

THE S M A R M

Service and Repair Instructions For Universal Conversion Kit Systems

040-0260-01 Rev. A

Please Check <http://service.globalvr.com>
for the Latest Service Information

- Read this manual before use.
- Keep this manual with the machine at all times.



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Important: This document provides service and repair procedures for components provided by GLOBAL VR in the **The Swarm Universal Conversion Kit**. The steps required to access the components will vary depending on the cabinet used.

Section 1: Service Procedures

This document provides service and repair procedures for components provided by GLOBAL VR in the **The Swarm Universal Conversion Kit**. The steps required to access the components will vary depending on the cabinet used.



CAUTION

GLOBAL VR assumes no liability for any damage or injuries incurred while servicing the cabinet. Only qualified service personnel should perform service and installation of cabinet hardware.

To prevent electrostatic discharge (ESD) damage, handle PCBs by the edges only and use a grounding wrist strap or similar precaution.

Disconnect power before connecting or disconnecting PCBs or guns.

Please read the service instructions before working on the cabinet.



Always turn the cabinet OFF and disconnect the AC power cord before performing any repair work.

1.1 Gun Service

The subsections that follow describe steps for testing and replacing the gun components.

The gun body contains micro switches for the trigger and the two buttons, and a coil and plunger assembly that creates the force-feedback recoil effect when the gun is fired. To service these parts, you need to open the gun case. See Figure 3 for a view of the open gun assembly.

The base of the gun contains pots that relay the gun position to the computer. If the gun position is not being read properly, refer to the gun pot service steps on page 8. You **do not** need to open the gun case to test or replace the pots.

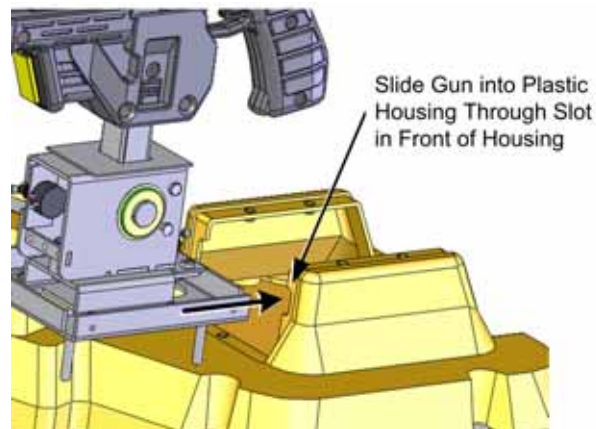
1.1.1 Gun Power Harness Fuses

The gun power harness has two fuses, one for each gun. If a gun has no power, check the fuse and replace if necessary. Replace only with MDL 2.5A Slo Blo fuses.

1.1.2 Gun Replacement

Do the following to remove and replace a gun:

1. Turn off the cabinet and disconnect the AC power cord.
2. Remove gun base and control base covers.
3. Disconnect the gun power harness from the 3-pin Molex connector.
4. Disconnect the gun USB cable from the extension cable.
5. Remove the Kep nut from the ground stud on the gun base plate and disconnect the cabinet earth-ground wire.
6. Remove the four (4) Kep nuts and flat washers from the gun mounting posts below the control panel base.
7. Lift the gun and slide it out of the slot in the plastic housing, toward the monitor.
8. Reverse these steps to install a gun. Secure the cabinet earth-ground wire with the gun ground wire to the ground lug on the gun base plate with the #8-32 Kep nut.



1.1.3 Opening the Gun Case

Open the gun case to service the trigger, buttons, and coil assembly. You **do not** need to open the case to service the pots that aim the gun (see page 8). See Figure 3 for a view of the open gun assembly

1. To open the gun case, first remove the 12 Torx security screws shown by the single arrows in the picture below, and remove the corresponding nuts from the other side of the gun.
2. Remove the four screws shown by the double arrows in the picture below. These screw into the frame, so there are no nuts to remove.
3. Carefully remove the left side cover from the gun, being careful not to pull the wires from the round red button on the cover. The wires are long enough that you can set the cover on the control panel near the gun without disconnecting the wires.



Figure 1. Gun Case Screws

1.1.4 Closing the Gun Case

1. To close the gun case, first align the slots that fit around the gun PCB (with the LED display), and then carefully put the two halves together. Make sure no wires or components get caught or pinched. Pay special attention to the area around the trigger and spring, the wires coming out of the frame shaft, and the wires attached to the coil and barrel light.
2. Insert the four (4) 3/8" x 10-32 screws shown with the double arrows in Figure 1. Partially tighten all four screws, verify the case is mating properly, and then tighten the screws snugly.
3. Check the trigger to make sure it works properly. The trigger or spring could shift while you are assembling the case.
4. Replace the remaining 8-32 screws and nuts, shown by the single arrows above, and tighten snugly. The screw at the top of the muzzle end is 3/4" long, and the two screws in the handle are 1" long, as shown above. All of the other screws are 1 1/4" long.

1.1.5 Gun Trigger Service

To replace the trigger spring, refer to the picture below for the placement of the spring in the gun housing.

Install the plastic trigger so it presses against the spring, and the bottom part of the trigger will press the switch actuator when a player pulls the trigger.

To replace the micro switch, remove the two screws that secure the switch in place. Remove the two wires and install them on the same terminals on the replacement switch.

Be sure to connect the signal wire to the **NO** connector (middle connector) and the black ground wire to the **C** connector.

