TM-405
2nd printing

TIME WARNER INTERACTIVE™

AREA 51™

Universal Kit Installation Instructions

Makes a great conversion for Lethal Enforcer, NBA Jam, or Mortal Kombat I and II!

ATARI® GAMES

TIME WARNER
INTERACTIVE™

AREA 51™

Universal Kit Installation Instructions

Conversion Kit for Two-Player Upright Games

Patents are pending on several parts of the Area 51 game.

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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, including cabinetry, 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 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.

Important Notice

If you are installing this Area 51 kit into a Showcase 33 cabinet with serial no.:	You have a Showcase 33 cabinet part no.:
PED0100 through PED0599	-01
PED0600 through PED0750	-02
PED0751 or higher	-03

Follow the table below and check for the parts you need, or the optional parts you would like to order.

Part Number	Quantity Required for -01 cab.	-02 cab.	-03 cab.	Description
A053517-01	1	1	1	Subwoofer Harness Assembly
A053518-01	1	1	1	XBUS Harness Assembly
148016-001	1	1	1	Subwoofer Speaker
A052910-02	1	1		Main Harness Assembly
149016-002	1			Power Supply Assembly
A052917-01	1			Fan Assembly
178392-001	1			Fan Guard
052896-01*	1	1	1	Attraction Film
052887-01*	1	1	1	Wide Plastic Control Panel Cover
053570-01*	1	1	1	Metal Control Panel
052821-01*	1			Plastic Control Panel Cover (original version)
052866-01*	1			Metal Control Panel (original version)
A053516-01*	2	2	2	Control Panel Harness Assembly

**Indicates an optional part that enhances the appearance of the converted Showcase 33 cabinet or eases installation.*

To order these parts, contact your distributor or the Time Warner Interactive Customer Service office nearest you; see the inside front cover of this manual.

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.

Précautions de'Emploi Générales ➠

PRÉCAUTIONS DE'EMPLOI GÉNÉRALES

Les précautions d'emploi ci-dessous s'adressent à toutes les personnes susceptibles d'utiliser ou de réparer ce jeu. La présente notice renferme également d'autres mises en garde et avertissements spécifiques.

MISES EN GARDE

Mettez le jeu à la terre. Les joueurs risquent de recevoir une décharge électrique si le jeu n'est pas correctement mis à la terre! Pour éviter les décharges électriques, assurez-vous que le jeu est correctement mis à la terre avant de le brancher. Branchez-le uniquement dans une prise tripolaire avec mise à la terre. Si vous n'avez pas de prise tripolaire, il est recommandé de faire appel à un électricien breveté pour en installer une. Si la console de commande n'est pas correctement mise à la terre, les joueurs risquent de recevoir une décharge électrique! Si une réparation quelconque a été faite sur la console de commande, assurez-vous que le fil de mise à la terre est solidement attaché à l'intérieur de la console. Ceci fait, verrouillez le jeu.

Branchement sur secteur. Avant de brancher le jeu, assurez-vous que son bloc d'alimentation est compatible avec la tension secteur locale. Les conditions d'alimentation du jeu apparaissent au premier chapitre de la présente notice.

Débranchez le jeu du secteur avant toute réparation. Pour éviter les décharges électriques, débranchez le jeu du secteur avant de le démonter ou de le réparer. Lors de la dépose ou de la réparation de l'affichage vidéo, attention aux décharges électriques. Les hautes tensions subsistent dans les circuits et le tube à rayon cathodique de l'affichage même après son débranchement. Ne touchez pas aux pièces internes de l'affichage avec les mains ou des objets métalliques! Prenez soin de toujours décharger le courant haute tension accumulé dans l'écran cathodique avant de le réparer, après avoir débranché l'appareil du secteur. Premièrement, reliez à la terre l'une des extrémités d'un gros fil de connexion bien isolé de calibre 18 [gauge]. Puis, touchez momentanément l'anode de l'écran cathodique avec l'extrémité libre du fil de connexion mis à la terre en glissant le fil sous le chapeau de l'anode de l'écran. Attendez deux minutes et recommencez.

Utilisez uniquement des pièces Atari. Pour éviter les risques d'accidents, utilisez toujours des pièces Atari pour réparer le jeu. L'emploi de pièces d'autres marques ou la modification des circuits du jeu sont potentiellement dangereux pour le réparateur et pour les joueurs.

Prenez soin de l'écran cathodique. Si vous faites tomber l'écran cathodique et qu'il se brise, il risque d'imploser et de projeter des débris de verre à six pieds ou plus!

Utilisez les fusibles appropriés. Pour éviter les décharges électriques, remplacez les fusibles par ceux indiqués dans la nomenclature du jeu. Les fusibles de rechange doivent être du même type, de la même tension et de la même intensité que ceux d'origine.

ATTENTION

Attachez correctement tous les connecteurs. Assurez-vous que tous les connecteurs sont bien enfichés dans les cartes circuits. Ces connecteurs sont dotés d'un détrompeur qui évite les erreurs de branchement. S'ils s'enfichent difficilement, ne forcez pas. Si vous branchez un connecteur à l'envers, vous risquez d'endommager le jeu et d'en annuler la garantie.

Vérifiez la fréquence de ligne du courant secteur. Les jeux vidéo fabriqués pour fonctionner à une fréquence de ligne de 60 Hz (fréquence utilisée en Amérique du Nord) ne doivent pas être utilisés dans les pays dont le courant a une fréquence de 50 Hz (Europe). Si vous branchez un appareil conçu pour une fréquence de 60 Hz sur un courant d'une fréquence de 50 Hz, le transformateur ballast de l'éclairage fluorescent surchauffera, ce qui présente des risques d'incendie. Vérifiez la fréquence de ligne requise par votre machine; elle est indiquée sur sa plaque signalétique.

REMARQUES, AVERTISSEMENTS ET MISES EN GARDE

Dans les publications d'Atari, les conventions, en ce qui concerne les remarques, avertissements et mises en garde, sont les suivantes:

REMARQUE — Sert à attirer l'attention sur un point particulier.

AVERTISSEMENT — Le non-respect des directives présente des risques d'endommagement et/ou de destruction pour le matériel et/ou les pièces. En cas d'endommagement ou de destruction du matériel ou des pièces, résultant du non-respect des directives, la garantie offerte sur les cartes circuits Atari, les pièces connexes et les affichages vidéo Atari sera annulée.

MISE EN GARDE — Le non-respect des directives présente des risques de blessures ou d'accidents mortels pour les joueurs et/ou les réparateurs.

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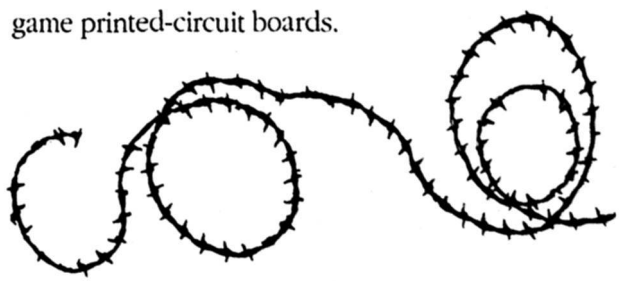
CHAPTER 1

Installation

How to Use this Manual

THE AREA 51™ conversion kit is a shooting game for one or two players that has a unique look and cinematic style of play due to a combination of computer generated graphics, digitized live action video, and stop-motion animation. ♦ This manual provides information for installing, testing, and troubleshooting the Area 51™ conversion kit. ♦ Chapter 1 describes how to install the Area 51 kit in your cabinet, includes hole-drilling templates, and also describes game play. ♦ Chapter 2 contains self-test procedures. The self-test is important in the Area 51 game. You can troubleshoot the PC boards, main circuits, and controls using the screens in the self-test. ♦ Chapter 3 provides information about maintenance, troubleshooting and repair procedures for your Area 51 game. ♦ Chapter 4 provides information you need to order parts for your game. ♦ Chapter 5 contains the schematic diagrams for most of the Area 51™ game printed-circuit boards.



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

WARNING

For safe use, you must install this Area 51 kit in a standard Time Warner Interactive "family" cabinet, or in any universal kit cabinet that is Underwriters Laboratories listed.

Table 1-1 lists the equipment required in the cabinet into which you are installing the Area 51 kit.

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
Main Harness	JAMMA-compatible connector for game PCB. If your game cabinet does not have such a connector, see Table 1-2.
Speakers	One or two 8 Ω, 10 W for mono/stereo; One 4 Ω, 10 W subwoofer (optional: for Showcase 33 cabinets only. See page iii.)
Coin Counter	+5 VDC or +12 VDC
Power Cord	Three-conductor with ground
Power Supply	+5 VDC ± 0.25V @ 12.0 amps minimum +12 VDC @ 2.0 amp

Table 1-1 Equipment Requirements

CAUTION

Do not unplug or plug in the Area 51 game printed-circuit board (PCB) edge connector while the power is on. You could seriously damage the PCB.

Tools Required

- Drill with a ½-inch and 5/16-inch drill bits
- Phillips screwdriver
- Flat-blade screwdriver
- Socket wrench set and ratchet
- 3/32-inch 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

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 Area 51 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.

1. Turn off power to the game, and unplug the power cord.
2. Remove the following from the cabinet:

Qty.	Description	Part No.
1	Area 51 Electronics Tray Assy. (see Figure 4-3 for details)	A054893-01
1	Area 51 Hard Disk Drive *(Acceptable substitutes are 136105-0018 and -0019.)*	136105-0013
1	3.5" Disk Drive Shipping Container	178055-024
1	75G Impact Indicator	178382-002
1	Ground Wire Assy.	A055057-01
2	Gun-to-PCB Harness Assy.	A054915-01
1	Blue Optical Gun Assy.	A054890-01
1	Red Optical Gun Assy.	A054890-02
2	Gun Holster Assemblies	178398-001
1	Blue Button Assy.	178237-005
1	Red Button Assy.	178237-001
2	SPDT Snap-Action Switches w/Gold Contacts	160044-001
2	Black "Start" Indicator Plates	178283-011
1	Attraction Shield	047205-01
1	1/16-inch Polycarbonate Control Panel Cover	054905-01
1	Attraction Film for Area 51 Kit	054895-01
1	Control Panel Decal for Area 51 Kit	054896-01
2	Side Panel Decals for Area 51 Kit	054897-01
2	Large Area 51 Logo Decals	054904-01
1	Small Area 51 Logo Decal	054904-02
1	Game Instruction Label for Area 51 Kit	054898-01
1	Universal Black Bezel for Kits	049774-01
1	Videotape on Hard Disk Drive Handling (for NTSC videotape players) ...OR...	136105-0011
1	Videotape on Hard Disk Drive Handling (for PAL videotape players)	136105-0012

Qty.	Description	Part No.
1	Manual: *Area 51 Universal Kit Installation Instructions*	TM-405
1	Product I.D. Label	038158-01
1	FCC Compliance Label	039450-01
1	FBI Warning Label	042452-01
1	ESD Caution Label	178290-001
6	#10-24 x 2.0" Steel/Black Oxide Carriage Bolts	75-5132B
18	.188 x .625 x .0630" Flat Washers	175014-1034
6	#10-24 Zinc Nut/Washer Assemblies	177026-0040
12	#10-24 Reg. Hex Locknuts	177010-240
4	#6-32 x ¼" Lg. Cross-Rec. Pan-Head Screws	172025-3604
4	.156 x .312 x .032" Flat Washers	175014-1024
4	#6 Zinc Spring Lock Washers	175017-2013
4	#10 x ⅜" Cross-Rec. Zinc Self-Tapping Screws	176015-110
1	.188 x .375 x .049" Flat Washer	175014-1031
1	#8-32 Zinc Nut/Washer Assembly	177026-0038
2	.50" I.D. Split Ferrite Beads	141031-001
2	.40" I.D. Split Ferrite Beads	141031-003
2	#10 Wire and Cable Tie	178032-002
1	Audio Harness (for Lethal Enforcer only)	A054917-01
6	#10-24 x ¾" Steel/Black Oxide Carriage Bolts	75-5112B

Note: A JAMMA-compatible harness is not included in this kit. If your game cabinet does not already have a JAMMA harness installed in it, you can order this harness from Time Warner Interactive Customer Service. Ask for part number A046501-01. Also, packaging materials are not listed above.

Table 1-2 Contents of Area 51 Kit

- Existing PCBs
- Game harness, if it is not Japan Amusement Machinery Manufacturers Association (JAMMA)–compatible
- Control panel decals, labels, and controls
- Side decals, graphics, and adhesive. If the cabinet sides are damaged, repair them before putting on the new decals.
- Video display (monitor) shield, display bezel, attraction shield, and marquee.

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

Assembling the Control Panel

Parts Needed for this Kit

To assemble the control panel, you must first decide where to cut the control panel holes (refer to Figure 1-1).

CAUTION

Before drilling any holes, make sure that the areas behind any drilled holes do not have any cleats or other obstructions.

Cut out the template sheet from Figure 1-4 of this manual (see the end of this chapter). You will also need the following parts from the kit:

- Clear control panel cover

Pin	Signal	Instructions
		Component Side
1	POWER GND	Connect to the 5V RTN terminal on the power supply. However, if you have 12V RTN, connect *one* of the wires at pin 1, 2, A, or B to the 12V RTN terminal.
2	POWER GND	Same as pin 1.
3	+5V DC	Connect to the +5V terminal on the power supply.
4	+5V DC	Connect to the +5V terminal on the power supply. However, if your power supply has a + Sense terminal, connect to the + Sense.
5	-5V	
6	+12V DC	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	COIN CTR 1	Connect this wire to one side of the left 12V 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	SPKR +	Connect to the + terminal on the speaker.
11	Not used	
12	RED	Attach to the video display.
13	BLUE	Attach to the video display.
14	VIDEO GND	Attach to the video display.
15	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 GND wire.)*
16	LT COIN	Connect to the N.O. terminal of the left coin switch. Connect the common terminal of the switch to a ground wire.
17	START1	Connect to the N.O. terminal of the switch.
18	Not used	
19	Not used	
20	Not used	
21	Not used	
22	Not used	
23	Not used	
24	Not used	
25	Not used	
26	Not used	
27	GND	Connect to the common terminal of the switches.
28	GND	Connect to the common terminal of the switches.

Pin	Signal	Instructions
		Solder Side
A	RTN	Connect to the 5V RTN terminal on the power supply. However, if you have 12V RTN, connect *one* of the wires at pin 1, 2, A, or B to the 12V RTN terminal.
B	RTN	Same as pin A.
C	+5V DC	Connect the +5V terminal on the power supply.
D	+5V DC	Connect the +5V terminal on the power supply.
E	-5V DC	
F	+12V DC	Connect to the +12V terminal of the power supply.
H	**Key**	
J	Not used	
K	Not used	
L	SPKR –	Connect to the – terminal on the speaker.
M	Not used	
N	VIDEO GREEN	Attach to the video display.
P	COMPSYNC	Attach to the video display.
R	Not used	
S	Not used	
T	RT COIN	Connect to the N.O. terminal of the right coin switch. Connect the common terminal of the switch to a GND wire.
U	START2	Connect to the N.O. terminal of the switch.
V	Not used	
W	Not used	
X	Not used	
Y	Not used	
Z	Not used	
a	Not used	
b	Not used	
c	Not used	
d	Not used	
e	GND	Connect to the common terminal of the switches.
f	GND	Connect to the common terminal of the switches.

Table 1-3 JAMMA Pin and Wire Connections

NOTE

The six holes in the corners and at the center top and bottom edges for securing the control panel cover are not shown in this illustration. Drill these holes wherever space permits.

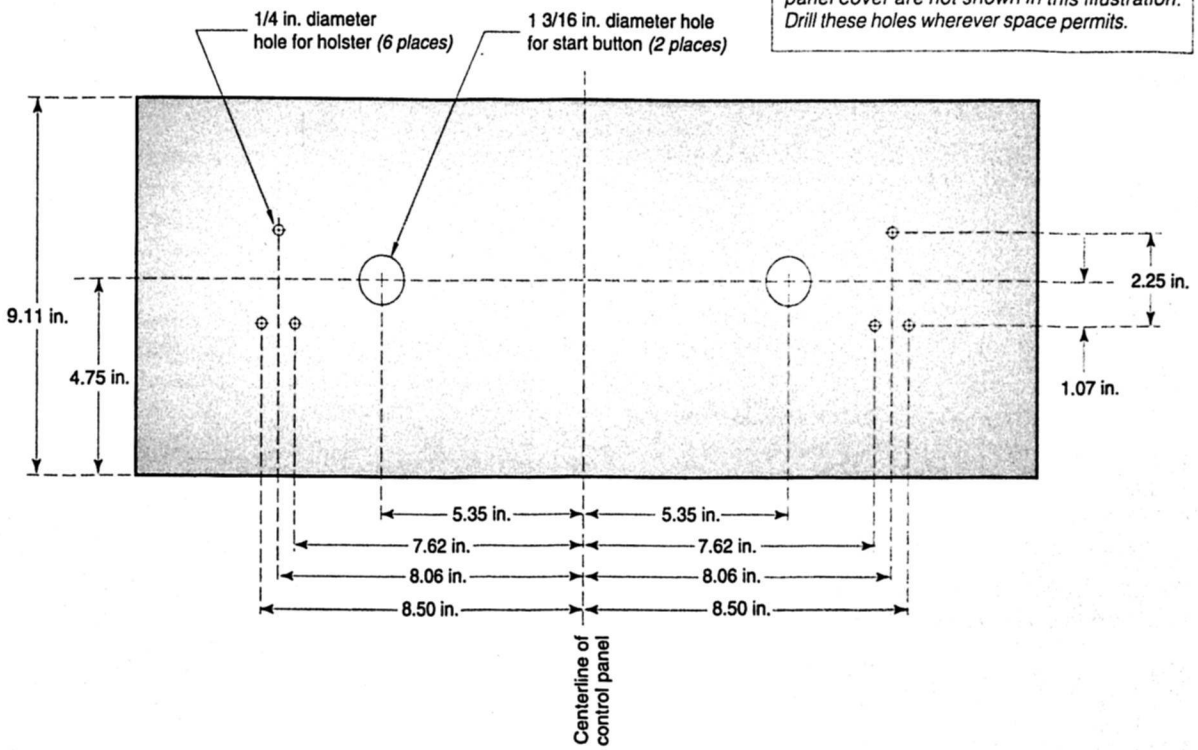


Figure 1-1 Locations of Control Panel Holes to be Drilled

- Control panel decal
- Small "Area 51" logo decal
- Red and blue start button assemblies
- Snap-action switches
- Start indicator plates
- Red and blue gun assemblies
- Two gun holster assemblies
- Gun and holster mounting hardware: six #10-24 x 1¼-inch-long black carriage bolts, 12 large flat washers, and 12 #10-24 nut/washer assemblies

Installing the Parts

1. Using carbon paper, transfer the design from the template to the control panel. Begin with the left position, then reverse the template and trace the right side pattern. Save the template.
2. Using a saber saw, carefully cut out the two large holes for the start buttons. Deburr the sharp edges with a file.
3. Drill the two 1⅜-inch holes for the buttons.
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 button holes as close as possible to the locations shown on the template.
5. Lastly, mark the positions of the six holes that will be used for securing the cover to the control panel. Place four of the holes anywhere near the corners, wherever space permits, and the two remaining holes at the top and bottom centers.
6. 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.

