE

(description)	conn-pin	◇	conn-pin ...	
(P20 - 1)	A1 - V5	◇	A1 - S1	(+5V, 10.6V RET.)
(P20 - 2)	A1 - V6	◇	A1 - R1	(+5 VOLT REG.)
(P20 - 3)	A1 - W1	◇	A1 - U1	(+22 VOLTS)
(P20 - 4)	A1 - W2	◇	A1 - U6	(-22 VOLTS)
(P20 - 5)	A1 - W3	◇	A1 - E3	(H DIR PL1)
(P20 - 6)	A1 - W4	◇	A1 - F1	(V DIR PL1)
(P20 - 7)	A1 - W5	◇	A1 - F2	(V DIR PL2)
(P20 - 8)	A1 - W6	◇	A1 - E4	(H DIR PL2)
(P20 - 13)	A1 - X5	◇	A1 - A2	(S1 PL2)
(P20 - 14)	A1 - X6	◇	A1 - H5	(START SW. 1)
(P20 - 17)	A1 - Y3	◇	A1 - H3	(SELF TEST)
(P20 - 21)	A1 - Z1	◇	A1 - R6	(+5V SENSE)
(P20 - 22)	A1 - Z2	◇	A1 - T4	(+5V RET. SENSE)
(P20 - A)	A1 - Z3	◇	A1 - S2	(5V, 10.6V RET.)
(P20 - B)	A1 - Z4	◇	A1 - R2	(+5 VOLT REG.)
(P20 - C)	A1 - Z5	◇	A1 - E1	(H CLK PL1)
(P20 - D)	A1 - Z6	◇	A1 - E5	(V CLK PL1)
(P20 - E)	A1 - a1	◇	A1 - T1	(10.6 VOLT)
(P20 - F)	A1 - a2	◇	A1 - E2	(H CLK PL2)
(P20 - H)	A1 - a3	◇	A1 - E6	(V CLK PL2)
(P20 - N)	A1 - b2	◇	A1 - A1	(S1 PL1)
(P20 - P)	A1 - b3	◇	A1 - H6	(START SW. 2)
(P20 - S)	A1 - b5	◇	A1 - G3	(COIN 3 (R))
(P20 - T)	A1 - b6	◇	A1 - G2	(COIN 2 (C))
(P20 - U)	A1 - c1	◇	A1 - G1	(COIN 1 (L))
(P20 - Y)	A1 - c5	◇	A1 - R3	(+5 VOLT REG.)
(P20 - Z)	A1 - c6	◇	A1 - S3	(5V, 10.6V RET.)

(COIN COUNTER 1 (L))	A1 - J1	◇	P19 - A	
(COIN COUNTER 2 (C))	A1 - J2	◇	P19 - C	
(START 1 LED)	A1 - L1	◇	P19 - 3	
(START 2 LED)	A1 - L2	◇	P19 - 4	
(AUDIO 1)	A1 - L3	◇	P19 - 2	
(AUDIO 2)	A1 - L4	◇	P19 - 1	
(CRV FLAG)	A1 - L6	◇	A1 - N6	(SIGNAL GND)
(RED)	A1 - M1	◇	P19 - 12	
(GREEN)	A1 - M2	◇	P19 - 11	
(BLUE)	A1 - M3	◇	P19 - 10	
(COMP SYNC, COMP VID)	A1 - M6	◇	P19 - 7	
(VIDEO RET.)	A1 - N1	◇	P19 - H	

THE END

PAT 9000 PROGRAM PLUG

for

MISSILE COMMAND

REV. : 1 DATE : 8-24-'82
FILE : MISSILEC

EDGE CONNECTORS, # OF PINS
P20 44
P19 24

START SWITCHES : 1 2
PLAYER SELECT SWITCHES : 1 2

AUX. SWITCHES 1-4
AUX 1 —— COCKTAIL
AUX 2 —— WATCHDOG DIS

PUSHBUTTON SWITCHES 1-6
G C sw 3 —— FIRE L
G C sw 4 —— FIRE C
G C sw 5 —— FIRE R

TRAKBALL/STEERING
H CLK ——
H DIR ——
V CLK ——
V DIR ——

WIRE ROUTING LIST : MISSILE COMMAND

(description) conn-pin ◇ conn-pin ...