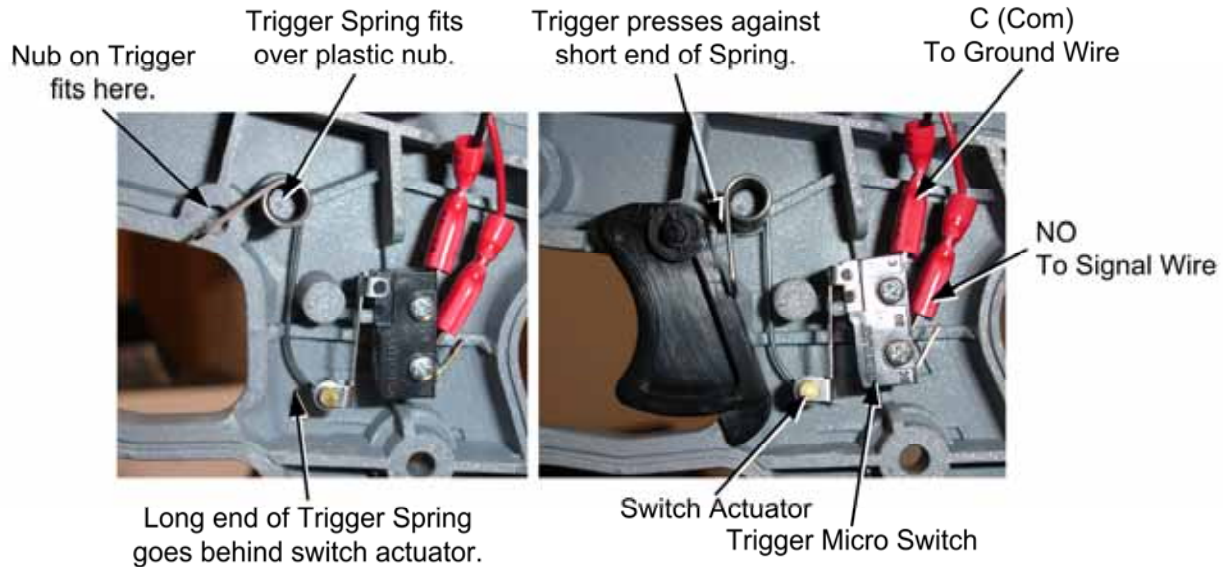


Figure 2. Gun Trigger Assembly

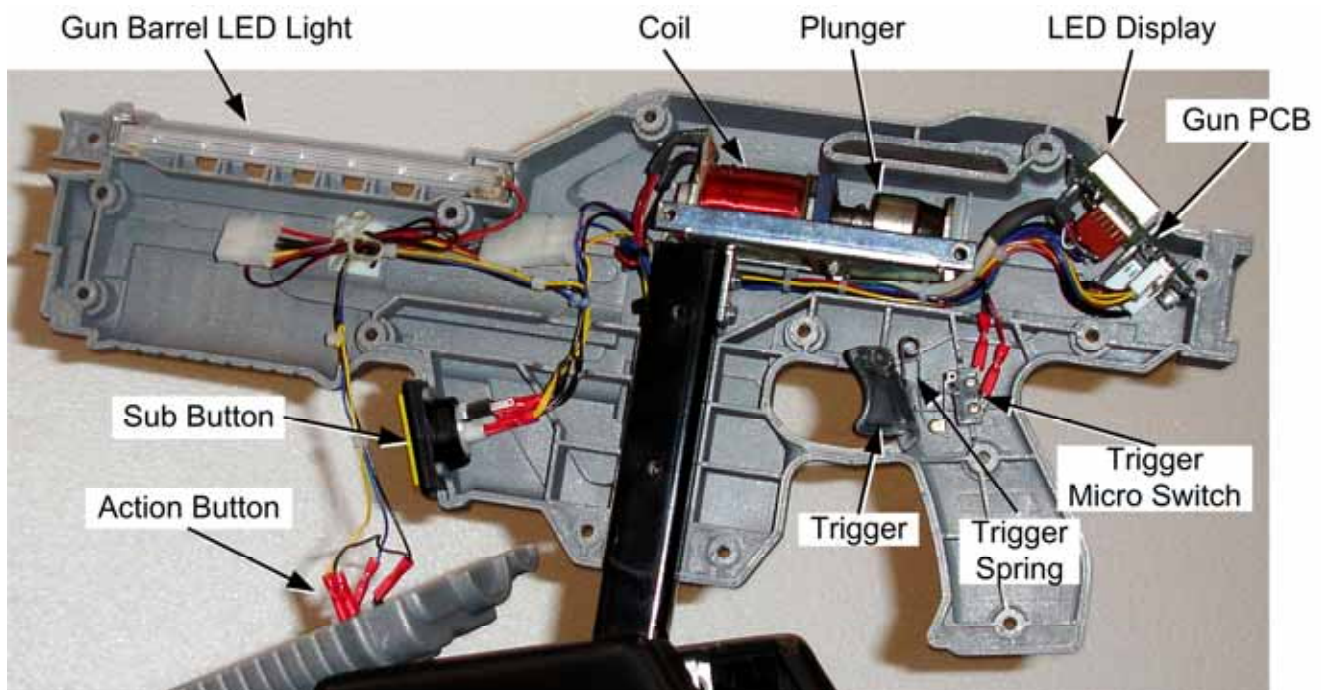


Figure 3. Gun Internal Parts

1.1.6 Gun Button Service

If you replace a button micro switch, be sure to connect the signal wire to the **NO** connector (middle connector) and the black ground wire to the **C** connector. If you connect the wires differently the button will not work.

To replace the light bulb, pull the lamp assembly straight out of the button housing, and then pull the bulb straight out of the lamp housing. The two lamp wires are interchangeable and can connect to either terminal on the lamp housing.

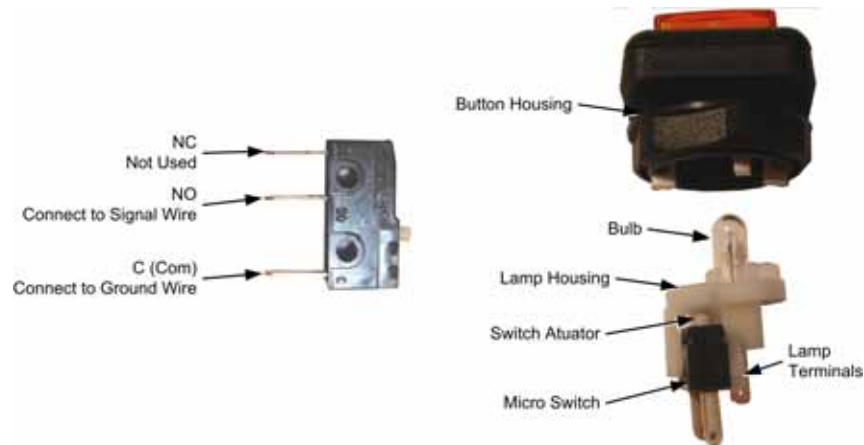


Figure 4. Gun Button, Lamp, and Micro Switch

1.1.7 Gun Coil Assembly Service

The coil assembly provides the force-feedback recoil when the gun is fired. Perform the following steps to replace components of the coil assembly:

1. Open the gun case as described on page 5.
2. Remove the two screws shown below from the right side of the gun.



3. Remove the nut that secures the ground wire to the ground lug on the side of the coil assembly mounting plate, as shown below.
4. Remove the two screws that secure the coil assembly mounting plate to the gun shaft, as shown in Figure 5.
5. Reverse these steps to re-install the coil assembly. Be sure to secure the ground wire to the ground lug on the coil assembly mounting plate.

