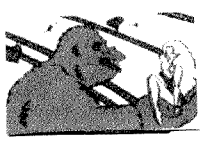
# SEGA

# CLUTCH HITTER

A Conversion Kit for Optional 19" or 25"
Monitor

## Installation/Owners Manual

SEGA ENTERPRISES, INC.



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# CLUTCH HITTER

by:

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**A Kit for**
**Upright Cabinet with Horizontal Monitor**

NOTE: THIS EQUIPMENT HAS BEEN TESTED AND FOUND TO COMPLY WITH THE LIMITS FOR A CLASS A DIGITAL DEVICE, PERSUANT 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 INTEFERENCE AT HIS/HER OWN EXPENSE.

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## Introduction

SEGA ENTERPRISES. LTD., supported by its high electronic technology of Large Scale Integration, microprocessors, etc. and a wealth of experience, has for more than 30 years been supplying various innovative and popular game machines to the world market. This OWNER'S AND KIT INSTALLATION manual is intended to provide detailed comments together with all the necessary information covering the operation and installation of electronic assemblies, electro-mechanical assemblies, control assemblies, and spare or replacement parts for coin operated games. This manual is intended for those who have knowledge of electricity and technical expertise in video games. Carefully read the enclosed information before starting the kit installation or troubleshooting procedures.

## Handling and Installation Precautions

### During Installation:

1. Be sure to remove power plug when working on the machine.
2. Be sure all connections and harness routing are secure.
3. Make sure all grounding connections are secure and properly affixed.
4. Do not use any fuse that does not meet the specified rating.

## Prevention of Counterfeiting and Conversion Labeling

To prevent counterfeit and unauthorized conversions, the following label is supplied with all authorized SEGA kit products. When handling such goods, be sure to locate and confirm the label. It is used to prevent illegal acts such as the unauthorized copying of the products and the printed circuit boards.

## Precautions Concerning the Place of Installation

The CONVERSION KIT is intended to be installed in an indoor game cabinet. Absolutely do not install it outdoors. When installed indoors the following places mentioned below should be avoided to ensure proper operation and usage:

- Places subject to rain or water leakage, or condensation due to humidity
- In the proximity of an indoor swimming pool and/or shower
- Places subject to direct sunlight
- Places subject to heat sources from heating units, hot air, etc.
- Vicinity of highly flammable/volatile chemicals or hazardous materials
- Sloped surfaces
- Vicinity of anti-disaster facilities such as fire exits and fire extinguishers
- Places subject to any type of violent impact
- Dusty environment

## System Requirements

### Power Supply:

- Input voltage 90 VAC to 13 5 VAC 60 Hz
- + 5 volts at 6 amps
- + 12 volts at 2 amps
- Over-voltage protected at + 5.8 volts
- Current limit set at 8 amps

### RFI Line Filter:

1. If a switching power supply is used:
   - Current rating of 6 amps
   - Frequency attenuation of the following:

| | |
|---|---|
| 0.15 MHz | 40db |
| 0.5 MHz | 65db |
| 1.0 MHz | 65db |
| 5.0 MHz | 55db |
| 10.0 MHz | 50db |
| 30.0 MHz | 50db |

2. If a linear power supply is used:
   - Current rating of 5 amps
   - Frequency attenuation of the following:

| | |
|---|---|
| 0.15 MHz | 6db |
| 0.5 MHz | 1 9db |
| 1.0 MHz | 28db |
| 5 .0 MHz | 42db |
| 10.0 MHz | 45db |
| 30.0 MHz | 50db |

### Miscellaneous:

| | |
|---|---|
| Line Fuse: | 4 amp 120 VAC |
| Speaker: | 8 ohms 10 watt |
| On/Off Switch: | 6 amp 120 VAC |
| Isolation Transformer: | 115 VAC primary, 115 VAC secondary, 100 Watts |
| Coin Door: | Dual coin acceptors |
| Coin Meter: | + 5 Volt DC |
| Power Cord: | Three conductor with ground |

Color Monitor:

- Video input 1 volt to 5 volt peak-to~peak positive polarity
- Sync TTL negative polarity separate horizontal and vertical
- Horizontal frequency 15.7 50 KHz
- Vertical frequency 60 Hz
- Video bandwidth 12 MHz or greater
- Horizontal mounted
- Recommended size 19 inch

## Tools Required

- Drill
- Hole cutter 1-3/16 "
- Phillips screw driver
- Flat blade screw driver
- Small flat blade screw driver
- Scissors
- Sand paper
- Paint
- Xacto knife
- Wood patch

## Cabinet Preparation

1. Remove old PCB, and all existing game harnesses.
2. Remove and disassemble the control panel.
3. Remove any side decals, monitor bezel, and marquee.
4. Using sandpaper and/or paint thinner, clean and smooth the cabinet for paint preparation. Use wood patch to fill any nicks or flaws in the cabinet.
5. Paint cabinet if required.
6. Wipe down and vacuum cabinet as necessary.

**NOTE:** You are building a new game, not just changing an old one. A nice, clean, and new looking conversion not only earns better, but lasts longer.