(P20 - 1) A1 - V5 ◇ A1 - S1 (+5V, 10.6V RET.)
(P20 - 2) A1 - V6 ◇ A1 - R1 (+5 VOLT REG.)
(P20 - 5) A1 - W3 ◇ A1 - L4 (AUDIO 2)
(P20 - 7) A1 - W5 ◇ A1 - A5 (S3 PL1)
(P20 - 8) A1 - W6 ◇ A1 - B3 (S5 PL1)
(P20 - 9) A1 - X1 ◇ A1 - G1 (COIN 1 (L))
(P20 - 10) A1 - X2 ◇ A1 - M1 (RED)
(P20 - 11) A1 - X3 ◇ A1 - J1 (COIN COUNTER 1 (L))
(P20 - 12) A1 - X4 ◇ A1 - J3 (COIN COUNTER 3 (R))
(P20 - 13) A1 - X5 ◇ A1 - H6 (START SW. 2)
(P20 - 14) A1 - X6 ◇ A1 - G4 (SLAM)
(P20 - 15) A1 - Y1 ◇ A1 - H5 (START SW. 1)
(P20 - 16) A1 - Y2 ◇ A1 - E5 (V CLK PL1)
(P20 - 17) A1 - Y3 ◇ A1 - E3 (H DIR PL1)
(P20 - 18) A1 - Y4 ◇ A1 - M6 (COMP SYNC, COMP VID)
(P20 - 19) A1 - Y5 ◇ A1 - U5 (-5 VOLTS)
(P20 - 20) A1 - Y6 ◇ A1 - U2 (+12 VOLTS)
(P20 - 21) A1 - Z1 ◇ A1 - R6 (+5V SENSE)
(P20 - 22) A1 - Z2 ◇ A1 - T4 (+5V RET. SENSE)
(P20 - A) A1 - Z3 ◇ A1 - S2 (5V, 10.6V RET.)
(P20 - B) A1 - Z4 ◇ A1 - R2 (+5 VOLT REG.)
(P20 - E) A1 - a1 ◇ A1 - L3 (AUDIO 1)
(P20 - H) A1 - a3 ◇ A1 - L2 (START 2 LED)
(P20 - J) A1 - a4 ◇ A1 - B1 (S4 PL1)
(P20 - K) A1 - a5 ◇ A1 - G3 (COIN 3 (R))
(P20 - L) A1 - a6 ◇ A1 - M3 (BLUE)
(P20 - M) A1 - b1 ◇ A1 - M2 (GREEN)
(P20 - N) A1 - b2 ◇ A1 - J2 (COIN COUNTER 2 (C))
(P20 - P) A1 - b3 ◇ A1 - L1 (START 1 LED)
(P20 - R) A1 - b4 ◇ A1 - H3 (SELF TEST)
(P20 - S) A1 - b5 ◇ A1 - G2 (COIN 2 (C))
(P20 - T) A1 - b6 ◇ A1 - F1 (V DIR PL1)
(P20 - U) A1 - c1 ◇ A1 - E1 (H CLK PL1)
(P20 - V) A1 - c2 ◇ A1 - L5 (RESET)
(P20 - Y) A1 - c5 ◇ A1 - R3 (+5 VOLT REG.)
(P20 - Z) A1 - c6 ◇ A1 - S3 (5V, 10.6V RET.)

(S3 PL2) A1 - A6 ◇ P19 - 5
(S4 PL2) A1 - B2 ◇ P19 - E
(S5 PL2) A1 - B4 ◇ P19 - D
(H CLK PL2) A1 - E2 ◇ P19 - L
(H DIR PL2) A1 - E4 ◇ P19 - K
(V CLK PL2) A1 - E6 ◇ P19 - 10
(V DIR PL2) A1 - F2 ◇ P19 - 9
(AUX 1) A1 - G5 ◇ P19 - H
(AUX 2) A1 - G6 ◇ P19 - J
(CRV FLAG) A1 - L6 ◇ A1 - N6 (SIGNAL GND)

THE END

PAT 9000 PROGRAM PLUG

for

POLEPOSITION (Dom.)

REV. : 1 DATE : 1-20-'83
FILE : POLEPOS

EDGE CONNECTORS, # OF PINS
P20 44
P19 30
P501 12
J501 12

START SWITCHES : 1
PLAYER SELECT SWITCHES : 1

AUX. SWITCHES 5-8
AUX 5A-c --- AUDIO 1
AUX 5A-up --- SOUND 1
AUX 5A-dn --- SOUND 3
AUX 5B-c --- AUDIO 2
AUX 5B-up --- SOUND2
AUX 5B-dn --- SOUND 4

PUSHBUTTON SWITCHES 1-6
G C sw 5 --- BRAKE

TOGGLE SWITCHES
G C sw 9 --- SHIFTER

PADDLE POT
PADDLE --- GAS

TRAKBALL/STEERING
H CLK --- STEERING 1
H DIR --- STEERING 2

WIRE ROUTING LIST : POLEPOSITION (Dom.)

(description) conn-pin ◇ conn-pin ...

