Namco-America, Inc.

KIT
For Conversion of TAITO Operation Thunderbolt™

Operators Manual

FCC Notice

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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STEEL GUNNER™ 2 Operators Manual

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CONTENTS (cont.)

CONVERSION of TAITO OPERATION THUNDERBOLT™
to
STEEL GUNNER™ 2

1. SPECIFICATIONS

POWER SUPPLIES:	UL Listed 120 Volt AC (60Hz)
POWER CONSUMPTION:	Total 110W
MONITOR:	One standard 26" Color Monitor with auto-degauss and remote adjustment board

DIMENSIONS:	Width	Depth	Height
	28 1/2"	40"	72"

ACCESSORIES:

Replacement Wiring Harness 1
NAMCO Gun Interface PCB 1
EMI Box 1
Graphics/ Decals:
    Acrylic Marquee Panel 1
    Play Screen Surround 1
    Cabinet Sides [2 per side]..................................4
    Gun Desk (Top)..1
    Gun Desk (Sides) 2
    Gun Bases...4
Instruction Manual 1

Note: Specifications may change without prior notice. Modification and/or alteration of the STEEL GUNNER™ 2 game with kits or parts not supplied by NAMCO may void the warranty.

GAME CONVERSION OVERVIEW

The STEEL GUNNER™ 2 kit allows conversion of a TAITO Operation Thunderbolt™ game to the latest version of STEEL GUNNER™ 2. Conversion consists of a few simple steps involving easy change out of the Game PC Board and associated harnesses, and modification of the game cabinet graphics with the provided decal set.

This manual describes those steps required to convert existing Operation Thunderbolt™ games, and then describes adjustments, tests, maintenance and troubleshooting associated with your "new" STEEL GUNNER™ 2 game. Before beginning the conversion, you should familarize yourself with Illustrations 4–1 and 4–2 in Section 4, Installation, as well as the Wiring Diagrams on pages 24, 25, 26 and 27.

2. PRECAUTIONS

2–1　Installation precautions

This game is designed for indoor use only. It should not be installed outdoors or under the following conditions:

a. In areas directly exposed to sunlight, high humidity, direct water contact, dust, high heat or extreme cold.

b. In locations that would present an obstacle in case of emergency, i.e. near fire equipment or emergency exits.

c. On an unstable surface or subject to floor or other vibration.

2–2　Handling precautions

a. Do not subject game to physical shock when transporting or moving it.

b. The cabinet should be grounded with a securely connected ground line.

c. The monitor includes areas of high-voltage. Care should be taken at all times to avoid electrical shock whenever inspecting or adjusting the game.

d. When unplugging the game from an electrical outlet, always grasp the plug, not the cord.

e. Power should always be turned off before replacing any parts.

f. DO NOT attempt to repair the Printed Circuit Board (PCB) on site. It contains sensitive integrated circuit chips that could easily be damaged by even the small internal voltage of a multi-meter. Always return the PCB to your distributor for any repairs.

g. Always return the level adjustors to the extreme "up" position before moving the game.

h. Adjustment is required whenever the game PC board, ROM, gun assembly or volume control is changed. (Ref. 5–7, Adjusting Replacement Parts – Gun Adjustment)

i. Exercise caution to prevent breaking or scratching the glass mirror that is located within the cabinet.

3. INSPECTION

The STEEL GUNNER™ 2 Kit carton should be carefully inspected upon receipt to insure that the kit is complete and was delivered in good condition. A complete kit should contain the following:

1. NAMCO Game PC Board.
2. NAMCO Game Wiring Harness
3. NAMCO Gun Interface PCB
4. EMI Box

5. New Cabinet and Gun Assembly graphics:
   a. Marquee Acrylic Panel (1).   d. Gun Desk Shelf Decal (1).
   b. Play Screen Overlay (1).   e. Gun Desk Cabinet Decals (2).
   c. Cabinet Side Decals (4) [2 per side]. f. Gun Base Decals (4).

4. INSTALLATION

A converted Operation Thunderbolt™ cabinet appears below. Note placement of NEW decals and other graphics. Also locate the Electronics Drawer in the lower front where some existing items will be replaced by STEEL GUNNER™ 2 electronic kit parts.

NEW
MARQUEE
ACRYLIC PANEL (1)

NEW
PLAY SCREEN
OVERLAY (1)

START BUTTONS

COIN DOOR ASSY.
(Service Panel Inside)

ELECTRONICS DRAWER
(Game PCB, Power,
Harness etc. Inside)

NEW
UPPER
CABINET SIDE
DECALS (2)
[one per side]

NEW
GUN BASE
DECALS (4)

NEW
GUN DECK
DECAL (1)

NEW
GUN DECK CABINET
DECALS (2)

NEW
LOWER
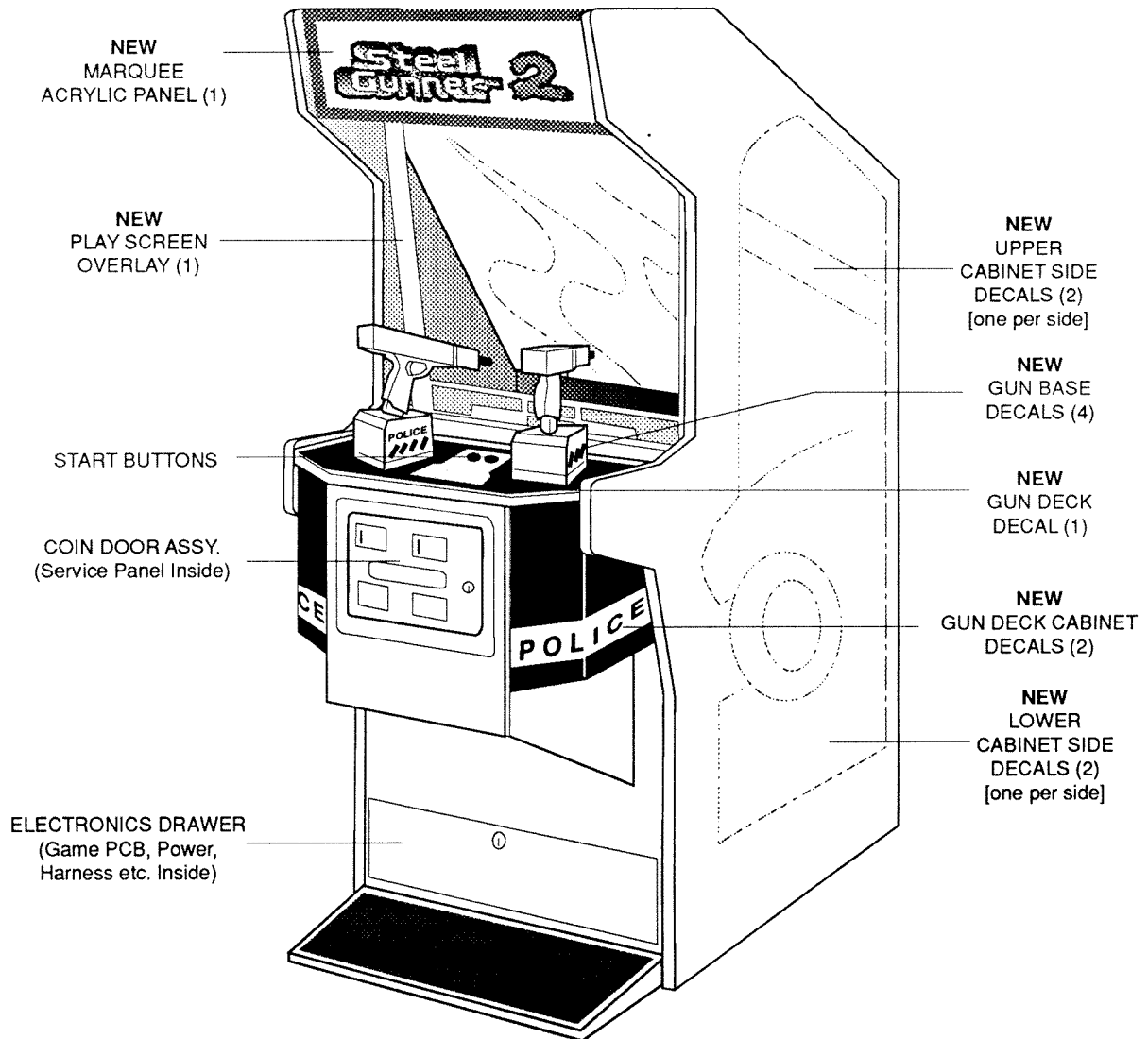CABINET SIDE
DECALS (2)
[one per side]

Illustration 4-1, 3/4 FRONT VIEW

4–1 Electronics

4–1–1 NAMCO PC Board

Open the Electronics Drawer in the lower front by unlocking and pulling out far enough to revel all internal components, but be carefull not to tear the existing wiring loose. The components and wiring in the drawer AFTER the conversion are shown below.