## Kit Component Verification

Verify each component with the kit list provided to assure your kit is complete. If any part is missing after the inventory is taken, please contact your distributor and provide to them the following information:

1. Kit serial number
2. Part number and description of missing item/s
3. Date received

## Kit List

| Part Number | Quantity | Description |
|---|---|---|
| 0002-0000 | 2 | #6 x 3/8 P/H Phil Tek |
| 0002-0001 | 4 | #6 x 3/4 P/H Phil "AB" SMS |
| 0312-0024 | 8 | #10-24 x 1 3/4 Carr/Bolt Black |
| 0502-0024 | 8 | #10-24 Hexnut |
| 0612-0024 | 8 | #10 Split Lock Washer |
| 0692-0024 | 8 | #10 Flat Washer 1/2 OD |
| 2112-0000 | 2 | Wire Nut #18 |
| 999-0069 | 1 | Monitor Card |
| 999-0079 | 1 | Owners Manual |
| 421-5801-124 | 1 | License Seal |
| 4212-0001 | 1 | (Kit) Serial # Sticker |
| 999-0068 | 2 | Side Decal |
| 999-0067 | 1 | Control Panel Overlay |
| 999-0066 | 1 | Control Panel Clear Plex |
| 999-0070 | 1 | Marquee Sheet |
| 999-0071 | 1 | Label Sheet (See List)<br>- Test, Service, Volume Sticker<br>- Play Instructions<br>- Action Button Labels<br>- Start Button Labels |
| 999-0047 | 1 | FCC Plate |
| 4750-0049 | 1 | Volume Control 100 Ohm 10 Watt |
| 5090-5028 | 2 | PB Spst Switch Momentary |
| 6010-0043 | 1 | Knob, 1/8 " Shaft |
| 999-0062 | 2 | Joy Stick, 8 Way |
| 999-0063 | 4 | Pushbutton, Microswitch (White) |
| 999-0064 | 2 | Pushbutton, Microswitch (Red) |
| 999-0065 | 2 | Pushbutton, Microswitch (Blue) |
| JAM-0000 | 1 | Jamma Harness |
| 833-7916-01 | 1 | Game PCB |
| KR0-1721 | 1 | Service Switch Bracket |

## Installation Procedure

**Monitor Card**

1. Locate the MONITOR CARD and measure the size of existing monitor card or the required size to fit (refer to the reverse side of the monitor card for 19" or 25" monitor size option). Cut the cardboard monitor card to size. (see figure 1 ) Install Play Instruction Labels horizontally accross the bottom of the Card.

**License Seal**

2. Locate the LICENSE SEAL and place seal as shown in figure 1. Install Monitor Card on game cabinet. Note: Verify that the License Seal will be visible when the Monitor Card is installed on game cabinet.

**Side Decal**

3. Locate the SIDE DECALS and install on the left and right side panels of the cabinet (see figure 1). Note: A mixture of slightly soapy water can be used on the cabinet to position the Decal as desired. A squeegee may be used to remove any wrinkles in the Decal if soapy water is used.

**Marquee**

4. Locate the MARQUEE SHEET and measure the size of existing Marquee or required size to fit and trim the Marquee Sheet to size. Install on cabinet. (see figure 1)

**Control Panel**

5. Locate the CONTROL PANEL OVERLAY and measure the size required and cut the control panel overlay to fit the existing control panel.

6. Define the location of the player push buttons and joystick(s) on the control panel. (see figure 2)

7. Cut holes in control panel to locate buttons and joystick(s). See template for button and joystick. (see figure 3)

8. Install the "ONE PLAYER START" label and the "TWO PLAYER START" label on the control panel overlay if applicable (see figure 2)

9. Install player control button labels on the control panel overlay (see figure 2)

10. Locate the CONTROL PANEL CLEAR PLEX and cut holes into the plex to match the holes cut into the control panel. Then trim as required to protect the control panel overlay and labels.
    **Note**: This clear plex overlay can be used to protect unused holes in the control panel from player punctures.(see figure 2)

11. Install player pushbutton/s as required. (see figure 2)

**NOTE**: When buttons are securely placed and tightened in the control panel assembly, a small amount of clear RTV Silicone may be placed on two or three areas of the lock-nut to keep the switches from being unscrewed from the top of the panel. (see figure 3)

12. Install player/s JOYSTICK/S as required. (see figure 2)

**Service Switch Assembly**

13. Locate SERVICE SWITCH BRACKET and install two PUSH BUTTON SPST SWITCH MOMENTARY into bracket as shown in figure 4.

16. Locate VOLUME CONTROL 100 OHM 10 WATT and install into service switch bracket as shown in figure 4.

17. Locate TEST, SERVICE, VOLUME STICKER and place on the service switch bracket as shown in figure 4.

18. Locate KNOB 1/8" SHAFT and install on shaft of volume control 100 ohm 10 watt as shown in figure 4.

19. Install the Service Switch Assembly using 2 ea screws in the cabinet at either of the following locations (see figure 5):
    - On top of the steel enclosure for the Cash Box, inside the coin door.
    - Inside to the left of the coin door, mounted to the wood cabinet.

**Harness Installation**

20. The Game PCB is Jamma compatible. Modification of an existing Jamma harness inside the game cabinet should not be necessary. CAUTION SHOULD BE OBSERVED TO ASSURE THAT THE PIN OUTPUTS ARE CORRECT.

21. Connect the Player/s controls and buttons to the PCB as defined in figure 9.

22. Connect the T.V Monitor as shown in figure 6.

23. Connect the routed speaker wires to the speaker. Check the routing for security.

24. Connect the SERVICE SWITCH ASSEMBLY as follows: (see figure 4.)

FOR REMOTE VOLUME CONTROL OPERATION PERFORM THE FOLLOWING STEPS:

a. Locate the 2 speaker wires which connect to pins L and 10 of the Jamma connector.
b. Connect the wire from Pin L of the Jamma connector and one side of the speaker to one side of the volume control.
c. Connect the wire from Pin 10 of the Jamma connector to the other side of the volume control.
d. Connect the other side of the speaker to the center terminal of the volume control.

FOR REMOTE TEST OPERATION PERFORM THE FOLLOWING STEP:

Connect the wire from Pin 15 of the Jamma harness to one side of the Test pushbutton and connect ground to the other terminal of the pushbutton.