(P20 - 1) A1 - V5 ◇ A1 - S1 (+5V, 10.6V RET.)
(P20 - 2) A1 - V6 ◇ A1 - R1 (+5 VOLT REG.)
(P20 - 6) A1 - W4 ◇ A1 - B3 (S5 PL1)
(P20 - 8) A1 - W6 ◇ A1 - E1 (H CLK PL1)
(P20 - 9) A1 - X1 ◇ A1 - J1 (COIN COUNTER 1 (L))
(P20 - 10) A1 - X2 ◇ A1 - G3 (COIN 3 (R))
(P20 - 11) A1 - X3 ◇ A1 - G1 (COIN 1 (L))
(P20 - 12) A1 - X4 ◇ A1 - B5 (S9 PL1)
(P20 - 15) A1 - Y1 ◇ P501- 3 ◇ J501- 3 ◇ A2 - P3 (AUX 5A DN)
(P20 - 16) A1 - Y2 ◇ P501- 6 ◇ J501- 6 ◇ A2 - P6 (AUX 5B DN)
(P20 - 18) A1 - Y4 ◇ P501- 5 ◇ J501- 5 ◇ A2 - P5 (AUX 5B UP)
(P20 - 21) A1 - Z1 ◇ A1 - R6 (+5V SENSE)
(P20 - 22) A1 - Z2 ◇ A1 - T4 (+5V RET. SENSE)
(P20 - A) A1 - Z3 ◇ A1 - S2 (5V, 10.6V RET.)
(P20 - B) A1 - Z4 ◇ A1 - R2 (+5 VOLT REG.)
(P20 - F) A1 - a2 ◇ A1 - F5 (PADDLE PL1)
(P20 - H) A1 - a3 ◇ A1 - E3 (H DIR PL1)
(P20 - J) A1 - a4 ◇ A1 - J2 (COIN COUNTER 2 (C))
(P20 - K) A1 - a5 ◇ A1 - H3 (SELF TEST)
(P20 - L) A1 - a6 ◇ A1 - G2 (COIN 2 (C))
(P20 - T) A1 - b6 ◇ P501- 2 ◇ J501- 2 ◇ A2 - P2 (AUX 5A UP)
(P20 - Y) A1 - c5 ◇ A1 - R3 (+5 VOLT REG.)
(P20 - Z) A1 - c6 ◇ A1 - S3 (5V, 10.6V RET.)

(AUDIO 1) A1 - L3 ◇ P501- 1 ◇ J501- 1 ◇ A2 - P1 (AUX 5A C)
(AUDIO 2) A1 - L4 ◇ P501- 4 ◇ J501- 4 ◇ A2 - P4 (AUX 5B C)
(CRV FLAG) A1 - L6 ◇ A1 - N6 (SIGNAL GND)
(RED) A1 - M1 ◇ P19 - 9
(GREEN) A1 - M2 ◇ P19 - 10
(BLUE) A1 - M3 ◇ P19 - 12
(COMP SYNC, COMP VID) A1 - M6 ◇ P19 - 11
(VIDEO RET.) A1 - N1 ◇ P19 - 13
(+5 VOLT REG.) A1 - R4 ◇ P19 - 2
(+5 VOLT REG.) A1 - R5 ◇ P19 - B
(5V, 10.6V RET.) A1 - S4 ◇ P19 - 1
(5V, 10.6V RET.) A1 - S5 ◇ P19 - A

THE END

PAT 9000 PROGRAM PLUG

for

QUANTUM

REV. : 1 DATE : 1-26-'83
FILE : QUANTUM

EDGE CONNECTORS, # OF PINS
P20 44

START SWITCHES : 1 2
PLAYER SELECT SWITCHES : 1 2

TRAKBALL/STEERING
H CLK —
H DIR —
V CLK —
V DIR —

WIRE ROUTING LIST : QUANTUM

(description)	conn-pin	◇	conn-pin	...
(P20 - 1)	A1 - V5	◇	A1 - S1	(+5V, 10.6V RET.)
(P20 - 2)	A1 - V6	◇	A1 - R1	(+5 VOLT REG.)
(P20 - 3)	A1 - W1	◇	A1 - U1	(+22 VOLTS)
(P20 - 4)	A1 - W2	◇	A1 - U6	(-22 VOLTS)
(P20 - 5)	A1 - W3	◇	A1 - E3	(H DIR PL1)
(P20 - 6)	A1 - W4	◇	A1 - E5	(V CLK PL1)
(P20 - 7)	A1 - W5	◇	A1 - E2	(H CLK PL2)
(P20 - 8)	A1 - W6	◇	A1 - E6	(V CLK PL2)
(P20 - 9)	A1 - X1	◇	A1 - G2	(COIN 2 (C))
(P20 - 10)	A1 - X2	◇	A1 - H3	(SELF TEST)
(P20 - 11)	A1 - X3	◇	A1 - H5	(START SW. 1)
(P20 - 12)	A1 - X4	◇	A1 - L4	(AUDIO 2)
(P20 - 13)	A1 - X5	◇	A1 - L3	(AUDIO 1)
(P20 - 14)	A1 - X6	◇	A1 - L2	(START 2 LED)
(P20 - 15)	A1 - Y1	◇	A1 - J1	(COIN COUNTER 1 (L))
(P20 - 16)	A1 - Y2	◇	A1 - N5	(Y RET.)
(P20 - 17)	A1 - Y3	◇	A1 - M3	(BLUE)
(P20 - 19)	A1 - Y5	◇	A1 - M5	(V SYNC, Y)
(P20 - 20)	A1 - Y6	◇	A1 - M4	(H SYNC, X)
(P20 - 21)	A1 - Z1	◇	A1 - R6	(+5V SENSE)
(P20 - 22)	A1 - Z2	◇	A1 - T4	(+5V RET. SENSE)
(P20 - A)	A1 - Z3	◇	A1 - S2	(5V, 10.6V RET.)
(P20 - B)	A1 - Z4	◇	A1 - R2	(+5 VOLT REG.)
(P20 - C)	A1 - Z5	◇	A1 - F2	(V DIR PL2)
(P20 - D)	A1 - Z6	◇	A1 - E4	(H DIR PL2)
(P20 - E)	A1 - a1	◇	A1 - T1	(10.6 VOLT)
(P20 - F)	A1 - a2	◇	A1 - E1	(H CLK PL1)
(P20 - H)	A1 - a3	◇	A1 - F1	(V DIR PL1)
(P20 - J)	A1 - a4	◇	A1 - G1	(COIN 1 (L))
(P20 - L)	A1 - a6	◇	A1 - G3	(COIN 3 (R))
(P20 - M)	A1 - b1	◇	A1 - H6	(START SW. 2)
(P20 - N)	A1 - b2	◇	A1 - L1	(START 1 LED)
(P20 - P)	A1 - b3	◇	A1 - N1	(VIDEO RET.)
(P20 - S)	A1 - b5	◇	A1 - J2	(COIN COUNTER 2 (C))
(P20 - T)	A1 - b6	◇	A1 - M1	(RED)
(P20 - U)	A1 - c1	◇	A1 - N4	(X RET.)
(P20 - V)	A1 - c2	◇	A1 - M2	(GREEN)
(P20 - Y)	A1 - c5	◇	A1 - R3	(+5 VOLT REG.)
(P20 - Z)	A1 - c6	◇	A1 - S3	(5V, 10.6V RET.)