POWER SUPPLY
(Switching Regulator)

TERMINAL BLOCK

10 AMP
LINE FILTER

PLACE PCB IN EMI BOX
DURING INSTALLATION

namco
Game PC Board

GAME HARNESS
EDGE CONNECTOR

TRANSFORMER

AUXILARY
POWER SUPPLY
(24 Volts)

FUSE PANEL
(with fuses and
service outlet)
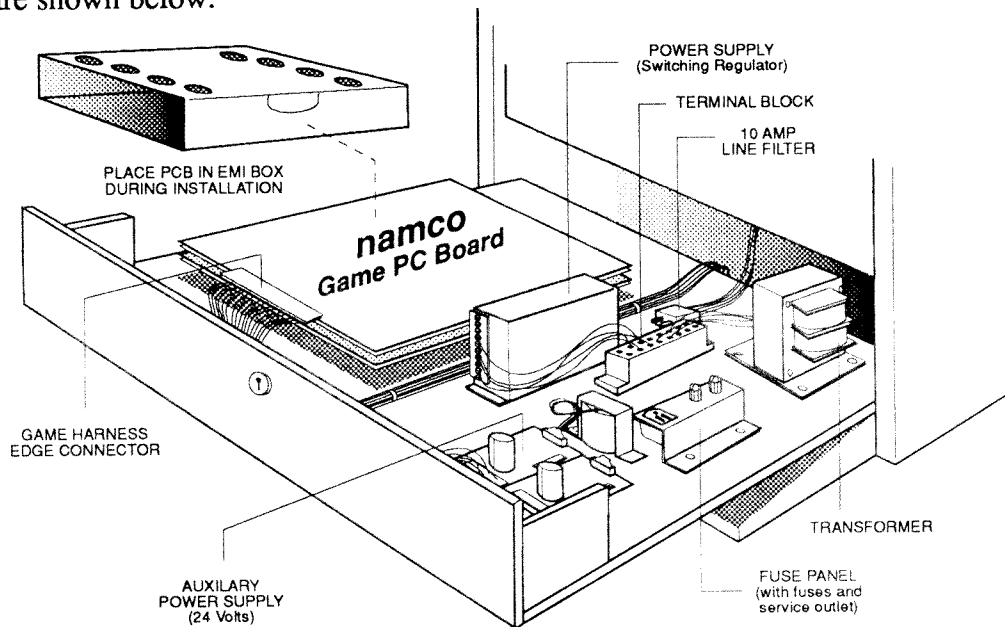
Illustration 4-2, ELECTRONICS DRAWER

Follow these steps to remove the TAITO PC Board and install the NAMCO PCB.

a. Carefully disconnect the edge connector from the TAITO PC Board.

b. Slide the PCB out of the channels of the side support rails.

c. As the new NAMCO PC is double sided, it will not fit in the grooves of the existing rails. Therefore, remove the two rails and discard.

d. Place the NAMCO PCB within the supplied EMI Box, and secure it in the same location as the removed PCB, using locally provided standoffs (not included with the kit).

4–1–2 NAMCO Wiring Harness

a. Next, the edge connector Wiring Harness originally attached to the TAITO PCB should be carefully removed by unpluging the remaining three connections – P2, P3 and P4 and all power supply connections including the 24 volt auxiliary supply. This harness can be discarded.

b. Lay the NAMCO supplied Wiring Harness in the location of the just removed harness, and by referring to the STEEL GUNNER™ 2 Wiring Diagram on pages 26–27, carefully make the following six connections:

1. The edge connector to the NAMCO PC Board.
2. P2 (15 pin)
3. P3 (12 pin)
4. P4 (6 pin)
5. DC power supply connections
   Attach the following leads to the DC power supply:
   a. +5 VDC – attach the **RED** lead.
   b. Ground – attach the **BLACK** lead.
   c. +12 – attach the **YELLOW** lead.
   d. FG (Frame Ground) – attach the **GREEN** lead.
6. Wafer connection to 24 volt auxiliary power supply

4–2   Graphics
  4–2–1 Acrylic Marquee Panel
   a. Remove the existing Operation Thunderbolt acrylic Marquee Panel by removing the retaining strips.
   b. Insert the NAMCO STEEL GUNNER™ 2 panel in its place.

NOTE: **The following ten (10) pressure sensitive decals have a protective covering on their backs that must be peeled away before applying. Care should be taken regarding their positioning as they stick very tight, and once placed they are almost impossible to remove.**

  4–2–2 Play Screen Surround (1)
   a. Remove the game Play Screen by removing the clear plastic screen panel held in place by the two retaining strips.
   b. Peel the existing graphic overlay off and discard, and place the new Game Screen Overlay from the kit in its place.

  4–2–3 Cabinet Sides (4) [2 per side]
   a. The new NAMCO STEEL GUNNER ™ 2 decals should be positioned on the cabinet sides as shown in Illustration 4–1.
   b. The decals for the cabinet sides are provided as a set of two for each side – an upper and lower. They should be trimmed to fit after they are applied.

  4–2–4 Gun Shelf, Top (1)
   a. The new NAMCO Gun Deck graphic is die cut to slip down over the two gun assembly bases and the start switches eliminating the need to remove them for placing the new decal.
   b. Peel the protective backing from the new decal and carefully place it in position on the deck as shown in Illustration 4–1.

  4–2–5 Gun Shelf Cabinet, Sides (2)
   a. The new NAMCO Gun Deck side graphic are sized to completely cover any existing graphics, therefore, they can be left in place.
   b. Peel the protective backing from the two new decals and carefully position one on each side of the deck cabinet as shown in Illustration 4–1.

  4–2–6 Gun Assembly Bases (4)
   a. The STEEL GUNNER™ 2 kit contains four (4) decals for mounting to each side of the two gun assembly bases.
   b. Peel the protective backing from the new decals and carefully place them in position on the sides of the bases as shown in Illustration 4–1.

5. ADJUSTMENTS

5-1   Power on

When installation is complete, connect the power cord to an AC outlet and turn the power on.

5-2   Test Switch (toggle)

The Test Switch is on the Wiring Harness located in the Electronics Drawer. It has sufficient lead to allow mounting inside the Coin Door, if desired. Toggle this switch on to put the game into the test mode. The test mode is used, among other things, to change the fee charged for a game, test various game functions, and calibrate the guns. (See Section 5-7).

5-3   Adjustment switches

Open the coin door to gain access to the service panel behind and to the left.
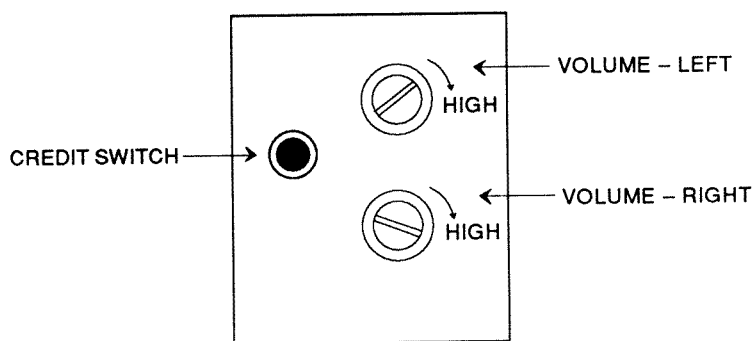
Illustration 5-1, SERVICE PANEL

5-3-1 Credit switch: This switch is used to increase the number of credits without activating the counter.

5-3-2 Volume control: Rotate left/right volume to adjust speaker sound level.

5-4   Self test

Self testing is conducted automatically in the first few seconds after the power is turned on. If no errors are found, the game screen will be displayed.

If an error is detected, a screen like that shown below will be displayed. This display indicates an error has been detected, NOT a malfunction.

```
33   TIP   *********

EXIT = 1P BUTTON
```
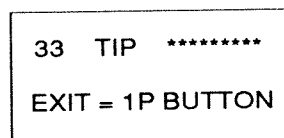
(The area designated by the asterisks [*********] differs depending on the specific error.)

* Press the red button to return to the game screen.

* If the error display does not disappear, or if the above display appears when turning on the power, contact your distributor.

* NOTE: The above display may also appear after replacing the ROM.

5–5   Test mode

The test mode function is activated by using the test switch on the Wiring Harness located in the Electronics Drawer. There are eight separate test mode screens which can be used to change game fees and test various functions of the game.

The eight test mode screens are:

1. Game Option Screen   5. Color Bar Test Screen
2. Switch Test Screen   6. ADS 1 Screen (Bookkeeping)
3. Sound Test Screen   7. ADS 2 Screen (Bookkeeping)
4. Cross Hatch Pattern Screen 8. ADS 3 Screen (Bookkeeping)

Each of these screens are discussed individually later in this manual.

Slide open the Electronics Drawer and turn the test switch to the "ON" position. The "Game Option" Screen will be displayed on the monitor. Game fees as well as other items can be changed from the "Game Option" Screen.

Pressing the service switch while in the Game Option Screen will generate a display of each of the other seven test screens in sequential order on the monitor.

Once the testing has been completed, turn the test switch to the "OFF" position. The Game Play Screen will always reappear from whatever test screen is being displayed at the moment.

Note: The test switch should normally be in the "OFF" position.