7. Tape or glue the template to the plexiglass cover. To start the saber saw cuts, drill a ½-inch hole inside the hole for the buttons.

8. Saw out the large holes for the two pushbuttons. Drill out the small holes for the holster.
9. Drill the six ¼-inch holes that will be used to mount the cover to the control panel and the six ¼-inch bolt holes to mount the holsters.
10. To prevent injury, carefully deburr all the edges of the plexiglass cover.
11. 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. If necessary, apply the small "Area 51" logo decal over any existing game graphics.
12. Install the cover on the control panel using the six ¾-inch-long carriage bolts, flat washers, and nut/washer assemblies.
13. Install the holsters on the control panel using the large flat washers and the hex locknuts.
14. Install the button assemblies with their START indicator plates and snap-action switches (refer to Figure 1-1 for correct placement).

For maintenance and servicing information on the controls, refer to Chapters 2 and 3 of this manual.

Connecting the Guns

Compatibility of Various Guns

This Area 51 kit includes the guns and all the attachment hardware necessary to install them in your game cabinet.

After calibrating and testing several manufacturers' guns, we have determined the following regarding compatibility:

1. The Time Warner Interactive (TWi) guns supplied in this kit were extensively tested with this game hardware. Therefore, these are the first choice to use with the Area 51 kit.
2. Happ guns can be calibrated and used in the white tracking screen in the self-test. In game play the guns responded well. Therefore, you can use these with the Area 51 kit.
3. *Do not use* the Lethal Enforcer Konami guns: in our testing, they failed to respond to any game play.

TWI Gun Installation Procedure

Insert each gun into its holster on the control panel. Let the cables drape towards you and straight down to the floor: the cables *should not* arc sideways.

CAUTION

If you install the gun cable mounting plates so that the cables arc sideways or are twisted, you will increase players' efforts required to move and aim the guns. This can decrease earnings.

To install the triangular gun cable mounting plates, you must first decide where to cut the holes on the front of the game cabinet; refer to Figure 1-2. Cut out the template sheet from Figure 1-5 of this manual (see the end of this chapter).

1. Using carbon paper, transfer the design from the template to the front panel. Begin with the left side, then reverse the template and trace the right side pattern. Save the template.
2. Tape or glue the template to the front of the cabinet. To start the saber saw cuts, drill a ½-inch hole inside the large hole for the cable.
3. Insert the end of each cable into the large hole, and make sure the cables hang straight down in front of the cabinet — not sideways.
4. Attach the mounting plates with this hardware: six #10-24 x 2-inch-long black carriage bolts, six large flat washers, and six #10-24 hex locknuts.
5. Plug the gun connectors into the two Gun-to-PCB harness assemblies. Plug the Gun-to-PCB Harnesses into the GUN1 and GUN2 headers on the Area 51 Game (CoJag) PCB jacks as follows: the left gun must be plugged into the GUN1 header, and the right gun must be plugged into the GUN2 header.

Connecting the JAMMA Harness

NOTE

If your game cabinet does not already have a JAMMA harness, install a JAMMA harness in the cabinet. To purchase a JAMMA harness assembly, contact the Time Warner Interactive Customer Service office closest to you and ask for part no. A046501-01.

1. Install the pair of 0.5-inch inside diameter split beads on the JAMMA harness as close to the PCB edge connector as possible. Install the pair of 0.4-inch inside diameter split beads on the gun harnesses, again as close to the PCB edge connector as pos-

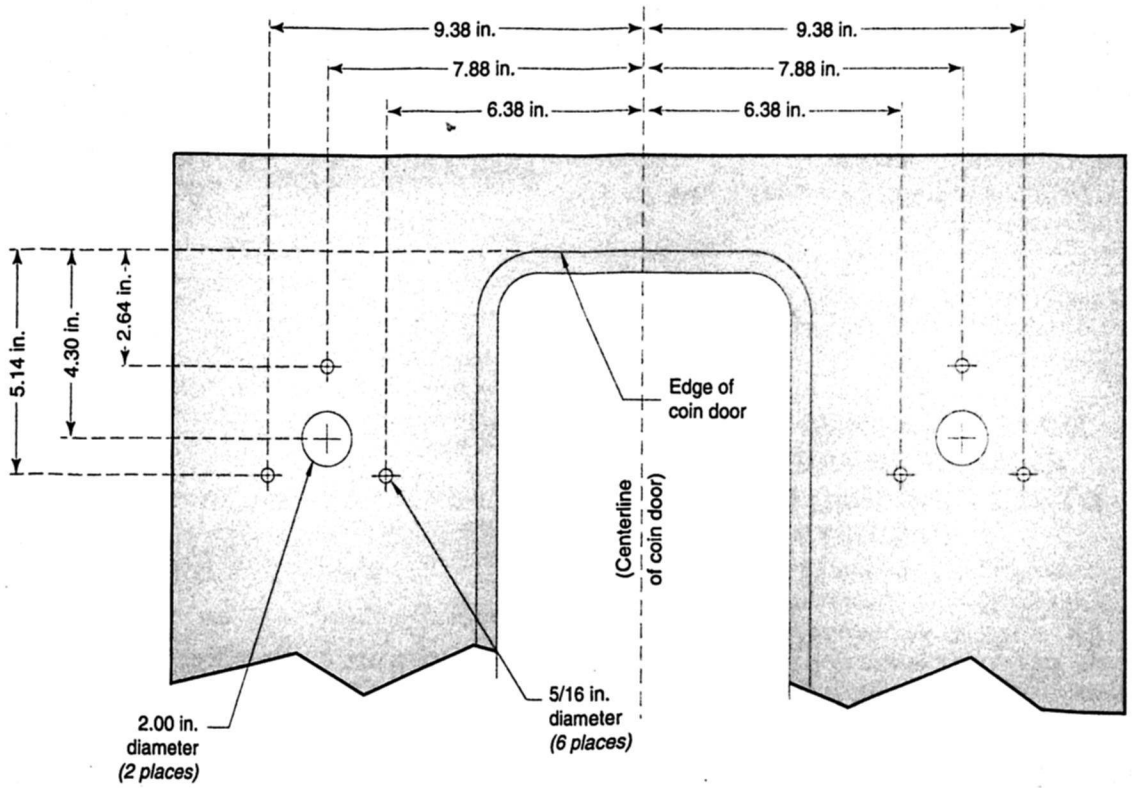


Figure 1-2 Locations of Front Panel Holes to be Drilled

sible. Clamp the beads shut so that the two halves lock together.

2. Attach your game's ground wire to the ground plane (the metal plate on which all electronics are mounted). Two threaded studs with hardware are provided for your convenience. If your game does not have a ground wire available, use the 36-inch-long ground wire provided in the kit.

CAUTION

To meet FCC requirements, you must install both pairs of split beads on the JAMMA and gun harnesses. You must also attach the ground plane under the game printed-circuit boards to a true earth ground. (Split beads and a ground wire are included in the kit for this purpose.)

---

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

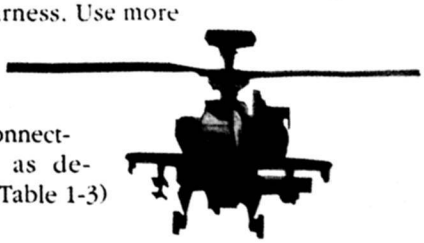
WARNING

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 Area 51 kit requires +5V and +12V. The –5V is not needed and should *not* be used. Tie off any other voltage wires on the power supply besides +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 power wiring does not overload and burn.

Connecting Video Display Wires

NOTE

The JAMMA harness provides only negative composite sync.

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

NOTE REGARDING LETHAL ENFORCERS VIDEO AND OTHER MIRRORED-MONITOR CABINETS

If you are installing this kit into a Lethal Enforcer cabinet, you will need to reverse the vertical yoke wires on the Wells-Gardner monitor. Otherwise the screen image will be upside-down and reversed.

Some monitors have an extra vertical yoke connector which will automatically swap the two wires. However, other monitors must be modified by extracting the two vertical wires from the connector and swapping their positions.

WARNING

The monitor contains lethal high voltages. To avoid injury, do not service your monitor unless:

1. *You observe all precautions necessary for working on high-voltage equipment.*
2. *You are a qualified technician.*

If you need to change wires in the monitor yoke connector, refer to the display manual for wiring information.

Connecting the Self-Test Switch (Optional)

The Lethal Enforcer cabinet uses a momentary (push-button) switch to turn on the self-test mode. However, Area 51 requires an on/off slide switch.

Solution: The Area 51 game board has a self-test switch you can use. However, for easier access, you may want to change the momentary switch to an on/off slide switch.

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.

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 button harnesses to the JAMMA harness using crimp splices or butt soldering, according to the information in Table 1-3.

Connecting the Audio Wires

Lethal Enforcer Cabinets

The Lethal Enforcer cabinet has two treble speakers (left/right) which terminate in a 4-pin connector. In contrast, the Area 51 kit was designed for one full-range speaker which terminates in an 11-pin connector on the game board. As a solution, TWi has included an adapter harness in the Area 51 kit. Plug this adapter harness into the Lethal Enforcer audio connector for the speakers.

Selecting the Type of Audio

The Area 51 Cojag (main) game board has four jumper blocks for the audio section — JSP1 through JSP4. These jumpers let you select three audio settings: mono, stereo without sub-woofer, and stereo with an optional sub-woofer. Refer to Table 1-4 for the correct setting to use with each type of audio. See Figure 1-3 for the locations of the four jumper receptacles on the game board.

Table 1-4 Audio Connector and Jumper Settings for Area 51 Game Board

JSPKR (Located near Audio Heat Sink)			
Pin #	**Mono/JAMMA Signal**	**Stereo Signal**	**Stereo with Subwoofer Signal**
5	KEY	KEY	KEY
6	Mono +	Left +	Left +
7	NC	Left –	Left –
8	NC	Right +	Right +
9	Mono –	Right –	Right –
10	NC	NC	Woofer +
11	NC	NC	Woofer –

Jumper Configuration			
	Mono/ JAMMA	**Stereo**	**Stereo w/Subwoofer**
JSP1	Pins 2–3	Pins 2–3	Pins 1–2
JSP2	Pins 2–3	Pins 2–3	Pins 1–2
JSP3	Pins 1–2	XXX	XXX
JSP4	Pins 2–3	XXX	Pins 1–2

(XXX = Don't care)

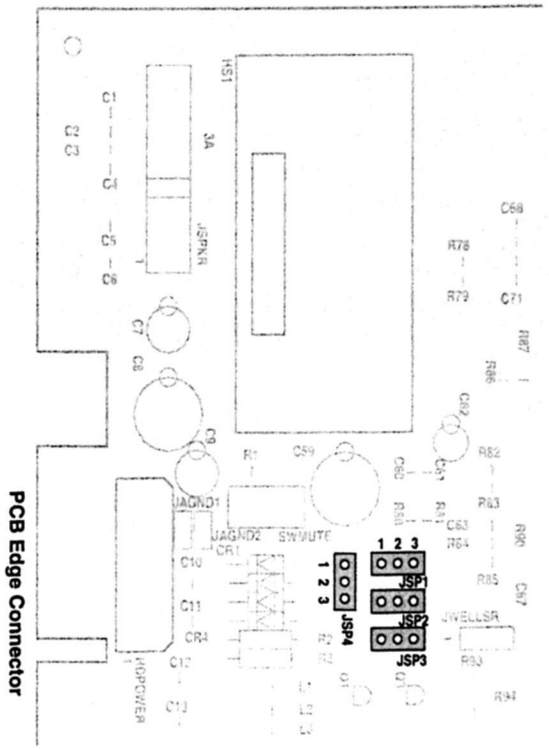


Figure 1-3 Detailed View of Game PCB Audio Jumpers

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.

If your cabinet does not have a ground wire available, use the 36-inch-long ground wire that is already attached to one of the threaded studs on the electronics tray. If the wire does not easily reach the ground attachment, you can use the other threaded stud.

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; and +12 Volts on pins F and 6.

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

Installing the Area 51 Electronics Tray

Hard Drive Installation

The hard disk drive stores the sound and graphics information for the game program.

1. Carefully remove the hard disk from its shipping box.

CAUTION

Handle with Care!

The hard disk drive can be damaged by a strong impact. Handle it gently to prevent damage. The hard disk drive can also be damaged by electrostatic discharge. Use the same precautions as used for the PCB.

2. Use the four #6-32 x ¼" screws, flat washers, and spring lock washers to secure the disk drive to the mounting bracket on the electronics tray.

CAUTION

*Do not use **any** screws longer than ¼ inch to mount the hard disk to its bracket. Doing so can make the screws touch the printed-circuit board inside the drive, and cause it to fracture.*

3. Plug in the ribbon and power cables into the disk drive.

Most power supplies don't support hard disk drives. Therefore, the Area 51 kit contains a special power harness for this purpose. Plug one end of this harness into the Area 51 Cojag (main) PC board, and plug the other end into the hard disk.

Electronics Tray Installation

Determine where you will install the Area 51 electronics tray in the cabinet. For better shock absorption while moving the game, your first choice should be on a horizontal panel in the middle of the cabinet — *not* on a panel at the floor. If your cabinet does not have a horizontal panel, your second choice is securing the electronics tray on a side panel. In this case, make sure the tray is oriented so the PCB is *above* the hard drive.

1. Use the four #10 x ¾" screws supplied with the kit to mount the electronics tray onto the wood cabinet side panel. The 90° bend in the sheet metal is designed to act as a handle while you install this hardware.
2. Secure the JAMMA harness away from the PCB with cable ties.
3. 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 Game Graphics

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. Then find the game instructions label in the kit, and adhere that label to the bottom center of the bezel.

Installing the Product ID and FCC Labels

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

Installing the Side Panel Decals

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

If you have a Lethal Enforcer game, apply the large "Area 51" logo decals diagonally onto the side panels, above the main side panel decals. This lets you cover up the existing Lethal Enforcer decals.

Installing the Attraction Assembly

Find the Area 51 attraction film and shield in the kit. Using the existing shield as a template, cut the film and shield to size (reuse the existing attraction shield, if practical). Install them in the cabinet attraction assembly.

Adjusting the Volume

There is no volume adjustment knob on any PCB in this game. Instead, volume is adjusted in the self-test software. The attract-mode and game-play volumes can be adjusted separately. Refer to Chapter 2 of this manual for more information.

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 Area 51 game. When you set up the game and when you collect

money, use all the screens in the self-test procedure — especially the Control Test.

Game Play

This section describes the features and play of the Area 51 game.

Introduction

Area 51 is a shooting game for one or two players that has a unique look and cinematic style of play due to a combination of computer generated graphics, digitized live-action video, and stop-motion animation.

Area 51's Features

- Reliable controls, provided by Time Warner's own AccuAim targeting system, a custom-designed circuit that allows for very accurate performance.
- Scoring enhancers and hidden features that will make Area 51 easy to learn but hard to master, ensuring long-lasting game depth.

Background

The game is set at the fabled Area 51 military base in Nevada. One of the most top-secret military bases in the world, Area 51 is so top secret that as far as the government is concerned, it does not exist. There is a great deal of speculation about what actually takes place at Area 51, and more than a hint of conspiracy. While it is believed that many of the most advanced aircraft, including the SR-71 Blackbird and the Stealth Fighter were tested there, there are also rumors and testimonials by ex-employees that the government has captured alien spacecraft (UFOs) that are studied in a facility at the base. Other rumors hint at genetic studies of dead alien bodies, development of deadly biological warfare weapons, and nuclear weapons testing.

Players are members of the STAAR Team (Special Tactical Advanced Alien Response), a secret paramilitary force who tackle dangerous jobs beyond the ability of the conventional military. As the game begins, the STAAR Team lands on the front tarmac of the air base and then they work their way through six security levels. Along the way, players must avoid being hit by armed enemies, helicopters, missiles, explosions, and deadly aliens. There are plenty of hidden weapons and surprises to help players out along the way.

At first, players don't know why they are being called in to destroy Area 51. As the game goes on, they realize that events at Area 51 have gotten horribly out of control. The personnel at the base are decaying into zombie-like creatures who are just the first stage in a horrible transformation, the end-stage of which is an amazing alien being who is fast, heavily armored, and equipped with deadly weapons.

Game Play

To win the game, players must play through all six levels of the game and beat the final end-game stage. To do this, they must pick up secret weapons and other power-ups hidden at various areas around the base. Players must blast away all the obstacles in their path while avoiding hitting their fellow STAAR Team members.

To give the game a movie-like feel, the "camera" moves players around the base, with a pace that varies according to the wave. For some waves, the camera explores the environment slowly and methodically, while other waves have a faster tempo. In one wave, players are taken on a wild Jeep ride, careening around the complex and crashing into objects as they shoot enemies and avoid being shot themselves. Players also take rides on elevators, forklifts, and helicopters at strategic points in the game.

Players are encouraged to explore their environment by shooting everything to find the hidden features and reveal the scoring bonuses.

Secret Rooms

The following are some hints on getting into a few of the seven secret rooms hidden in Area 51. There are 14 separate secret room entries — some of them are extremely challenging to get into. They are so challenging, in fact, that so far no one has played a perfect game.

Egg Cellent

When players get into the Administration Building (Wave 4), they should shoot out the first "Exit" sign and the first three ceiling lights right around it. This will get them into a room where there are disturbingly cute alien babies hidden inside eggs. Players can score over 15,000 points in this room.

Chow Palace

Players should shoot out all of the exploding barrels during the barrel-throwing zombies lockdown in the Bunker (Wave 6). This will open up into an awesome bonus room named after the San Francisco–area arena, the Cow Palace. Chow Palace is a huge power-up feast, with 21 power-ups: two give shotguns, two give machine guns, and 17 give grenades. This room is also the *only* place in the game where players can see a Stage 2 alien, the intermediate bioform between the Stage 1 zombies and the full-blown Stage 3 Kronomorph alien. Here the Stage 2 alien can be seen happily munching on a poor woman in a nightgown.

