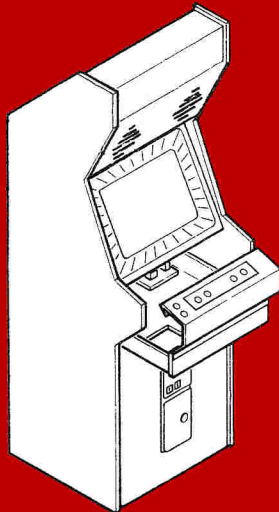




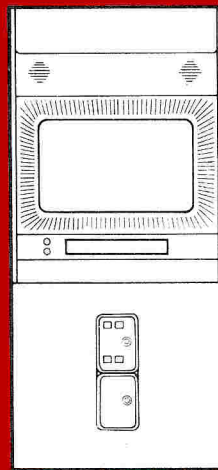
UNIVERSAL VIDEO HARDWARE SYSTEM

JAMMA COMPATIBLE

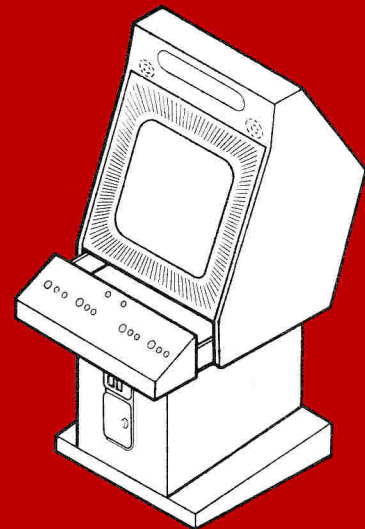
OWNER'S MANUAL



HS-2



HS-1



HS-3 AND HS-4

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INTRODUCTION

This manual contains step-by-step instructions, wiring diagrams, and suggestions to assist in preparing and producing a professional game.

Study this manual thoroughly before beginning the Kit Game installation.

The card edge connector harness provides additional wires to the control panel for installation of multiple joystick and push button controls.

Additional spare parts are available through your local Dynamo Corporation distributor.

The Dynamo "JAMMA COMPATIBLE" Universal Video Hardware System may be adapted for use to any vertically or horizontally displayed video game. The cabinet is shipped in a vertical display mode in HS-1 and HS-2 models and in the horizontal display mode in HS-3 and HS-4 models.

The name "JAMMA" stands for "JAPANESE AMUSEMENT GAME MANUFACTURERS ASSOCIATION". All members of the Association have agreed to use a standard pin-out for the main card edge connector on the PC Boards of games manufactured by "JAMMA" members.

Consequently, Dynamo Corp. has modified the Universal Video Hardware Systems main harness to accept and be compatible with all "JAMMA" Standard Game PC Boards. This will greatly facilitate the installation of "JAMMA" Kit Games into the Dynamo Universal Video Hardware System cabinet.

In the event the main card edge connector has a non-Jamma pin-out, you may purchase a Solder Interface Board (part no. H-52) to connect the kit PC Board to the system.

However, no soldering is necessary if you purchase an exclusive copyrighted Dynamo Interface Wiring Board, Part No. 1838, to interface with Dynamo Non-Jamma Universal Hardware System Main Wire Harness, produced prior to 1988, and Part No. 1838-B to interface with Dynamo Jamma Compatible Universal Hardware System Main Wire Harness currently being produced (designated Dynamo/Jamma on 56 pin connector of main harness). You will also need to purchase a Wire Installation Tool (part no. H-35). All parts and components are available at your local Dynamo distributor.

MODEL PREPARATION

CABINET PREPARATION

Cabinet side panels should be thoroughly cleaned before applying the Kit Game side graphics.

SIDE GRAPHIC APPLICATION

1. Spray a mild soap and water solution to the cabinet area where the side graphics are to be applied.
2. Remove the protective backing from the decals.
3. Position decals into place.
4. With a soft squeegee, and starting from the center of the decal, slowly press out excess soap solution until a smooth finish is achieved.
5. Before handling, allow to dry for two to three hours.

MONITOR PREPARATION

1. Determine video display system of game to be installed and position monitor accordingly.
2. For monitor position changes refer to Figure 1 and as follows:
 - a. Open control panel.
 - b. Remove glass (plexiglass), graphic border, wooden border, and cardboard bezel.
 - c. Disconnect the three plugs from the monitor assembly.
 - d. Remove the four screws attaching monitor mounting board to cabinet.
 - e. Rotate monitor mounting board and monitor assembly 90 degrees vertically or horizontally as applicable.
 - f. Install the four screws.
 - g. Connect the three plugs to the monitor assembly.

**DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEM
MODELS HS-1, HS-2, HS-3, AND HS-4**

MONITOR CONVERSION

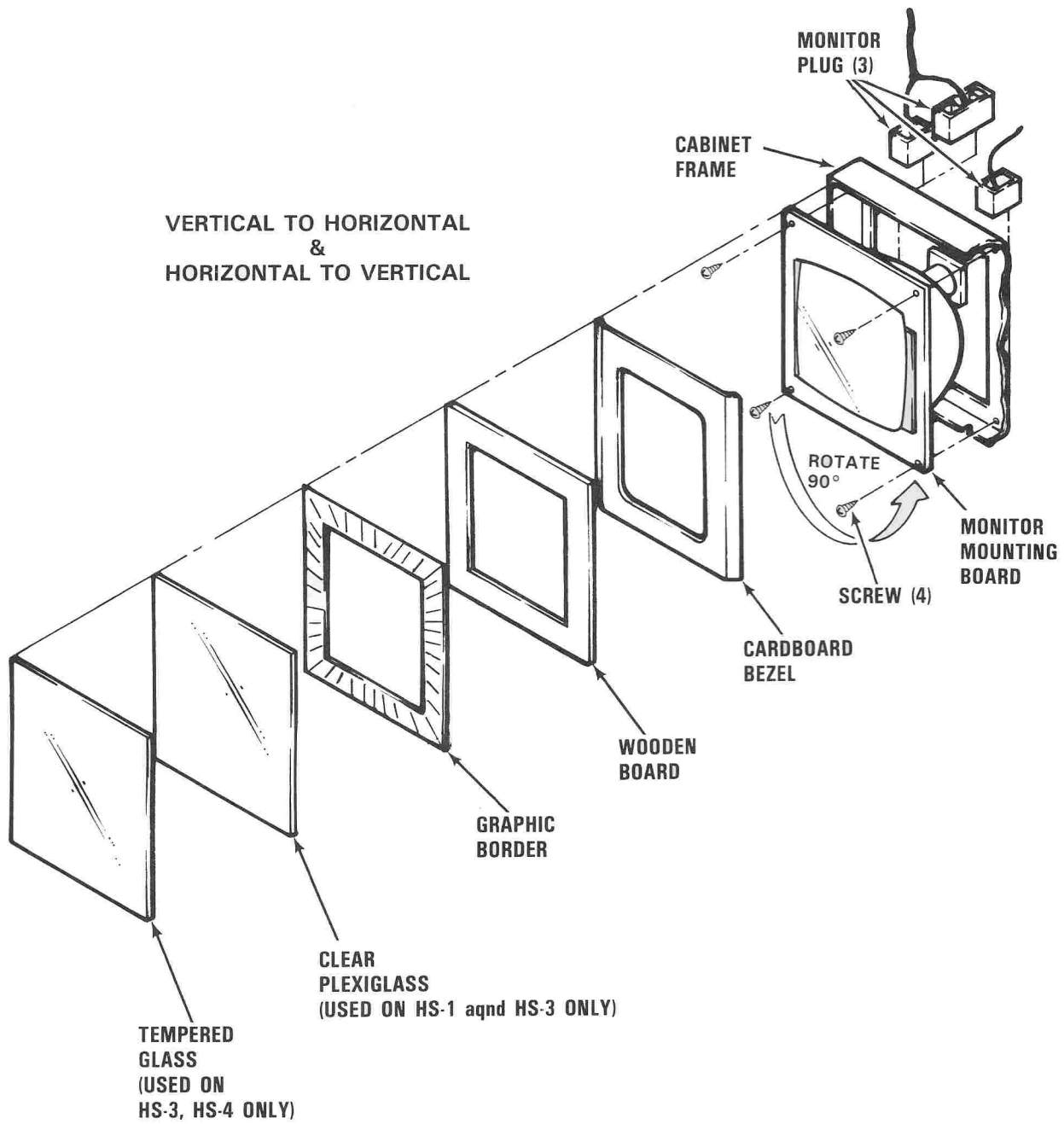


FIGURE — 1

CONTROL PANEL PREPARATION HS-1, HS-2, HS-3, AND HS-4

Method 1 — Customer can use the Universal insert for quick conversion to current game system. A Universal insert is used, being modified by customer decals and Kit Games controls.

Method 2 — Allows customer to use a universal wrap on the control panel using customer Kit Game controls installed into selected predrilled universal insert holes.

Method 3 — Allows customer, using a blank insert and customer wrap, to select their own configuration and drill their own hole patterns.

Method 4 — Applies to HS-3 and HS-4 models only. It utilizes predrilled holes on the control panel from which the customer may select the hole pattern required.

CONTROL PANEL PREPARATION MODELS HS-1 AND HS-2

Control panels may be prepared by three methods:

METHOD 1 — UNIVERSAL CONTROL PANEL INSERT PREPARATION

Removal of the main control panel from the cabinet is NOT required to perform Game Kit Installation. Refer to Figures 2 and 3.

Included with the Dynamo System is a universal control panel insert.

The metal insert can be used for selecting most existing control configurations. Blank metal inserts are also available for universal control configurations. These blank inserts require drilling.

