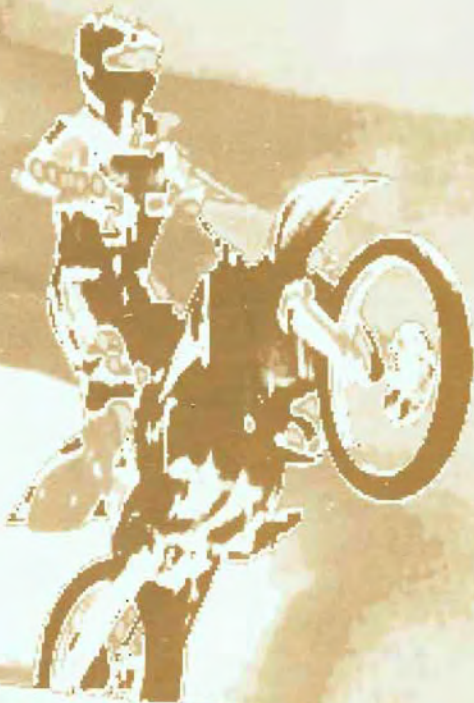




# MOTO *Frenzy*™

**Mini-  
Deluxe**



## **Operator's Manual**

*with Schematics*

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If reading through this manual does not lead to solving your game maintenance or repair problem, call TELE-HELP® at one of these Atari Games Customer Service offices:

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California Customer Service Office  
737 Sycamore Drive  
Milpitas, CA 95035

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Tipperary Town, Ireland

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# MOTO<sup>TM</sup> *Frenzy*

*Mini-Deluxe*



**Operator's Manual**

with Schematics



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*Use of non-Atari parts or modifications of any Atari game circuitry may adversely affect the safety of your game, and may cause injury to you and your players.*

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## NOTE

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- All ground wires in the game are properly connected as shown in the game wiring diagram.
- The power cord is properly plugged into a grounded three-wire outlet.
- On games provided with an Electromagnetic Interference (EMI) ground plane, be sure that the game printed-circuit boards (PCBs) are properly installed on the EMI ground plane and that the end board is securely installed with **all** screws in place and tightened.

If you are still unable to solve the interference problem, please contact Customer Service at Atari Games Corporation. See the inside front cover of this manual for service in your area.

## S A F E T Y   S U M M A R Y

*The following safety precautions apply to all game operators and service personnel. Specific warnings and cautions will be found in this manual whenever they apply.*

### WARNING

**Properly Ground the Game.** Players may receive an electrical shock if this game is not properly grounded! To avoid electrical shock, do not plug in the game until it has been inspected and properly grounded. This game should only be plugged into a grounded three-wire outlet. If you have only a two-wire outlet, we recommend you hire a licensed electrician to install a three-wire grounded outlet. If the control panel is not properly grounded, players may receive an electrical shock! After servicing any part on the control panel, check that the grounding wire is firmly secured to the control panel. After you have checked this, lock up the game.

**AC Power Connection.** Before you plug in the game, be sure that the game's power supply can accept the AC line voltage in your location. The line voltage requirements are listed in the first chapter of this manual.

**Disconnect Power During Repairs.** To avoid electrical shock, disconnect the game from the AC power before removing or repairing any part of the game. If you remove or repair the video display, be very careful to avoid electrical shock. High voltages continue to exist even after power is disconnected in the display circuitry and the cathode-ray tube (CRT). Do not touch the internal parts of the display with your hands or with metal objects! Always discharge the high voltage from the CRT before servicing it. Do this after you disconnect it from the power source. First, attach one end of a large, well-insulated, 18-gauge jumper wire to ground. Then momentarily touch the free end of the grounded jumper wire to the CRT anode by sliding the wire under the anode cap. Wait two minutes and do this again.

**Use Only Atari Parts.** To maintain the safety of your Atari game, use only Atari parts when you repair it. Using non-Atari parts or modifying the game circuitry

may be dangerous, and could injure you and your players.

**Handle the CRT With Care.** If you drop the CRT and it breaks, it may implode! Shattered glass from the implosion can fly six feet or more.

**Use the Proper Fuses.** To avoid electrical shock, use replacement fuses which are specified in the parts list for this game. Replacement fuses must match those replaced in fuse type, voltage rating, and current rating. In addition, the fuse cover must be in place during game operation.

### CAUTION

**Properly Attach All Connectors.** Make sure that the connectors on each printed circuit board (PCB) are properly plugged in. The connectors are keyed to fit only one way. If they do not slip on easily, do not force them. If you reverse a connector, it may damage your game and void your warranty.

**Ensure the Proper AC Line Frequency.** Video games manufactured for operation on 60 Hz line power (used in the United States) must not be operated in countries with 50 Hz line power (used in Europe). If a 60 Hz machine operates on 50 Hz line power, the fluorescent line ballast transformer will overheat and cause a potential fire hazard. Check the product identification label on your machine for the line frequency required.

### ABOUT NOTES, CAUTIONS, AND WARNINGS

In Atari publications, notes, cautions and warnings have the following meaning:

**NOTE** — A highlighted piece of information.

**CAUTION** — Equipment and/or parts can be damaged or destroyed if instructions are not followed. You will void the warranty on Atari printed-circuit boards, parts thereon, and video displays if equipment or parts are damaged or destroyed due to failure of following instructions.

**WARNING** — Players and/or technicians can be killed or injured if instructions are not followed.

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**N O T E S**



## CHAPTER 1

# Set-Up



### How to Use This Manual

**T**HIS MANUAL IS written for operators and service personnel. It provides information for setting up, playing, testing, and maintaining your Moto Frenzy™ Mini-Deluxe game. Moto Frenzy in the Mini-Deluxe cabinet is a one- or two-player off-road motorcycle racing game with realistic controls and digitized video. The game provides photographically real views of off-road courses in Los Angeles, Maui, Utah, Las Vegas, Kenya, and Norway. ♦ To maximize earnings, you can link two Mini-Deluxe cabinets together so that as many as four players can compete head-to-head. To do so, a separate link kit is available from your authorized Atari distributor for a nominal fee. ♦ Chapter 1 of this manual contains set-up and game play information. ♦ Chapter

2 contains a description of the self-test procedures. The self-test is important in the Moto Frenzy game. You can troubleshoot the PC boards, main circuits, and controls using the screens in the self-test. You should regularly test the boards and controls with the self-test to keep your game in peak condition and at top earnings. ♦ Chapter 3 contains several troubleshooting tables, plus complete maintenance and repair procedures for the game components. If you have problems with your game, use this chapter to troubleshoot and to repair it. Be sure to perform the preven-

tive maintenance tasks to keep your game in good condition. ♦ Chapter 4 contains the illustrations and PCB parts lists. ♦ Chapter 5 contains the schematics for all the PCBs and all the wiring diagrams.



## Operating the Game

To operate your game for maximum income, you should regularly run the self-test and check the controls with the Control Test and Sound Test in the self-test. By using the self-test regularly, you can find and fix problems immediately. This lets you keep your game in top condition.

## Inspecting the Game

### WARNING

*To avoid electrical shock, do not plug in the cabinet until it has been properly inspected and set up for the line voltage in your area.*

This cabinet should be connected to a grounded three-wire outlet only. If you have only two-wire outlets, we recommend that you hire a licensed electrician to install grounded outlets. Players can receive an electrical shock if the cabinet is not properly grounded.

Make note of the power consumption when you set up this game, so that you do not overload your electrical circuit. See Table 1-1 for the power consumption and the other important specifications of this game.

Inspect your Moto Frenzy Mini-Deluxe game carefully to ensure that the game is complete and was delivered to you in good condition.

Inspect the cabinet and seat as follows:

1. Examine the exterior of the cabinet for dents, chips, or broken parts.
2. Open the lower rear access panel. Unlock and open the coin door. Inspect the interior of the cabinet as follows:
  - a. Check that all plug-in connectors on the cabinet harnesses are firmly plugged in. Do not force connectors together. The connectors are keyed so they fit only in the proper orientation. A reversed connector can damage a printed-circuit board (PCB). This will void your warranty.
  - b. Ensure that all plug-in integrated circuits on each PCB are firmly plugged into their sockets.
  - c. Inspect the power cord for any cuts or dents in the insulation.
  - d. Inspect the power supply. Make sure that the correct fuses are installed. Check that the har-

Characteristic	Specification
<b>Input Current</b>	2.6 Amps at 120 V
<b>Line Fuse Rating</b>	3.0 Amps at 250 V, slow blow
<b>Line Voltage</b>	102 to 132 VAC
<b>Temperature</b>	5° to 38° C (37° to 100° F)
<b>Humidity</b>	Not to exceed 95% relative
<b>Width</b>	57 inches (142.5 cm)
<b>Length</b>	53 inches (132.5 cm)
<b>Height</b>	78.5 inches (196.3 cm)
<b>Weight</b>	630 lbs. (286 kg)

**Table 1-1 Game Specifications**

ness is plugged in correctly. Check that the green ground wires are connected.

- e. Inspect other sub-assemblies, such as the video display, controls, printed-circuit boards (PCBs), and speakers. Make sure that they are mounted securely and that the ground wires are connected.

## Control and Switch Locations

All of the controls are located on the back of the cabinet or behind the coin doors (see Figure 1-1). The following describes the locations in more detail:

### Power On/Off Switch

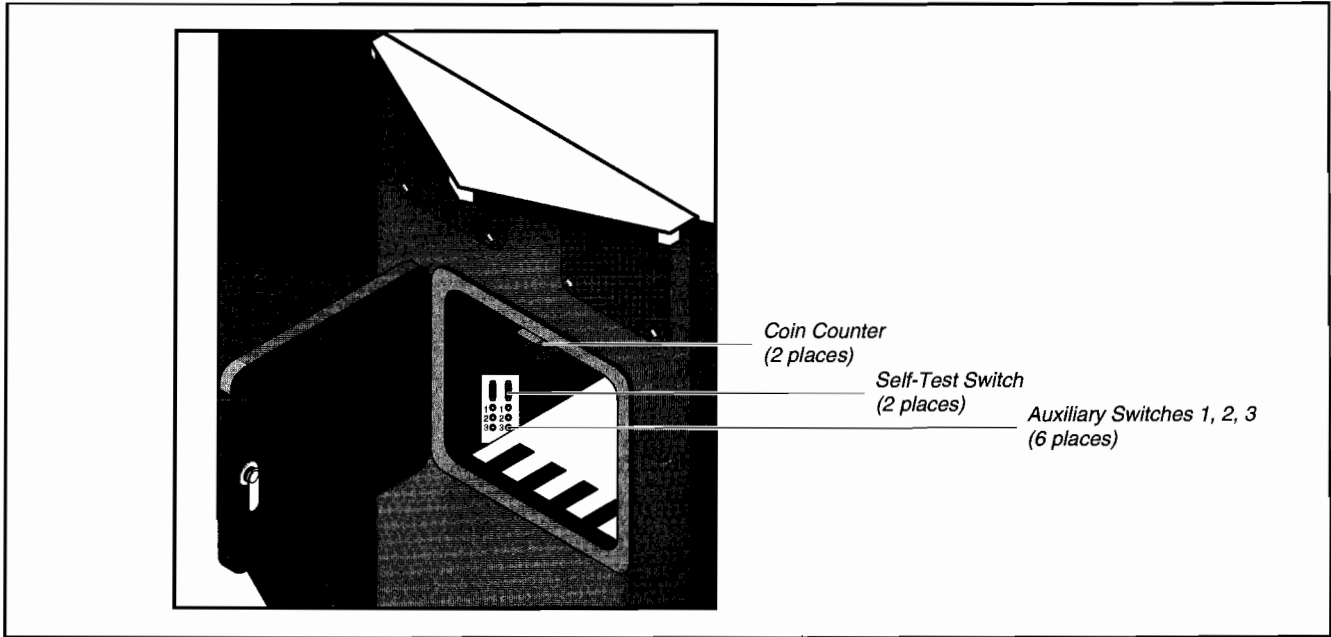
The power on/off switch is located on the bottom rear panel of the cabinet, below the rear access panel.

### Volume Control

There is no volume adjustment knob on this game's PCB. Instead, volume is adjusted in the self-test. Refer to Chapter 2 of this manual for more information.

### Self-Test Switch and Bracket

There are two self-test on/off switches, one for each display. Both switches are mounted on a bracket behind the coin door. Also mounted on each bracket are six auxiliary self-test pushbuttons, three for each display. The top, middle, and bottom buttons are referred to in the self-test as AUX1, AUX2, and AUX3, respectively.



**Figure 1-1 Main Control and Switch Locations**

Although there are two additional self-test switches located on the audio PCB of each game, it is recommended that you use the coin door self-test switches.

### **Coin Counter**

The coin counters are located to the right and left of the coin box, inside the coin door.

## **Installing the Attraction Signs**

Each Moto Frenzy Mini-Deluxe game includes two large cardboard attraction signs to promote the game. You can hang both signs back-to-back, from the ceiling, so that the graphics are visible from the back and front of the game. Alternatively, you can hang one sign above the game and the other one in your store window.

Insert one end of each string into the hole in the sign, and tie it securely. Insert the two ceiling hooks into the T-bar of the suspended ceiling over the game. To prevent bowing (curving) of the sign, make sure you stretch the strings outward towards the ceiling — beyond the left and right edge of the sign. Do *not* hang the sign with the strings oriented vertically.

## **Setting the Coin and Game Options**

The Moto Frenzy Deluxe coin and game options are set in the self-test. Refer to Chapter 2 for the recommended settings and the procedure for setting the options.

## **Game Play**

This section describes the features and play of the Moto Frenzy Mini-Deluxe game.

### **Introduction**

Atari Games' Moto Frenzy™ Mini-Deluxe is a one- or two-player sit-down game featuring high speed, off-road motorcycle racing and shooting action. Each track has challenging obstacles such as rivers to cross, trees, rocks and the cheering crowd to avoid or blast out of the way. The realistic handlebar controls, with a vibrating twist-grip throttle, and the “rump-thump” add to the excitement.

### **Game Play**

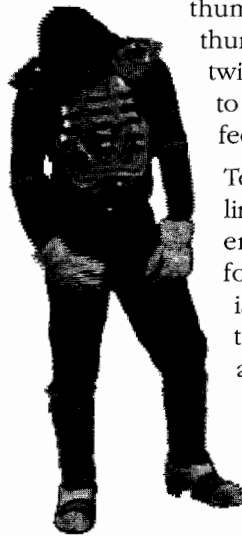
To ensure a long earnings life, there are six different player-selectable tracks, each with unique obstacles:

The Los Angeles indoor arena has “big foot” trucks that get in your way; Maui has lava flows and thunder-

storms; Utah's challenging track features huge buffalo and steep cliffs; the desert race in Las Vegas is made more difficult with raging twisters; monkeys try to knock you off your bike in Kenya; and polar bears attack you in the Norwegian race.

The race is a timed lap format with extended play for lap completion, bonuses for special stunts, and flashing targets to shoot for turbo speed. Initial race time and bonus times are operator selectable to adjust game difficulty.

Competition between players is maximized with Atari's "rump-thump" feature. When a player is "shot" by another motorcycle rider or "explodes", a solenoid



thumper is activated, giving a tactile thump under the fiberglass seat. The twist-grip throttle control also vibrates to give players a realistic motorcycle feel.

To maximize earnings, operators can link two units together for four-player, head-to-head competition. With four players in the race, if one player is able to finish the lap within the time allowed, all players will be awarded extended time.

# Self-Test



## Introduction

**U**SE THE MOTO FRENZY™ Mini-Deluxe self-test to check the condition of the game circuitry and controls. You will see the self-test information on the video display and hear the sound test information through the speakers. You do not need any additional equipment to perform the self-test. Perform the self-

test when you first set up the game, each time you collect the money, or when you suspect game problems. This



chapter shows the screens in the self-test and explains each of the tests. The screens and explanations are arranged in the order they appear in the self-test. Table 2-1 lists

all the self-test screens.

# Entering and Exiting the Self-Test

Both of the games' self-test switches are conveniently located behind the coin door. (There is one self-test switch for each display). To enter the self-test mode, turn on the self-test switch. Doing so displays the Select Test menu (entitled "Self Test"); see Figure 2-1. Exit the self-test by turning off the self-test switch at any time.

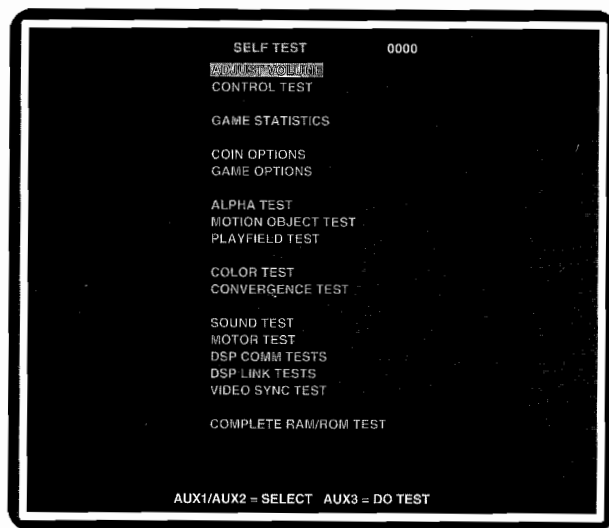
Self Test (Select Test Menu)
Adjust Volume
Control Test
Game Statistics
Coin Options
Game Options
Alpha(numeric) Test
Motion Objects Test
Motion Object ROM Checksums
MOB Priority Test
MOB Full Screen Test
MOB Picture/Position/Size Test
Playfield Test
Color Test
First Color Test (red, green, blue, white)
Second Color Test (yellow, cyan, magenta, white)
Red Color Purity
Green Color Purity
Blue Color Purity
White Color Purity
Grey Color Purity
Convergence Test
White Convergence
Violet Convergence
Blue Convergence
Yellow Convergence
Sound Test
Common RAM Test
DSP Comm(unication) Tests
DSP Link Tests
Video Sync Test
Complete RAM/ROM Test

**Table 2-1 Summary of All Self-Test Screens**

Almost all the tests are done by pressing one or more of the three auxiliary self-test buttons. These pushbuttons are mounted on a test bracket inside the coin door. The self-test screens refer to AUX1, AUX2, and AUX3, which are the top, middle, and bottom buttons, respectively.

## Select Test Menu

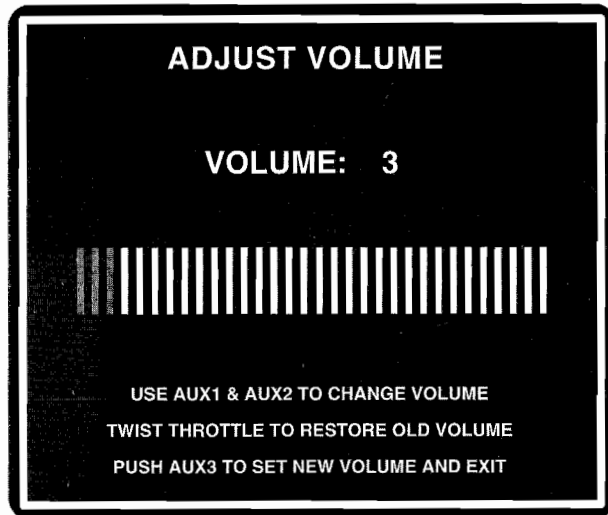
Choose which test or screen you want to see from this menu, shown in Figure 2-1. Move up and down the menu by pressing the AUX1 or AUX2 button. Start the selected test by pressing the AUX3 button.



**Figure 2-1 Select Test Menu Screen**

## Adjust Volume

Adjust the volume of the game using this screen, shown in Figure 2-2. Follow the instructions at the bottom of the screen to change the volume, to restore the old volume level, and to save the new volume and return to the select test menu. (The default volume setting is 11.)



**Figure 2-2 Adjust Volume Screen**

## Control Test

### NOTE

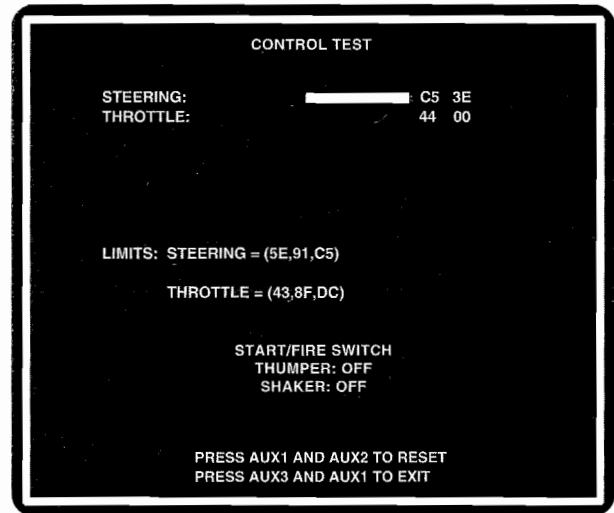
*The coin switches are checked in the Sound test. See the section that follows later in this chapter.*

The control test screen is shown in Figure 2-3. This test checks all the pushbutton switches, the steering and throttle potentiometers, the thumper and the shaker. As you use each control, the green bars for the pots lengthen, or the switch names are highlighted in blue. (Remember to check the right and left player controls.) If the changes do not appear on the screen, check the controls and their wiring. Follow this procedure:

1. Simultaneously press the AUX1 and AUX2 buttons to reset the pots for the steering and throttle controls. Then twist the throttle to set the maximum, then release it to set the minimum. Make sure that the green throttle bar corresponds to the changes.
2. Now turn the handlebar control fully left and right to set the left and right limits. Make sure that the green steering bar corresponds to the changes.

Check the three numbers displayed in parentheses in the middle of the screen, after the words *LIMITS: STEERING*. The left number should be less than 70, the right number should be greater than A0, and the middle number should be green. If it is blue, this indicates an error (an out-of-range number).

3. Press the start/fire button on the left handlebar. Make sure that the *START/FIRE SWITCH* message is highlighted on the screen.



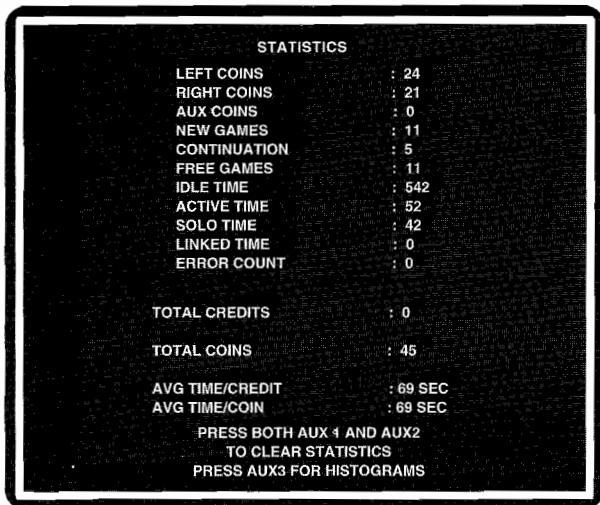
**Figure 2-3 Control Test Screen**

4. Press the start/fire button on the left handlebar to test the thumper. The thumper will thump once each time the start/fire button is pressed. As the thumper is activated, the *THUMPER: OFF* message will change to *THUMPER: ON*.
5. Hold down the start/fire button on the left handlebar and turn the throttle fully to test the shaker. The shaker will shake when the throttle is held in the full position. As the shaker is activated, the *SHAKER: OFF* message will change to *SHAKER: ON*. Simultaneously press the AUX1 and AUX3 buttons to return to the select test menu.

## Game Statistics

Use the information shown in the statistics and histogram (bar graph) screens to keep track of your game use and maximize your profits. Record the information on the Moto Frenzy Mini-Deluxe statistics page in the back of this manual. The first of the screens is shown in Figure 2-4. (Make several extra copies of this form before writing on it!)

The game statistics are collected from the last time the statistics were cleared. Follow the instructions at the bottom of the screen to clear the statistics, to advance to the next statistics or histogram screen, or to go back to the select test menu.



**Figure 2-4 Game Statistics Screen**

### Statistics Screen

The statistics screen lists the following information:

- Left Coins shows the number of coins counted in the left coin mechanism.
- Right Coins shows the number of coins counted in the right coin mechanism.
- Aux Coins shows the number of coins counted on the auxiliary service coin inputs.
- New Games shows the number of unique games played. A unique game is counted every time a player starts a new game (not a continued game).
- Continuation shows the number of games that players continued.
- Free Games shows the number of games of free play.
- Idle Time shows the number of minutes that the game was idle.
- Active Time shows the number of minutes that the game was played.
- Solo Time shows the number of minutes that the game was played in solo mode (one or two Moto Frenzy Mini-Deluxe cabinets).
- Linked Time show the number of minutes that the game was played while linked with another Moto Frenzy Mini-Deluxe cabinet, or two players linked in the same cabinet.
- Error Count shows the number of errors counted in the erasable memory. If you have an error count, the statistics may be wrong. If you consistently have errors counted for several weeks, replace the EEROM at 13C on the Moto Frenzy game PCB.

- Total Credits shows the number of credits accumulated by the game.
- Total Coins shows the number of coin accumulated by the game in all coin slots.
- Average Time per Credit and per Coin are displayed in seconds. These items are tabulated for all games played since the statistics were cleared. If there are no credits, these lines will not be displayed.

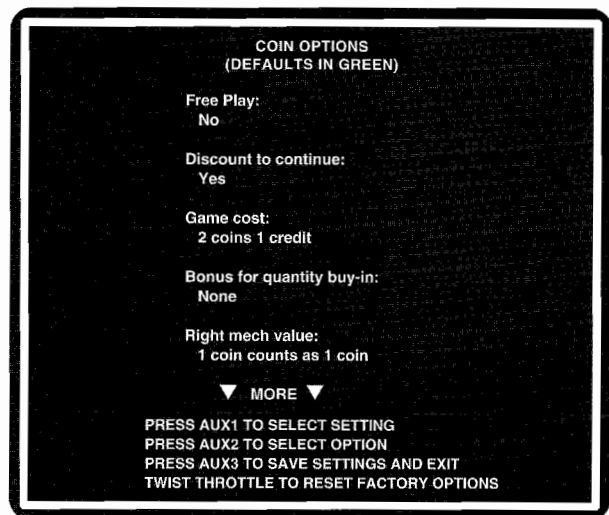
### Histograms 1-6

The next screens are six histograms (horizontal bar graphs) showing game times in seconds for the Los Angeles, Maui, Utah, Las Vegas, Kenya, and Norway tracks. All these screens show the number of games played, grouped in 30-second increments.

The bottom of each screen shows the total games played on that track and the median game time for that track. The median value means half the games were above that value and half below.

## Coin Options

Check and select the coin options on this screen, shown in Figure 2-5. The screen shows the factory default settings in green.



**Figure 2-5 Coin Options Screen**

To move through the options, to change or save the settings, or to return to the select test menu, follow the instructions shown at the bottom of the screen. The coin option settings, with defaults, are shown and explained in Table 2-2.



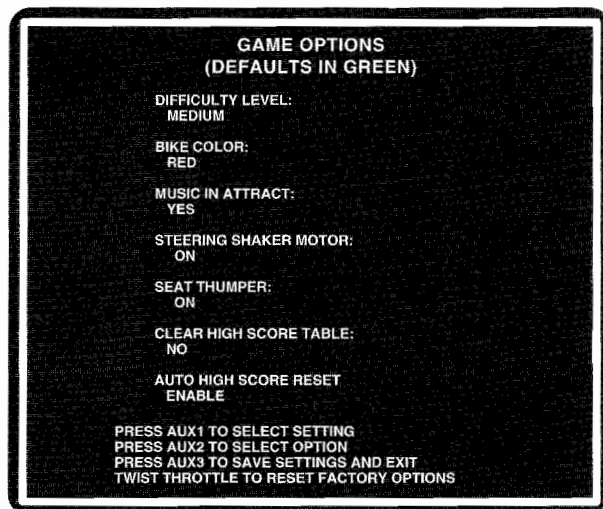
Option	Available Settings	Explanation
<b>Free Play</b>	No ✓ Yes	Lets you choose free play to demonstrate the game.
<b>Discount to Continue</b>	No ✓ Yes	If set to Yes, this option reduces by 50% the player's cost to continue a game (always rounded up to the next full coin).
<b>Game Cost</b>	1 coin 1 credit 2 coins 1 credit ✓ ... 8 coins 1 credit	The number of coins required for one credit.
<b>Bonus for Quantity Buy-in</b>	None ✓ 2 coins give 1 3 coins give 1 3 coins give 2 4 coins give 1 ... 9 coins give 2 9 coins give 3	Lets you choose from various kinds of bonuses or no bonus.
<b>Right Mech Value</b>	1 coin counts as 1 coin ✓ 1 coin counts as 2 coins ... 1 coin counts as 7 coins 1 coin counts as 8 coins	The number of coins each coin counts as in the right coin mechanism.
<b>Left Mech Value</b>	1 coin counts as 1 coin ✓ 1 coin counts as 2 coins ... 1 coin counts as 7 coins 1 coin counts as 8 coins	The number of coins each coin counts as in the left coin mechanism.

✓ *Manufacturer's recommended settings*

**Table 2-2 Coin Option Settings**

## Game Options

Check and select the game options on this screen, shown in Figure 2-6. The screen shows the factory default settings in green.



**Figure 2-6 Game Options Screen**

To move through the options, to change or save the settings, or to return to the select test menu, follow the instructions shown at the bottom of the screen. The game options, with defaults, are shown and explained in Table 2-3.