NOTES

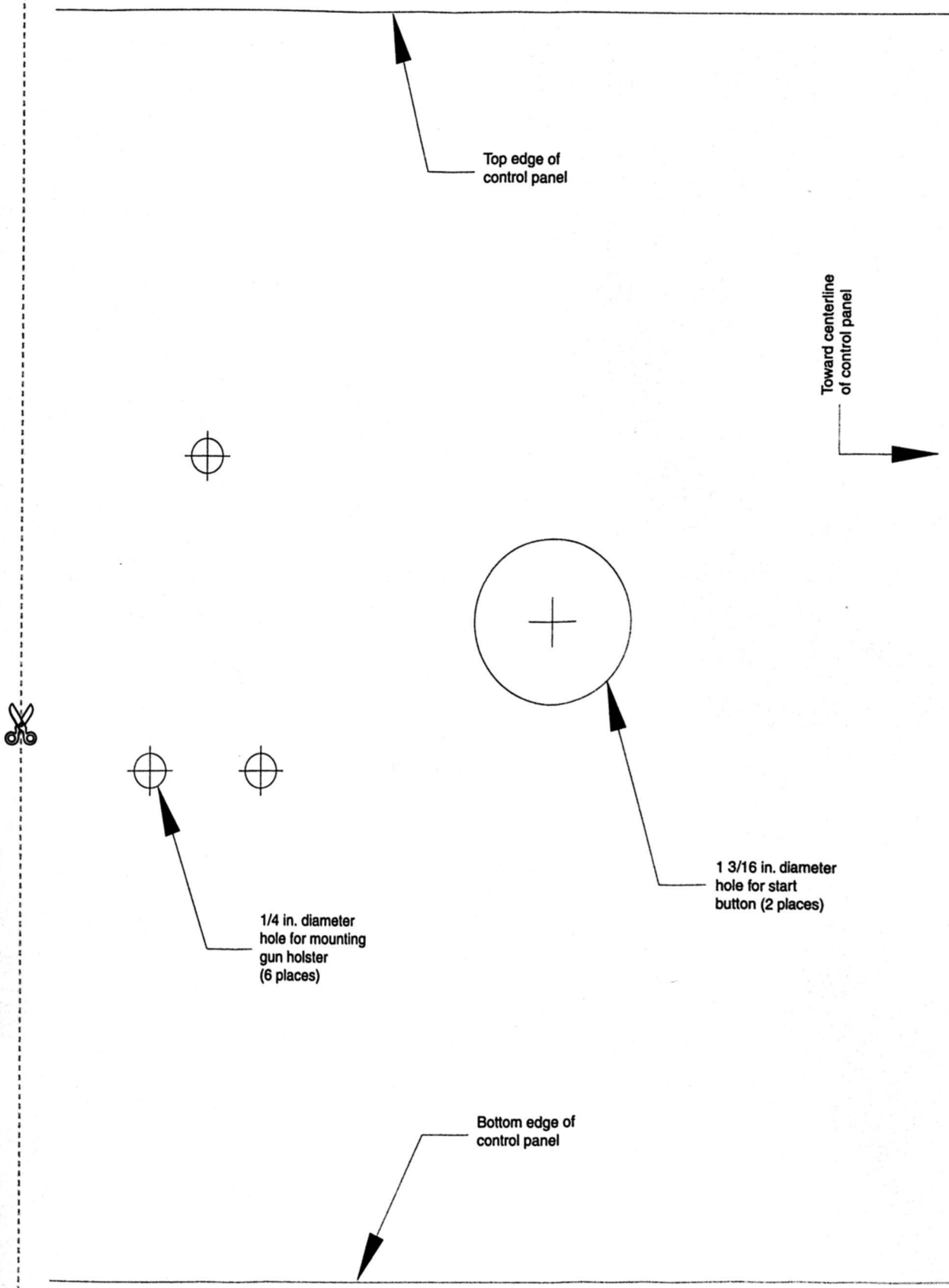


Figure 1-4 Actual-Size Template for Drilling Control Panel Holes

Left holster position shown. Reverse for right holster/start button position.

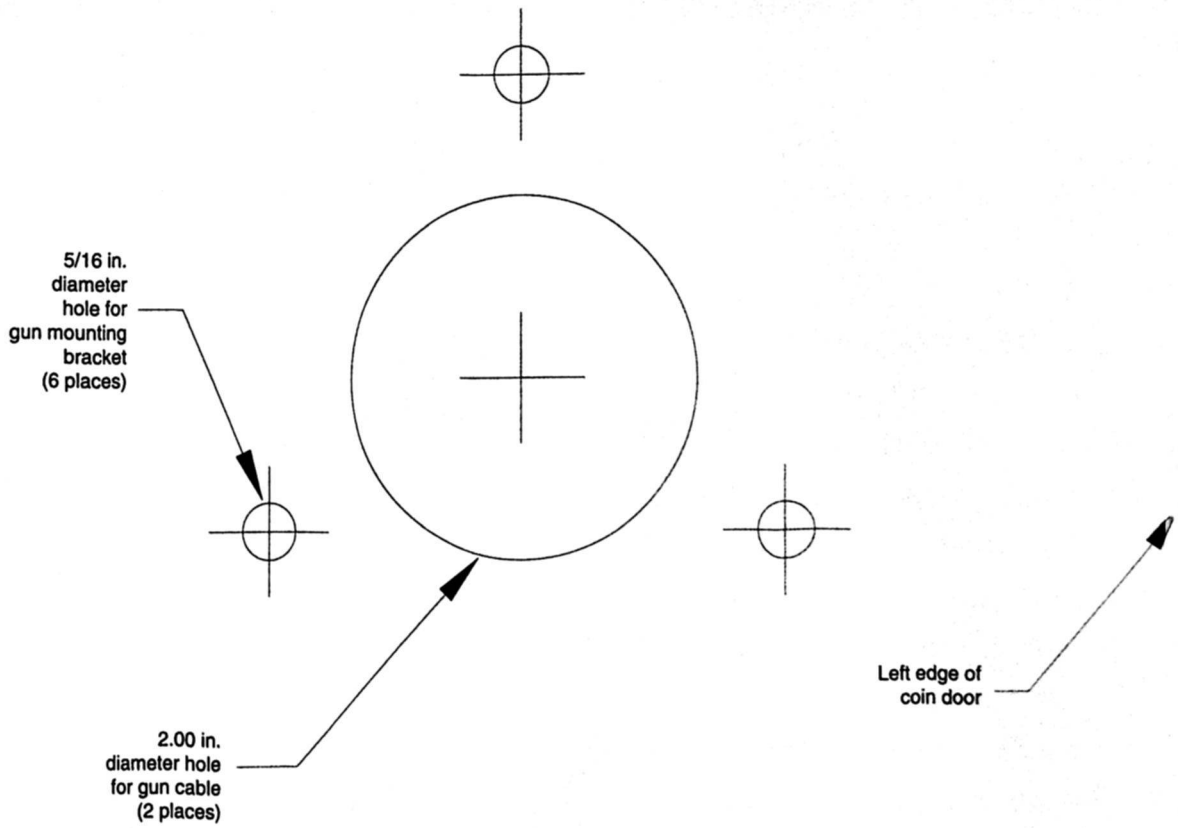


Figure 1-5 Actual-Size Template for Drilling Front Panel Holes

Left gun mounting plate shown. Reverse for right gun mounting plate.

CHAPTER 2

Self-Test

Introduction

USE THE AREA 51™ 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

The game's self-test switch is located on the Area 51 game board. However, for easier access, you may want to add a self-test slide switch behind the coin door. Refer to the details about the JAMMA edge connector Pin 15 in Table 1-3, JAMMA Pin and Wire Connections (in Chapter 1 of this manual).

Turning on the self-test switch causes the screen to enter the self-test mode. Doing so displays the Select Test menu; see Figure 2-1. Exit the self-test by turning off the self-test switch at any time.

It is likely that version numbers shown in the self-test screens in this manual will be different from those shown on your game. The functioning of the menus, however, will be the same.

Using the Gun

Either gun can be used in the self-test menus to make selections or adjustments. A menu item can be selected by aiming the gun at it and then clicking the gun trigger. A menu item can be run by aiming the gun at it and clicking the trigger twice. The top, bottom, left, and right of the screens that are marked with arrows can be activated with the gun to move up and down the menu, to change selections, and to make adjustments (such as the game volume).

Select Test Menu
Adjust Volume
Statistics Statistics Histograms
Game Options
Coin Options
Controls Test
Gun Test
Disk Test
Memory Tests Color RAM Working RAM DRAM Bank 1 DRAM Bank 2 All RAM ROM Test
Monitor Tests Color Test Purity Test Convergence Test

Table 2-1 Summary of All Self-Test Screens

Select Test Menu

Choose which test or screen you want to run from this menu, shown in Figure 2-1 and Table 2-1. Run the item by shooting it twice with a gun or by pressing the left start button to select it and then the right start button to run it.

Figure 2-1 Select Test Menu Screen

Adjust Volume

Adjust the volume of the game using this screen, shown in Figure 2-2.

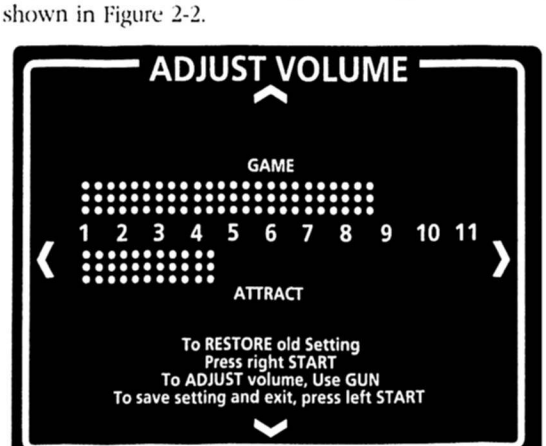


Figure 2-2 Adjust Volume Screen

The software plays continuous music to allow you to adjust both the game and attract-mode volume levels. The word *GAME* or *ATTRACT* flashes to show which of the two volumes levels you are adjusting. Fire the gun at the top or bottom of the screen to select between the two, and to the left or right of the screen to adjust volumes. The attract-mode volume level has four steps: mute, 1/3, 2/3 or full volume level (these are fractions of the game volume level). The manufacturer's suggested volume levels for a moderately noisy environment are GAME at 9 and ATTRACT at 2/3.

Statistics

Use the information shown in the statistics and histogram (bar graph) screens to keep track of your game use and maximize your profits.

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 or to advance to the histogram screen.

Statistics Screen

The Statistics screen (see Figure 2-3) 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 manually added by the operator. (not inserted into any mechanism).
- Idle Minutes shows the number of minutes that the game was idle and not being played.
- 1-Player Minutes/2-Player Minutes shows the number of minutes that the game was played by one or two players.
- New Game Minutes shows the number of minutes played after starting a new game.
- Continued Game Minutes shows the number of minutes played after continuing a game.

Figure 2-3 Statistics Screen

- Games Won shows the number of games that have been played to the finish.
- Total Sessions shows the number of different sessions (new and continued games). A "session" is measured from the time the first player starts to play (from attract mode) to the time the last remaining player declines to continue. Any number of players may join or leave during a session. This statistic is intended to gauge the "band wagon" effect, where players are attracted to join a game in progress.
- Chow Palace, Head Quarters, Shake your Booda, and Egg-cellent show the number of times a secret room has been entered.
- Cry mode shows the number of times that the Cry mode effect has been active.
- Error count shows the number of errors counted in erasable memory. If the game consistently has an error count for several weeks, the PCB EPROM may need replacement.
- Total Coins shows the number of coins counted in both left and right coin mechanisms.
- Average Time per Coin shows an average of the number of minutes played for every coin counted.
- Percentage Play shows the ratio of game playing time to total time the game has been turned on.

Histogram Screens

The Histograms screen is a menu that lets you display one of three screens (see Figure 2-4). These show horizontal bar graphs for new game times, continued game times, and session length.

Game Option	Available Settings	Explanation
End Game Looping	On ✔ Off	When set to *On*, the game will "loop" from the final screen back to the beginning screen. When set to *Off*, the game ends at the final screen.
Game Difficulty	Easy Medium ✔ Difficult	Provides a choice of 3 levels of game difficulty. Changing this setting will reset the High-Scores memory.
Gore	On ✔ Off	Turning gore off removes any animation with red blood.
Secret Room	On Off ✔	Turns on or off a room containing "Buddha" statues. Using the off setting deletes the Buddha Room and replaces it with another secret room.
Reset High Scores	No ✔ Yes	Choosing *Yes* will reset all high scores (upon leaving the Game Options Screen).
Reset Factory Options	No ✔ Yes	Choosing *Yes* will reset the game to the original factory settings (upon leaving the Game Options Screen).
Number of Lives	3, 4 ✔, 5, 6, or 7	Sets number of lives per credit.
Language	English ✔ Japanese German Spanish French	Chooses the language for the screen text.

✔ *Manufacturer's recommended settings*

Table 2-2 Game Option Settings

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

Figure 2-4 Histograms Screen

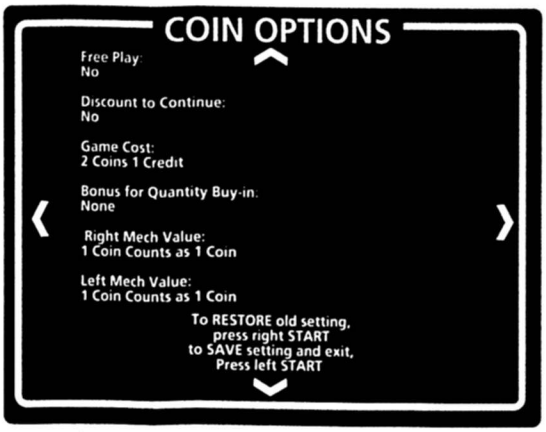


Figure 2-6 Coin Options Screen

Game Options

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

Use the gun to change the game options as desired. The game option settings, with defaults, are shown and explained in Table 2-2.

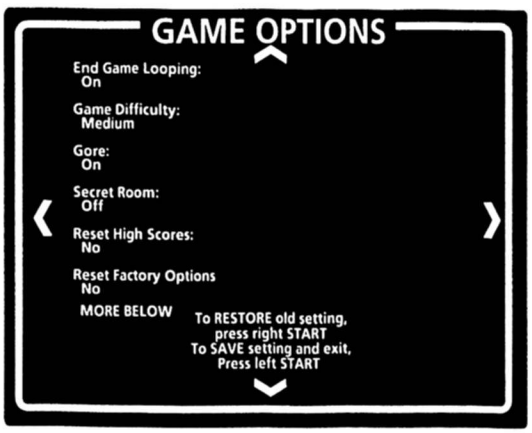


Figure 2-5 Game Options Screen

Coin Options

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

Use the gun to change the coin options as desired. The coin option settings, with defaults, are shown and explained in Table 2-3.

Controls Test

The controls test screen is shown in Figure 2-7. This test checks the pushbutton switches, the gun triggers, and the coin mechanisms.

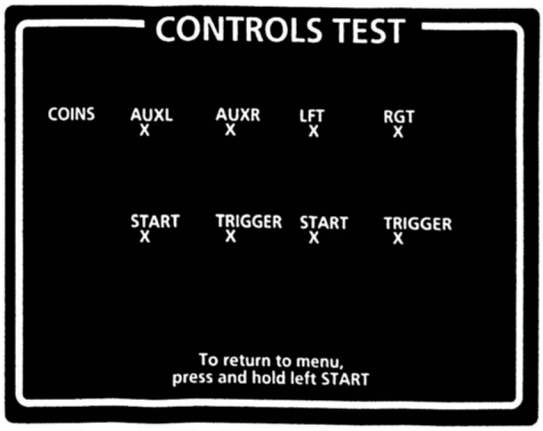


Figure 2-7 Controls Test Screen

The "X" markings change to "O" markings each time a control is activated. If the changes do not occur, check the controls and their wiring.

Gun Test

The gun test screen is shown in Figure 2-8. This test checks and calibrates the guns.

NOTE

Well-calibrated guns are important for players' enjoyment. Calibrate the guns often to keep the game at peak earnings.

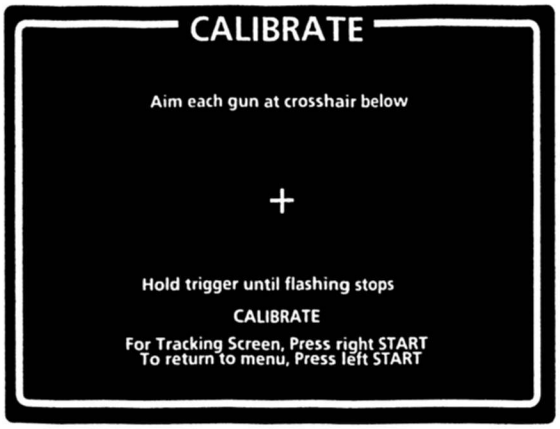


Figure 2-8 Gun Test Screen

Each gun is calibrated separately. Hold one gun at a normal playing distance from the screen. Use the sights to aim the gun at the cross hairs on the screen. Press and hold the trigger until the screen stops flashing and the word "DONE" appears (in the same color as the gun that you are calibrating). The gun is now calibrated. Repeat the process with the other gun.

Use the tracking screen to verify that the gun tracks evenly across the entire screen (with the exception of the edges, which are used as a buffer zone).

Exit to the main menu to save the calibration settings.

Disk Test

Use the Disk Test screen, shown in Figure 2-9, to test the hard disk.

If the "Hard Drive Connected:" display shows "No", check that all of the cables going to the drive are secure.

The test will continue running until the left start button is pressed. Normally, the "Status" of the drive will be displayed as "Good". If the Status shows "Bad", check the cables going to the drive, then run the test again. If the Status still shows "Bad", then you probably have a defective hard disk drive. Contact your distributor for replacement. When returning a bad hard drive, you must return it in the original shipping container with foam inserts.

Figure 2-9 Disk Test Screen

Memory Tests

Use this selection screen, shown in Figure 2-10, to run a memory test. These tests check the RAM and ROM chips.

When the game power is turned on, the computer automatically runs through the random-access memory (RAM) tests. To bypass the startup RAM test, tap the right start button repeatedly.

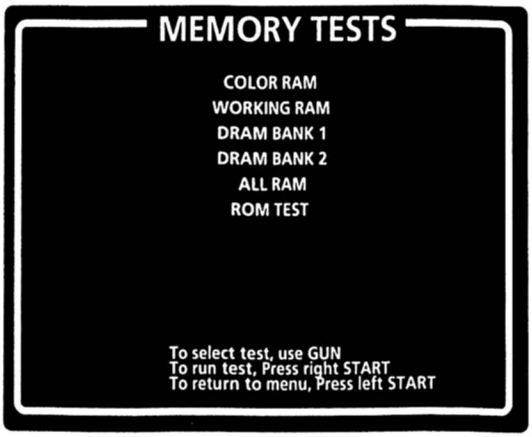


Figure 2-10 Memory Tests Screen

Monitor Tests

The monitor test selection screen (shown in Figure 2-11) lets you select from three screens — color, purity, and convergence. Advance to each screen to completely test the monitor.

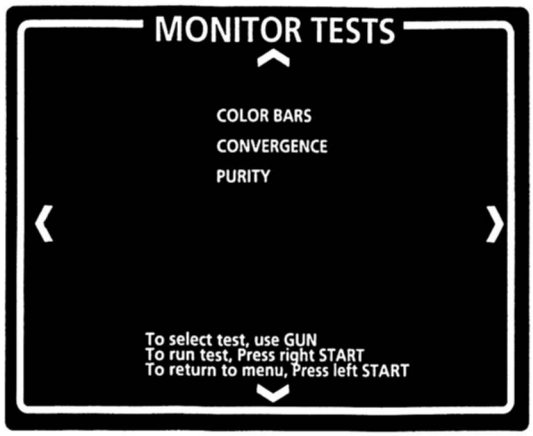


Figure 2-11 Monitor Tests Screen

Color Test

The color test (see Figure 2-12) indicates the dynamic range of the video display color circuitry. The screen should show four bands (red, green, blue and white), ranging from dark to bright, from left to right. The red, green, and blue bands are produced by only one color gun being turned on in each band.