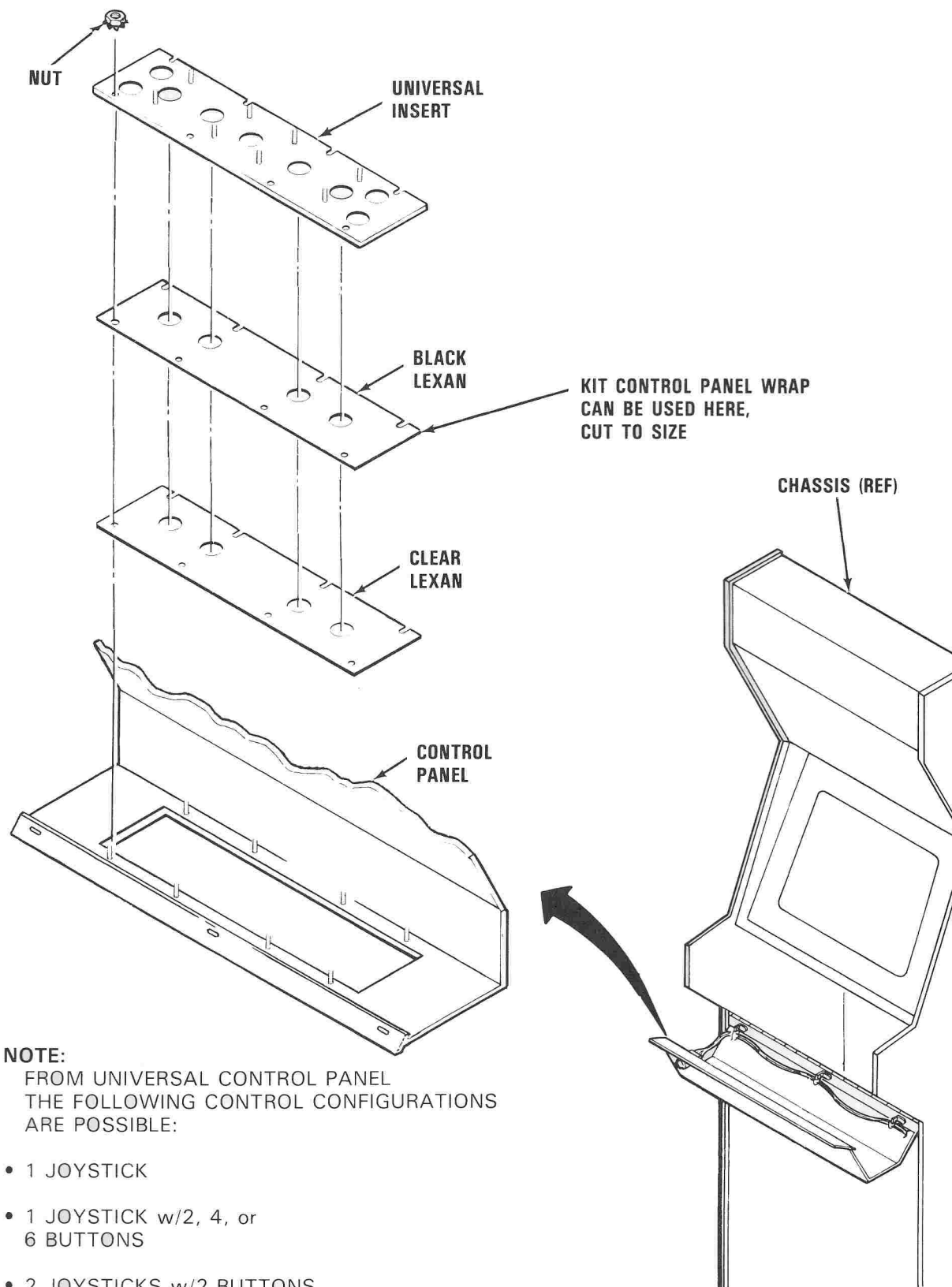
To install the insert, perform the following:

1. Select holes to be used in universal control panel.
2. Spray the metal insert with 3M "77" adhesive spray.
3. Apply black lexan to insert.
4. Using a sharp X-ACTO knife cut out selected hole pattern in black lexan.
5. Select decals for Kit Game controls.
6. Peel adhesive backing.
7. Ensure decal positions allow room for button placement over the diecut area.
8. Apply decals approximately 1/8-inch from holes.
9. Using 3M "77" spray adhesive, hold can approximately 18 inches from insert and spray a light mist once over decals and black lexan.
10. Place clear lexan overlay over decals and smooth surface with hand.
11. Using an X-ACTO knife, carefully cut out Kit Game control positions in clear lexan. Ensure holes in clear lexan are positioned the same as in the black lexan.

12. Install Kit Game controls on the covered control panel insert.
13. Attach wire harness terminals to button and joystick controls.
14. Install universal insert to control panel of cabinet and connect Kit Game harness to main harness connectors.
15. Tie down harness and excess wiring.

DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
MODELS HS-1 AND HS-2

UNIVERSAL CONTROL PANEL INSERT



NOTE:
FROM UNIVERSAL CONTROL PANEL
THE FOLLOWING CONTROL CONFIGURATIONS
ARE POSSIBLE:

- 1 JOYSTICK
- 1 JOYSTICK w/2, 4, or 6 BUTTONS
- 2 JOYSTICKS w/2 BUTTONS
- 2, 4, or 6 BUTTONS

FIGURE — 2

**DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
MODELS HS-1 AND HS-2**

**UNIVERSAL CONTROL PANEL INSERT
(PREPARATION METHOD 1)**

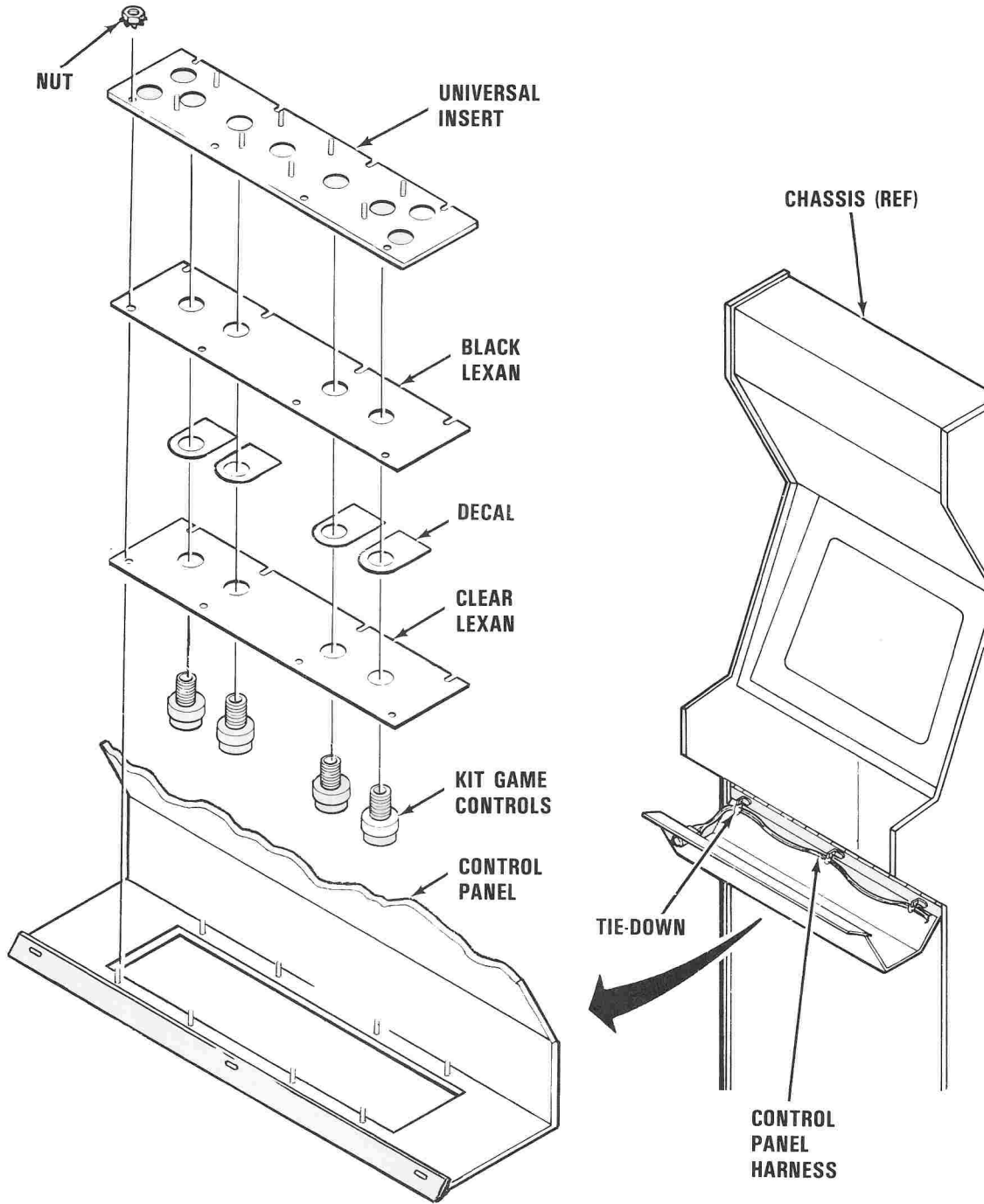


FIGURE — 3

METHOD 2 — UNIVERSAL CONTROL PANEL PREPARATION

Refer to Figure -4.

1. Install universal control panel insert into control panel utilizing existing studs and eight nuts provided.
2. Lay in the cardboard filler insert.
3. Cover entire panel with control panel covering supplied with kit; following kit instructions.
4. Using an X-acto knife, cut out selected holes in covering wrap for control configuration selected.
5. Apply button and joystick decals to the covered insert by peeling backing and applying where desired. Be sure decals are positioned to allow room (approx 3/8-inch) for button placement over the diecut area.
6. Lay 1/8-inch thick plexiglass overlay on panel and mark holes to be drilled; drill holes in plexiglass to correspond with holes selected for controls.
7. Drill six 5/16-inch diameter mounting holes.
8. Bolt plexiglass covering to control panel as shown in Figure -4, using six No. 10-24 carriage bolts.
9. Install buttons and joystick controls on panel through holes selected.
10. Attach wire harness terminal to button and joystick controls and insert harness connector into main harness connector.

DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
MODELS HS-1 AND HS-2

UNIVERSAL CONTROL PANEL INSERT
(PREPARATION METHOD 2)