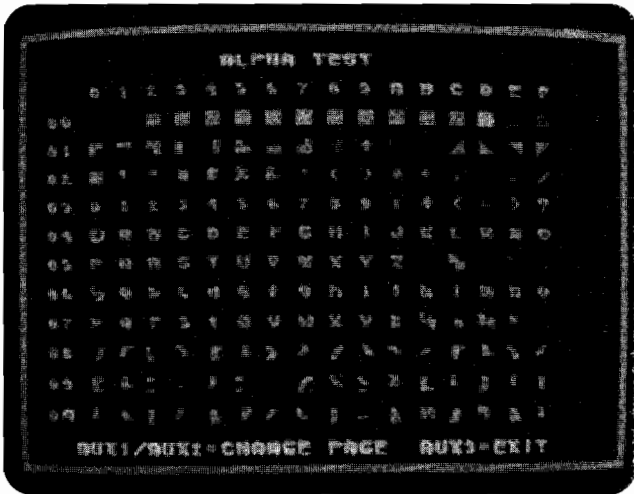
## Alpha Test

The alphanumeric test, shown in Figure 2-7, checks the condition of the alphanumerics in the game. If you see an error in the alphanumerics or graphics on the screen, check the EPROM at 13N on the Moto Frenzy game PCB. To page (scroll) the screen up and down, or to return to the select test menu, follow the instructions shown at the bottom of the screen.

Option	Available Settings	Explanation
<b>Difficulty Level</b>	Easiest Easier Easy Medium ✓ Med. Hard Hard Harder Hardest	Sets the game difficulty. The left and right sides must be set to the same difficulty level.
<b>Bike Color</b>	Red-Right/Blue-Left ✓  Green-Right/Orange-Left	Red/Blue are the default colors of the players' motorcycles on the screen. If you link two games together, set this option to Green/Orange on the second linked game. Also, regardless of whether you link two games, make sure that the left and right sides in the same cabinet are set to the same Bike Color setting.
<b>Music in Attract (Mode)</b>	Yes ✓ No	Lets you turn the sound on or off in the attract mode.
<b>Clear High Score Table</b>	Yes No ✓	Clears the high score table the next time you select the game mode.
<b>Auto High Score Reset</b>	Enable ✓ Disable	Automatically clears the high score table periodically.

✓ *Manufacturer's recommended settings*

**Table 2-3 Game Option Settings**



**Figure 2-7 Alphanumeric Test Screen**

## Motion Object Test

### Motion Object ROM Checksums

The first motion object test screen, shown in Figure 2-8, examines the checksums of the motion object ROMs. If the checksums match, *TEST PASSED* is displayed. If the checksums do not match, either you have a defective EPROM/ROM or a chip may be installed incorrectly.

### MOB Priority Test

The second motion object test screen shows eight vertical bars that are cut off by horizontal bars, forming a stairstep from top left to bottom right. Only the green

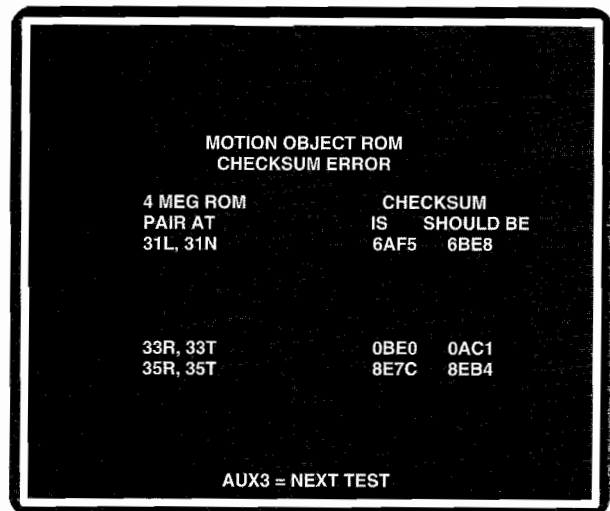
bar on the far right should extend the full vertical height of the screen. Any other display would indicate a priority failure.

### MOB Full Screen Test

The third motion object test screen shows two squares; one grows to full-screen size, while the other shrinks. Use the throttle to control the rate of growth of these squares. Make sure the growth is smooth; any tearing of lines or pixels and/or inconsistent colors indicate a problem with the motion object circuitry.

### MOB Picture/Position/Size Test

This test is intended to be used *only* by Atari Games technicians to troubleshoot a faulty board.



**Figure 2-8 Motion Object Test Screen**

## Playfield Test

The playfield test screen, shown in Figure 2-9, tests the movement of the playfield.

To scroll the playfield continuously in a horizontal direction, move the handlebar to the right or left. To scroll the picture vertically, also hold down the start/fire button. Make sure that the playfield screen is clean and scrolls smoothly across the screen.



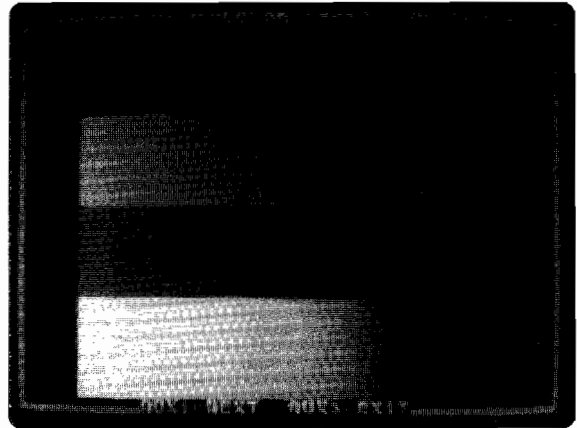
**Figure 2-9 Playfield Test Screen**

## Color Test

This test has seven screens, the first of which is shown in Figure 2-10. Advance to each screen by pressing the AUX1 button.

- The first color test indicates the dynamic range of the video display color circuit. The screen should show four bands (red, green, blue, and white, from top to bottom), ranging from bright to dark, left to right. The red, green, and blue bands are produced by only one color gun being turned on in each band. At the bottom is a white band, in which all three color guns are turned on.
- The second color test shows the same as the first color test, but with two color guns being turned on in three bands — a yellow band (red and green guns), cyan band (blue and green guns), and magenta or purple band (blue and red guns). At the bottom is a white band.
- The remaining five screens are color purity tests. The rectangles of color shown are red, green, blue, white, and grey.

Each screen should display a straight rectangle of color, with no curving at the corners, no unevenness of color, and no lines in the display.

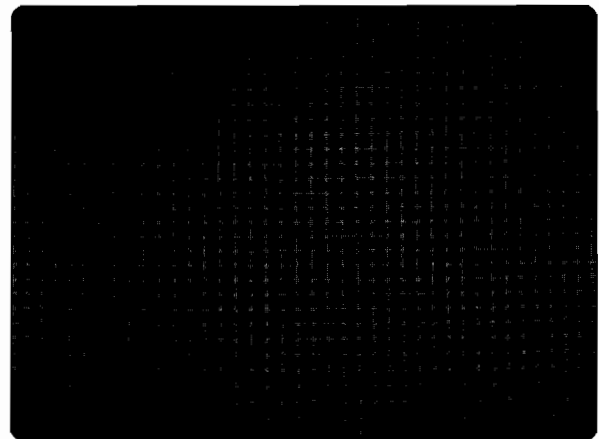


**Figure 2-10 Color Test Screen**

If any of these screens are not correct, adjust the video display as described in the video display manual. Return to the select test menu by pressing AUX3.

## Convergence Test

The convergence test has four screens — white, violet, blue, and yellow backgrounds with white grid lines. The white screen is shown in Figure 2-11. To see the remaining screens, press the AUX1 button. Press the AUX3 button to go to the select test menu.



**Figure 2-11 Convergence Test Screen**

Check the following on the screens:

- The grid lines should be straight within 3.0 mm and the lines should not pincushion or barrel.
- The convergence of the lines on the violet and black screens should be within 2.0 mm.

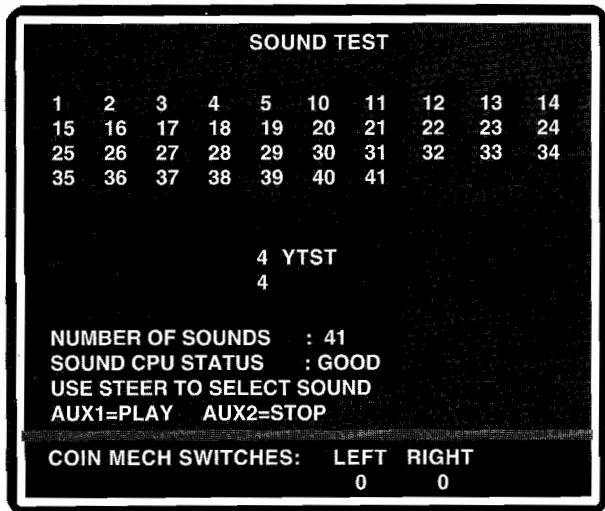
If these screens do not meet these criteria, adjust the video display as described in the video display manual.

# Sound Test

The sound test indicates the condition of the sound effects circuit on the game PCB. The sound test screen appears in Figure 2-12.

**NOTE**

*The Audio PCB must be installed and connected in the game to perform this test.*



**Figure 2-12 Sound Test Screen**

To select a sound, to play a sound, or to return to the select test menu, follow the instructions shown at the bottom of the screen. (You can have numerous sounds playing simultaneously, or you can have silence, depending on which ones you select.)

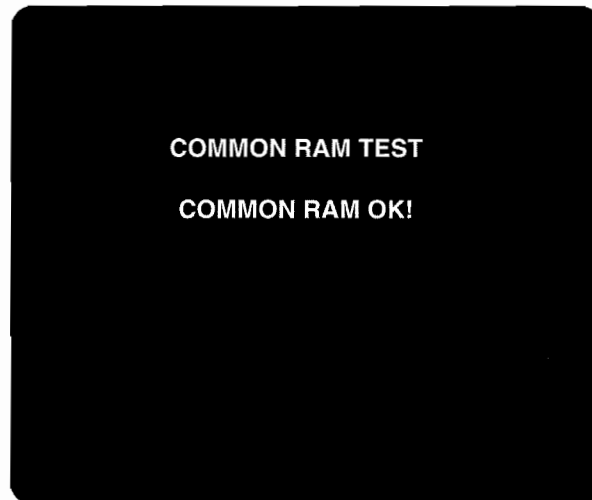
Verify that the Sound CPU status is good. Also press the left and right coin mechanism switches: the 0 on the screen should change to a 1 while you press the corresponding switch.

# Comm (Common) RAM Test

Use this selection screen, shown in Figure 2-13, to see if the common RAM is OK. This test is automatically run when you switch to game mode.

When the test runs successfully, you see the message *COMMON RAM OK!* If the RAM is bad, the message *COMMON RAM ERROR* is displayed and you must replace the Common RAM board.

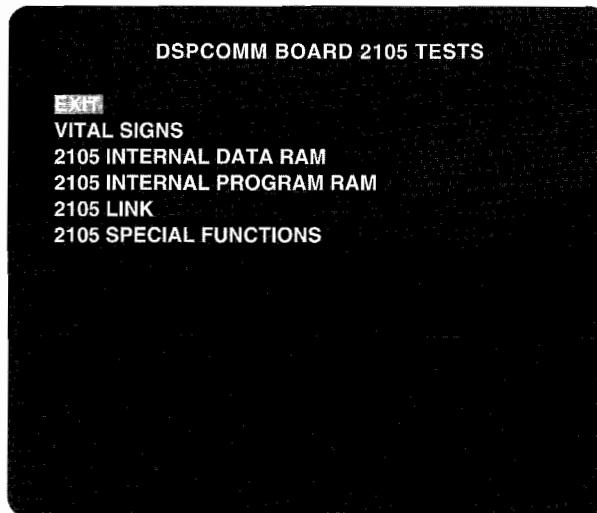
Press the START button to exit.



**Figure 2-13 RAM Test Screen**

# DSP Comm Tests

The tests under this main screen item check the local communications of the game (see Figure 2-14). Press the AUX1 or AUX2 buttons to select one of the tests, and press AUX3 to do the selected test. The 2105 special functions are intended to be used *only* by Atari Games technicians to troubleshoot a faulty link board.



**Figure 2-14 DSP Comm Tests Screen**

After you do each of the tests, you should see *OK* displayed on the screen. In the Vital Signs test, however, you should see the messages *It's Alive* and *Interface*

OK. If any test fails, contact the Atari Games Customer Service office closest to you for help.

## DSP Link Tests

The tests under this main screen item check the link between two Moto Frenzy Mini-Deluxe games (see Figure 2-15). All of these tests (except for the cable test) are intended to be used *only* by Atari Games technicians.

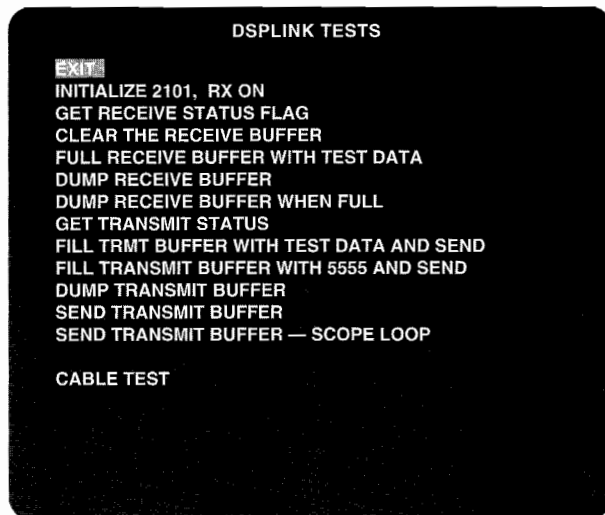


Figure 2-15 DSP Link Tests Screen

To use the cable test, set one game to “Echo” and the other game to one of the “Originate” settings. The screen will show hexadecimal numbers transmitted by the originating game and what data it received back. Then reverse the settings of the games: change the game that was echoing to be the one originating, and vice versa.

### NOTE

*A link problem can remain hidden and unsolved if you do not check the link in **both** directions.*

If incorrect data is received in any of these cable tests, the failure will appear in a color other than green. You may have a problem with the cable, plug, harnesses, or connectors.

## Video Sync Test

This test is useful only if you have linked two Moto Frenzy Mini-Deluxe games together. The video sync test (see Figure 2-16) checks that both games are synchronized. Make sure that both linked games are displaying this test; then check the positions of the red/blue and green/orange blocks on the screens. They should not drift from the correct positions, which are shown in Figure 2-16.

If the blocks on one screen are not in the same position as on the other screen or the blocks are drifting, you could have two causes for this problem. The CLARN PCB could be bad, or the link harness or related connectors on it could be defective.

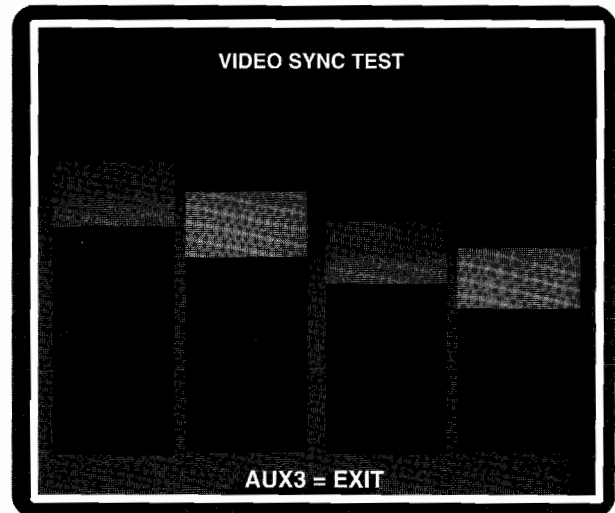


Figure 2-16 Video Sync Test

## Complete RAM/ROM Test

When you turn on the power, the game automatically runs through the random-access memory (RAM) and read-only memory (ROM) test. This test is not part of the self-test procedure. Regardless of whether or not the game has a problem, it will always advance to the attract mode. The game will stop only if you power it up and the self-test switch has been previously turned on.

### Game RAM Test

No message appears while the test is checking the RAMs. If more than 30 seconds elapse and the self-test

menu doesn't appear, the game has a problem. The two RAMs in this game are located at 13E and 13E/F on the Moto Frenzy game PCB; either of them could be bad.

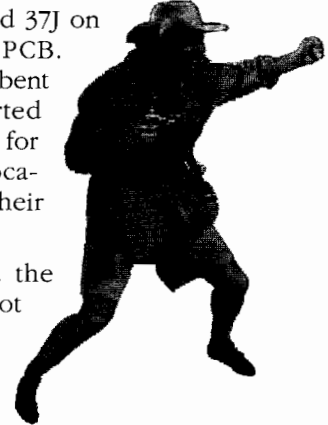
If the test finds no RAM errors, no message appears and the program goes to the ROM test after 15–20 seconds.

### Game ROM Test

If the test finds no ROM errors, no message appears and the program goes to the title screen in the attract mode. If a ROM fails, a message may be displayed. However, the program may be unable to show the location of the failed ROM — you may only see six zeroes where there should be a chip location. The ROM error test takes a few seconds.

If you think you have a ROM error, but the screen shows no messages, check the ROMs at 23E, 23J, 37E, and 37J on the Moto Frenzy game PCB. Check these locations for bent pins or incorrectly inserted chips. Also see Table 3-2 for information about the locations of the ROMs and their functions.

Depending on how bad the ROM error is, you may not be able to enter the self-test.



# Troubleshooting and Maintenance



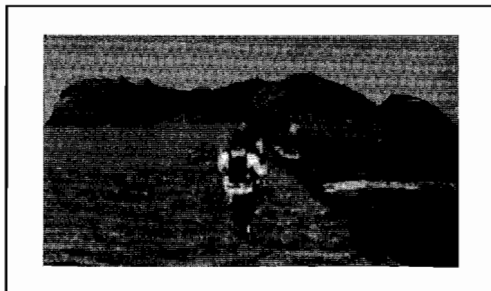
## Introduction

**T**HIS CHAPTER contains maintenance, troubleshooting and repair procedures for your Moto Frenzy™

Mini-Deluxe game. The maintenance section gives information on cleaning the parts. The troubleshooting section contains several tables to help determine the

source of a problem and the steps necessary to repair it. The repair section contains the steps necessary to remove and install the ser-

viceable parts. Together, these three sections provide a complete guide to servicing your Moto Frenzy™ Mini-Deluxe game.



# Maintenance Procedures

## Introduction

This section describes the maintenance procedures for all of the major assemblies and components of the game. The maintenance procedures should be performed every 3–4 months on a regular basis.

### WARNING

*Before performing any maintenance, please observe all of the following safety precautions:*

1. Turn the game's power off.
2. Unplug the power cord from the electrical socket.
3. Secure loose clothing such as ties and long sleeves that could get caught within the game.
4. Remove all metal jewelry such as watches and necklaces that could conduct electricity from the game's power sources.

## Cleaning Procedure for Coin Mechanisms

Regular use of the coin mechanisms may result in a build-up of residue and dirt. If this is the case, clean the coin mechanism by following the steps below (refer to Figure 4-5 and Figure 4-6 for detailed part information on the coin door).

1. Open the upper coin door.
2. Open the gate on the door that covers the magnet. Use the blade of a screwdriver to scrape away any metal filings that have collected on the magnet.
3. Clean the loose dust and dirt from the coin mechanism with a lint-free rag or a soft brush.
4. Clean the dirt and residue from the coin path with a toothbrush. Hot, soapy water may be used to help dissolve dirt and residue.
5. Blow out all the loose dirt and dry the coin mechanism with compressed air.
6. Close the gate on the door that covers the magnet and close the upper coin door.

### CAUTION

*Never lubricate the coin mechanism with oil or grease.*

# Troubleshooting Procedures

This section is designed to help determine the source of a malfunction and detailed information on repairing the problem.

*Table 3-1 General Troubleshooting*, is divided into two columns. The left-hand column is broken down into the general nature of problems. The right-hand column lists suggested solutions to solve the problem.

*Table 3-2 ROMs and RAMs Troubleshooting*, is designed to help determine the specific ROMs and RAMs that are the source of a game logic malfunction. The left-hand column shows some problems that may result from malfunctioning ROMs and RAMs. The middle column shows the ROMs and RAMs that may be the source of the problem and their purposes. The right-hand column shows the PCB locations of the ROMs and RAMs that may be causing the problem.

*Table 3-3 Voltage Inputs and Test Points*, is divided into three columns. The left-hand column shows the correct voltages that should be measured. The middle column shows the physical locations of the test points or LEDs. The right-hand column shows the sources and purposes of the voltages.

# Repair Procedures

## Introduction

This section describes the repair procedures for all of the major assemblies and components of the game. Before performing any repairs, use the tables in the *Troubleshooting Procedures* section to help narrow the source of the problem. The *Maintenance Procedures* section may also provide a good starting point for fixing many game problems before beginning what might be unnecessary repairs.



**WARNING**

*Before performing any repairs, please observe all of the following safety precautions:*

1. Turn the game's power off.
2. Unplug the power cord from the electrical socket.
3. Remove loose clothing such as ties that could get caught within the game.
4. Remove all metal jewelry such as watches and necklaces that could conduct electricity from the game's power sources.

**Attraction Assemblies****Attraction Light**

The 15 watt, 18" fluorescent attraction light lights the attraction panel. Replace the light by following the removal and installation steps below.

1. Unfasten the 13 square drive screws that secure the light housing assembly (refer to Figure 4-1 and Figure 4-2.)
2. Unfasten 2 retaining clips that secure the light to the light fixture and remove the light.
3. Install the new fluorescent light by following the previous steps in the reverse order.

**Attraction Light Fixture**

The attraction light is responsible for providing power to the fluorescent light and holding it in place. Failure of the light fixture may result in poor or no light. If this is the case, replace the light fixture by following the removal and installation steps below.

1. Unfasten the 13 square drive screws that secure the light housing assembly.
2. Disconnect the wiring harness from the light fixture to the power supply.
3. Unfasten 2 retaining clips that secure the light to the light fixture and remove the light.
4. Remove the 2 screws that secure the light fixture to the cabinet and remove the light fixture.
5. Install the new light fixture by following the previous steps in the reverse order.

**Foot Rests**

Each foot rest consists of a metal peg covered by a rubber sleeve. The foot rests are responsible for providing sup-

port and traction for the rider during game play. Replace damaged foot rests by following the removal and installation steps below.

1. Cut the damaged rubber sleeves from the metal pegs.
2. Slide the new rubber sleeves over the metal pegs.

**Speakers**

Each game has four speakers, two for each player. The speakers provide the music and sounds for the game and self-tests. Failure of the speakers may result in distorted or no sound. If this is the case, replace the speakers by following the removal and installation steps below.

1. Unlock the rear access panels of the cabinet and remove them.
2. Disconnect the wires from the speakers using the rear access panels.
3. Unfasten the 4 square drive screws that secure each speaker grille to the front panel of the cabinet.
4. Unfasten the 4 screws that mount each speaker in the recess of the front panel of the cabinet.
5. Install the new speakers by following the previous steps in the reverse order.

**Start/Fire Button**

The start/fire button is used for starting game play and for firing the bike's gun during game play. Failure of the start/fire button will result in no response from either of its functions. If this is the case, follow the removal and installation steps (refer to Figure 4-3.)

1. Unfasten the 3 screws that secure the left-hand grip to the handlebars and remove the hand grip.
2. If the solder connections are broken or otherwise bad, resolder the start wires.
3. To replace the start switch:
  - a. Cut the start wires as close to the switch leads as possible. (Be sure to label the wires before disconnecting them.)
  - b. Unfasten the screw that secures the start switch to its housing.
  - c. Secure the new switch to the housing with the screw.
  - d. Resolder the start wires to the new switch.
  - e. Check the start switch in the Control Test of the self-test to make sure the new switch is working.
4. Re-install the hand grip with the 3 screws.

## Steering Assemblies

This section describes the removal and installation procedures for the various assemblies and components that provide the steering motion and control.

### Steering Potentiometer

The steering potentiometer (5K ohms) is responsible for measuring the turning motion of the handlebars and relaying the information to the PCBs for game play. Failure of the steering potentiometer will result in no response from the game's graphics to the steering control. In this case, replace the steering potentiometer by following the removal and installation steps below.

1. Disconnect the wires from the steering potentiometer leads.

---

### NOTE

*Before disconnecting the wires from the steering potentiometer leads, label the wires as to the position of the potentiometer leads. That way you can correctly reconnect the wires when installing the new potentiometer.*

2. Unfasten nut and washer that secure the steering potentiometer to the steering bracket.
3. Install the new steering potentiometer by following the previous steps in the reverse order.

## System Logic Assemblies

This section describes the repair and maintenance procedures for the major assemblies and components that are related to the system's logic and electronics, including the printed-circuit boards (PCBs) and the power supply. These components are housed in the bottom rear cabinet below the video display.

### Moto Frenzy Game PCB Set

The Moto Frenzy game PCB set is responsible for the display graphics and game play. Failure of the game PCB set may result in erratic or no game play. If this is the case, repair or replace the game PCB set by following the removal and installation steps below.

1. Unlock the rear access panel of the cabinet and remove it.
2. Disconnect the harness connectors from the game PCB set.
3. Unfasten the screw and spacer that secures the game PCB set to the cabinet. Remove the game PCB set and attached cover (refer to Figure 4-8.)

---

### CAUTION

*Before handling static-sensitive components, properly ground yourself to discharge buildup of static charges.*

4. Re-install the game PCB set by following the previous steps in the reverse order.

### Electronic Game Link

Each Moto Frenzy Mini-Deluxe game is linked internally. Electronic game link connector are available to electronically link two Moto Frenzy Mini-Deluxe game units together for four-person play. Damage to the electronic game link connector may cause the four-person play to function incorrectly or not at all. If this is the case, replace the electronic game link connector by following the removal and installation steps below.

1. Unlock the rear access panel of the cabinet and remove it.
2. Disconnect the external game link cable from the game link connector.
3. Remove the ground plane hat and disconnect the link connector from the CLARN PCB.
4. Unfasten the 4 screws that secure the game link plate to the cabinet and remove the game link connector and attached plate.
5. Install the new game link connector by following the previous steps in the reverse order.

### Power Supply

The power supply is responsible for providing power to all of the game assemblies that require it. Failure of the power supply may result in erratic game play or no power at all. If this is the case, repair or replace the power supply assembly by following the steps below.

1. Unlock the rear access panel of the cabinet and remove it.
2. Disconnect the wiring harnesses from the power supply.

---

### WARNING

*The power supply can contain high voltages even after the power is turned off. To avoid injury, observe all of the safety precautions before working on the power supply. (Refer to the Introduction in the Maintenance Procedures section.)*

---

3. Unfasten the 4 screws that secure the power supply assembly to the cabinet, and remove the power supply assembly.
4. Re-install the power supply assembly by following the previous steps in the reverse order.
4. Disconnect the wires from the throttle potentiometer, labeling the leads first, so you can correctly reconnect them later.
5. Install the new potentiometer by following the previous steps in the reverse order.

### **ROMs/RAMs**

The ROMs and RAMs contain the programming routines used by the game PCB set to control game play. Refer to *Table 3-2 ROMs and RAMs Troubleshooting*, in the *Troubleshooting Procedures* section to determine the ROMs or RAMs that are malfunctioning. Replace the damaged ROMs or RAMs by following the removal and installation steps below.

1. Remove the game PCB set according to the procedure in the *Moto Frenzy Game PCB Set* section.

### **CAUTION**

*Before handling static-sensitive components, properly ground yourself to discharge buildup of static charges.*

2. Remove the damaged ROMs and RAMs from the game PCB set using a chip extraction tool.
3. Install the new ROMs and RAMs by plugging them in the game PCB set sockets.
4. Re-install the game PCB set by following the steps in the *Moto Frenzy Game PCB Set* section in the reverse order.

## **Throttle Control**

### **Throttle Potentiometer**

The throttle potentiometer (5K ohms) is responsible for measuring the twisting motion of the throttle control and relaying the information to the drive motor to accelerate and decelerate the rolling pin. Failure of the throttle potentiometer will result in no response from the drive motor to the throttle control. If this is the case, replace the throttle potentiometer by following the removal and installation steps below.

1. Unfasten the 3 screws from the base of the throttle that secure it to the handlebars and remove the throttle control (refer to Figure 4-3.)
2. Loosen the retaining screw that secures the potentiometer to the throttle shaft until the potentiometer and the attached bracket slide easily from the throttle shaft.
3. Unfasten the nut and washer that secure the bracket to the potentiometer and remove the bracket from the potentiometer.

### **NOTE**

*The metal tab extending from the bracket should point away from the leads on the potentiometer when properly installed.*

### **Throttle Torsion Spring**

The throttle torsion spring is responsible for returning the throttle control to its center position. If the spring has stretched excessively or is broken, the throttle control will stay in the position the rider turns it to. This may result in decreased responsiveness in the rider's acceleration and deceleration control. If this is the case, replace the throttle torsion spring by following the removal and installation steps below.

1. Unfasten the 3 screws from the base of the throttle that secure it to the handlebars and remove the throttle control.
2. Unfasten the retaining screw that secures the potentiometer to the throttle shaft and remove the potentiometer and attached bracket from the throttle shaft.
3. Unfasten the retaining screw that secures the torsion spring to the throttle shaft.
4. Remove the plastic retaining washer and the torsion spring from the throttle shaft.
5. Install the new torsion spring on the throttle shaft:
  - a. Secure the straight end of the spring through the hole in angle bracket.
  - b. Holding the looped end of the torsion spring back with a slotted screwdriver or a pair of pliers, tighten the retaining screw to the throttle shaft.
  - c. Hook the looped end of the torsion spring over the retaining screw.