THE END

PAT 9000 PROGRAM PLUG

for

RED BARON

REV. : 1 DATE : 8-23-'82
FILE : REDBARON

EDGE CONNECTORS, # OF PINS
P20 44
P18 44

START SWITCHES : 1
PLAYER SELECT SWITCHES : 1

PUSHBUTTON SWITCHES 1-6
G C sw 1 —— FIRE

LINEAR JOYSTICK
VERT. POT ——
HORZ. POT ——

WIRE ROUTING LIST : RED BARON

(description)	conn-pin	◇	conn-pin ...	
(P20 - 1)	A1 - V5	◇	A1 - S1	(+5V, 10.6V RET.)
(P20 - 2)	A1 - V6	◇	A1 - R2	(+5 VOLT REG.)
(P20 - 3)	A1 - W1	◇	A1 - U1	(+22 VOLTS)
(P20 - 4)	A1 - W2	◇	A1 - U6	(-22 VOLTS)
(P20 - 6)	A1 - W4	◇	A1 - G4	(SLAM)
(P20 - 7)	A1 - W5	◇	A1 - H3	(SELF TEST)
(P20 - 8)	A1 - W6	◇	A1 - J1	(COIN COUNTER 1 (L))
(P20 - 9)	A1 - X1	◇	A1 - J2	(COIN COUNTER 2 (C))
(P20 - 15)	A1 - Y1	◇	A1 - N1	(VIDEO RET.)
(P20 - 16)	A1 - Y2	◇	A1 - N4	(X RET.)
(P20 - 17)	A1 - Y3	◇	A1 - M5	(V SYNC, Y)
(P20 - 19)	A1 - Y5	◇	A1 - U5	(-5 VOLTS)
(P20 - 20)	A1 - Y6	◇	A1 - U2	(+12 VOLTS)
(P20 - 21)	A1 - Z1	◇	A1 - R6	(+5V SENSE)
(P20 - Z2)	A1 - Z2	◇	A1 - T4	(+5V RET. SENSE)
(P20 - A)	A1 - Z3	◇	A1 - S2	(5V, 10.6V RET.)
(P20 - B)	A1 - Z4	◇	A1 - R1	(+5 VOLT REG.)
(P20 - E)	A1 - a1	◇	A1 - G1	(COIN 1 (L))
(P20 - F)	A1 - a2	◇	A1 - G2	(COIN 2 (C))
(P20 - H)	A1 - a3	◇	A1 - G3	(COIN 3 (R))
(P20 - J)	A1 - a4	◇	A1 - J3	(COIN COUNTER 3 (R))
(P20 - S)	A1 - b5	◇	A1 - M2	(GREEN)
(P20 - T)	A1 - b6	◇	A1 - M4	(H SYNC, X)
(P20 - U)	A1 - c1	◇	A1 - N5	(Y RET.)
(P20 - V)	A1 - c2	◇	P18 - V ◇ A1 - L5	(RESET)
(P20 - W)	A1 - c3	◇	P18 - W	
(P20 - X)	A1 - c4	◇	P18 - X	
(P20 - Y)	A1 - c5	◇	A1 - R3	(+5 VOLT REG.)
(P20 - Z)	A1 - c6	◇	A1 - S3	(5V, 10.6V RET.)
(S1 PL1)	A1 - A1	◇	P18 - T	
(H POT PL1)	A1 - F3	◇	P18 - 14	
(V POT PL1)	A1 - F4	◇	P18 - 13	
(START SW. 1)	A1 - H5	◇	P18 - 16	
(START 1 LED)	A1 - L1	◇	P18 - 9	
(AUDIO 1)	A1 - L3	◇	P18 - 5	
(AUDIO 2)	A1 - L4	◇	P18 - 6	
(+5 VOLT REG.)	A1 - R4	◇	P18 - B	
(+5 VOLT REG.)	A1 - R5	◇	P18 - 2	
(5V, 10.6V RET.)	A1 - S4	◇	P18 - A	
(5V, 10.6V RET.)	A1 - S5	◇	P18 - 1	