FOR REMOTE SERVICE OPERATION PERFORM THE FOLLOWING STEP:

Connect the wire from Pin R of the Jamma harness to one side of the Service pushbutton and then connect ground to the other terminal of the pushbutton.

**Cabinet 115 VAC System Grounding**

24. Locate the GROUND lead (green) of the 115 volt input power Line (see figure 7). This must be connected to all components of the game system. This is a safety requirement for the players protection. This AC GROUND must be of # 18 AWG wire or larger. (see figure 7 for the proper routing of the wire)

**Cabinet System Checkout**

25. Apply power to cabinet system and check for the following voltages. If any voltage is incorrect, remove power and correct problem before proceeding any further.
    a. + 5 Volts on pins 3,4,C, and D of the 56 pin PCB connector.
    b. + 12 Volts on pins 6 and F of the 56 pin PCB connector.
    c. No voltage present on any other pins of the 56 pin PCB connector.

26. Check that the monitor has power. This can be accomplished by observing the glow of the filament inside the neck of the picture tube.

27. Check that the Marquee lamp has power.

28. Check that the system ON/OFF switch functions properly.

**WARNING: PROCEED ONLY IF THE ABOVE CHECKS ARE CORRECT**

**PCB Installation**

29. Install the logic PCB inside the cabinet (see figure 5). Use wood screws to secure the PCB through its' mounting feet.

30. Locate the Switch Setting Sheet. Place this sheet on the inside of the game so that it is visible when the back door is removed or opened. This will allow the DIP SWITCH OPTIONS to be handy when service or changes in options are required.

31. Connect the 56 pin Jamma connector to the PCB.

NOTE: The proper orientation of the connector (see figure 8). If not connected properly, the system will not function and damage can occur to the PCB.

**Logic Board and Complete System Checkout**

32. Apply power to the system and observe that the logic PCB functions. If a video picture is not present proceed to "IN CASE OF DIFFICULTY" portion of this manual. When corrected, return to this point and continue.

33. Press the TEST BUTTON to enter the test menu. Individual tests can be entered by following the instructions on the Test screen.

34. Set up game options as shown in figure 9.
    a. DIP SWITCH 1 on PCB sets up the number of coins per credit
    b. DIP SWITCH 2 on PCB sets up specific game options

35. Functionally test the game by:
    a. VERIFY that coin drops register proper credit/s and the COIN METER OPERATES
    b. VERIFY that the proper number of lives is given for each CREDIT
    c. VERIFY that all player controls operate properly

36. Locate the Kit SERIAL NUMBER STICKER and FCC PLATE. Install on the rear of the game cabinet. (see figure 1 )

## In Case of Difficulty

**No Raster/No Video**
- -Check A.C. line cord
- -Check line fuse
- -Check monitor brightness
- -Check power switch and/or interlock switch
- -Check all solder connections on line filter and transformer
- -Check for proper orientation of the 56 pin PCB connector

**Raster/No Video**
- -Check all PCB to monitor connections
- -Check power supply voltage on PCB

**No Video/ Game sounds can be heard**
- -Check monitor brightness
- -Check all PCB to monitor connections

**Incorrect Colors**
- -Monitor needs degaussing
- -Check for proper wiring between PCB and monitor
- -Check monitor adjustment and adjust if necessary

**Wavy Picture**
- -Check monitor ground is properly connected to monitor
- -Be certain sync inputs are properly connected to monitor
- -Check horizontal hold adjustment

**Vertical Roll/Horizontal Tear**
- -Check horizontal and/or vertical hold adjustments
- -Check for proper wiring of sync from PCB to monitor

**No Sound**
- -Check volume control potentiometer adjustment
- -Check for + 12 volts on edge connector of PCB
- -Check wiring from PCB to speaker
- -Check speaker for low resistance between the " + " and " - " tabs

**Bad Sound**
- -Check wiring to speaker for bad solder connections
- -Check sound with another speaker

**No Switch Input**
- -Check ground connection to switch/es
- -Check wiring between PCB and switch/es for proper connection
- -Check switch/es with an ohm meter to verify proper operation

**Switch Operates Incorrect Function**
- -Check wiring between PCB and switches for proper orientation
- -Check wiring for shorts between switch inputs

**No Coin Meter**
- -Check wiring to coin meter
- -Check that + 5 volts is on + side of meter
- -Verify a + 5 volt meter is used

**When coin switch is made and meter pulses, the screen blanks out and/or game resets**
- -Verify that a meter with a diode is used
- -If no diode is built in meter a 1N4004 can be used across the meter. Cathode to "+" side of meter and anode to "-"side of meter.