5–5–1 Game Option Screen

Turn the test switch to the "ON" position to display the Game Option Screen. You can change any of the items which are displayed in red letters on this screen, with the exception of "TYPE B", which is non-selectable.

a) **To select the option** that you wish to change – press the fire button on the front side of the left gun.

b) **To change the content of the selected option** according to the Game Option Settings table – press either start switch .

Once the option change(s) has been completed, return the test switch to the "OFF" position, and the monitor will return to the Game Screen.

```
                    GAME OPTIONS

        COIN1:     2 COINS   ─────┐───────── (a)
                   1 CREDIT  ──────┘
        COIN 2     2 COINS   ─────┐───────── (b)
                   1 CREDIT  ──────┘
        ATTRACT    SOUND ON  ───────────────── (c)
        TYPE       B         ───────────────── (d)
        FLIP       OFF       ───────────────── (e)
        RANK       A         ───────────────── (f)
        COIN MODE  B         ───────────────── (g)
```

Illustration 5–2, GAME OPTION SCREEN

TABLE OF GAME OPTION SETTINGS (◁ standard setting)

| ITEM		CONTENT
(a) Game Fees (coin 1)	Coin	1–9 (original setting is 2 ◁)
	Credit	1–9 (original setting is 1 ◁)
(b) Game Fees (coin 2)	Coin	1–9 (original setting is 2 ◁)
	Credit	1–9 (original setting is 1 ◁)
(c) Attract Sound		SOUND ON SOUND OFF
(d) Type		Non-selectable
(e) Screen Flip		To invert image for cocktail table
(f) Difficulty		A (easy) ➤ E (hard) (original setting is A ◁)
(g) Coin Mode (refer to diagrams)		MODE A: Mutual Credit MODE B: Separate Credit (original setting is B ◁)

Illustration 5–3, TABLE OF GAME OPTION SETTINGS
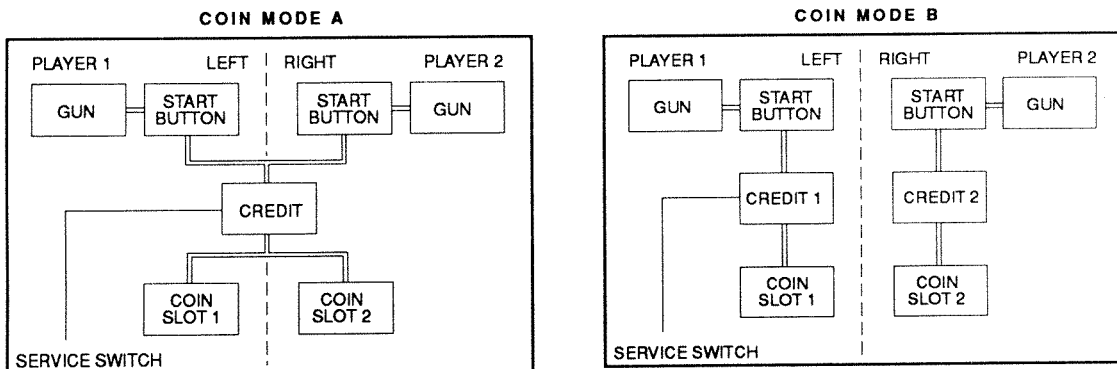
Illustration 5–4, – COIN MODES "A" and "B"

5–5–2 Switch Test Screen

The Switch Test Screen, shown below, provides test points for the various STEEL GUNNER™ 2 game functions.

```
                    SWITCH TEST
     DIPSW   1 2 3 4 5 6 7 8                      ————|————  (a)
     TESTSW                                       ————|————  (b)
     COIN1  COIN1 – COUNT  0000                   ————|————  (c)
     COIN2  COIN2 – COUNT  0000                   ————|————  (d)
    ┌────────────────────────────────────────┐
    │ TIME       0000   H  00  M  00           │
    │ 3D TEST                                  │ ┐
    │            LEFT  RIGHT                    │ │
    │ PADDLE     000                           │ ├  NON-SELECTABLE
    │ A/D CONVERTER                            │ │
    │ CHO 00    CH1  00    CH2  00    CH3  00   │ ┘
    └ CH4 00    CH5  00    CH6  00    CH7  00 ──┘ ————|———— (e)
      PLAYER1  START1    PLAYER2  START2          ————|———— (f)
    ┌────────────────────────────────────────┐
    │ STICK    RIGHT    STICK    RIGHT         │ ┐
    │          LEFT              LEFT          │ │
    │          DOWN              DOWN          │ ├  NON-SELECTABLE
    │          UP                UP            │ ┘
    └──────────────────────────────────────────┘
      BUTTON  1 2 3    BUTTON  1 2 3  ————|———— (g)
```
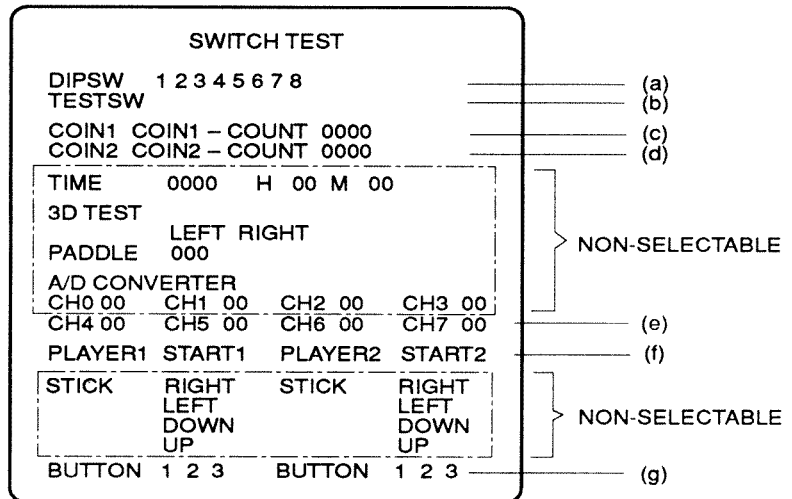
Illustration 5–5, SWITCH TEST SCREEN

(a) The status of the DIP switch on the game PCB board (CPU-PCB) is indicated by this display. Any number opposite DIP SW (switch) that is lighted red indicates that it is turned on.

(b) A lighted red "ON" opposite TEST SW indicates a normal condition.

(c) When the coin 1 switch is closed, a lighted red "ON" appears indicating proper operation. The number shown indicates the number of times the switch has been triggered. The coin counter also advances.

(d) When the coin 2 switch is closed, a lighted red "ON" appears indicating proper operation. The number displayed indicates the number of times the switch has been triggered. The coin counter also advances.

(e) Test the potentiometer on the gun. The values change as shown.

   NOTE: Values **increase** when the gun is moved **down** or to the **right**, and **decrease** when its moved **up** or to the **left**.

   Left (1P) gun:
   Moving left and right...the value of Channel 4 (CH4 00) will change.
   Moving up and down...the value of Channel 6 (CH6 00) will change.

   Right (2P) gun:
   Moving left and right...the value of Channel 5 (CH5 00) will change.
   Moving up and down...the value of Channel 7 (CH7 00) will change.

(f) These characters should turn red when the start button is pressed.

(g) Testing the gun switch: Pull the trigger. Number 1 should light red.

   Press the missile fire button, and number 2 should light red.

   Repeat sequence for each of the two guns.

   NOTE: The number "3" is not used for STEEL GUNNER™ 2.

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5-5-3 Sound Test Screen

The Sound Test Screen (below) allows for selection and playing of specific sounds. This can be useful when replacing speakers or adjusting the stereo volume.
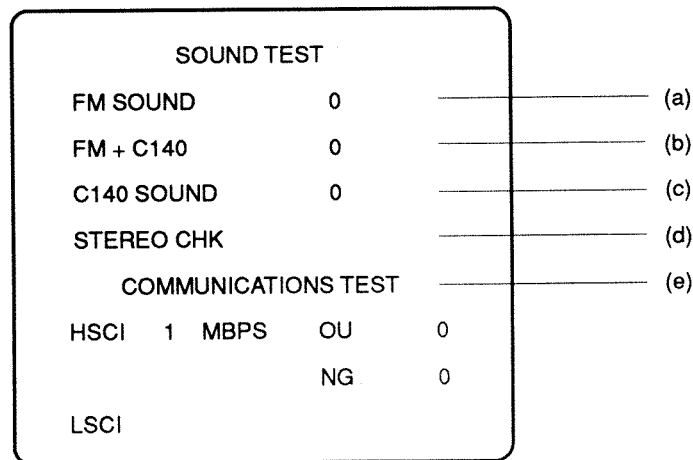
```
                 SOUND TEST

   FM SOUND            0      ──────────── (a)

   FM + C140           0      ──────────  (b)

   C140 SOUND          0      ─────────   (c)

   STEREO CHK                 ──────────  (d)

        COMMUNICATIONS TEST   ─────────   (e)

   HSCI   1   MBPS   OU    0

                      NG    0

   LSCI
```

Illustration 5-6, SOUND TEST SCREEN

Select the option to test by pressing the left missle button until the desired choice appears in red. With all options, press the left start button to increase the number of the sound to be tested (the right start button decreases the number) and the left gun trigger to play the sound (the right missle button stops the sound).

