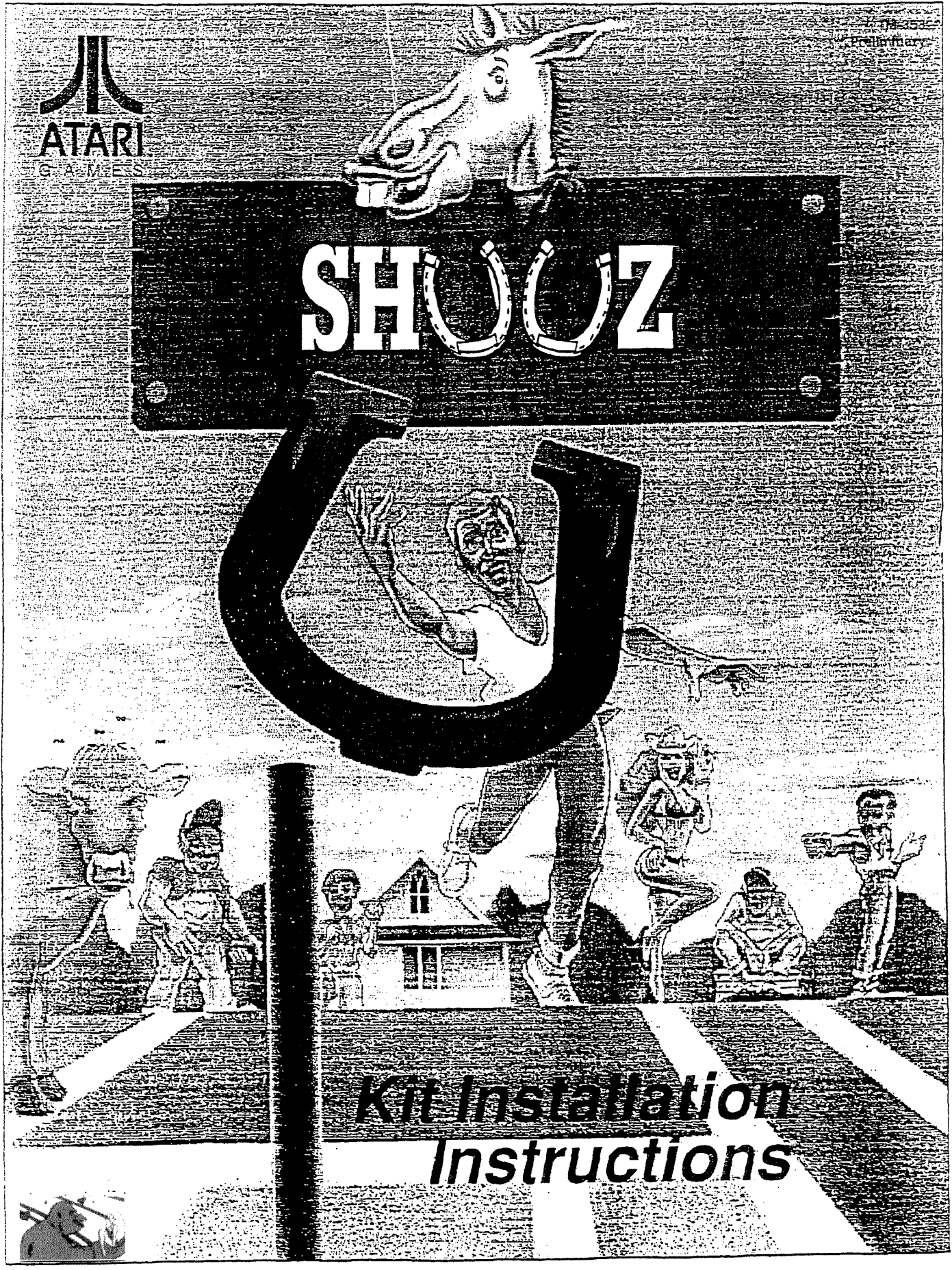
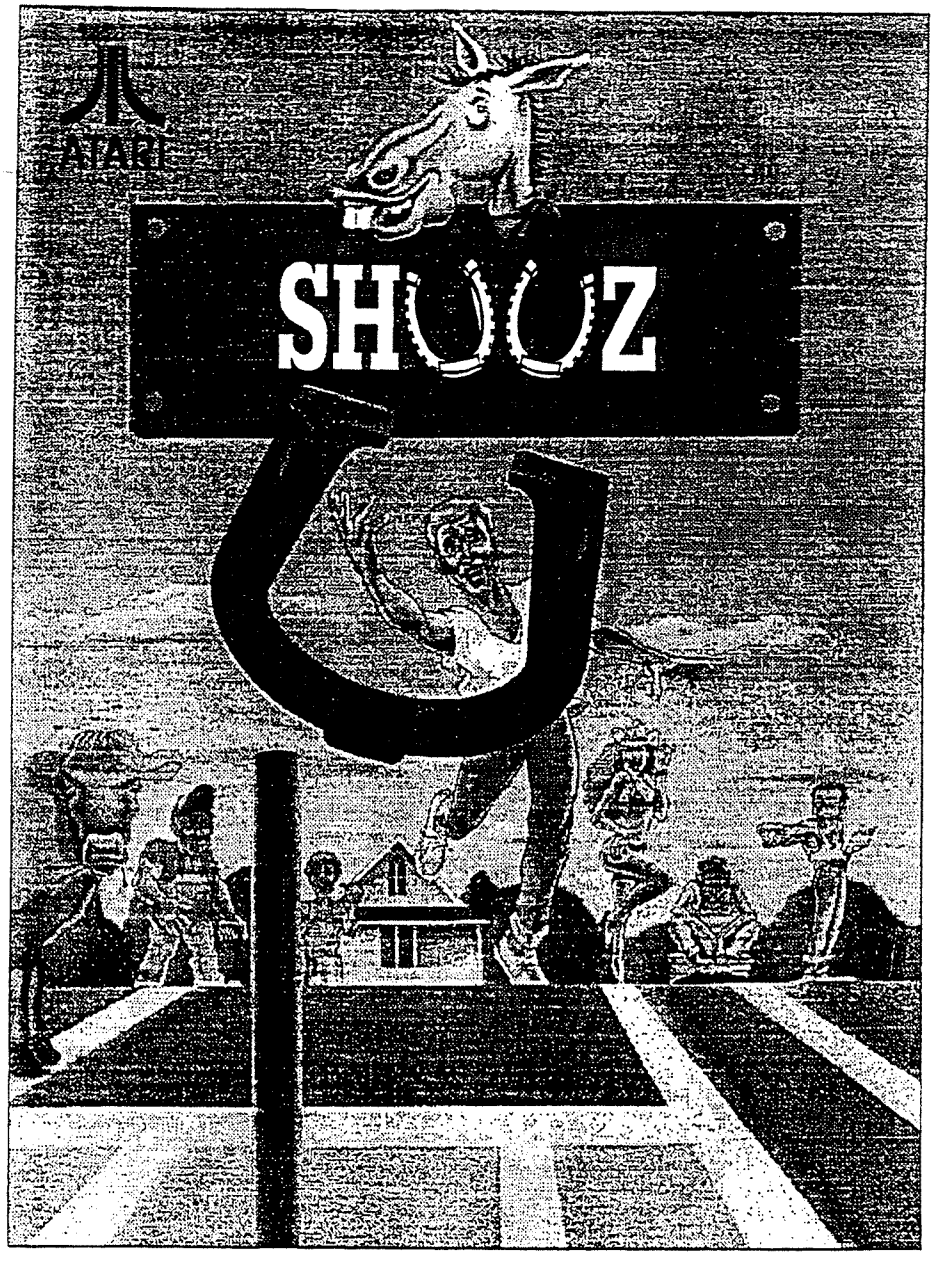
ATARI
GAMES

Preliminary

SHOOZ



Kit Installation Instructions



Kit Installation Instructions

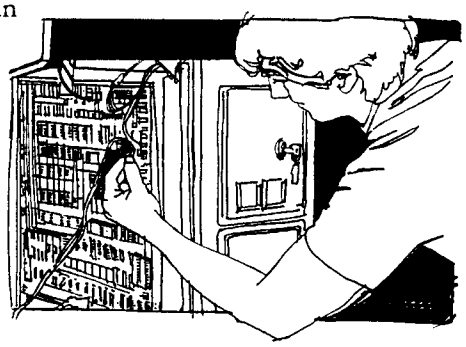
Conversion kit for upright and countertop games

Copyright © 1990 by Atari Games Corporation. All rights reserved.

No part of this publication may be reproduced by any mechanical, photographic or electronic process, or in the form of a phonographic recording, nor may it be stored in a retrieval system, transmitted, or otherwise copied for public or private use, without permission from the publisher.

The game play, all graphic designs, this technical manual, its accompanying schematic diagrams, and the display manual are protected by the U.S. Copyright Act of 1976.

This Act provides for substantial penalties for violating federal copyright laws. Courts can impound infringing articles while legal action is pending. If infringers are convicted, courts can order destruction of the infringing articles.



In addition, the Act provides for payment of statutory damages of up to $50,000 per infringing transaction in certain cases. Infringers may also have to pay costs and attorneys' fees and face an imprisonment of up to five years as well as fines of up to $250,000 in the case of individuals and up to $500,000 in the case of corporations.

Atari Games Corporation will aggressively enforce its copyrights against infringers. We will use all legal means to immediately halt any manufacture, distribution, or operation of a copy of video games made by us. Anyone who purchases such copies risks forfeiting such a game.

Published by:
Atari Games Corporation
675 Sycamore Drive
P.O. Box 361110
Milpitas, California 95036

Printed in the U.S.A. **12/90**

Produced by the Atari Games Technical Publications Department.
Writing and Editing: Andrea Dencker
Illustration and Design: Mary Ohanessian Sumner

NOTICE RE. NON-ATARI PARTS

WARNING

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.

You may void the game warranty (printed on the inside back cover of this manual) if you do any of the following:

- Substitute non-Atari parts in the game.
- Modify or alter any circuits in the game by using kits or parts *not* supplied by Atari Games Corporation.

NOTE

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area or modification to this equipment is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference. If you suspect interference from an Atari game at your location, check the following:

- 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 cage, be sure that the game printed-circuit boards (PCBs) are properly installed on the EMI ground cage 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.

SAFETY SUMMARY

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 inside of 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.

CONTENTS

1 Set-Up

How to Use This Manual 1-1
Cabinet Equipment Requirements 1-2
Tools Required 1-2
Inspecting the Kit 1-3
Preparing the Cabinet for the Kit Installation 1-3
Assembling the Control Panel 1-7
Connecting the JAMMA Harness 1-8
Installing the Shuuz Game PCB 1-9
Installing the Bezel, Decals, Labels, and Attraction Assembly 1-9
Setting the Coin and Game Options 1-10
Maximizing Earnings 1-10
Game Play 1-10

2 Self-Test

Introduction 2-1
Entering and Exiting the Self-Test 2-2
Select Test Menu 2-2
Statistics 2-2
Histograms 2-3
Game Options 2-4
Coin Options 2-4
Sound Test 2-5
Controls Test 2-6
Complete RAM Test 2-6
Complete ROM Test 2-7
Playfield Test 2-7
Motion Object Test 2-7
Color Test 2-7
Color Purity Test 2-8
Convergence Test 2-8

3 Maintenance and Troubleshooting

Video Display Sync Problems 3-2
Midi Trak-Ball Control 3-2
ROMs and RAMs 3-4

4 Parts Illustrations

See the List of Illustrations that follows.

5 Schematic Diagrams

See the List of Illustrations that follows.

Statistics Sheet

ILLUSTRATIONS

Figure 1-1 Installed Kit Parts 1-3
Figure 1-2 Front View of Cabinet-Mounted Assemblies (Dedicated Game) 1-4
Figure 1-3 Rear View of Cabinet-Mounted Assemblies (Dedicated Game) 1-5

Figure 2-1 Self-Test Menu Screen 2-2
Figure 2-2 Statistics Screen 2-3
Figure 2-3 Histogram Screen 2-3
Figure 2-4 Game Options Screen 2-4
Figure 2-5 Coin Options Screen 2-5
Figure 2-6 Sound Test Screen 2-6
Figure 2-7 Controls Test Screen 2-6
Figure 2-8 RAM Test Menu 2-6
Figure 2-9 Complete ROM Test Screen 2-7
Figure 2-10 Playfield Test Screen 2-7
Figure 2-11 Motion Object Test Screen 2-7
Figure 2-12 Color Test Screen 2-8
Figure 2-13 Purity Test Screen 2-8
Figure 2-14 Convergence Test Screen 2-8

Figure 3-1 Excessive Shaft Wear 3-4

Figure 4-1 Parts for Shuuz Universal Kit 4-2
Figure 4-2 Midi Trak-Ball Assembly 4-3
Figure 4-3 Shuuz Game PCB Assembly 4-4

Figure 5-1 Shuuz Game PCB Assembly Schematic Diagram 5-2
Figure 5-2 Shuuz Coupler PCB Assembly Schematic Diagram 5-12
Figure 5-3 Faulty RAM/ROM Tables 5-13

TABLES

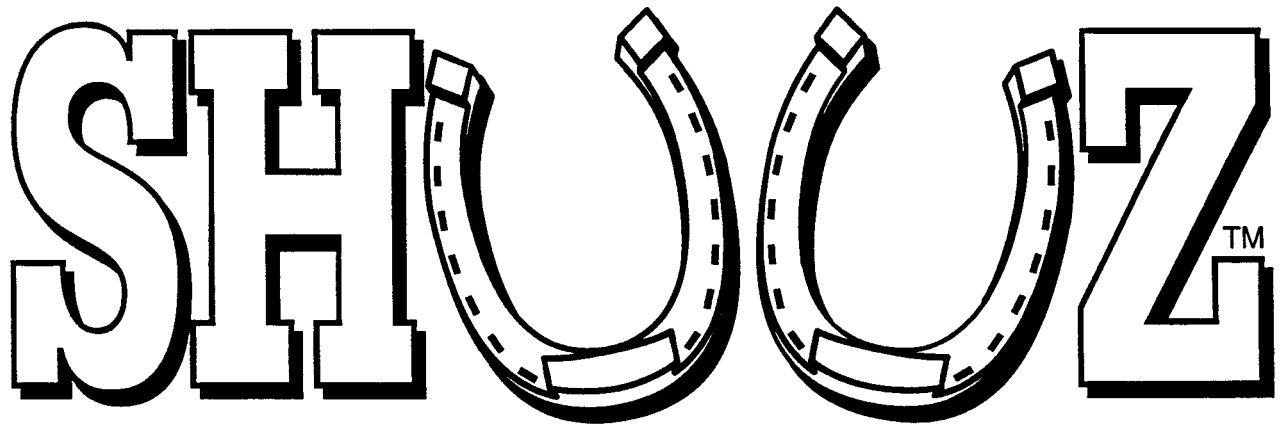
Table 1-1 Equipment Requirements 1-2
Table 1-2 Contents of Shuuz Kit 1-2
Table 1-3 JAMMA Pin and Wire Connections 1-6

Table 2-1 Summary of All Self-Test Screens 2-2
Table 2-2 Game Option Settings 2-4
Table 2-3 Coin Option Settings 2-5
Table 2-4 When to Run the RAM Tests 2-6
Table 2-5 Bad RAM Locations by Error Address 2-6
Table 2-6 Bad ROM Locations by Error Address 2-7

Table 3-1 Troubleshooting Table 3-2
Table 3-2 Voltage Inputs and Test Points on the PCB 3-3
Table 3-3 What ROM Problems Look Like 3-3
Table 3-4 Atari Games Video Connector Pin Assignments 3-3

CHAPTER 1

Installation



How to Use This Manual

This manual provides information for installing, testing, and troubleshooting the Shuuz™ conversion kit. ❖ Chapter 1 describes how to install the Shuuz kit in your Dynamo or other cabinet. This kit can also be installed in countertop cabinets. This chapter also describes game play. ❖ Chapter 2 contains self-test procedures and additional diagnostic tests. The self-test is important in the Shuuz 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 contains troubleshooting and maintenance procedures for the Midi-Trak-Ball™ control. ❖ Chapter 4 contains the kit parts list and parts illustrations. ❖ Chapter 5 contains the schematics for the Shuuz game PCB and the Trak-Ball Coupler PCB.

WARNING

To avoid electrical shock, unplug the cabinet while installing the kit. After installation, plug the game only into a grounded 3-wire outlet.

Cabinet Equipment Requirements

Table 1-1 lists the equipment required in the cabinet into which you are installing the Shuuz kit.

CAUTION

Do not unplug or plug in the Shuuz game printed-circuit board (PCB) edge connector while the power is on. You could seriously damage the PCB.