### **NOTE**

*Make sure that there is sufficient clearance between the end of the torsion spring retaining screw and the right angle bracket so that there is no interference with the throttle's operation. The cap of the retaining screw should be between the 2 throttle stops and should strike the stops in their centers when properly adjusted.*

Problem	Suggested Action
<b>Coin Mechanism Problem</b>	
	<ol style="list-style-type: none"> <li>1. Check the wiring connections to the coin mechanism.</li> <li>2. Check the voltage to the + side of the mechanism.</li> <li>3. Test the coin mechanism with the Sound Test screen in the self-test.</li> </ol>
<b>Throttle Control Problem</b>	
Throttle control is not responding	<ol style="list-style-type: none"> <li>1. Check the harnesses and connections to the throttle control.</li> <li>2. Check the throttle potentiometer.</li> </ol>
Throttle control does not return to closed	<ol style="list-style-type: none"> <li>1. Check the throttle return spring.</li> </ol>
<b>Steering Control</b>	
Handlebars do not return to center	<ol style="list-style-type: none"> <li>1. Check the lower tension spring.</li> </ol>
Game play does not respond to steering	<ol style="list-style-type: none"> <li>1. Check the harnesses and connections to the steering controls.</li> <li>2. Check the steering potentiometer..</li> </ol>
<b>Start Switch Problem</b>	
	<ol style="list-style-type: none"> <li>1. Check the start switch in the Control Test of the self-test .</li> <li>2. Check the wire connections and solder joints to the start switch.</li> <li>3. Check the start switch for continuity using an ohmmeter.</li> <li>4. Replace the start switch only if it is bad.</li> </ol>
<b>Sound Problem</b>	
	<ol style="list-style-type: none"> <li>1. Check the speaker volume setting.</li> <li>2. Check the voltage on the PCB edge connector.</li> <li>3. Check the connections from the PCB to the speakers.</li> <li>4. Check the voltage level to the PCB.</li> <li>5. Check the sound ROMs in the Sound Test of the self-test procedure.</li> <li>6. Check the resistance of the speakers for 8 Ohms.</li> <li>7. Replace the speaker(s) only if bad.</li> </ol>
<b>Video Display Problem</b>	
Screen is dark	<ol style="list-style-type: none"> <li>1. Check to see that the game is plugged in.</li> <li>2. Check to see that the game is turned on.</li> <li>3. Check the line fuse.</li> <li>4. Check the display brightness.</li> <li>5. Check the solder connections on the line filter and the transformer.</li> <li>6. Check the edge connector to the PCB.</li> <li>7. Check the harnesses and connectors to the video display PCB.</li> <li>8. Check the voltage levels to the video display PCB .</li> <li>9. Run through the following checklist. If you answer <i>no</i> to any question, you have a problem with the video display, not with the game circuitry. In this case, refer to your video display service manual. <ol style="list-style-type: none"> <li>a. Do you have power to the video display?</li> <li>b. Are the video display's filaments lit?</li> <li>c. Do you have the correct voltage to the video display?</li> </ol> </li> </ol>
Only a colored screen appears	<ol style="list-style-type: none"> <li>1. Attempt to run a complete RAM/ROM test in the self-test.</li> <li>2. Replace the RAM.</li> </ol>
Display area wavers or is too small	<ol style="list-style-type: none"> <li>1. Check the voltage levels to the video display PCB.</li> <li>2. Check the B+ to the video display. (Refer to the video display manual.)</li> </ol>

**Table 3-1 General Troubleshooting**

- Picture is wavy
  1. Check the connection of the monitor ground wire to the monitor.
  2. Check the connections of the sync inputs.
- Picture is upside down or reversed
  1. Switch the horizontal or vertical yoke wire connections to the video display.
- Convergence, purity or color problems
  1. Use the self-test mode to digitally adjust the video display.
  2. Use the adjustment procedures in your video display manual.
- Picture is not centered
  1. Use the centering procedures in your video display manual.

**Electronic Game Link Problem**

1. Check the harnesses and connections between both games.

**Seat Thumper Problem**

1. Only qualified technicians having experience with high-power devices should troubleshoot this system. The solenoids and the solenoid/motor PCB run on live voltage and can cause serious injury.

**Table 3-1 General Troubleshooting, Continued**

Problem	ROMs/RAMs Source and Purpose	Location
<b>ROMs</b>		
The program works, but the motion objects are incorrect or non-existent.	Motion Object ROMs (responsible for moving graphic objects)	31L, 31N, 31R, 31T, 33L, 33N, 33R, 33T, 35L, 35N, 35R, 35T, 37L, 37N, 37R, 37T
Garbage appears on the screen or game play doesn't work correctly.	Program ROMs (responsible for game control)	23E, 23J, 37E, 37J
The text or numbers are incorrect or non-existent.	Alphanumeric ROM (responsible for controlling graphic text and numbers)	13N
The sound is incorrect or non-existent.	Audio ROMs (responsible for controlling sound) Audio Program ROM Audio ADPCM ROM	12C 19E
The moving backgrounds graphics are incorrect or non-existent.	Playfield ROMs (responsible for controlling background graphics)	2D, 2J, 5D, 5J, 8D, 8J
<b>RAMs</b>		
The display color is red.	Working RAM	
The display color is green.	Playfield RAM	
The display color is blue.	Motion Object RAM	

**Table 3-2 ROMs and RAMs Troubleshooting**

Voltage	Test Point or LED Location	Voltage Source and Purpose
+5 ± 0.25 VDC	+5V1	Logic power from the switching power supply.
	CR3 LED (game PCB)	Lights when 5 V is applied to the PCB and the reset (RST) jumper is open.
	CR9 LED (JSA Audio III PCB)	Lights when the +12 V supply is good.
	CR3 LED (JSA Audio III PCB)	Lights when the -5 V supply is good.
+12 V	+V0P (pin 4 of LM324)	+12 V from the switching power supply. Positive supply for the analog circuitry.
-5 V	-V0P (pin 11 of LM324)	-5 V from the switching power supply (if connected). Negative supply for the analog circuitry.

**Table 3-3 Voltage Inputs and Test Points**

- Slide the plastic retaining washer on top of the torsion spring.
- Re-install the potentiometer and attached bracket to the throttle by tightening the potentiometer retaining screw against the flat edge of the potentiometer shaft.

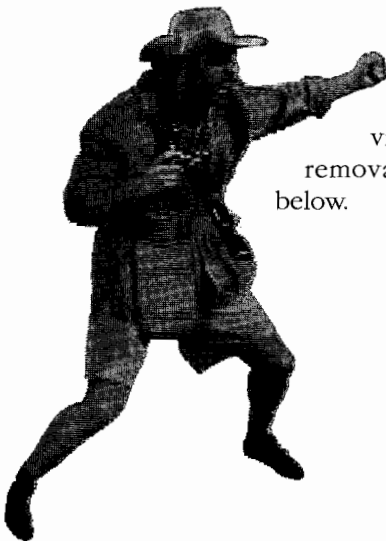
**NOTE**

*The plastic retaining washer should be below the potentiometer retaining screw when properly installed.*

- Re-install the throttle control to the handlebars by securing it with the 3 screws at the base of the throttle control.

**Video Display**

To repair, replace or make adjustments to the video display, follow the removal and installation steps below.



**WARNING**

**High Voltage**

*The video display contains lethal high voltages. To avoid injury, do not service this display until you observe all precautions necessary for working on high-voltage equipment.*

**X-Radiation**

*This video display is designed to minimize X-radiation. However, to avoid possible exposure to soft X-radiation, never modify the high-voltage circuitry.*

**Implosion Hazard**

*The cathode-ray tube (CRT) may implode if struck or dropped. The shattered glass from the tube may cause injury up to six feet away. Use care when handling the display and when removing it from the game cabinet. Also, wear gloves to protect your hands from the sheet-metal edges.*

- Unfasten the 8 square drive screws that secure the monitor doors to the cabinet and remove them.
- Discharge the high-voltage from the cathode-ray tube (CRT).

**NOTE**

*The label on the video display assembly shows a circuit for discharging the high-voltage contained in the CRT to ground when the power is off.*

- a. Secure one end of a solid 18-gauge wire to a well-insulated or wooden handle screwdriver.
  - b. Secure the other end of the wire to an earth ground.
  - c. Briefly touch the blade end of the screwdriver to the CRT anode by sliding it under the anode cap.
  - d. Wait 2 minutes and repeat the previous step.
3. Disconnect all of the wire harnesses from the video display.
  4. Unfasten the 13 square drive screws that secure the light housing assembly and remove it.
  5. Unfasten the 10 square drive screws that secure the lower glass retainers. Remove the display shields and card-board bezels.
  6. Unfasten the 4 flat washers and nuts that secure each video display chassis to the cabinet monitor mounting brackets.
  7. Remove the video display assembly from the cabinet.

---

**NOTE**

*Do not attempt to remove the video display without its chassis.*

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8. Install the new video display by following the previous steps (excluding steps 2a.–2d.) in the reverse order.
9. If necessary, adjust the new video display's brightness, size, centering, purity and convergence according to the video display service manual.



**N O T E S**



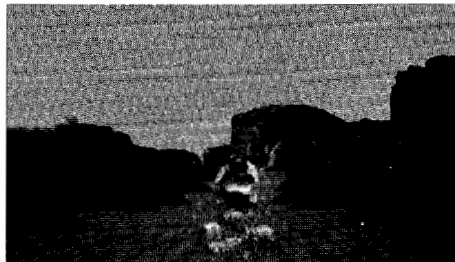
# Parts Illustrations



## Part Ordering Information

**T**HIS CHAPTER provides information you need to order parts for your game. The printed-circuit board (PCB) parts lists are arranged in alphabetical order by component. Within each section the parts are arranged numerically by part number. When you order parts, give the part number, part name, the

number of this manual, and the serial number of your game. With this information, we can fill your order rapidly and correctly. We hope this will create less downtime and more profit from your games. Atari Games Customer Service phone numbers are listed on the inside front cover of this manual.



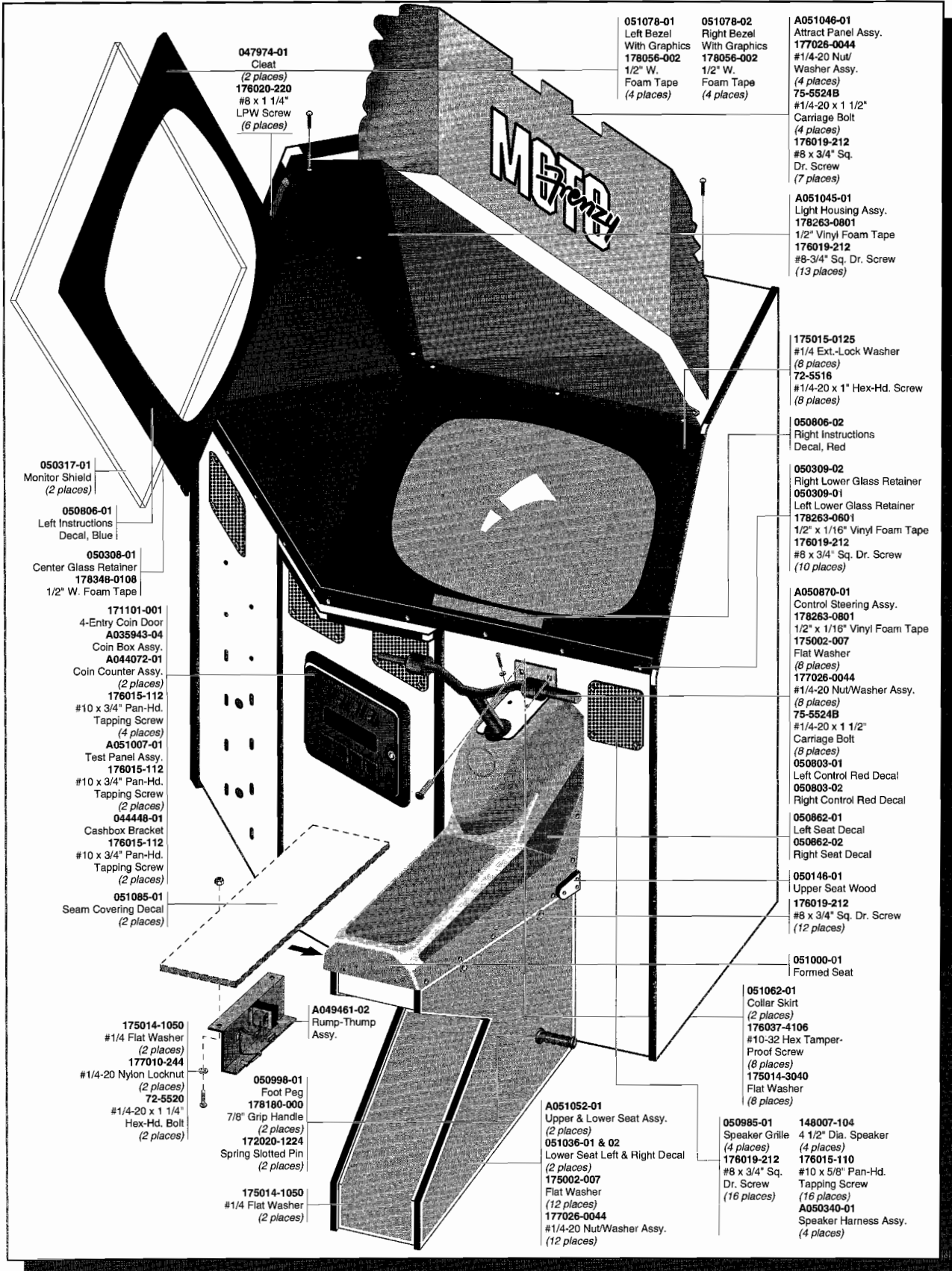
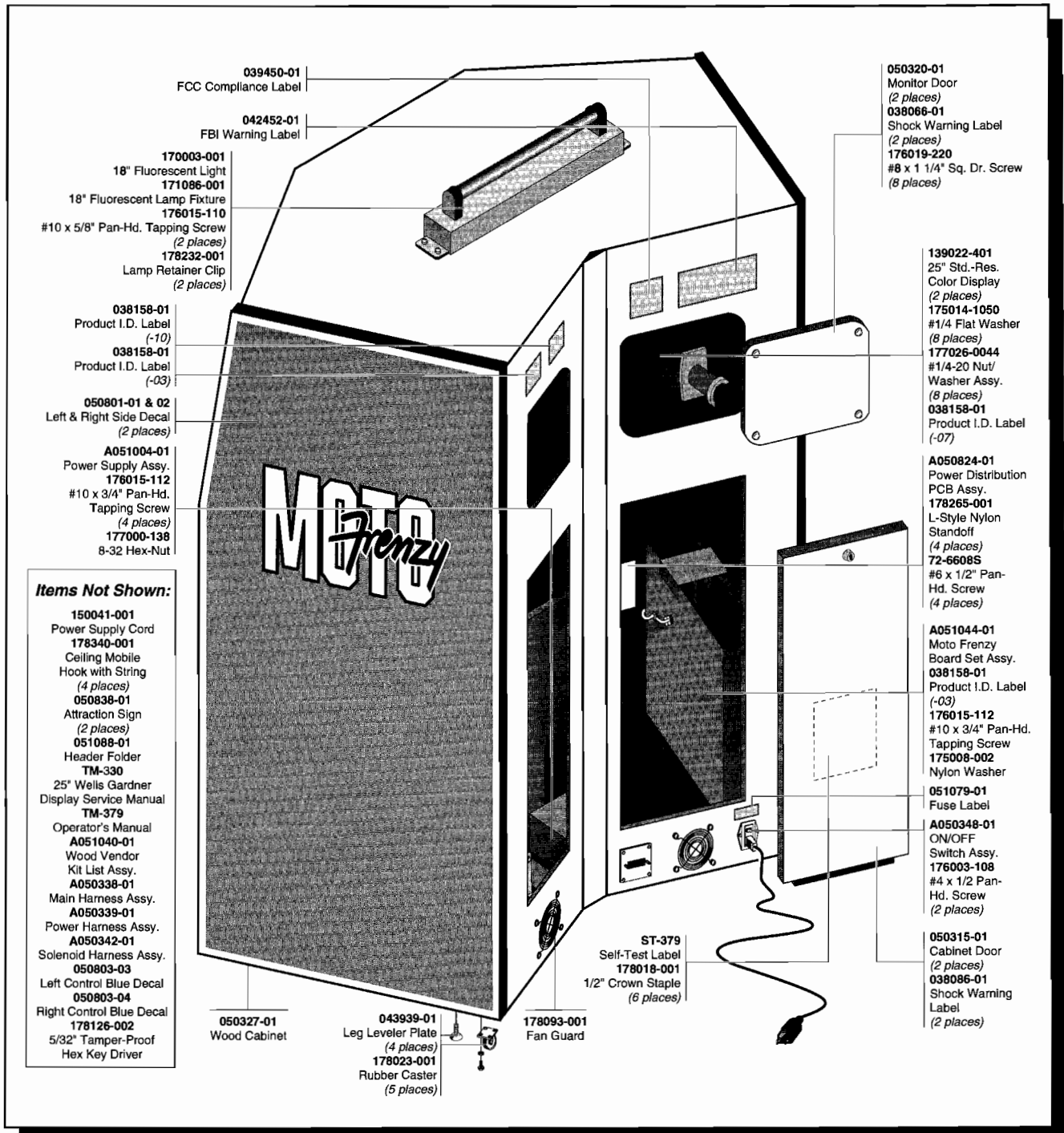


Figure 4-1 Cabinet-Mounted Assemblies, Front View

A050330-01 B



**Figure 4-2 Cabinet-Mounted Assemblies, Rear View**

A050330-01 B

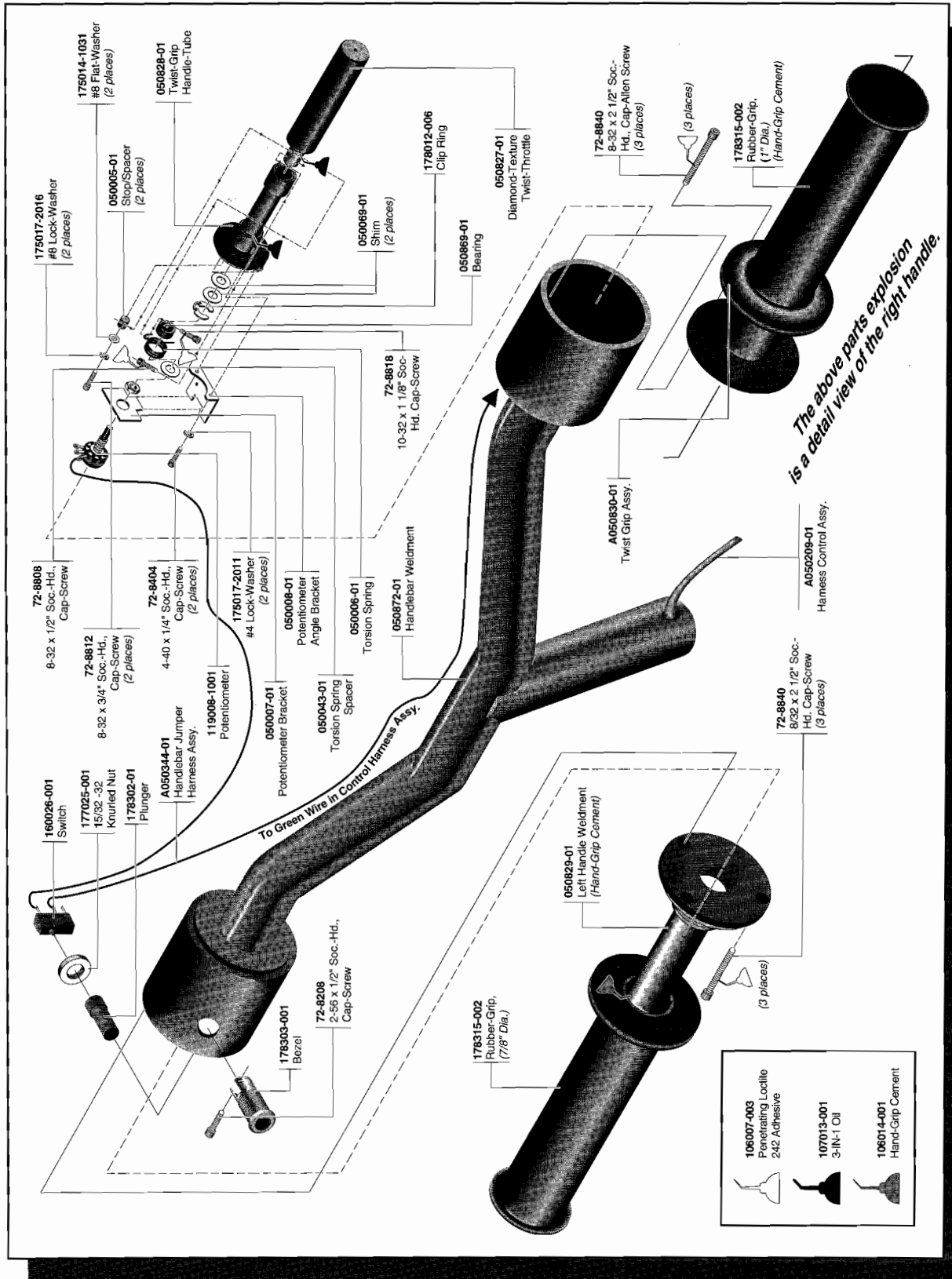
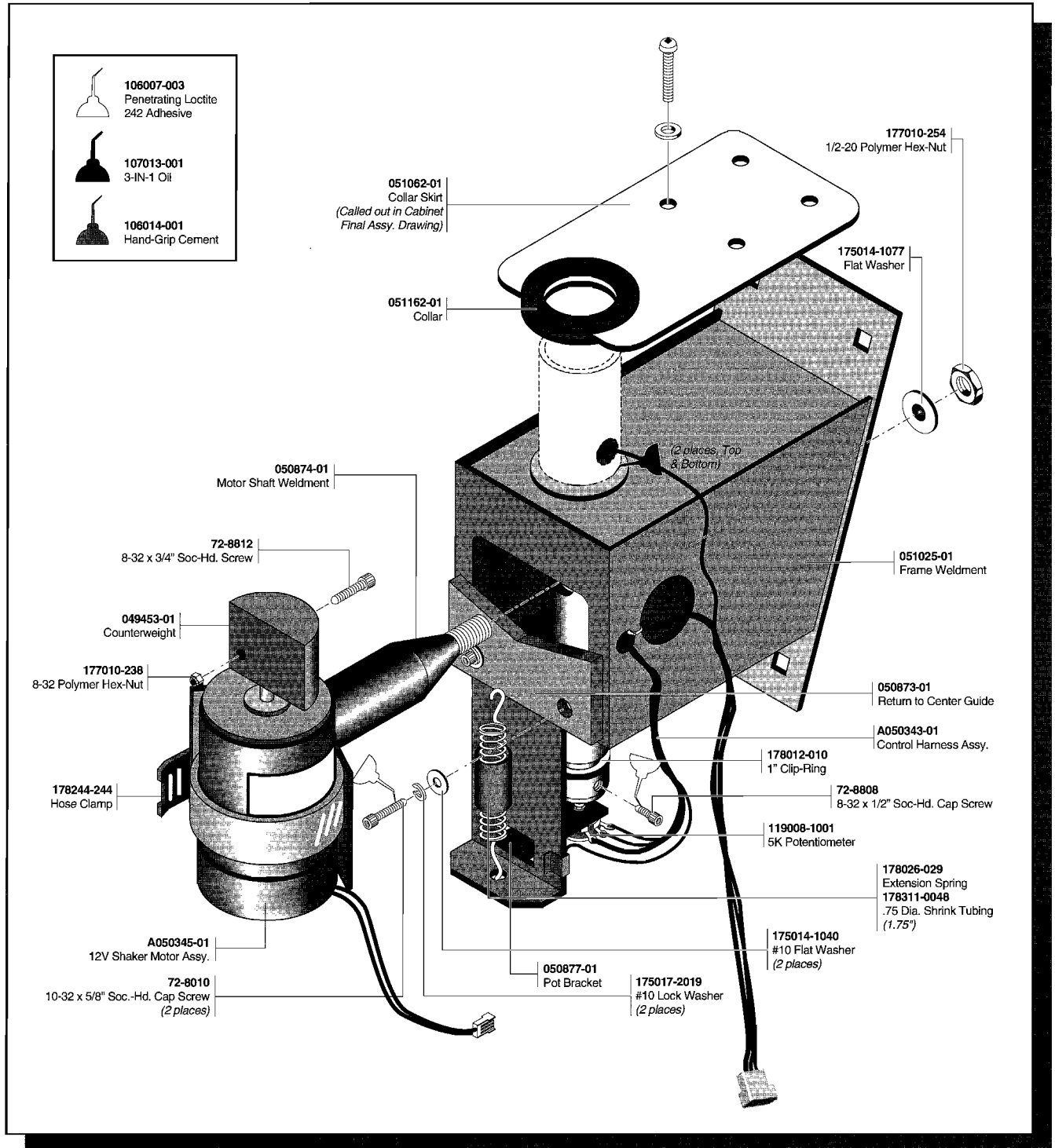


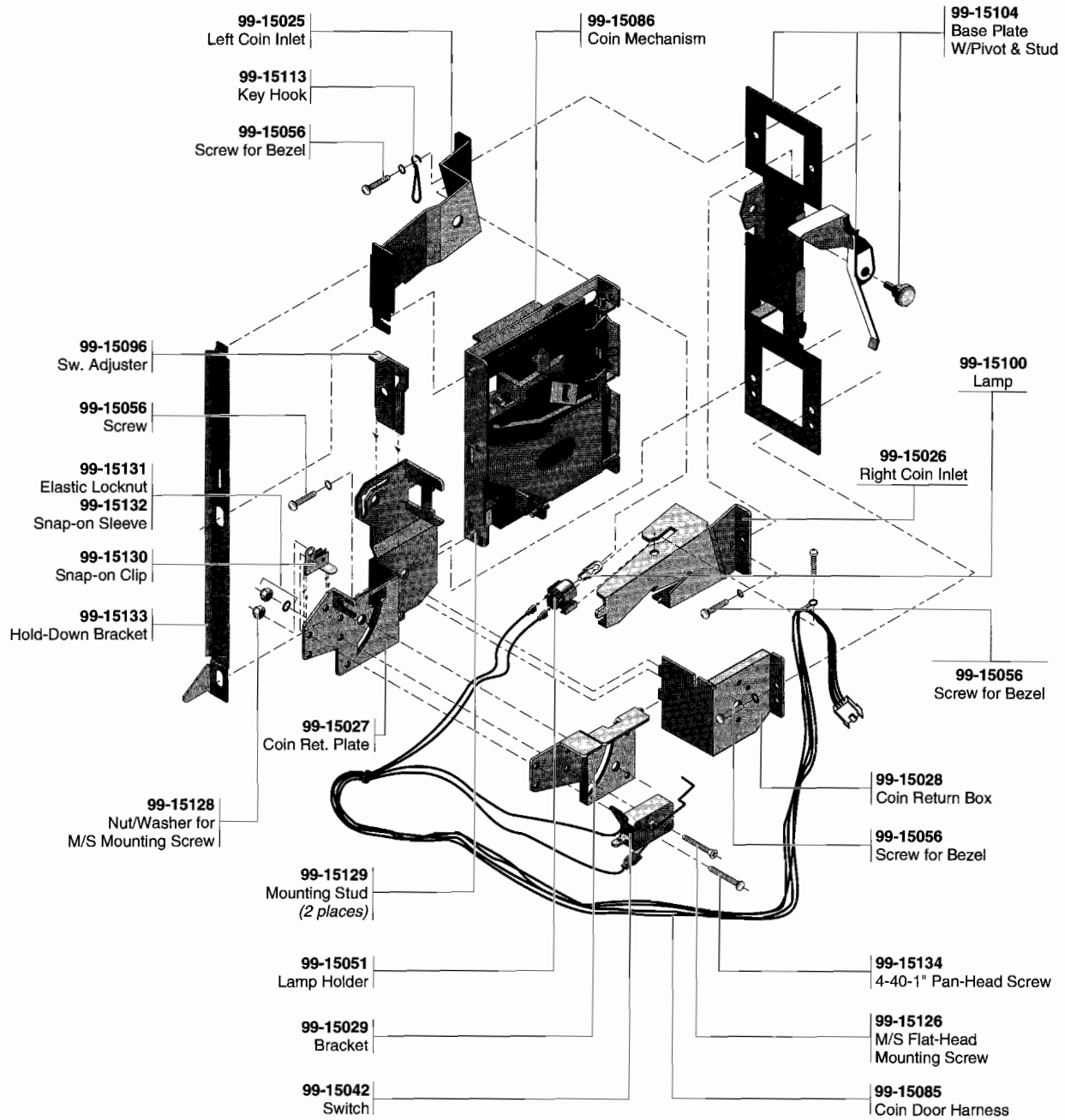
Figure 4-3 Steering Control Assembly, Handlebar Detail