(a) The FM SOUND includes "Filed Music" or digitally recorded sound selections.

(b) The FM + C140 option selects both (a) and (c) combined. This is where most of the actual game play sounds are stored.

(c) The C140 SOUND includes percussion-type sounds only.

(d) When the STEREO CHK option is played, a tone is sent to the right speaker and then the left speaker.

(e) The COMMUNICATIONS TEST simply verifies the proper operation of the sound system, and is not adjustable.

5-5-4 Cross Hatch Pattern Screen • WARNING – HIGH VOLTAGE

This test sends a white grid to the screen to be used for adjusting monitor height, width, and convergence. Adjustment should not be necessary, but can be adjusted on the monitor board by a qualified service technician.

5-5-5 Color Bar Test Screen • WARNING – HIGH VOLTAGE

This test sends a color bar pattern to the screen to be used for adjusting the red, green and blue colors. Adjustment should not be necessary, but can be adjusted on the monitor neck board by a qualified service technician.

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5-5-6 ADS Screen (1-3)

These three Automatic Data System screens provide detailed game information such as length of time the machine has been on, the number of minutes the game has been played, the number of 1 player and 2 player games played, at which level each player died and how many people continued. These screens can be useful in adjusting the game for maximum income.

5-5-9 DIP Switch

The DIP switch on the game PC board (CPU-PCB) is not used for STEEL GUNNER™ 2.

DIP switch number 1 is also a test switch, however, you should normally use the test switch located inside the coin box door.

The other switches are not in use at present, therefore, they should all be in the "OFF" position.

5-6 Monitor Adjustment

The monitor remote adjustment control is located inside the coin door so that one person may adjust the monitor while in the player's position.
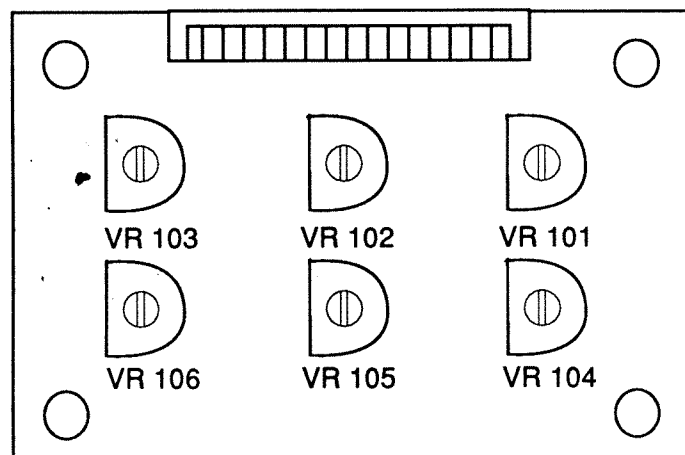
TOP ROW - LEFT TO RIGHT	BOTTOM ROW - LEFT TO RIGHT
VR 103 - VERTICAL POSITION	VR 106 - HORIZONTAL POSITION
VR 102 - BLACK LEVEL	VR 105 - VERTICAL HOLD
VR 101 - CONTRAST	VR 104 - VERTICAL SIZE

Illustration 5-7, MONITOR REMOTE ADJUSTMENT BOARD

5-7 Gun Adjustment

STEEL GUNNER™ 2 will not operate correctly if the game PC board, ROM, gun assembly, and the volume control are not adjusted after being replaced.

Always carry out the steps listed below when replacing parts.

1) Open the electronics drawer and the coin box door.

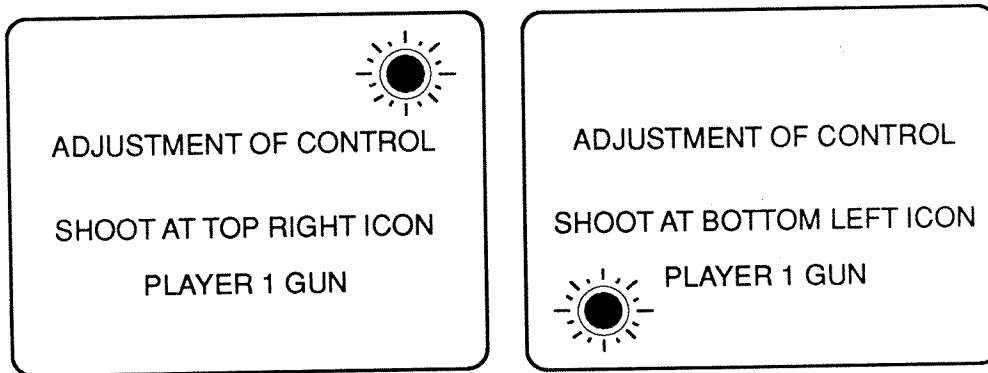2) Toggle the test switch to the "ON" position while holding down the service switch. Screen 1 will appear.

Illustration 5–8, GUN AIMING SCREENS 1 and 2

3) Adjust the gun on the left side (Garcia) as follows.
   a. Aim the gun on the left side (Garcia) up and to the right as far as possible, and pull the trigger. A light will flash red on the upper-right of the screen.

   b. Now, press the service switch. Screen 2 will appear.

   c. Aim the gun on the left side (Garcia) down and to the left as far as possible, and pull the trigger. A light will flash red on the lower-left of the screen.

   d. Now, press the service switch. You have now completed adjusting the gun on the left side, and will be ready for right side gun adjustment.

4) Follow the same sequence to adjust the gun on the right (Cliff) side.

5) Turn the test switch to the "OFF" position to return to game mode.

NOTE: If the gun aim does not line up with the line of shot displayed on the screen during game play, repeat the above procedure.

6. HOW TO PLAY

- STEEL GUNNER™ 2 is a two-player interactive game that displays various enemies on the screen which the player(s) attempts to shoot with the gun.

- After inserting the proper coin(s), a player starts the game by pressing the appropriate start button. A second person can join in at any time.

- Once the game has been started, the pre-game "briefing" will be displayed. Here you are ordered to repel the invading terrorist army of "VANGUARD" from the city. (You can press the grenade button repeatedly to bypass this briefing if you wish.)

- After the briefing, the enemy will begin their attack using machine guns, missiles, hand grenades, etc. Every time you are hit by enemy fire, your status area (lower part of the screen) will flash and your "LIFE" energy will decrease. Your life energy will also decrease if you shoot any innocent bystanders.

- The object of the game is to shoot the enemy using your machine gun and grenades without harming innocent bystanders while sustaining as little damage as possible.

- Holding the trigger down sends out a continuous stream of bullets. There is no limit to the number of bullets that can be fired. Missiles are fired by pressing the button on the left of the gun barrel. The missiles destroy everything on the screen (including civilians), however, the number of missiles is limited. The number of missiles remaining is displayed in the status area of each player.

- The game has six different levels (acts) that must be cleared. Once all six acts have been finished, the city is declared safe from terrorism and the game ends. As each individual act is completed, the results are tallied and displayed. The "LIFE" energy and missiles of each player is then increased according to the results.

- Once a player's "LIFE" energy reaches "O", the game is over.

- Players with the highest daily scores can enter their initials by aiming at the letters and then pulling the trigger to set them in the computer.

7. MAINTENANCE

## BE SURE TO TURN THE POWER OFF BEFORE CONDUCTING ANY MAINTENANCE PROCEDURES.

7–1   Marquee, fluorescent and attract (24V incandesent) lamp replacement
1) Using the wrench provided, loosen and remove the three (3) 10/24 tamper proof screws holding the bottom retaining bracket.
2) Using the wrench provided, remove the four (4) 10/24 tamper proof screws holding the top retaining bracket.
3) Remove Effect Plates after removing the marquee.
4) Replace the fluorescent lamp (20W) and/or the attract lamps (24V, 0.11A).

7–2   Gun assembly replacement
Refer to Illustrations on pages 16 and 18 for details of Gun Assembly.
1) Remove the left and right pedestal covers (cup bolt M4 x 35 – 1 screw; M4 x 50 – 1 screw; button head bolt M4 x 10 – 4 screws).
2) Remove the pedestal from the cabinet (cup bolt M6 x 20 – 4 flat springs).
3) Lift the gun assembly slightly, disconnect the connector, then lift completely out of the cabinet.
4) Reverse these steps to assemble. When attaching the pedestal cover, be careful to put the slide plate on top of the slide table.

7–3   Mirror replacement
1) Open the rear door and remove the three screws from the plywood retaining plate.
2) Slowly lift the mirror up, and then slide out to remove.
CAUTION: Do not touch the front surface of the mirror with your hands. The mirror is glass, and is easily scratched or broken if not carefully handled.

7–4   Game PC board removal
Refer to Illustration of Electronics Drawer on page 4 for location of Game PC Board and Wiring Harness.
1) Unplug the game to cut the power.
2) Open the Electronics Drawer on the lower front of the game cabinet and remove the edge connector to the PC board.
3) Remove the screws holding the standoff spacers.
4) Lift the game PC Board up and out of the EMI box and the drawer.