THE END

PAT 9000 PROGRAM PLUG

for

REGULATOR AUDIO II

REV. : 2 DATE : 1-20-'83
FILE : REGAUDII

EDGE CONNECTORS, # OF PINS

	0
J6	6
J7	9
J8	4
J9	6
J10	12

START SWITCHES : 1
PLAYER SELECT SWITCHES : 1

TRAKBALL/STEERING
H CLK —— AUDIO 1
V CLK —— AUDIO 2

WIRE ROUTING LIST : REGULATOR AUDIO II

(description)	conn-pin	◇	conn-pin ...
(H CLK PL1)	A1 - E1	◇	J7 - 9
(V CLK PL1)	A1 - E5	◇	J7 - 8
(AUDIO 1)	A1 - L3	◇	J8 - 4
(AUDIO 2)	A1 - L4	◇	J8 - 3
(AUD 1 PWR GND)	A1 - N2	◇	J8 - 2
(AUD 2 PWR GND)	A1 - N3	◇	J8 - 1
(+5V, 10.6V RET.)	A1 - S1	◇	J6 - 1
(5V, 10.6V RET.)	A1 - S2	◇	J6 - 2
(5V, 10.6V RET.)	A1 - S3	◇	J6 - 4
(10.6 VOLT)	A1 - T1	◇	J6 - 3
(10.6 VOLT)	A1 - T2	◇	J6 - 5
(10.6 VOLT)	A1 - T3	◇	J6 - 6
(+/-22V RET.)	A1 - T5	◇	J9 - 1
(+/-22V RET.)	A1 - T6	◇	J9 - 2
(+22 VOLTS)	A1 - U1	◇	J9 - 4
(-22 VOLTS)	A1 - U6	◇	J9 - 5

THE END

PAT 9000 PROGRAM PLUG

for

SPACE DUEL

REV. : 1 DATE : 6-15-'82
FILE : SDUEL

EDGE CONNECTORS, # OF PINS
P20 44
P19 24

START SWITCHES : 1
PLAYER SELECT SWITCHES : 1 2

AUX. SWITCHES 1-4
AUX 1 —— GAME SELECT
AUX 2 —— CABINET

INDICATORS L1-L4
L1 —— SELECT LED

PUSHBUTTON SWITCHES 1-6
G C sw 1 —— FIRE
G C sw 2 —— SHIELDS
G C sw 3 —— ROTATE LEFT
G C sw 4 —— ROTATE RIGHT
G C sw 5 —— THRUST

WIRE ROUTING LIST : SPACE DUEL

(description)	conn-pin	◇	conn-pin	...	
(P20 - 1)	A1	- V5 ◇	A1	- S1	(+5V, 10.6V RET.)
(P20 - 2)	A1	- V6 ◇	A1	- R1	(+5 VOLT REG.)
(P20 - 3)	A1	- W1 ◇	A1	- U1	(+22 VOLTS)
(P20 - 4)	A1	- W2 ◇	A1	- U6	(-22 VOLTS)
(P20 - 6)	A1	- W4 ◇	A1	- J2	(COIN COUNTER 2 (C))
(P20 - 7)	A1	- W5 ◇	A1	- J5	(L1)
(P20 - 8)	A1	- W6 ◇	A1	- A6	(S3 PL2)
(P20 - 9)	A1	- X1 ◇	A1	- A4	(S2 PL2)
(P20 - 10)	A1	- X2 ◇	A1	- B3	(S5 PL1)
(P20 - 11)	A1	- X3 ◇	A1	- G5	(AUX 1)
(P20 - 14)	A1	- X6 ◇	A1	- G4	(SLAM)
(P20 - 15)	A1	- Y1 ◇	A1	- H4	(DIAGNOSTIC)
(P20 - 16)	A1	- Y2 ◇	A1	- G1	(COIN 1 (L))
(P20 - 21)	A1	- Z1 ◇	A1	- R6	(+5V SENSE)
(P20 - 22)	A1	- Z2 ◇	A1	- T4	(+5V RET. SENSE)
(P20 - A)	A1	- Z3 ◇	A1	- S2	(5V, 10.6V RET.)
(P20 - B)	A1	- Z4 ◇	A1	- R2	(+5 VOLT REG.)
(P20 - E)	A1	- a1 ◇	A1	- T1	(10.6 VOLT)
(P20 - F)	A1	- a2 ◇	A1	- J4	(LOCKOUT COIL)
(P20 - H)	A1	- a3 ◇	A1	- J1	(COIN COUNTER 1 (L))
(P20 - J)	A1	- a4 ◇	A1	- L1	(START 1 LED)
(P20 - K)	A1	- a5 ◇	A1	- A5	(S3 PL1)
(P20 - L)	A1	- a6 ◇	A1	- A3	(S2 PL1)
(P20 - M)	A1	- b1 ◇	A1	- B4	(S5 PL2)
(P20 - R)	A1	- b4 ◇	A1	- G6	(AUX 2)
(P20 - S)	A1	- b5 ◇	A1	- G3	(COIN 3 (R))
(P20 - T)	A1	- b6 ◇	A1	- H3	(SELF TEST)
(P20 - U)	A1	- c1 ◇	A1	- G2	(COIN 2 (C))
(P20 - V)	A1	- c2 ◇	A1	- L5	(RESET)
(P20 - Y)	A1	- c5 ◇	A1	- R3	(+5 VOLT REG.)
(P20 - Z)	A1	- c6 ◇	A1	- S3	(5V, 10.6V RET.)