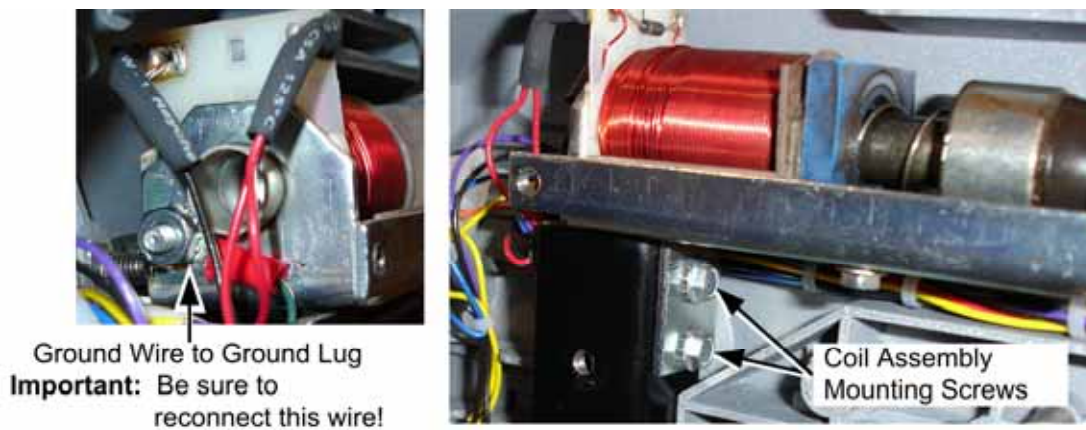


Figure 5. Gun Coil Assembly Service

1.1.8 Gun Pot and Gear Service

Each gun has two pots that measure the movement of the gun on the X-axis (left and right) and Y-axis (up and down). The X-axis pot is located under the gun base below the trigger. The Y-axis pot is located on the side of the gun base.

Use the **Gun Test & Calibrate** screen from **System Tests** in the Operator menu to test gun motion. To test a pot, power off the game and test resistance at the pot. When you move the gun, you should see a steady linear increase or decrease in resistance, with no jumps. Replace the gears if they are worn or cracked.

Refer to Figure 6 for gun base components, and perform the following steps to replace a pot or gear shaft:

1. Remove the six (6) Torx security screws that secure the covers over the gun base, and remove the covers.
2. Remove the two mounting nuts and remove the metal mounting plate from the pot to be replaced.
3. Use an Allen wrench to loosen the set screw from the gear shaft, and remove the gear shaft.
4. Using a 1/2" wrench, remove the nut and lock washer that secure the pot to the frame.
5. De-solder the wires from the pot and solder them on the same terminals on the replacement pot.
6. Install the new 5K Ω pot with the same orientation. Make sure that the plastic keys on the pot mate properly with the metal.
7. Re-install the lock washer and nut, being careful not to over-tighten.
8. Re-install the gear shaft and tighten the set screw.
9. Calibrate the gun using the **Gun Test & Calibrate** screen from **System Tests** in the Operator menu after replacing a pot.

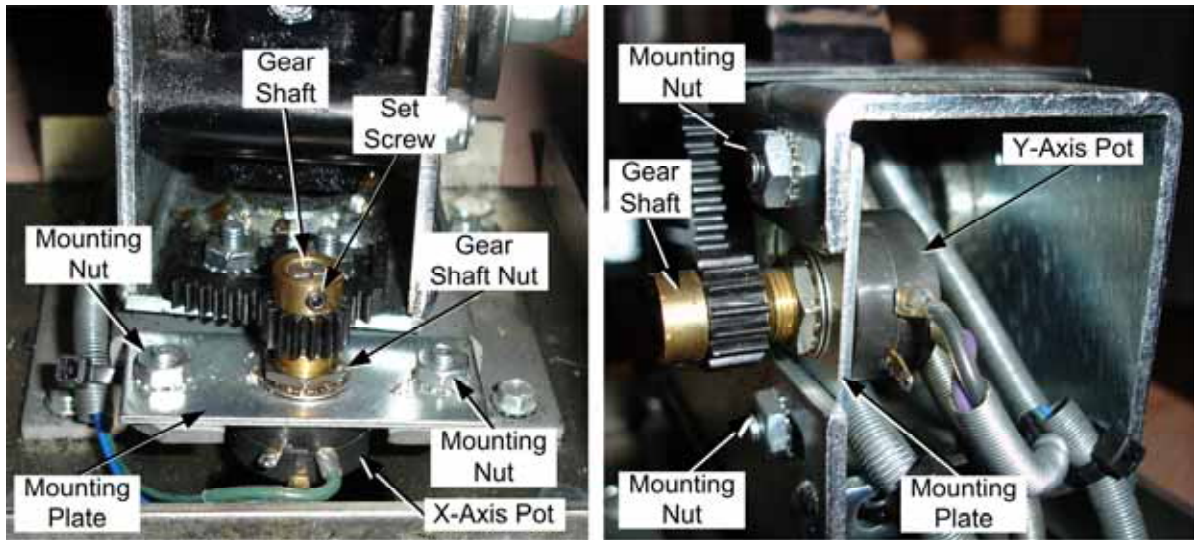


Figure 6. Gun Pot Replacement

1.1.9 The Gun PCB

The Gun PCB routes all signals within the gun, and between the gun and the system computer. It also has an LED display that shows remaining ammo during game play. Each connector on the Gun PCB is keyed to fit only to the correct harness connector. Refer to the picture below to locate the connectors on the PCB (layout varies depending on PCB version). See Figure 8 on page 10 for detailed gun wiring information.

To replace the PCB, open the gun case as described on page 5. Slide the PCB out of the case and disconnect all connectors. Replace PCB version 1.x with version 1.8; replace PCB version 5.01 only with version 5.01 or later.

Caution: Disconnect the cabinet from AC power before making any connections to the Gun PCB. Hot-plugging any connector will damage the PCB.