Table 1-1 Equipment Requirements

Equipment	Specification
Video Display	Color RGB monitor Separate positive horizontal and vertical sync or negative composite sync Horizontal mounting Horizontal frequency: 15.750 KHz Vertical frequency: 60 Hz Video input: 1V to 3V peak-to-peak positive polarity
Control Panel	Metal only
Speaker	8 Ω, 10 W
Coin Counter	+5 VDC or +12 VDC
Power Cord	Three-conductor with ground
Power Supply	+5 VDC ± 0.25V @ 3.0 amps +12 VDC @ 1.0 amp -5 VDC @ 1.0 amp

Tools Required

- Drill with a 1/2-inch and 5/16-inch drill bits
- Phillips screwdriver
- Flat-blade screwdriver
- Socket wrench set and ratchet
- 1/4-20 hex wrench
- Wire cutters and strippers
- Straight edge
- Squeegee
- X-ACTO™ knife
- Insulated wire connectors (if you are installing a new JAMMA harness)
- Carbon paper
- Saber saw
- File
- Bandsaw
- Tape or glue

Table 1-2 Contents of Shuuz Kit

Part No.	Description	Part No.	Description
72-6612S	#6 x 3/4"-Long, Type AB, Pan-Head, Cross-Recessed Screws (4)	175014-1040	#10 Flat Washers (8)
75-5112B	#10-24 x 3/4"-Long Black Carriage Bolts (4)	177010-240	#10-24 Hex. Polymer Locknuts (8)
75-5148B	#10 x 3"-Long Black Carriage Bolts (4)	178032-002	#10 Wire & Cable Tie
038158-01	Product I.D. Label	178237-006	Green Button Assemblies (2)
		178265-001	L-Style Nylon Standoffs (4)
039450-01	FCC Compliance Label	178283-008	Indicator Plates (Start/Action), Black with White Back (2)
047205-01	Shield, Attraction		
047209-01	Control Panel Cover	A038038-01	Midi Trak-Ball Assy.
047991-01	Control Panel Decal	A046501-01	JAMMA Harness Assy.
047992-01	Side Panel Decals (2)	A047365-01	Shuuz PCB Assy.
047993-01	Attraction Panel Film	A047982-01	Trak-Ball Adapter Harness Assy.
047994-01	Monitor Bezel with Graphics	TM-358	Shuuz Universal Kit Installation Instructions
048431-01	Instructions Label for Countertop Games		
141026-001	.50"-Inside Diameter Ferrite Split Beads (2)		
160044-001	Snap-Action Switches (2)		

Packaging materials are not listed. All parts are a quantity of 1, except as noted in parentheses.

NOTE

Your game cabinet may not appear exactly as shown in this illustration. The picture shows the control panel and electronic parts installed in a typical game cabinet.

Items Not Shown:

A046501-01
JAMMA Harness Assy.

TM-358
Shuuz Universal Kit
Installation Instructions

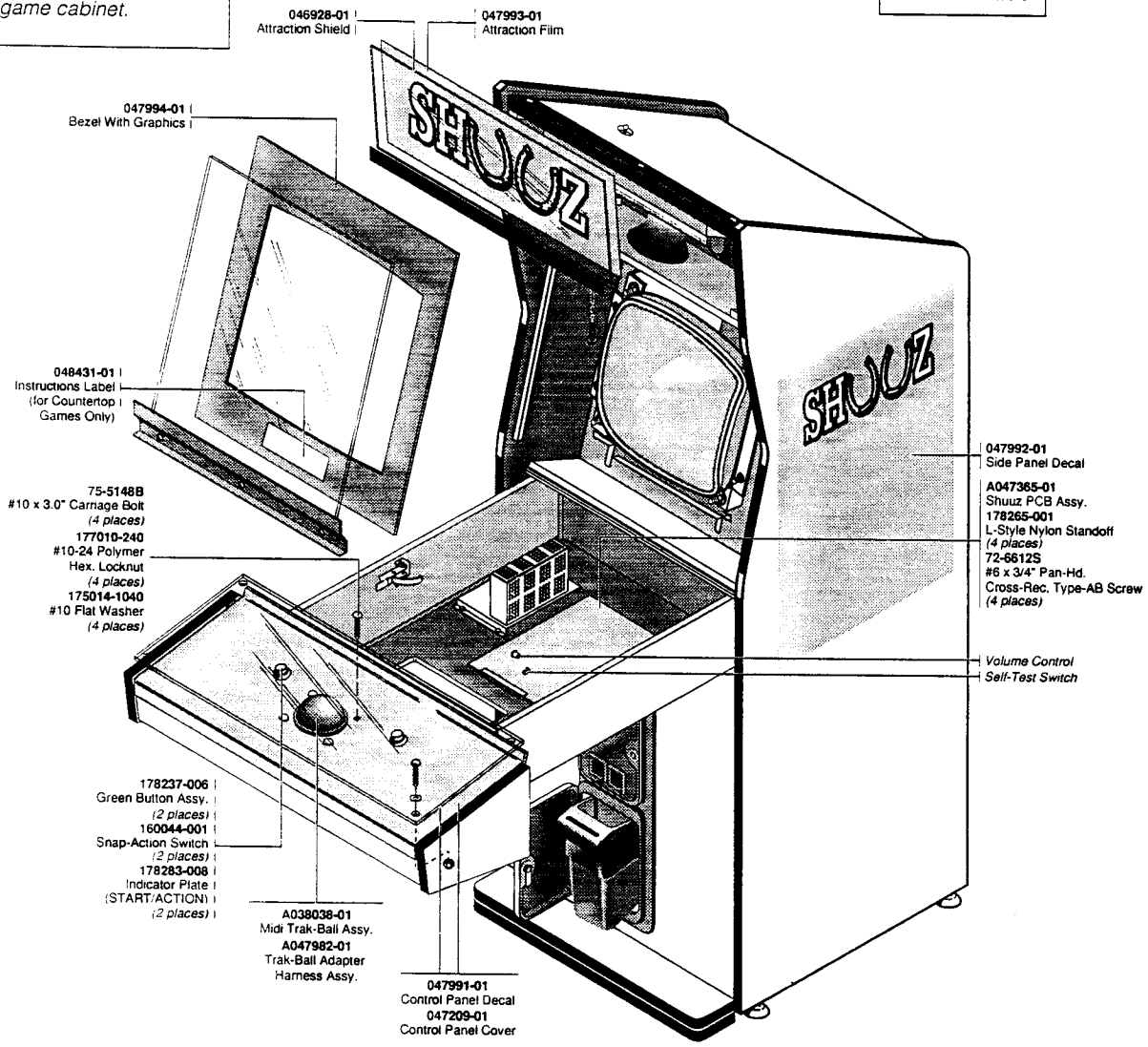


Figure 1-1 Installed Kit Parts

Inspecting the Kit

Check to see that you have all the parts listed in the kit parts list in Table 1-2. If any part is missing or damaged, contact your distributor with the Shuuz kit serial number, part number, and description of the missing or damaged parts, and date received.

Preparing the Cabinet for the Kit Installation

WARNING

To avoid electrical shock, unplug the cabinet while installing the kit. After installation, plug the game only into a grounded 3-wire outlet.

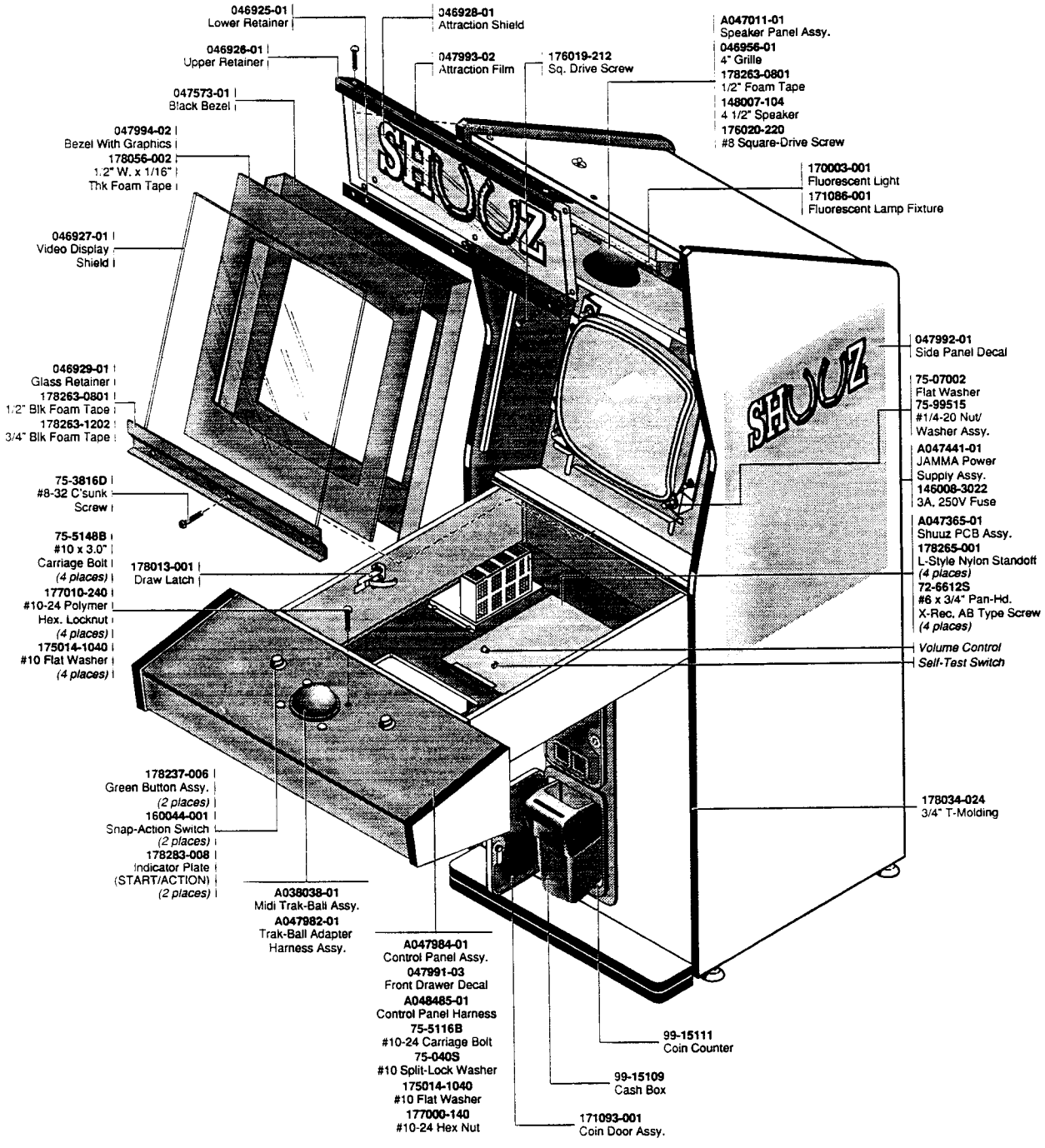


Figure 1-2 Front View of Cabinet-Mounted Assemblies (Dedicated Game)

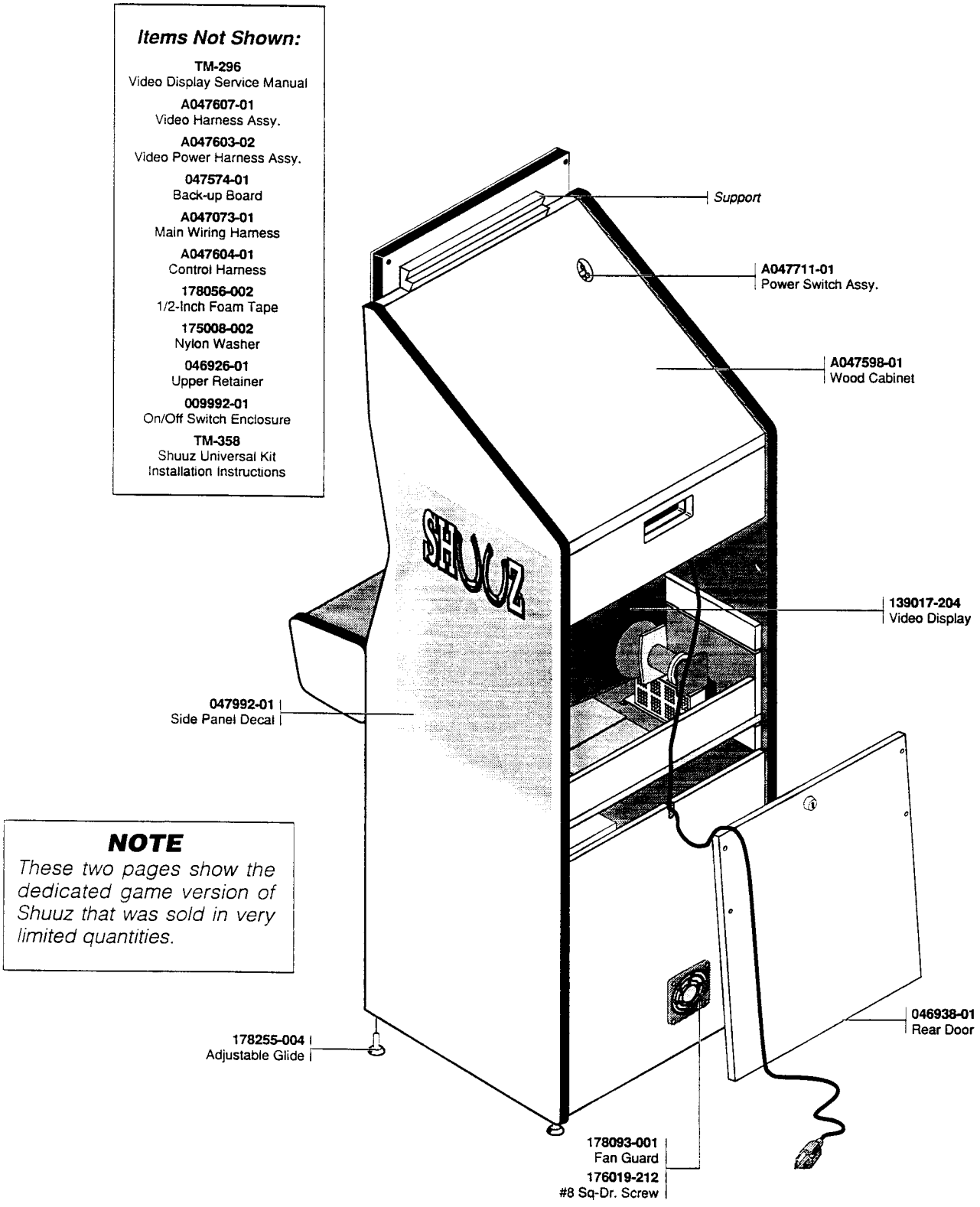


Figure 1-3 Rear View of Cabinet-Mounted Assemblies (Dedicated Game)

Table 1-3 JAMMA Pin and Wire Connections

Pin	Wire Color	Signal	Instructions
Component Side			
1	BN	GND	Connect to the 5V RTN (GND) terminal on the power supply. However, if you have 12V RTN, connect *one* of the BN wires at pin 1, 2, A, or B to the 12V RTN terminal.
2	BN	GND	Same as pin **1**.
3	R	+5V	Connect to the +5V terminal on the power supply. However, if your power supply has a +SENSE terminal, connect *one* of the R wires at pin 3, 4, or C to +SENSE instead of +5V.
4	R	+5V	Same as pin **3**.
5	OR	–5V	Connect to the –5V terminal of the power supply.
6	Y	+12V	Connect to the +12V terminal of the power supply. If your coin counter(s) require 12V, also connect to the + side of the coin counter(s).
7		**Key**	
8	BU/W	COIN CTR 1	Connect this wire to the – side of the coin counter. *Note: Do not use 24V counters.* Connect the + side to +5V or +12V on the power supply, as appropriate.
9		Not used	
10	BN	SPKR +	Connect to the + terminal on the speaker. (This wire is part of a twisted pair.)
11		Not used	
12	R	RED	Attach to the video display.
13	BU	BLUE	Attach to the video display.
14	BK	VIDEO GND	Attach to the video display.
15	W	SELF-TEST	Use this wire if you want an external self-test switch. However, the kit already has a self-test switch on the PCB. *(If you connect an external self-test switch, switch off the switch on the PCB. Connect the wire to the N.O. terminal on the external self-test switch. Connect the common terminal of the switch to a BK/W wire (GND).)*
16	Y	LT COIN	Connect to the N.O. terminal of the left coin switch. Connect the common terminal of the switch to a BK/W wire.
17	W/BK	Not Used	
18	W/BN	TB X DIR	Connect the matching colors on the Trak-Ball adapter harness.
19	W/R	TB Y DIR	
20	W/OR	TB X CLK	
21	W/Y	TB Y CLK	
22	W/GN	RT BUTTON	
23	W/BU	LT BUTTON	
24	W/V	Not used	
25	W/GY	Not used	
26	V	Not used	
27	BK/W	GND	Connect one of the BK/W wires at pin 27, 28, e, and f to the negative sense terminal of the power supply (if it exists) and one to the common terminals of the coin switches. Connect two of these wires to the common terminals of the control switches on the control panel.
28	BK/W	GND	Same as pin **27**.

Figure 1-1 shows almost all kit parts installed in a typical cabinet. Use this illustration as a guide while you install the parts. For your ordering convenience, Figures 1-2 and 1-3 show most of the parts in the Shuuz game (dedicated game version).

1. Turn off power to the game, and unplug the power cord.
2. Remove the following from the cabinet:
   - Existing PCBs
   - Game harness, if it is not Japan Amusement Machinery Manufacturers Association (JAMMA)–compatible
   - Control panel decals, labels, and controls

Table 1-3 JAMMA Wire Connections, Continued

Pin	Wire Color	Signal	Instructions
Solder Side			
A	BN	GND	Connect to the 5V RTN (GND) terminal on the power supply. However, if you have 12V RTN, connect *one* of the BN wires at pin 1, 2, A, or B to the 12V RTN terminal.
B	BN	GND	Same as pin **A**.
C	R	+5V	Connect to the +5V terminal on the power supply. However, if your power supply has a +SENSE terminal, connect *one* of the R wires at pin 3, 4, or C to +SENSE instead of +5V.
D	R	+5V	Connect to the R wire on the Trak-Ball adapter harness.
E	OR	–5V	Connect to the –5V terminal of the power supply.
F	Y	+12V	Connect to the +12V terminal of the power supply.
H		**Key**	
J	V/W	COIN CTR 2	Connect this wire to the – side of the second coin counter. Clip R28 on the game PCB if you use a second coin counter. *Note: Do not use 24V counters.* Connect the + side to +5V or +12V on the power supply, as appropriate.
K		Not used	
L	W	SPKR–	Connect to the – terminal on the speaker. (This wire is one of a twisted pair.)
M		Not used	
N	GN	GREEN	Attach to the video display.
P	BN	COMPSYNC	Attach to the video display.
R	GY	Service	
S		Not used	
T	OR	RT COIN	Connect to the N.O. terminal of the right coin switch. Connect the common terminal of the switch to a BK/W wire.
U	Y/BK	Not used	
V	Y/BN	Not used	
W	Y/R	Not used	
X	Y/OR	Not used	
Y	Y/W	Not used	
Z	Y/GN	Not used	
a	Y/BU	Not used	
b	Y/V	Not used	
c	Y/GY	Not used	
d	GY/W	Not used	
e	BK/W	GND	Connect one of the BK/W wires at pin 27, 28, e, or f to the negative sense terminal of the power supply (if it exists) and one to the common terminals of the coin switches. Connect two of these wires to the common terminals of the control switches on the control panel and the BK wire on the Trak-Ball adapter harness.
f	BK/W	GND	Same as pin **e**.