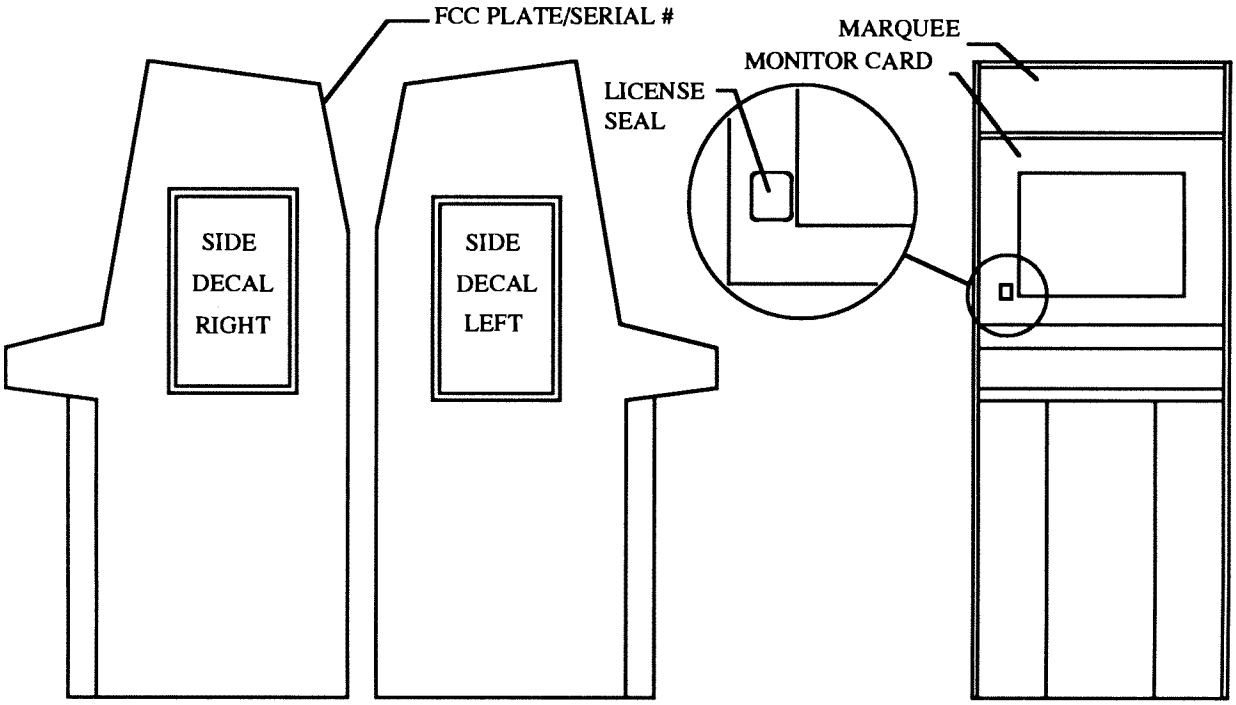



Figure 1

CONTROL PANEL TOP VIEW

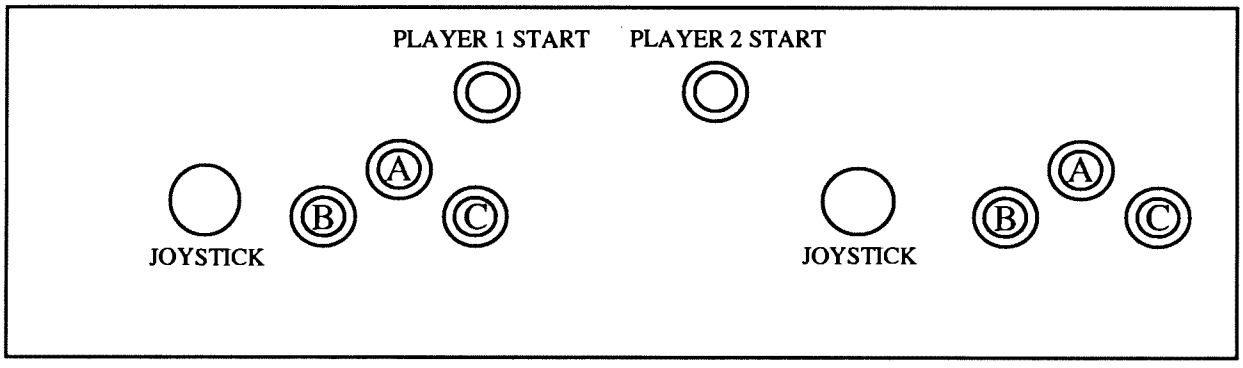