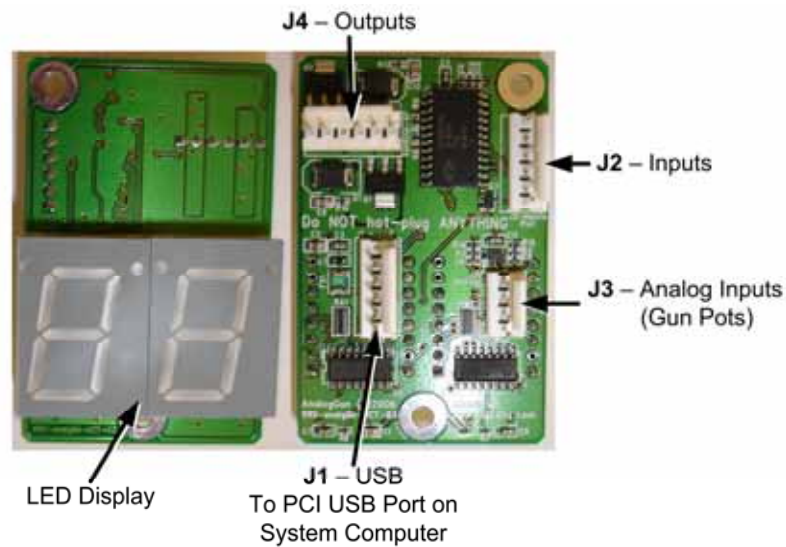
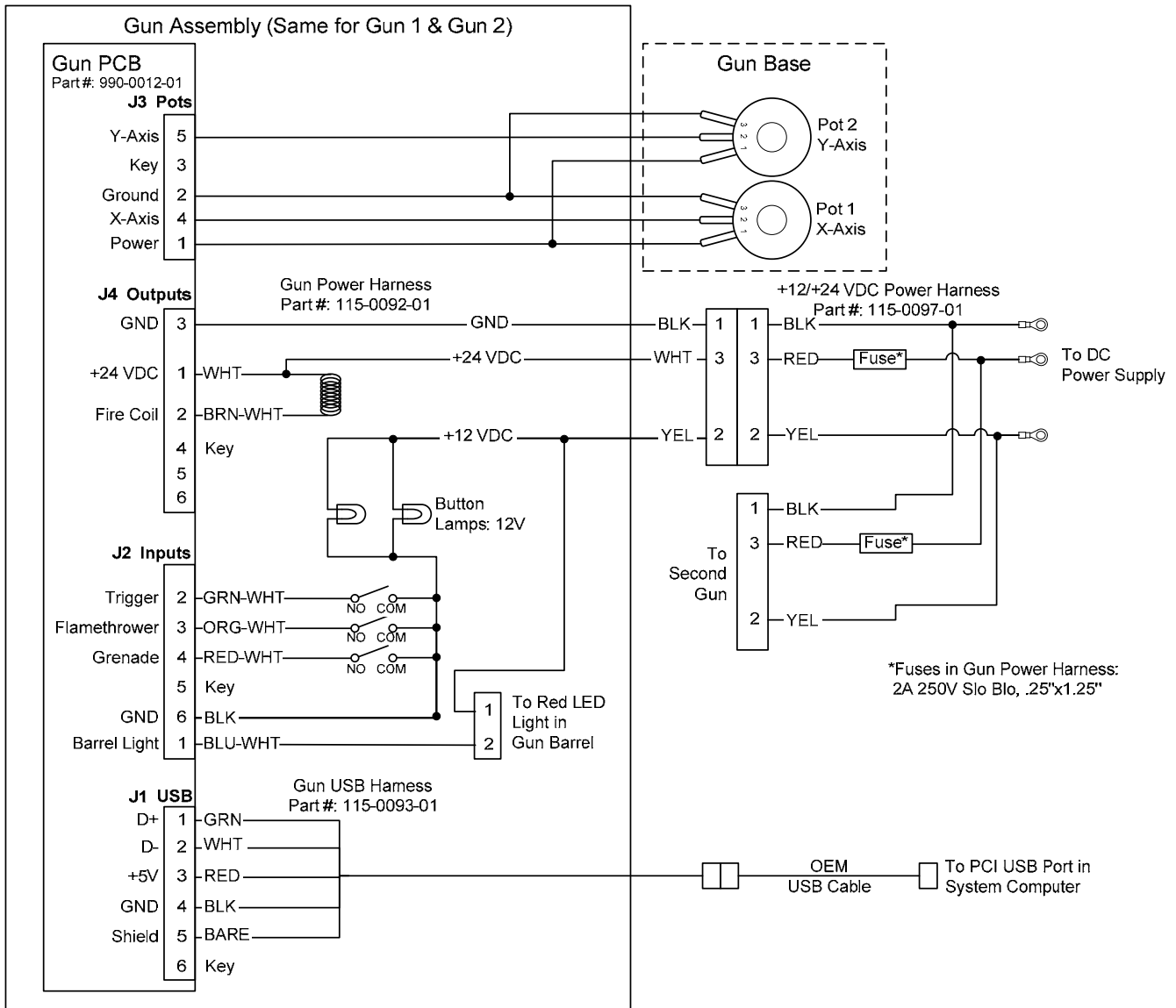


Figure 7. Gun PCB



NOTE: Wire colors may vary due to harness revisions.

Caution: Disconnect power before changing any USB connections or you will damage the PCBs.

Figure 8. Gun Wiring Diagram

1.2 The GVRI/O Mini PCB

The GVRI/O Mini PCB relays the signals between the system computer and the controls. Each connector on the PCB is keyed to fit only to the correct harness connector.

The PCB must be programmed with the correct firmware. The firmware version is displayed in the Operator Menu under System Information.

The Swarm, Frightfearland, Paradise Lost, and Aliens[®] Extermination use the same firmware, so PCBs can be swapped between these three games. PCBs used in other games are not compatible. (For PCB versions 00 and 01, place a jumper across pins **4 & 5** of **J5** – Mode Select. For versions 02 and 04 place a jumper at position **2**.)

Check the Hardware Reference page on <http://service.globalvr.com> for detailed information on the various PCB versions.

See the figure below to identify the PCB connectors, and Figure 10 on page 12 for detailed wiring information. The PCB must have a jumper installed at position **2** of **J5** – Mode Select to put the PCB in Keyboard Mode.

Caution: Disconnect the cabinet from AC power before making any connections to the PCB.