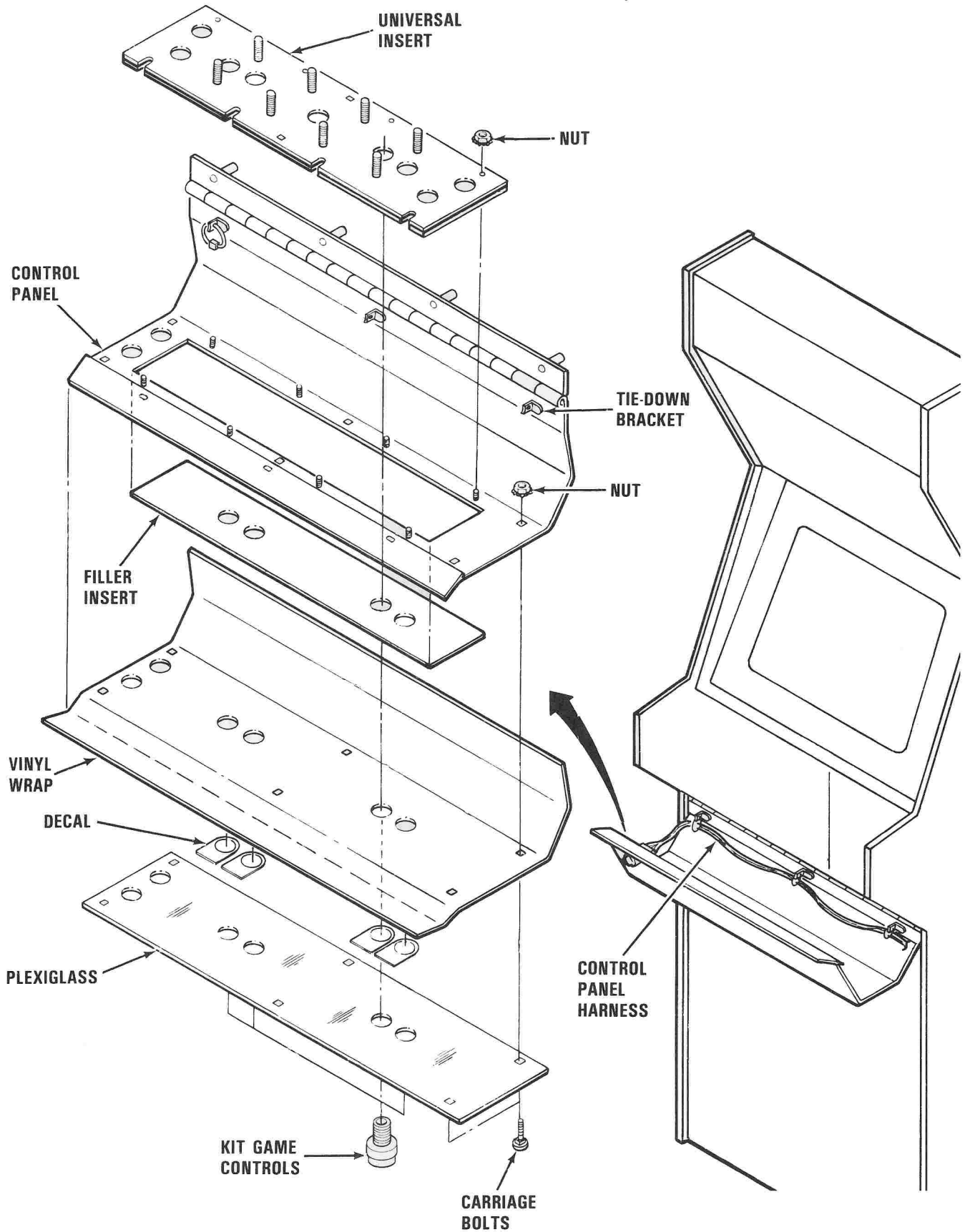


FIGURE — 4

METHOD 3 — BLANK INSERT AND VINYL WRAP PREPARATION

Refer to Figure -5.

1. Using blank insert, drill on the preferred hole configuration.
2. Spray insert with 3M“77” adhesive spray.
3. Apply black lexan insert.
4. Using sharp X-ACTO knife cut out selected hole pattern in lexan.
5. Select decals for Kit Game controls.
6. Peel adhesive backing.
7. Position decals to allow 1/8-inch distance from holes.
8. Apply decals.
9. Use 3M“77” spray adhesive and spray a light mist once over decals and black lexan.
10. Place clear lexan overlay over decals and smooth with hand.
11. Using an X-ACTO knife carefully cut out Kit Game controls positions in clear lexan.
12. Install Kit Game controls into insert.
13. Apply vinyl wraps to universal control panel.
14. Cut vinyl wrap 1-inch away from window edge.
15. Cut corners with angle cuts.
16. Cut slots at each screw position and fold over the 1-inch edge of vinyl.
17. Install insert into universal control panel utilizing eight nuts.

**DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
MODELS HS-1 AND HS-2**

**BLANK INSERT AND VINYL WRAP PREPARATION
(PREPARATION METHOD 3)**

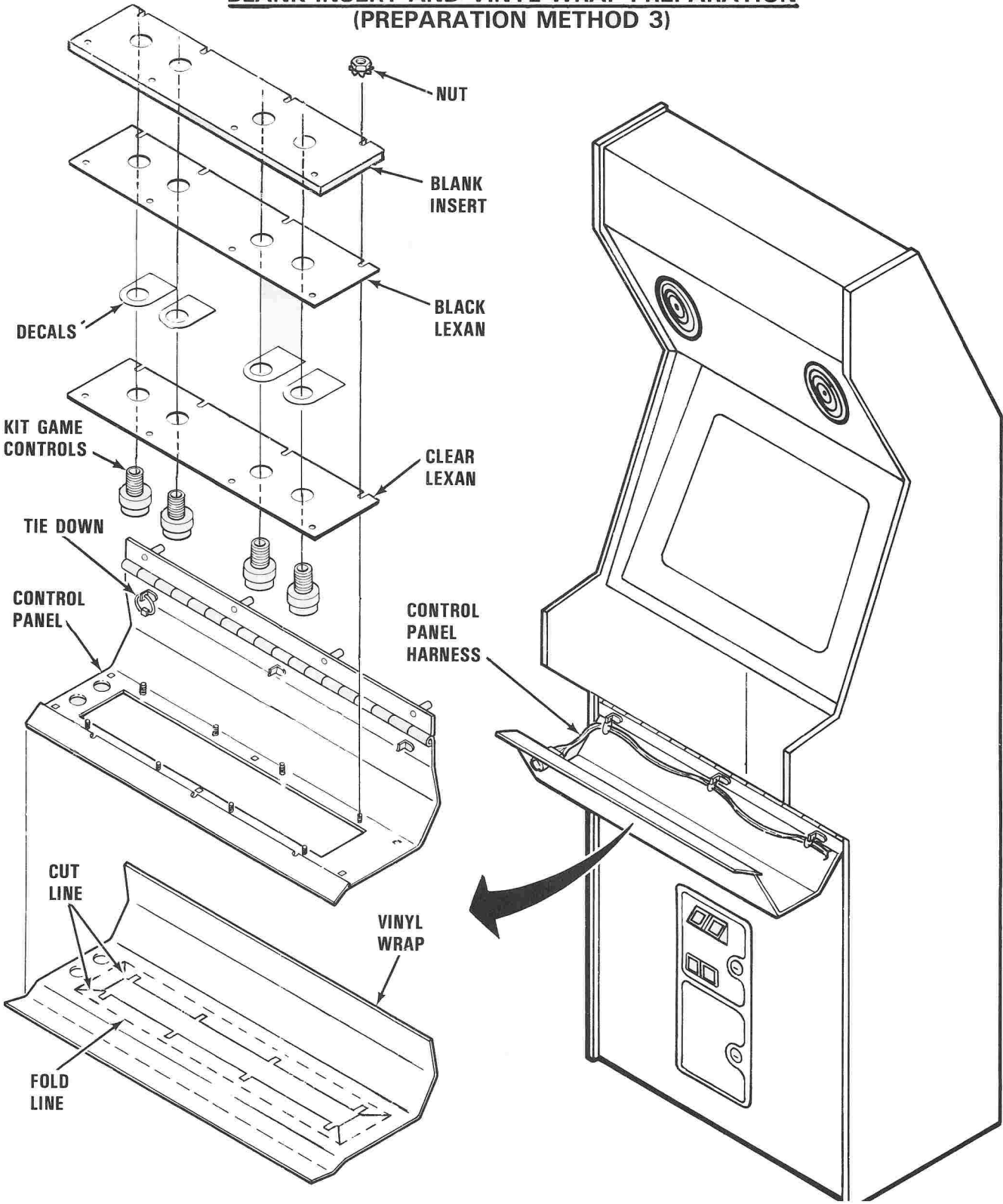


FIGURE — 5

METHOD 4 — UNIVERSAL CONTROL PANEL PREPARATION — MODELS HS-3 AND HS-4

Refer to figure -6.

1. Lay black lexan over hole pattern on control panel.
2. Cut out selected hole configuration in black lexan.
3. Apply decals at selected holes on black lexan.
4. Position plexiglass on top of lexan and bolt in place on control panel using six carriage bolts.
5. Drill out selected control holes thru plexiglass.
6. Install controls.

DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
MODELS HS-3 AND HS-4

UNIVERSAL CONTROL PANEL PREPARATION
(METHOD 4)

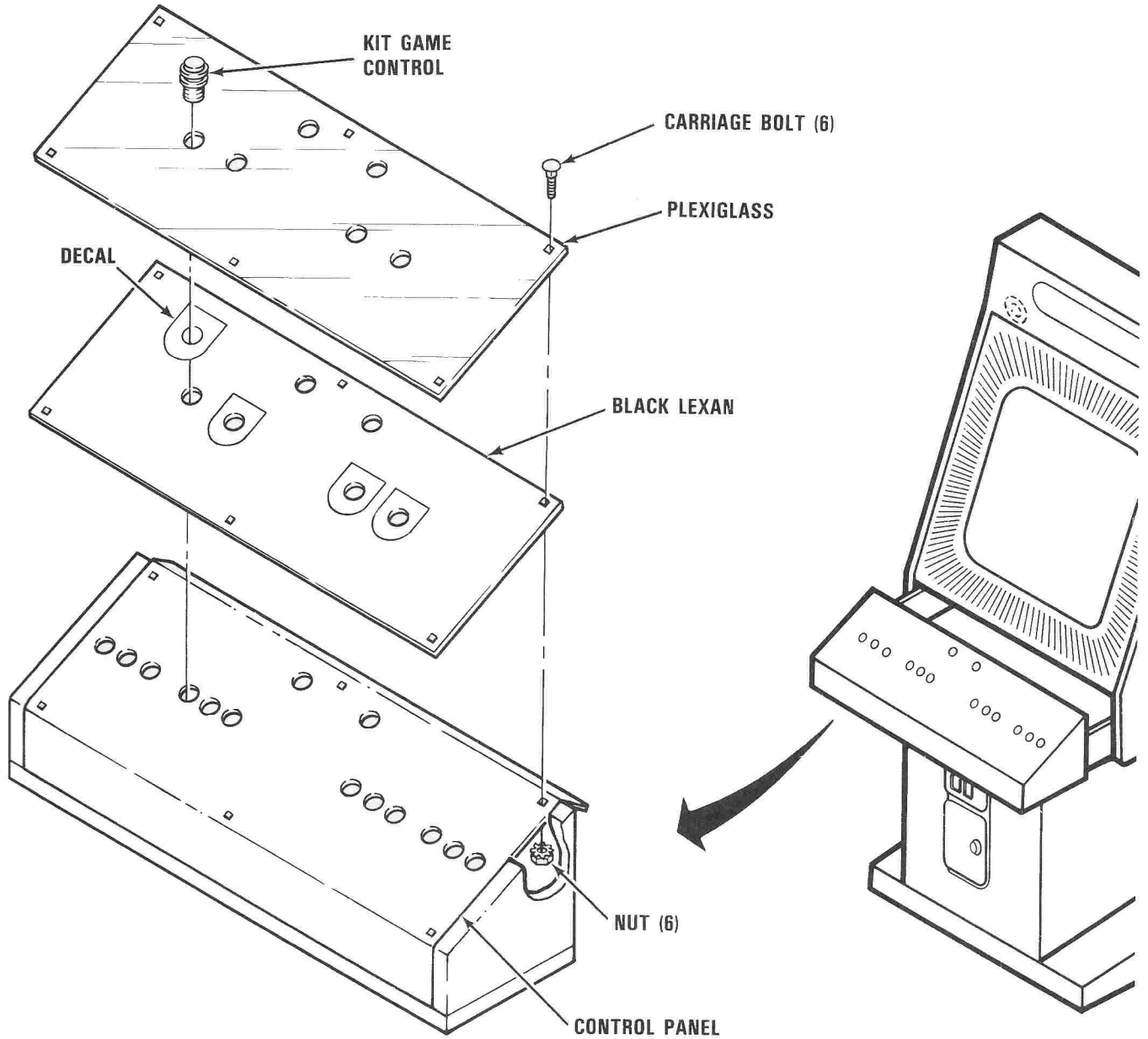


FIGURE — 6

MARQUEE PREPARATION — MODELS HS-1 AND HS-2

Refer to Figure -7.