A050870-01 A



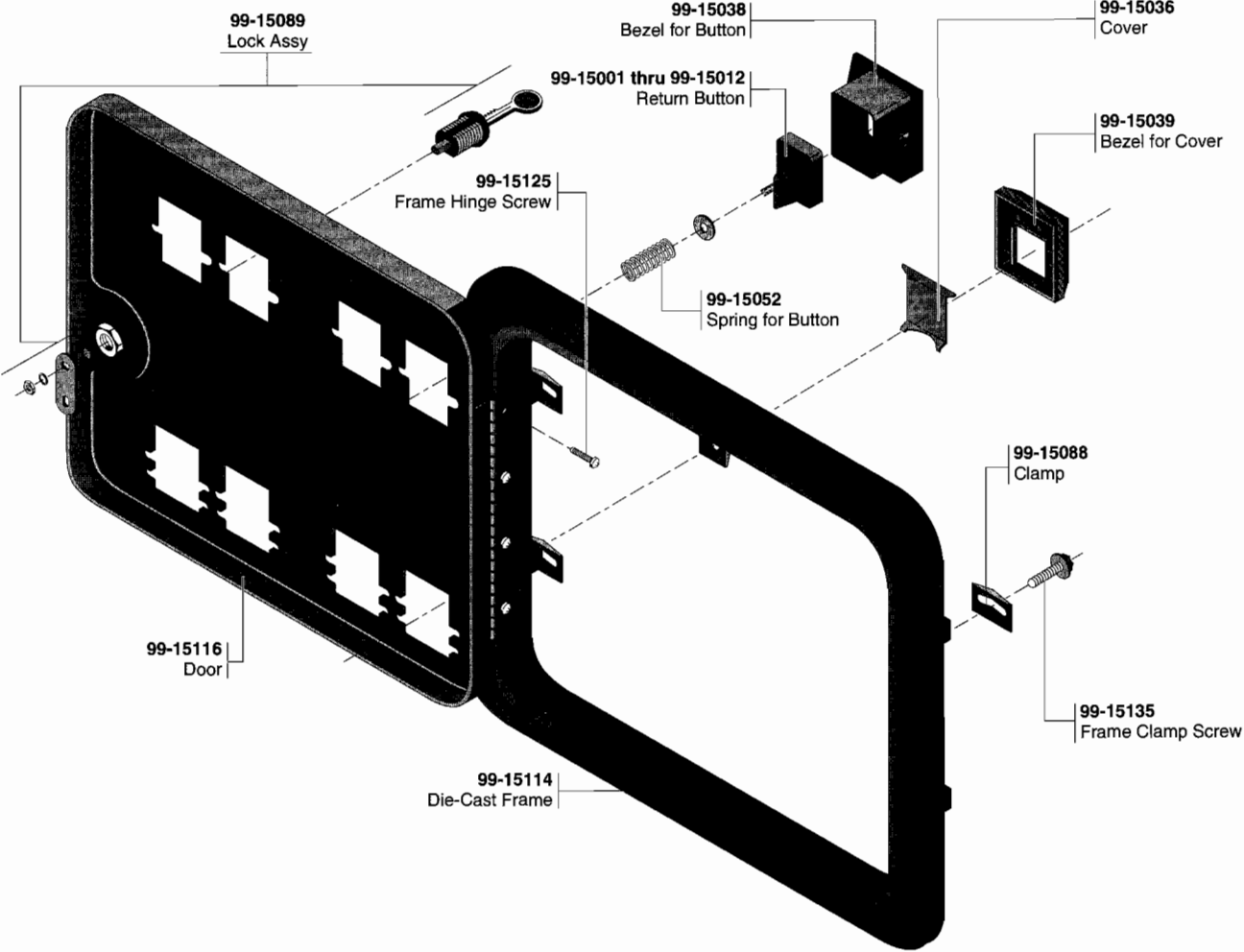
**Figure 4-4 Steering Control Assembly, Shaker Detail**

A050870-01 A



**Figure 4-5 Four-Entry Coin Door Assembly, Coin Mechanism Detail**

171101-001



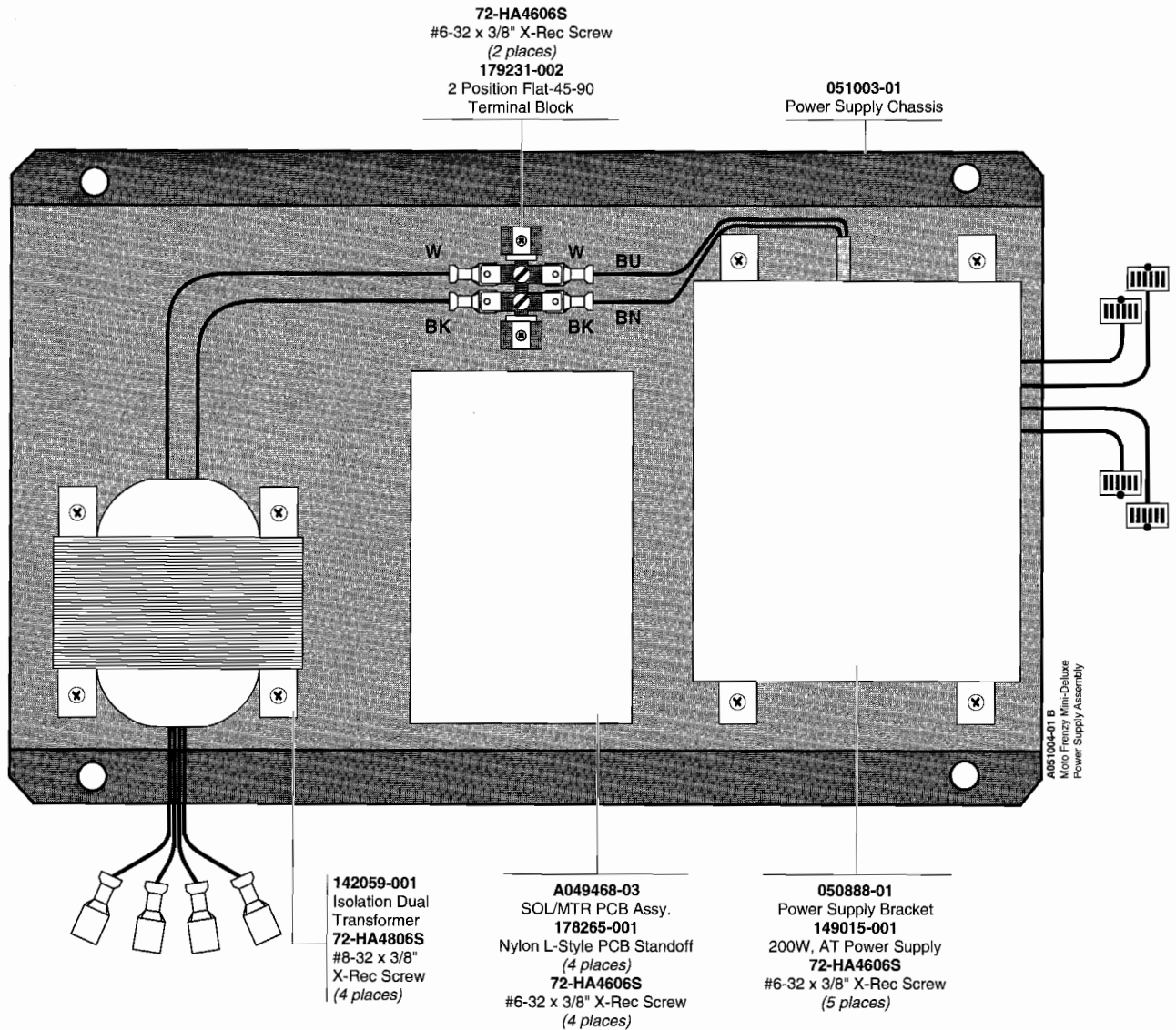
**NOTE:** The Coin Box Assembly was intentionally left out and is shown in the Cabinet-Mounted Assemblies drawing (Figure 4-1 of this manual).

**Figure 4-6 Four-Entry Coin Door Assembly, Coin Door Detail**

171101-001

**N O T E S**





**Figure 4-7 Power Supply Assembly**

A051004-01 A

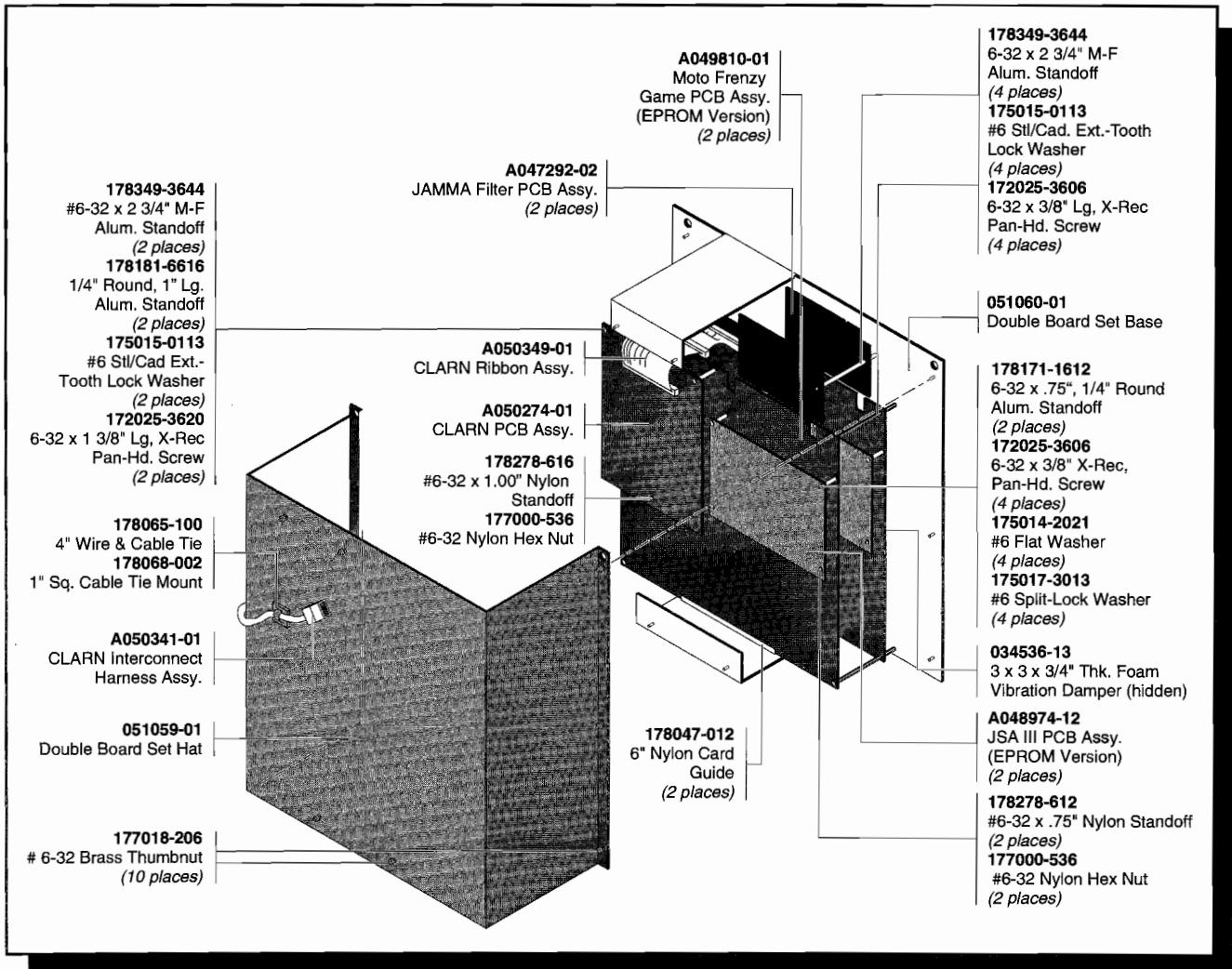
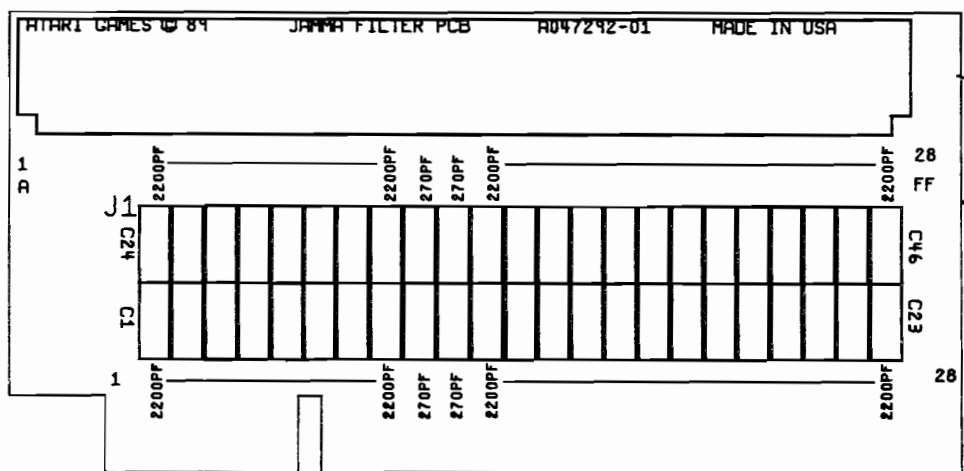


Figure 4-8 Moto Frenzy Mini-Deluxe Board Set Assembly

A051044-01 B

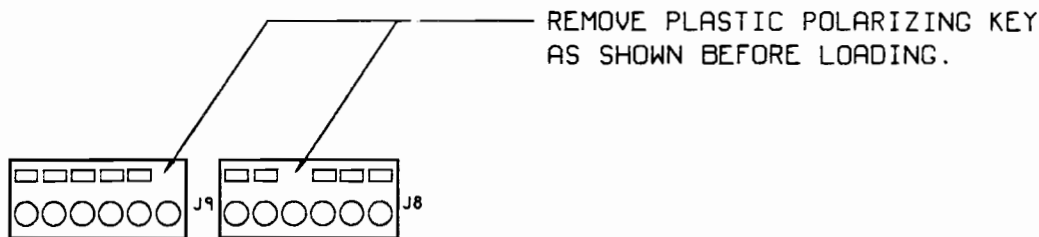
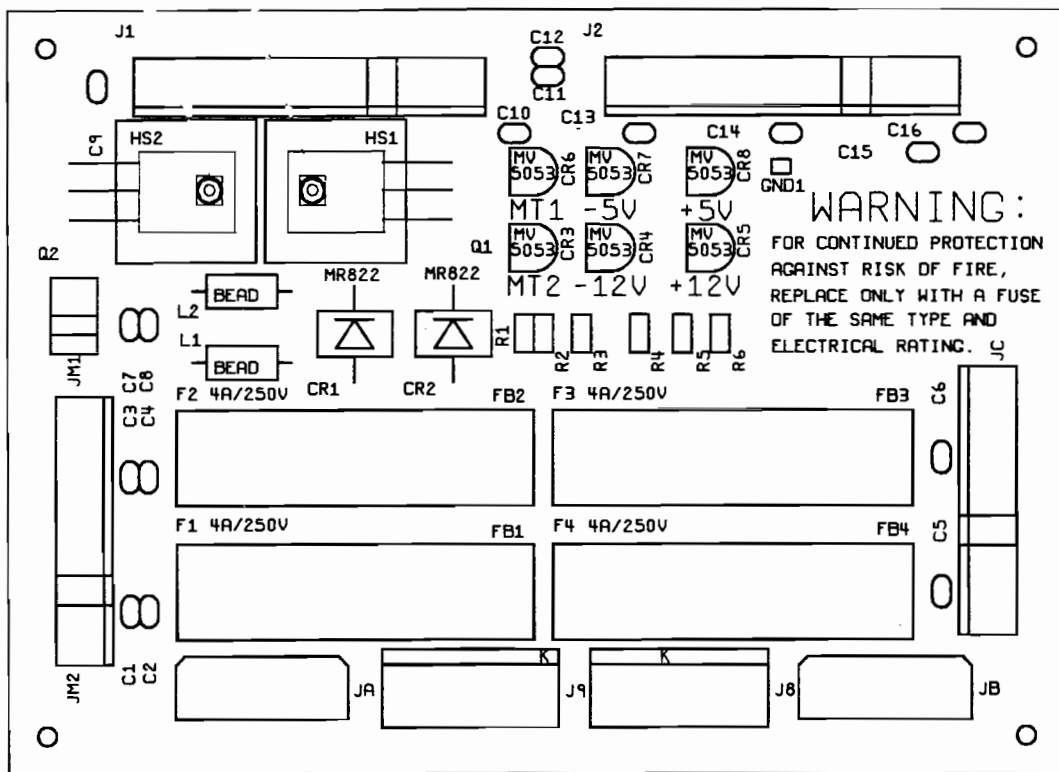


**Figure 4-9 JAMMA Filter PCB Assembly**

A047292-01 A

### JAMMA Filter PCB Assembly Parts List

Designator	Description	Part No.	Designator	Description	Part No.
C1-5, C7,	2200 pF, 50V, 3-Pin EMI Filter Cap.	140006-222	C32, C33	270 pF, 50V, 3-Pin EMI Filter Cap.	140006-271
C9, C10	270 pF, 50V, 3-Pin EMI Filter Cap.	140006-271	C36, C37	2200 pF, 50V, 3-Pin EMI Filter Cap.	140006-222
C11-15, C18-21, C24-27, C30	2200 pF, 50V, 3-Pin EMI Filter Cap.	140006-222	J1	Connector, 56 Ckt., .156 Ctr, RT	179240-056



**Figure 4-10 Power Distribution PCB Assembly**

A050824-01 B

**Power Distribution PCB Assembly  
Parts List**

Designator	Description	Part No.	Designator	Description	Part No.
C1-6, C9-C16	.01 µF, 50V, +80% -20% Cer. Cap.	122002-103	L1, L2	N12N Ferrite Bead Inductor	141003-005
C7-8	100 pF, 100V, ±5% Cer. Cap.	122016-101	R1, R2, R4, R6	Resistor, 1.2 K Ω, ±5%, 1/8 W	110027-122
J1, J2	Hdr. Connector, 12 Ckt., .156 Ctr, Key 9	179213-012	R3, R5	Resistor, 470 Ω, ±5%, 1/8 W	110027-471
JM1	Hdr. Connector, 4 Ckt., .100 Ctr, Key 2	179118-004	GND1	Test Point	179051-001
JA, JB	Hdr. Connector, 4 Ckt., .200 Ctr	179310-004	Q1, Q2	TIP120 Transistor	133051-001
J8, J9	Hdr. Connector, 6 Ckt., .156 Ctr	179309-006	HS1, HS2	TO-220 Heat Sink with #4-40 Stud	178063-007
JM2	Hdr. Connector, 9 Ckt., .156 Ctr, Key 3	179213-009	F1-F4	3AG 4 Amp 250 V Slow-Blow Fuse	146008-4022
JC	Hdr. Connector, 9 Ckt., .156 Ctr, Key 6	179213-009	(HS1, HS2)	#4-40 Steel/Zinc Hex Nut	177000-132
CR1, CR2	MR822 Diode	131019-001	(HS1, HS2)	#4 Steel/Zinc Internal-Tooth Washer	75-054
CR3-CR8	MV5053 Light-Emitting Diode	131027-002	(HS1, HS2)	#4 Steel/Zinc Rect. Washer	178347-001
FB1-FB4	3AG Fuse Block	179225-4401			

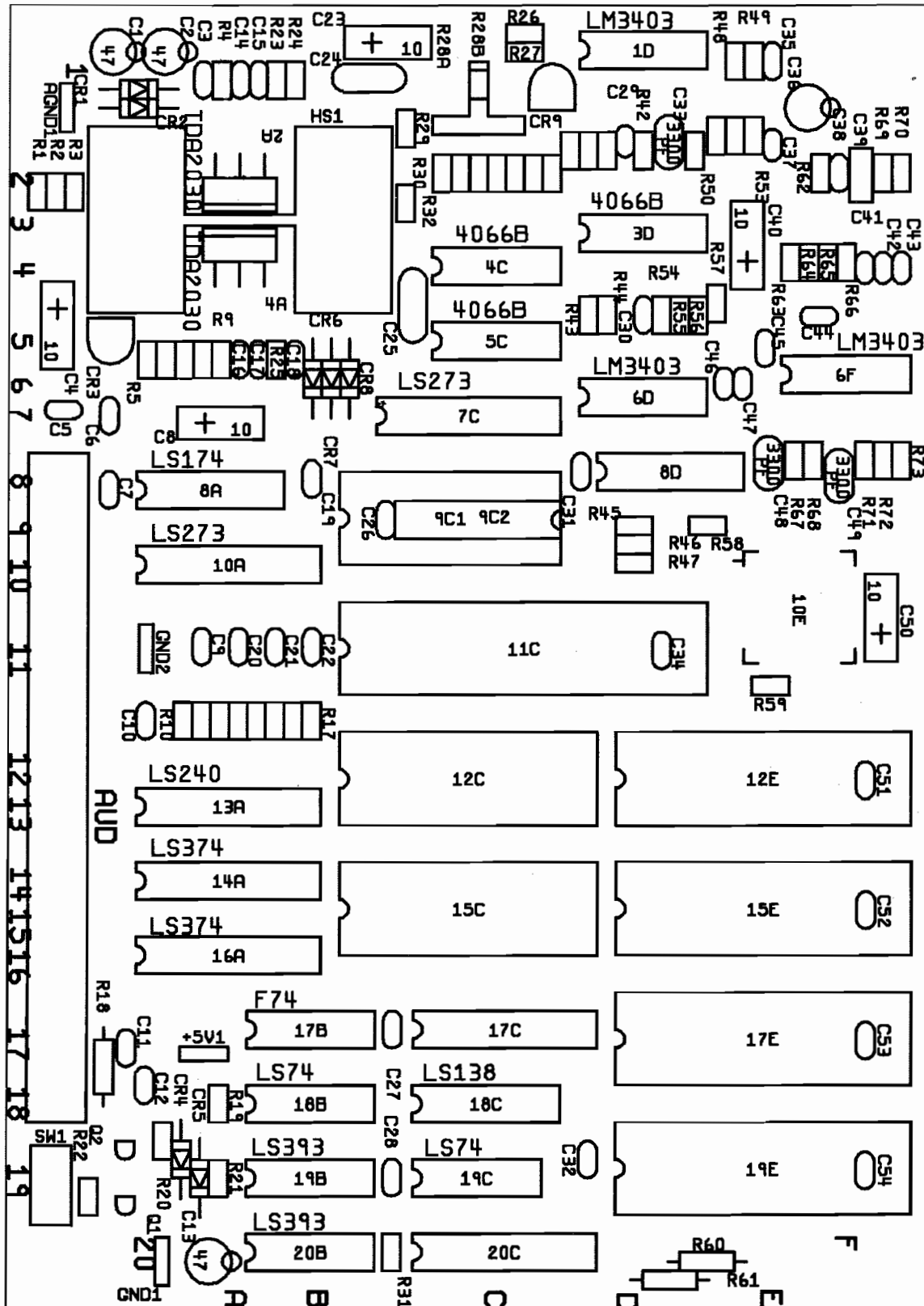


Figure 4-11 JSA III PCB Assembly (EPROM Version)

A048974-12 A

### JSA III PCB Assembly (EPROM Version) Parts List

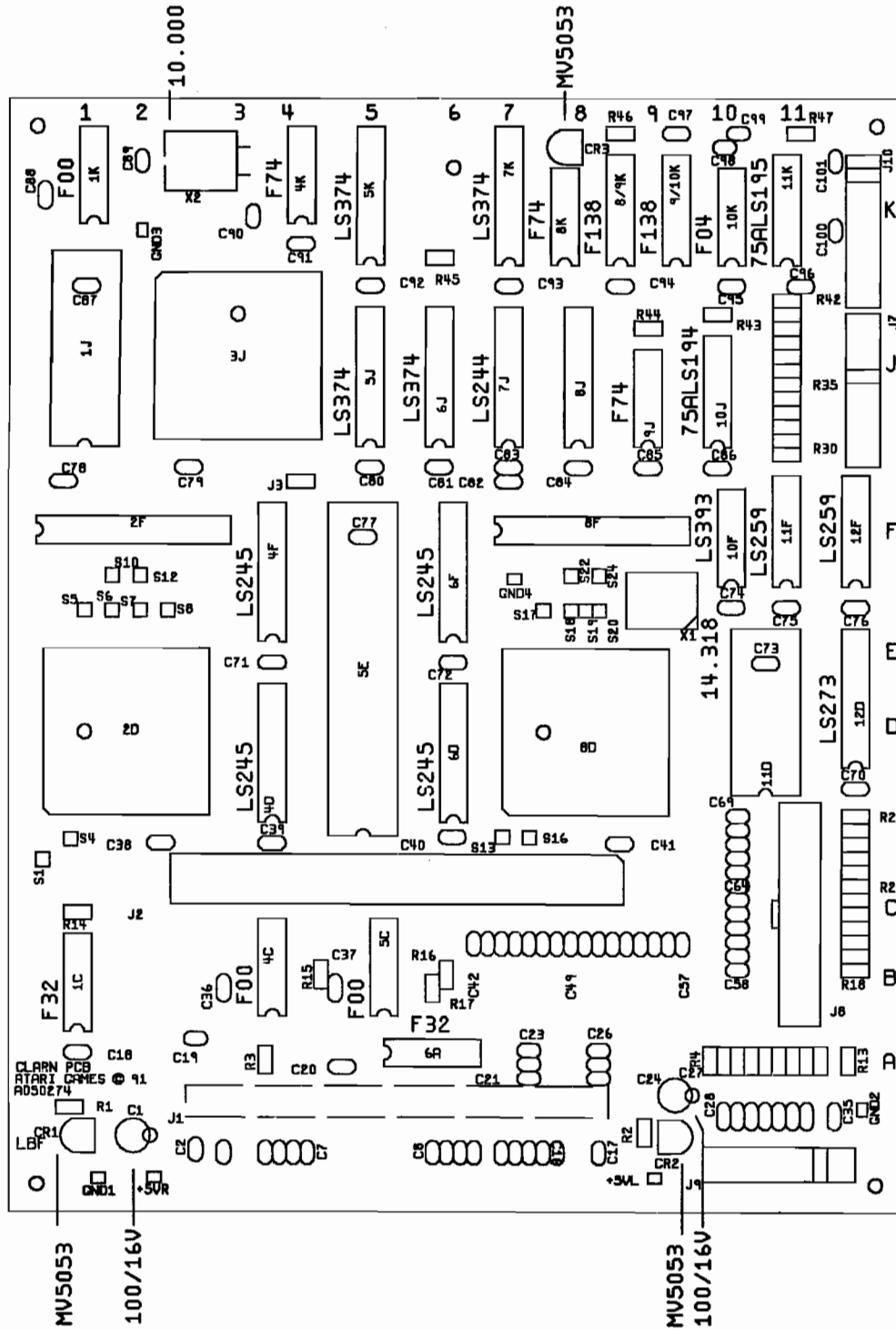
Designator	Description	Part No.	Designator	Description	Part No.
<b>Sockets</b>					
8D	Socket, 16 Pin, .300	179259-016	16A	Integrated Circuit, 74LS374	137144-001
9C1	Socket, 24 Pin, .600	179257-024	17B	Integrated Circuit, 74F74	137436-001
11C	Socket, 40 Pin, .600	179257-040	17C	GAL16V8, 25 ns	136085-1038
12C	Socket, 28 Pin, .600	179257-028	17E	EPROM, 200 ns, 128K x 8	136089-1049
12E	Socket, 32 Pin, .600	179257-032	18B	Integrated Circuit, 74LS74	137023-001
15C	Socket, 28 Pin, .600	179257-028	18C	Integrated Circuit, 74LS138	137177-001
15E	Socket, 32 Pin, .600	179257-032	19B	Integrated Circuit, 74LS393	137146-001
17C	Socket, 20 Pin, .300	179259-020	19C	Integrated Circuit, 74LS74	137023-001
17E, 19E	Socket, 32 Pin, .600	179257-032	19E	EPROM, 100 ns, 512K x 8	136094-0081
20C	Socket, 20 Pin, .300	179259-020	20B	Integrated Circuit, 74LS393	137146-001
			20C	GAL16V8, 25 ns	136085-2046
<b>Miscellaneous Hardware</b>			<b>Capacitors</b>		
++1005V1	Test Point	179051-001	C1,C2	Capacitor, 47 $\mu$ F, 50V, Electrolytic	123015-476
AGND1	Test Point	179051-001	C3	Capacitor, .1 $\mu$ F, 50 V, +80%-20%, Ceramic	122002-104
GND1,GND2	Test Point	179051-001	C4	Capacitor, 10 $\mu$ F, 25 V, Electrolytic	124009-106
—	Nut/Washer Assy.	177026-0036	C5-C7	Capacitor, .1 $\mu$ F, 50 V, +80%-20%, Ceramic	122002-104
HS1	Heat Sink, TDA2030	178190-032	C8	Capacitor, 10 $\mu$ F, 25 V, Electrolytic	124009-106
JAUD	Connector, 36 Ckt, .1 Bottom Entry	179299-036	C9, C10	Capacitor, .1 $\mu$ F, 50 V, +80%-20%, Ceramic	122002-104
SW1	Switch, Slide, SPDT	160040-001	C13	Capacitor, 47 $\mu$ F, 50V, Electrolytic	123015-476
—	Nut/Washer, Zinc	177026-0036	C14-C22	Capacitor, .1 $\mu$ F, 50 V, +80%-20%, Ceramic	122002-104
—	Screw, Pan-Head, #6-32x3/8, Cross-Recessed, Cadmium	72-1606S	C23	Capacitor, 10 $\mu$ F, 25 V, Electrolytic	124009-106
—	Thermal Compound	107031-001	C24, C25	Capacitor, .22 $\mu$ F, 50 V, $\pm$ 10%, Ceramic	122015-224
<b>Integrated Circuits</b>			C26-C28	Capacitor, .1 $\mu$ F, 50 V, +80%-20%, Ceramic	122002-104
1D	Integrated Circuit, Quad Op-Amp, LM3403	137673-001	C29	Capacitor, 1000 pF, 50 V, $\pm$ 10%, Ceramic	122015-102
2A	Integrated Circuit, TDA2030	137301-001	C30-C32	Capacitor, .1 $\mu$ F, 50 V, +80%-20%, Ceramic	122002-104
3D	Integrated Circuit, 4066B	137580-001	C33	Capacitor, 3300 pF, 50 V, $\pm$ 5%, NPO, +80%-20%	122019-332
4A	Integrated Circuit, TDA2030	137301-001	C34, C35	Capacitor, .1 $\mu$ F, 50 V, +80%-20%, Ceramic	122002-104
4C, 5C	Integrated Circuit, 4066B	137580-001	C37	Capacitor, 2200 pF, 50 V, +80%-10%, Ceramic	122015-222
6D, 6F	Integrated Circuit, Quad Op-Amp, LM3403	137673-001	C38	Capacitor, .1 $\mu$ F, 50 V, +80%-20%, Ceramic	122002-104
7C	Integrated Circuit, 74LS273	137040-001	C39	Capacitor, .015 $\mu$ F, 100 V, $\pm$ 5%, Poly	126009-153
8A	Integrated Circuit, 74LS174	137122-001	C40	Capacitor, 10 $\mu$ F, 25 V, Electrolytic	124009-106
8D	Integrated Circuit, YM3012	137402-001	C41	Capacitor, 1000 pF, 50 V, $\pm$ 10%, Ceramic	122015-102
9C1	Integrated Circuit, YM2151	137401-001	C42, C43	Capacitor, 6800 pF, 50 V, 80%-10%, Ceramic	122015-682
10A	Integrated Circuit, 74LS273	137040-001			
11C	Integrated Circuit, 6502 A	137577-001			
12C	EPROM, 200 ns, 64K x 8	136094-0080			
12E	EPROM, 200 ns, 128K x 8	136089-1051			
13A	Integrated Circuit, 74LS240	137251-001			
14A	Integrated Circuit, 74LS374	137144-001			
15C	Integrated Circuit, RAM, 8K x 8, 100 ns, .6	137535-004			
15E	EPROM, 200 ns, 128K x 8	136089-1050			