8. TROUBLESHOOTING – GENERAL

If you suspect the game may be malfunctioning, the following steps should be considered before you make a service request.

(1) The power supply should be between 110-120 Volts AC. However, when some other equipment (air conditioner, multiple pinball games, a big ride-on game, etc.) are connected to the same power supply, the voltage may change beyond this range and cause game trouble or improper operation. To guard against this, each STEEL GUN-NER™ 2 Cabinet should have its own dedicated power source.

(2) When the game does not work with the power turned on, turn the power off once and then back on. This may restart the game. If it still does not work, inspect the fuses.

(3) When the game PCB, the ROMs, the Gun Assembly, or the Potentiometers are replaced, it is necessary to make adjustment for the game to function normally. Make appropriate adjustments referring to 5–7, Adjusting replacment parts – gun assembly.

(4) If the gun aim does not line up with the line of shot displayed on the screen, refer to 5–7, Adjusting replacement parts – gun assembly.

(5) Check all wiring connections as malfunctions can be caused by loose connections.

(6) Foreign substances on the game PCB or on the monitor PCB, or dust may cause malfunctions or improper operation. Check that the PCBs are clean.

(7) When you make electrical checks, use the wiring diagrams for reference.

   * If the above suggestions are not applicable, or no improvement is observed, contact your distributor or the service office printed on the back cover of this manual.

   * DO NOT ATTEMPT TO REPAIR THE GAME PCB YOURSELF. Instead, please return the board to your distributor for any repairs. This PCB contains sensitive chips that could be destroyed even by the internal voltage of a multi-meter.

   * When sending parts to be repaired, make sure to pack them firmly with a complete explanation of the problem. When sending PCBs, package them in anti-static foam or bubble wrap, and pack them in cardboard boxes to protect against impact damage during shipment. To ship monitors, pack them in wooden frames so that CRTs and PCBs are protected against excess load.

9. PARTS LIST
Gun Assembly
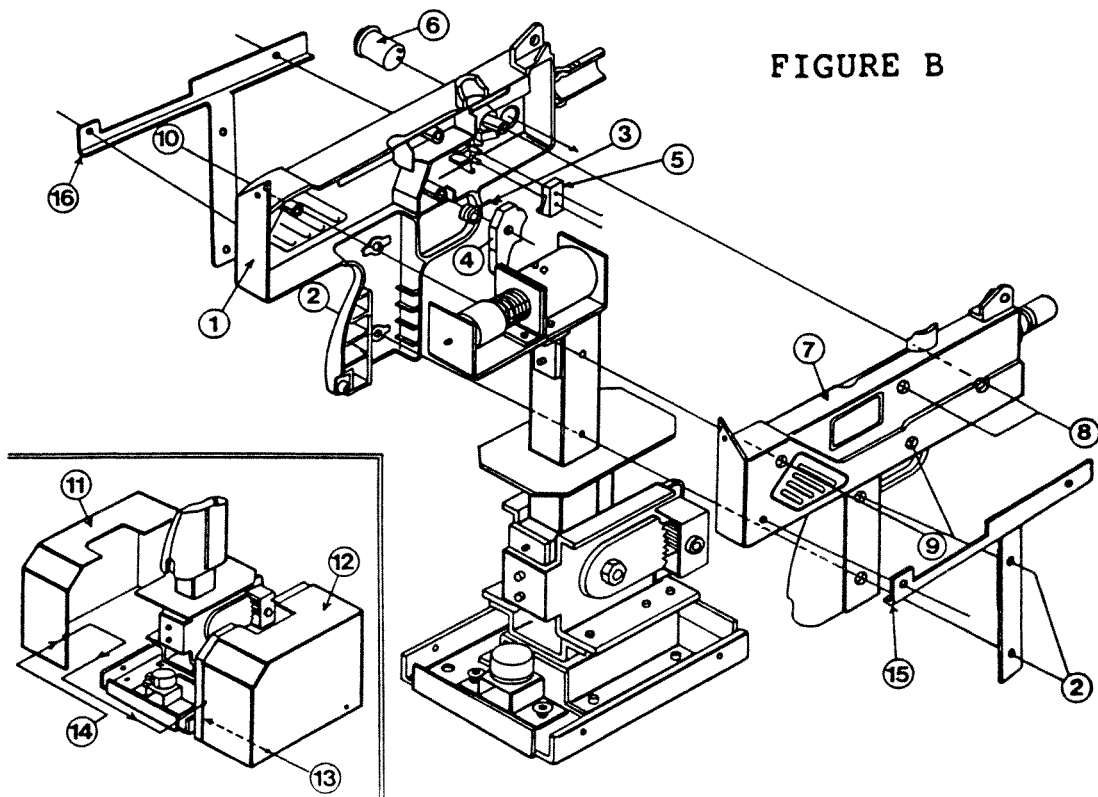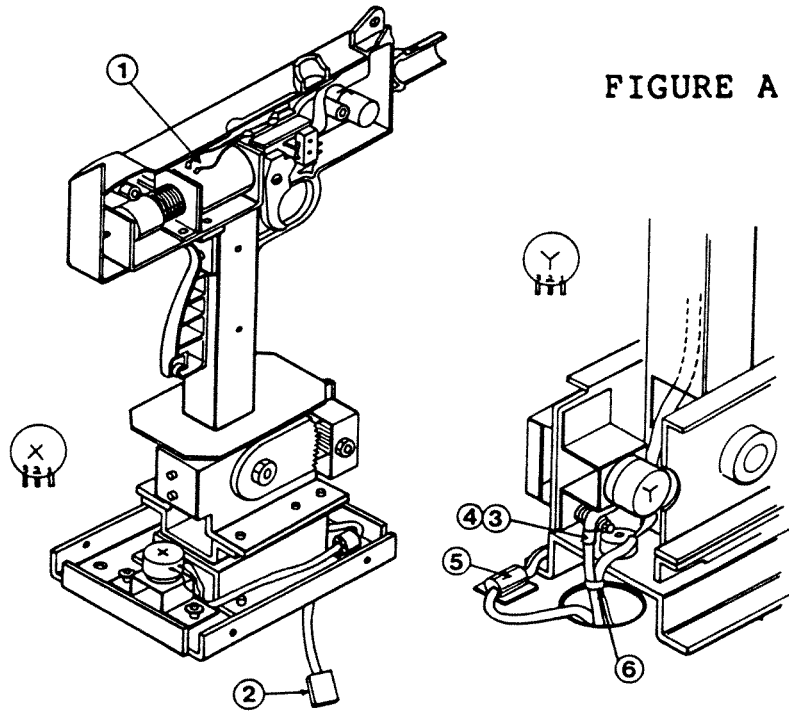
FIGURE A

FIGURE B

9. PARTS LIST
Gun Assembly

FIGURE A – Operation Thunderbolt™ Gun Assembly Parts

ITEM	DESCRIPTION	PART NO.
1	Diode 03C	140-913037
2	K Harness	140-913038
3	Nylon Clamp MP-SN	140-913215

ITEM	DESCRIPTION	PART NO.
4	Flange Nut M4	140-913216
5	DK Clamp DK-0SF	140-913217
6	Convex CV-100	140-913039

FIGURE B – Operation Thunderbolt™ Gun Assembly Parts.

ITEM	DESCRIPTION	PART NO.
1	Gun Cover (A)	140-913040
2	C-Sink HD Torx. Screw M4 x 8	140-913218
3	Trigger Spring	140-913041
4	Trigger	140-913042
5	Mico-Switch SS-5GL2	140-913043
6	Push Button Switch	140-913044
7	Gun Cover (B)	140-913045
8	Socket Cap Torx. Bolt M4 x 35	140-913219