Figure 2

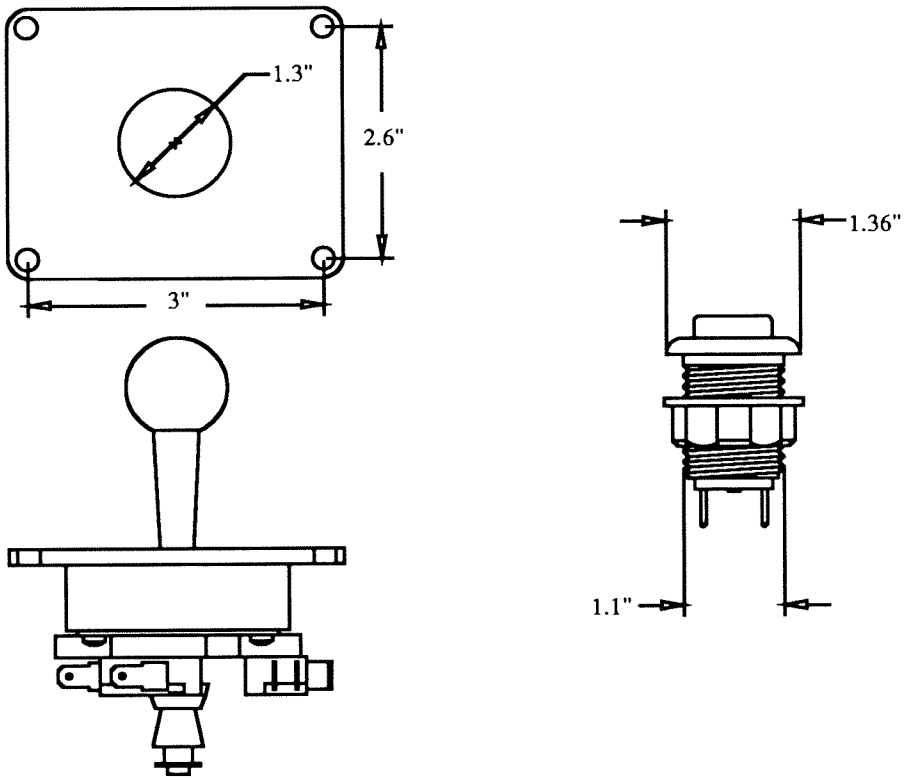
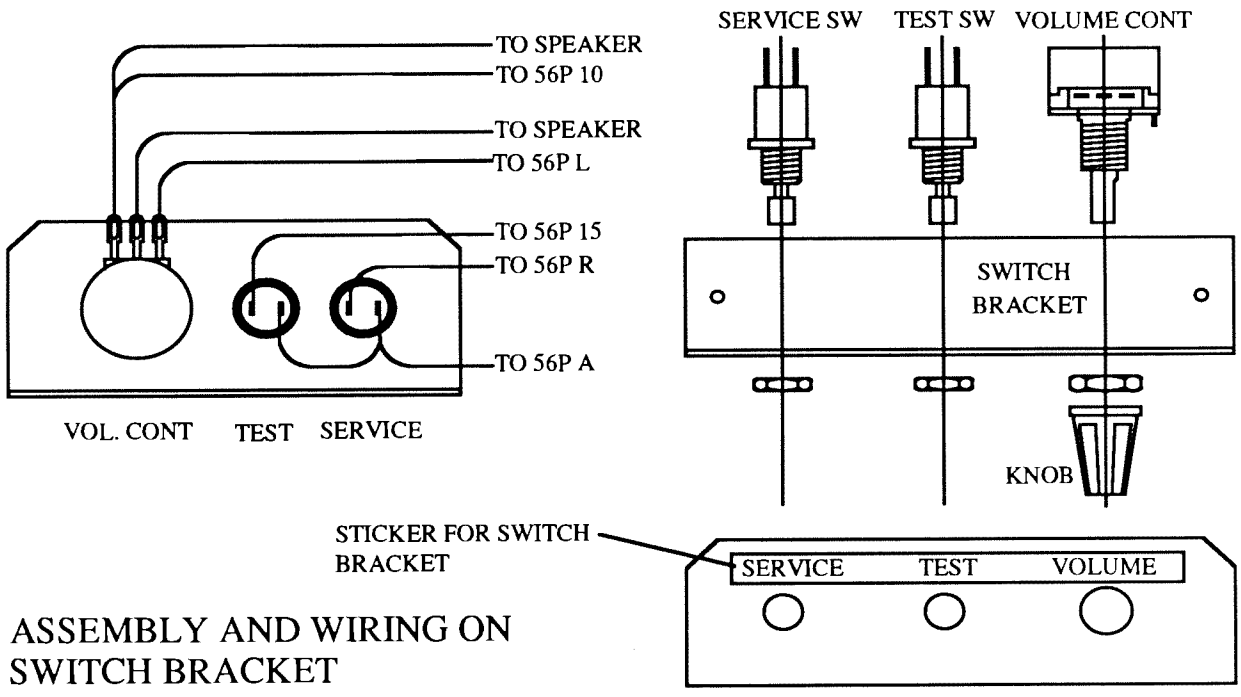