1. The Kit Game marquee may need to be cut to fit the Dynamo cabinet. If the Kit Game contains a mylar marquee overlay, slowly remove backing as it is applied it to a clear plexiglass marquee panel cut to fit this cabinet.
2. Gently trim excess around the edges with an X-ACTO knife.
3. If a plexiglass marquee is supplied with the Kit Game it may need to be cut to fit the cabinet. Do not remove the protective masking until this is done. Be sure to protect the slik-screened side of the marquee from any surface which may mark or scratch the finish.
4. Marquee may be cut by using a scribing knife or a sturdy craft knife. Using the clear marquee plexiglass as a guide, place the clear panel over the marquee and hold firmly in place. Draw the scribe several times along the clear panel edge using firm even pressure.
5. Hold the marquee rigidly under a straight edge with the scribed mark hanging just over the edge of a table. Using a cloth to protect your hands, apply an even sharp downward pressure to break the marquee along the scratched mark. Smooth all corners and sharp edges.
6. If marquee is soft vinyl, then cut vinyl to fit using clear marquee plexiglass supplied with system cabinet as a pattern. Then put the soft vinyl marquee behind the clear plexiglass.

DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
MODELS HS-1 AND HS-2

SLIDE OUT MARQUEE

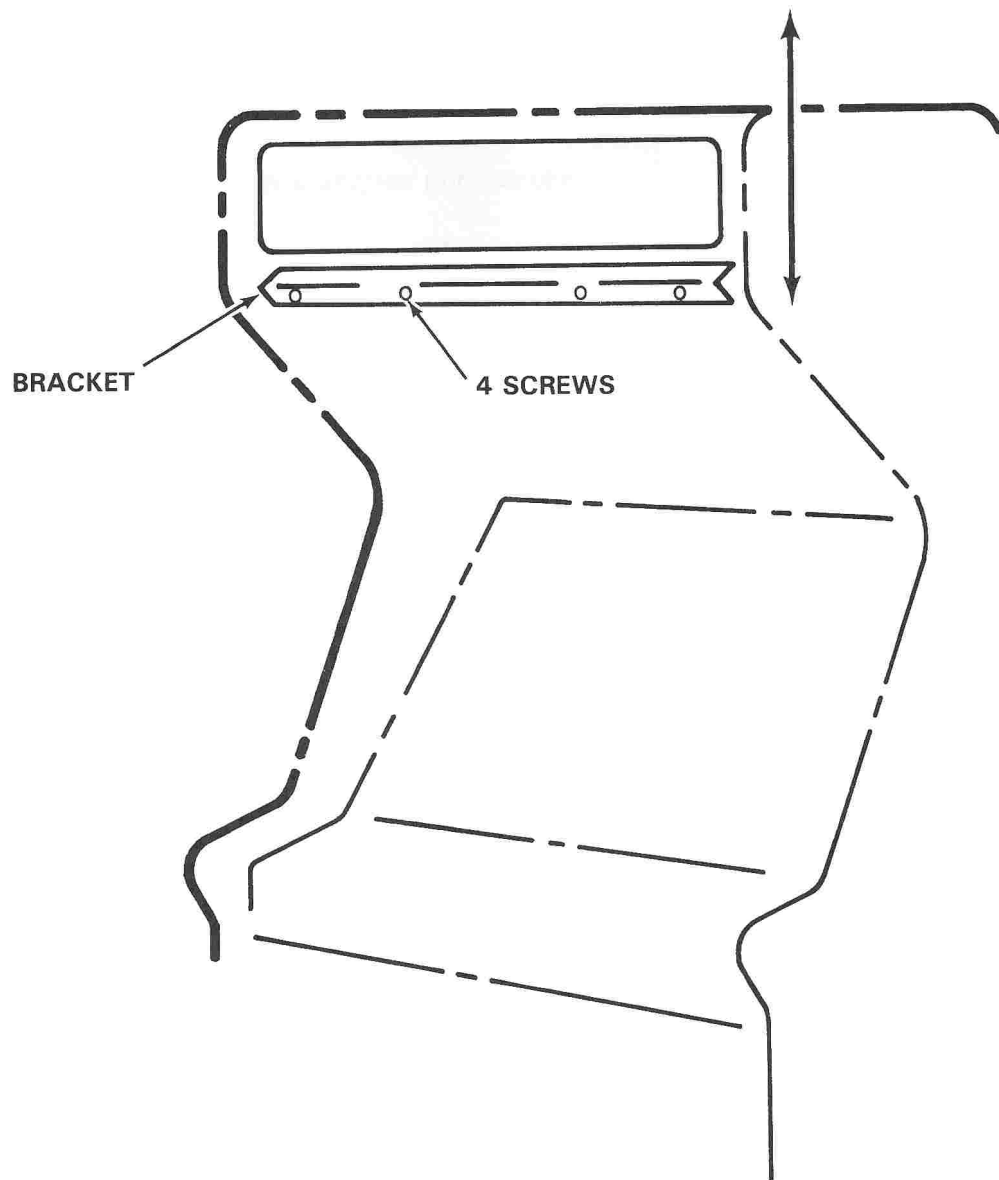


FIGURE — 7

SLIDE-OUT MARQUEE — MODELS HS-3 AND HS-4

Refer to Figure -8.

1. Open control panel drawer.
2. Remove tempered glass and wooden board.
3. Remove three wood screws at top of marquee cover.
4. Loosen screw on clip.
5. Slide in marquee and center.
6. Tighten screw on clip.
7. Reinstall three wood screws at top of marquee cover.

DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
MODELS HS-3 AND HS-4

SLIDE-OUT MARQUEE

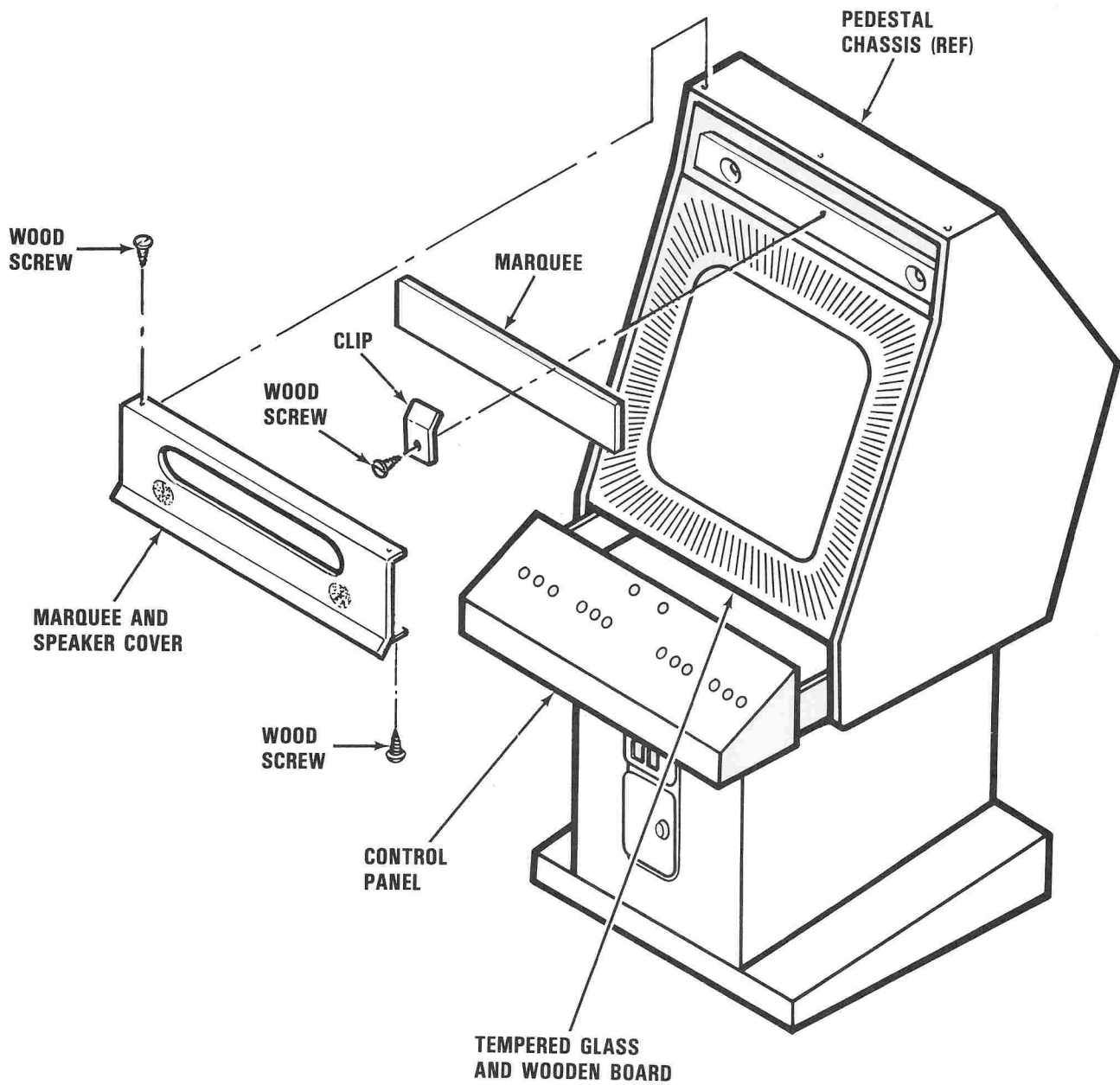


FIGURE — 8

JAMMA KIT INSTALLATION

Refer to Figure -9.