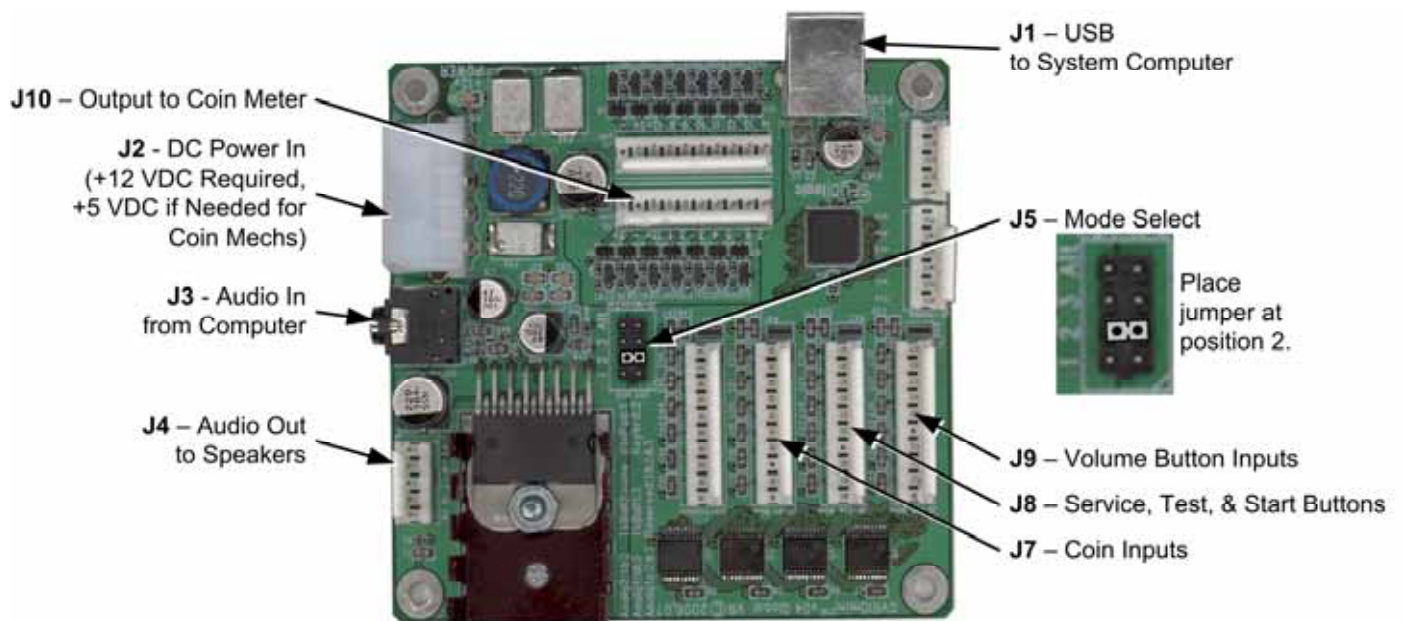


Figure 9. GVRI/O Mini PCB, Version 04

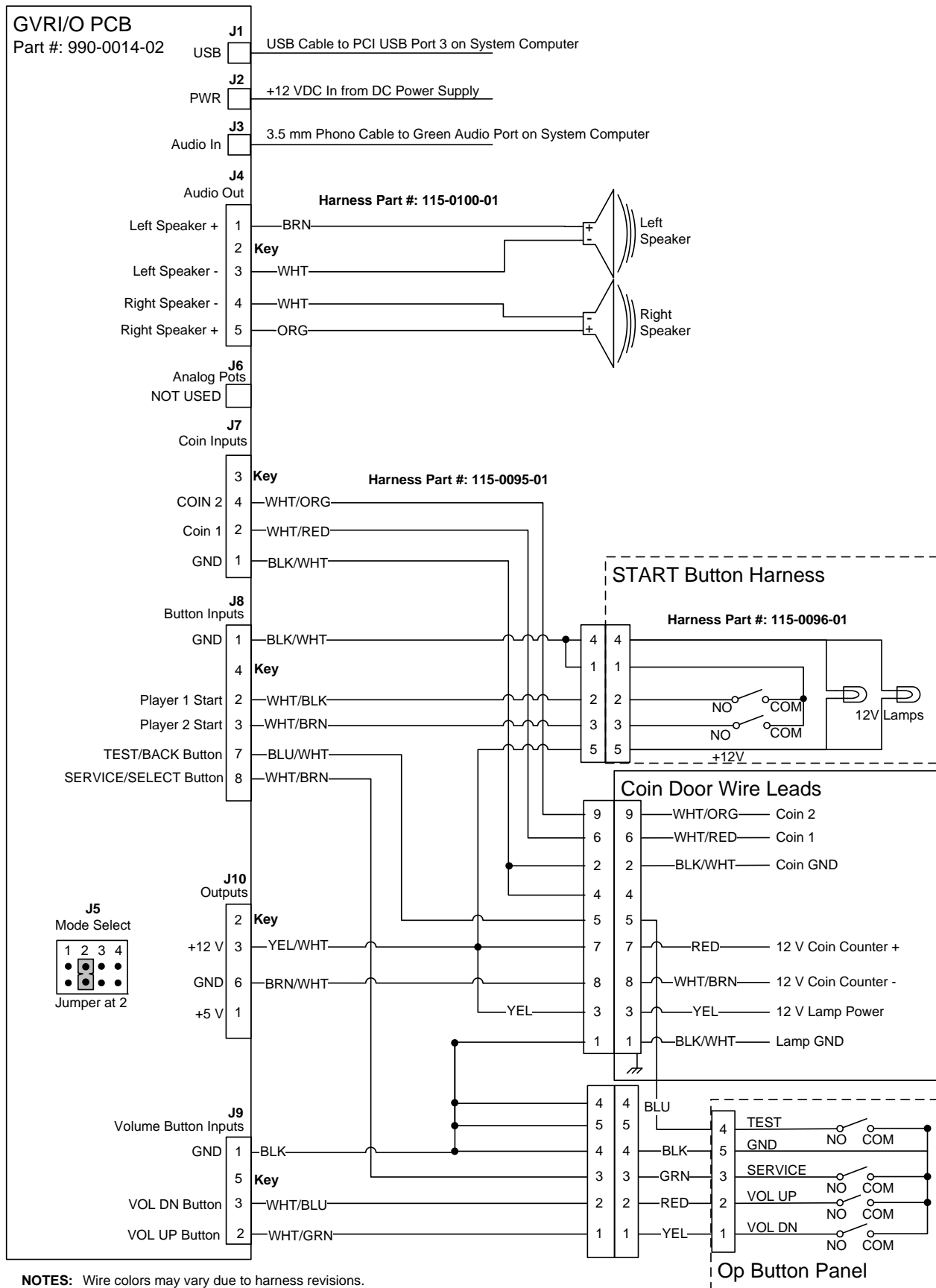


Figure 10. GVRI/O Mini PCB Wiring Diagram

1.3 Start Button Service

The Start buttons for each player are illuminated with 12-volt lamps. Refer to Figure 11 and perform the following steps to replace the buttons, lamps, and micro switches:

1. Disconnect the cabinet from AC power.
2. Open the coin door and reach up under the control panel to access the buttons.
3. To remove a micro switch, gently rock it to the side and remove it from the housing. Remove the wires and install them on the same connectors on the new micro switch.
4. To remove the lamp housing, gently rock the white plastic housing from side to side to pop it out of the button housing.
5. To remove the button from the control panel, unscrew the retaining ring from under the control panel.
6. To remove a lamp from the housing for replacement, pull it straight out of the lamp housing.
7. When connecting the wiring to the micro switch and lamp, refer to the labels on the wires and the figure below to make sure the connections are correct.