- Side decals, graphics, and adhesive. If the cabinet sides are damaged, repair them before putting on the new decals.
- Video display shield, display bezel, attraction shield, and marquee.

3. Wipe down and vacuum the cabinet. Paint the cabinet, if required.

Assembling the Control Panel

NOTE

This kit includes a Midi-Trak Ball control that will fit most upright games. If you are installing this Shuuz kit into a countertop cabinet, you should purchase a small Mini Trak-Ball from your Atari Games distributor (Atari part no. A036190-01).

Parts Needed

To assemble the control panel, you need a copy of the appropriate control panel hole-cutting template. Two versions of the template (for countertop and upright games) are printed at the center of this manual. Gently pull out the template sheets from the staples, and the manual should remain bound. You will also need the following parts from kit:

- Clear cover for the control panel
- Control panel decal
- Two green button assemblies
- Two snap-action switches
- Two indicator plates (Start/Action)
- One Midi Trak-Ball
- Four #10 x 3"-long black carriage bolts, flat washers, and locknuts
- Four #10 x 3/4"-long black carriage bolts, flat washers, and locknuts

Installing The Parts

1. Using carbon paper, transfer the Trak-Ball mounting pattern from the template to the control panel. Be sure to center the Trak-Ball control on the panel for best playability. Save the template.
2. Drill four 5/16" holes for the Trak-Ball mounting bolts.
3. Using a saber saw, carefully cut out the large hole "A" for the Trak-Ball. Deburr the sharp edges with a file.
4. Lay the plexiglass cover over the top of the control panel and mark the outside shape of the panel on the plastic. Also mark the two button holes "C" as close as possible to the locations shown on the template. Lastly, mark the positions of the four holes which mount the cover to the control panel.
5. Using a bandsaw, cut the control panel cover to its correct outside shape.

WARNING

Wear safety glasses when drilling the plastic control panel cover. Use care to avoid shattering or chipping the plastic.

---

6. Tape or glue the template to the plexiglass cover. To start the saber saw cut, drill a 1/2" hole inside the "B" and each "C" hole.
7. Saw out the large hole "B" and both "C" holes.
8. Drill the four 5/16" holes that will be used to mount the cover to the control panel.
9. To prevent injury, carefully deburr all the edges of the plexiglas cover.
10. Install the control panel decal on the control panel. Use a sharp X-ACTO knife to trim the outside edge and to cut out the holes for the controls.
11. Install the cover on the control panel with the four 3/4"-long carriage bolts, washers, and locknuts.
12. Install the midi Trak-Ball assembly using the four 3"-long carriage bolts. Install the two button assemblies and the indicator plates.

NOTE

The orientation of the Trak-Ball is critical. Refer to the template for a picture of the correct position.

For maintenance and servicing information on the Midi Trak-Ball control, refer to Chapter 3 of this manual.

Connecting the JAMMA Harness

1. If your game cabinet does not already have a JAMMA harness, install the JAMMA harness in the cabinet..
2. Install the split beads on the harness as close to the PCB edge connector as possible. Hold the beads on the harness with the tie wraps included in the kit.

CAUTION

You must install the split beads included in the kit on the JAMMA harness to meet FCC requirements.

---

3. Using Table 1-2 for wiring information, connect the JAMMA harness to existing component harnesses. Use crimp splices or butt soldering.

WARNING

Do not simply tie the wires together. If you do, you could cause intermittent problems, loose connections, oxidation, or a fire.

Connecting Power Wires

1. Connect the wires on the JAMMA harness to the wires for the power supply, as shown in Table 1-3. The Shuuz kit requires +5V and +12V. If -5V is available, it should be used too. Tie off any other

voltage wires on the power supply besides +5V, –5V, and +12V.

There is more than one wire for each voltage in the JAMMA harness. Use more than one wire for each voltage (connecting them as described in Table 1-3) so that the edge connector does not overload and burn.

Connecting Video Display Wires

NOTE

The JAMMA harness provides only negative composite sync. If your video display requires separate positive sync, see Chapter 3 for alternative wiring.

Connect the wires designated for the red, green and blue video guns along with the sync and ground wires, according to Table 1-3.

Connecting Coin Door Wires

1. Connect the wires on the JAMMA harness to the coin switches and meter according to Table 1-3.
2. Connect one terminal of the door lamps to one of the BK/W wires. Connect the other terminal of the door lamps to the R wire supplying +5V.

NOTE

Do not use –5V for the coin door lamps. –5V is required for audio.

(Some games have separate power supply outputs for the coin door lamps. If you choose to use these outputs, make sure you connect both terminals of each lamp to the terminals on the power supply.)

Connecting the Control Wires

Connect the Trak-Ball adapter harness to the JAMMA harness using crimp splices or butt soldering, according to the information in Table 1-3. Then plug the adapter harness into the Trak-Ball harness.

Grounding the Cabinet

Find the ground lead (green) of the 115V input power line. Connect this lead in daisy-chain fashion to a bare metal part of the coin door, the control panel, the video display, and the power supply. This AC ground must be of #18 AWG wire or larger.

WARNING

For the safety of players, you must connect the green ground wire as indicated above.

Checking the JAMMA Connections

Before plugging in the game PCB, turn on the power to the game, and check +5 Volts on pins 3, 4, C, and D of the JAMMA connector; +12 Volts on pins F and 6; and –5 Volts on pins E and 5.

Check that the video display and the attraction lamp have power. Now turn off the power to the game.

Installing the Shuuz Game PCB

1. After you have checked the power on the JAMMA connector, above, install the Shuuz game board set in the cabinet. Use the nylon standoffs and four #6-32 screws in the kit.
2. Connect the JAMMA connector to the PCB.
3. Secure the JAMMA harness away from the PCB with cable ties.
4. Turn on the power to the game. Check that the game PCB functions. If a video picture is not present, see Chapter 3.

Installing the Bezel, Decals, Labels, and Attraction Assembly

The kit parts are shown assembled in a cabinet in Figure 1-1.

Installing the Display Bezel

Find the cardboard display bezel in the kit. This bezel can accommodate both 19-inch and 25-inch video displays. Follow the instructions on the back of the bezel, and cut the hole and outside edges as required.

Installing the Product ID and FCC Label

Place the product ID label (part no. 038158-01) and FCC label (part no. 039450-01) on the back of the cabinet.

Installing the Side Panel Decals

Find the side panel decals. Wet the left and right side panels of the cabinet with slightly soapy water. Then position the decals as shown in Figure 1-1. Remove any wrinkles in the artwork using a squeegee. Allow the sides to dry.

Installing the Attraction Assembly

Find the Shuuz attraction shield and the attraction film. Using the existing shield as a template, cut the shield and film to size, if necessary. Install them on the cabinet as shown in Figure 1-1.

Setting the Coin and Game Options

Set the coin and game options in the self-test. See Chapter 2 for information about the option settings.

Maximizing Earnings

For maximum earnings, regularly maintain your Shuuz game following the instructions in Table 3-1, in Chapter 3.

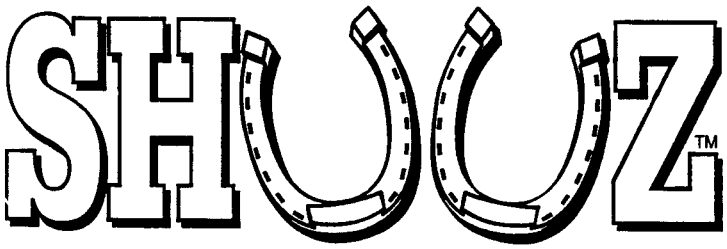
When you set up the game and when you collect money, perform the automated self-test and check the controls with the Control Inputs screen in the self-test.

Game Play

This section describes the features and play of the Shuuz game.

Introduction

Shuuz™ is a video version of traditional horseshoes. The rules are similar to those used at picnics throughout America. In addition, an occasional round is designated a "beer round". The player who loses that round is encouraged to buy a round of drinks for his opponents.



Game Play

Each player inserts a coin. The players must select the game they want (one player alone or against the computer, two or three players head-to-head, or four players on two teams). Each player selects a character.

Play continues in rounds until:

- A player trying the high score challenge uses up his allotted rounds.
- A player or team has reached the specified final score.
- The players have used up their allotted rounds without scoring enough points. They will be offered a chance to add a coin and continue with more rounds.

In each round, all players in turn are allowed two tosses. After each round (or, in a team game, each half-round) the tosses are scored.

Scoring

Ringer: 3 points. **Close** (within the circle): 1 point.

If two opponents score ringers, the two shoes "cancel" each other and are ignored.

Only shoes closer to the pin than any of the opponents' shoes (ignoring canceled ringers) count toward your score.

Throwing a Shoe

First, the player aligns his character by moving side to side with the track-ball. Pressing the button or exceeding a time limit ends this phase.

Next, the player draws the shoe back by rolling the track-ball towards himself. The "arc meter" on the right side of the screen indicates the amount he is moving his character's arm. This controls the height of the trajectory that the shoe will follow. This phase ends after a time limit or when the player begins to roll the track-ball forward.

Finally, the player rolls the track-ball forward. The speed and direction he spins the track-ball controls the power and rotation of the throw. While the shoe is in the air, further movement of the track-ball adds "English", allowing the shoe to curve right or left and to speed up or slow down its rotation.

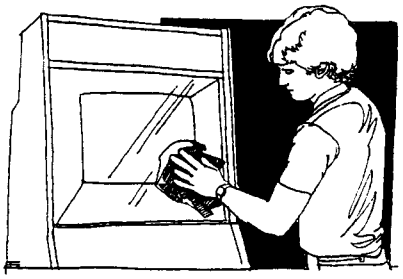
Statistics

At the end of a game, the player is shown the number of ringers, the number of double-ringers, and the percentage of ringers for that game. In a high-score challenge, the player is entered on a high-score table if his total score is high enough. In head-to-head game play, a player can enter a high score if his ringer percentage is high enough.

CHAPTER 2

Self-Test

INTRODUCTION



Use the Shuuz 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. ❖ You should perform the self-test when you first set up the game, each time you collect the money, or when you suspect game failure. ❖ 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 of the self-test screens and their purposes.

Entering and Exiting the Self-Test

To enter the self-test, turn on the self-test switch on the game PCB. Exit the self-test by switching off the self-test switch.

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 list by rolling the Trak-Ball; the corresponding test is highlighted in white. Choose the screen by pressing the left button.

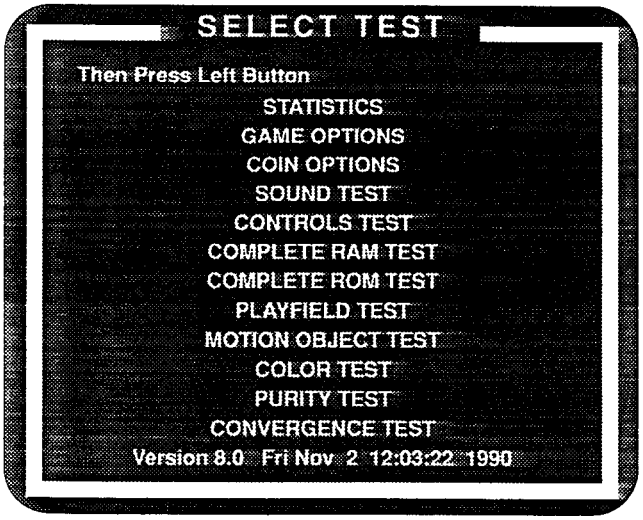


Figure 2-1 Self-Test Menu Screen

Statistics

Use the information shown on the statistics screen, in Figure 2-2, and on the histogram screens to keep track

Table 2-1 Summary of All Self-Test Screens

Screen	Use or Purpose
Statistics Screen	
Histogram Screen 1	Displays the histogram for all new games.
Histogram Screen 2	Displays the histogram for all continued games.
Histogram Screen 3	Displays the histogram for scores per 10 rounds.
Histogram Screen 4	Displays the histogram for "ringers" per 10 rounds.
Histogram Screen 5	Displays the histogram for player characters chosen.
Game Options Screen	Use to set and check the game options settings.
Coin Options Screen	Use to set and check the coin options settings.
Sound Test Screen	Use to check the audio circuits.
Controls Test Screen	Use to test the player controls.
RAM Test Screen	
Video RAM (looping)	Use to check the video RAM.
Color RAM (looping)	Use to check the color RAM.
All RAM (looping)	Use to check all RAM.
ROM Test Screen	Use to check the program ROMs.
Playfield Test Screen	Use to check the alphanumeric displays.
Motion Object Screen	Use to test the movement and color of game objects.
Color Test Screen	Use to check the video display color circuits.
Purity Test Screen	
Red Color Purity Screen	Use to check the red color purity in the video display.
Green Color Purity Screen	Use to check the green color purity in the video display.
Blue Color Purity Screen	Use to check the blue color purity in the video display.
White Color Purity Screen	Use to check the white color in the video display.
Grey Color Purity Screen	Use to check the grey color in the video display.
White Convergence Screen	Use to check and adjust video display convergence of red, blue, and green.
Violet Convergence Screen	Use to check and adjust video display convergence of red to blue.
Green Convergence Screen	Use to check and adjust video display convergence of red and blue to green.

of your game use and maximize your profits. Record the information on the Shuuz statistics page in the back of this manual. The statistics are collected from the last time the statistics were cleared. You can clear the statistics by holding down the right button and pressing the left button at the same time. Press the left button to leave this screen and go to the histograms.

- *Left Coins* show the number of coins counted in the left coin mechanism.
- *Right Coins* show the number of coins counted in the right coin mechanism.
- *Idle Mins* shows the number of minutes the game was not being played.
- *Active Mins* is the number of minutes the game was being played in any mode.
- *1 Player/2 Player/3 Player Games* is the number of minutes the game was played by one, two, or three players.
- *4 Player Games* is the number of minutes the game was played by four players on two teams.
- *1 Plyr/2 Plyr/3 Plyr/4 Plyr Avg Time* is the average number of minutes the game was played by the 1, 2, 3, or 4 players.
- *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 38F.
- *Total Coins* is the number of coins put into both coin mechanisms.

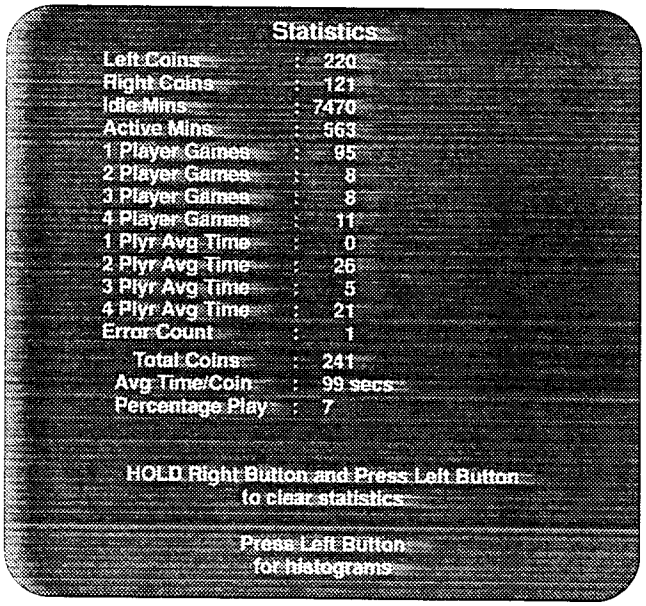


Figure 2-2 Statistics Screen

- *Avg Time/Coin* is the average number of seconds played per coin.
- *Percentage Play* is the amount of time, as a percentage, that the game is played while it is powered on.

Histograms

The five histogram (horizontal bar graph) screens show the length of game play and the number of games played. The first histogram screen is shown in Figure 2-3. Clear all five histograms by going to the last screen; then hold the right button down and press the left button.

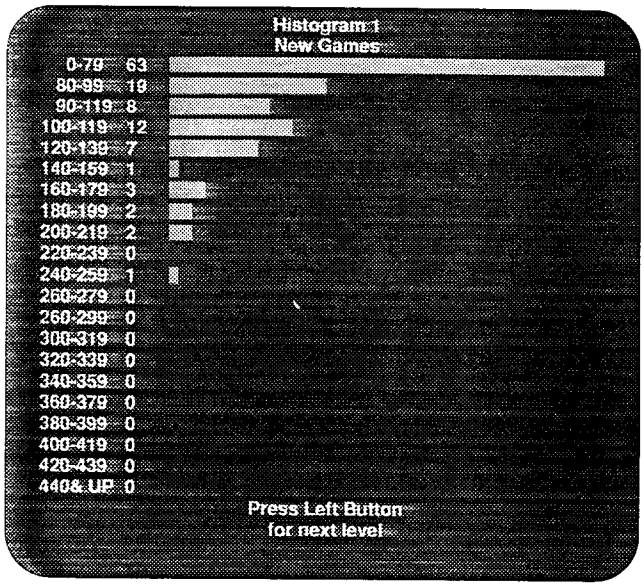


Figure 2-3 Histogram Screen

Read the histogram screens frequently and record the numbers on the statistics sheet at the back of the manual. Read and then clear the screens frequently. If more than 255 games are played in any one time category, then all the numbers on that screen are divided by two. If you read the screens infrequently, the number of games will always be correct proportionally, but may be incorrect numerically.