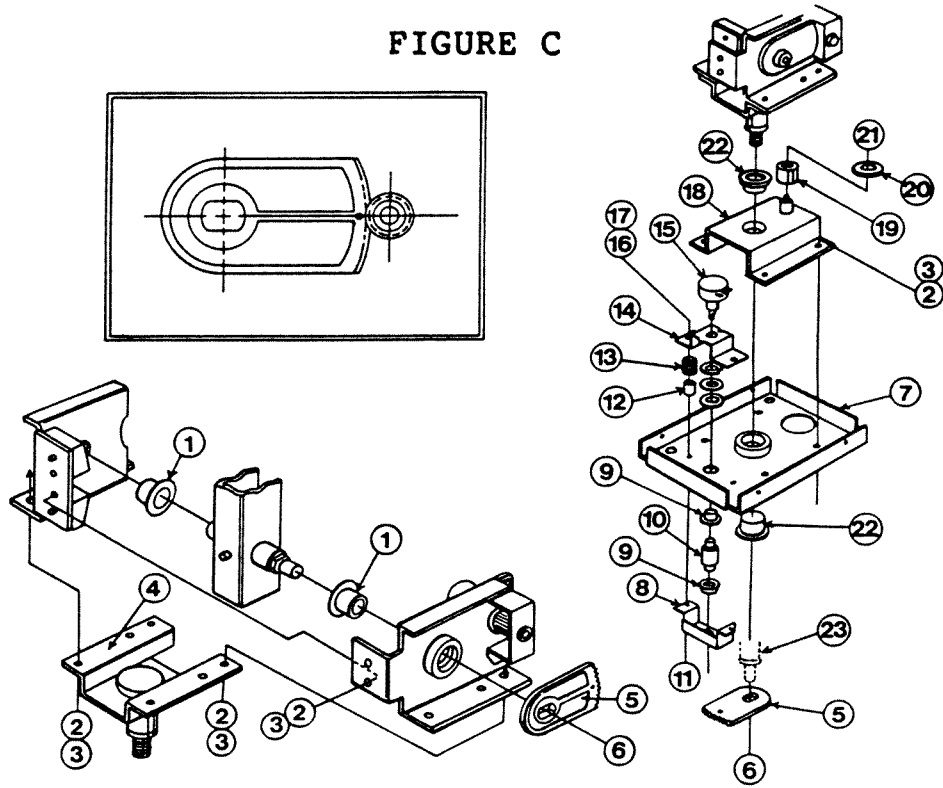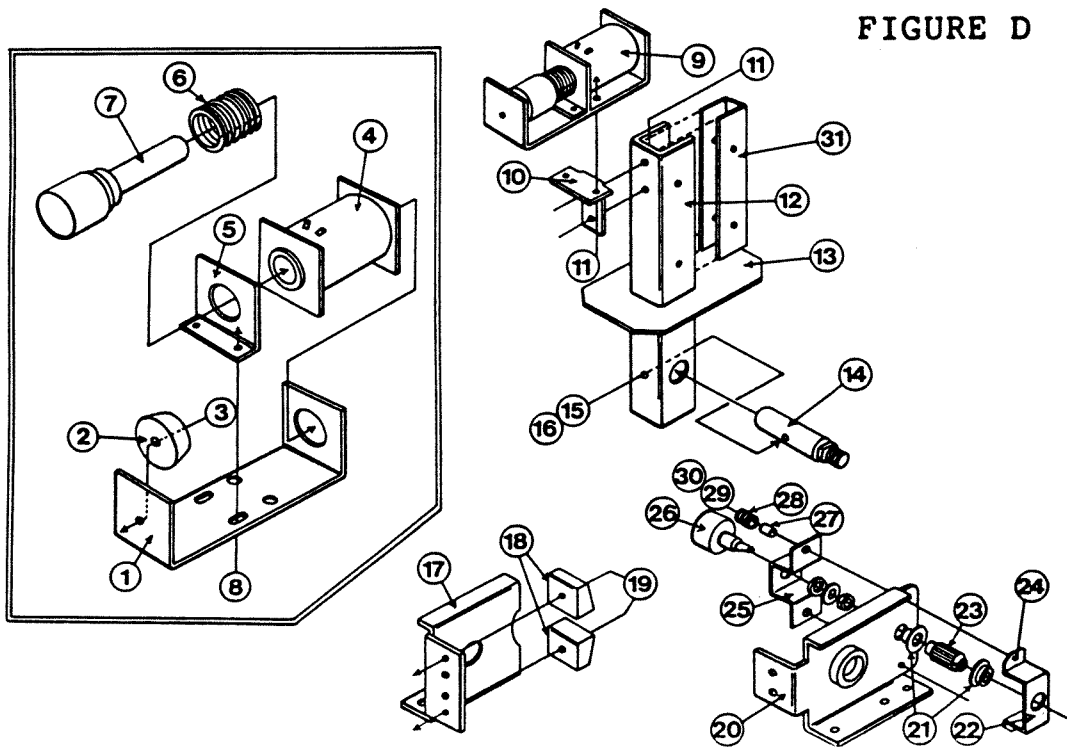| ITEM	DESCRIPTION	PART NO.
9	Socket Cap Torx. Bolt M4 x 40	140-913220
10	Hex Cap Nut M4-3 (Black)	140-913221
11	Side Cover, Right	140-913046
12	Side Cover, Left	140-913047
13	Button MD Torx. Screw M4 x 8	140-913222
14	Button ND Tork Screw M3 x 6	140-913223
15	Right Side Metal Support Bkt.	140-913226
16	Left Side Metal Support Bkt.	140-913227

9. PARTS LIST
Gun Assembly

FIGURE C

FIGURE D

9. PARTS LIST
Gun Assembly

FIGURE C – Operation Thunderbolt™ Gun Assembly Parts						
ITEM	**DESCRIPTION**	**PART NO.**		**ITEM**	**DESCRIPTION**	**PART NO.**
1	Oil-less Flange Bush. 80F-0905	140-913001		13	Tension Spring	140-913011
2	Spring Washer	140-913002		14	Volume Bracket	140-913012
3	Socket Cap	140-913003		15	Variable Res., Pset Knob BSM	140-913013
4	Shaft Bracket	140-913004		16	Plain Washer	140-913202
5	Gear – A	140-913005		17	Self Locking Nut – U M4	140-913203
6	Self-locking Nut N, M10	140-913225		18	Upper Base	140-913014
7	Underbase	140-913006		19	Stopper Rubber (B)	140-913015
8	Gear Bracket	140-913007		20	Washer	140-913016
9	Oil-less Flange Bush. 80F-0905	140-913008		21	Pan Hd. Semuth (S) M4 x 20	140-913204
10	Gear – B	140-913009		22	Oil-less Flange Bush. 80F-1810	140-913017
11	Pan MD Semuth (S) M4 x 20	140-913010		23	C Ring for Shaft STW-18	140-913205
12	Spacer – 5L	140-913048				

FIGURE D – Operation Thunderbolt™ Gun Assembly Parts						
ITEM	**DESCRIPTION**	**PART NO.**		**ITEM**	**DESCRIPTION**	**PART NO.**
1	Solenoid Bracket	140-913018		17	Side Bracket (L)	140-913028
2	Rubber Leg K-24	140-913019		18	Stopper Rubber A	140-913029
3	Pan He. Semuth M4 x 10	140-913206		19	Washer Tap Tight M4 x 12	140-913030
4	Solenoid	140-913224		20	Side Bracket (R)	140-913031
5	L-Bracket	140-913020		21	Oil-less Flange Bush. 80F-0905	140-913032
6	Button Spring	140-913021		22	Gear Bracket	140-913033
7	Plunger	140-913022		23	Gear (B)	140-913009
8	Pan Hd. Semuth M4 x 8	140-913207		24	Pan Hd. Semuth (S) M4 x 20	140-913212
9	Solenoid Assembly	140-913023		25	Gear Bracket	140-913033
10	Support Bracket	140-913024		26	Variable Resistor Pset Knob	140-913013
11	Pan Hd. Semuth M5 x 10	140-913208		27	Spacer – 5L	140-913036
12	Arm	140-913025		28	Tension Spring	140-913035
13	Gun Mask	140-913026		29	Plain Washer	140-913202
14	Sub Shaft	140-913027		30	Self Locking Nut-V M4	140-913214
15	Spring Washer 5M	140-913210		31	Arm Support	140-913228
16	Socket Cap Bolt	140-913211				

9. PARTS LIST

Shipping Assembly OS01-00757-00

Itm	Description	Part Number
1	OS Kit Carton	OS60-00734-00
2	OS Carton Insert	OS60-00741-00
3	OS Carton Pad	OS60-00742-00
4	OPSG2 Manual	OS45-00745-00
5	EMI Carton	VG60-00753-00
6	FCC Notice	VG46-00571-00
7	Label, Shipping	VG44-00151-00
8	Shipping Carton, OS	OS60-00734-00
9	Box Insert, Econo Kit	OS60-00941-00
10	Carton Pad, OS	OS60-00742-00
11	Bag Poly, 9X12 .002 Kits	VG60-00098-00

Top Assembly

Itm	Description	Part Number
1	Namco Game PCB	SG03-00652-00
2	Ferrite Clamp	VG78-00198-00
3	Ferrite Housing	VG78-00199-00
4	Graphics Kit	OS05-00749-00
5	Gun Interface PCB	OS14-00721-00
6	Interface Harness Assy	OS50-00740-00

9. PARTS LIST

Graphics Kit Assembly OS05-00749-00

Itm	Description	Part Number
1	Side Decal, OS	OS40-00659-00
2	Marquee, OS	OS40-00661-00
3	Acrylic Monitor Panel, OS	OS40-00651-00
4	Coin Door Left Decal, OS	OS40-00655-00
5	Coin Door Right Decal, OS	OS40-00656-00
6	Control Panel Overlay, OS	OS40-00654-00
7	Left Gun Decal, OS	OS40-00657-00
8	Right Gun Decal, OS	OS40-00658-00

Gun Interface PCB Assy OS14-00721-00

Itm	Description	Part Number
1	Gun Interface PCB, Fab	VG86-00756-00
2	Tranisistor, 5-9 AMp SIP NP	VG77-00744-00
3	RES, 1/4W, 100 ohm	VG75-00746-00
4	RES, 1/4W, 4.7K ohm	VG75-00747-00
5	RES, 2 W,	VG75-00758-00
6	IC, 74LSo4	VG74-00745-00
7	CAP. TANT .12 F 35 V	VG76-00755-00
8	CONN., 6 Pin	VG67-00748-00