FIGURE 3




ASSEMBLY AND WIRING ON SWITCH BRACKET

FIGURE 4

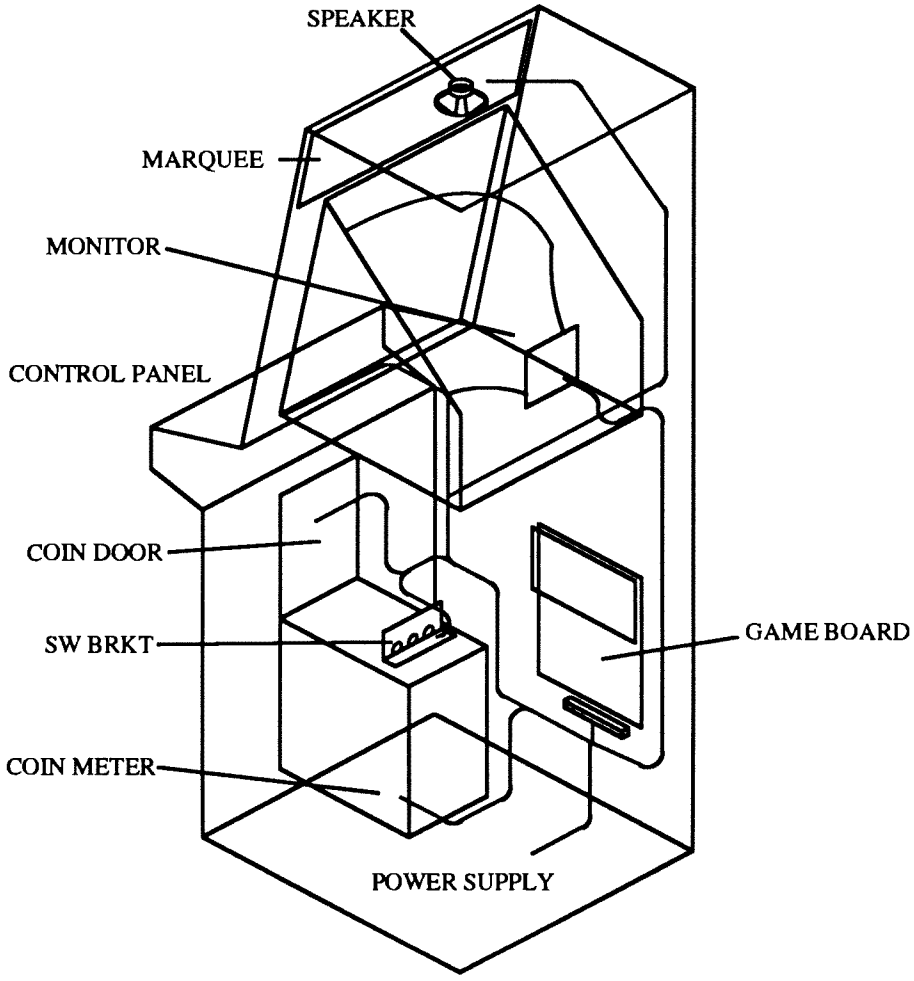



FIGURE 5

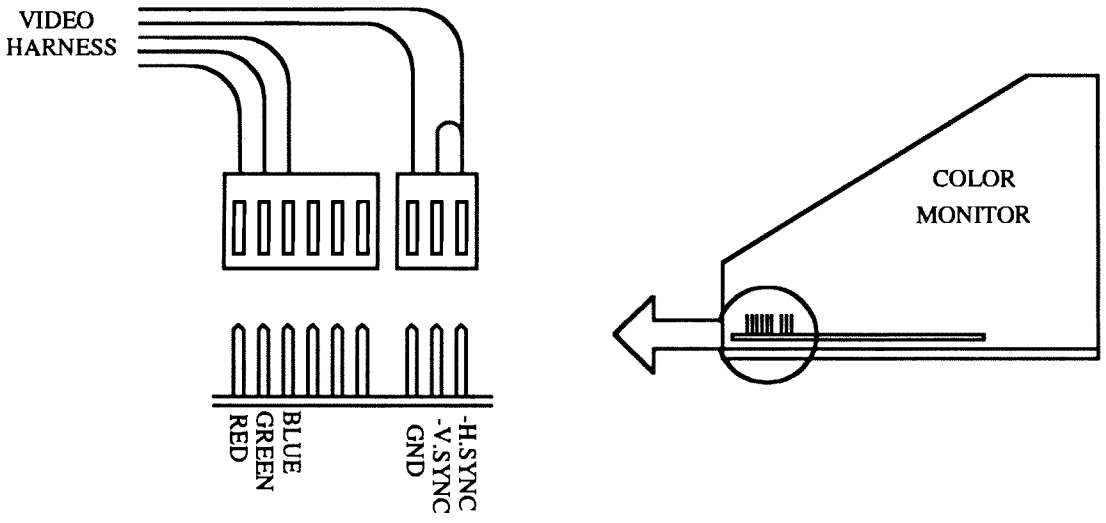



FIGURE 6

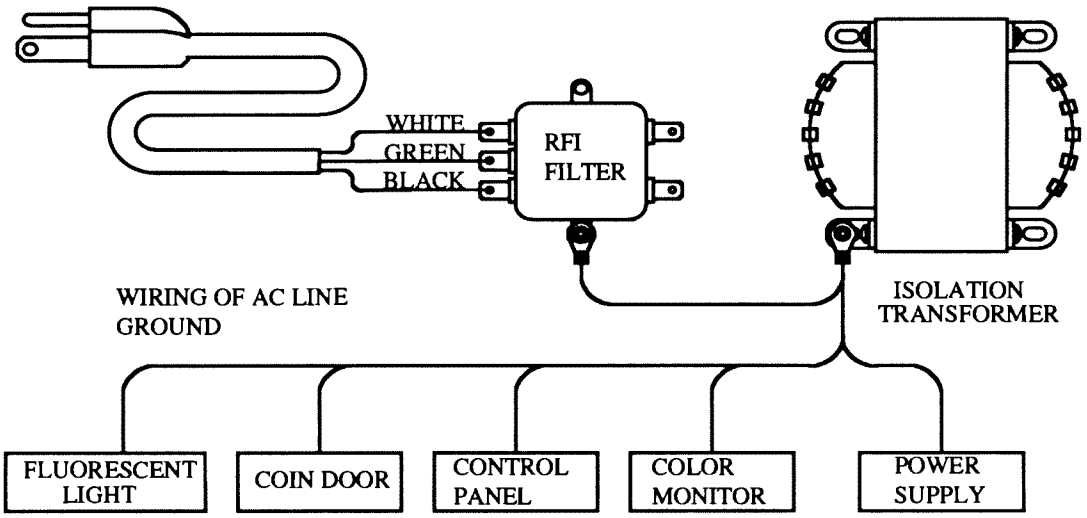



Figure 7

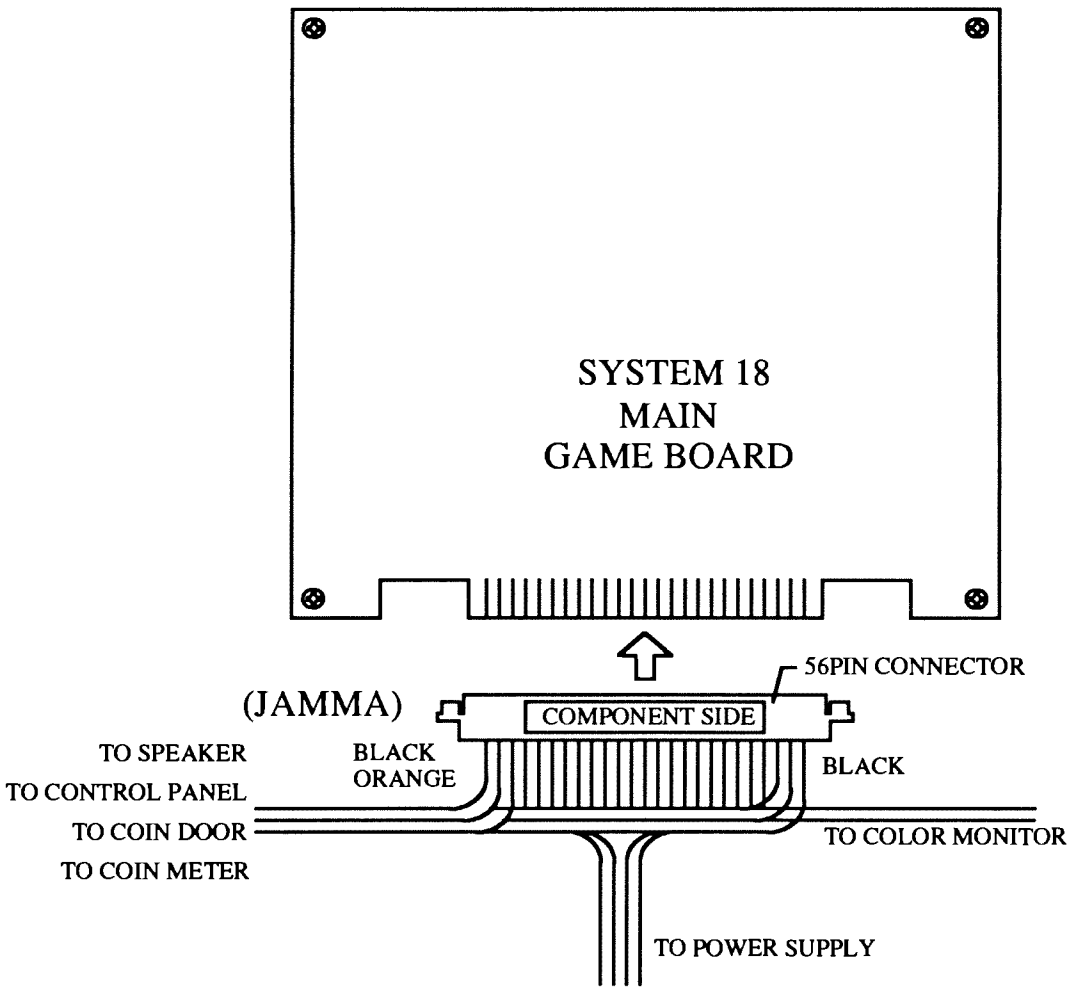


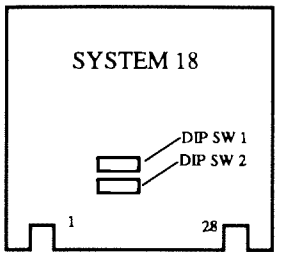

FIGURE 8

# CLUTCH HITTER

## SWITCH SETTINGS

### COIN / CREDIT OPTION SWITCH SETTING

| OPTION | | DIP SW #1 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| 1 COIN | 1 CREDIT | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| 1 COIN | 2 CREDITS | ON | OFF | OFF | OFF | ON | OFF | OFF | OFF |
| 1 COIN | 3 CREDITS | OFF | ON | OFF | OFF | OFF | ON | OFF | OFF |
| 1 COIN | 4 CREDITS | ON | ON | OFF | OFF | ON | ON | OFF | OFF |
| 1 COIN | 5 CREDITS | OFF | OFF | ON | OFF | OFF | OFF | ON | OFF |
| 1 COIN | 6 CREDITS | ON | OFF | ON | OFF | ON | OFF | ON | OFF |
| 2 COINS | 1 CREDIT | OFF | ON | ON | OFF | OFF | ON | ON | OFF |
| 3 COINS | 1 CREDIT | ON | ON | ON | OFF | ON | ON | ON | OFF |
| 4 COINS | 1 CREDIT | OFF | OFF | OFF | ON | OFF | OFF | OFF | ON |
| 2 COINS | 3 CREDITS | ON | OFF | OFF | ON | ON | OFF | OFF | ON |
| 2 COINS | 1 CREDIT<br>4 COINS 2 CREDITS<br>5 COINS 3 CREDITS<br>6 COINS 4 CREDITS | OFF | ON | OFF | ON | OFF | ON | OFF | ON |
| 2 COINS | 1 CREDIT<br>4 COINS 3 CREDITS | ON | ON | OFF | ON | ON | ON | OFF | ON |