### JSA III PCB Assembly (EPROM Version), Continued Parts List

Designator	Description	Part No.	Designator	Description	Part No.
C44, C45	Capacitor, .1 $\mu$ F, 50 V, +80%-20%, Ceramic	122002-104	R35	Resistor, 20 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-203
C46, C47	Capacitor, 1000 pF, 50 V, $\pm$ 10%, Ceramic	122015-102	R36	Resistor, 39 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-393
C48, C49	Capacitor, 3300 pF, 50 V, $\pm$ 5%, NPO	122019-332	R37	Resistor, 160 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-164
C50	Capacitor, 10 $\mu$ F, 25 V, Electrolytic	124009-106	R38	Resistor, 10 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-103
C51-C54	Capacitor, .1 $\mu$ F, 50 V, +80%-20%, Ceramic	122002-104	R40	Resistor, 30 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-303
			R41	Resistor, 15 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-153
			R42	Resistor, 150 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-154
			R43	Resistor, 7.5 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-752
	<b>Diodes</b>		R44	Resistor, 15 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-153
CR1, CR2	Diode, 1N4001	131048-001	R48	Resistor, 3.3 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-332
CR3	Diode, MV5053, Light-Emitting	131027-002	R49	Resistor, 33 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-333
CR6-CR8	Diode, 1N4001	131048-001	R50	Resistor, 30 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-303
CR9	Diode, MV5053, Light-Emitting	131027-002			
	<b>Resistors</b>		R51	Resistor, 6.2 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-622
R1, R2	Resistor, 10 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-103	R52, R53	Resistor, 12 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-123
R3	Resistor, 33 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-333	R54	Resistor, 7.5 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-752
R4	Resistor, 1 $\Omega$ , $\pm$ 5%, 1/8 W	110027-010	R55	Resistor, 560 $\Omega$ , $\pm$ 5%, 1/8 W	110027-561
R5	Resistor, 33 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-333			
R6	Resistor, 470 $\Omega$ , $\pm$ 5%, 1/8 W	110027-471	R56	Resistor, 470 $\Omega$ , $\pm$ 5%, 1/8 W	110027-471
R7	Resistor, 33 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-333	R57	Resistor, 100 $\Omega$ , $\pm$ 5%, 1/8 W	110027-101
R8	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102	R59	Resistor, 10 $\Omega$ , $\pm$ 5%, 1/8 W	110027-100
R9	Resistor, 33 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-333	R62	Resistor, 15 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-153
R10	Resistor, 470 $\Omega$ , $\pm$ 5%, 1/8 W	110027-471	R63	Resistor, 10 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-103
R11	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102	R64	Resistor, 15 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-153
R12	Resistor, 470 $\Omega$ , $\pm$ 5%, 1/8 W	110027-471	R65	Resistor, 7.5 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-752
R13	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102	R66	Resistor, 10 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-103
R14	Resistor, 470 $\Omega$ , $\pm$ 5%, 1/8 W	110027-471	R67	Resistor, 3.3 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-332
R15	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102	R68	Resistor, 6.8 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-682
R16	Resistor, 470 $\Omega$ , $\pm$ 5%, 1/8 W	110027-471	R69	Resistor, 16 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-163
R17, R20	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102	R70	Resistor, 2 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-202
R22	Resistor, 470 $\Omega$ , $\pm$ 5%, 1/8 W	110027-471	R71	Resistor, 6.8 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-682
R23	Resistor, 33 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-333	R72	Resistor, 10 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-103
R24	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102	R73	Resistor, 20 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-203
R25	Resistor, 1 $\Omega$ , $\pm$ 5%, 1/8 W	110027-010			
R26	Resistor, 1.2 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-122			
R28B	Resistor, 10 $\Omega$ , $\pm$ 5%, 1/8 W	110027-100			
R29	Resistor, 5.1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-512			
R30	Resistor, 15 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-153			
R31	Resistor, 10 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-103			
R32	Resistor, 620 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-624			
R33	Resistor, 330 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-334			
R34	Resistor, 82 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-823			

**N O T E S**





**Figure 4-12 CLARN PCB Assembly**

A050274-01 A

## CLARN PCB Assembly Parts List

Designator	Description	Part No.	Designator	Description	Part No.
1J	Socket, 28 Pin, .600	179257-028	C1	Capacitor, 100 $\mu$ F, 16 V, Electrolytic, Radial	123013-107
2F	Socket, 28 Pin, .300	179259-028	C2	Capacitor, 47 pF, 100 V, $\pm$ 5%, Ceramic	122016-470
3J	Socket, 68 Pin, PLCC	179237-068	C3	Capacitor, 33 pF, 100 V, $\pm$ 5%, Ceramic	122016-330
8D	Socket, 68 Pin, PLCC	179237-068	C4, C5	Capacitor, 100 pF, 100 V, $\pm$ 5%, Ceramic	122016-101
8F	Socket, 28 Pin, .300	179259-028	C6–C8	Capacitor, 33 pF, 100 V, $\pm$ 5%, Ceramic	122016-330
8J	Socket, 20 Pin, .300	179259-020	C9–C17	Capacitor, 100 pF, 100 V, $\pm$ 5%, Ceramic	122016-101
11D	Socket, 24 Pin, .600	179257-024	C18	Capacitor, .1 $\mu$ F, 50 V, +80% –20%, Ceramic	122002-104
+	IC, 74LS374	137144-001	C19	Capacitor, 33 pF, 100 V, $\pm$ 5%, Ceramic	122016-330
++1005VL	Test Point	179051-001	C20	Capacitor, .1 $\mu$ F, 50 V, +80% –20%, Ceramic	122002-104
++1005VR	Test Point	179051-001	C21–C26	Capacitor, 100 pF, 100 V, $\pm$ 5%, Ceramic	122016-101
1C	IC, 74F32	137486-001	C27	Capacitor, 100 $\mu$ F, 16 V, Electrolytic, Radial	123013-107
1J	EPROM, 64K x 8, 200 ns	136094-0071	C28–C35	Capacitor, .01 $\mu$ F, 50 V, +80% –20%, Ceramic	122002-103
1K	IC, 74F00	137327-001	C36–C41	Capacitor, .1 $\mu$ F, 50 V, +80% –20%, Ceramic	122002-104
3J	IC, ADSP2105, 40 MHz	137674-040	C42	Capacitor, 33 pF, 100 V, $\pm$ 5%, Ceramic	122016-330
4C	IC, 74F00	137327-001	C43–C57	Capacitor, 100 pF, 100 V, $\pm$ 5%, Ceramic	122016-101
4D, 4F	IC, 74LS245	137134-001	C58–C69	Capacitor, 1000 pF, 100 V, $\pm$ 10%, Ceramic	122015-102
4K	IC, 74F74	137436-001	C70–C88,	Capacitor, .1 $\mu$ F, 50 V, +80% –20%, Ceramic	122002-104
5C	IC, 74F00	137327-001	C89, C90	Capacitor, 22 pF, 100 V, $\pm$ 5%, NPO	122016-220
5J, 5K	IC, 74LS374	137144-001	C91–C97	Capacitor, .1 $\mu$ F, 50 V, +80% –20%, Ceramic	122002-104
6A	IC, 74F32	137486-001	C98, C99	Capacitor, 100 pF, 100 V, $\pm$ 5%, Ceramic	122016-101
6D, 6F	IC, 74LS245	137134-001	C100, C101	Capacitor, 1000 pF, 100 V, $\pm$ 10%, Ceramic	122015-102
6J	IC, 74LS374	137144-001	CR1–CR3	Diode, MV5053, Light Emitting	131027-002
7J	IC, 74LS244	137038-001	GND1–4	Test Point	179051-001
7K	IC, 74LS374	137144-001	J1	Connector, 60 Circuit, Rec, .1 x .1C	179303-060
8/9K	IC, 74F138	137521-001	J2	Connector, 60 Circuit, Header, 4 Wall, .1 x .1C	179021-060
8D	1010 FPGA	136094-0072	J3	Connector, 2 Circuit, Header, .100 Ctr	179048-002
8F	IC, RAM, 8K x 8, 45 ns, .3	137667-045	J7	Connector, 11 Circuit, Header, .100 Ctr, Key 5	179118-011
8J	GAL16V8, 25 ns	136094-0070			
8K	IC, 74F74	137436-001			
9/10K	IC, 74F138	137521-001			
9J	IC, 74F74	137436-001			
10F	IC, 74LS393	137146-001			
10J	IC, 75ALS194	137675-001			
10K	IC, 74F04	137437-001			
11F	IC, 74LS259	137137-001			
11K	IC, 75ALS195	137676-001			
12D	IC, 74LS273	137040-001			
12F	IC, 74LS259	137137-001			

### CLARN PCB Assembly, Continued Parts List

Designator	Description	Part No.	Designator	Description	Part No.
J8	Connector, 26 Circuit, Header, 2 x 13, Pol	179261-026	R17	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102
J9	Connector, 11 Circuit, Header, .100 Ctr, Key 3	179118-011	R18–R37, R39	Resistor, 100 $\Omega$ , $\pm$ 5%, 1/8 W	110027-101
J10	Connector, 11 Circuit, Header, .100 Ctr, Key 2	179118-011	R40, R41	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102
R1, R2	Resistor, 220 $\Omega$ , $\pm$ 5%, 1/8 W	110027-221	R42	Resistor, 100 $\Omega$ , $\pm$ 5%, 1/8 W	110027-101
R3	Resistor, 10 $\Omega$ , $\pm$ 5%, 1/8 W	110027-100	R43–R45	Resistor, 10 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-103
R4	Resistor, 10 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-103	R46	Resistor, 150 $\Omega$ , $\pm$ 5%, 1/8 W	110027-151
R5	Resistor, 100 $\Omega$ , $\pm$ 5%, 1/8 W	110027-101	R47	Resistor, 100 $\Omega$ , $\pm$ 5%, 1/8 W	110027-101
R6–R13	Resistor, 10 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-103	X+	Crystal, 14.318M, Osc. Module, .3 x .3 DIP	144009-001
R14	Resistor, 470 $\Omega$ , $\pm$ 5%, 1/8 W	110027-471	X1	Crystal, 14.318M, Osc. Module, .3 x .3 DIP	144009-001
R15	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102	X2	Crystal, 10.000 MHz	144000-013
R16	Resistor, 470 $\Omega$ , $\pm$ 5%, 1/8 W	110027-471			

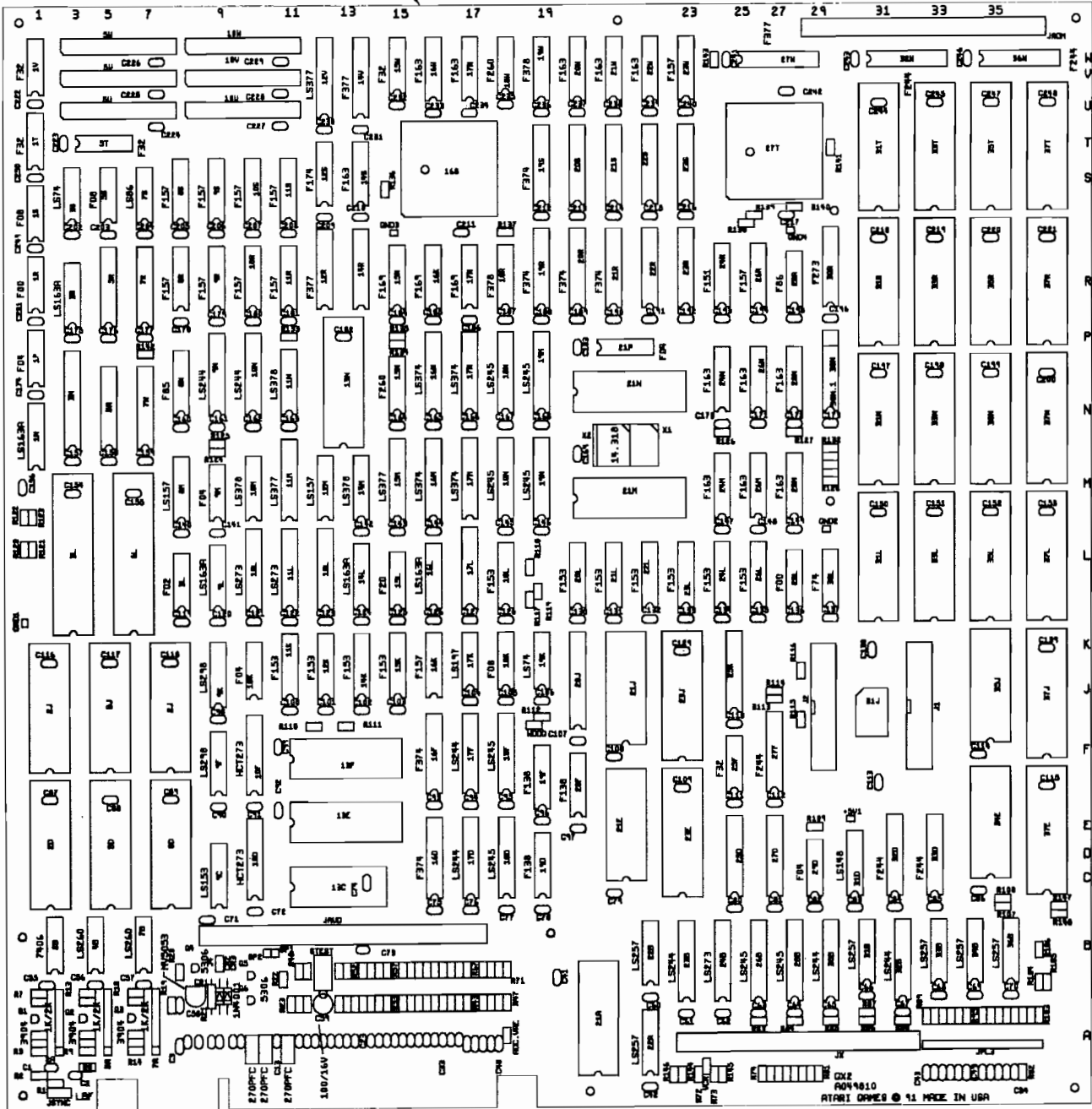


Figure 4-13 Moto Frenzy Mini-Deluxe Game PCB Assembly (EPROM Version)

A049810-04 A

## Moto Frenzy Game PCB Assembly Parts List

Designator	Description	Part No.	Designator	Description	Part No.
2D, 2J	Socket, 32 Pin, .600	179257-032	2D	EPROM, 512K x 8, 100 ns	136094-0030
3L	Socket, 40 Pin, .600	179257-040	3L	IC, SOS	137550-001
3N	Socket, 24 Pin, .300	179259-024			
5D, 5J	Socket, 32 Pin, .600	179257-032	3N	GAL20V8, 25 ns	136094-0019
			3R	IC, 74LS163 A	137114-001
5N, 5R	Socket, 20 Pin, .300	179259-020	3S	IC, 74LS74	137023-001
5U, 5V, 5W	Socket, Zip 28	179302-028	4B	IC, 74LS260	137332-001
6L	Socket, 40 Pin, .600	179257-040			
7N, 7R	Socket, 20 Pin, .300	179259-020	5A	Res, R/2R, 1K/2K	118016-001
			5D	EPROM, 512K x 8, 100 ns	136094-0031
8D, 8J	Socket, 32 Pin, .600	179257-032	5N	GAL16V8, 25 ns	136094-0010
10U, 10V, 10W	Socket, Zip 28	179302-028	5R	GAL16V8, 25 ns	136094-0011
12L	Socket, 20 Pin, .300	179259-020	5S	IC, 74F08	137483-001
13C	Socket, 24 Pin, .600	179257-024	5T	IC, 74F32	137486-001
			5U, 5V, 5W	IC, VRAM, 256K x 4, 100 ns	137682-100
13E, 13F	Socket, 24 Pin, .300	179259-024	6L	IC, PFHS	137419-104
13N	Socket, 32 Pin, .600	179257-032			
14R	Socket, 20 Pin, .300	179259-020	7A	Res, R/2R, 1K/2K	118016-001
16S	Socket, 68 Pin, Plcc	179237-068	7B	IC, 74LS260	137332-001
			7N	GAL16V8, 25 ns	136094-0009
17L	Socket, 20 Pin, .300	179259-020	7R	GAL16V8, 25 ns	136094-0012
20J	Socket, 24 Pin, .300	179259-024			
20S	Socket, 20 Pin, .300	179259-020	7S	IC, 74LS86	137079-001
21A, 21E, 21J, 21M, 21N	Socket, 28 Pin, .600	179257-028	8D	EPROM, 512K x 8, 100 ns	136094-0032
			8L	IC, 74F02	137481-001
21S, 22R, 22S	Socket, 20 Pin, .300	179259-020	8M	IC, 74LS157	137029-001
			8N	IC, 74F85	137685-001
23E, 23J	Socket, 32 Pin, .600	179257-032	8R, 8S	IC, 74F157	137494-001
23R, 23S, 25D, 25K, 27D	Socket, 20 Pin, .300	179259-020	9C	IC, 74LS153	137104-001
			9F, 9K	IC, 74LS298	137201-001
27T	Socket, 68 Pin, PLCC	179237-068			
			9L	IC, 74LS163 A	137114-001
30N	Socket, 20 Pin, .300	179259-020	9M	IC, 74F04	137437-001
31L, 31N, 31R, 31T, 33L, 33N, 33R, 33T	Socket, 32 Pin, .600	179257-032	9N	IC, 74LS244	137038-001
			9R, 9S	IC, 74F157	137494-001
34E, 35J	Socket, 28 Pin, .600	179257-028			
35L, 35N, 35R, 35T, 37E, 37J, 37L, 37N, 37R, 37T	Socket, 32 Pin, .600	179257-032	10D, 10F	IC, 74HCT273	137655-001
			10K	IC, 74F04	137437-001
+	IC, 74F163	137345-001	10L	IC, 74LS273	137040-001
			10M	IC, 74LS378	137305-001
+	EPROM, 128K x 8, 100 ns	136094-0021			
+	EPROM, 512K x 8, 100 ns	136094-0053	10N	IC, 74LS244	137038-001
			10R, 10S	IC, 74F157	137494-001
1N	IC, 74LS163 A	137114-001	10U, 10V, 10W	IC, VRAM, 256K x 4, 100 ns	137682-100
1R	IC, 74F00	137327-001			
1S	IC, 74F04	137437-001	11K	IC, 74F153	137492-001
1U	IC, 74F32	137486-001			
			11L	IC, 74LS273	137040-001
2A	Res, R/2R, 1K/2K	118016-001	11M	IC, 74LS377	137145-001
2B	IC, 7406	137052-001	11N	IC, 74LS378	137305-001
			11R, 11S	IC, 74F157	137494-001

## Moto Frenzy Game PCB Assembly, Continued

### Parts List

Designator	Description	Part No.	Designator	Description	Part No.
12K	IC, 74F153	137492-001	19M, 19N	IC, 74LS245	137134-001
12L	GAL16V8, 25 ns	136094-0007	19R, 19S	IC, 74F374	137420-001
12M	IC, 74LS157	137029-001			
12R	IC, 74F377	137622-001	19W	IC, 74F378	137612-001
			20F	IC, 74F138	137521-001
12S	IC, 74F174	137531-001	20J	GAL6001, 35 ns	136094-0005
12V	IC, 74LS377	137145-001	20L	IC, 74F153	137492-001
13C	IC, 28C16-200, 200 ns	137648-200			
13E, 13F	IC, RAM, 2K x 8, 35 ns, .3	137534-001	20R	IC, 74F374	137420-001
			20S	PROM, 82S147	136094-0003
13N	EPROM, 128K x 8, 100 ns	136094-0025	20W	IC, 74F163	137345-001
14K	IC, 74F153	137492-001	21A	IC, ADC0809	137243-001
14L	IC, 74LS163 A	137114-001			
14M	IC, 74LS378	137305-001	21E, 21J	IC, RAM, 32K x 8, 70 ns, .6	137615-070
			21L	IC, 74F153	137492-001
14R	GAL16V8, 10 ns	136094-0006	21M, 21N	IC, RAM, 32K x 8, 70 ns, .6	137615-070
14S	IC, 74F163	137345-001	21P	IC, 74F04	137437-001
14V	IC, 74F377	137622-001			
15K	IC, 74F153	137492-001	21R	IC, 74F374	137420-001
			21S	PROM, 82S147	136094-0002
15L	IC, 74F20	137530-001	21W	IC, 74F163	137345-001
15M	IC, 74LS377	137145-001	22A, 22B	IC, 74LS257	137136-001
15N	IC, 74F260	137570-001			
15R	IC, 74F169	137496-001	22L	IC, 74F153	137492-001
			22R	GAL16V8, 25 ns	136094-0014
15W	IC, 74F32	137486-001	22S	PROM, 82S147	136094-0001
16D, 16F	IC, 74F374	137420-001	22W	IC, 74F163	137345-001
16K	IC, 74F157	137494-001			
16L	IC, 74LS163 A	137114-001	23B	IC, 74LS244	137038-001
			23E	EPROM, 128K x 8, 100 ns	136094-0221
16M, 16N	IC, 74LS374	137144-001	23J	EPROM, 128K x 8, 100 ns	136094-0222
16R	IC, 74F169	137496-001	23L	IC, 74F153	137492-001
16S	FPLA, 20 ns	136094-0004			
16W	IC, 74F163	137345-001	23R	GAL16V8, 25 ns	136094-0016
			23S	GAL16V8, 25 ns	136094-0015
17D, 17F	IC, 74LS244	137038-001	23W	IC, 74F157	137494-001
17K	IC, 74LS197	137240-001	24B	IC, 74LS273	137040-001
17L	GAL16V8, 25 ns	136094-0008			
17M, 17N	IC, 74LS374	137144-001	24L	IC, 74F153	137492-001
			24M, 24N	IC, 74F163	137345-001
17R	IC, 74F169	137496-001	24R	IC, 74F151	137490-001
17W	IC, 74F163	137345-001	25D	GAL16V8, 25 ns	136094-0013
18D, 18F	IC, 74LS245	137134-001			
18K	IC, 74F08	137483-001	25F	IC, 74F32	137486-001
			25K	GAL16V8, 25 ns	136094-0018
18L	IC, 74F153	137492-001	26B	IC, 74LS245	137134-001
18M, 18N	IC, 74LS245	137134-001	26L	IC, 74F153	137492-001
18R	IC, 74F378	137612-001			
18W	IC, 74F260	137570-001	26M, 26N	IC, 74F163	137345-001
			26R	IC, 74F157	137494-001
19D, 19F	IC, 74F138	137521-001	27D	GAL16V8, 25 ns	136094-0017
19K	IC, 74LS74	137023-001	27F	IC, 74F244	137502-001

## Moto Frenzy Game PCB Assembly, Continued

### Parts List

Designator	Description	Part No.	Designator	Description	Part No.
27T	IC, CPU, PLCC	137658-101	C4, C5, C7, C8	Capacitor, .01 $\mu$ F, 50 V, +80% -20%, Ceramic	122002-103
27W	IC, 74F377	137622-001	C9, C10	Capacitor, 1000 pF, 100 V, $\pm$ 10%, Ceramic	122015-102
28B	IC, 74LS245	137134-001	C11, C12	Capacitor, 270 PFC, 50 V, EMI Filter	140006-271
28L	IC, 74F00	137327-001	C13	Capacitor, 100 pF, 100 V, $\pm$ 5%, Ceramic	122016-101
28M, 28N	IC, 74F163	137345-001	C14	Capacitor, 270 PFC, 50 V, EMI Filter	140006-271
28R	IC, 74F86	137649-001	C15, C16	Capacitor, .1 $\mu$ F, 50 V, +80% -20%, Ceramic	122002-104
29D	IC, 74F04	137437-001	C17-C19	Capacitor, .01 $\mu$ F, 50 V, +80% -20%, Ceramic	122002-103
30B	IC, 74LS244	137038-001	C20, C21	Capacitor, .1 $\mu$ F, 50 V, +80% -20%, Ceramic	122002-104
30L	IC, 74F74	137436-001	C22-C29	Capacitor, .01 $\mu$ F, 50 V, +80% -20%, Ceramic	122002-103
30N	IC, 74F138	137521-001	C30-C35, C36-C58	Capacitor, .1 $\mu$ F, 50 V, +80% -20%, Ceramic	122002-104
30R	IC, 74F273	137610-001	C59	Capacitor, 100 $\mu$ F, 16 V, Electrolytic, Radial	123013-107
31B	IC, 74LS257	137136-001	C60-C72	Capacitor, .1 $\mu$ F, 50 V, +80% -20%, Ceramic	122002-104
31D	IC, 74LS148	137417-001	C73	Capacitor, 100 pF, 100 V, $\pm$ 5%, Ceramic	122016-101
31J	IC, CPU, 68EC020, 16 MHz, 100PQFP	137691-001	C74-C248	Capacitor, .1 $\mu$ F, 50 V, +80% -20%, Ceramic	122002-104
31L	EPROM, 512K x 8, 100 ns	136094-0040	CR1	Diode, MV5053, Light Emitting	131027-002
31N	EPROM, 512K x 8, 100 ns	136094-0041	CR2, CR3	Diode, 1N4001	131048-001
31R	EPROM, 512K x 8, 100 ns	136094-0048	GND1, GND2	Test Point	179051-001
31T	EPROM, 512K x 8, 100 ns	136094-0049	J4	Connector, 2 Circuit, Header, .100 Ctr	179048-002
32B	IC, 74LS244	137038-001	JAUD	Conn, 36 Ckt, .1 Hdr, Long	179300-036
32D, 32W	IC, 74F244	137502-001	JPL3	Conn, 15 Ckt, Hdr, .100 Ctr	179118-015
33B	IC, 74LS257	137136-001	JROM	Conn, 60 Ckt, Hdr, .1 x .1C	179291-060
33D	IC, 74F244	137502-001	JSYNC	Conn, 3 Ckt, Hdr, .100 Ctr	179048-003
33L	EPROM, 512K x 8, 100 ns	136094-0042	JX	Conn, 60 Ckt, Hdr, .1 x .1C	179291-060
33N	EPROM, 512K x 8, 100 ns	136094-0043	Q1-Q3	Transistor, 2N3904	133041-001
33R	EPROM, 512K x 8, 100 ns	136094-0050	Q4-Q6	Transistor, 2N5306	133033-001
33T	EPROM, 512K x 8, 100 ns	136094-0051	R+	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102
34B	IC, 74LS257	137136-001	R1, R2	Resistor, 470 $\Omega$ , $\pm$ 5%, 1/8 W	110027-471
34E, 35J	IC, RAM, 32K x 8, 70 ns, .6	137615-070	R3	Resistor, 10 $\Omega$ , $\pm$ 5%, 1/8 W	110027-100
35L	EPROM, 512K x 8, 100 ns	136094-0044	R4	Resistor, 100 $\Omega$ , $\pm$ 5%, 1/8 W	110027-101
35N	EPROM, 512K x 8, 100 ns	136094-0045	R5	Resistor, 15 $\Omega$ , $\pm$ 5%, 1/8 W	110027-150
35R	EPROM, 512K x 8, 100 ns	136094-0052	ADC.VRE	Connector, 2 Circuit, Header, .100 Ctr	179048-002
35T	EPROM, 512K x 8, 100 ns	136094-0053	C1, C2	Capacitor, 100 pF, 100 V, $\pm$ 5%, Ceramic	122016-101
36B	IC, 74LS257	137136-001	C3	Capacitor, .1 $\mu$ F, 50 V, +80% -20%, Ceramic	122002-104
36W	IC, 74F244	137502-001			
37E	EPROM, 128K x 8, 100 ns	136094-0223			
37J	EPROM, 128K x 8, 100 ns	136094-0224			
37L	EPROM, 512K x 8, 100 ns	136094-0046			
37N	EPROM, 512K x 8, 100 ns	136094-0047			