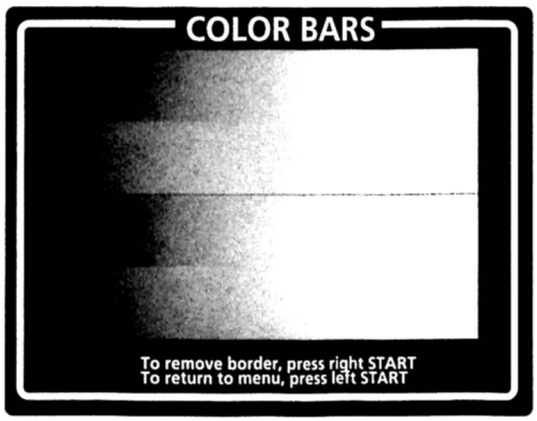


Figure 2-12 Color Test Screen

Convergence Test

The convergence test has three screens — white, violet, and green backgrounds with grid lines. This sequence is then repeated but without any text on the screen. The green screen is shown in Figure 2-13. To see the remaining screens or return to the select test menu, follow the instructions shown at the bottom of the screen.

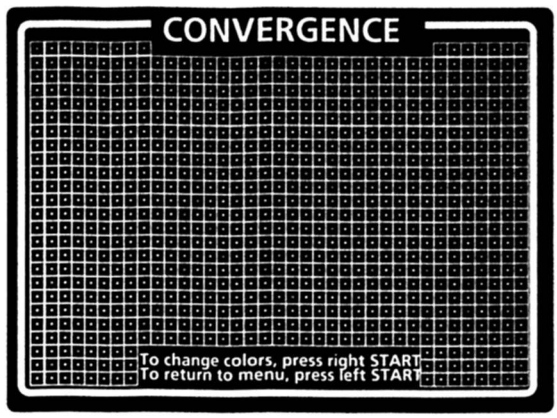


Figure 2-13 Convergence Test Screen

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 green screens should be within 2.0 mm.

Purity Test

The next seven screens are color purity tests (see Figure 2-14). The entire screen will be red, green, blue, white, grey, "ones", and black. The "ones" screen shows the lowest possible intensity of color (almost black). Press the right start button to change colors. The seven screens are also repeated without text, so that the entire screen can be checked. Each screen should show no unevenness of color and no lines in the display.

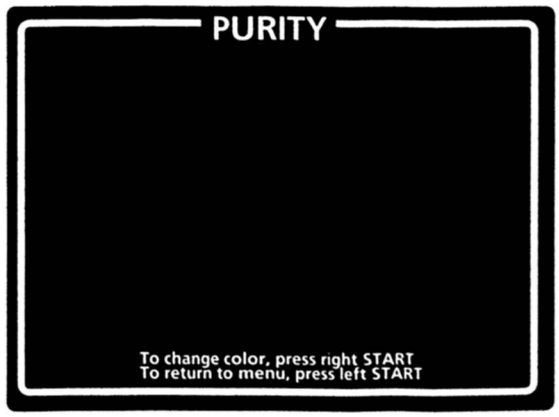


Figure 2-14 Purity Test Screen

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

NOTES

CHAPTER 3

Troubleshooting & Maintenance

Introduction

THIS CHAPTER contains maintenance, troubleshooting and repair procedures for your Area 51™ 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 serviceable parts. Together, these three sections provide a complete guide to servicing your Area 51™ 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 or 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. *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.*

Troubleshooting Procedures

This section is designed to help determine the source of a malfunction and provide 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 Area 51 PCB LED Indicators Troubleshooting, helps determine the cause of problems with the computer circuit boards or the hard disk drive by checking the status of the indicator LEDs. The left-hand column lists the various states. The middle column explains the meaning of the state. The right-hand column suggests actions to correct a problem.

Table 3-3 Computer System Troubleshooting, helps determine the cause of game operation problems. The left-hand column list symptoms. The middle column explains the probable cause of the symptom. The right-hand column suggests actions to correct a problem.

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 and the screens in the *Self-Test* software to help determine 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.

Speakers

The game kit is designed to use one or two speakers (mono or stereo) plus an optional subwoofer. 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 damaged speaker.

Guns

To detach the gun and its cable for repair or replacement, use the following steps.

CAUTION

Unplugging the guns from the wiring harness while the power is on can damage the PCB.

1. Open the upper coin door.
2. Disconnect the gun wire connector from the wiring harness.
3. Unfasten the three flat washers and nuts that secure the gun cable mount.

Use the self-test to calibrate the guns after installation.

System Logic Assemblies

This section describes the repair and maintenance procedures for the 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 accessed through the front door.

Problem	Suggested Action
Coin Mechanism Problem	
	1. Check the wiring connections to the coin mechanism. 2. Check the voltage to the + side of the mechanism. 3. Test the coin mechanism with the Controls Test screen in the self-test.
Gun Problem	
	1. Check the gun lens for dirt or blockage. 2. Test the gun with the Gun Test screen in the self-test. 3. Check the harnesses and connectors. 4. If you took the gun apart, have you reassembled it correctly? 5. Make sure all the parts of the gun are in good order. Repair or replace parts as needed. 6. Check to see if any bright lights in the game area are interfering with gun operation.
Sound Problem	
	1. Check the speaker volume setting: make sure the volume isn't zero! 2. Test the sound with the Sound Test screen in the self-test. 3. Check the resistance of the speakers for 4 Ohms.
Video Display Problem	
Screen is dark	1. Check to see that the game is plugged in and powered on. 2. Check the line fuse if no power is present. 3. Check the display brightness. 4. Check the edge connector to the PCB. 5. Check the harnesses and connectors to the video display PCB. 6. Check the voltage levels to the video display PCB. 7. Run through the following checklist. If you answer *no* 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. a. Do you have power to the video display? b. Are the video display's filaments lit? c. Do you have the correct voltage to the video display?
Only a colored screen appears	1. Attempt to run a complete memory test in the self-test. 2. Replace the ROM if a ROM failure is reported in the self-test.
Picture wavers or is too small	1. Check the voltage levels to the video display PCB. 2. Check the B+ to the video display. (Refer to the video display manual.)
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. If you replaced the monitor recently, check the horizontal or vertical yoke wire connections to the video display. They may be switched.
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.

Table 3-1 General Troubleshooting

LED Indicator	Meaning	Action
DRIVE_BUSY *(YELLOW — located near the hard disk cable)*		
Flashing Intermittently	Normal	
Continuously OFF	Hard disk not reading	Check the cables connected to the disk
Continuously ON	Hard disk error	Check the cables connected to the disk
Program WatchDog *(GREEN — located near the four ROM chips on the top board)*		
Continuously ON	Normal	
Blinking	ROM problem	Check the program EPROM for bent pins
POWER *(GREEN — located near the JAMMA connector)*		
Continuously ON	Normal	
Continuously OFF	No power is reaching the board	Check the power supply and cables
TOO_LOW *(RED — located next to the power LED)*		
Continuously ON	Power supply voltage too low	Adjust the power supply, as explained in the Repair Procedures
TOO_HIGH *(RED — located next to the power LED)*		
Continuously ON	Power supply voltage too high	Adjust the power supply, as explained in the Repair Procedures

Table 3-2 LED Indicators Troubleshooting

Section/Symptom	Meaning	Action
Hard Disk/		
"ZERO DIVISION" message at top of screen	Hard disk not connected	Check the cables that connect the hard disk to the game PCB
EEPROM/		
"SETTING EEPROM DEFAULT VALUES" message appears during every start and the high score table is empty	EEPROM bad	Replace the EEPROM

Table 3-3 Computer System Troubleshooting

Area 51 Game PCB Set

The Area 51 game PCB set (board stack) 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 access door and remove it.
2. Disconnect the harness connectors from the game PCB set. (There are 5 connectors in all.)

CAUTION

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

3. Unfasten the five screws and washers that secure the game PCB set to the electronics tray. Remove the game PCB set (refer to Figure 4-2 and Figure 4-3).
4. Re-install the game PCB set by following the previous steps in the reverse order.

Hard Disk Drive

The hard disk drive unit stores the sound and graphics information for the game program.

CAUTION

Handle with Care!

The hard disk drive can be damaged by a strong impact. Handle it gently to prevent damage. The hard disk drive can also be damaged by electrostatic discharge. Use the same precautions as used for the PCB.

1. Disconnect the ribbon and power cables from the disk drive.
2. Remove the four mounting screws that secure the disk drive to the mounting bracket.

Power Supply — Adjustment

CAUTION

If your power supply is adjustable, adjust it ***slowly*** *to prevent over-voltage damage to the PCB. During adjustment, do not push hard on the adjustment knob with the screwdriver, because it may be an easily damaged plastic part.*

If the 5-volt power supply in your game cabinet is adjustable, use its adjustment knob. If the power LED indicators on the game PCB show that the voltage needs to be adjusted (see Table 3-2), use the following procedure:

1. If the TOO_HIGH LED is on, skip to step 2. Otherwise, slowly raise the voltage until the TOO_HIGH LED turns on.
2. Slowly lower the voltage until the TOO_HIGH LED turns off.

ROMs

The ROMs contain the programming routines used by the game PCB set to control game play. Replace the damaged ROMs by following the removal and installation steps below.

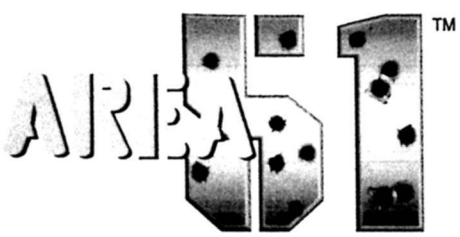
1. Remove the game PCB set according to the procedure in the *Area 51 Game PCB Set* section.

CAUTION

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

2. Remove the damaged ROMs from the game PCB set using a chip extraction tool.
3. Install the new ROMs by plugging them in the game PCB set sockets.
4. Re-install the game PCB set by following the steps in the *Area 51 Game PCB Set* section in the reverse order.

NOTES

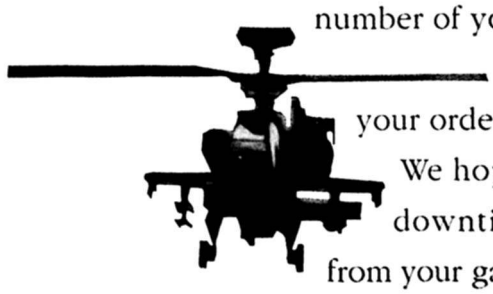


CHAPTER 4

Parts Illustrations

Part Ordering Information

THIS 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.



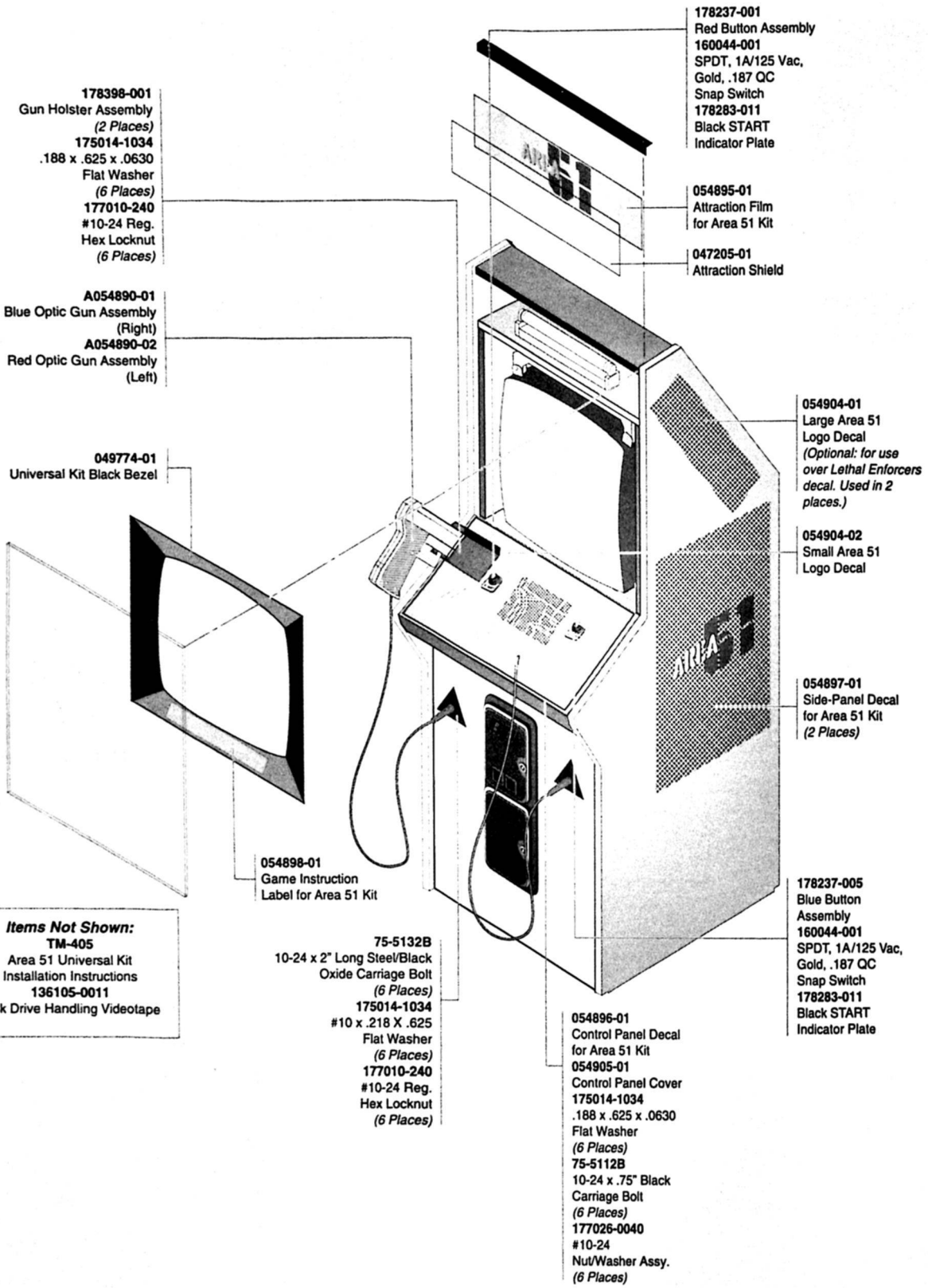
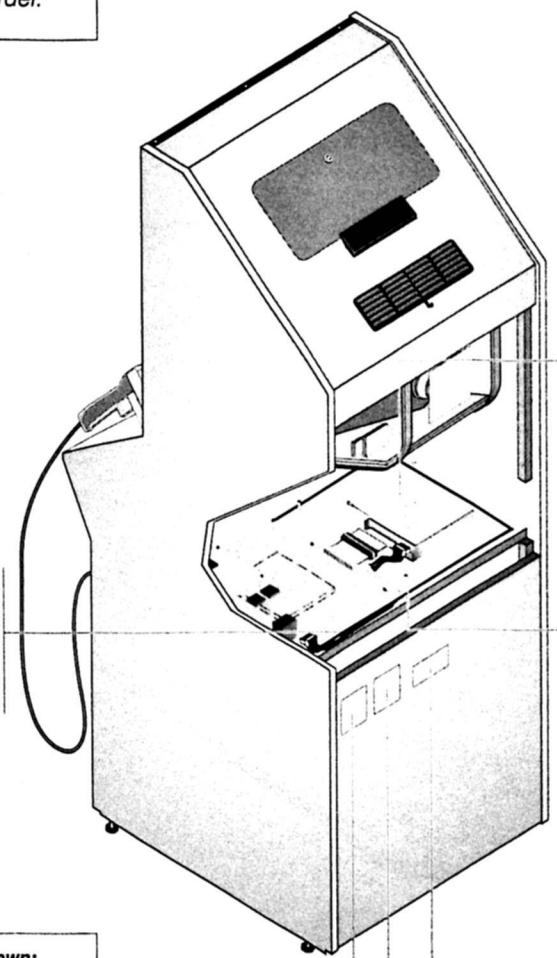


Figure 4-1 Area 51 Kit Contents, Front View

A054892-01, Rev. D

NOTE

If you are installing this kit into a Showcase 33 cabinet, see page iii of this manual for additional parts you may need to order.



136105-0013
Area 51 Hard Disk Drive
(Acceptable substitutes are 136105-0018 and -0019)
178382-002
75G Impact Indicator
172025-3604
6-32 x .25" Lg. Cross-Recessed Pan-Hd. Screw
(4 Places)
175014-1024
.156 x .312 x .032" Flat Washer
(4 Places)
175017-2013
#6 Zinc Spring Lock Washer
(4 Places)

A055057-01
Ground Wire Assy.
(only ground stud attachment point is shown)
175014-1031
.188 x .375 x .049" Flat Washer
177026-0038
#8-32 Zinc Nut/Washer Assy.