(S1 PL1)	A1	- A1 ◇	P19	- 3
(S1 PL2)	A1	- A2 ◇	P19	- 4
(S4 PL1)	A1	- B1 ◇	P19	- 5
(S4 PL2)	A1	- B2 ◇	P19	- E
(START SW. 1)	A1	- H5 ◇	P19	- 6
(AUDIO 1)	A1	- L3 ◇	P19	- 12
(AUDIO 2)	A1	- L4 ◇	P19	- 11
(RED)	A1	- M1 ◇	P19	- 7
(GREEN)	A1	- M2 ◇	P19	- 8
(BLUE)	A1	- M3 ◇	P19	- 9
(H SYNC, X)	A1	- M4 ◇	P19	- A
(V SYNC, Y)	A1	- M5 ◇	P19	- B
(VIDEO RET.)	A1	- N1 ◇	P19	- J
(X RET.)	A1	- N4 ◇	P19	- 1
(Y RET.)	A1	- N5 ◇	P19	- 2

THE END

PAT 9000 PROGRAM PLUG

for

TEMPEST

REV. : 2 DATE : 8-24-'82
FILE : TEMPEST

EDGE CONNECTORS, # OF PINS
P20 44
P18 30

START SWITCHES : 1 2
PLAYER SELECT SWITCHES : 1 2

AUX. SWITCHES 1-4
AUX 1 — COCKTAIL

PUSHBUTTON SWITCHES 1-6
G C sw 1 — FIRE
G C sw 2 — ZAP

TRAKBALL/STEERING
H CLK — TB CLK
H DIR — TB DIR

WIRE ROUTING LIST : TEMPEST

(description)	conn-pin ◇ conn-pin ...	
(P20 - 1)	A1 - V5 ◇ A1 - S1	(+5V, 10.6V RET.)
(P20 - 2)	A1 - V6 ◇ A1 - R1	(+5 VOLT REG.)
(P20 - 3)	A1 - W1 ◇ A1 - U1	(+22 VOLTS)
(P20 - 4)	A1 - W2 ◇ A1 - U6	(-22 VOLTS)
(P20 - 5)	A1 - W3 ◇ A1 - G4	(SLAM)
(P20 - 6)	A1 - W4 ◇ A1 - G1	(COIN 1 (L))
(P20 - 7)	A1 - W5 ◇ A1 - H3	(SELF TEST)
(P20 - 9)	A1 - X1 ◇ A1 - M3	(BLUE)
(P20 - 10)	A1 - X2 ◇ A1 - M1	(RED)
(P20 - 12)	A1 - X4 ◇ A1 - J1	(COIN COUNTER 1 (L))
(P20 - 14)	A1 - X6 ◇ A1 - T1	(10.6 VOLT)
(P20 - 15)	A1 - Y1 ◇ A1 - a4	(P20 - J)
(P20 - 16)	A1 - Y2 ◇ A1 - N5	(Y RET.)
(P20 - 17)	A1 - Y3 ◇ A1 - M4	(H SYNC, X)
(P20 - 21)	A1 - Z1 ◇ A1 - R6	(+5V SENSE)
(P20 - 22)	A1 - Z2 ◇ A1 - T4	(+5V RET. SENSE)
(P20 - A)	A1 - Z3 ◇ A1 - S2	(5V, 10.6V RET.)
(P20 - B)	A1 - Z4 ◇ A1 - R2	(+5 VOLT REG.)
(P20 - C)	A1 - Z5 ◇ A1 - G5	(AUX 1)
(P20 - E)	A1 - a1 ◇ A1 - G3	(COIN 3 (R))
(P20 - F)	A1 - a2 ◇ A1 - G2	(COIN 2 (C))
(P20 - H)	A1 - a3 ◇ A1 - H4	(DIAGNOSTIC)
(P20 - K)	A1 - a5 ◇ A1 - b5	(P20 - S)
(P20 - L)	A1 - a6 ◇ A1 - M2	(GREEN)
(P20 - M)	A1 - b1 ◇ A1 - N1	(VIDEO RET.)
(P20 - N)	A1 - b2 ◇ A1 - J3	(COIN COUNTER 3 (R))
(P20 - P)	A1 - b3 ◇ A1 - J2	(COIN COUNTER 2 (C))
(P20 - T)	A1 - b6 ◇ A1 - M5	(V SYNC, Y)
(P20 - U)	A1 - c1 ◇ A1 - N4	(X RET.)
(P20 - V)	A1 - c2 ◇ P18 - F ◇ A1 - L5	(RESET)
(P20 - W)	A1 - c3 ◇ P18 - 4	
(P20 - X)	A1 - c4 ◇ P18 - 3	
(P20 - Y)	A1 - c5 ◇ A1 - R3	(+5 VOLT REG.)
(P20 - Z)	A1 - c6 ◇ A1 - S3	(5V, 10.6V RET.)
(S1 PL1)	A1 - A1 ◇ P18 - 9	
(S1 PL2)	A1 - A2 ◇ P18 - K	
(S2 PL1)	A1 - A3 ◇ P18 - 10	
(S2 PL2)	A1 - A4 ◇ P18 - L	
(H CLK PL1)	A1 - E1 ◇ P18 - H	
(H CLK PL2)	A1 - E2 ◇ P18 - 7	
(H DIR PL1)	A1 - E3 ◇ P18 - J	
(H DIR PL2)	A1 - E4 ◇ P18 - 8	
(START SW. 1)	A1 - H5 ◇ P18 - 11	
(START SW. 2)	A1 - H6 ◇ P18 - M	
(START 1 LED)	A1 - L1 ◇ P18 - 12	
(START 2 LED)	A1 - L2 ◇ P18 - 13	
(AUDIO 1)	A1 - L3 ◇ P18 - 5	
(AUDIO 2)	A1 - L4 ◇ P18 - D	
(+5 VOLT REG.)	A1 - R4 ◇ P18 - 2	
(+5 VOLT REG.)	A1 - R5 ◇ P18 - B	
(5V, 10.6V RET.)	A1 - S4 ◇ P18 - A	
(5V, 10.6V RET.)	A1 - S5 ◇ P18 - 1	
(5V, 10.6V RET.)	A1 - S6 ◇ P18 - 15	