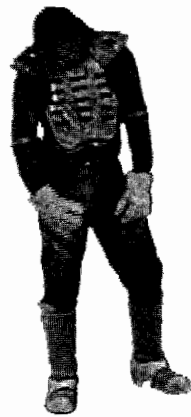
## Moto Frenzy Game PCB Assembly, Continued

### Parts List

Designator	Description	Part No.	Designator	Description	Part No.
R6	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102	R88	Resistor, 470 $\Omega$ , $\pm$ 5%, 1/8 W	110027-471
R7	Resistor, 2.4 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-242	R89–R100	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102
R8	Resistor, 470 $\Omega$ , $\pm$ 5%, 1/8 W	110027-471	R101–R106	Resistor, 470 $\Omega$ , $\pm$ 5%, 1/8 W	110027-471
R9	Resistor, 10 $\Omega$ , $\pm$ 5%, 1/8 W	110027-100	R108	Resistor, 10 $\Omega$ , $\pm$ 5%, 1/8 W	110027-100
R10	Resistor, 100 $\Omega$ , $\pm$ 5%, 1/8 W	110027-101	R109	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102
R11	Resistor, 15 $\Omega$ , $\pm$ 5%, 1/8 W	110027-150	R110	Resistor, 10 $\Omega$ , $\pm$ 5%, 1/8 W	110027-100
R12	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102	R112	Resistor, 10 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-103
R13	Resistor, 2.4 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-242	R113, R114	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102
R14	Resistor, 10 $\Omega$ , $\pm$ 5%, 1/8 W	110027-100	R115	Resistor, 10 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-103
R15	Resistor, 100 $\Omega$ , $\pm$ 5%, 1/8 W	110027-101	R116	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102
R16	Resistor, 15 $\Omega$ , $\pm$ 5%, 1/8 W	110027-150	R117	Resistor, 470 $\Omega$ , $\pm$ 5%, 1/8 W	110027-471
R17	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102	R118	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102
R18	Resistor, 2.4 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-242	R119	Resistor, 10 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-103
R19	Resistor, 100 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-104	R120, R123, R124	Resistor, 10 $\Omega$ , $\pm$ 5%, 1/8 W	110027-100
R20	Resistor, 240 $\Omega$ , $\pm$ 5%, 1/8 W	110027-241	R125	Resistor, 10 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-103
R21	Resistor, 0 $\Omega$ , $\pm$ 5%, 1/4 W	110005-001	R126, R127	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102
R22–R27	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102	R128, R130–R133	Resistor, 10 $\Omega$ , $\pm$ 5%, 1/8 W	110027-100
R28–R35	Resistor, 470 $\Omega$ , $\pm$ 5%, 1/8 W	110027-471	R135–R139	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102
R36–R41	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102	R140	Resistor, 470 $\Omega$ , $\pm$ 5%, 1/8 W	110027-471
R42, R43	Resistor, 10 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-103	R141–R145	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102
R44	Resistor, 100 $\Omega$ , $\pm$ 5%, 1/8 W	110027-101	R146	Resistor, 2.2 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-222
R45	Resistor, 220 $\Omega$ , $\pm$ 5%, 1/8 W	110027-221	STEST	Switch, Slide, SPDT	160040-001
R46, R47	Resistor, 100 $\Omega$ , $\pm$ 5%, 1/8 W	110027-101	VCR	Connector, 2 Circuit, Header, .100 Ctr	179048-002
R48, R49,	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102	WDOG	Connector, 2 Circuit, Header, .100 Ctr	179048-002
R52–R59			X2	Crystal, 14.318M, Osc. Module, .3 x .3 DIP	144009-001
R60–R63	Resistor, 470 $\Omega$ , $\pm$ 5%, 1/8 W	110027-471			
R66–R71	Resistor, 10 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-103			
R72	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102			
R73	Resistor, 10 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-103			
R74–R77	Resistor, 470 $\Omega$ , $\pm$ 5%, 1/8 W	110027-471			
R78–R81	Resistor, 1 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-102			
R82–R86	Resistor, 470 $\Omega$ , $\pm$ 5%, 1/8 W	110027-471			
R87	Resistor, 10 K $\Omega$ , $\pm$ 5%, 1/8 W	110027-103			



# Schematic Diagrams



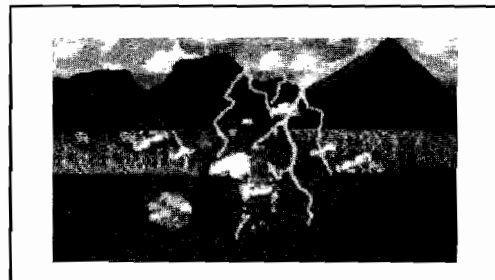
## INTRODUCTION

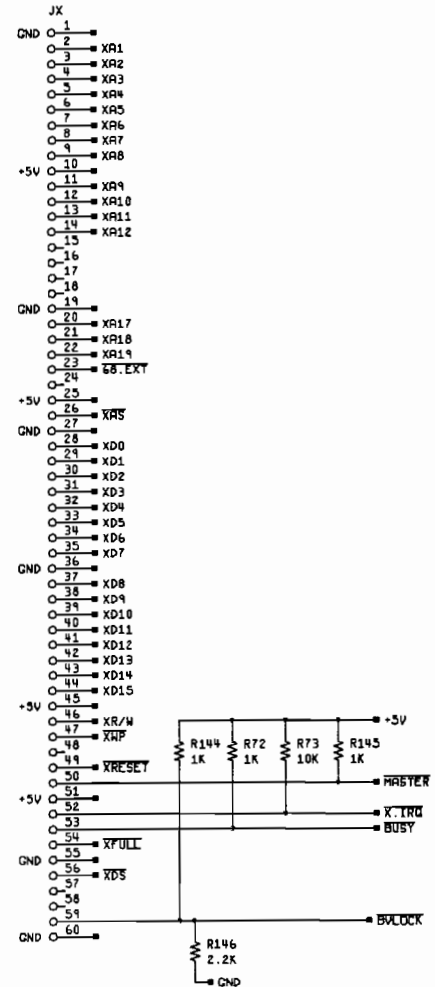
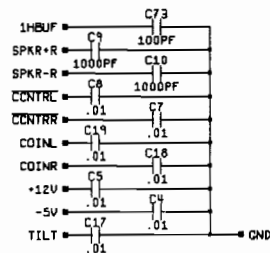
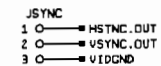
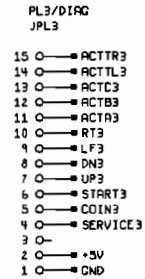
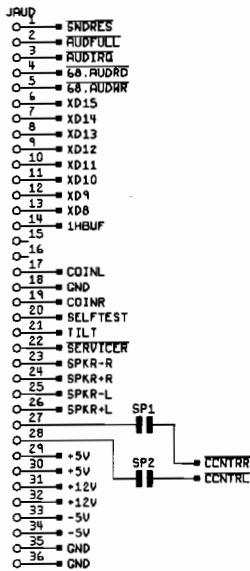
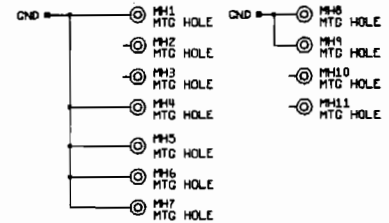
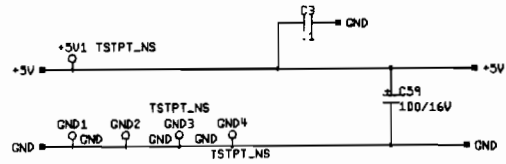
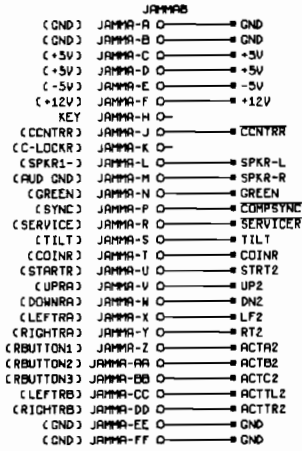
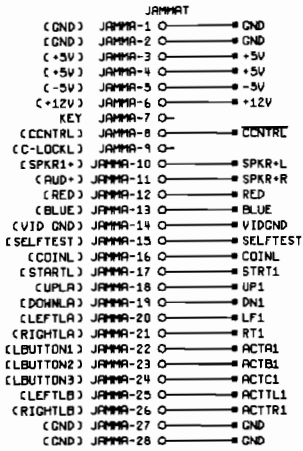
**T**HIS CHAPTER contains the schematic diagrams for all the Moto Frenzy™ Mini-Deluxe printed-circuit boards,

including the game PCB (also called GX2), the JSA III PCB, the CLARN PCB, and the JAMMA Filter PCB. In addi-

tion, this chapter includes wiring diagrams for the entire game, the coin door, the JAMMA power supply, and the Hitron and Peter Chou

switching power supplies. The PCB *assembly drawings* are illustrated in Chapter 4, Parts Illustrations.





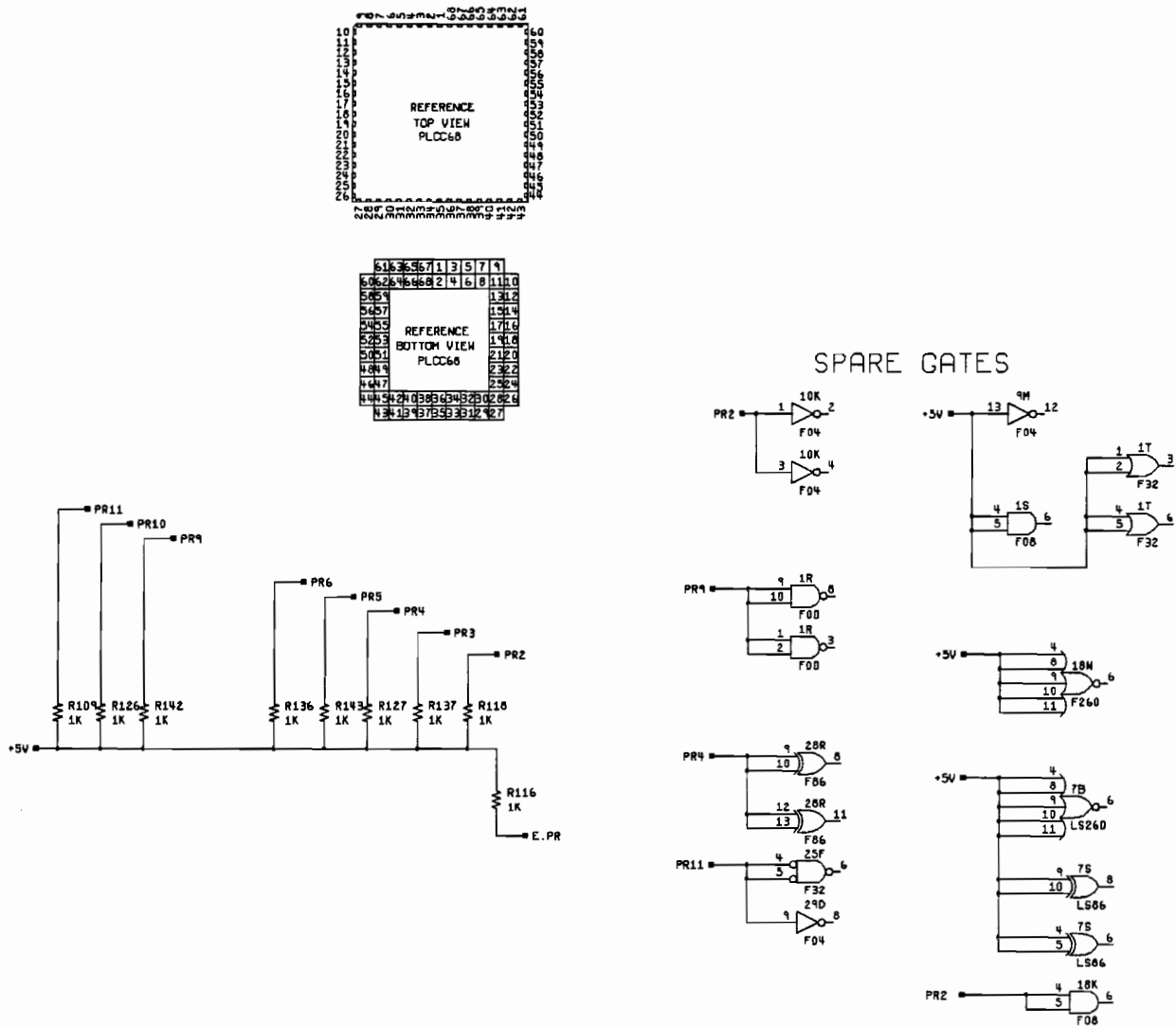
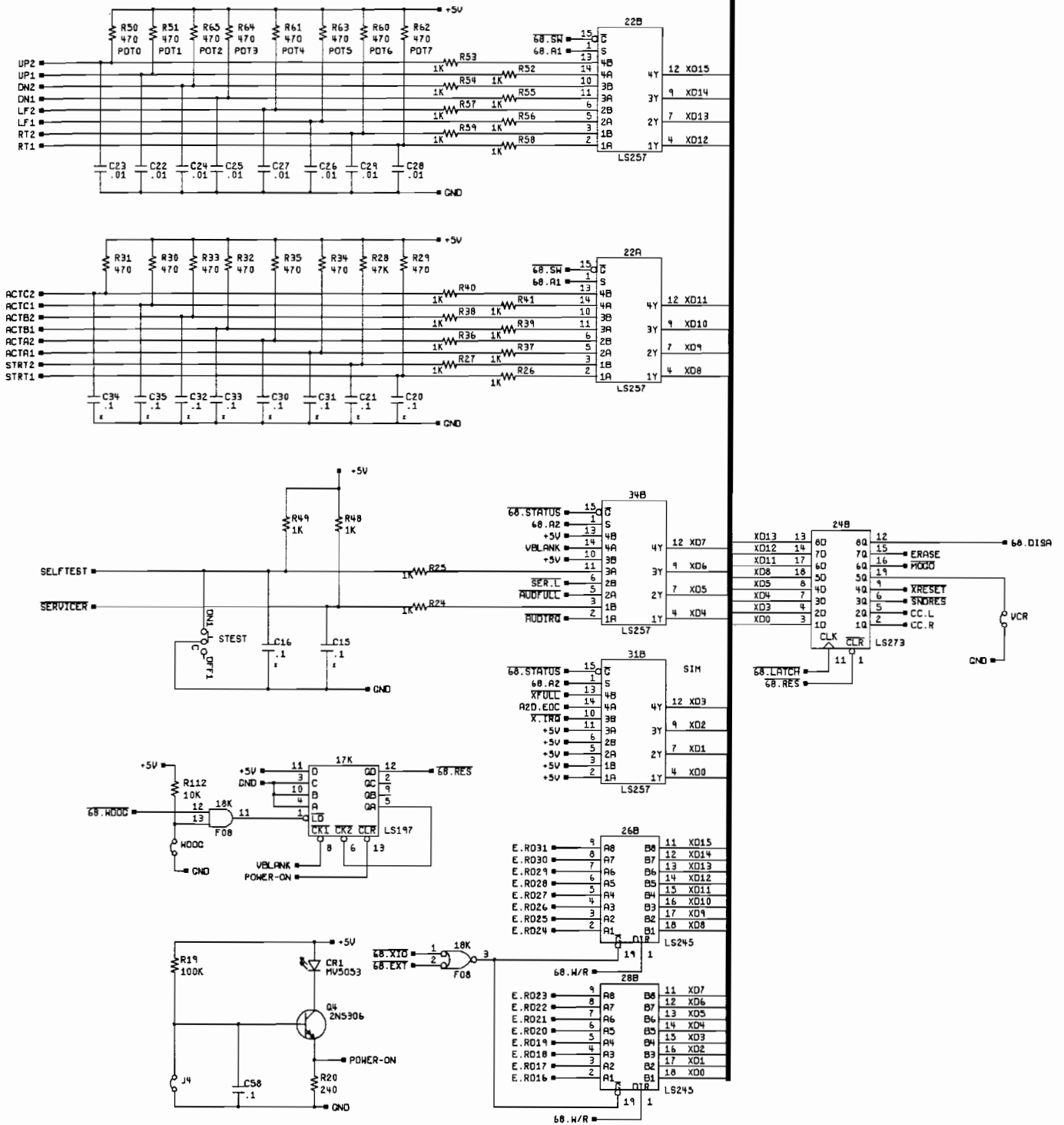


Figure 5-1 Moto Frenzy Mini-Deluxe Game PCB (GX2) Assembly Schematic Diagram

A049809-XX C



XDC0:153

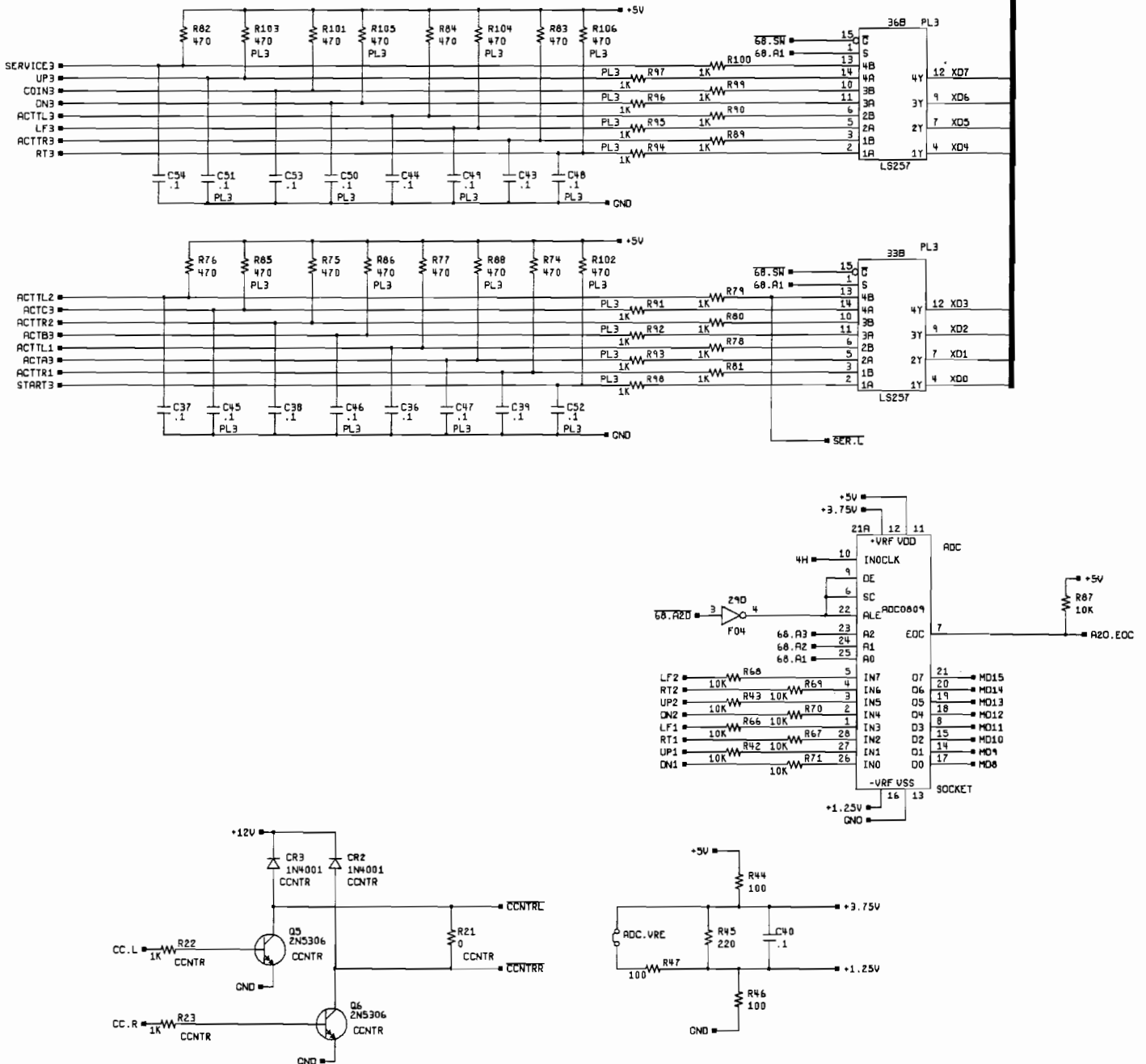


Figure 5-1 Moto Frenzy Mini-Deluxe Game PCB (GX2) Assembly Schematic Diagram

A049809-XX C

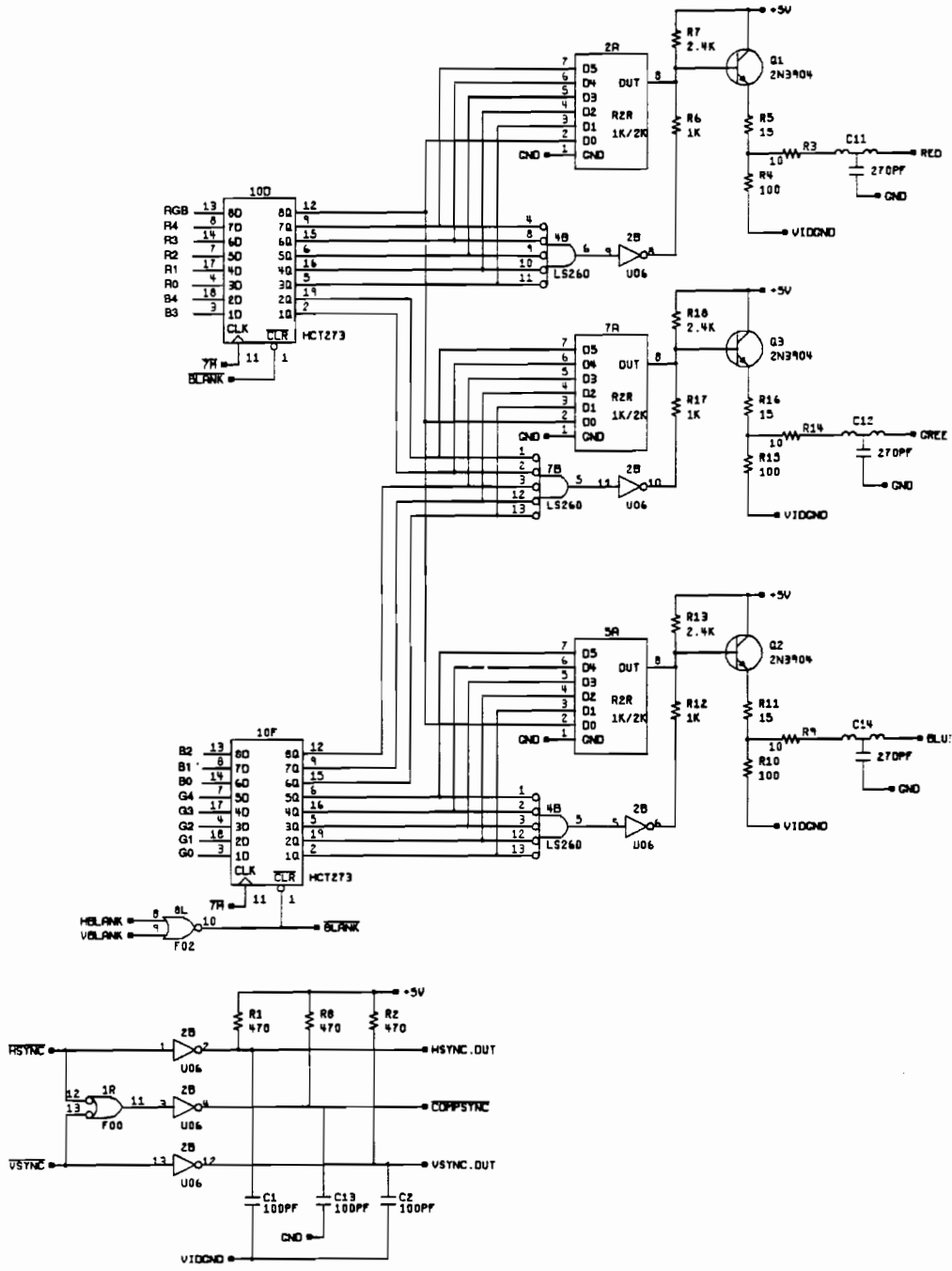
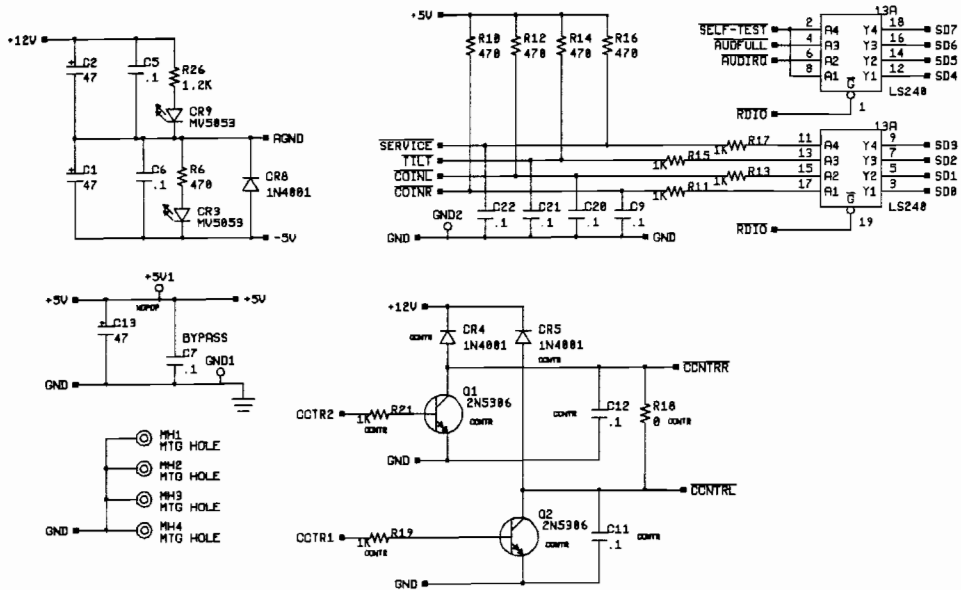


Figure 5-1 Moto Frenzy Mini-Deluxe Game PCB (GX2) Assembly Schematic Diagram  
A049809-XX C