A054893-01
Area 51 Kit Electronics Tray Assy
176015-110
#10 x 5/8" Cross-Recessed Zinc Self-Tapping Screw
(4 Places)

Items Not Shown:
A054917-01
Lethal Enforcer Audio Harness Assy.
A054915-01
Gun-to-PCB Harness Assy.
(2 Places)
141031-003
.40" i.d. Ferrite Bead NIZN Clamp
141031-001
.50" i.d. Ferrite Bead NIZN Clamp
178290-001
ESD Caution Label

038158-01
Product ID Label

039450-01
FCC Compliance Label

042452-01
FBI Warning Label

Figure 4-2 Area 51 Kit Contents, Rear View

A05-4892-01, Rev. D

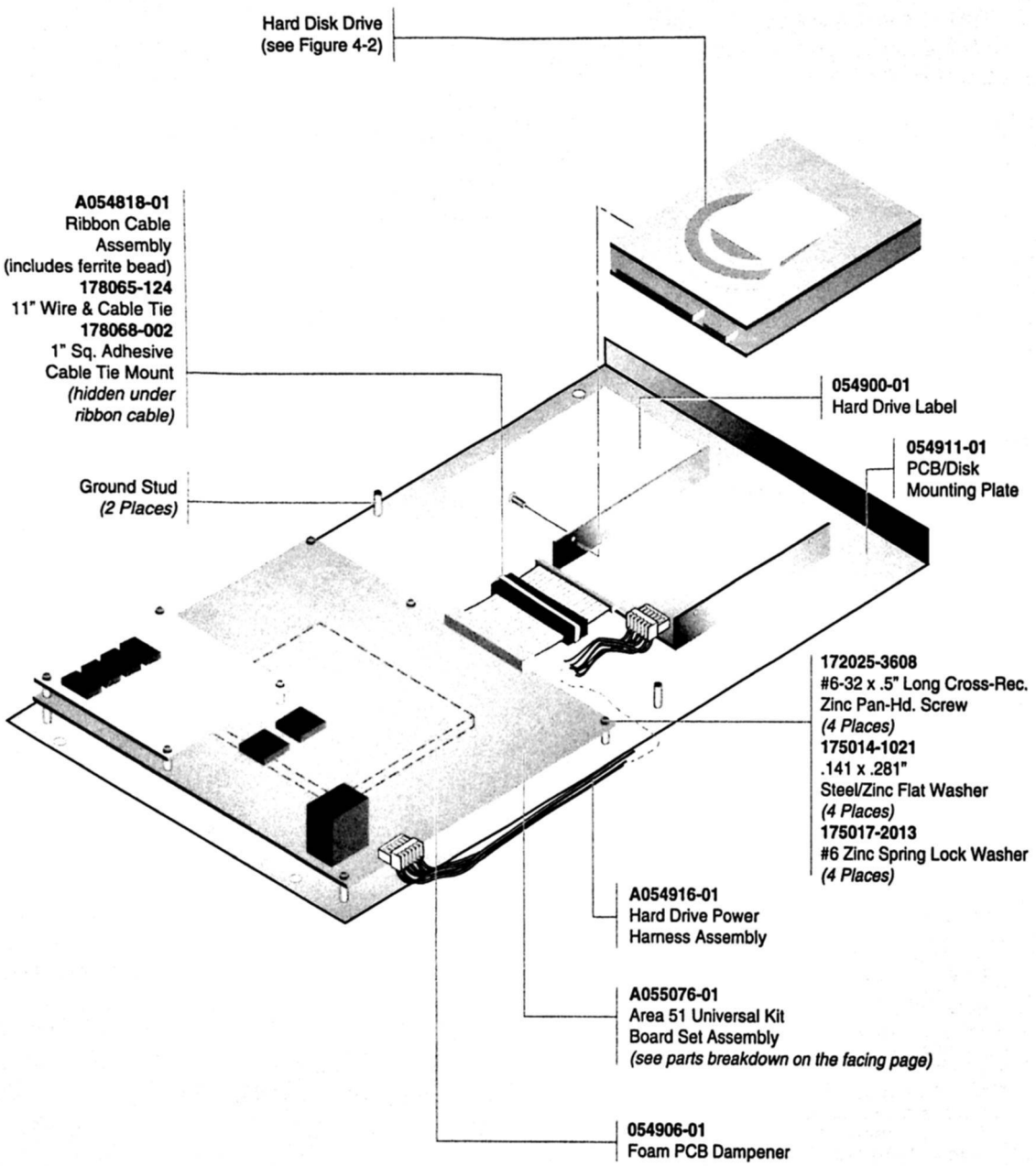


Figure 4-3 Electronics Tray Assembly

A054893-01 Rev. D

The Board Set Assembly consists of the following items:

Quantity	Part Number	Description
1	A053538-02	Area 51 CoJag PCB Top Assy.
1	A053448-02	Area 51 EC20X32 PCB Top Assy.
1	A053924-01	Power Harness Assy.
4	178140-2614	1/4 Hex, #6-32 x .875" Aluminum Standoff
6	172025-3606	#6-32 x .375" Cross-Recessed Zinc Pan-Head Screw
7	175017-2013	#6 Zinc Spring Lock Washer
7	175014-1021	.141 x .281" Steel/Zinc Flat Washer
1	172025-3622	#6-32 x 1.375" Cross-Recessed Zinc Pan-Head Screw

Figure 4-3 Electronics Tray Assembly, Continued

A054893-01 Rev. D

TOP SIDE

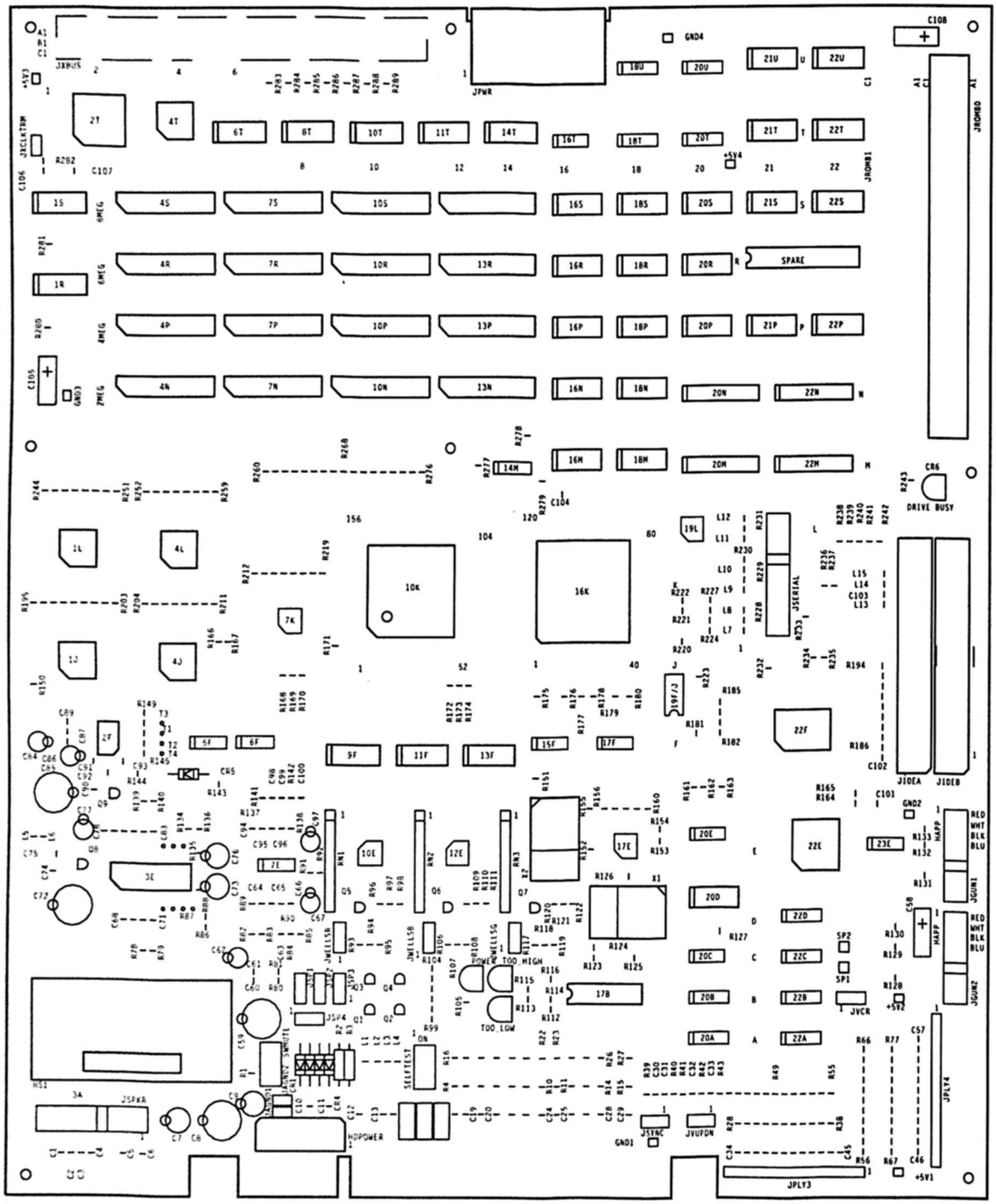


Figure 4-4 Area 51 CoJag PCB Assembly (Top Side)

A053538-02

BOTTOM SIDE

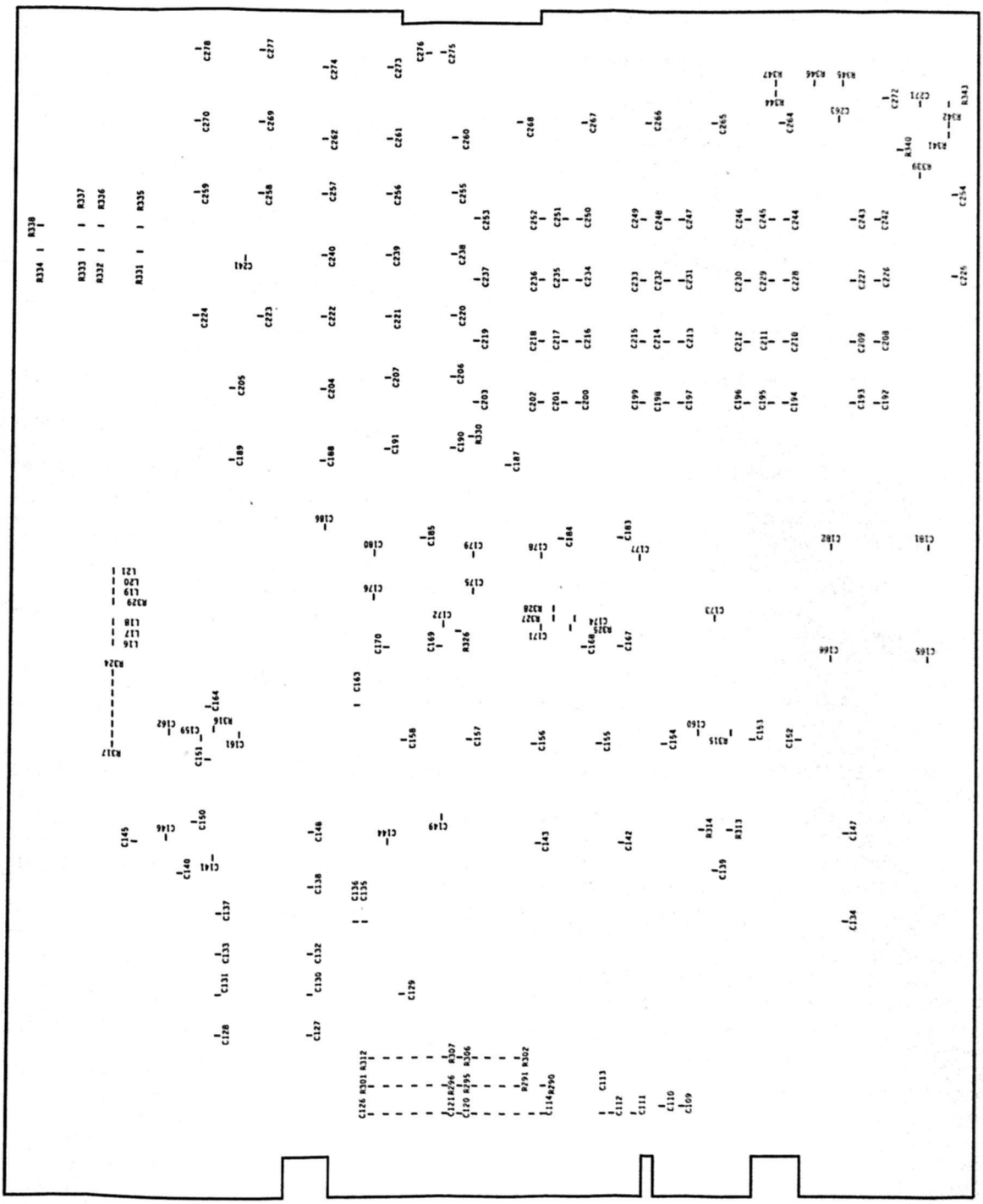


Figure 4-4 Area 51 CoJag PCB Assembly (Bottom Side)

A053538-02

Area 51 CoJag PCB Assembly
Parts List

Designator	Description	Part No.
19F/J	Socket, 8 Pin, .300, Dbl Wipe	179356-0308
(HS1)	Screw, Pan, 4-40X3/8, Xrec, Zinc	172025-3206
(JSP1)	Conn, Rcpt, 2-Ckt	179178-002
(JXBUS)	Shroud, 96 Pos, Pinless	179369-0096
1R, 1S	IC, 74F245, SO20.3	137591-0001
2	Conn, Receptacle, 2-Ckt	179178-002
2F	IC, AK4310, VSOP24	137744-002
3A	IC, TDA1554	137733-001
3E	IC, TEA6320T, SO32.3	137800-0001
4	Conn, Receptacle, 2-Ckt	179178-002
4N, 4P, 4R	IC, DRAM, 256KX16, 70 ns, SOJ40	137751-070
5F, 6F	IC, 74F74, SO14.15	137436-0001
6T	IC, 74F245, SO20.3	137591-0001
7E	IC, Quad Op-Amp, MC3403D, SO14.15 137673-1001	
7N, 7P, 7R	IC, DRAM, 256KX16, 70 ns, SOJ40	137751-070
8T	IC, 74F245, SO20.3	137591-0001
9F	IC, 74HCT245, SO20.3	137791-0001
10K	IC, CPU, Tom, QFP208	137785-001
10N,10P,10R	IC, DRAM, 256KX16, 70 ns, SOJ40	137751-070
10T	IC, 74F245, SO20.3	137591-0001
11F	IC, 74HCT245, SO20.3	137791-0001
11T	IC, 74F245, SO20.3	137591-0001
13F	IC, 74HCT245, SO20.3	137791-0001
13N,13P,13R	IC, DRAM, 256KX16, 70 ns, SOJ40	137751-070
14M	IC, 74F06, SO14.15	137789-0001
14T	IC, 74F245, SO20.3	137591-0001
15F	IC, 74F00, SO14.15	137327-0001
16K	IC, DSP, Jerry, QFP160	137785-002
16M	IC, 74F273, SO20.3	137610-1001
16P, 16S	IC, 74F245, SO20.3	137591-0001
17B	IC, LM613	137746-001
17F	IC, 74F02, SO14.15	137481-0001
18M,18P,18S	IC, 74F245, SO20.3	137591-0001
20A, 20B	IC, 74LS257, SO16.15	137136-0001
20C	IC, 74F06, SO14.15	137789-0001
20D	IC, 74LS273, SO20.3	137040-0001
20E	IC, 74F32, SO14.15	137486-0001
20P,20R,20S	IC, 74F245, SO20.3	137591-0001
22A, 22B, 22C, 22D	IC, 74LS257, SO16.15	137136-0001
22F	IC, VT83C461, QFP100	137799-0001
23E	IC, 74LS14, SO14.15	137056-0001
B	Conn, Receptacle, 2-Ckt	179178-002
C1–C6	Capacitor, Chip, 1000 pF, 50 V, Ceramic, 1206	125001-0102
C7	Capacitor, 100 µF, 16 V, Electrolytic, Radial	123013-107
C8	Capacitor, 1000 µF, 16 V, Electrolytic	123031-108
C9	Capacitor, 100 µF, 16 V, Electrolytic, Radial	123013-107
C10, C11	Capacitor, Chip, .012 µF, 50 V, Ceramic, 1206	125002-0123
C12	Capacitor, Chip, .1 µF, 50 V, Ceramic, 1206	125003-0104
C13	Capacitor, Chip, 1000 pF, 50 V, Ceramic, 1206	125001-0102
C14	Capacitor, Chip, 100 pF, 50 V, Ceramic, 1206	125001-0101
C15–C17	Capacitor, 270PFC, 50 V, EMI Filter	140006-271
C18–C21	Capacitor, Chip, .1 µF, 50 V, Ceramic, 1206	125003-0104
C22–C25	Capacitor, Chip, .012 µF, 50 V, Ceramic, 1206	125002-0123
C26–C29	Capacitor, Chip, .1 µF, 50 V, Ceramic, 1206	125003-0104
C30, C31	Capacitor, Chip, 1000 pF, 50 V, Ceramic, 1206	125001-0102
C32–C57	Capacitor, Chip, .1 µF, 50 V, Ceramic, 1206	125003-0104
C58	Capacitor, 10 µF, 25 V, Electrolytic	124009-106
C59	Capacitor, 1000 µF, 16 V, Electrolytic	123031-108
C60, C61	Capacitor, Chip, .22 µF, 50 V, Ceramic, 1206	125003-0224
C62	Capacitor, 1 µF, 50 V, Electrolytic, Radial	123001-105
C63	Capacitor, Chip, .22 µF, 50 V, Ceramic, 1206	125003-0224
C64	Capacitor, Chip, .047 µF, 50 V, Ceramic, 1206	125002-0473
C65	Capacitor, Chip, .012 µF, 50 V, Ceramic, 1206	125002-0123
C66	Capacitor, Chip, .047 µF, 50 V, Ceramic, 1206	125002-0473
C67	Capacitor, 1 µF, 50 V, Electrolytic, Radial	123001-105
C68	Capacitor, Chip, 5600 pF, 50 V, Ceramic, 1206	125002-0562

Area 51 CoJag PCB Assembly
Parts List, Continued

Designator	Description	Part No.
C69	Capacitor, Chip, .033 µF, 50 V, Ceramic, 1206	125002-0333
C70	Capacitor, Chip, .22 µF, 50 V, Ceramic, 1206	125003-0224
C71	Capacitor, Chip, .150 µF, 50 V, Ceramic, 1206	125003-0154
C72	Capacitor, 1000 µF, 16 V, Electrolytic	123031-108
C73	Capacitor, 100 µF, 35 V, Electrolytic, Radial	123009-1014
C74, C75	Capacitor, Chip, .33 µF, 50 V, Ceramic, 1206	125003-0334
C76	Capacitor, 47 µF, 50 V, Electrolytic	123015-476
C77	Capacitor, 10 µF, 35 V, Electrolytic, Radial	123000-106
C78, C79	Capacitor, Chip, .1 µF, 50 V, Ceramic, 1206	125003-0104
C80	Capacitor, Chip, 5600 pF, 50 V, Ceramic, 1206	125002-0562
C81	Capacitor, Chip, .033 µF, 50 V, Ceramic, 1206	125002-0333
C82	Capacitor, Chip, 8200 pF, 50 V, Ceramic, 1206	125002-0822
C83	Capacitor, Chip, .150 µF, 50 V, Ceramic, 1206	125003-0154
C84	Capacitor, 10 µF, 35 V, Electrolytic, Radial	123000-106
C85	Capacitor, 1000 µF, 16 V, Electrolytic	123031-108
C86	Capacitor, 10 µF, 35 V, Electrolytic, Radial	123000-106
C87	Capacitor, Chip, .1 µF, 50 V, Ceramic, 1206	125003-0104
C88, C89	Capacitor, Chip, .22 µF, 50 V, Ceramic, 1206	125003-0224
C90	Capacitor, Chip, .33 µF, 50 V, Ceramic, 1206	125003-0334
C91	Capacitor, Chip, .1 µF, 50 V, Ceramic, 1206	125003-0104
C92	Capacitor, Chip, .33 µF, 50 V, Ceramic, 1206	125003-0334
C93	Capacitor, Chip, .1 µF, 50 V, Ceramic, 1206	125003-0104
C94–C96	Capacitor, Chip, .047 µF, 50 V, Ceramic, 1206	125002-0473
C97	Capacitor, 1 µF, 50 V, Electrolytic, Radial	123001-105
C98–C100	Capacitor, Chip, .047 µF, 50 V, Ceramic, 1206	125002-0473
C102	Capacitor, Chip, .1 µF, 50 V, Ceramic, 1206	125003-0104
C103	Capacitor, Chip, 100 pF, 50 V, Ceramic, 1206	125001-0101
C104	Capacitor, Chip, .1 µF, 50 V, Ceramic, 1206	125003-0104
C105	Capacitor, 10 µF, 25 V, Electrolytic	124009-106
C106	Capacitor, Chip, 47 pF, 50 V, Ceramic, 1206	125001-0470
C108	Capacitor, 10 µF, 25 V, Electrolytic	124009-106
C109, C110	Capacitor, Chip, .012 µF, 50 V, Ceramic, 1206	125002-0123
C111	Capacitor, Chip, .1 µF, 50 V, Ceramic, 1206	125003-0104
C112	Capacitor, Chip, 1000 pF, 50 V, Ceramic, 1206	125001-0102
C113	Capacitor, Chip, 100 pF, 50 V, Ceramic, 1206	125001-0101
C114	Capacitor, Chip, 1000 pF, 50 V, Ceramic, 1206	125001-0102
C115–C117	Capacitor, Chip, .1 µF, 50 V, Ceramic, 1206	125003-0104
C118–C121	Capacitor, Chip, .012 µF, 50 V, Ceramic, 1206	125002-0123
C122–C133	Capacitor, Chip, .1 µF, 50 V, Ceramic, 1206	125003-0104
C134	Capacitor, Chip, 8200 pF, 50 V, Ceramic, 1206	125002-0822
C135	Capacitor, Chip, .012 µF, 50 V, Ceramic, 1206	125002-0123
C136–C146	Capacitor, Chip, .1 µF, 50 V, Ceramic, 1206	125003-0104
C147	Capacitor, Chip, .22 µF, 50 V, Ceramic, 1206	125003-0224
C148–C158, C161–C171, C173, C175–C278	Capacitor, Chip, .1 µF, 50 V, Cer., 1206	125003-0104
CR1–CR4	Diode, 1N4001	131048-001
CR5	Diode, 1N5818	131025-001
CR6	LED, Yel, T1-3/4, Diffused, 25-MCD, 40-Deg	138016-001
(G)	Conn, Receptacle, 2-Ckt	179178-002
GND1–4	Test Point	179051-001
HDPOWER	Conn, 4-Ckt, Hdr, .200 Ctr	179310-004
HS1	Heat Sink, Alum, 2X2X1, 2X4-40	178378-001