The five histogram screens show the following information:

- *New Games* shows the number of seconds each new game lasted.
- *Continuations* shows the number of seconds each continuation of the game lasted.
- *Score per 10 Rounds* shows what scores were achieved for every 10 rounds' worth of game play.

Table 2-2 Game Option Settings

Option	Settings	Explanation
Restore Factory Options	Yes ***No***	Lets you set all the game options to the factory options or lets you use your own settings. Make sure you set this to *no* to use your own chosen settings.
Clear High Scores	Yes ***No***	Lets you clear the high score table.
Game Length, 1/2/3 Player	11, 13, ***15***, 17, 19, 21, 23, 25	Lets you choose the maximum number of points each player can receive in 1-, 2-, or 3-player games.
Game Length, Team	13, 15, 17, ***21,*** 25, 30, 35, 40	Lets you choose the maximum number of points each team can receive in 4-player, 2-team games.
Initial Rounds Per Game	3, 4, 5, ***6,*** 7, 8, 9, 10	Lets you choose the maximum number of rounds a player is given at the start of a game.
Discount to Continue?	Yes ***No***	Lets you offer a reduced price per credit when players want to continue a game.
Frequency of Beer Round	Never ***Every 5 (rounds)*** Every 8 (rounds) Every 10 (rounds)	Lets you choose how often the "beer round" message is displayed on the screen.
Sound in Attract Mode	***Off*** On	Lets you turn the sounds on or off in the attract mode.
Auto-reset High Scores	Off ***On***	Automatically resets the high scores to the factory defaults after 2000 games, unless a player has entered his initials within the previous 200 games.

Manufacturer's recommended settings are in bold italic type.

- *Ringers per 10 Rounds* shows how many horseshoe "ringers" occurred for every 10 rounds' worth of game play.
- *Character choice* shows how often the four player characters (Joe, Al, Sid, and Lefty) were chosen.

Game Options

Check and select the coin options on this screen, shown in Figure 2-4.

To move through the options, roll the Trak-Ball up or down. Change the option in yellow type. The factory default settings are shown with a band behind them. To change a setting, roll the Trak-Ball right or left. To save the new settings, press the left button. This returns you to the select test screen. If you want to keep the original setting, although you have changed it, press the right button. This brings back the original setting. Use the left button to exit.

NOTE

The word More *appears at the bottom of the screen to indicate more options. Roll the Trak-Ball downwards to see the rest of the options.*

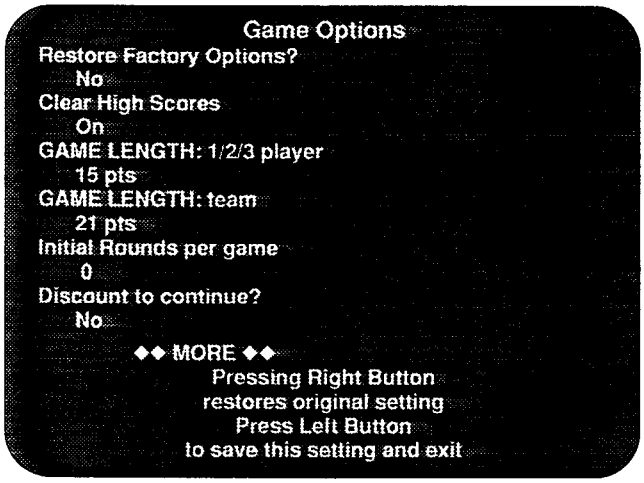


Figure 2-4 Game Options Screen

The game option settings with factory defaults are shown in Table 2-2.

Coin Options

Check and select the coin options on this screen, shown in Figure 2-5.

Table 2-3 Coin Option Settings

Option	Settings	Explanation
Free Play	***No*** Yes	Set this to "Yes" for demonstrating the game.
Game Cost	***1 coin 1 credit*** 2 coins 1 credit ... 8 coins 1 credit	Sets the number of coins required for one credit.
Bonus for Quantity Buy-in	***None*** 2 coins give 1 (extra coin) 3 coins give 1 (extra coin) 3 coins give 2 (extra coins) 4 coins give 1 (extra coin) 4 coins give 2 (extra coins) 4 coins give 3 (extra coins) 5 coins give 1 (extra coin) 5 coins give 2 (extra coins) 5 coins give 3 (extra coins) 6 coins give 1 (extra coin) 6 coins give 2 (extra coins) 6 coins give 3 (extra coins) 7 coins give 1 (extra coin) 7 coins give 2 (extra coins) 7 coins give 3 (extra coins) 8 coins give 1 (extra coin) 8 coins give 2 (extra coins) 8 coins give 3 (extra coins) 9 coins give 1 (extra coin) 9 coins give 2 (extra coins) 9 coins give 3 (extra coins)	Lets you choose various levels of bonus coins or no bonus.
Right Mech Value	***1 coin counts as 1 coin*** ... 8 coins count as 1 coin	Is the number of coins each coin counts as in the right coin mechanism.
Left Mech Value	***1 coin counts as 1 coin*** ... 8 coins count as 1 coin	Is the number of coins each coin counts as in the left coin mechanism.

Manufacturer's recommended settings are in bold italic type.

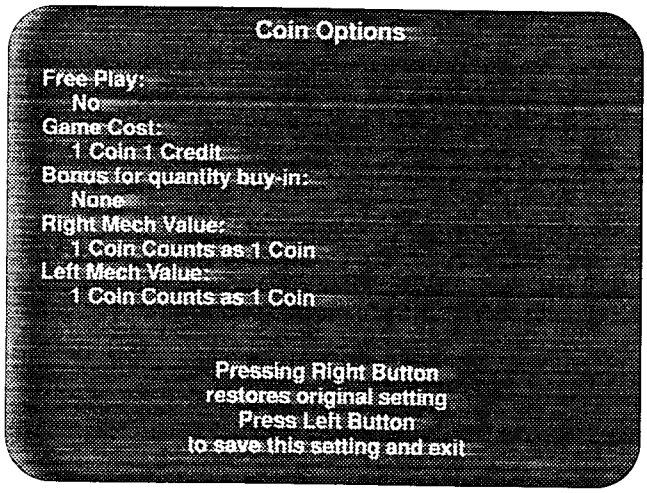


Figure 2-5 Coin Options Screen

To move through the options, roll the Trak-Ball up or down. Change the option in yellow type. The factory default settings are shown with a band behind them. To change a setting, roll the Trak-Ball right or left. To save the new settings, press the left button. This returns you to the select test screen. If you want to keep the original setting, although you have changed it, press the right button. This brings back the original setting. Use the left button to exit.

The coin option settings and factory defaults are explained in Table 2-3.

Sound Test

The sound test indicates the condition of the sound effects circuit on the game PCB. The sound test screen appears in Figure 2-6.

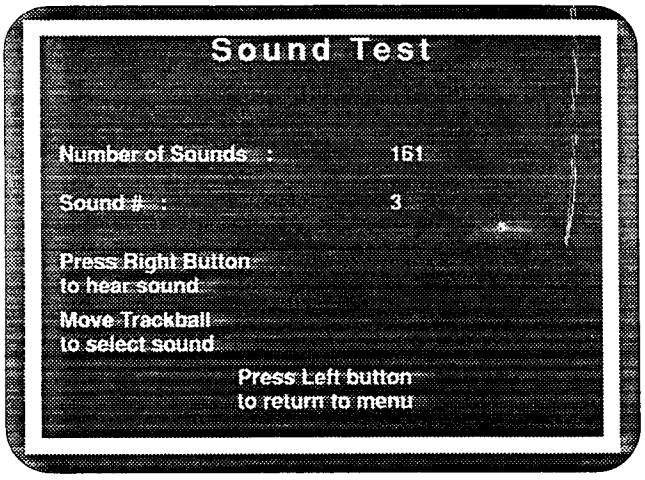


Figure 2-6 Sound Test Screen

Use the Trak-Ball to select the sound and press the right button to listen to it. Pressing the left button returns you to the select test menu

Controls Test

The controls test screen is shown in Figure 2-7. Test the coin mechanism switches, control panel buttons, and Trak-Balls. As you use the control, the control name appears in red on the screen. If the name does not change to red, check the connections, switches, and mechanism. Simultaneously press the left and right button to return to the test select screen.

Moving the Trak-Ball causes the yellow hexadecimal numbers to change when you roll it up and down (UP/DN) or left and right (LT/RT). If the numbers do not change, check the optical coupler PCBs, connectors, and harnesses for that direction of movement.

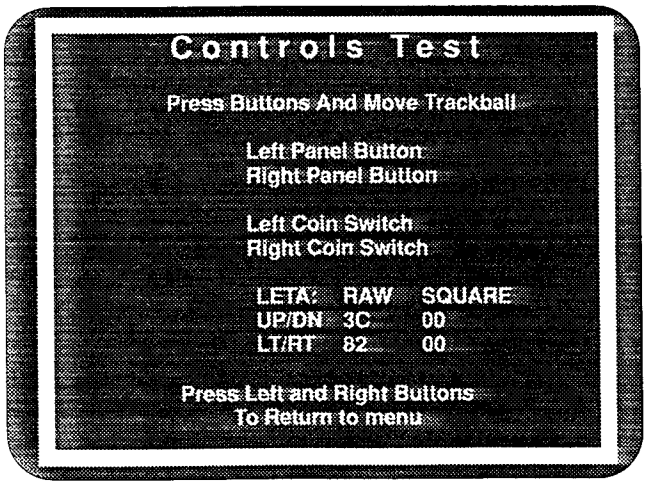


Figure 2-7 Controls Test Screen

Complete RAM Test

Use this selection screen, shown in Figure 2-8, to choose which RAM test you want to perform. Use the different tests according to Table 2-4.

If you get an error in any of the RAM tests, see Table 2-5 for more information. If you have serious RAM problems, you may see only a colored screen.

Press the left button to leave the individual RAM tests and return to the RAM test menu screen. Press the left button once more to return to the test select screen.

Table 2-4 When to Run the RAM Tests

Problem	Type of Test	Location of RAMs Tested
Playfield is erratic or looks wrong, or motion objects are not working properly.	Video RAM	41N, 70N
Colors look wrong.	Color RAM	54K

Table 2-5 Bad RAM Locations by Error Address

Error Address	RAM Location High	Low
3F0000	41N	70N
3F4000	54K	54K

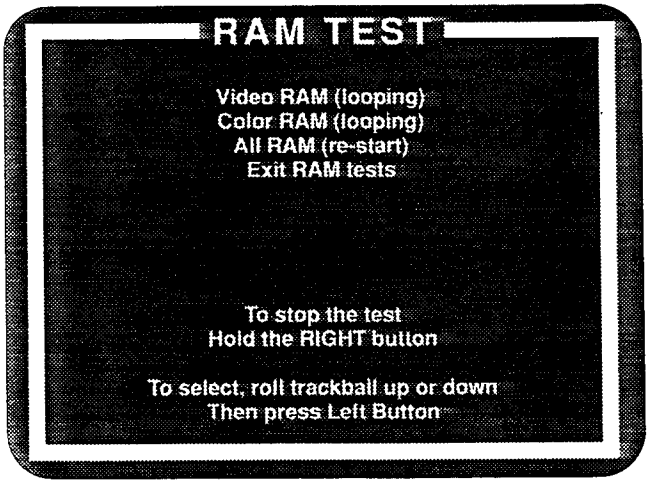


Figure 2-8 RAM Test Menu

Complete ROM Test

The ROM test screen is shown in Figure 2-9. The OK information appears. If the game has no ROM errors, you see the message *ALL ROMS are OK.*

If the game does have ROM errors, the ROM test screen will remain until the ROM error information is complete. Press the left button several times to pass the ROM errors. The ROM error test takes a few seconds.

See Table 2-6 for the locations of the ROM errors. Press the left button to return to the test select screen.

Table 2-6 Bad ROM Locations by Error Address

Error Address	ROM Location High	Low
OK	23P	13P

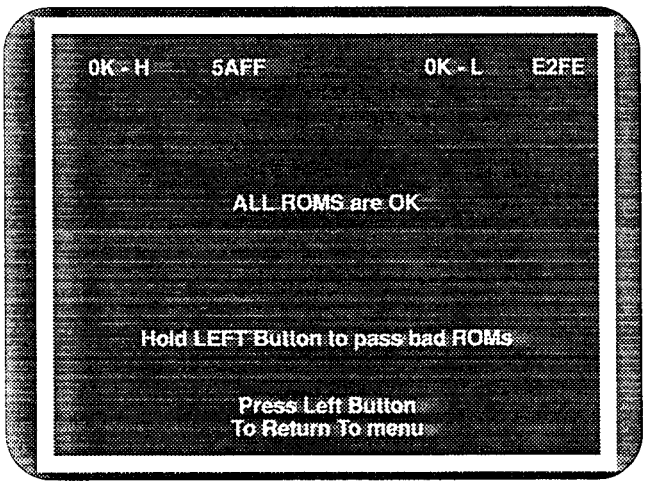


Figure 2-9 Complete ROM Test Screen

Playfield Test

This test, shown in Figure 2-10, checks the condition of the alphanumerics in the game. You can flip the characters into a mirror image of themselves by pressing the right button.

If you see an error on the screen, check the EPROMs at 87X, 65X, 43X, and 20X. Press the left button to go to the test select screen.

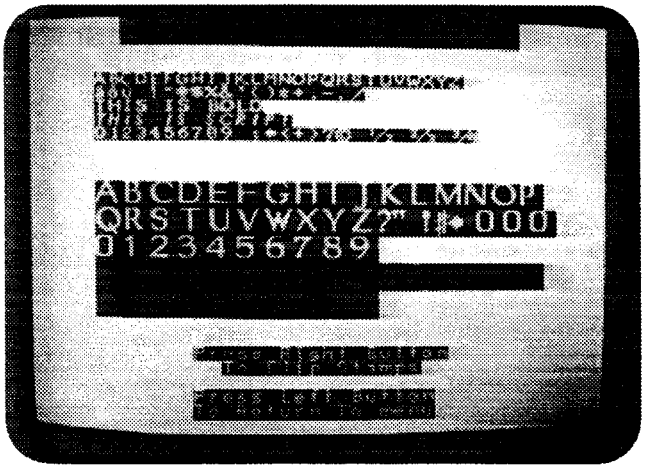


Figure 2-10 Playfield Test Screen

Motion Object Test

The motion object test screen, shown in Figure 2-11, tests the movement and color of various game objects.

Choose an object with the left button. Use the Trak-Ball to move the object. If there is an error, check the EPROMs AT 87W, 65W, 43W, 20W, 87U, 65U, 43U, and 20U.

Press the left button to move to the next object. Simultaneously press the left and right buttons to go to the test select screen.

Color Test

This test indicates the dynamic range of the video display color circuit. The screen is shown in Figure 2-12.

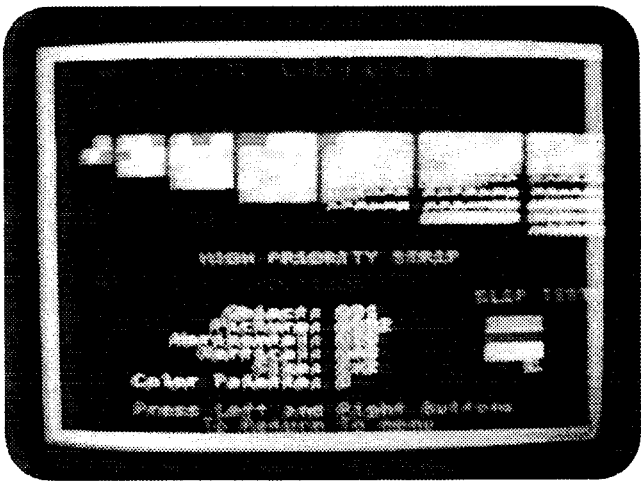


Figure 2-11 Motion Object Test Screen

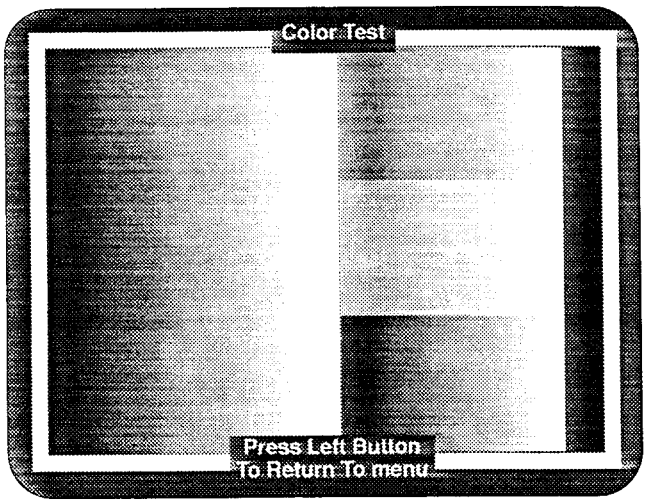


Figure 2-12 Color Test Screen

The left side of the screen should be white, with a grey scale changing to white in the middle. The right half of the screen should be red, green, and blue from top to bottom, each with a color scale from dark to bright, left to right.

If the screen does not match this description, adjust the video display as described in the video display manual.

Return to the test select screen by pressing the left button.

Color Purity Test

The color purity test has five screens. Each screen is a rectangle of color. The first screen, shown in Figure 2-13, is red. The other screens, which you can see by pressing the right button, are green, blue, white, and gray.