| 1 COIN | 1 CREDIT<br>2 COINS 2 CREDITS<br>3 COINS 3 CREDITS<br>4 COINS 4 CREDITS<br>5 COINS 6 CREDITS | OFF | OFF | ON | ON | OFF | OFF | ON | ON |
| 1 COIN<br>2 COIN<br>3 COINS<br>4 COINS | 1 CREDIT<br>2 CREDITS<br>3 CREDITS<br>5 CREDITS | ON | OFF | ON | ON | ON | OFF | ON | ON |
| 1 COIN | 1 CREDIT<br>2 COINS 3 CREDITS | OFF | ON | ON | ON | OFF | ON | ON | ON |
| FREE PLAY | | ON | ON | ON | ON | ON | ON | ON | ON |
| | | COIN SW #1 | | | | COIN SW #2 | | | |




PIN ASSIGNMENTS

| COMPONENT SIDE | (JAMMA) | | SOLDER SIDE |
|---|---|---|---|
| GND | 1 | A | GND |
| GND | 2 | B | GND |
| +5V | 3 | C | +5V |
| +5V | 4 | D | +5V |
| (NOT USED) | 5 | E | (NOT USED) |
| +12V | 6 | F | +12V |
| (NOT USED) | 7 | H | (NOT USED) |
| COIN METER 1 | 8 | J | COIN METER 2 |
| (NOT USED) | 9 | K | (NOT USED) |
| SPEAKER (+) | 10 | L | SPEAKER (-) |
| (NOT USED) | 11 | M | (NOT USED) |
| RED | 12 | N | GREEN |
| BLUE | 13 | P | SYNC |
| GND(SYNC) | 14 | R | SERVICE |
| TEST | 15 | S | (NOT USED) |
| COIN 1 | 16 | T | COIN 2 |
| 1P START | 17 | U | 2P START |
| 1P UP | 18 | V | 2P UP |
| 1P DOWN | 19 | W | 2P DOWN |
| 1P LEFT | 20 | X | 2P LEFT |
| 1P RIGHT | 21 | Y | 2P RIGHT |
| 1P BUTTON A | 22 | Z | 2P BUTTON A |
| 1P BUTTON B | 23 | a | 2P BUTTON B |
| 1P BUTTON C | 24 | b | 2P BUTTON C |
| (NOT USED) | 25 | c | (NOT USED) |
| (NOT USED) | 26 | d | (NOT USED) |
| GND | 27 | e | GND |
| GND | 28 | f | GND |