Area 51 CoJag PCB Assembly
Parts List, Continued

Designator	Description	Part No.
JGUN1, 2	Conn, 9-Ckt, Hdr, .100 Ctr, Key 6	179118-009
JIDEB	Conn, 40-Ckt, Hdr, 2X20, Low Prof.	179261-040
JPLY3, 4	Conn, 15-Ckt, Hdr, .100 Ctr	179118-015
JPWR	Conn, 9-Ckt, Hdr, .156 Ctr, Rt, Key 3	179165-009
JSP1–JSP4	Conn, 3-Ckt, Hdr, .100 Ctr	179048-003
JSPKR	Conn, 11-Ckt, Hdr, .100 Ctr, Key 5	179118-011
JSYNC	Conn, 3-Ckt, Hdr, .100 Ctr	179048-003
JVCR	Conn, 3-Ckt, Hdr, .100 Ctr	179048-003
JVUPDN	Conn, 3-Ckt, Hdr, .100 Ctr	179048-003
JWELLSB	Conn, 3-Ckt, Hdr, .100 Ctr	179048-003
JWELLSG	Conn, 3-Ckt, Hdr, .100 Ctr	179048-003
JWELLSR	Conn, 3-Ckt, Hdr, .100 Ctr	179048-003
JWELLSR	Conn, Receptacle, 2-Ckt	179178-002
JXBUS	Conn, 96-Ckt, Recep., Pressfit, Long	179368-0096
JXCLKTRM	Conn, 2-Ckt, Hdr, .100 Ctr	179048-002
L1–L6	Inductor, Ferrite Bead, 1206	141032-0001
L13–L21	Inductor, 600 Ω, 1206	141032-0002
POWER	LED, Grn, MV5453, T1-3/4, 20-MCD, Wide	138020-001
Q1–Q4	Transistor, 2N5306	133033-001
Q5–Q7	Transistor, 2N3904	133041-001
Q8	IC, 78L09	137740-002
Q9	IC, 78L05	137258-001
R1	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R2, R3	Resistor, 0 Ω, ±5%, 1/4 W	110005-001
R4, R5	Resistor, Chip, 470 Ω, ±5%, 1/8 W, 1206	112006-0471
R6	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R7–R15	Resistor, Chip, 470 Ω, ±5%, 1/8 W, 1206	112006-0471
R16–R27	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R28–R40	Resistor, Chip, 470 Ω, ±5%, 1/8 W, 1206	112006-0471
R41–R66	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R67–R75	Resistor, Chip, 470 Ω, ±5%, 1/8 W, 1206	112006-0471
R76	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R77	Resistor, Chip, 470 Ω, ±5%, 1/8 W, 1206	112006-0471
R78	Resistor, Chip, 20 KΩ, ±5%, 1/8 W, 1206	112006-0203
R79	Resistor, Chip, 2.2 KΩ, ±5%, 1/8 W, 1206	112006-0222
R80, R81	Resistor, Chip, 100 KΩ, ±1%, 1/8 W, 1206	112002-1003
R82–R84	Resistor, Chip, 45.3 KΩ, ±1%, 1/8 W, 1206	112002-4532
R85	Resistor, Chip, 10 KΩ, ±5%, 1/8 W, 1206	112006-0103
R88	Resistor, Chip, 100 KΩ, ±1%, 1/8 W, 1206	112002-1003
R89	Resistor, Chip, 47 KΩ, ±5%, 1/8 W, 1206	112006-0473
R90	Resistor, Chip, 22.6 KΩ, ±1%, 1/8 W, 1206	112002-2262
R91, R92	Resistor, Chip, 45.3 KΩ, ±1%, 1/8 W, 1206	112002-4532
R93	Resistor, Chip, 12 Ω, ±5%, 1/8 W, 1206	112006-0120
R94	Resistor, Chip, 10 Ω, ±5%, 1/8 W, 1206	112006-0100
R95	Resistor, Chip, 75 Ω, ±5%, 1/8 W, 1206	112006-0750
R96	Resistor, Chip, 100 Ω, ±5%, 1/8 W, 1206	112006-0101
R97	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R98	Resistor, Chip, 2.4 KΩ, ±5%, 1/8 W, 1206	112006-0242
R99–R104	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R105	Resistor, Chip, 470 Ω, ±5%, 1/8 W, 1206	112006-0471
R106	Resistor, Chip, 12 Ω, ±5%, 1/8 W, 1206	112006-0120
R107	Resistor, Chip, 10 Ω, ±5%, 1/8 W, 1206	112006-0100
R108	Resistor, Chip, 75 Ω, ±5%, 1/8 W, 1206	112006-0750
R109	Resistor, Chip, 100 Ω, ±5%, 1/8 W, 1206	112006-0101
R110	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R111	Resistor, Chip, 2.4 KΩ, ±5%, 1/8 W, 1206	112006-0242
R112	Resistor, Chip, 20 Ω, ±1%, 1/8 W, 1206	112002-0200
R113	Resistor, Chip, 470 Ω, ±5%, 1/8 W, 1206	112006-0471
R114	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R115	Resistor, Chip, 470 Ω, ±5%, 1/8 W, 1206	112006-0471
R116	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R117	Resistor, Chip, 12 Ω, ±5%, 1/8 W, 1206	112006-0120
R118	Resistor, Chip, 10 Ω, ±5%, 1/8 W, 1206	112006-0100
R119	Resistor, Chip, 75 Ω, ±5%, 1/8 W, 1206	112006-0750
R120	Resistor, Chip, 100 Ω, ±5%, 1/8 W, 1206	112006-0101
R121	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R122	Resistor, Chip, 2.4 KΩ, ±5%, 1/8 W, 1206	112006-0242
R123–R125	Resistor, Chip, 39 KΩ, ±5%, 1/8 W, 1206	112006-0393
R126	Resistor, Chip, 0 Ω, ±5%, 1/8 W, 1206	112006-0001
R127	Resistor, Chip, 330 Ω, ±5%, 1/8 W, 1206	112006-0331
R128	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R129	Resistor, Chip, 330 Ω, ±5%, 1/8 W, 1206	112006-0331
R130, R131	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R132	Resistor, Chip, 330 Ω, ±5%, 1/8 W, 1206	112006-0331
R133	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R134	Resistor, Chip, 100 KΩ, ±1%, 1/8 W, 1206	112002-1003
R137, R138	Resistor, Chip, 11.0 KΩ, ±1%, 1/8 W, 1206	112002-1102
R139	Resistor, Chip, 20 KΩ, ±5%, 1/8 W, 1206	112006-0203
R140	Resistor, Chip, 2.2 KΩ, ±5%, 1/8 W, 1206	112006-0222
R141, R142	Resistor, Chip, 22.6 KΩ, ±1%, 1/8 W, 1206	112002-2262
R143	Resistor, Chip, 330 Ω, ±5%, 1/8 W, 1206	112006-0331
R144	Resistor, Chip, 10 Ω, ±5%, 1/8 W, 1206	112006-0100

Area 51 CoJag PCB Assembly
Parts List, Continued

Designator	Description	Part No.
R145–R149	Resistor, Chip, 47 Ω, ±5%, 1/8 W, 1206	112006-0470
R150	Resistor, Chip, 220 Ω, ±5%, 1/8 W, 1206	112006-0221
R151	Resistor, Chip, 2.2 KΩ, ±5%, 1/8 W, 1206	112006-0222
R152–R155, R158–R160	Resistor, Chip, 33 Ω, ±5%, 1/8 W, 1206	112006-0330
R161–R163, R165	Resistor, Chip, 10 KΩ, ±5%, 1/8 W, 1206	112006-0103
R166, R167	Resistor, Chip, 2.2 KΩ, ±5%, 1/8 W, 1206	112006-0222
R168–R170	Resistor, Chip, 33 Ω, ±5%, 1/8 W, 1206	112006-0330
R172	Resistor, Chip, 2 KΩ, ±5%, 1/8 W, 1206	112006-0202
R173	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R174	Resistor, Chip, 2 KΩ, ±5%, 1/8 W, 1206	112006-0202
R175, R176	Resistor, Chip, 10 KΩ, ±5%, 1/8 W, 1206	112006-0103
R177, R178	Resistor, Chip, 2.2 KΩ, ±5%, 1/8 W, 1206	112006-0222
R179	Resistor, Chip, 330, ±5%, 1/8 W, 1206	112006-0331
R180	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R181	Resistor, Chip, 10 KΩ, ±5%, 1/8 W, 1206	112006-0103
R182, R183	Resistor, Chip, 1.2 KΩ, ±5%, 1/8 W, 1206	112006-0122
R184	Resistor, Chip, 100 Ω, ±5%, 1/8 W, 1206	112006-0101
R185	Resistor, Chip, 4.7 KΩ, ±5%, 1/8 W, 1206	112006-0472
R186	Resistor, Chip, 100 Ω, ±5%, 1/8 W, 1206	112006-0101
R187–R194	Resistor, Chip, 47 Ω, ±5%, 1/8 W, 1206	112006-0470
R195	Resistor, Chip, 220 Ω, ±5%, 1/8 W, 1206	112006-0221
R196–R219	Resistor, Chip, 33 Ω, ±5%, 1/8 W, 1206	112006-0330
R220	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R221, R222, R224–R232	Resistor, Chip, 10 KΩ, ±5%, 1/8 W, 1206	112006-0103
R233	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R234	Resistor, Chip, 10 KΩ, ±5%, 1/8 W, 1206	112006-0103
R235	Resistor, Chip, 4.7 KΩ, ±5%, 1/8 W, 1206	112006-0472
R236	Resistor, Chip, 300 Ω, ±5%, 1/8 W, 1206	112006-0301
R237	Resistor, Chip, 4.7 KΩ, ±5%, 1/8 W, 1206	112006-0472
R238–R242	Resistor, Chip, 10 KΩ, ±5%, 1/8 W, 1206	112006-0103
R243	Resistor, Chip, 470 Ω, ±5%, 1/8 W, 1206	112006-0471
R252–R264	Resistor, Chip, 33 Ω, ±5%, 1/8 W, 1206	112006-0330
R265–R267	Resistor, Chip, 10 KΩ, ±5%, 1/8 W, 1206	112006-0103
R268–R271	Resistor, Chip, 33 Ω, ±5%, 1/8 W, 1206	112006-0330
R272–R276	Resistor, Chip, 10 KΩ, ±5%, 1/8 W, 1206	112006-0103
R277	Resistor, Chip, 220 Ω, ±5%, 1/8 W, 1206	112006-0221
R278, R279	Resistor, Chip, 330 Ω, ±5%, 1/8 W, 1206	112006-0331
R280	Resistor, Chip, 2 KΩ, ±5%, 1/8 W, 1206	112006-0202
R281	Resistor, Chip, 4.7 KΩ, ±5%, 1/8 W, 1206	112006-0472
R282	Resistor, Chip, 47 Ω, ±5%, 1/8 W, 1206	112006-0470
R286	Resistor, Chip, 10 Ω, ±5%, 1/8 W, 1206	112006-0100
R287–R289	Resistor, Chip, 4.7 KΩ, ±5%, 1/8 W, 1206	112006-0472
R290–R301	Resistor, Chip, 470 Ω, ±5%, 1/8 W, 1206	112006-0471
R302–R312	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R313, R314	Resistor, Chip, 45.3 KΩ, ±1%, 1/8 W, 1206	112002-4532
R317–R324	Resistor, Chip, 47 Ω, ±5%, 1/8 W, 1206	112006-0470
R325	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R329	Resistor, Chip, 100 Ω, ±5%, 1/8 W, 1206	112006-0101
R330	Resistor, Chip, 470, ±5%, 1/8 W, 1206	112006-0471
R340	Resistor, Chip, 4.7 KΩ, ±5%, 1/8 W, 1206	112006-0472
R341	Resistor, Chip, 2 KΩ, ±5%, 1/8 W, 1206	112006-0202
R342	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R343	Resistor, Chip, 10 KΩ, ±5%, 1/8 W, 1206	112006-0103
R344–R347	Resistor, Chip, 22 Ω, ±5%, 1/8 W, 1206	112006-0220
RN1–RN3	Resistor Network, R2R10, 1K/2 KΩ, SIP10	118015-001
SELFTEST	Switch, Slide, SPDT	160040-001
SPARE	Socket, 24 Pin, .300, Dbl Wipe	179356-0324
TOO_HIGH	LED, Red, T1-3/4, Diffused, .5MCD, 80-Deg	138021-001
TOO_LOW	LED, Red, T1-3/4, Diffused, .5MCD, 80-Deg	138021-001
X1	Crystal, 52.000 MHz, Osc. Module, .3X.6DIP	144008-012
X2	Crystal, 14.318 MHz, Osc. Module	144008-001
HS1	Compound, Thermal	107031-001