1. If the Kit Game has a "JAMMA" PC Board, the DYNAMO "JAMMA COMPATIBLE" Universal Harness 56 pin double-sided edge connector will insert directly onto the "JAMMA" PC Board card edge. The most commonly known errors made during conversion are wire connections and edge connector insertion. It is therefore of the utmost importance to thoroughly study the edge connector pin configuration, so that mistakes NOT be made during wire hook up.
2. To assist in identifying the numerical and alphabetical side of the system's PC Board edge connector, an illustration with pin configuration is found in Figure -9, which contains 56 pins designated "A" thru "f" and 1 thru 28.
3. Referring to the wiring diagram, Figure -9, the edge connector is keyed for polarization at pins No. 7 and "H".
4. The control panel harness with the two 12 pin Molex connectors was designed to allow bench assembly of the panel insert. The control panel harness is equipped with 20 designated, and 20 ground push-on terminals to accommodate a variety of applications. Do not cut any wire on the control panel, this would destroy the system for future use.

CAUTION: Be careful when connecting the black wires of the game harness; these wires are DC ground and are not to be confused with or connected to the black wires of the cabinet AC circuit. Black wires in an AC circuit are "HOT" and carry a potentially dangerous 120 volts; white is "NEUTRAL" and green identifies earth ground.

5. Illustration of the cabinet ground system, AC power harness, and main harness layout are shown in Figures -10 thru -20.

**DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
MODELS HS-1, HS-2, HS-3, AND HS-4**

**56 PIN EDGE CONN. PIN-OUT CHART
(JAMMA COMPATIBLE)**

WIRE COLOR	SOLDER SIDE			PARTS SIDE	WIRE COLOR
BLACK	GND	A	1	GND	BLACK
BLACK	GND	B	2	GND	BLACK
RED	+5V	C	3	+5V	RED
RED	+5V	D	4	+5V	RED
WHITE	-5V	E	5	-5V	WHITE
YELLOW YELLOW	+12V	F	6	+12V	YELLOW YELLOW
	KEY	H	7	KEY	
	COIN COUNTER 2	J	8	COIN COUNTER 1	BROWN
	COIN LOCK OUT 2	K	9	COIN LOCK OUT 1	RED
WHITE/BLACK	SP (-)	L	10	SP (+)	WHITE
OP. -BLU/BLACK	N.C.	M	11	N.C.	BLUE - OPTION
GREEN	VIDEO GREEN	N	12	VIDEO RED	RED
GRAY	VIDEO SYNC	P	13	VIDEO BLUE	BLUE
RED/BLACK	SERVICE SWITCH	R	14	VIDEO GND	BLACK
OP. - BRN/BLACK	TILT SW.	S	15	TEST SW.	BROWN
	COIN SW. 2	T	16	COIN SW. 1	WHITE
WHITE/GRAY	START SW. 2	U	17	START SW. 1	GRAY
WHITE/VIOLET	2P UP	V	18	1P UP	VIOLET
WHITE/BLUE	2P DOWN	W	19	1P DOWN	BLUE
WHITE/GREEN	2P LEFT	X	20	1P LEFT	GREEN
WHITE/YELLOW	2P RIGHT	Y	21	1P RIGHT	YELLOW
WHITE/ORANGE	2P PUSH 1	Z	22	1P PUSH 1	ORANGE
WHITE/RED	2P PUSH 2	a	23	1P PUSH 2	RED
WHITE/BROWN	2P PUSH 3	b	24	1P PUSH 3	BROWN
GREEN/WHITE	N.C.	c	25	N.C.	BLUE/WHITE
YELLOW/WHITE	N.C.	d	26	N.C.	RED/WHITE
BLACK	GND	e	27	GND	BLACK
OPTION-BLACK	GND	f	28	GND	BLACK-OPTION

FIGURE — 9

DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
 MODELS HS-1, HS-2, HS-3, AND HS-4

MAIN HARNESS WIRING DIAGRAM

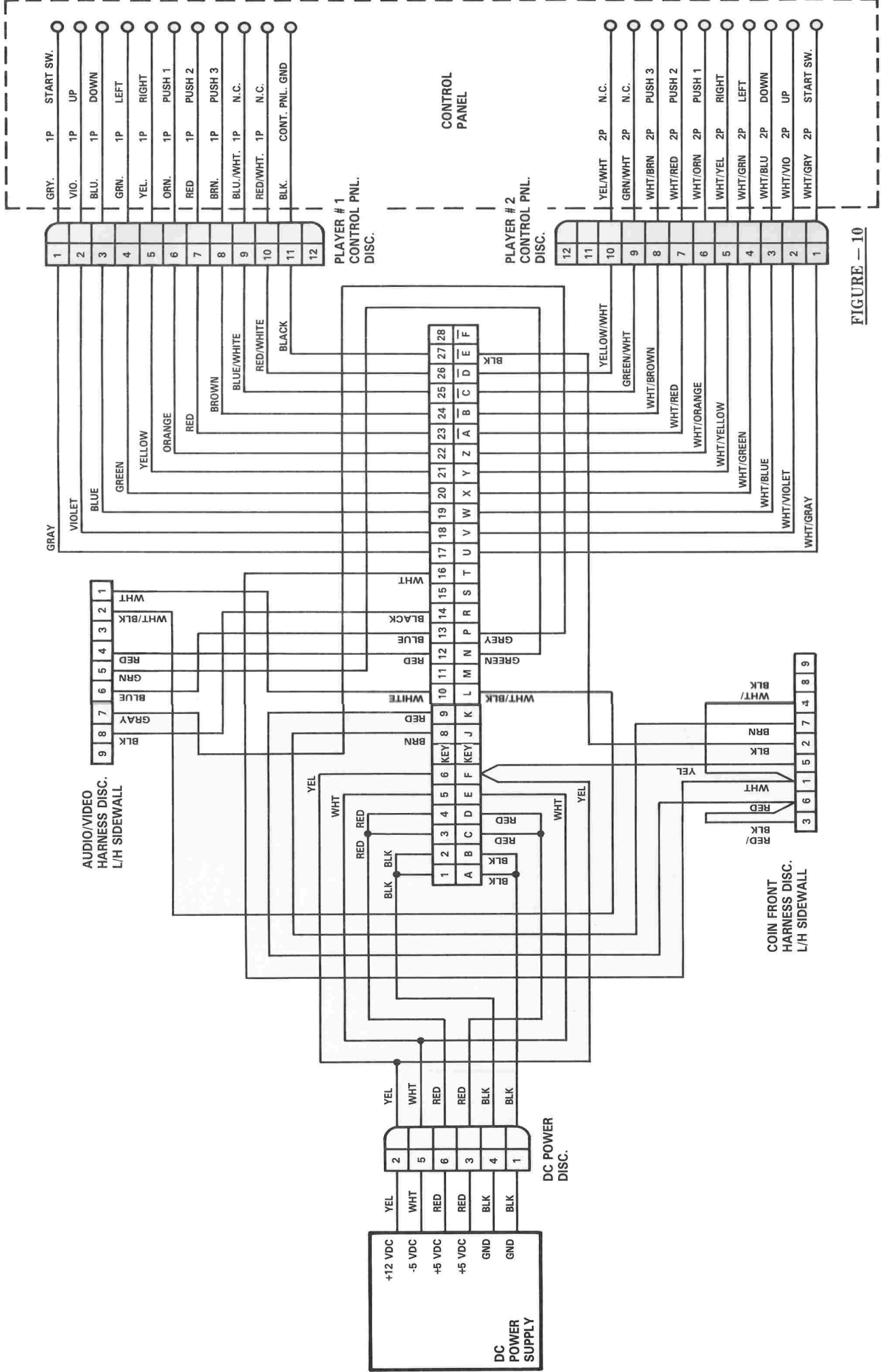
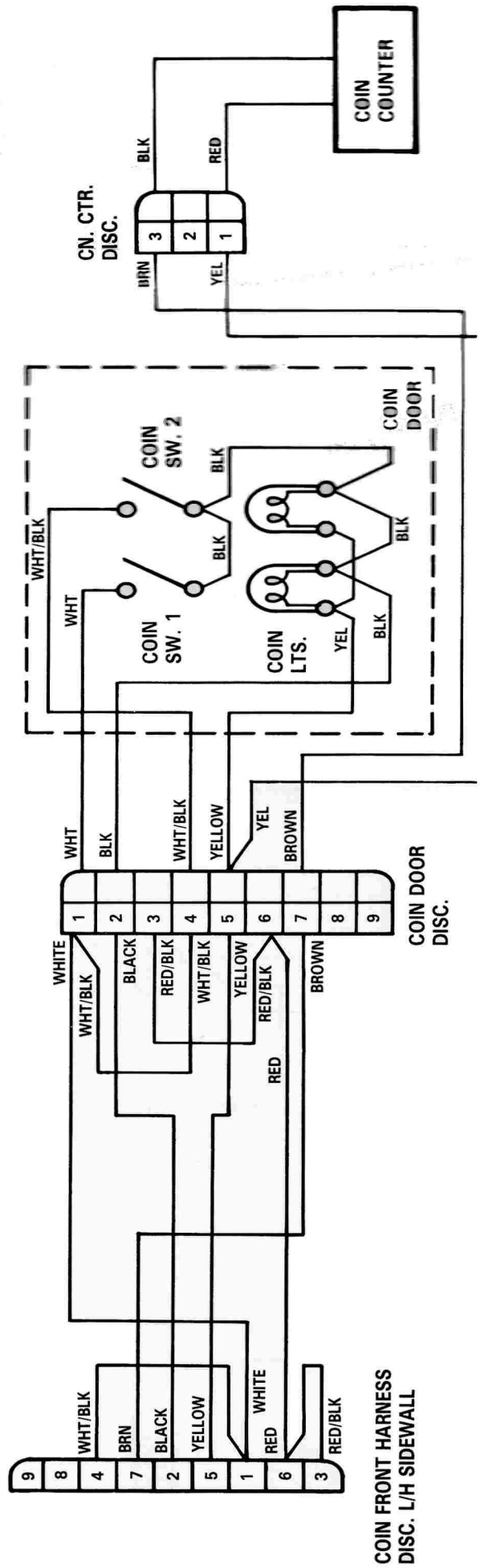


FIGURE — 10

DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
MODELS HS-1, HS-2, HS-3, AND HS-4

COIN FRONT HARNESS WIRING DIAGRAM



**COIN FRONT HARNESS
DISC. L/H SIDEWALL**

DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
 MODELS HS-1, HS-2, HS-3, AND HS-4