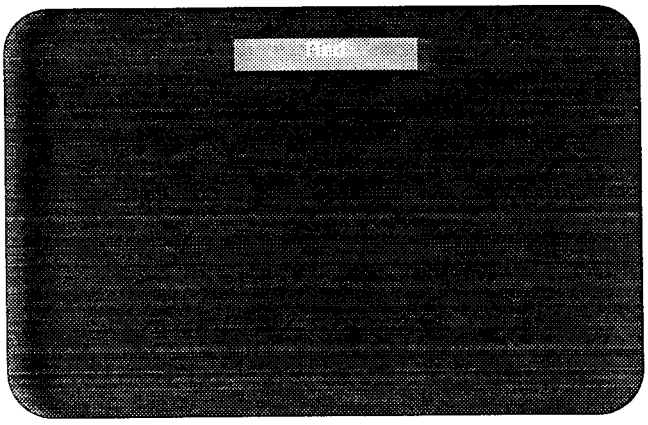


Figure 2-13 Purity Test Screen

These screens show the adjustment of the color purity of the video display. Each screen should display a rectangle of color, with no curving at the corners, no unevenness of color, and no lines in the display.

If the screens are not correct, adjust the video display as described in the video display manual.

Return to the test select screen by pressing the left button.

Convergence Test

The convergence test has three screens: first white, then violet, and finally green. The white screen is shown in Figure 2-14. To see the violet and green screens, press the right button. Press the left button to go to the test select screen.

Check the following on the screens:

- The grid lines should be straight within 3 mm, and the lines should not pincushion or barrel.
- The convergence of the lines on the violet and white screens should be within 2 mm.

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

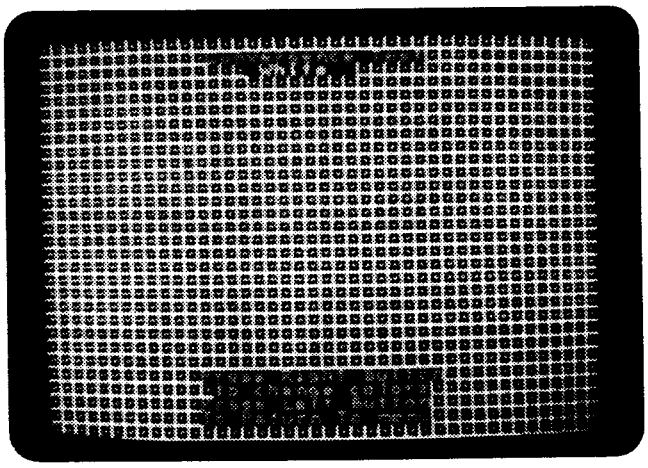


Figure 2-14 Convergence Test Screen

CHAPTER 3

Troubleshooting and Maintenance

This chapter contains troubleshooting tables and repair procedures for your Shuuz™ game. The chapter has two parts. The first part contains three troubleshooting tables. The tables contain general troubleshooting information, the voltage levels and test points on the game printed-circuit board, and a list of ROM-caused problems, with specific ROMs to check and replace. The last part of the chapter has information about connecting the video display if it requires separate positive sync and repair information for the Midi Trak-Ball control assembly.

Table 3-1 Troubleshooting Table

Problem	Suggested Action
Coin Mechanism Problem	1. Check the wiring to the coin mechanism. 2. Check the voltage to the + side of the mechanism. 3. Test the coin mechanisms with the sound test screen in the self-test.
Game Play Problem	1. Check the harness and connectors. 2. Perform the self-test. 3. Check the voltage levels on the PCB. See Table 3-2, *Voltage Inputs and Test Points.* 4. Check *What ROM Problems Look Like,* Table 3-3, for specific ROM problems.
Trak-Ball Control Problem	1. Has the Trak-Ball been lubricated with the correct type of lubricant? If not, lubricate it as shown in Figure 4-2 . 2. Check the harnesses and connectors. 3. Check the optical coupler PCBs on the control. 4. If you took the control apart, have you reassembled it correctly? 5. Make sure all the parts on the control are in good repair. Repair or replace parts.
Sound Problem	1. Is the speaker volume turned up? 2. Check the voltage on the JAMMA connector. 3. Check the wiring from the PCB to the speaker. 4. Check the voltage level to the PCB. See Table 3-2, *Voltage Inputs and Test Points.* 5. Replace the speaker.
Video Display Problem	
Sync problems.	Does your display need separate positive sync? See the *Video Display Sync Problems* section in this chapter.
Screen is dark.	1. Is the game plugged in? 2. Is the game turned on? 3. Are the connections good? 4. Is the line fuse good? 5. Is the display brightness turned up? 6. Are the solder connections on the line filter and transformer good? 7. Is the JAMMA connector on the PCB tightly connected? 8. Check all of the items below. If you answer *no* to any question, you have a problem with the video display, not with the game circuitry. See your video display service manual. a. Do you have power to the video display? b. Are the video display's filaments lit? c. Do you have high voltage to the video display? 9. Are the voltage levels to the video display PCB correct? (Power voltage is 100 VAC or 110 VAC, depending on the type of video display. Video signal voltage is 0.5 to 3.5 Volts.) 10. If the level is not correct, check the connectors and the harness.
Display area wavers or is too small.	1. Do you have correct power voltage to the video display PCB? 2. Do you have correct high voltage to the video display?
Picture is wavy.	1. Is the video ground connected to the display? 2. Are the sync inputs connected properly? Does your monitor need a separate positive sync? See the *Video Display Sync Problems* section in this chapter.
Picture is upside down.	Switch the horizontal or vertical yoke wires on the display.
Convergence, purity or color problems.	Use the screens in the self-test to adjust the video display. Use the adjustment procedures in your video display manual.
Picture is not centered.	Use the centering procedures in your video display manual.

Table 3-2 Voltage Inputs and Test Points on the PCB

Voltage	Test Point or LED	Source and Purpose
+5 ± 0.25 VDC	+5V1	Logic power from the switching power supply.
	CR7 LED	Lights when 5 V is applied to the PCB and the reset (RST) jumper is open.
	CR4 LED	Lights when the +12 V supply is good.
	CR3 LED	Lights when the –5 V supply is good.
+12V	+V0P (pin 4 of LM324)	+12 V from the switching power supply. Positive supply for the analog circuitry.
–5V	–V0P (pin 11 of LM324)	–5V from the switching power supply (if connected). Negative supply for the analog circuitry.

Table 3-3 What ROM Problems Look Like

Problem	ROM Causing the Problem	Check the ROM at:
Program works, but the motion objects or playfield are wrong.	Graphics	87W, 65W, 43W, 20W, 87U, 65U, 43U, or 20U
Garbage on screen; program doesn't work. OR Game program is erratic.	Processor Program ROM 0	30C 23P, 13P
No sound or erratic sound.	Audio ROM: Audio Program Audio ADPCM	 23P, 13P 65B, 75B

Video Display Sync Problems

Some video displays cannot use the composite negative sync that is on the JAMMA connector. The Shuuz kit includes a standard Atari Games video connector (located at 12A) that provides separate positive sync. Refer to Table 3-4 and make the appropriate connections for your video display.

For other problems, see the video display manual that came with your game.

Table 3-4 Atari Games Video Connector Pin Assignments

Pin	Signal	Pin	Signal
1	Red	7	GND
2	GND	8	GND
3	Key	9	Negative composite sync
4	Green		
5	GND	10	Positive V sync
6	Blue	11	Positive H sync

Midi Trak-Ball Control

Routine maintenance of the Midi Trak-Ball control consists mainly of inspecting the roller shafts for excessive wear and periodically lubricating the bearings.

Removing the Midi Trak-Ball

1. Open the control panel, and disconnect the harness at the six-pin connector.
2. Remove the four nuts and carriage bolts that secure the Midi Trak-Ball assembly to the control panel.

Disassembling the Midi Trak-Ball

To disassemble the Midi Trak-Ball after it has been removed from the control panel, remove the six screws that secure the upper and lower frames (see Figure 4-2). Lift off the upper frame. The Midi Trak-Ball can now be disassembled.

Inspecting the Midi Trak-Ball

1. With the Midi Trak-Ball disassembled, inspect the roller shafts and the idler shaft for excessive wear (see Figure 3-1). If the wear band exceeds 3/8 inch, replace the roller shaft as described in steps 2–6, or replace the idler shaft as described in steps 7–10.

2. To replace a roller shaft, first remove the roller shaft from the lower frame.
3. Remove the metal encoding wheel by loosening the socket-head screw, flat washer, and split-lock washer. Remove the encoding wheel and bearings.
4. Remount the bearings and encoding wheel on a new roller shaft.
5. Tighten the encoding wheel by inserting a 1/8-inch-diameter pin or screwdriver through the hole in the shaft. Tighten the socket-head screw with an Allen wrench.
6. Reinstall the roller shaft in the lower frame.
7. To replace the idler shaft, first remove the idler shaft from the lower frame.
8. Remove the bearings from the ends of the idler shaft.
9. Remount the bearings on a new idler shaft.
10. Reinstall the idler shaft in the lower frame.

Lubricating the Midi Trak-Ball

Lubrication of the Midi Trak-Ball assembly should be performed every three months or 6,000 credits (as counted on the coin counter). To lubricate, place two drops of a light-duty oil, such as 3-In-One oil, on each of the six ball bearings shown in Figure 4-2.

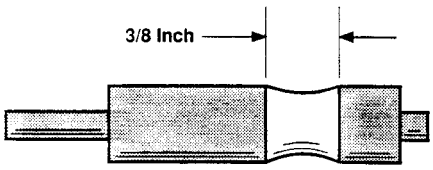


Figure 3-1 Excessive Shaft Wear

Replacing the Coupler PCB

1. To remove the Coupler PCB, first disassemble the Midi Trak-Ball. Lift the PCB out of its slot. Carefully disconnect the red connector and remove the PCB.
2. To reinstall the Coupler PCB, place the PCB in the slot in the lower frame, and reconnect the red connector.

NOTE

When you reinstall the Coupler PCB, make sure that the metal encoding wheel is not bent or damaged. Be sure the encoding wheel turns freely between the two halves of the radial optical coupler.

Reassembling the Midi Trak-Ball

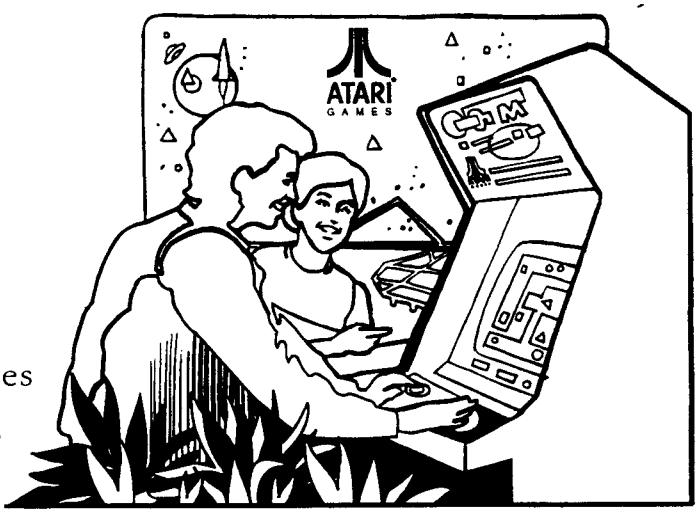
1. Install the upper frame of the Midi Trak-Ball over the assembly. Be sure that each Couple PCB is engaged in the slots of the upper frame.
2. Replace the six screws that secure the upper and lower frames together.
3. Remount the Midi Trak-Ball assembly to the control panel using the four nuts and carriage bolts.
4. Reconnect the six-pin connector of the harness.

ROMs and RAMs

If you have think you have bad ROMs or RAMs, preform the ROM or RAM test in the self-test. If you have a ROM problem, see Table 3-3.

CHAPTER 4

Parts Illustrations



This chapter provides information you need to order replacement parts for your kit. Common hardware parts, such as screws, nuts, washers, and so on, are included in these parts illustrations. 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.