9. PARTS LIST
Coin Assembly

91-1311-16
91-1113-01
91-0604-16
91-1121-00
91-1312-16
92-1002-021
91-1141-00
90-1300-00
90-1109-16
90-1000-00
90-1017-00
90-1002-00
92-1002-01
91-0502-16
91-1117-00
91-1118-00
92-1002-10
91-0603-16
91-1036-00
12-4150-011
12-4050-01
91-1145-00
90-1003-00
91-1120-00
90-1206-02
91-1108-01
92-1002-08
91-1106-00
91-0506-00
92-1002-09
92-1002-07
91-1107-00
91-1105-00
90-1007-00
91-0537-00
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92-1002-11
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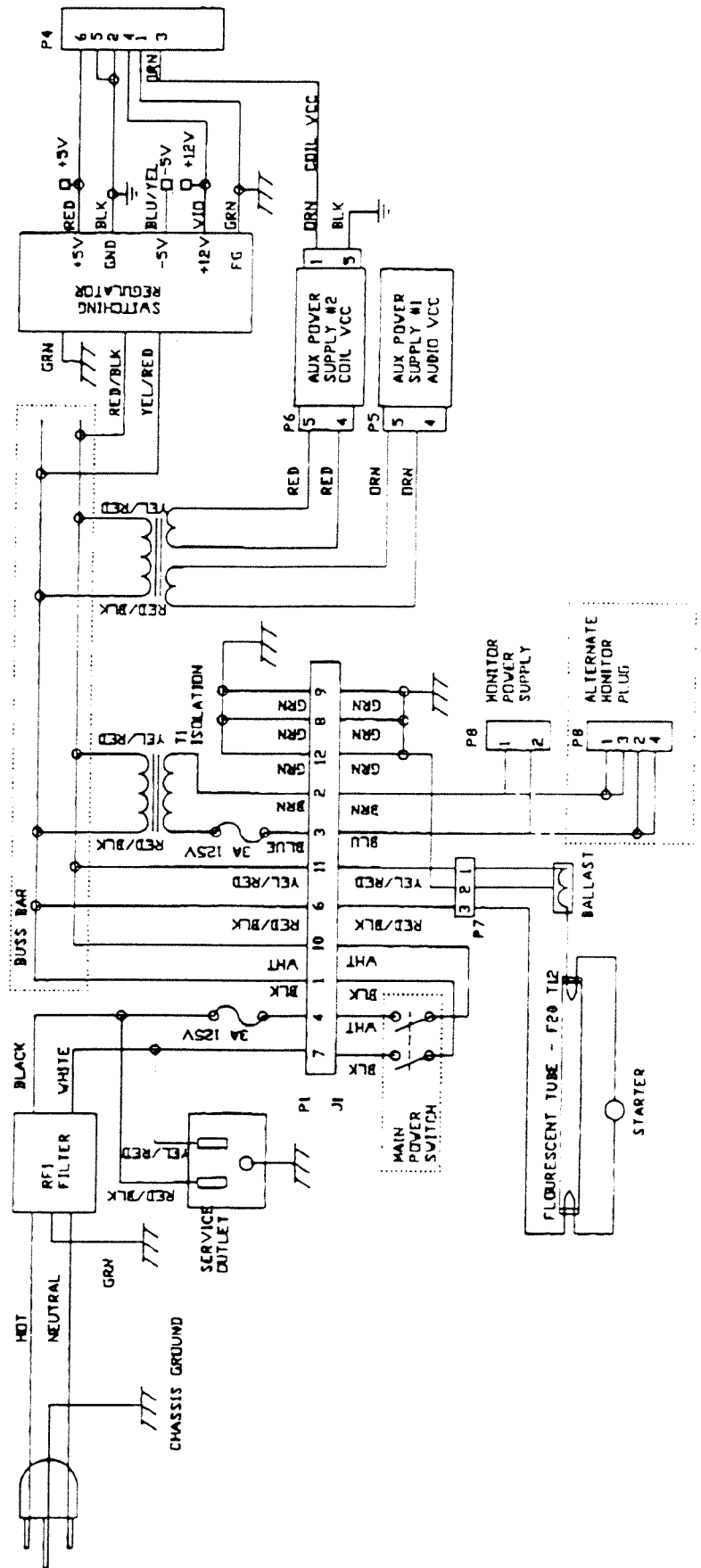
COIN CONTROLS COIN DOOR ASSEMBLY
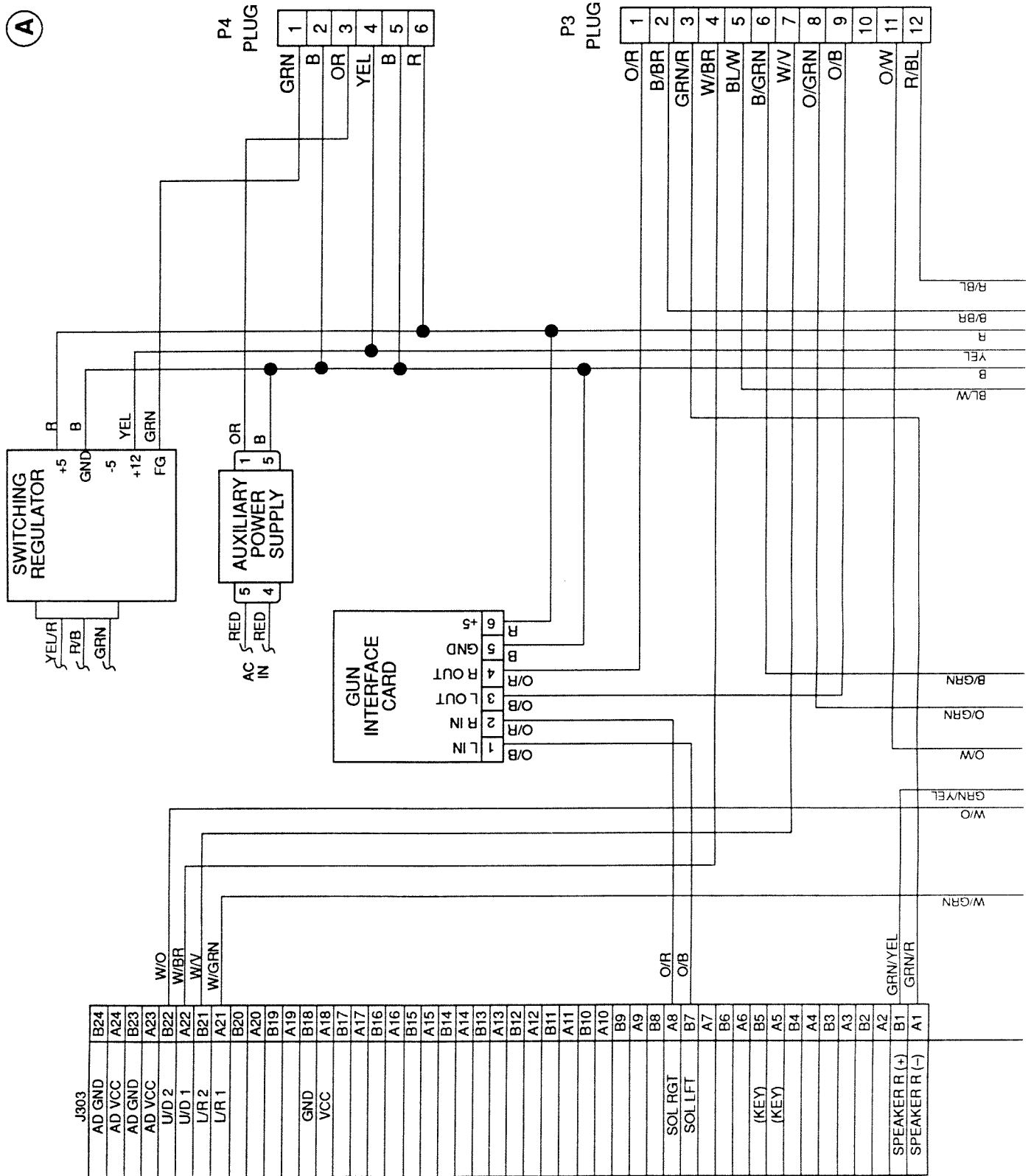
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Wiring Harness
Diagram
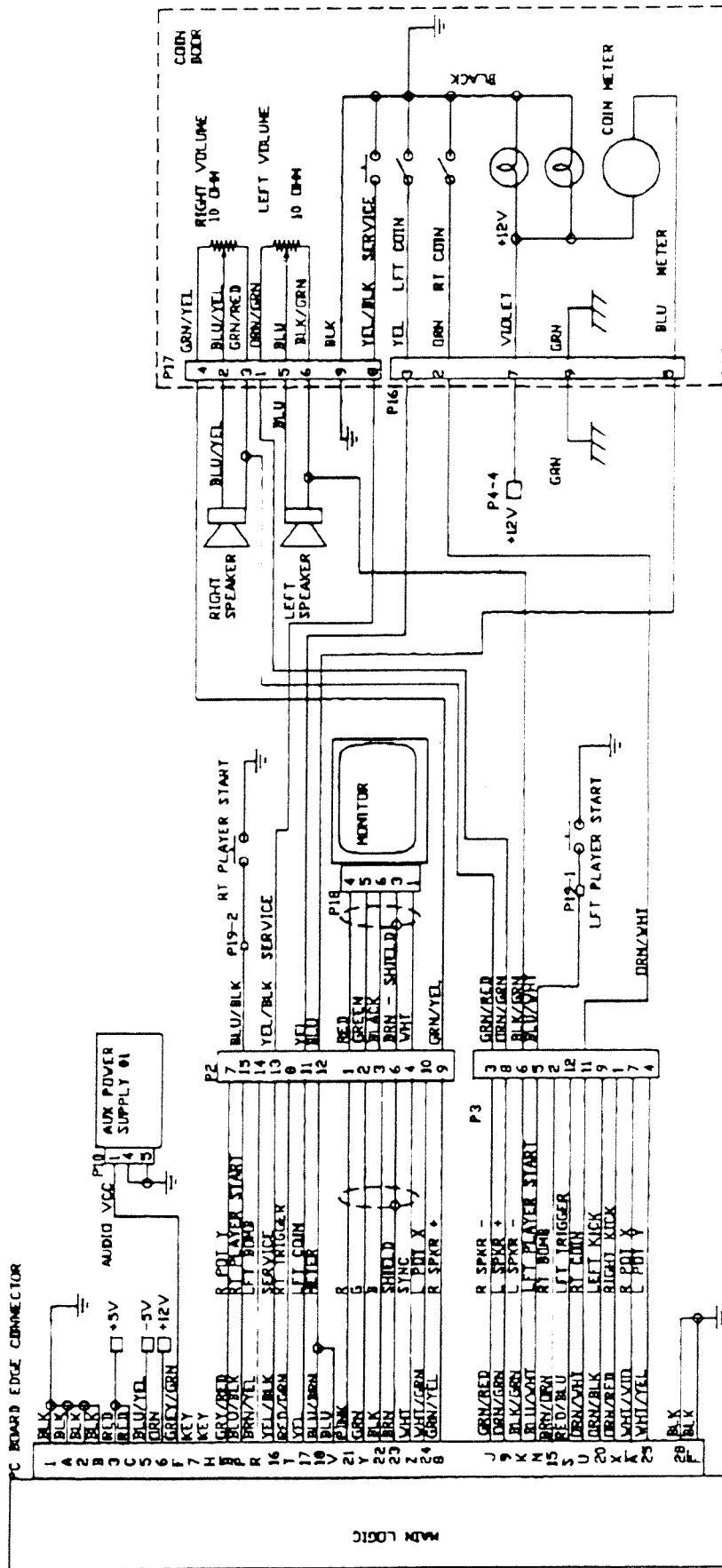
OPERATION THUNDERBOLT™ — Control Wiring Diagram
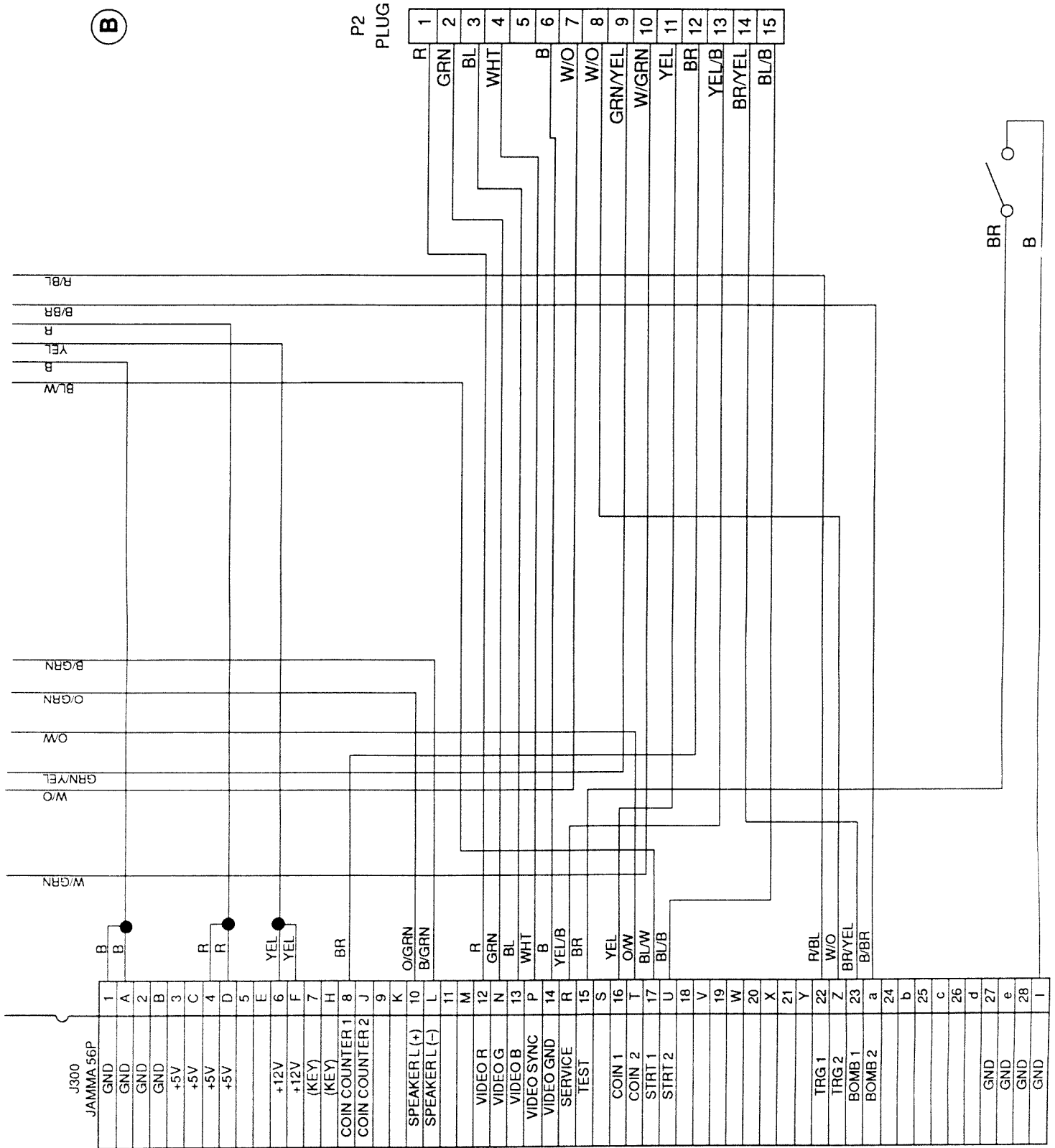
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OPERATION THUNDERBOLT™ — AC Wiring Diagram