SIDEWALL AUDIO/VIDEO HARNESS WIRING DIAGRAM

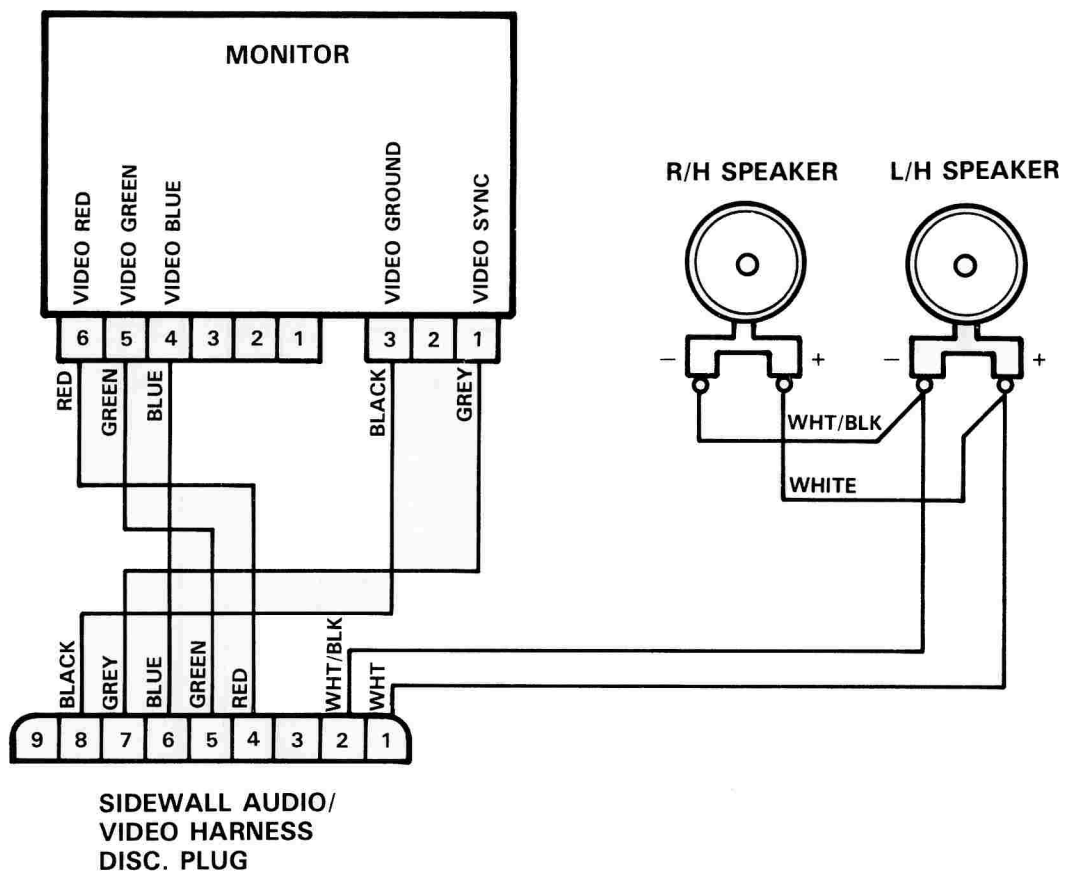
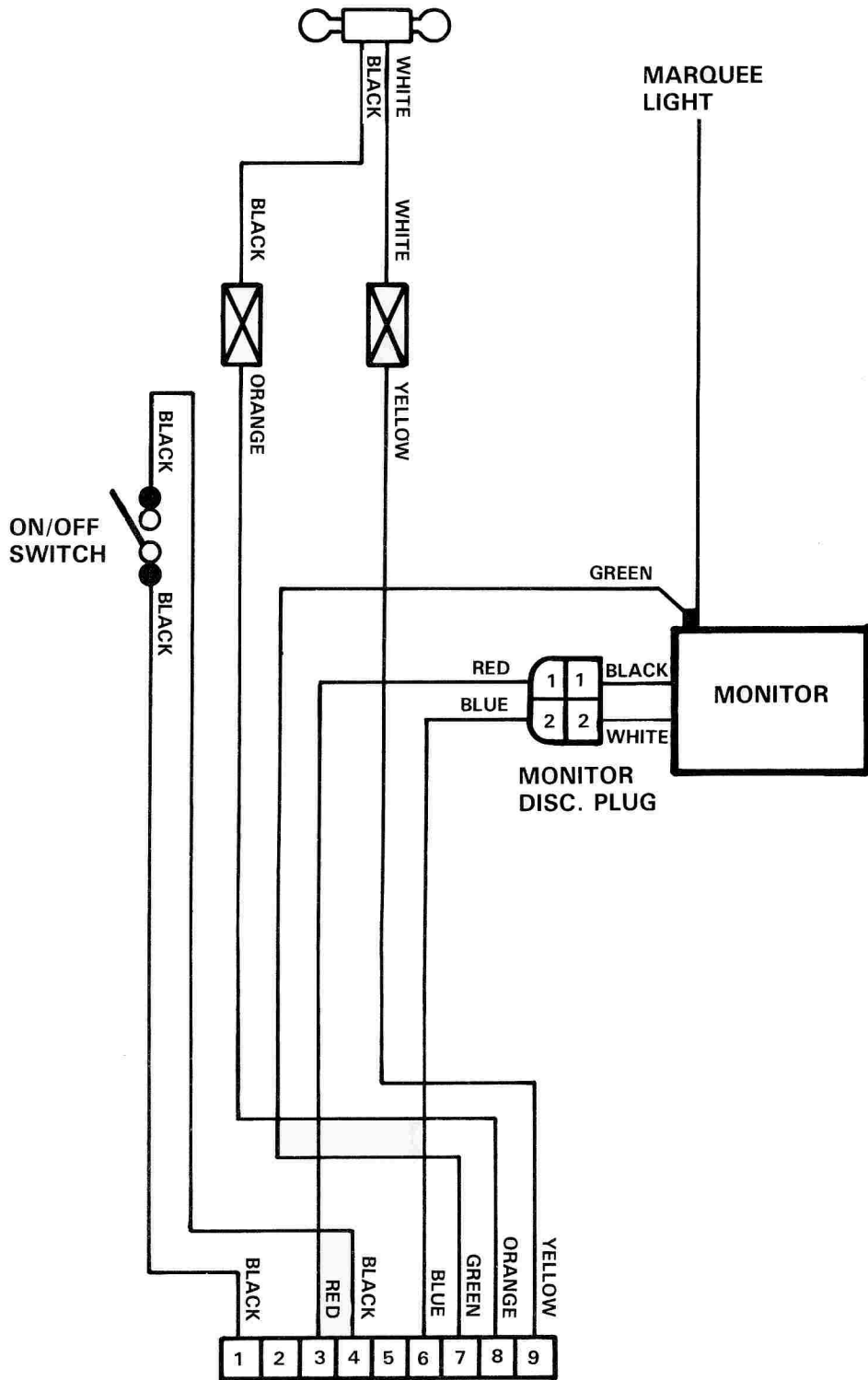


FIGURE — 13

DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
MODELS HS-1, HS-2, HS-3, AND HS-4

SIDEWALL AC AND GROUND HARNESS



**SIDEWALL AC AND
 GROUND DISC. PLUG
 R/H SIDEWALL**

FIGURE — 14

DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
MODELS HS-1, HS-2, HS-3, AND HS-4

AC POWER CORD WIRING DIAGRAM

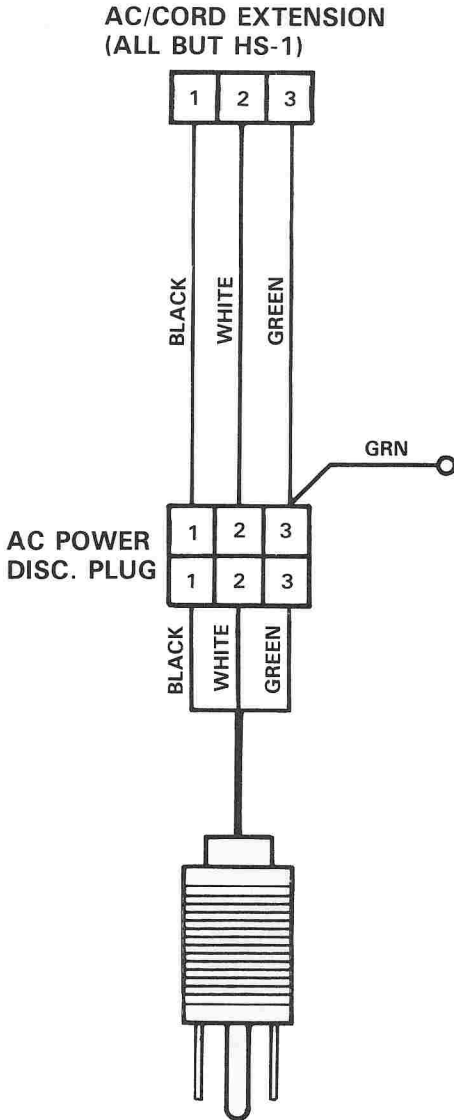


FIGURE — 15

DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
MODELS HS-1, HS-2, HS-3, AND HS-4