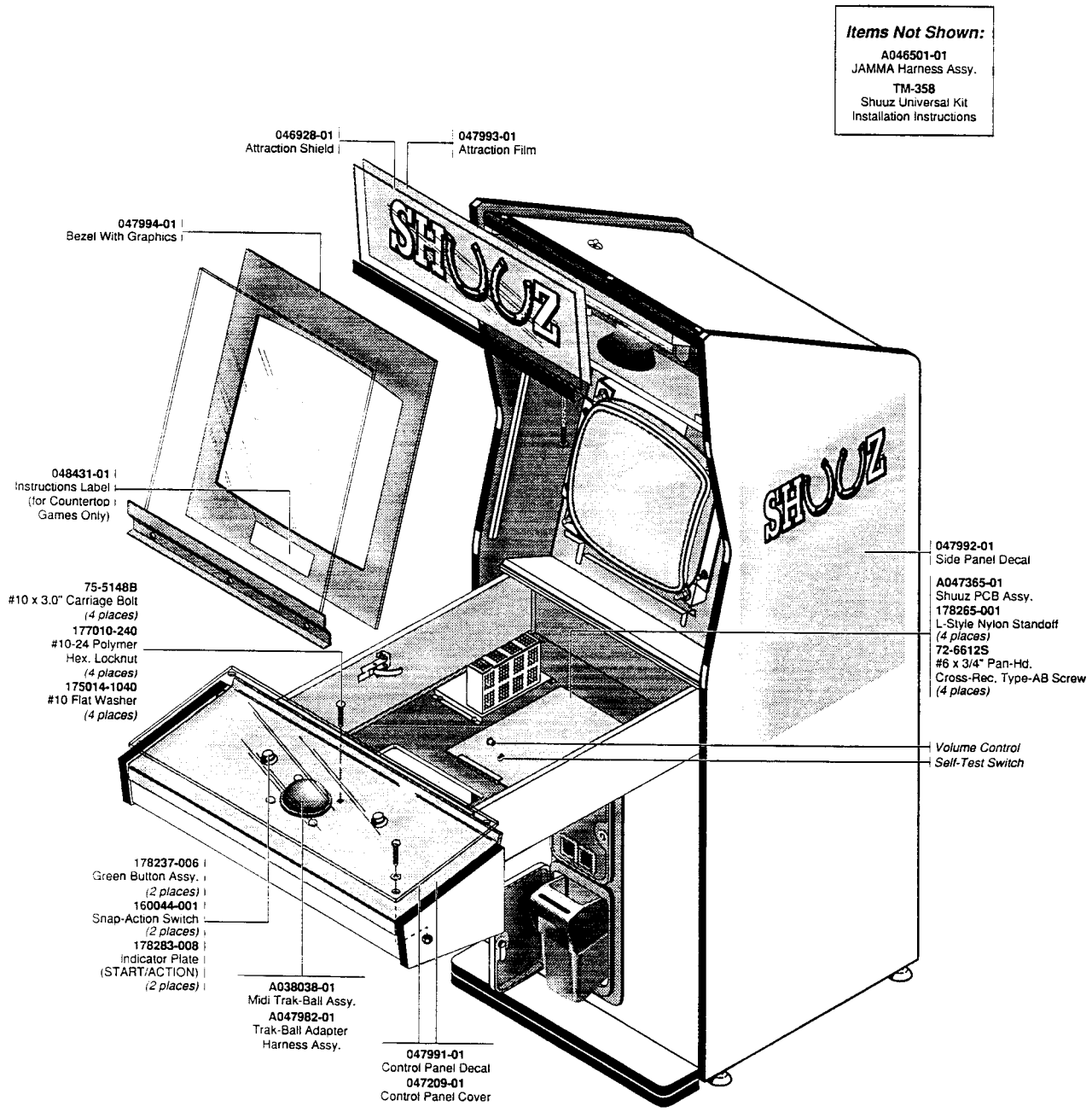


Figure 4-1 Parts for Shuuz Universal Kit
A047980-01 D

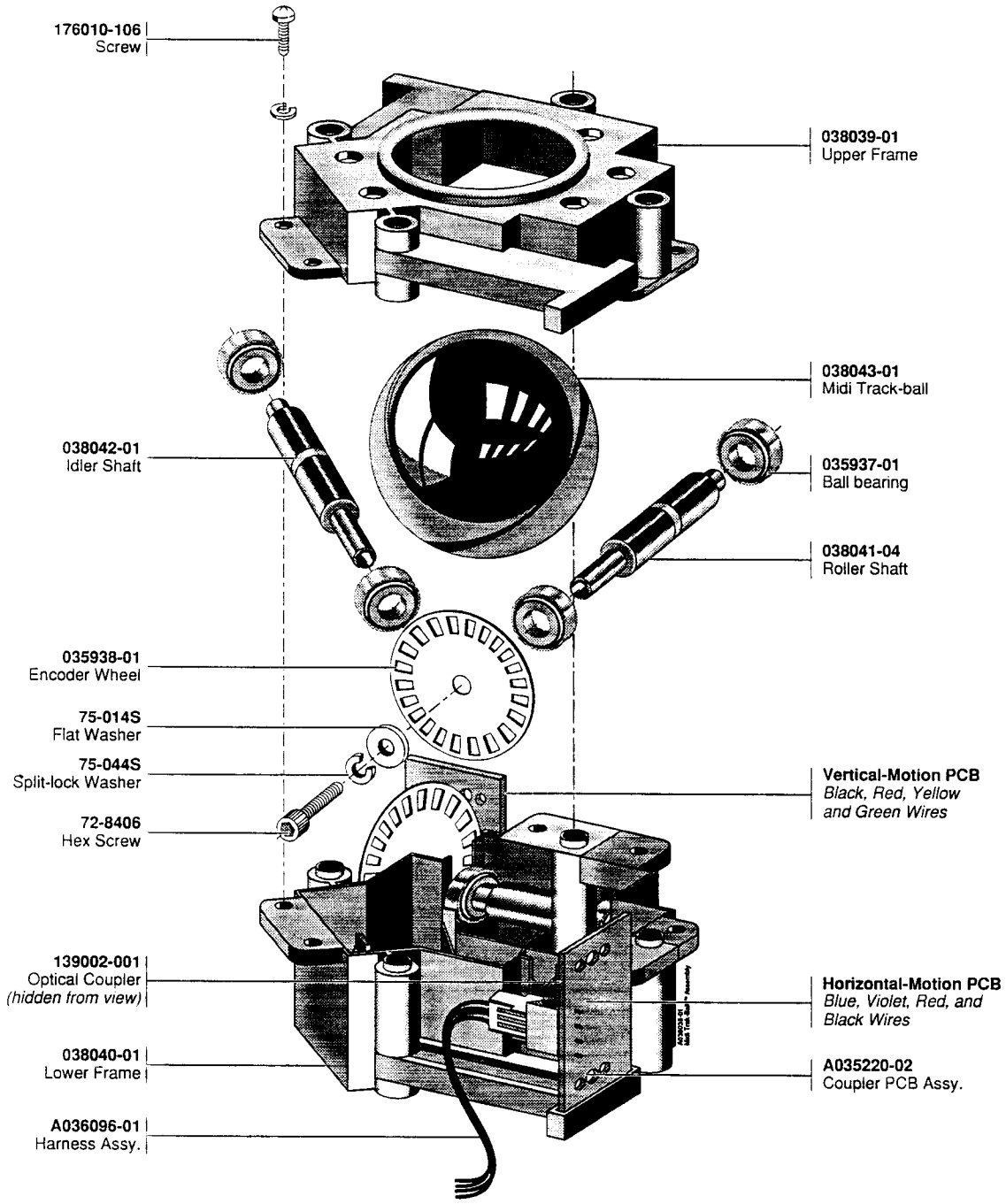


Figure 4-2 Midi Trak-Ball Assembly
A038038-01 G

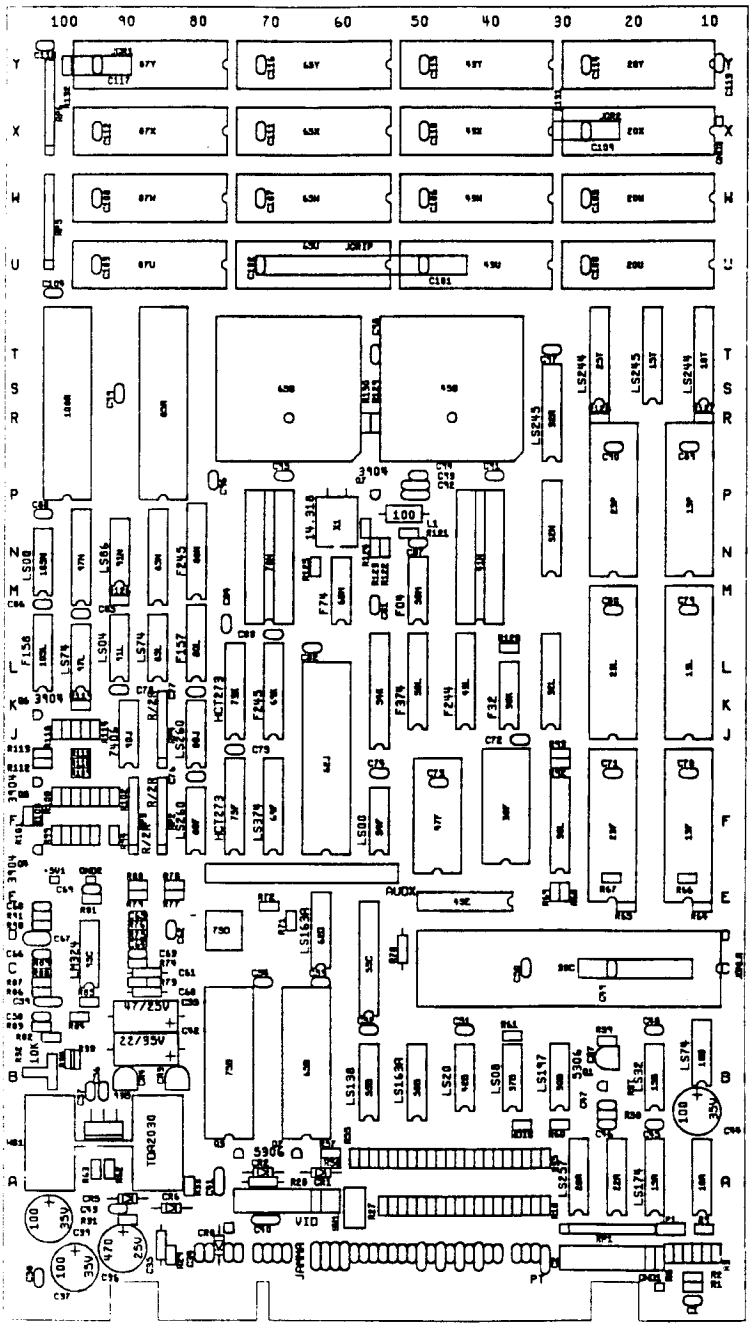
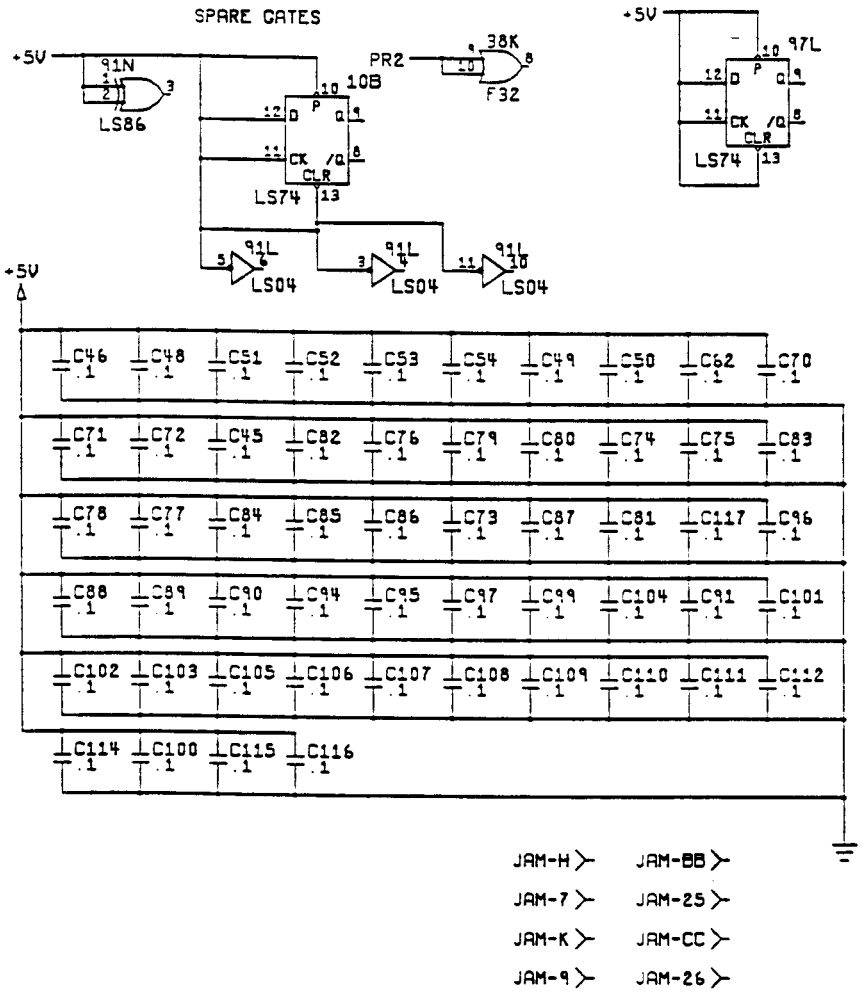


Figure 4-3 Shuuz Game PCB Assembly
A047365-01 A

CHAPTER 5

Schematic Diagrams

This chapter contains the schematics diagrams for your SHUUZ™ game PCB. In addition, the faulty RAM/ROM tables are printed at the end of this chapter. (The game board assembly drawing is illustrated in Chapter 4, Parts Illustrations.)



NOT STUFF

-5V	AUDX-1	+12V	AUDX-2
AGND	AUDX-3	AUDMP	AUDX-4
AUX1	AUDX-5	AUX2	AUDX-6
AGND	AUDX-7	AGND	AUDX-8
D7	AUDX-9	/AUX	AUDX-10
GND	AUDX-11	D6	AUDX-12
D5	AUDX-13	GND	AUDX-14
GND	AUDX-15	D4	AUDX-16
D3	AUDX-17	GND	AUDX-18
GND	AUDX-19	D2	AUDX-20
D1	AUDX-21	GND	AUDX-22
GND	AUDX-23	D0	AUDX-24
6502CLK	AUDX-25	YAMCLK	AUDX-26
MA1	AUDX-27	GND	AUDX-28
GND	AUDX-29	/SINT	AUDX-30
/VINT	AUDX-31	GND	AUDX-32
GND	AUDX-33	S-TEST	AUDX-34
W//R	AUDX-35	GND	AUDX-36
GND	AUDX-37	/AUDRES	AUDX-38
+5V	AUDX-39	+5V	AUDX-40

FIDUCIAL MARK
FIDUCIAL MARK
FIDUCIAL MARK
FIDUCIAL MARK

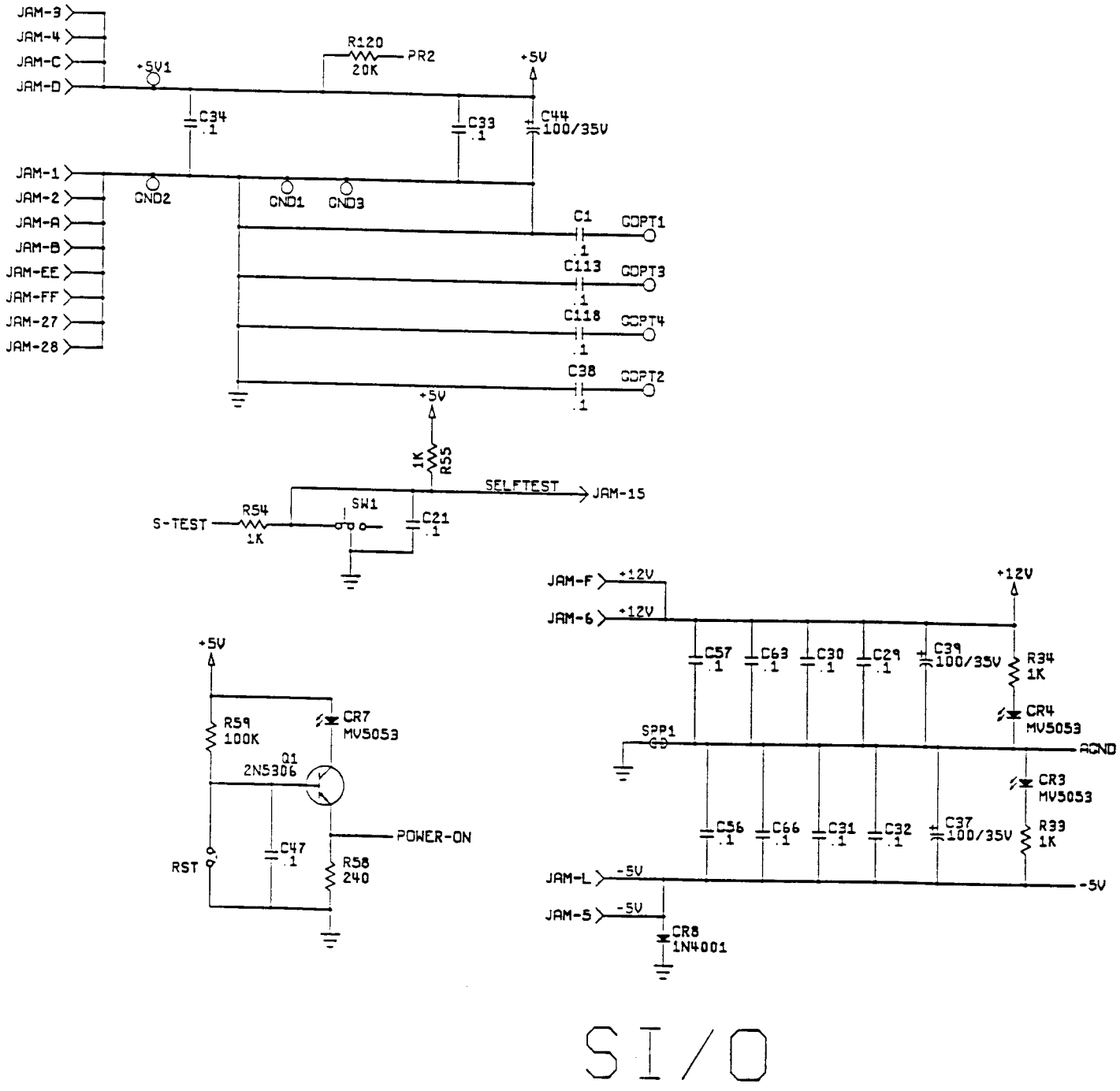
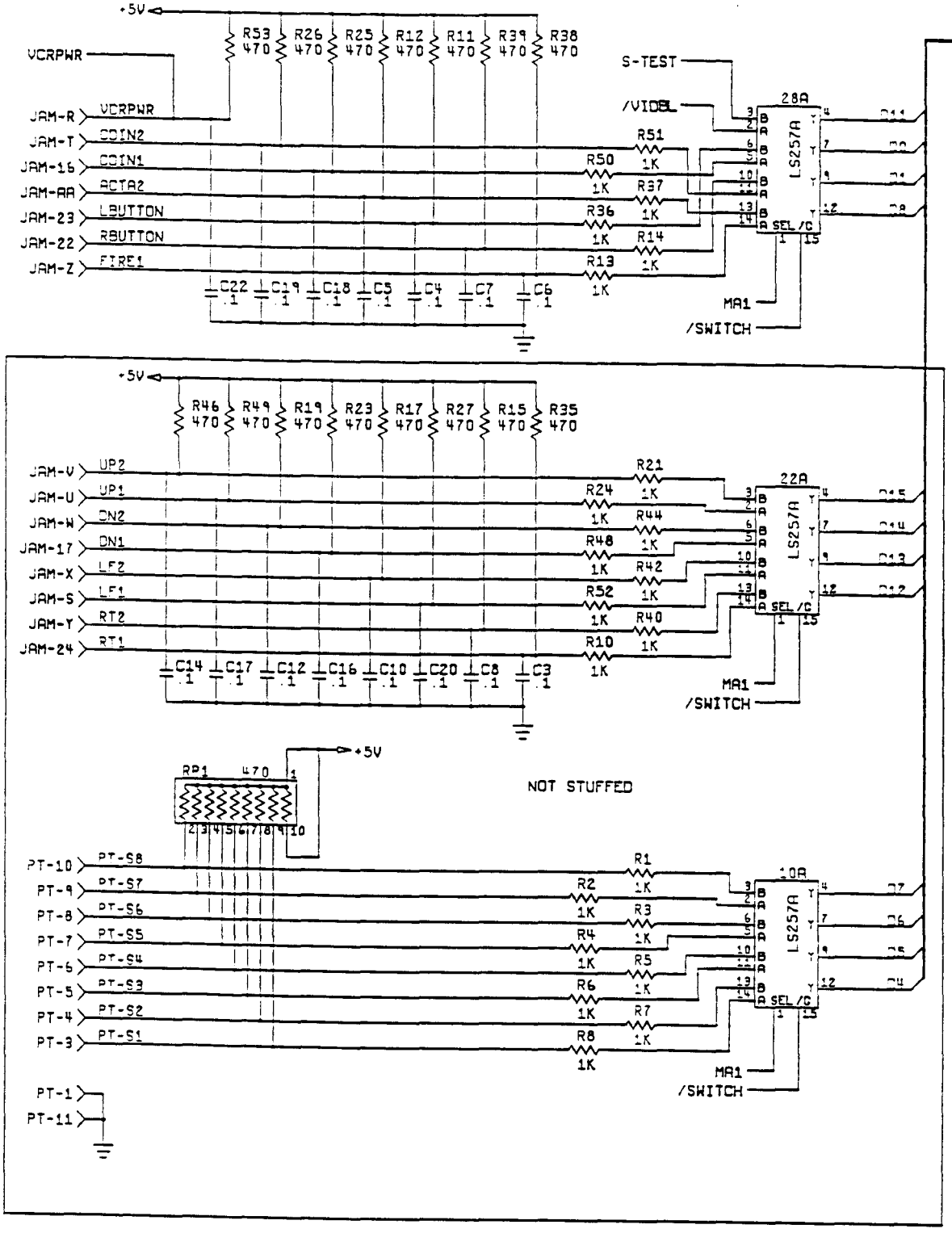


Figure 5-1 Shuuz Game PCB Assembly Schematic Diagram

047366-01 A


+5V
R53 470
R26 470
R25 470
R12 470
R11 470
R39 470
R38 470
VCRPWR
S-TEST
/VIDBL
28A
LS257A
JAM-R VCRPWR
JAM-T COIN2
JAM-16 COIN1
JAM-AA ACTA2
JAM-23 LBUTTON
JAM-22 RBUTTON
JAM-Z FIRE1
R51 1K
R50 1K
R37 1K
R36 1K
R14 1K
R13 1K
C22 .1
C19 .1
C18 .1
C5 .1
C4 .1
C7 .1
C6 .1
MA1
/SWITCH
+5V
R46 470
R49 470
R19 470
R23 470
R17 470
R27 470
R15 470
R35 470
22A
LS257A
JAM-V UP2
JAM-U UP1
JAM-W DN2
JAM-17 DN1
JAM-X LF2
JAM-S LF1
JAM-Y RT2
JAM-24 RT1
R21 1K
R24 1K
R44 1K
R48 1K
R42 1K
R52 1K
R40 1K
R10 1K
C14 .1
C17 .1
C12 .1
C16 .1
C10 .1
C20 .1
C8 .1
C3 .1
MA1
/SWITCH
+5V
RP1 470
NOT STUFFED
10A
LS257A
PT-10 PT-S8
PT-9 PT-S7
PT-8 PT-S6
PT-7 PT-S5
PT-6 PT-S4
PT-5 PT-S3
PT-4 PT-S2
PT-3 PT-S1
R1 1K
R2 1K
R3 1K
R4 1K
R5 1K
R6 1K
R7 1K
R8 1K
MA1
/SWITCH
PT-1
PT-11