### GAME OPTION SWITCH SETTINGS

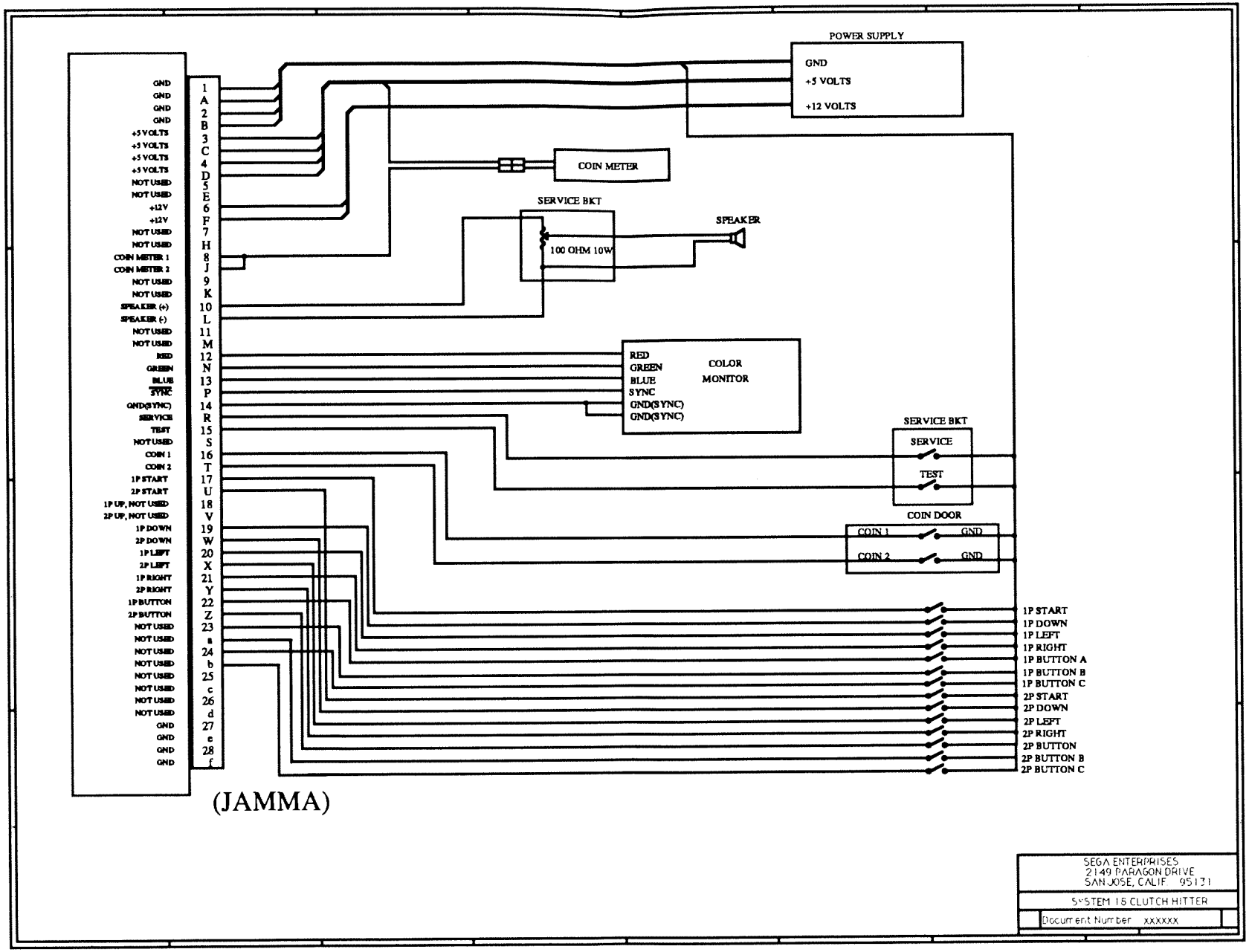
DIP SW #2

| DIP SWITCH #2 | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| 1 CREDIT TO START<br>(1 CREDIT TO CONTINUE) | | OFF | | | | | | | |
| 2 CREDITS TO START<br>(1 CREDIT TO CONTINUE) | | ON | | | | | | | |
| ADVERTISE SOUND | OFF | | OFF | | | | | | |
| | ON | | ON | | | | | | |
| GAME TIME (1P PLAY) | 1C - 60/8M 2C - 180/14M<br>1C - 120/12M<br>2C - 180/14M<br>1C - 60/7M | | | OFF<br>ON<br>OFF<br>ON | OFF<br>OFF<br>ON<br>ON | | | | |
| GAME TIME (2P PLAY) | 2C - 60/8M 4C-180/16M<br>1C - 120/14M<br>2C - 180/16M<br>2C - 60/8M | | | | | OFF<br>ON<br>OFF<br>ON | OFF<br>OFF<br>ON<br>ON | | |
| GAME DIFFICULTY | NORMAL<br>EASY 1<br>EASY 2<br>HARD | | | | | | | OFF<br>ON<br>OFF<br>ON | OFF<br>OFF<br>ON<br>ON |

GAME TIME EXAMPLE:

| | |
|---|---|
| 1C - 120/12M | C = CREDITS<br>O = OUT COUNTS<br>M = MINUTES |

FIGURE 9




(JAMMA)

FIGURE 10