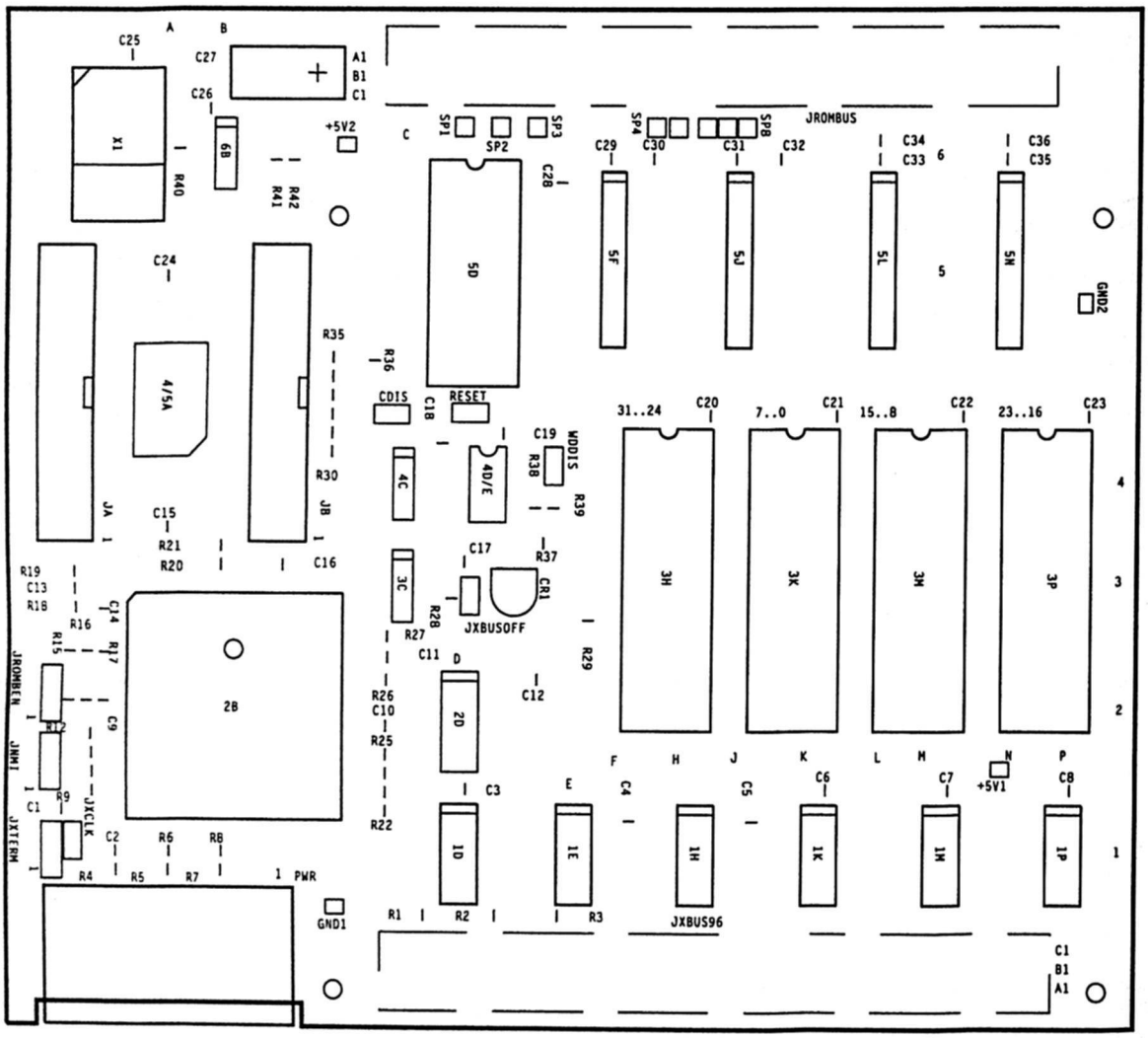


Figure 4-5 Area 51 EC20X32 PCB Assembly

A053448-02

Area 51 EC20X32 PCB Assembly
Parts List

Designator	Description	Part No.
2B	Socket, 68 Pin, PGA for 68PLCC IC	179237-068
3H, 3K, 3M, 3P	Socket, 32 Pin, .600, Dbl Wipe	179356-0632
5D	Socket, 24 Pin, .600 Dbl Wipe	179356-0624
1D, 1E, 1H, 1K, 1M, 1P, 2D	IC, 74F245, SO20.3	137591-0001
3C	IC, 74F04, SO14.15	137437-0001
4/5A	IC, CPU, 68EC020, 25 MHz, 100PQFP	137691-025
4D/E	IC, DS1232	137762-001
5D	IC, RAM, 48T02, Battery W/Clock	137540-150
5F,5J,5L,5N	IC, SRAM, 32KX8, 20 ns, SOJ28.3	137670-1020
6B	IC, 74F74, SO14.15	137436-0001
C2–C12, C15–C26	Capacitor, Chip, .1 µF, 50 V, Cer., 1206	125003-0104
C27	Capacitor, 100 µF, 16 V, Electro., Axial	124008-107
C28, C29	Capacitor, Chip, .1 µF, 50 V, Cer., 1206	125003-0104
C30	Capacitor, Chip, .012 µF, 50 V, Cer., 1206	125002-0123
C31	Capacitor, Chip, .1 µF, 50 V, Cer., 1206	125003-0104
C32	Capacitor, Chip, .012 µF, 50 V, Cer., 1206	125002-0123
C33	Capacitor, Chip, .1 µF, 50 V, Cer., 1206	125003-0104
C34	Capacitor, Chip, .012 µF, 50 V, Cer., 1206	125002-0123
C35	Capacitor, Chip, .1 µF, 50 V, Cer., 1206	125003-0104
C36	Capacitor, Chip, .012 µF, 50 V, Cer., 1206	125002-0123
CR1	LED, Grn, MV5453, T1-3/4, 20-MCD, Wide	138020-001
GND1, 2	Test Point	179051-001
JXBUS96	Conn, 96 Ckt, Rcpt, Pressfit, Short	179368-0196
PWR	Conn, 9 Ckt, Hdr, .156 Ctr, Rt, Key 3	179165-009
R1–R3	Resistor, Chip, 2.2 KΩ, ±5%, 1/8 W, 1206	112006-0222
R4	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R5	Resistor, Chip, 220 Ω, ±5%, 1/8 W, 1206	112006-0221
R6–R8	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R10	Resistor, Chip, 10 KΩ, ±5%, 1/8 W, 1206	112006-0103
R11	Resistor, Chip, 22 Ω, ±5%, 1/8 W, 1206	112006-0220
R12–R14	Resistor, Chip, 10 KΩ, ±5%, 1/8 W, 1206	112006-0103
R15, R16	Resistor, Chip, 22 Ω, ±5%, 1/8 W, 1206	112006-0220
R19	Resistor, Chip, 10 KΩ, ±5%, 1/8 W, 1206	112006-0103
R20	Resistor, Chip, 10 Ω, ±5%, 1/8 W, 1206	112006-0100
R22–R26	Resistor, Chip, 22 Ω, ±5%, 1/8 W, 1206	112006-0220
R27	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R28	Resistor, Chip, 10 KΩ, ±5%, 1/8 W, 1206	112006-0103
R29	Resistor, Chip, 10 Ω, ±5%, 1/8 W, 1206	112006-0100
R30	Resistor, Chip, 10 KΩ, ±5%, 1/8 W, 1206	112006-0103
R31	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R32	Resistor, Chip, 10 KΩ, ±5%, 1/8 W, 1206	112006-0103
R35	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R36	Resistor, Chip, 10 KΩ, ±5%, 1/8 W, 1206	112006-0103
R37–R39	Resistor, Chip, 1 KΩ, ±5%, 1/8 W, 1206	112006-0102
R40–R42	Resistor, Chip, 22 Ω, ±5%, 1/8 W, 1206	112006-0220
X1	Crystal, 50.000 MHz, Osc. Module	144008-005

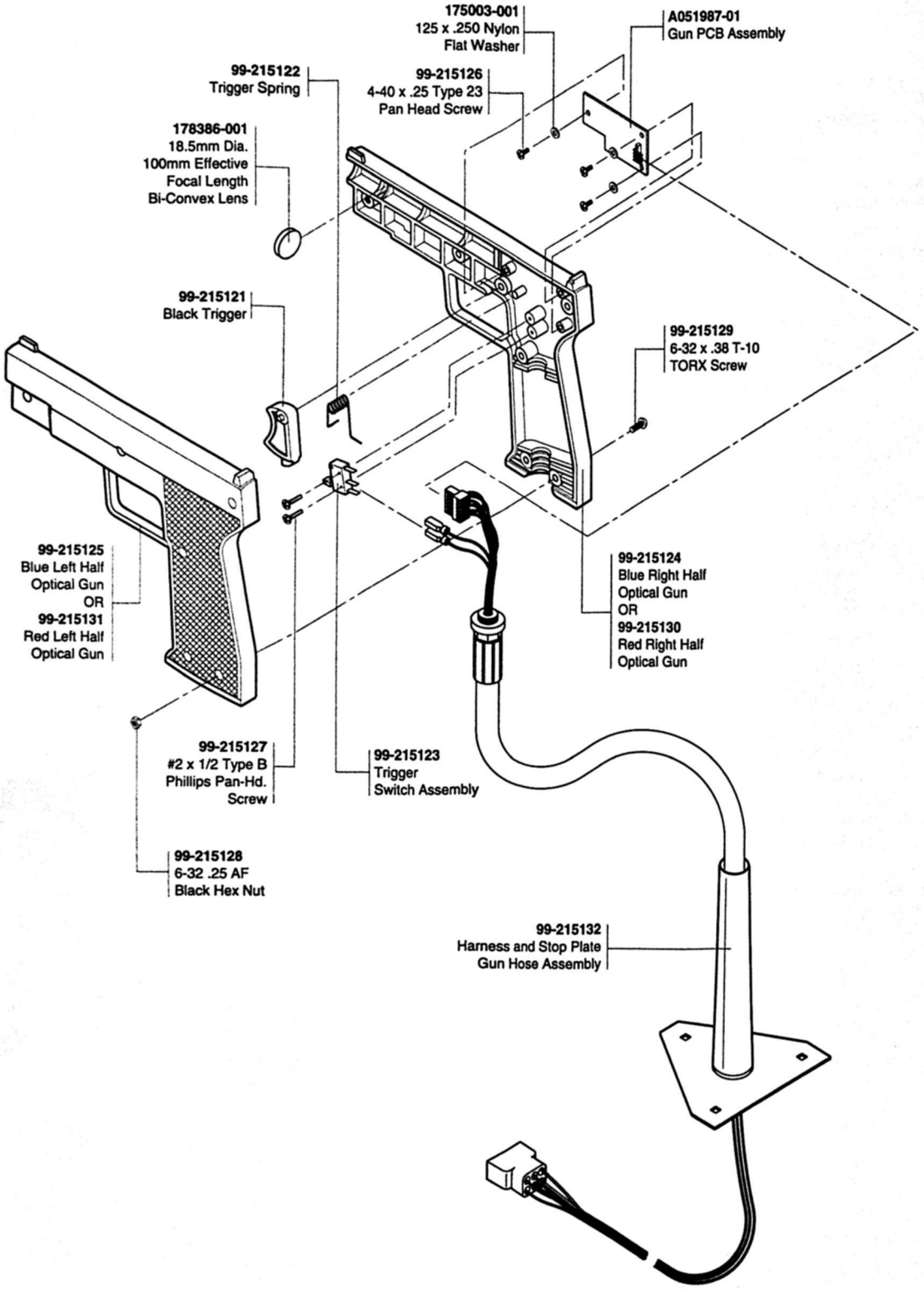


Figure 4-6 Gun Assembly

A054890-01 (blue), A054890-02 (red)

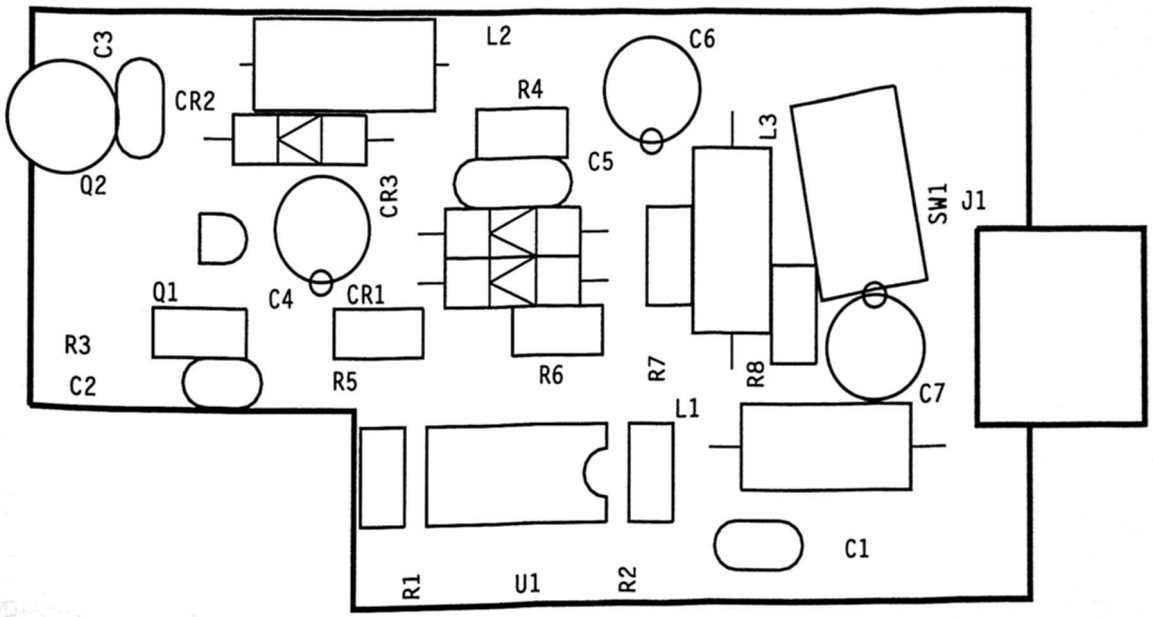


Figure 4-7 Area 51 Gun PCB Assembly
A051987-01 Rev. C

Area 51 Gun PCB Assembly
Parts List

Designator	Description	Part No.
	PCB, Gun	051986-01
C2	Capacitor, .01 µF, 50V, ±10%, Cer.	122015-103
C1, C3	Capacitor, .1 µF, 50V, +80% –20%, Cer.	122002-104
C5	Capacitor, 1000 PF, 100V, ±5%, Cer.	122016-102
C4, C6, C7	Capacitor, 22 µF, 16V, ±10%, Tant., Radial	127003-226
J1	Conn., 4 Ckt., Header, .100 Center, Right-Angle	179165-004
CR1–CR3	Diode, 1N914	131052-001
U1	IC, LM311	137687-001

Designator	Description	Part No.
L1, L3	Inductor, Ferrite Bead, N12N	141003-005
L2	Inductor, 5.6 µH	141016-562
R2	Resistor, 100K Ω, ±5%, 1/8W	110027-104
R1	Resistor, 150K Ω, ±5%, 1/8W	110027-154
R4, R7	Resistor, 1K Ω, ±5%, 1/8W	110027-102
R5	Resistor, 200K Ω, ±5%, 1/8W	110027-204
R3	Resistor, 24K Ω, ±5%, 1/8W	110027-243
R8	Resistor, 47 Ω, ±5%, 1/8W	110027-470
R6	Resistor, 47K Ω, ±5%, 1/8W	110027-473
Q1	Transistor, 2N3904	133041-001
Q2	Transistor, QTL14G2, TO18	133038-002

NOTES

CHAPTER 5

Schematic Diagrams

INTRODUCTION

THIS CHAPTER contains schematic diagrams for several sheets of the Area 51™ CoJag Game Printed-Circuit Board, and the gun assembly. The PCB *assembly drawings* are illustrated in Chapter 4, Parts Illustrations.