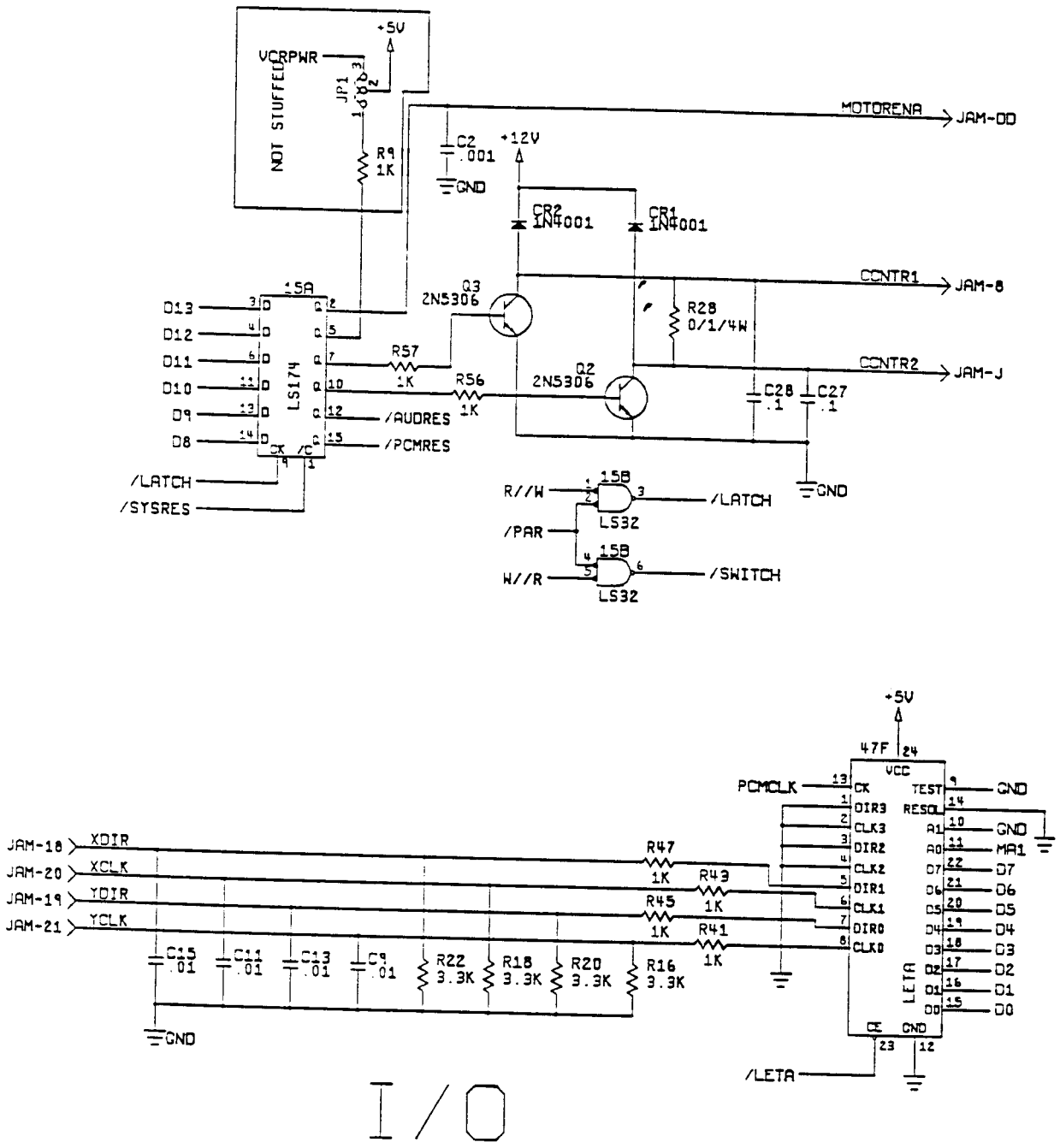
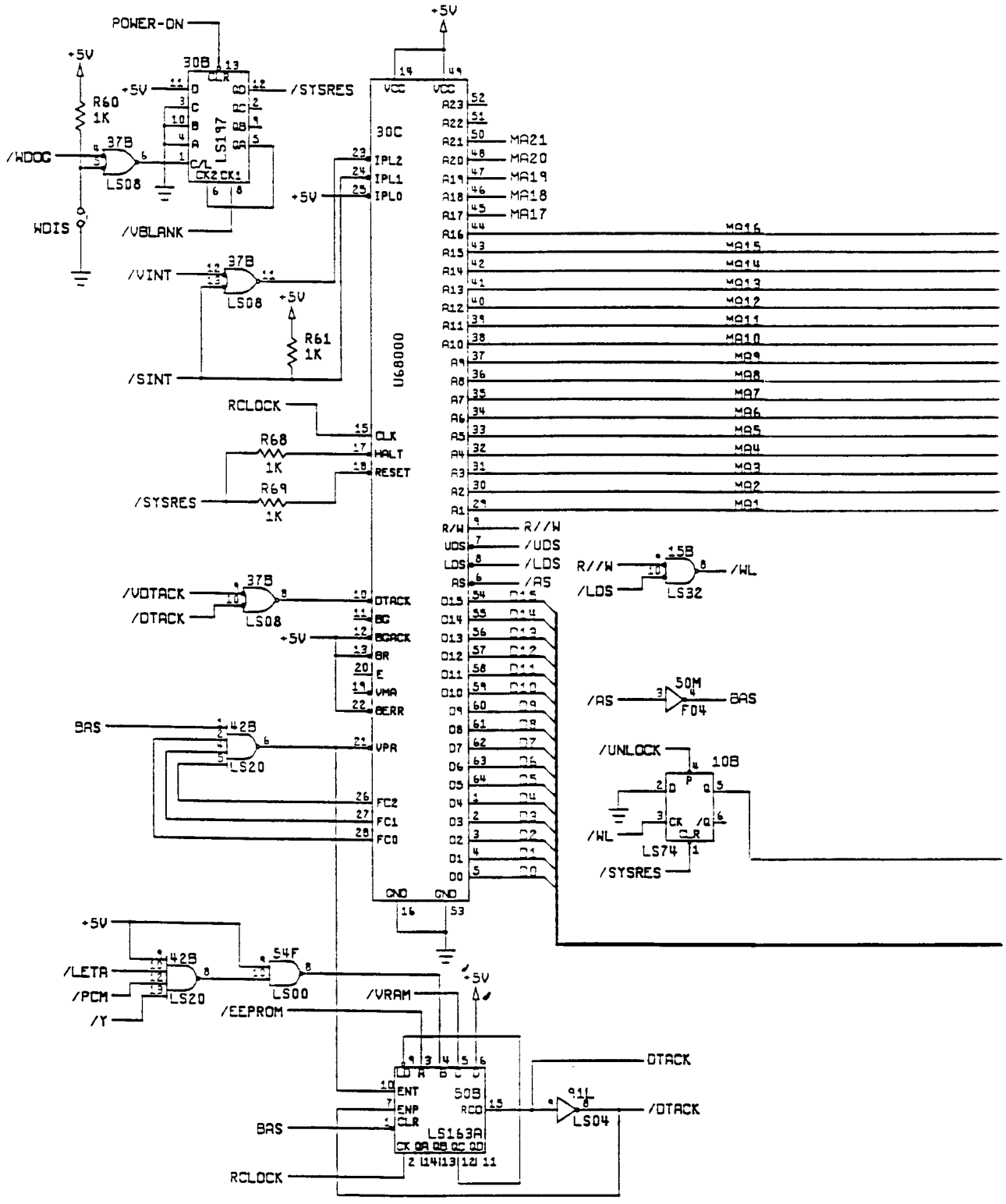


Figure 5-1 Shuuz Game PCB Assembly Schematic Diagram

047366-01 A


POWER-ON
+5V
/SYSRES
R60
1K
/WDOG
WDIS
LS08
LS197
/VBLANK
/VINT
R61
1K
/SINT
RCLOCK
R68
1K
R69
1K
/SYSRES
/VDTACK
/DTACK
BAS
/AS
/UDS
/LDS
R//W
/WL
/UNLOCK
/SYSRES
LS74
LS32
LS04
LS20
LS00
LS163A
/LETA
/PCM
/Y
/VRAM
/EEPROM
/DTACK
RCLOCK
U68000
30B
30C
37B
42B
50M
F04
10B
54F
91L
50B

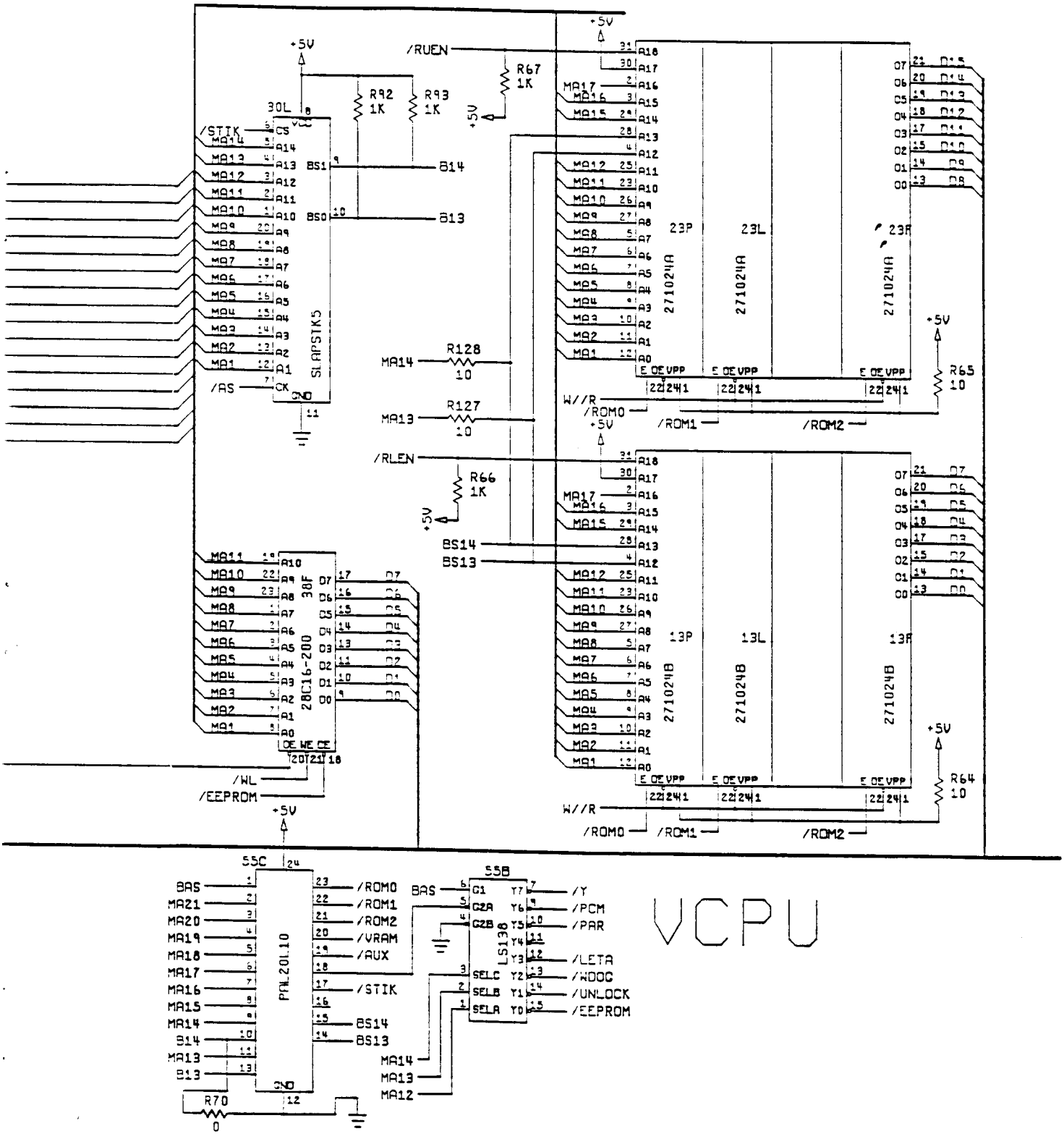
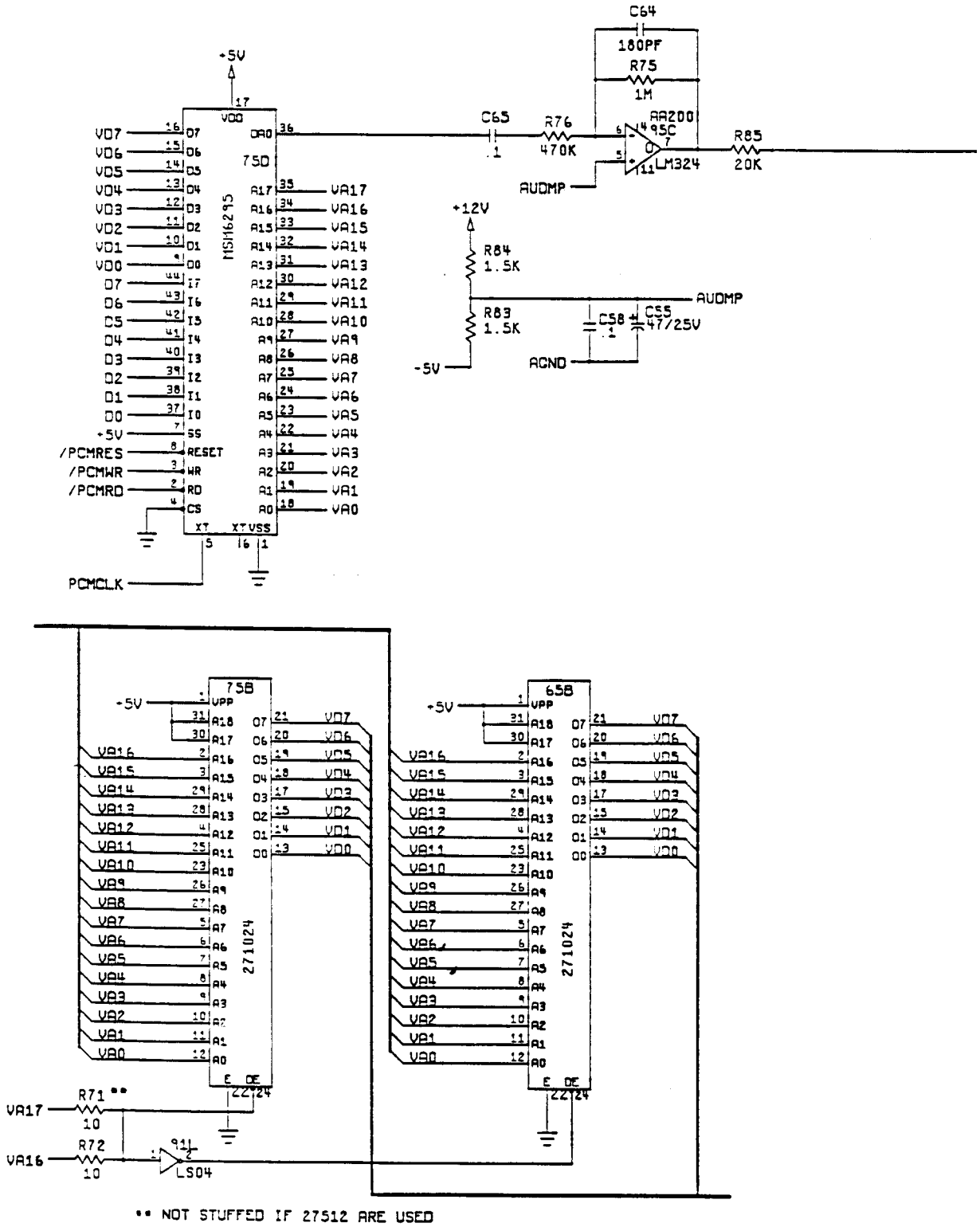


Figure 5-1 Shuuz Game PCB Assembly Schematic Diagram

047366-01 A


C64
180PF
R75
1M
+5V
C65
.1
R76
470K
AA200
495C
LM324
R85
20K
AUDMP
+12V
R84
1.5K
R83
1.5K
C58
.1
C55
47/25V
AGND
-5V
MSM6295
VDD
SS
XT
XTVSS
RESET
WR
RD
CS
PCMRES
/PCMWR
/PCMRD
PCMCLK
D0
D1
D2
D3
D4
D5
D6
D7
I0
I1
I2
I3
I4
I5
I6
I7
A0
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
A13
A14
A15
A16
A17
VA0
VA1
VA2
VA3
VA4
VA5
VA6
VA7
VA8
VA9
VA10
VA11
VA12
VA13
VA14
VA15
VA16
VA17
VD0
VD1
VD2
VD3
VD4
VD5
VD6
VD7
27512
VPP
A18
OE
R71 **
10
R72
10
LS04
** NOT STUFFED IF 27512 ARE USED