STEEL GUNNER™ 2 – Wiring Harness Diagram

P2 PLUG

Pin	Color
1	R
2	GRN
3	BL
4	WHT
5	
6	B
7	W/O
8	W/O
9	GRN/YEL
10	W/GRN
11	YEL
12	BR
13	YEL/B
14	BR/YEL
15	BL/B

BR
B

R/BL
B/BR
R
YEL
B
BL/W

B/GRN
O/GRN
O/W
GRN/YEL
W/O
W/GRN

J300 JAMMA 56P

Pin	Function	Color
1	GND	B
A	GND	B
2	GND	
B	GND	
3	GND	
C	+5V	
4	+5V	R
D	+5V	R
5	+5V	
E	+5V	
6	+12V	YEL
F	+12V	YEL
7	(KEY)	
H	(KEY)	
8	COIN COUNTER 1	BR
J	COIN COUNTER 2	
9		O/GRN
K	SPEAKER L (+)	B/GRN
10	SPEAKER L (–)	
L		
11		R
M	VIDEO R	GRN
12	VIDEO G	BL
N	VIDEO B	WHT
13	VIDEO SYNC	B
P	VIDEO GND	YEL/B
14	SERVICE	BR
R	TEST	
15		YEL
S	COIN 1	O/W
16	COIN 2	BL/W
T	STRT 1	BL/B
17	STRT 2	
U		
18		
V		
19		
W		
20		
X		
21		R/BL
Y	TRG 1	W/O
22	TRG 2	BR/YEL
Z	BOMB 1	B/BR
23	BOMB 2	
a		
24		
b		
25		
c		
26		
d		
27	GND	
e	GND	
28	GND	
i	GND	

STEEL GUNNER™ 2 — Wiring Harness Diagram

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Warranty

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

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

(a)   Seller is promptly notified in writing upon discovery by Buyer that said products are defective;

(b)   Such products are returned prepaid to Seller's plant; and

(c)   Seller's examination of said products discloses to Seller's satisfaction that such alleged defects existed and were not caused by accident, misuse, neglect, alteration, improper repair, installation, or improper testing.

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