DO NOT connect the 12-volt lamp power wire to the micro switch. Doing so could damage the GVRI/O Mini PCB.

8. Reverse these steps to install the replacement button and micro switch. Connect the ground wire to the COM connector on the bottom of the switch housing, and the signal wire to the NO connector, as shown in the figure below. **Do not** use the NC connector.

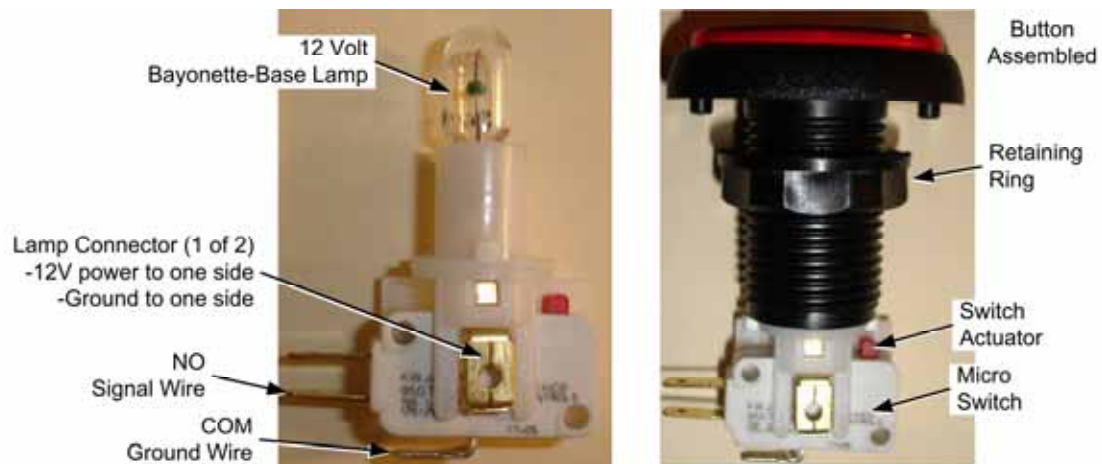


Figure 11. Start Button Assembly

1.4 Computer Replacement



The computer is serviced as one unit. YOU WILL VOID YOUR WARRANTY if you open the computer without direct authorization from the GLOBAL VR technical support staff.

Shipping the computer without enough padding can VOID THE WARRANTY if the computer is visibly damaged from shipping.

Perform the following steps to remove the computer from the cabinet:

1. Disconnect all of the cables from the computer.

2. Remove the Game Dongle and keep it with your cabinet. **Do not** ship the game dongle with the computer.
3. Note the position of the computer for re-installation. Open the buckle on the strap that secures the computer in place and carefully remove the computer from the cabinet.
4. Reverse these steps to replace the computer. Make sure that the computer air vents are clear. There is an air vent under the bottom front panel of the computer that is easily blocked by padding or debris.

When shipping the computer, always use plenty of padding and protection. GLOBAL VR recommends shipping the computer in a box with three inches of foam padding on all sides.

1.5 +12/+24 VDC Power Supply Replacement

This power supply provides +24-volt power to the gun coils, and may be used to provide +12-volt power to the GVRI/O Mini PCB and/or other components. Perform the following steps to replace the power supply:

1. Turn the cabinet OFF and disconnect the AC power cord.
2. Make sure that all wires connected to the DC power supply are properly labeled for easy re-assembly, and then disconnect the wires from the terminals on the DC power supply.
3. Remove the screws that secure the power supply to the cabinet.
4. Reverse these steps to install the new power supply. Adjust the +5V output to 5.4V **before** connecting the power supply to the cabinet harnesses (use 5.2V if the power supply is connected). If the voltage is too high it will damage electronic components. If it is too low, the game will not work properly.
5. Be sure to connect the wires to the correct terminals. Refer to the diagram below.