THE END

PAT 9000 PROGRAM PLUG

for

WARLORDS

REV. : 2 DATE : 2-23-83
FILE : WARLORDS

EDGE CONNECTORS, # OF PINS
P20 44
P19 24

START SWITCHES : 1
PLAYER SELECT SWITCHES : 1 2

AUX. SWITCHES 1-4
AUX 1 —— MIRROR (COCKTAIL)
AUX 2 —— WATCHDOG DISABLE

INDICATORS L1-L4
L1 —— LED 1
L2 —— LED 2
L3 —— LED 3
L4 —— LED 4

PUSHBUTTON SWITCHES 1-6
G C sw 1 —— STONE, PLAYER 1,3
G C sw 2 —— STONE, PLAYER 2,4

LINEAR JOYSTICK
VERT. POT —— PADDLE, PLAYER 2,4
HORZ. POT —— PADDLE PLAYER 1,3

WIRE ROUTING LIST : WARLORDS

(description)	conn-pin	◇	conn-pin ...	
(P20 - 1)	A1 - V5	◇	A1 - S1	(+5V, 10.6V RET.)
(P20 - 2)	A1 - V6	◇	A1 - R1	(+5 VOLT REG.)
(P20 - 3)	A1 - W1	◇	A1 - U1	(+22 VOLTS)
(P20 - 5)	A1 - W3	◇	A1 - J3	(COIN COUNTER 3 (R))
(P20 - 6)	A1 - W4	◇	A1 - J5	(L1)
(P20 - 7)	A1 - W5	◇	A1 - K2	(L4)
(P20 - 9)	A1 - X1	◇	A1 - L4	(AUDIO 2)
(P20 - 10)	A1 - X2	◇	A1 - L3	(AUDIO 1)
(P20 - 12)	A1 - X4	◇	A1 - G6	(AUX 2)
(P20 - 13)	A1 - X5	◇	A1 - H3	(SELF TEST)
(P20 - 14)	A1 - X6	◇	A1 - G2	(COIN 2 (C))
(P20 - 15)	A1 - Y1	◇	A1 - A3	(S2 PL1)
(P20 - 16)	A1 - Y2	◇	A1 - A4	(S2 PL2)
(P20 - 17)	A1 - Y3	◇	A1 - G4	(SLAM)
(P20 - 19)	A1 - Y5	◇	A1 - U5	(-5 VOLTS)
(P20 - 20)	A1 - Y6	◇	A1 - U2	(+12 VOLTS)
(P20 - 21)	A1 - Z1	◇	A1 - R6	(+5V SENSE)
(P20 - 22)	A1 - Z2	◇	A1 - T4	(+5V RET. SENSE)
(P20 - A)	A1 - Z3	◇	A1 - S2	(5V, 10.6V RET.)
(P20 - B)	A1 - Z4	◇	A1 - R2	(+5 VOLT REG.)
(P20 - E)	A1 - a1	◇	A1 - J1	(COIN COUNTER 1 (L))
(P20 - F)	A1 - a2	◇	A1 - J2	(COIN COUNTER 2 (C))
(P20 - H)	A1 - a3	◇	A1 - J6	(L2)
(P20 - J)	A1 - a4	◇	A1 - K1	(L3)
(P20 - P)	A1 - b3	◇	A1 - G3	(COIN 3 (R))
(P20 - R)	A1 - b4	◇	A1 - G1	(COIN 1 (L))
(P20 - S)	A1 - b5	◇	A1 - A1	(S1 PL1)
(P20 - T)	A1 - b6	◇	A1 - A2	(S1 PL2)
(P20 - U)	A1 - c1	◇	A1 - H4	(DIAGNOSTIC)
(P20 - V)	A1 - c2	◇	A1 - L5	(RESET)
(P20 - Y)	A1 - c5	◇	A1 - R3	(+5 VOLT REG.)
(P20 - Z)	A1 - c6	◇	A1 - S3	(5V, 10.6V RET.)
(H POT PL1)	A1 - F3	◇	P19 - K	
(V POT PL1)	A1 - F4	◇	P19 - 9	
(AUX 1)	A1 - G5	◇	P19 - 8	
(CRV FLAG)	A1 - L6	◇	A1 - N6	(SIGNAL GND)
(RED)	A1 - M1	◇	P19 - E	
(GREEN)	A1 - M2	◇	P19 - 4	
(BLUE)	A1 - M3	◇	P19 - 5	
(COMP SYNC, COMP VID)	A1 - M6	◇	P19 - D	
(VIDEO RET.)	A1 - N1	◇	P19 - F	