TYPICAL GROUND LAYOUT

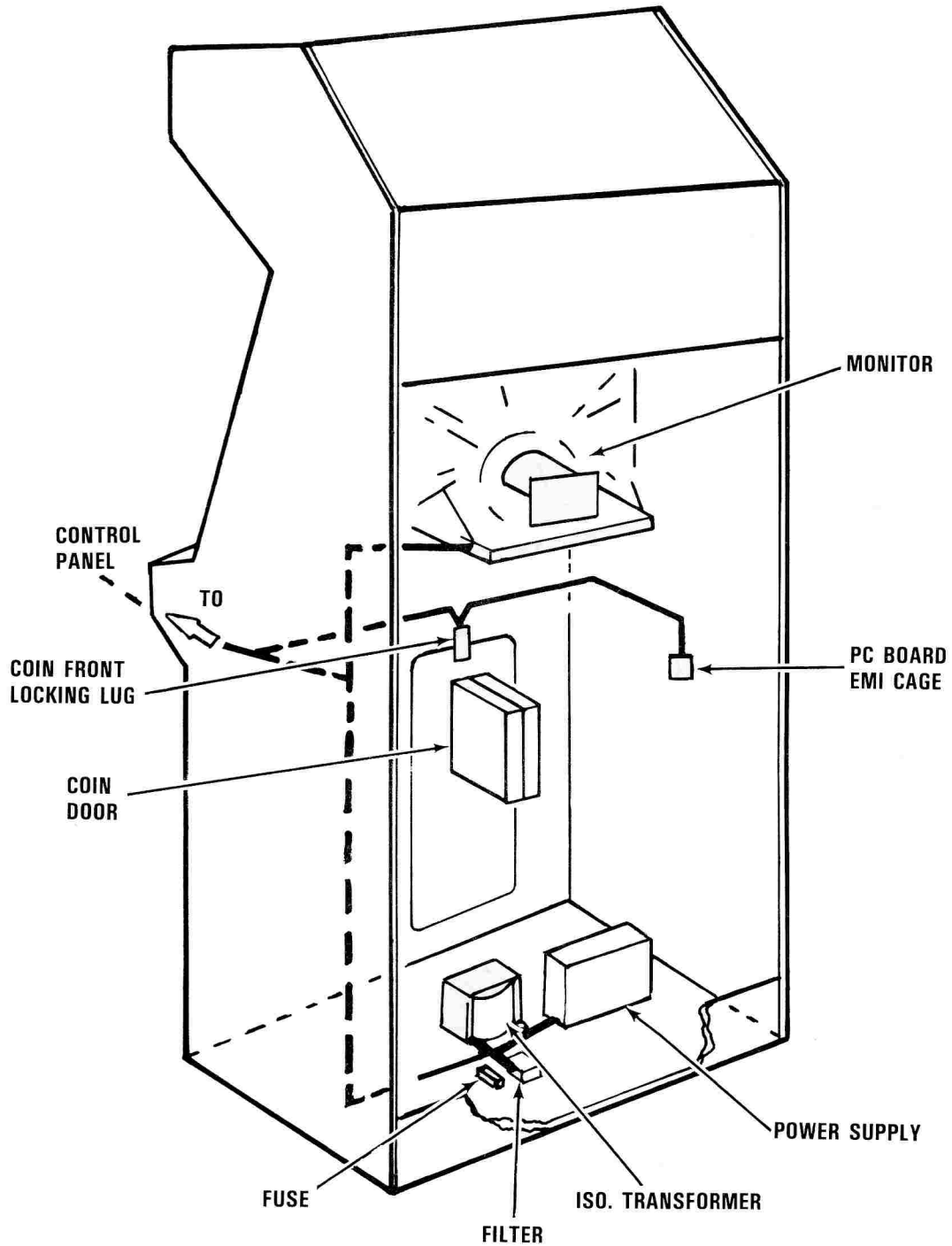
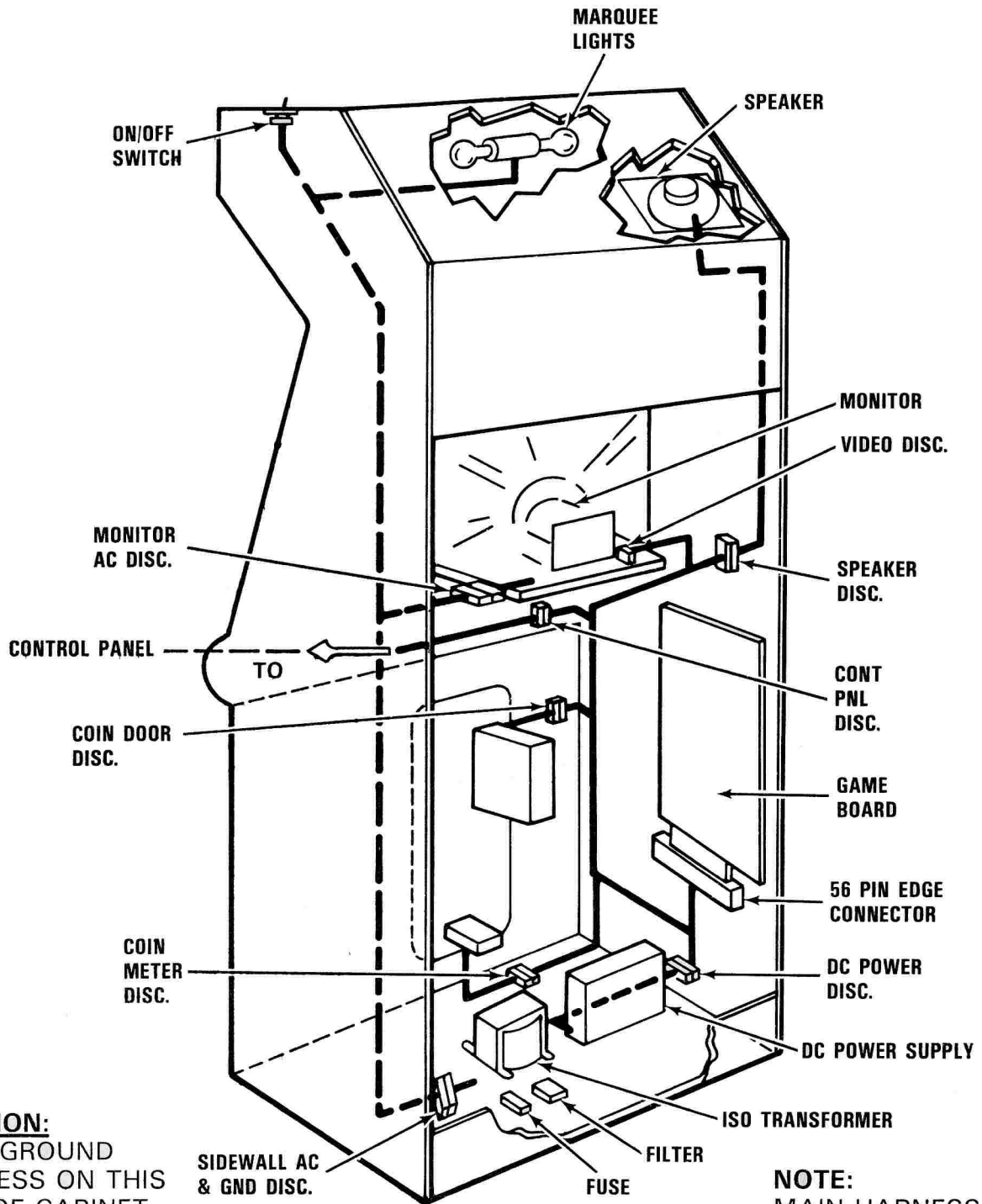


FIGURE — 16

**DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
MODEL HS-1**

MAIN HARNESS AND SIDEWALL AC HARNESS LAYOUT



CAUTION:
AC & GROUND
HARNESS ON THIS
SIDE OF CABINET
120V.

NOTE:
MAIN HARNESS
ON THIS SIDE OF
CABINET 5V-12V.