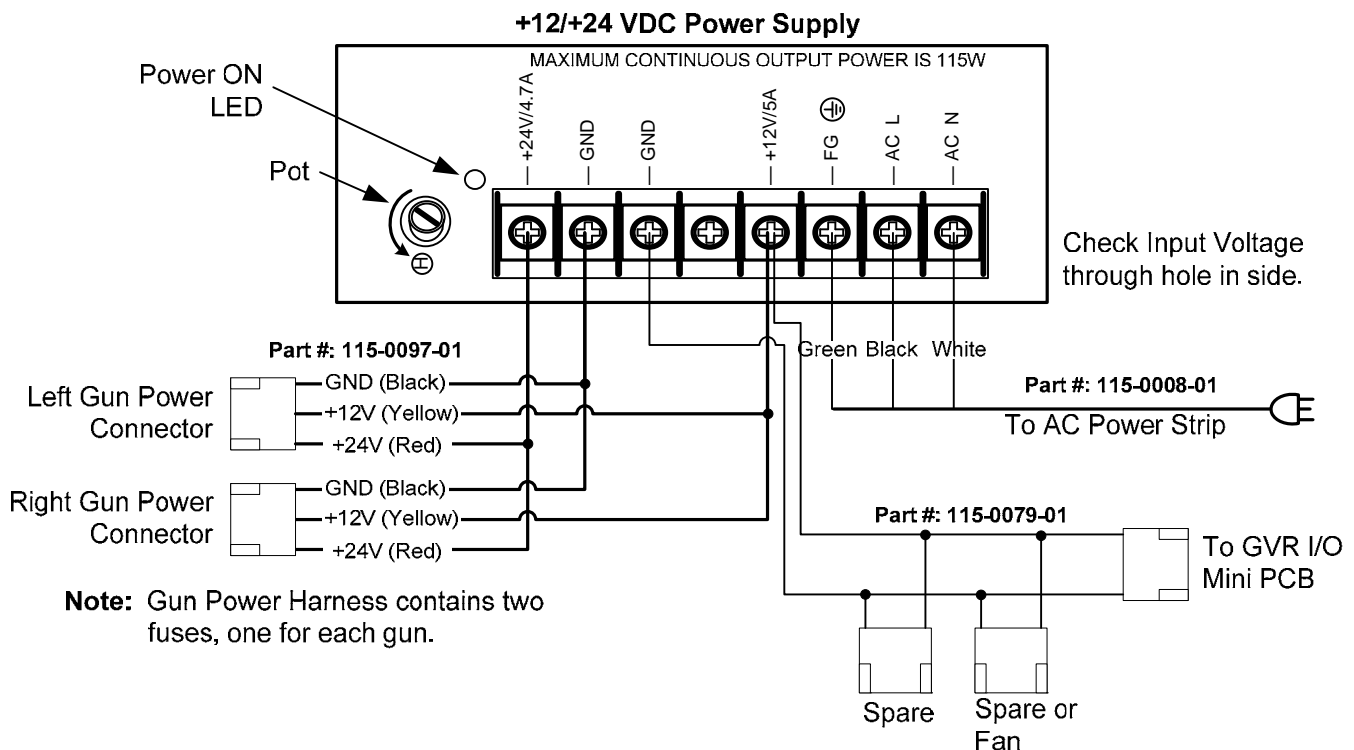


Figure 12. +12/+24 VDC Power Supply Connections

Section 2 — Replacement Parts

If you need replacement parts, please reference these part numbers when contacting GLOBAL VR technical support or your distributor.

Documents and Software

Part Number	Qty	Item Description
040-0259-01	1	Universal Conversion Kit Instructions (This Document)
040-0258-01	1	Operation Instructions for Kit Systems
040-0260-01	1	Service Instructions for Universal Kit Systems
040-0251-01	1	Leveling a Sloped Control Panel for Conversion Kit Systems
040-0238-01	1	Software Restore Guide
050-0219-01	1	Software, Game Install Disk
050-0220-01	1	Software, System Recovery Disk

*Part numbers may change due to software revisions.

Cables

Part Number	Qty	Item Description
115-0008-01	1	Cable, AC Power Strip to DC Power Supply
115-0100-01	1	Audio Harness, GVRI/O Mini PCB to Speakers
115-0079-01	1	DC Power to GVRI/O Mini PCB
115-0095-01	1	Main Wiring Harness
115-0096-01	1	Start Button Harness
115-0097-01	1	24 VDC Gun Power Harness W/ Fuse
115-0099-01	1	Earth Ground Cable
96-0539-00	1	Stereo Cable, 3.5mm, 6'
USB-AB06MM	1	USB Cable, 6'
USB-EXT-6	2	USB Extension Cable, 6', USB 2.0, A Plug/A Jack

Cabinet Functional Components

Part Number	Qty	Item Description
990-0014-02	1	GVRI/O Mini PCB, v04 (Must be programmed with the Swarm/Aliens/Paradise Lost/Frightfearland firmware.)
44-0600	1	Power Supply, +12/+24 VDC
23-1913-00	1	Power Strip, Surge Protector, 15 Amps, 1500 Joules
59-6582-8222232	1	Start Button, Blue
59-6584-8222233	1	Start Button, Green
115-0025-01		Fan Assembly, AC
45086-00	1	System Computer Assembly
BK/MDL-2-1/2	2	Fuse, 250 V, 2.5 Amp, Gun Power Harness
USB-KQRTG-HL-SWM	1	USB Game Dongle (Exchange Only)

Gun Exploded-View Parts

Ref #	Qty	Part Number	Item Description
1	1	96-4901-00	BOTTOM PLATE F/WMS ANALOG GUN
2	1	96-4937-00	BRACKET F/SWIVEL BASE ASSY.
3	1	96-4934-00	BRACKET PIVOT BOX & SHAFT ASSY.
4	1	96-4902-00	BRACKET HANDLE WELDED
5	1	96-4915-00	BRKT COIL MTG
6	1	96-4923-00	SHAFT 5/8 DIA.
7	1	96-4908-00	DISC PLASTIC WASHER
8	1	96-4907-00	GEAR SEGMENT W/HUB
9	1	96-4960-00	SPACER SEGMENT GEAR
10	1	43-0232-00	NUT, HEX NYLOCK 1/2-20
11	1	43-0055-00	WASHER, FLAT 1/2 SAE
12	7	42-0082-00	NUT, KEPS 8-32
13	8	43-0252-00	SCREW, #8-32 x 3/8 HEX HEAD
14	1	43-0003-00	3/8 SAE FLAT WASHER ZNC PLTD
15	1	43-0092-00	NUT 3/8-16 NYLOCK
16	1	43-0280-00	HEX HEAD CAP SCREW 10-32 X 1-1/4
17	2	43-0037-00	LOCKWASHER, EXT #10
18	3	43-0253-00	NUT HEX 10-32 JAM NYLOCK ZINC PLATED
19	1	96-4900-00	COIL RETAINING BRACKET
20	1	96-4938-00	INSULATOR
21	1	96-4904-00	BRACKET POT MTG HORIZONTAL
22	1	96-4913-00	BRKT POT MTG VERTICAL
23	1	96-4936-00	PLUNGER F/SOLENOID
24	1	96-4931-00	SPRING COMPRESSION
25	1	96-4971-00	BUMPER SOLENOID STOP
26	1	96-4921-00	GEAR SEGMENT HUBLESS
27	2	43-6972-00	SPACER F/BUMPER
28	1	43-0188-00	SCREW, #8-32 x 3/8" HEX WASHER HD
29	2	43-0254-00	SCREW 10-32 X 2.25 HEX HD ZINC
30	4	96-4920-00	BEARING .625 BORE
31	2	96-4917-00	GEAR 32DP 16T .25" BORE .5" L.
32	1	96-4970-00	REAR BUMPER PAD
33	1	96-4911-00	BUMPER 3/4 DIA.
34	2	96-4919-00	BUMPER 5/8 DIA. VERTICAL
35	1	96-4935-00	COIL WITH TUBING
36	2	96-4973-00	PAD ADHESIVE FOAM TAPE
37	2	96-4916-00	LONG LIFE POT W/NUT & WSHR 5K
38	1	43-0223-00	E-RING 3/8 DIA SHAFT
39	1	FI-0229-GVR	ALIEN GUN HALF LEFT FI FROM GVR
40	1	FI-0230-GVR	ALIEN GUN HALF RIGHT FI FROM GVR
41	1	95-4142-00	SWITCH ASSY BALL DETECT
42	1	54V-0004-20	IPB SM CIR RED RED CAP 14V73 VLT LAMP ASSY
43	1	96-2515-06	TRIGGER BLACK NEW STYLE
44	1	96-0005-00	SPRING, TRIGGER RETURN
45	1	57-2000-50	VLT BUTTON REC,RED W/6V LAMP
46	11	4008-01100-16	SCREW 8-32 X 1" BH TORX
47	8	43-1130-00	SCREW 10-32 X 3/8" BUTTON HD TORX T-P
48	14	43-0211-00	NUT, 8-32 NYLOK
49	1	43-2318-00	SCREW 8-32 X 5/8 BHMS TORX
50	2	43-2317-00	SCREW 8-32 X 7/8 BHMS TORX
51	2	43-0172 00	SCREW, #2 X 1/2 TYPE B. PPH