(description)	conn-pin	◇	conn-pin ...
(H POT PL2)	A2 - M3	◇	P19 - L
(V POT PL2)	A2 - M5	◇	P19 - 10

THE END

PAT 9000 PROGRAM PLUG

for

XEVIOUS

REV. : 3 DATE : 2-22-83
FILE : XEVIOUS

EDGE CONNECTORS, # OF PINS
P20 44
P18 30

START SWITCHES : 1 2
PLAYER SELECT SWITCHES : 1 2

AUX. SWITCHES 1-4
AUX 1 —— COCKTAIL

PUSHBUTTON SWITCHES 1-6
G C sw 1 —— ZAPPER
G C sw 2 —— BLASTER

4 POS. JOYSTICK
JSTCK UP ——
JSTCK DN ——
JSTCK L ——
JSTCK R ——

WIRE ROUTING LIST : XEVIOUS

(description)	conn-pin	◇	conn-pin	...
(P20 - 1)	A1 - V5	◇	A1 - S1	(+5V, 10.6V RET.)
(P20 - 2)	A1 - V6	◇	A1 - R1	(+5 VOLT REG.)
(P20 - 6)	A1 - W4	◇	A1 - L3	(AUDIO 1)
(P20 - 7)	A1 - W5	◇	A1 - J1	(COIN COUNTER 1 (L))
(P20 - 8)	A1 - W6	◇	A1 - H3	(SELF TEST)
(P20 - 9)	A1 - X1	◇	A1 - G3	(COIN 3 (R))
(P20 - 10)	A1 - X2	◇	A1 - H6	(START SW. 2)
(P20 - 11)	A1 - X3	◇	A1 - A2	(S1 PL2)
(P20 - 12)	A1 - X4	◇	A2 - L5	(S8 UP PL2)
(P20 - 13)	A1 - X5	◇	A2 - L3	(S7 DN PL2)
(P20 - 14)	A1 - X6	◇	A2 - M1	(S8 DN PL2)
(P20 - 15)	A1 - Y1	◇	A2 - L1	(S7 UP PL2)
(P20 - 16)	A1 - Y2	◇	A1 - A3	(S2 PL1)
(P20 - 17)	A1 - Y3	◇	A1 - L1	(START 1 LED)
(P20 - 21)	A1 - Z1	◇	A1 - R6	(+5V SENSE)
(P20 - 22)	A1 - Z2	◇	A1 - T4	(+5V RET. SENSE)
(P20 - A)	A1 - Z3	◇	A1 - S2	(5V, 10.6V RET.)
(P20 - B)	A1 - Z4	◇	A1 - R2	(+5 VOLT REG.)
(P20 - E)	A1 - a1	◇	A1 - T1	(10.6 VOLT)
(P20 - F)	A1 - a2	◇	A1 - L4	(AUDIO 2)
(P20 - H)	A1 - a3	◇	A1 - J3	(COIN COUNTER 3 (R))
(P20 - K)	A1 - a5	◇	A1 - G1	(COIN 1 (L))
(P20 - L)	A1 - a6	◇	A1 - H5	(START SW. 1)
(P20 - M)	A1 - b1	◇	A1 - A1	(S1 PL1)
(P20 - N)	A1 - b2	◇	A1 - C3	(S8 UP PL1)
(P20 - P)	A1 - b3	◇	A1 - C2	(S7 DN PL1)
(P20 - R)	A1 - b4	◇	A1 - C4	(S8 DN PL1)
(P20 - S)	A1 - b5	◇	A1 - C1	(S7 UP PL1)
(P20 - T)	A1 - b6	◇	A1 - A4	(S2 PL2)
(P20 - U)	A1 - c1	◇	A1 - L2	(START 2 LED)
(P20 - V)	A1 - c2	◇	A1 - G5	(AUX 1)
(P20 - Y)	A1 - c5	◇	A1 - R3	(+5 VOLT REG.)
(P20 - Z)	A1 - c6	◇	A1 - S3	(5V, 10.6V RET.)
(CRV FLAG)	A1 - L6	◇	A1 - N6	(SIGNAL GND)
(RED)	A1 - M1	◇	P18 - 9	
(GREEN)	A1 - M2	◇	P18 - 10	
(BLUE)	A1 - M3	◇	P18 - 12	
(COMP SYNC, COMP VID)	A1 - M6	◇	P18 - 11	
(VIDEO RET.)	A1 - N1	◇	P18 - 13	
(+5 VOLT REG.)	A1 - R4	◇	P18 - 2	
(+5 VOLT REG.)	A1 - R5	◇	P18 - B	
(5V, 10.6V RET.)	A1 - S4	◇	P18 - 1	
(5V, 10.6V RET.)	A1 - S5	◇	P18 - A	

THE END