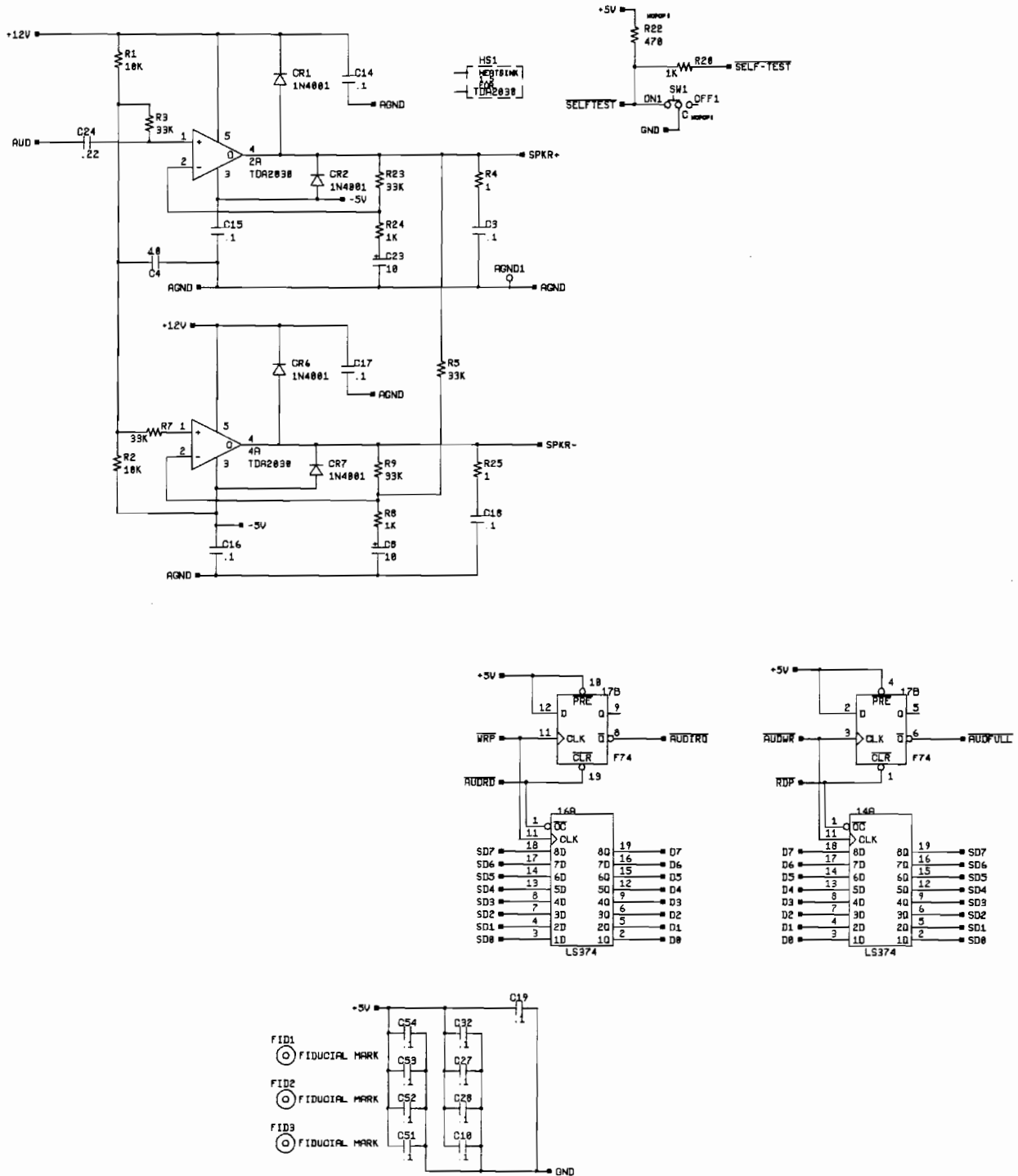


- 1 → RESET
- 2 → AUDFULL
- 3 → AUDTRG
- 4 → AUDRD
- 5 → AUDWR
- 6 → D7
- 7 → D6
- 8 → D5
- 9 → D4
- 10 → D3
- 11 → D2
- 12 → D1
- 13 → D0
- 14 → 3579K
- 15 →
- 16 →
- 17 → CDINC
- 18 → GND
- 19 → CDTRN
- 20 → SELFTEST
- 21 → YFLT
- 22 → SERVICE
- 23 → AGND
- 24 → AUDOUT
- 25 → SPKR-
- 26 → SPKR+
- 27 → CDNTRR
- 28 → CDNTRL
- 29 →
- 30 → +5V
- 31 → +5V
- 32 → +12V
- 33 → +12V
- 34 → -5V
- 35 → -5V
- 36 → GND



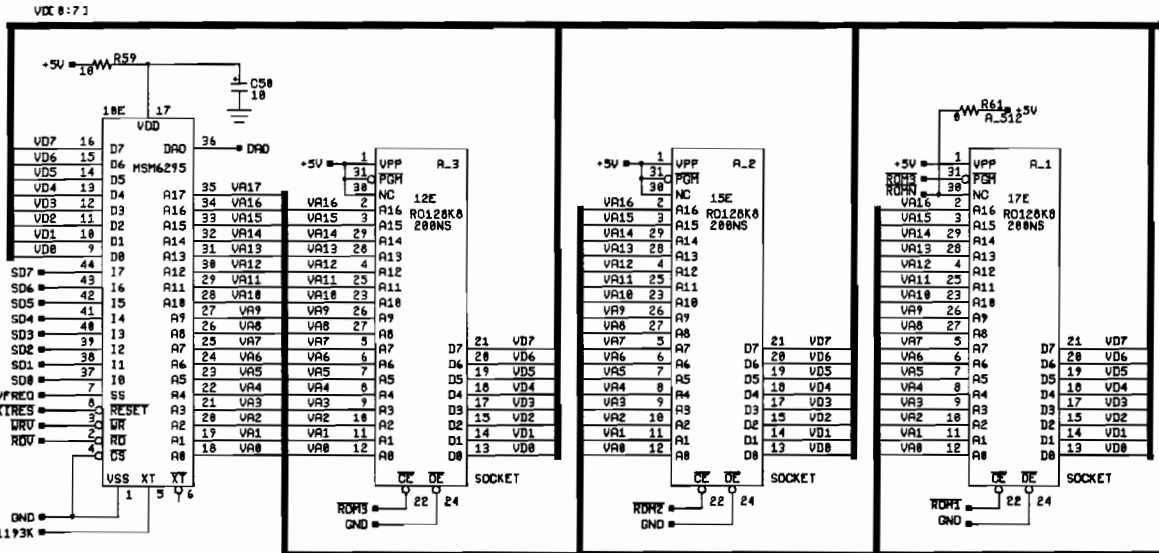
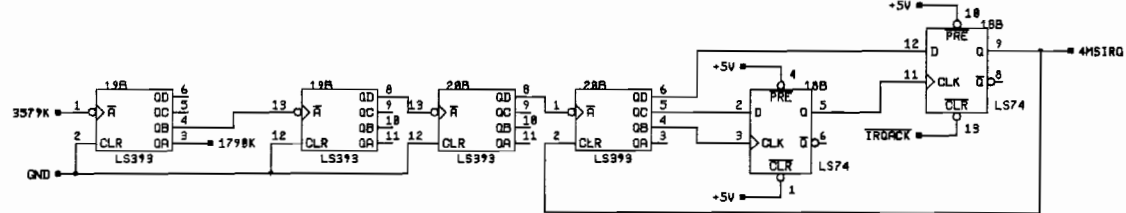
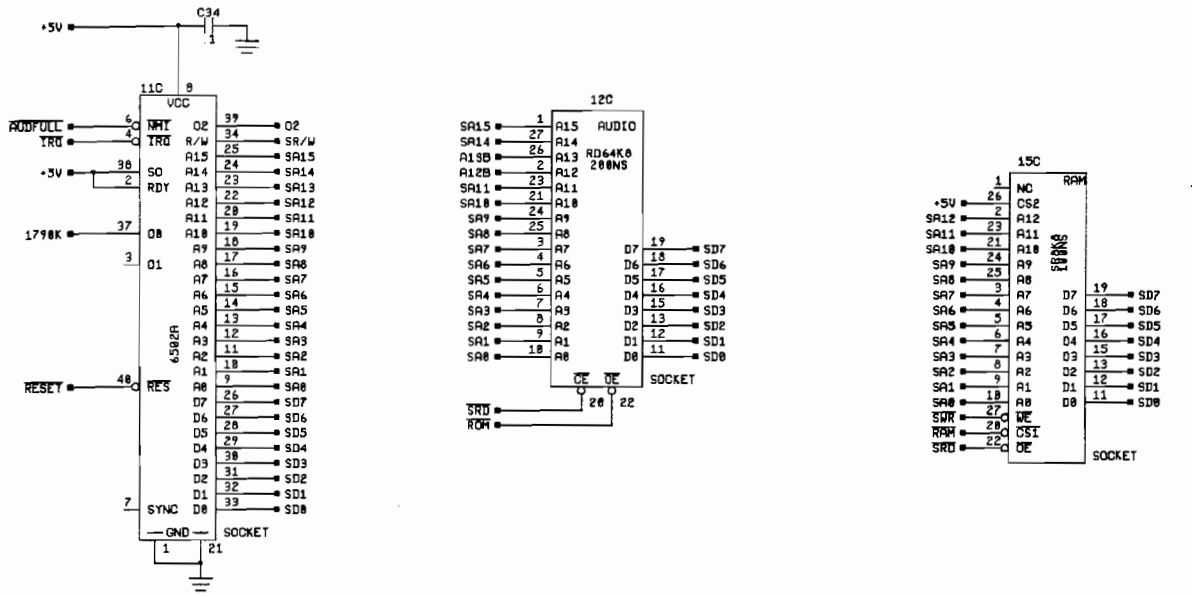
GND AND AGND TIED INTERNALLY NEAR MSM6295



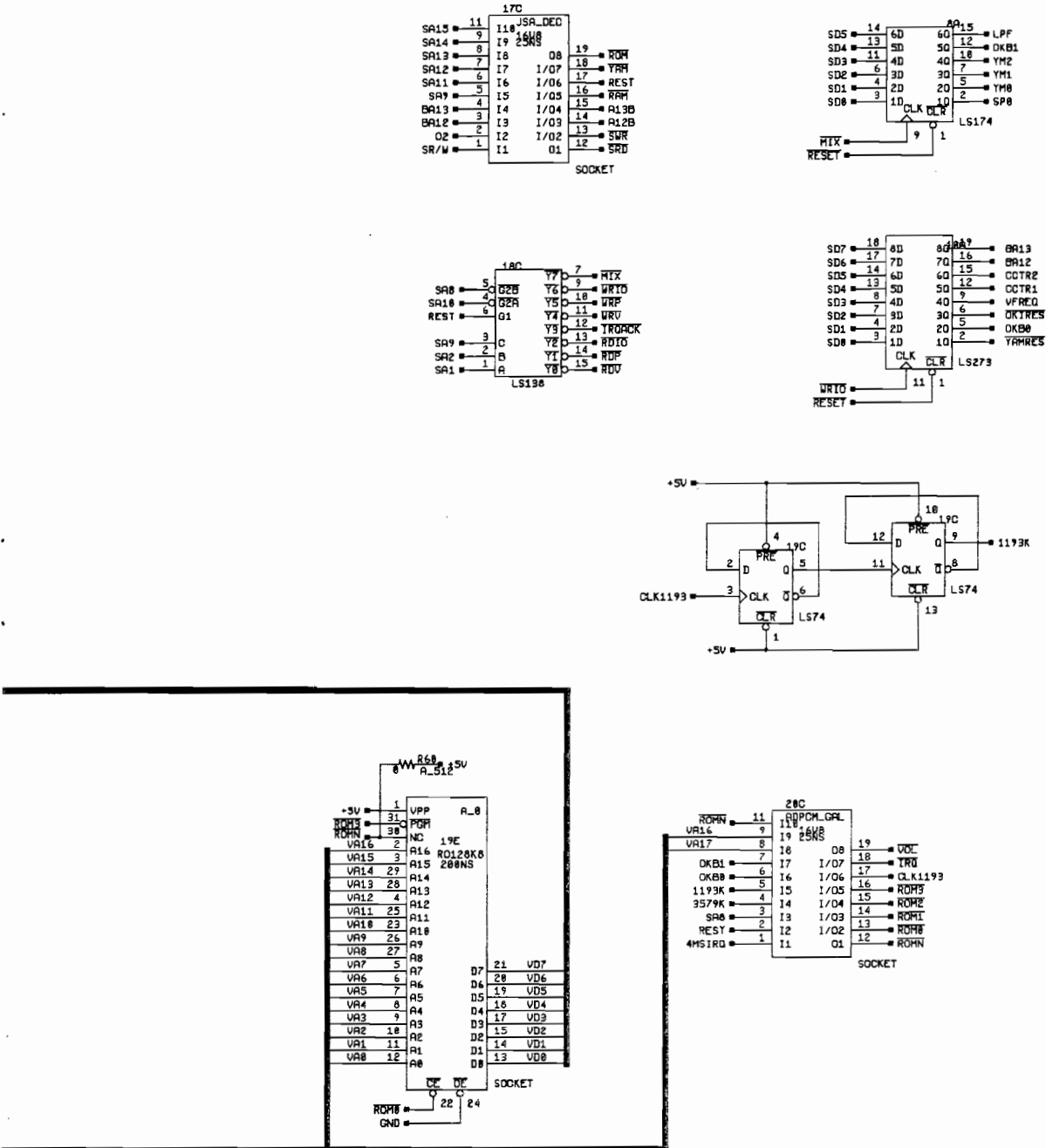


**Figure 5-3 JSA III PCB Assembly Schematic Diagram**

A048973-01 D

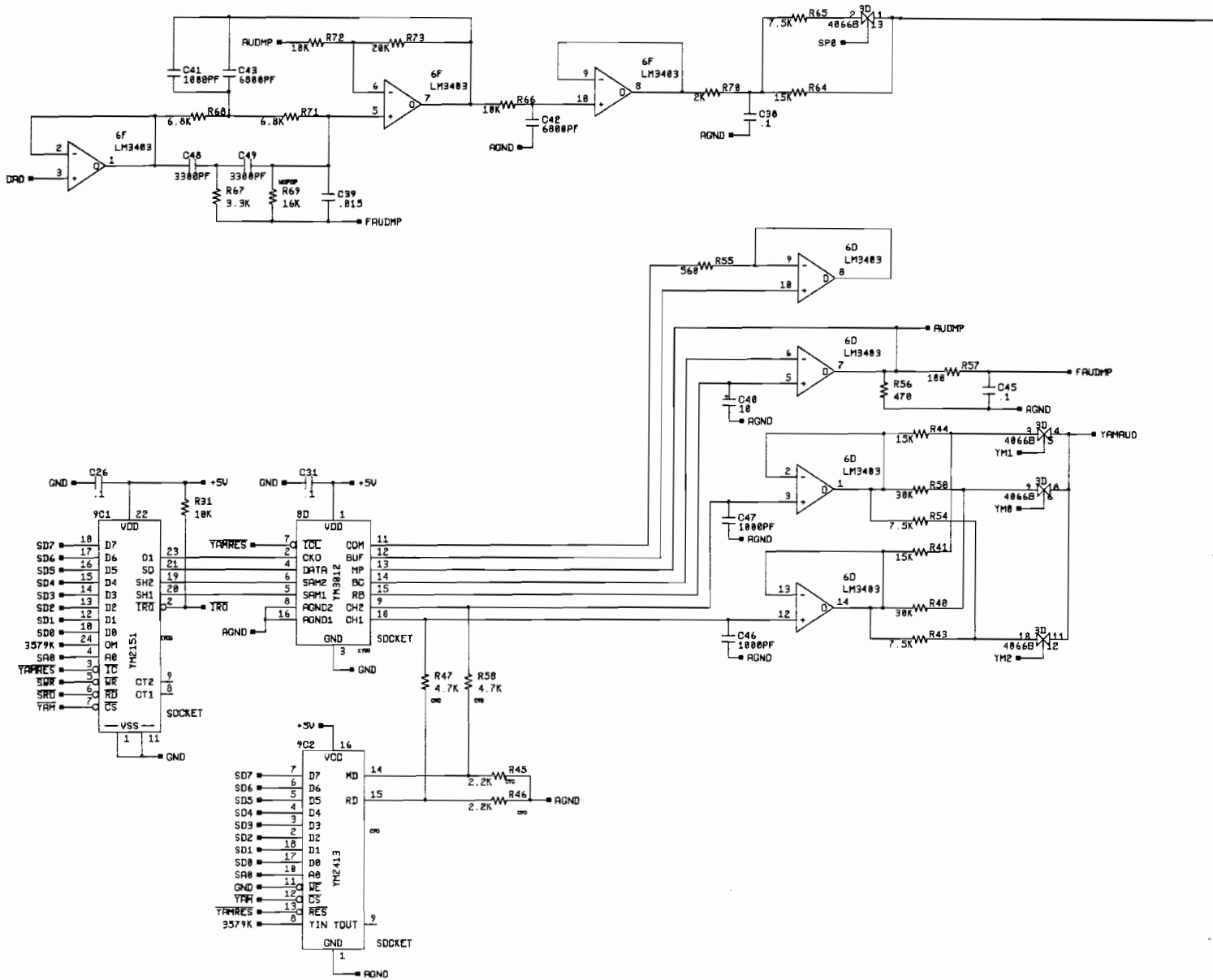


VEP 8:17J



**Figure 5-3 JSA III PCB Assembly Schematic Diagram**

A048973-01 D



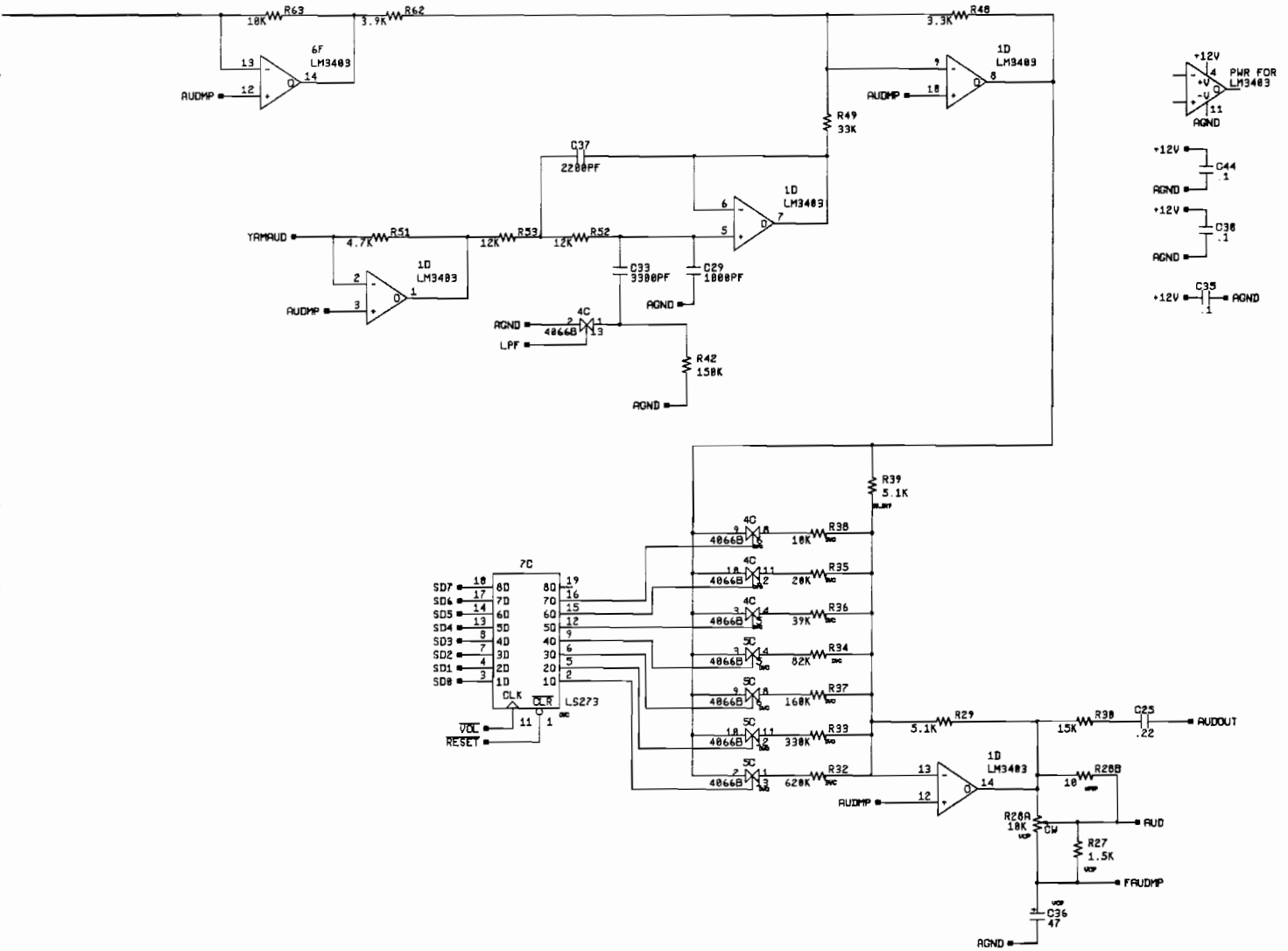
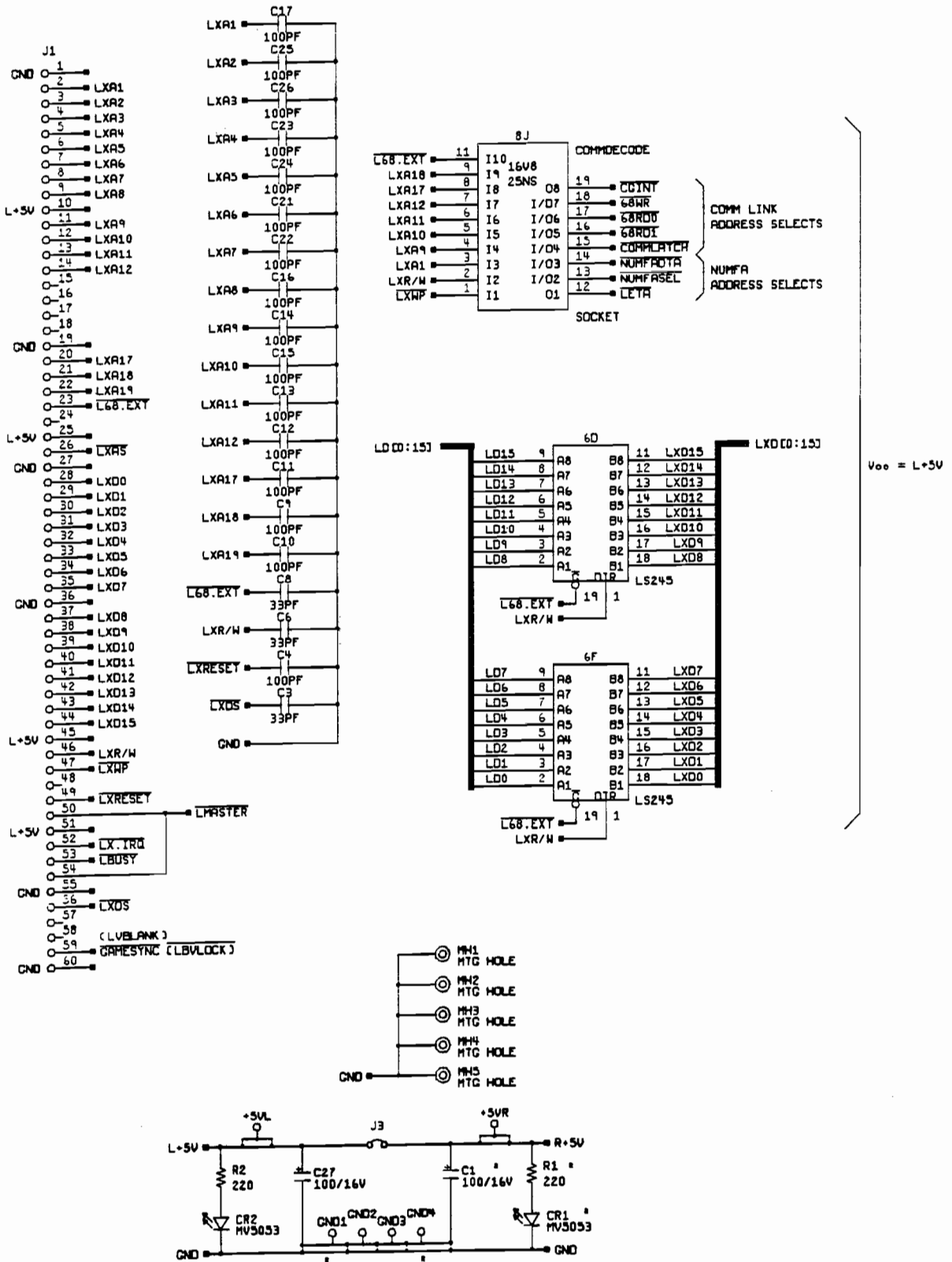
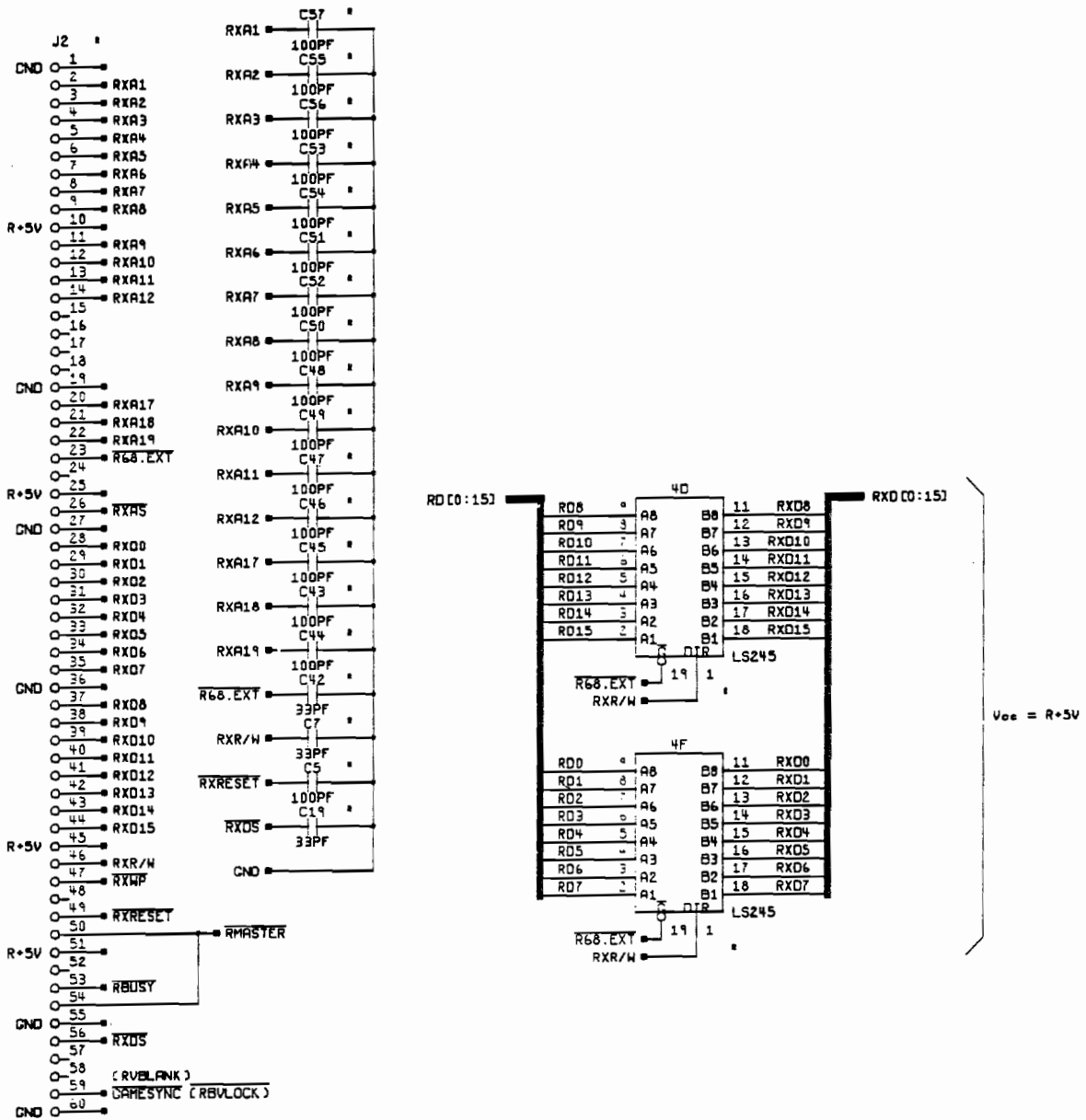