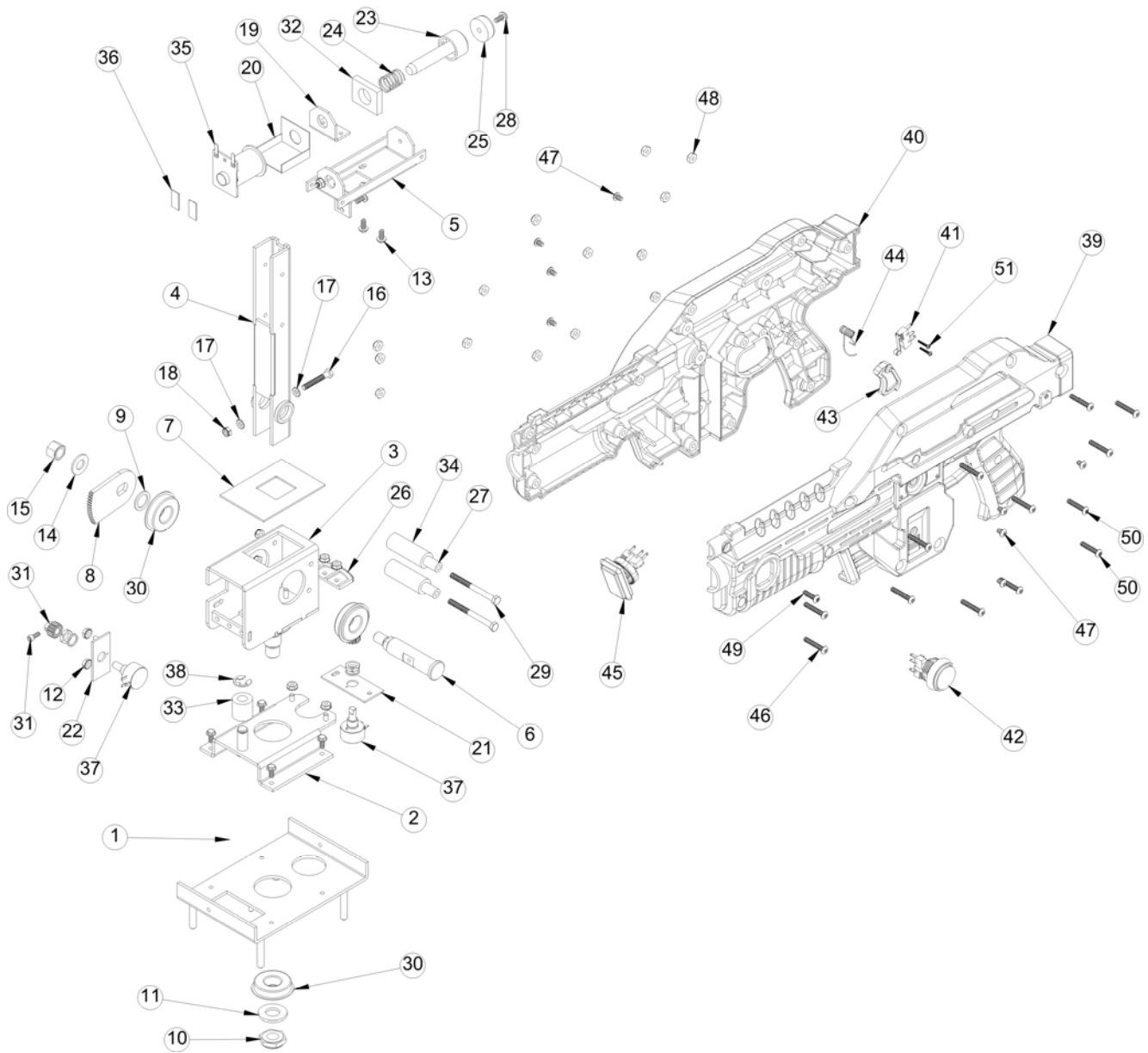


Figure 13. Gun Exploded-View Drawing

Additional Gun Parts

Part Number	Qty per Gun	Item Description
26090-01	1	Gun Housing, Left
26090-02	1	Gun Housing, Right
96-0799-00	1	Gun Assembly
METL6R	1	LED Light Tube, Red
990-0012-02	1	Gun PCB

Technical Support

Service & Parts

Hours: 7:00AM–5:00PM Pacific Time, Monday–Friday

Phone: 408.597.3435

Fax: 408.597.3437

E-mail: techsupport@globalvr.com

Parts E-mail: servicesupport@globalvr.com

Website: <http://service.globalvr.com>

Online Store: <http://parts.globalvr.com>

Free telephone, e-mail, and online support are provided for systems during the warranty period. GLOBAL VR[®] Technical Support can help you troubleshoot problems and diagnose defective parts. We can also answer questions about the operation of your game.

When you contact Technical Support, please provide the information listed below to assist the Technical Support representative in solving your problem quickly. For your convenience, space is provided to write important numbers.

- Cabinet Serial Number (from label on cabinet rear): _____
- Build (from Operator Menu): _____
- I/O Board Version (from Operator Menu): _____
- Your mailing address and telephone number.
- A summary of the question or a detailed description of the problem with your cabinet.

The additional information listed below, as applicable, may assist Technical Support in solving your problem quickly.

- Specific error message
- Date of latest install or upgrade
- Any changes made to the system
- For game-play issues, the game mode and number of players

To comment on this manual, please e-mail: techpubs@globalvr.com