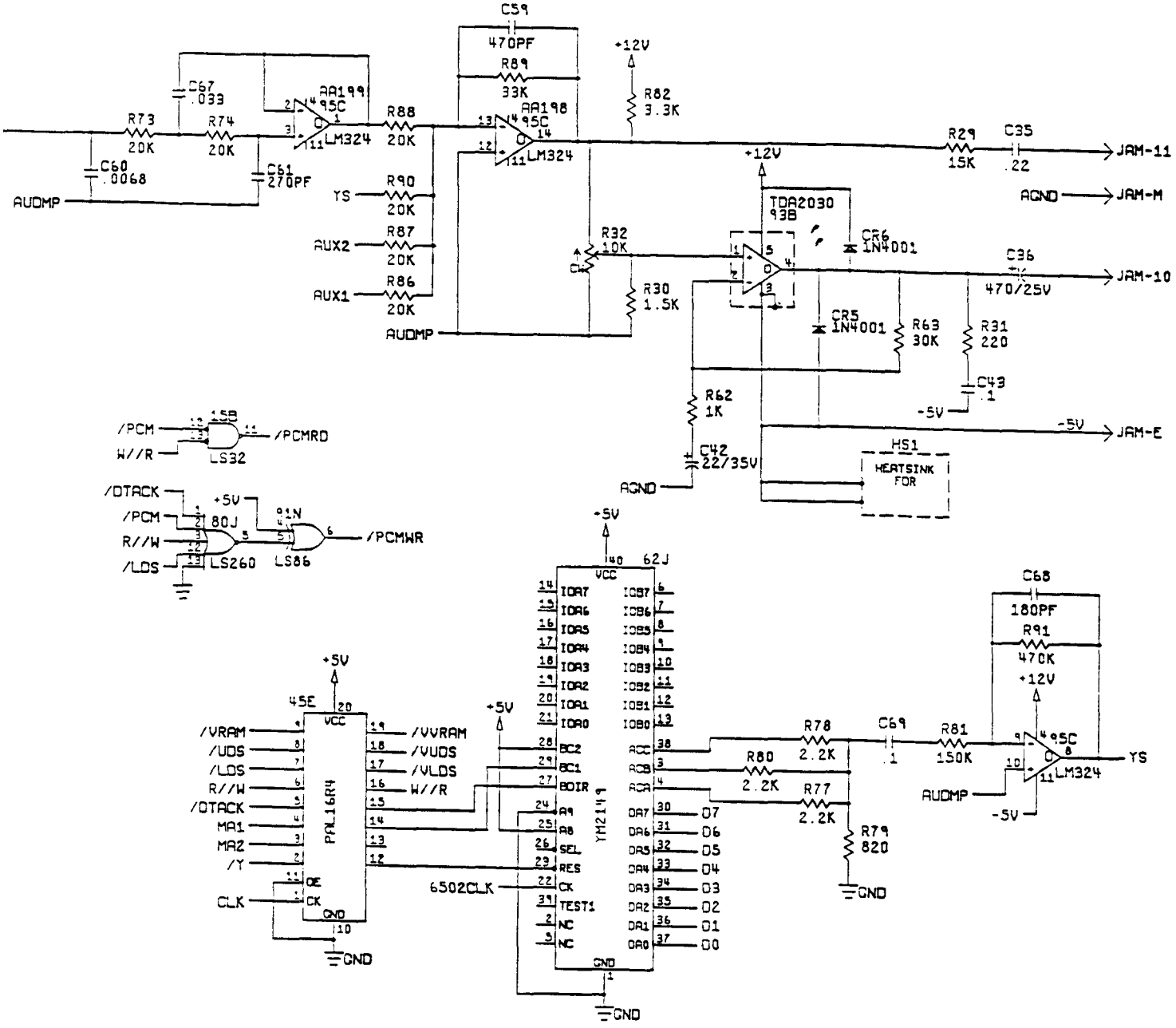
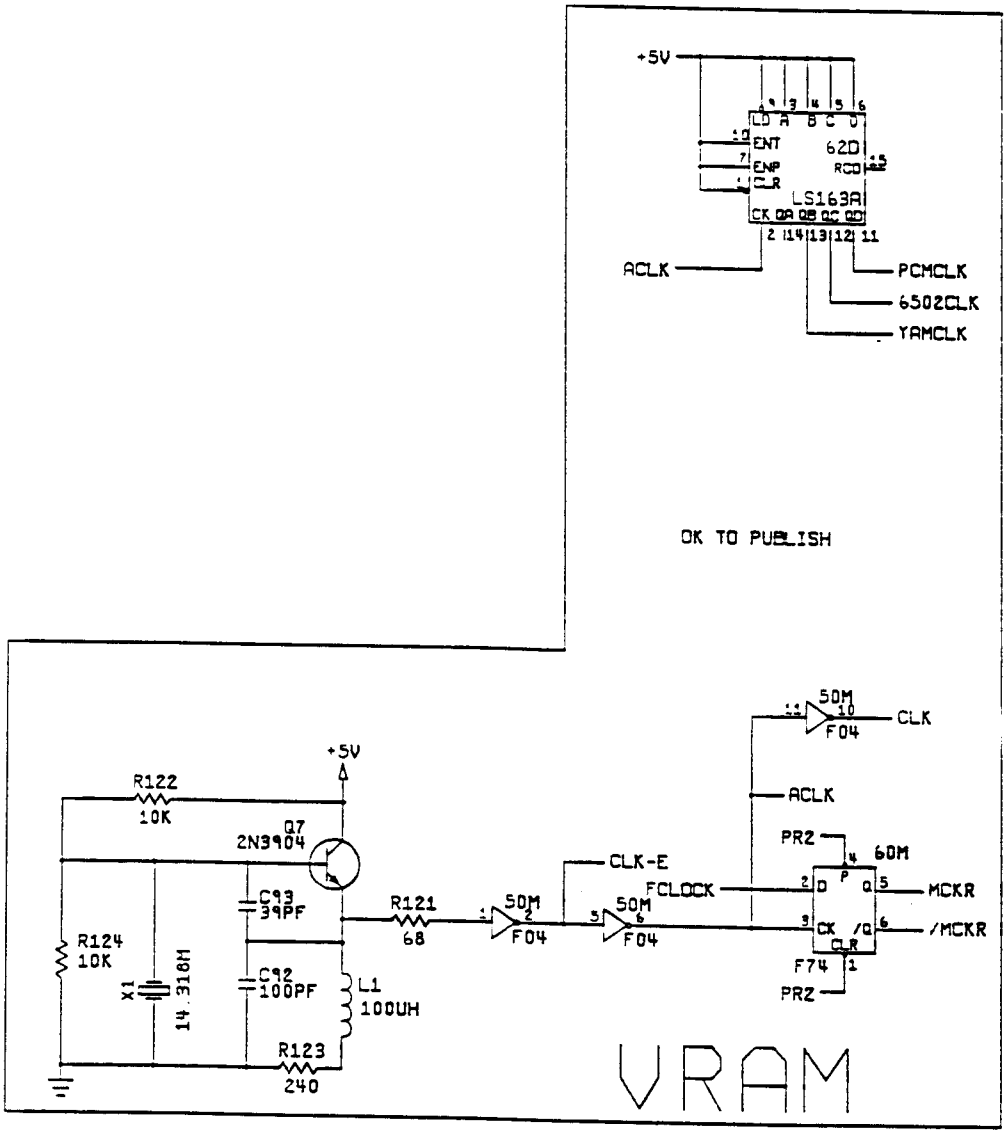
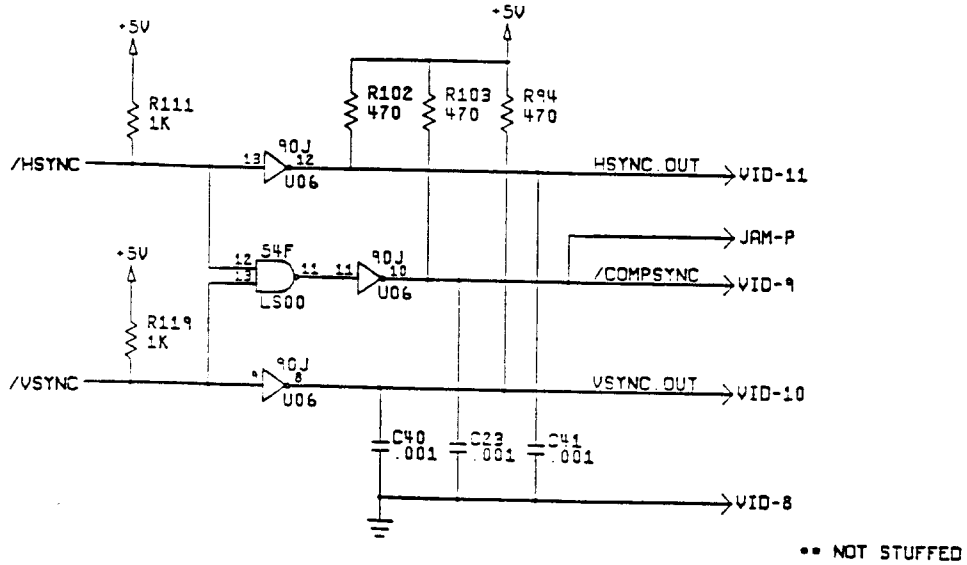


Figure 5-1 Shuuz Game PCB Assembly Schematic Diagram

047366-01 A


+5V
LD A B C D
ENT
ENP
CLR
62D
RCO
LS163A
CK QA QB QC QD
ACLK
PCMCLK
6502CLK
YAMCLK
OK TO PUBLISH
50M
F04
CLK
ACLK
PR2
60M
CLK-E
FCLOCK
MCKR
/MCKR
F74
PR2
R122
10K
Q7
2N3904
C93
39PF
R121
68
R124
10K
X1
14.318M
C92
100PF
L1
100UH
R123
240
VRAM


+5V
R111
1K
R102
470
R103
470
R94
470
/HSYNC
90J
U06
HSYNC.OUT
VID-11
JAM-P
54F
LS00
/COMPSYNC
VID-9
R119
1K
/VSYNC
VSYNC.OUT
VID-10
C40
.001
C23
.001
C41
.001
VID-8
** NOT STUFFED

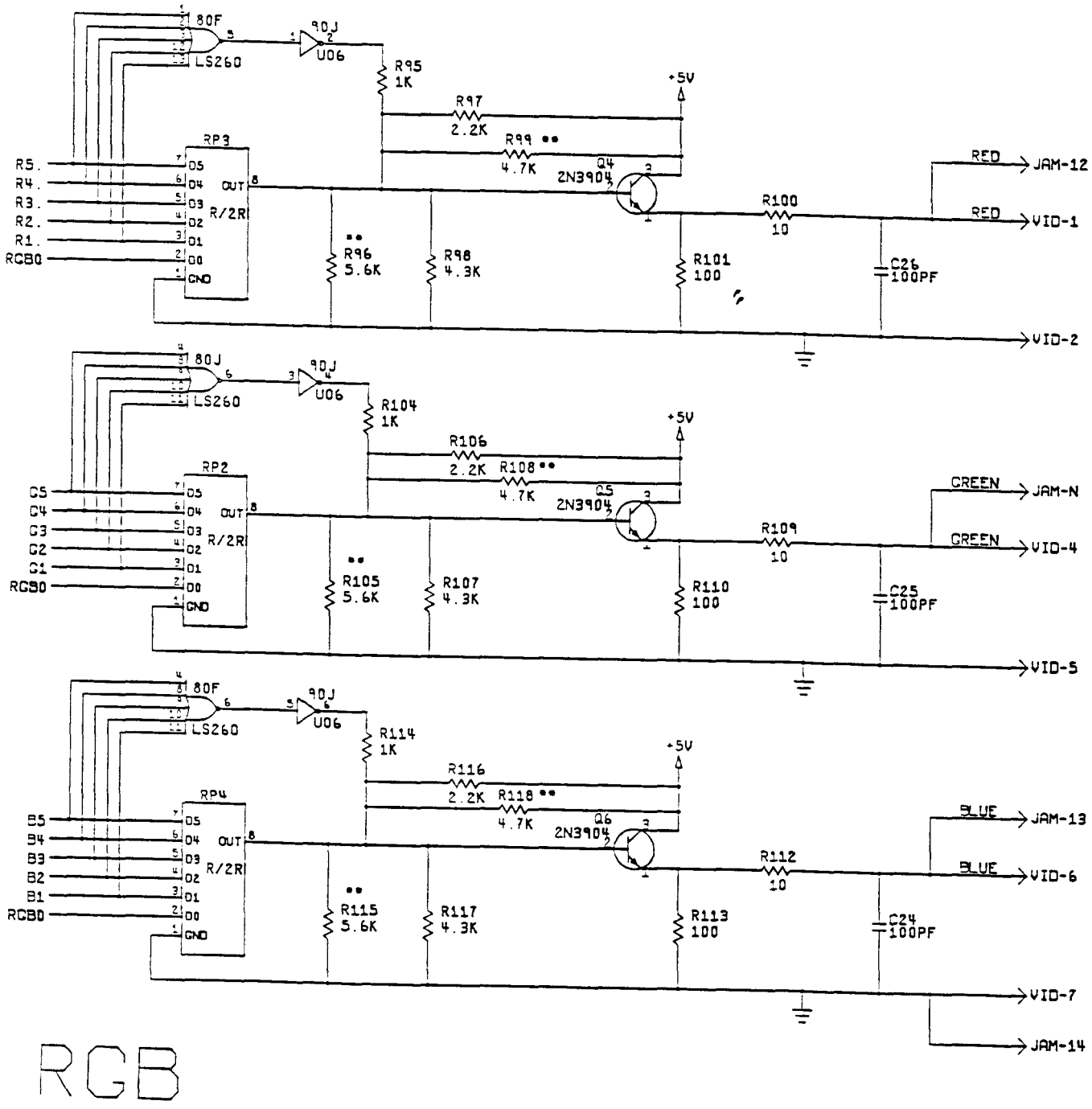
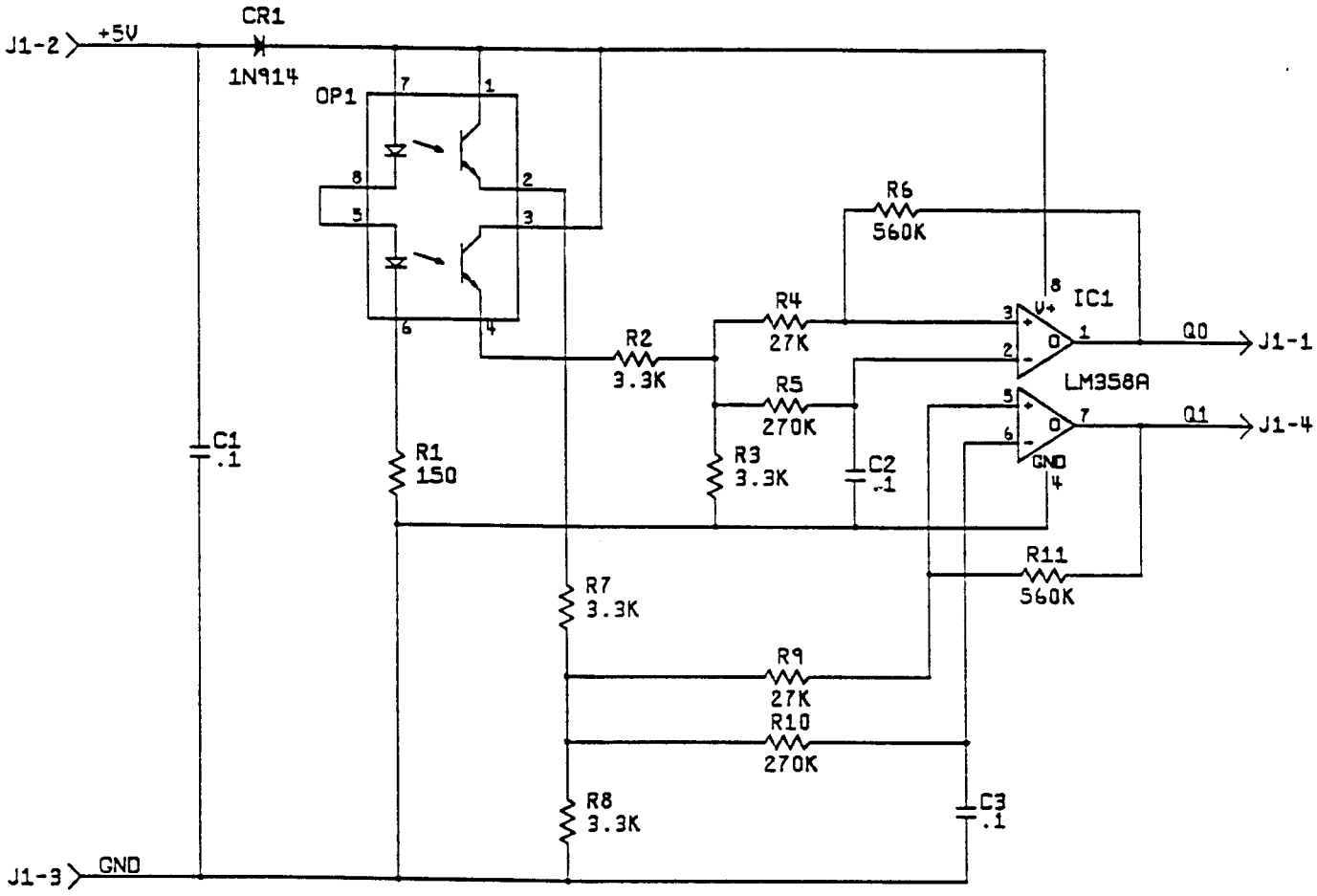


Figure 5-1 Shuuz Game PCB Assembly Schematic Diagram

047366-01 A



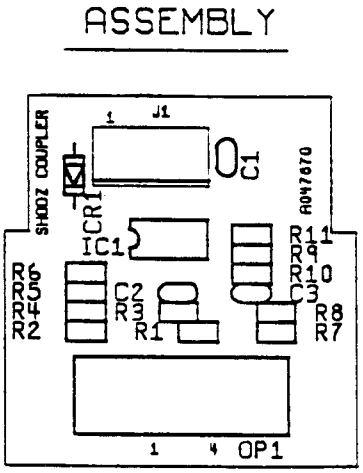


Figure 5-2 Shuuz Coupler PCB Assembly Schematic Diagram

047870-01 B

Bad RAM Locations by Error Address

Error Address	RAM Location High	Low
3F0000	41N	70N
3F4000	54K	54K

Bad ROM Locations by Error Address

Error Address	RAM Location High	Low
0K	23P	13P

Figure 5-3 Faulty RAM/ROM Tables