Figure 5-3 JSA III PCB Assembly Schematic Diagram

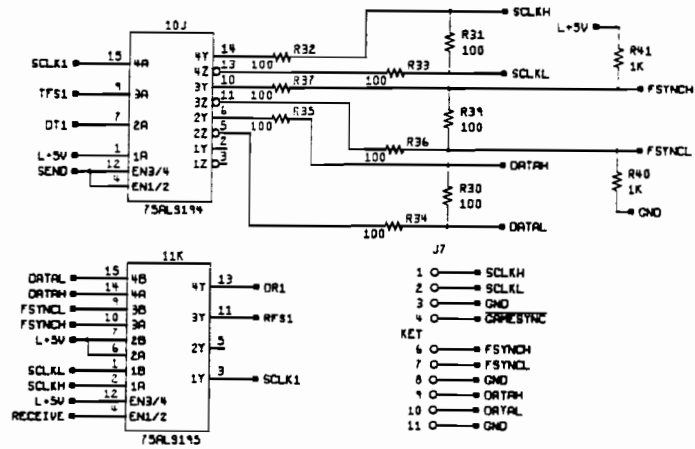
A048973-01 D



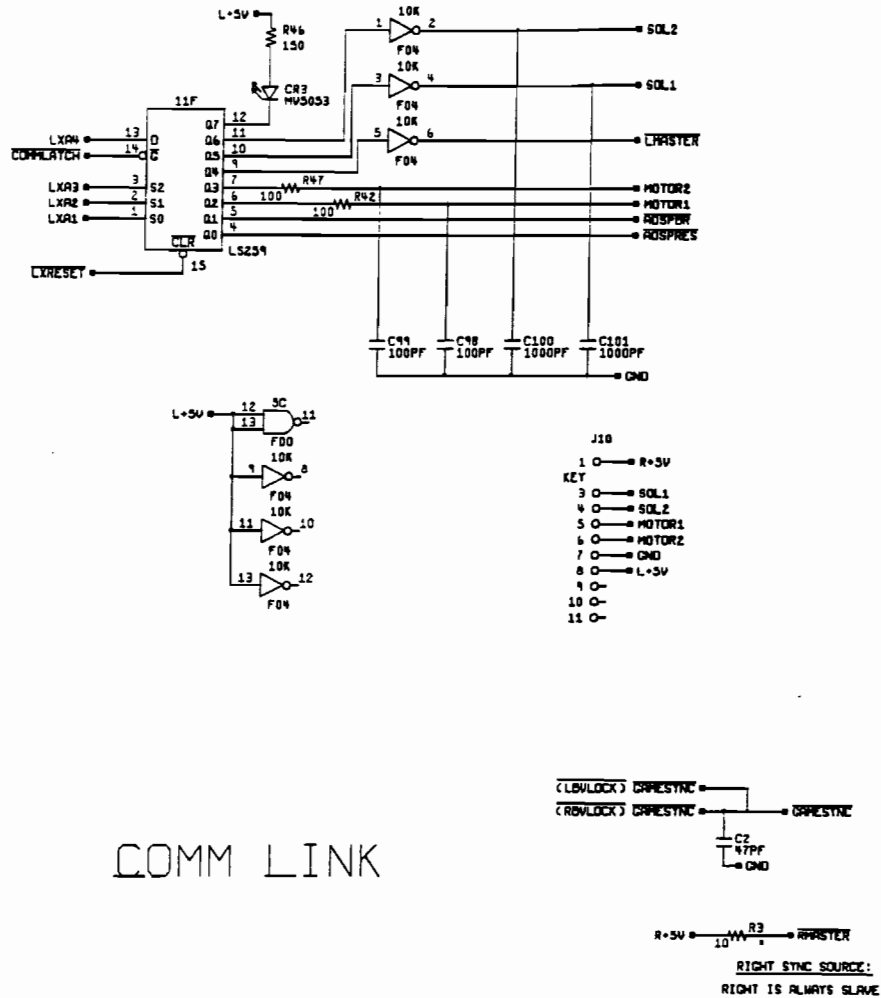


**Figure 5-4 CLARN PCB Assembly Schematic Diagram**

A050273-XX A

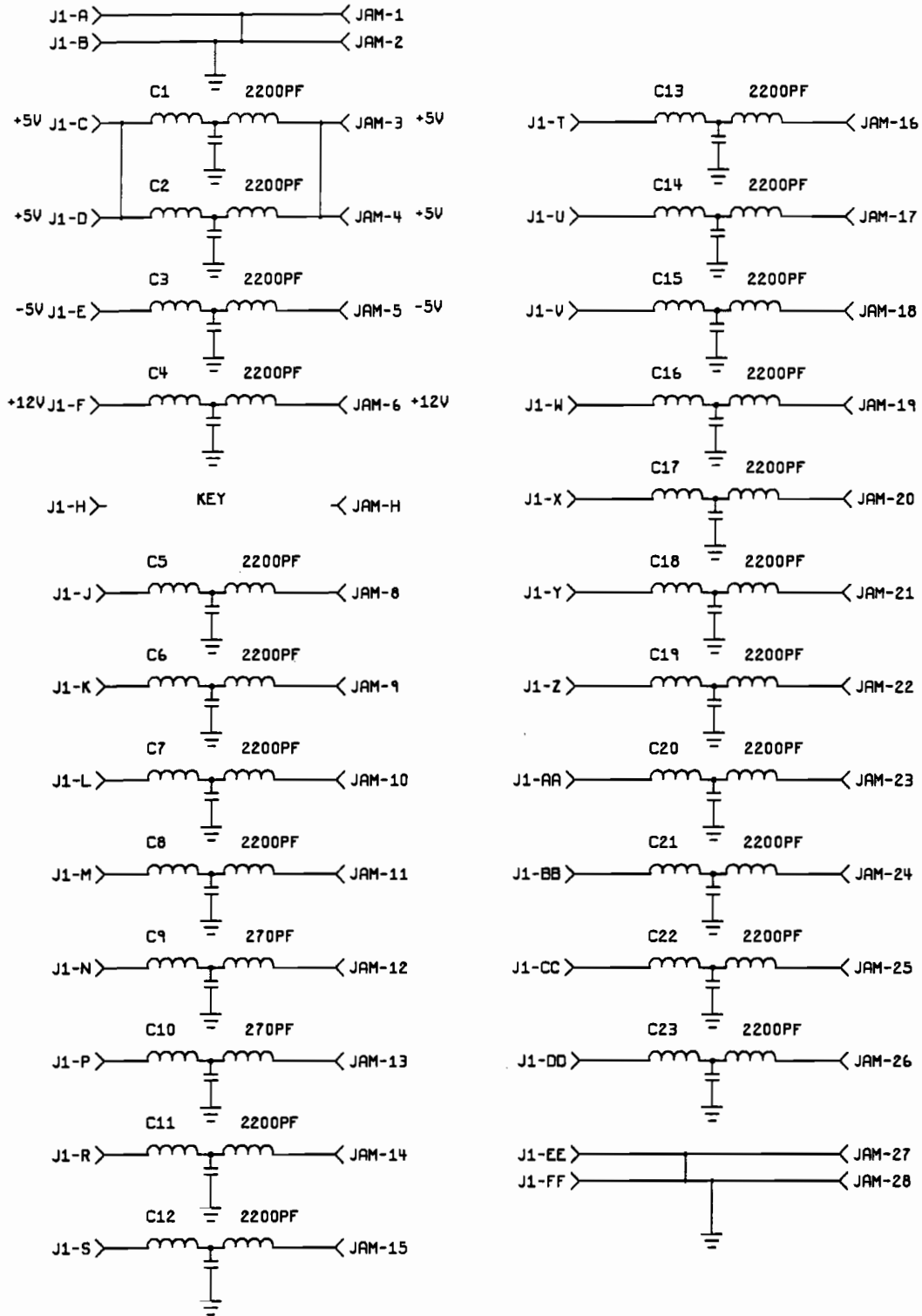


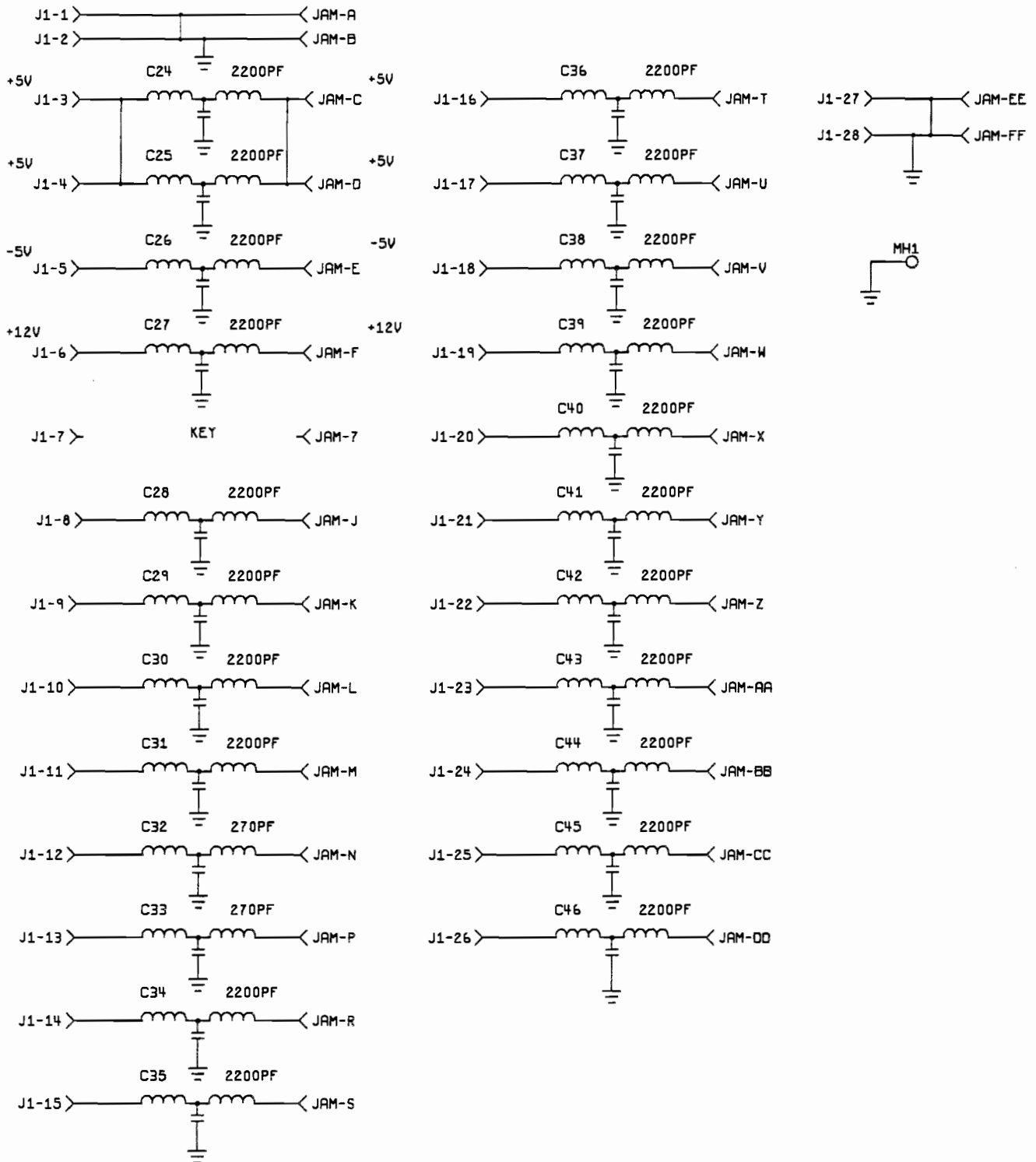




**Figure 5-4 CLARN PCB Assembly Schematic Diagram**

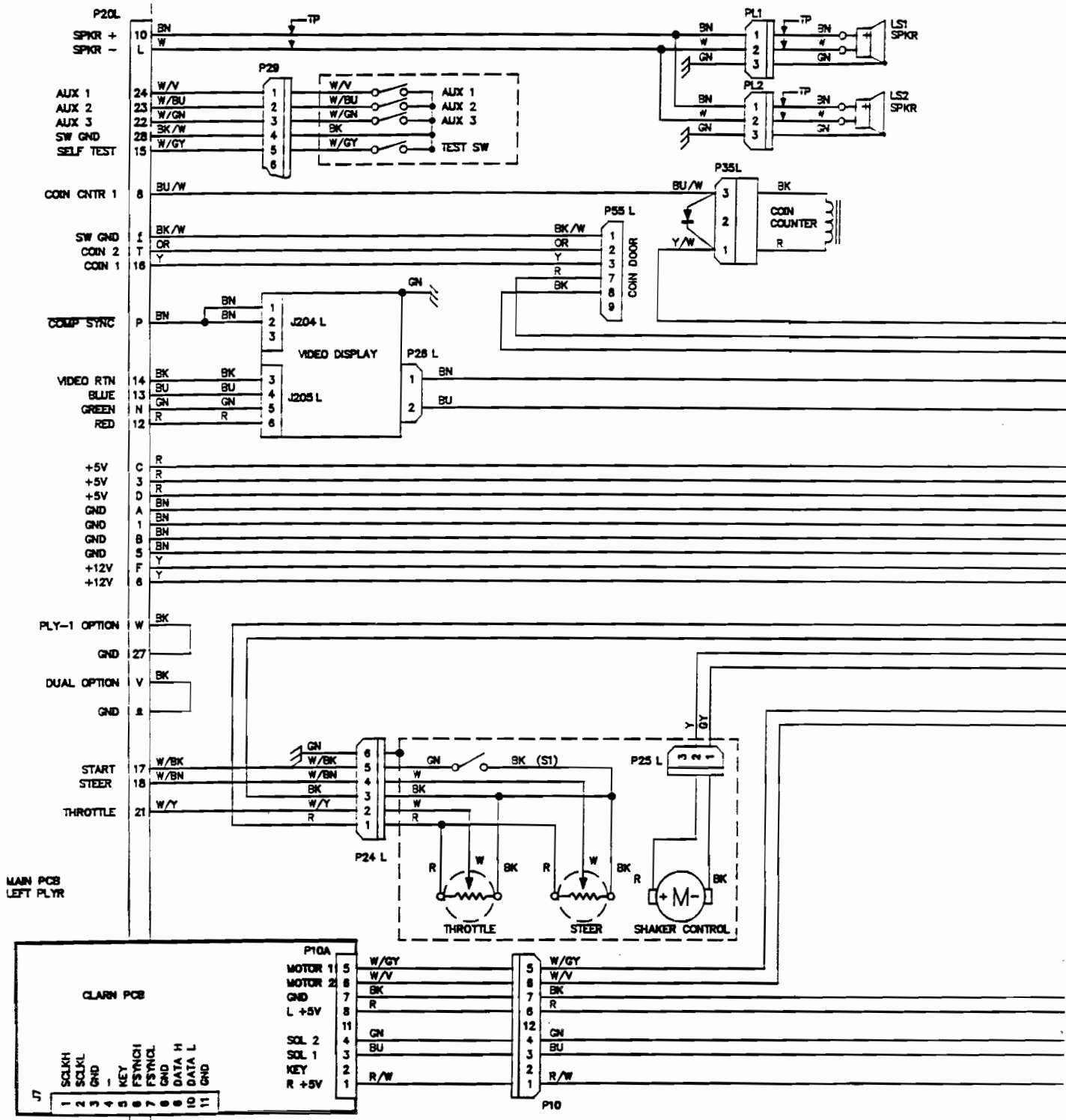
A050273-XX A





**Figure 5-5 JAMMA Filter PCB Assembly Schematic Diagram**

A047292-02 A



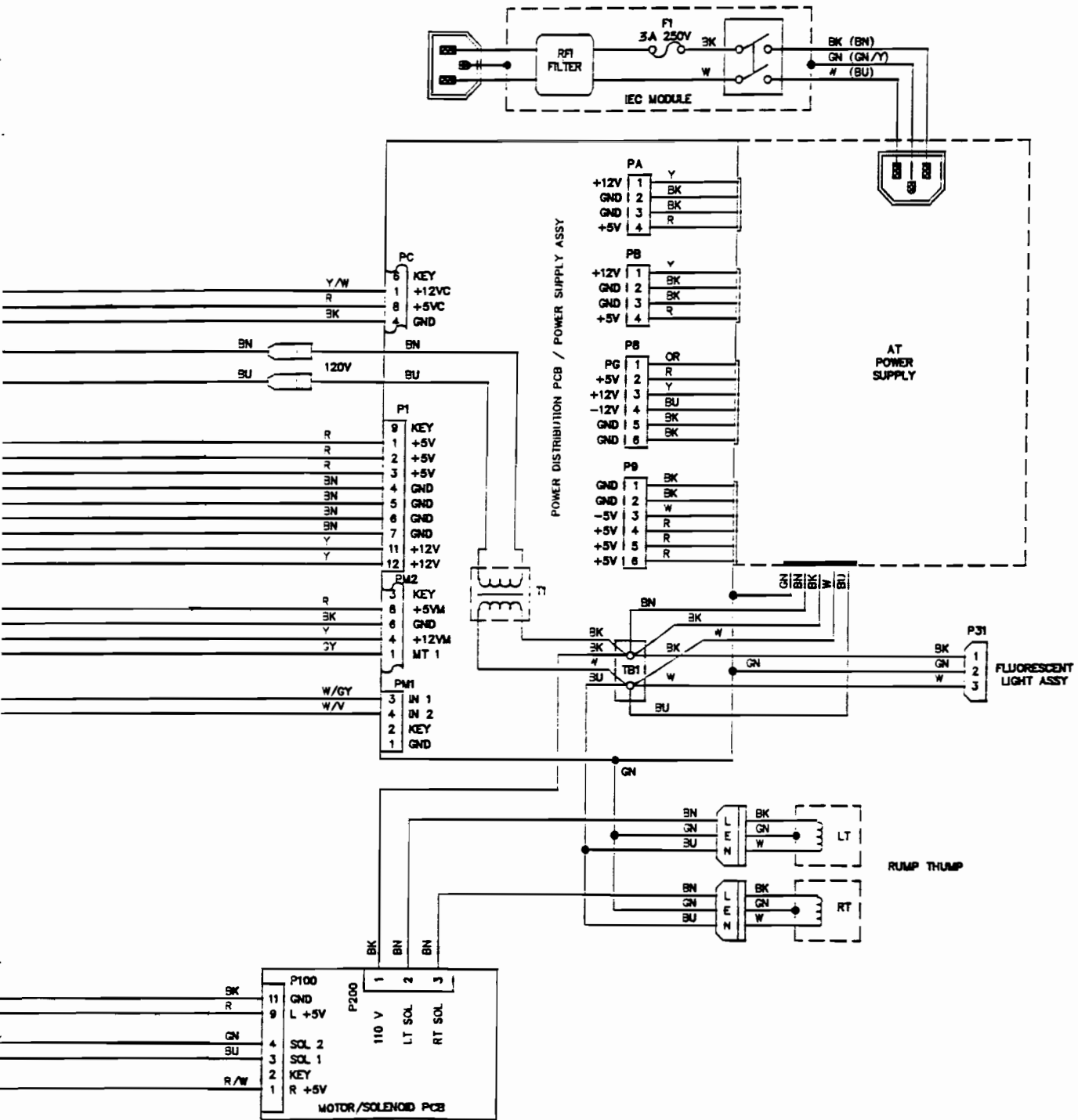
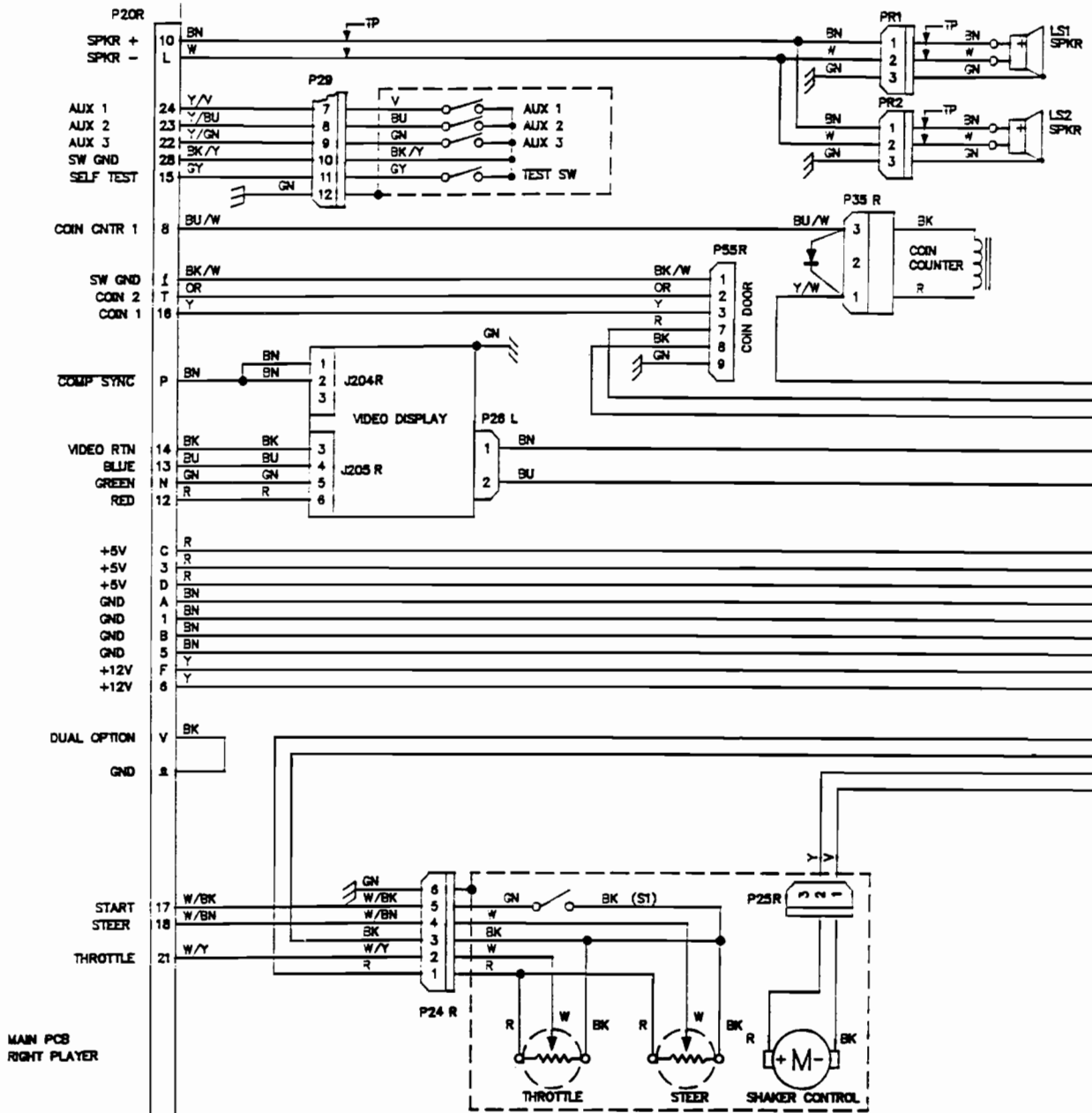
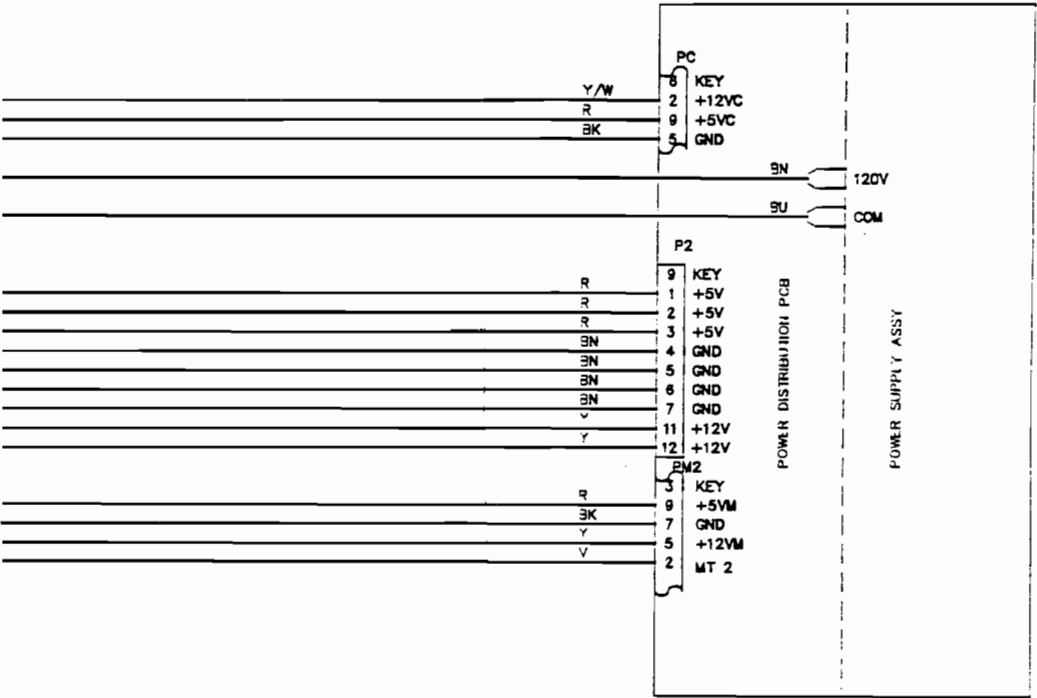


Figure 5-6 Moto Frenzy Mini-Deluxe Game Main Wiring Diagram

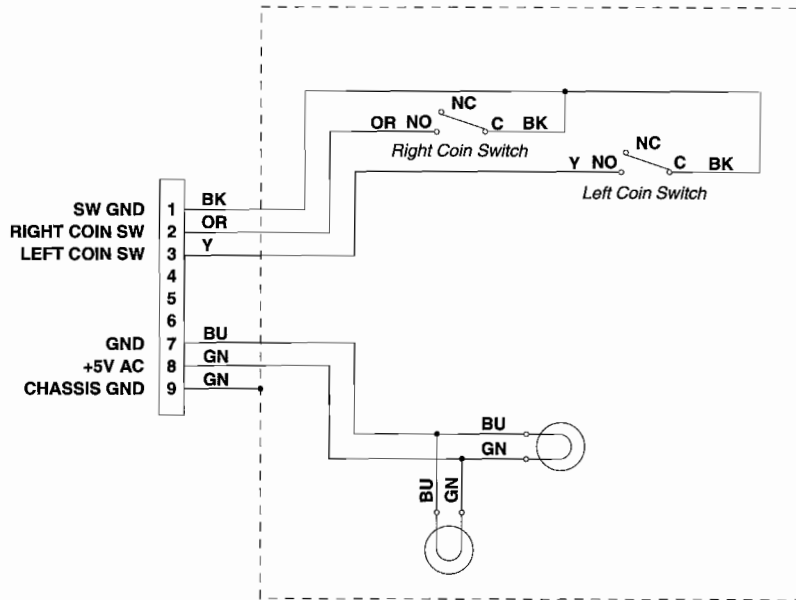
050337-01 A





**Figure 5-6 Moto Frenzy Mini-Deluxe Game Main Wiring Diagram**

A047292-02 A



**Figure 5-7 Coin Door Wiring Diagram**

A037542-XX F





# Moto Frenzy™ Mini-Deluxe Statistics Sheet

Location: \_\_\_\_\_

Date Recorded: \_\_\_\_\_

Meter: \_\_\_\_\_

FIRST STATISTICS SCREEN		
Left Coins: _____	Idle Time: _____	Total Credits: _____
Right Coins: _____	Active Time: _____	Total Coins: _____
Auxiliary Coins: _____	Solo Time: _____	Average Time/Credit: _____ secs.
New Games: _____	Linked Time: _____	Average Time/Coin: _____ secs.
Continuation: _____	Error Count: _____	
Free Games: _____		

REMAINING STATISTICS SCREENS		
<i><b>Histogram 1: Game times for Los Angeles track</b></i>	<i><b>Histogram 2: Game times for Maui track</b></i>	<i><b>Histogram 3: Game times for Utah track</b></i>
0-29 _____	0-29 _____	0-29 _____
30-59 _____	30-59 _____	30-59 _____
60-89 _____	60-89 _____	60-89 _____
90-119 _____	90-119 _____	90-119 _____
120-149 _____	120-149 _____	120-149 _____
150-179 _____	150-179 _____	150-179 _____
180-209 _____	180-209 _____	180-209 _____
210-239 _____	210-239 _____	210-239 _____
240-269 _____	240-269 _____	240-269 _____
270-299 _____	270-299 _____	270-299 _____
300-329 _____	300-329 _____	300-329 _____
330-359 _____	330-359 _____	330-359 _____
360-389 _____	360-389 _____	360-389 _____
390-419 _____	390-419 _____	390-419 _____
420-449 _____	420-449 _____	420-449 _____
450-479 _____	450-479 _____	450-479 _____
480-509 _____	480-509 _____	480-509 _____
510-539 _____	510-539 _____	510-539 _____
540-569 _____	540-569 _____	540-569 _____
570 & up _____	570 & up _____	570 & up _____
Total _____	Total _____	Total _____
Median _____	Median _____	Median _____



# Moto Frenzy™ Mini-Deluxe Statistics Sheet, Continued

Location: \_\_\_\_\_

Date Recorded: \_\_\_\_\_

Meter: \_\_\_\_\_

## REMAINING STATISTICS SCREENS

<i><b>Histogram 4: Game times for Las Vegas track</b></i>	<i><b>Histogram 5: Game times for Kenya track</b></i>	<i><b>Histogram 6: Game times for Norway track</b></i>
0-29 _____	0-29 _____	0-29 _____
30-59 _____	30-59 _____	30-59 _____
60-89 _____	60-89 _____	60-89 _____
90-119 _____	90-119 _____	90-119 _____
120-149 _____	120-149 _____	120-149 _____
150-179 _____	150-179 _____	150-179 _____
180-209 _____	180-209 _____	180-209 _____
210-239 _____	210-239 _____	210-239 _____
240-269 _____	240-269 _____	240-269 _____
270-299 _____	270-299 _____	270-299 _____
300-329 _____	300-329 _____	300-329 _____
330-359 _____	330-359 _____	330-359 _____
360-389 _____	360-389 _____	360-389 _____
390-419 _____	390-419 _____	390-419 _____
420-449 _____	420-449 _____	420-449 _____
450-479 _____	450-479 _____	450-479 _____
480-509 _____	480-509 _____	480-509 _____
510-539 _____	510-539 _____	510-539 _____
540-569 _____	540-569 _____	540-569 _____
570 & up _____	570 & up _____	570 & up _____
Total _____	Total _____	Total _____
Median _____	Median _____	Median _____



# Warranty

Seller warrants that its printed-circuit boards and parts thereon are free from defects in material and workmanship under normal use and service for a period of ninety (90) days from date of shipment. Seller warrants that its video displays and laser-video disc players (in games supplied with displays and video-disc players) are free from defects in material and workmanship under normal use and service for a period of thirty (30) days from date of shipment. None of the Seller's other products or parts thereof are warranted.

If the products described in this manual fail to conform to this warranty, Seller's sole liability shall be, at its option, to repair, replace, or credit Buyer's account for such products which are returned to Seller during said warranty period, provided:

- (a) Seller is promptly notified in writing upon discovery by Buyer that said products are defective;
- (b) Such products are returned prepaid to Seller's plant; and
- (c) Seller's examination of said products discloses to Seller's satisfaction that such alleged defects existed and were not caused by accident, misuse, neglect, alteration, improper repair, installation, or improper testing.

In no event shall Seller be liable for loss of profits, loss of use, incidental or consequential damages.

*Except for any express warranty set forth in a written contract between Seller and Buyer which contract supersedes the terms herein, this warranty is expressed in lieu of all other warranties expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose, and of all other obligations or liabilities on the Seller's part, and it neither assumes nor authorizes any other person to assume for the Seller any other liabilities in connection with the sale of products by Seller.*

The use of any non-Atari parts may void your warranty, according to the terms of the warranty. The use of any non-Atari parts may also adversely affect the safety of your game and cause injury to you and others. Be very cautious in using non-Atari-supplied components with our games, in order to ensure your safety.

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