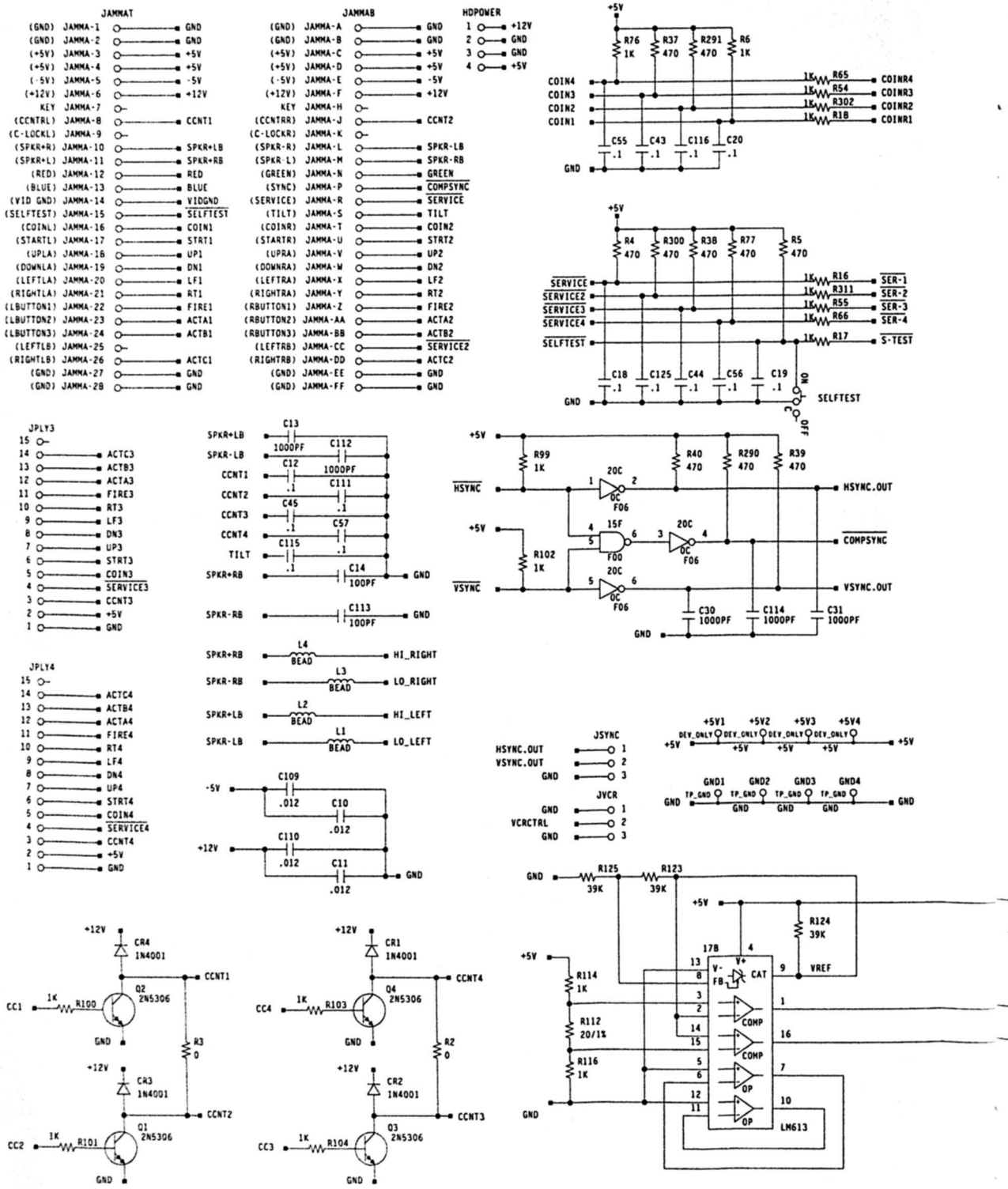


Figure 5-1 CoJag Board Schematic Diagram
Sheet 2 of 10

053537-XX Rev. D

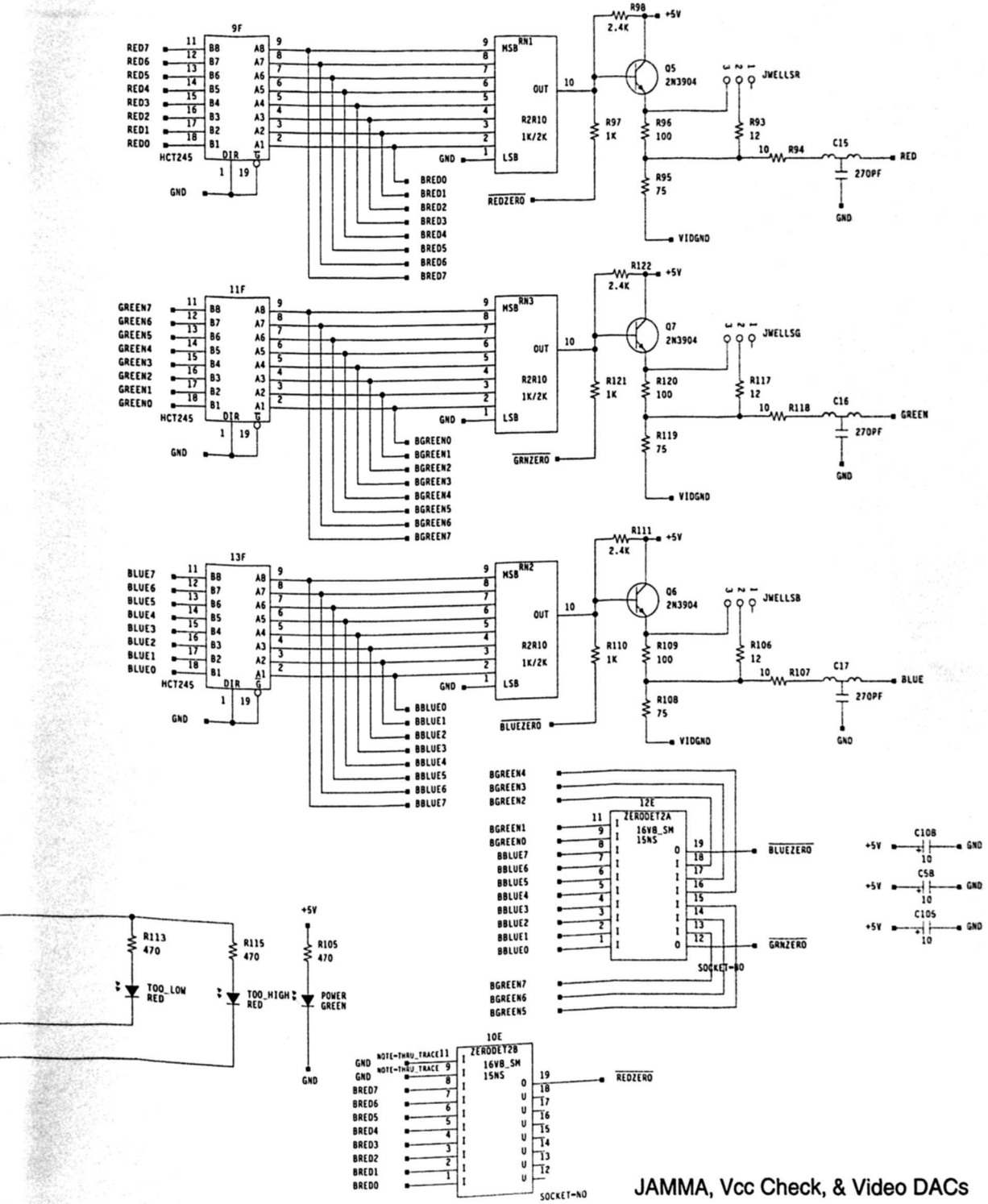
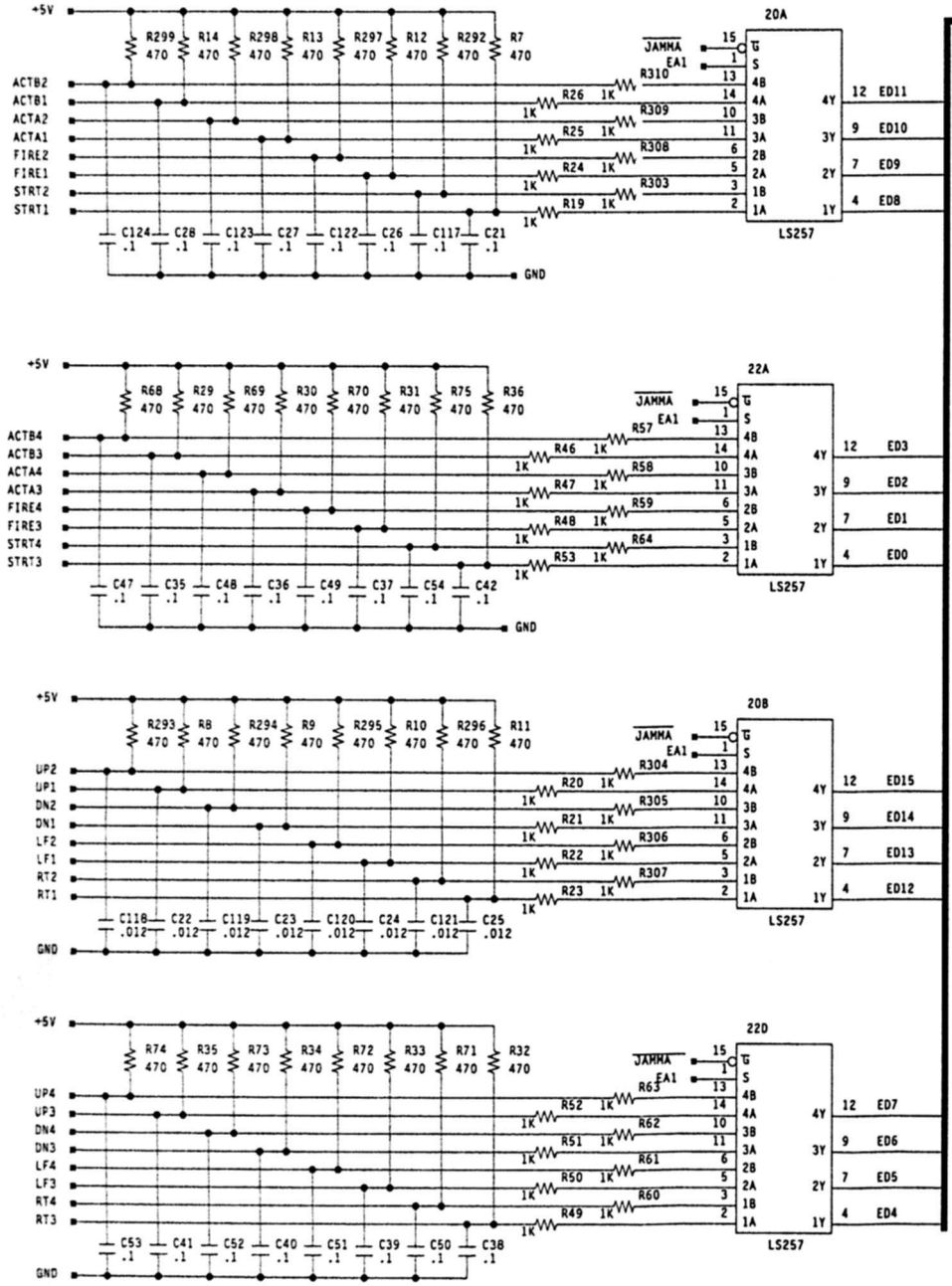


Figure 5-1 CoJag Board Schematic Diagram, Continued
Sheet 2 of 10

053537-XX Rev. D



JAMMA Registers & Decode

Figure 5-1 CoJag Board Schematic Diagram, Continued
Sheet 3 of 10

053537-XX Rev. D

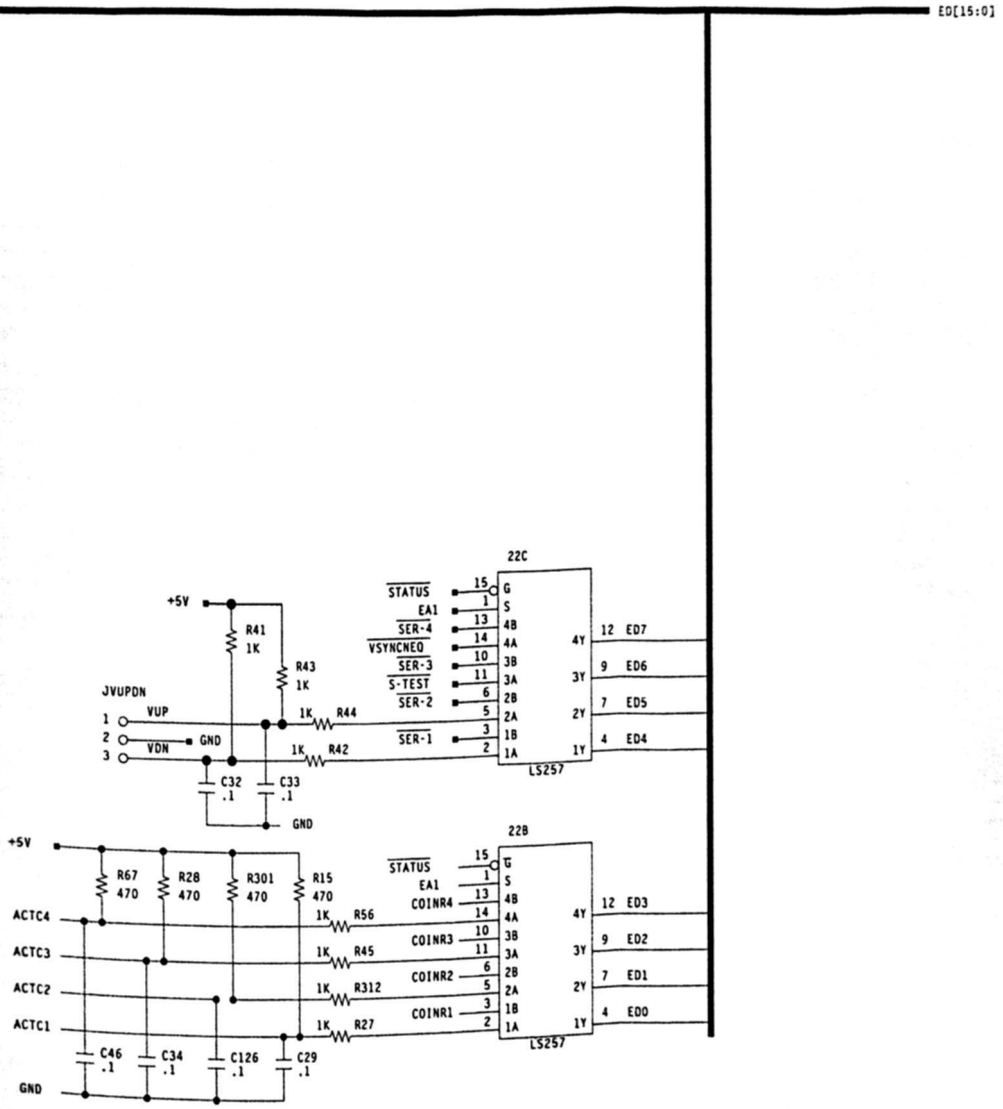


Figure 5-1 CoJag Board Schematic Diagram, Continued
Sheet 3 of 10

053537-XX Rev. D

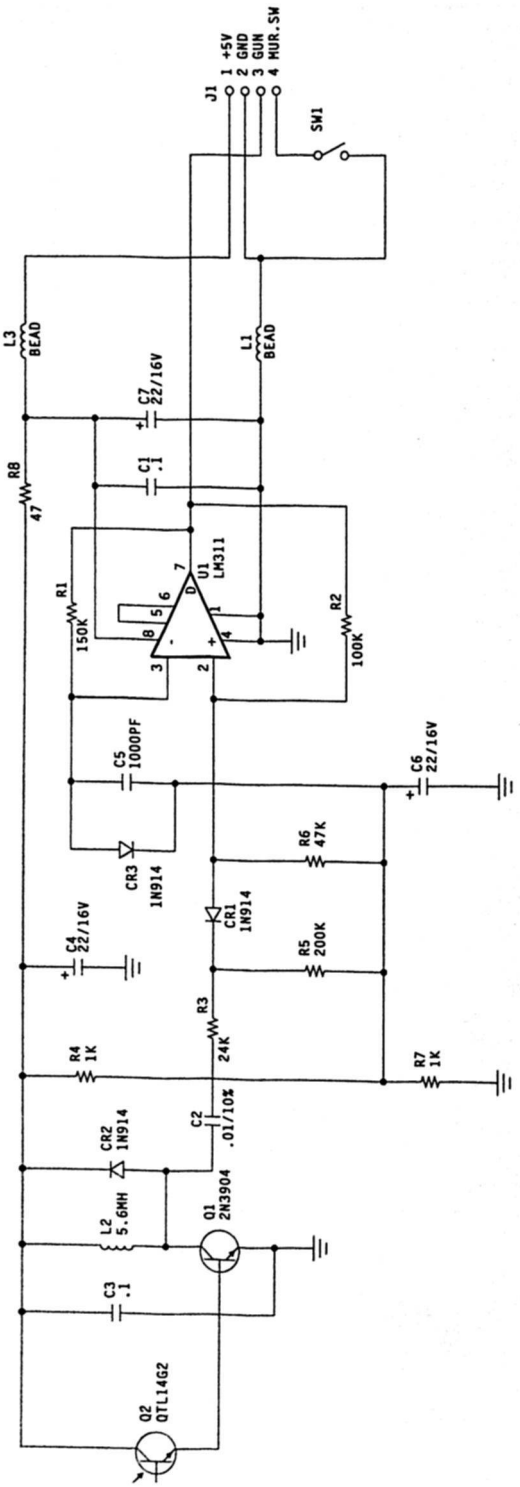


Figure 5-2 Gun Board Schematic Diagram

51987-XX Rev. C

Glossary

AC
Alternating current; from zero it rises to a maximum positive level, then passes through zero again to a maximum negative level.

ACTIVE STATE
The true state of a signal. For example: The active state for is low.

ADDRESS
A value that identifies a specific location of data in memory; normally expressed in hexadecimal notation.

ANALOG
Measurable in an absolute quantity (as opposed to on or off). Analog devices are volume controls, light dimmers, stereo amplifiers, etc.

ANODE
The positive (arrow) end of a diode.

AMPLIFIER
A device used to increase the strength of an applied signal.

AMPLITUDE
The maximum instantaneous value of a waveform pulse from zero.

ASTABLE
Having no normal state. An astable device will free-run or oscillate as long as operating voltage is applied. The oscillation frequency is usually controlled by external circuitry.

AUXILIARY COIN SWITCH
A momentary-contact pushbutton switch with a black cap located on the utility panel. The auxiliary coin switch adds credits to the game without activating a coin counter.

BEZEL
A cut, formed, or machined retention device, such as the conical device used to mount a pushbutton switch to a control panel, or the formed device used to frame the video display screen.

BIDIRECTIONAL
Able to send or receive data on the same line (e.g., the data bus of a microprocessor).

BINARY
A number system that expresses all values by using two digits (0 and 1).

BIT
A binary digit; expressed as 1 or 0.

BLANKING
Turning off the beam on a cathode-ray tube during retrace.

BLOCK DIAGRAM
A drawing in which functional circuitry units are represented by blocks. Very useful during initial troubleshooting.

BUFFER
1. An isolating circuit designed to eliminate the reaction of a driven circuit on the circuits driving it (e.g., a buffer amplifier).

2. A device used to supply additional drive capability.

BUS
An electrical path over which information is transferred from any of several sources to any of several destinations.

CAPACITOR
A device capable of storing electrical energy. A capacitor blocks the flow of DC current while allowing AC current to pass.

CATHODE
The negative end of a diode.

CHIP
An integrated circuit comprising many circuits on a single wafer slice.

CLOCK
A repetitive timing signal for synchronizing system functions.

COINCIDENCE
Occurring at the same time.

COIN COUNTER
A 6-digit electromechanical device that counts the coins inserted in the coin mechanism(s).

COIN MECHANISM
A device on the inside of the coin door that inspects the coin to determine if the correct coin has been inserted.

COMPLEMENTARY
Having opposite states, such as the outputs of a flip-flop.

COMPOSITE SYNC
Horizontal and vertical synchronization pulses that are bused together into a single signal. This signal provides the timing necessary to keep the display in synchronization with the game circuitry.

COMPOSITE VIDEO
Complete video signal from the game system to drive the display circuitry, usually comprising H SYNC, V SYNC, and the video.

CREDIT
One play for one person based on the game switch settings.

CRT
Cathode-ray tube.

DATA
General term for the numbers, letters, and symbols that serve as input for device processing.

DARLINGTON
A two-transistor amplifier that provides extremely high gain.

DC
Direct current, meaning current flowing in one direction and of a fixed value.

DEFLECTION YOKE
Electromagnetic coils around the neck of a cathode-ray tube. One set of coils deflects the electron beam horizontally and the other set deflects the beam vertically.

DIAGNOSTICS
A programmed routine for checking circuitry. For example: the self-test is a diagnostic routine.

DIODE
A semiconductor device that conducts in only one direction.

DISCRETE
Non-integrated components, such as resistors, capacitors, and transistors.

DMA
Direct memory access. DMA is a process of accessing memory that bypasses the microprocessor logic. DMA is normally used for transferring data between the input/output ports and memory.

DOWN TIME
The period during which a game is malfunctioning or not operating correctly due to machine failure.

EAROM
Electrically alterable read-only memory (see ROM). The EAROM is a memory that can be changed by the application of high voltage.

FLYBACK
A step-up transformer used in a display to provide the high voltage.

GATE
1. A circuit with one output that responds only when a certain combination of pulses is present at the inputs.

2. A circuit in which one signal switches another signal on and off.

3. To control the passage of a pulse or signal.

HARNESS
A prefabricated assembly of insulated wires and terminals ready to be attached to a piece of equipment.

HEXADECIMAL
A number system using the equivalent of the decimal number 16 as a base. The symbols 0–9 and A–F are usually used.

IMPLODE
To burst inward; the inward collapse of a vacuum tube.

I/O
Input/Output.

IRQ
Interrupt request. IRQ is a control signal to the microprocessor that is generated by external logic. This signal tells the microprocessor that external logic needs attention. Depending on the program, the processor may or may not respond.

LED
The abbreviation for a light-emitting diode.

LOCKOUT COIL
Directs coins into the coin return box when there is no power to the game.

LOGIC STATE
The binary (1 or 0) value at the node of a logic element or integrated circuit during a particular time. Also called the logic level. The list below shows the voltage levels corresponding to the logic states (levels) in a TTL system.

Logic 0, Low = 0 VDC to +0.8 VDC

Grey Area (Tri-State Level) = +0.8 VDC to +2.4 VDC

Logic 1, High = +2.4 VDC to +5 VDC

MULTIPLEXER
A device that takes several low-speed inputs and combines them into one high-speed data stream for simultaneous transmission on a single line.

NMI
Non-maskable interrupt. NMI is a request for service by the microprocessor from external logic. The microprocessor cannot ignore this interrupt request.

PAGE
A subsection of memory. A read-only memory device (see ROM) is broken into discrete blocks of data. These blocks are called pages. Each block has X number of bytes.

PCB
The abbreviation for a printed-circuit board.

PHOTOTRANSISTOR
A transistor that is activated by an external light source.

POTENTIOMETER
1. A resistor that has a continuously moving contact which is generally mounted on a moving shaft. Used chiefly as a voltage divider. Also called a pot (slang).

2. An instrument for measuring a voltage by balancing it against a known voltage.

RAM
Random-access memory. A device for the temporary storage of data.

RASTER-SCAN DISPLAY
A display system whereby images are displayed by continuously scanning the cathode-ray tube horizontally and vertically with an electron beam. The display system controls the intensity of the electron beam.

RETRACE
In a raster-scan display, retrace is the time during which the cathode-ray tube electron beam is resetting either from right to left or from bottom to top.

RESISTOR
A device designed to have a definite amount of resistance. Used in circuits to limit current flow or to provide a voltage drop.

ROM
Read-only memory. A device for the permanent storage of data.

SIGNATURE ANALYSIS
A process of isolating digital logic faults at the component level by means of special test equipment called signature analyzers. Basically, signature analyzers (e.g., the ATARI® CAT Box) convert lengthy bit streams into four-digit hexadecimal signatures. The signature read by the analyzer at each circuit node is then compared with the known good signature for that node. This process continues until a fault is located.

TROUBLESHOOT
The process of locating and repairing a fault.

VECTOR
A line segment drawn between specific X and Y coordinates on a cathode-ray tube.

WATCHDOG
A counter circuit designed to protect the microprocessor from self-destruction if a program malfunction occurs. If a malfunction does occur, the counter applies continuous pulses to the reset line of the microprocessor, which causes the microprocessor to keep resetting.

X-Y DISPLAY
A display system whereby images are displayed with vectors.

ZENER DIODE
A special diode used as a regulator. Its main characteristic is breaking down at a specified reverse-bias (Zener) voltage.

CO-405-01
1st printing

TIME WARNER
INTERACTIVE

Troubleshooting Guns Installed with Kits

Supplement to the Area 51 Universal Kit Installation Instructions (TM-405, 1st printing)

THIS SUPPLEMENT sheet describes how to troubleshoot the guns included with this universal kit. If you are having problems with the guns tracking across the whole screen, check these items before calling Customer Service.

① Check the brightness and contrast. Adjust the picture as bright and with as much contrast as you can. (However, do not boost the brightness to the point where the screen is washed out and you can see the diagonal retrace lines.)

② Check that you have a pure white screen in the monitor purity test (under Monitor Tests in the self-test procedure). Follow the instructions on page 2-7 of the *Area 51 Universal Kit Installation Instructions.*

③ Make sure the monitor screen is clean and free of dust.

When the monitor is properly adjusted, the guns should track to within *two inches* of the left side of the screen and *all the way* to the right side. If you still have problems after checking these three items, call Customer Service at the number on the back of this sheet. We suggest you keep this supplement with your kit manual, and refer to it when installing the guns.

ATARI GAMES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