FIGURE — 17

**DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEM
MODEL HS-2**

MAIN HARNESS LAYOUT

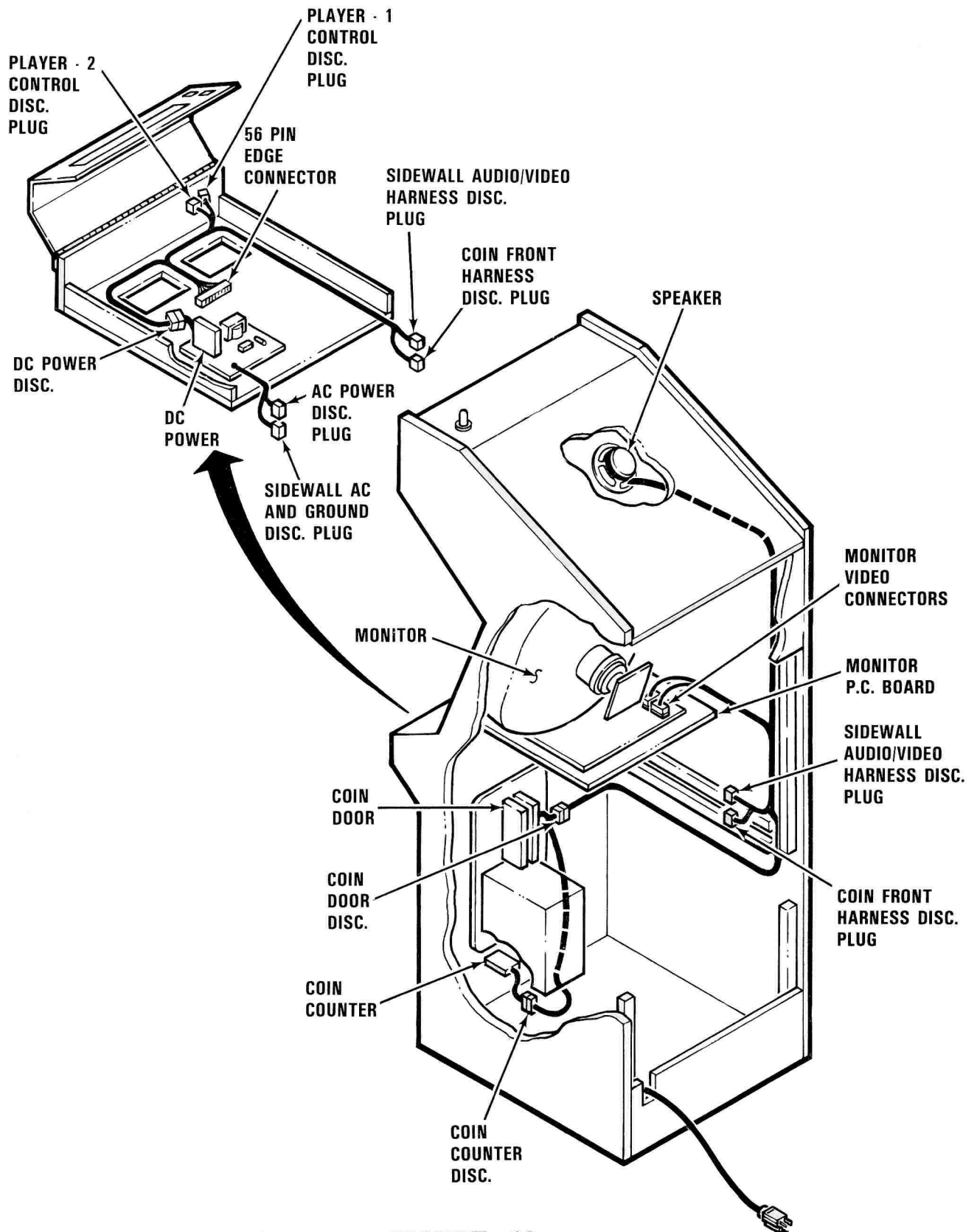


FIGURE - 18

**DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
MODEL HS-2**

SIDEWALL AC AND GROUND HARNESS LAYOUT

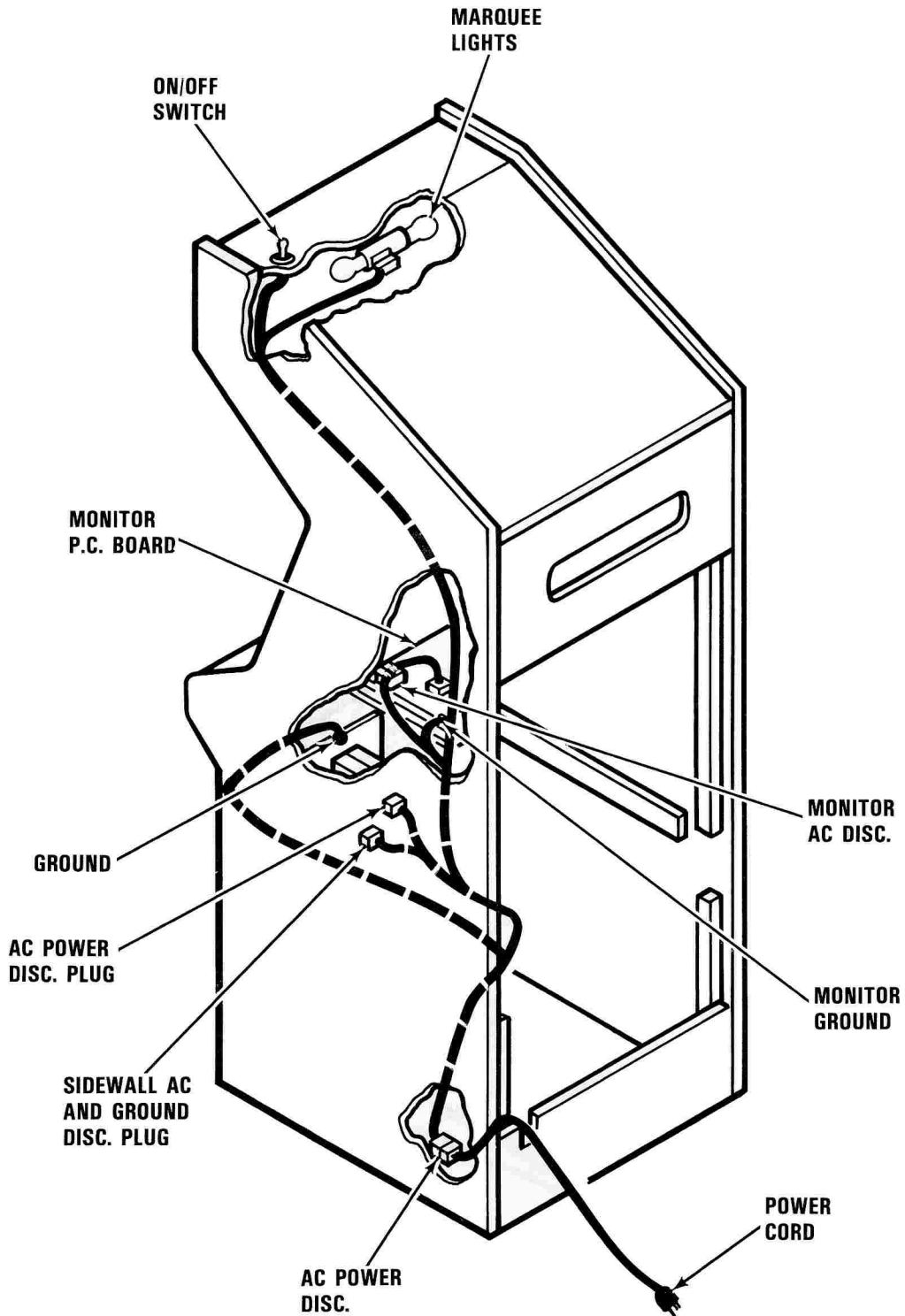


FIGURE — 18 A

**DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
MODELS HS-3 AND HS-4**

MAIN HARNESS LAYOUT

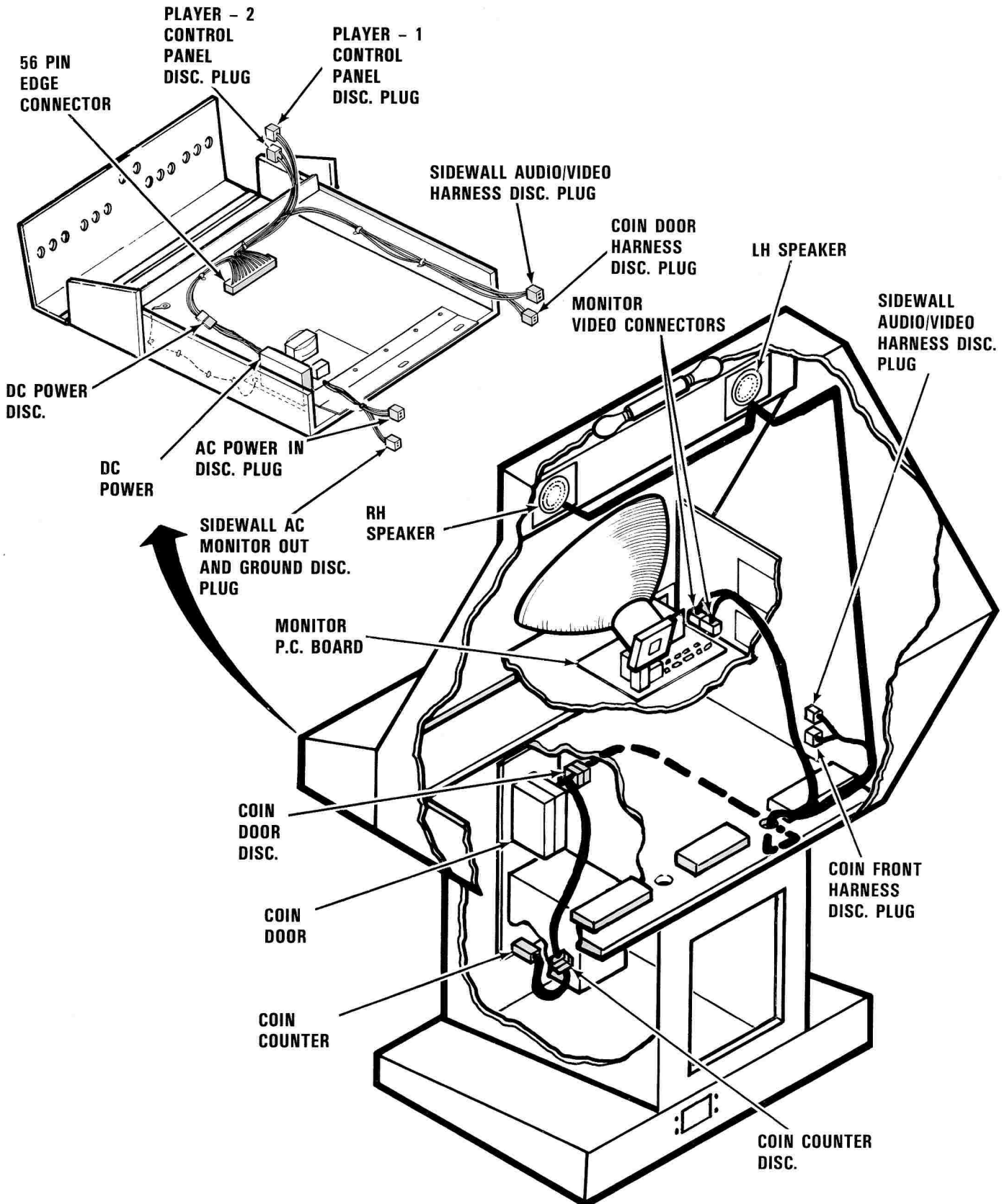


FIGURE — 19

DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
MODEL HS-2

SIDEWALL AC HARNESS LAYOUT

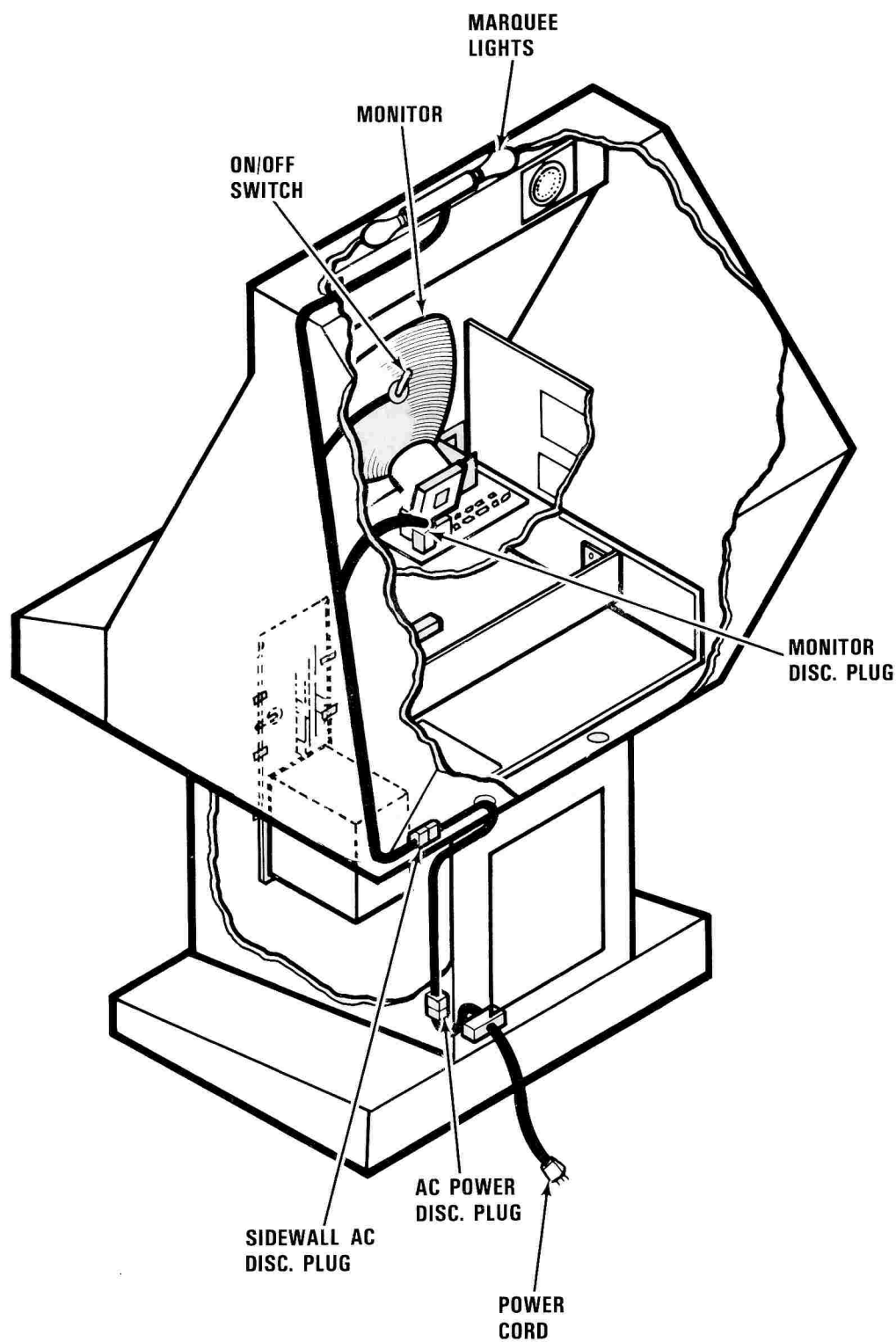


FIGURE — 20

CONNECTING HARNESS INSTALLATION

Solder Interface Board Part No. H-52: **Solder Connections**

Refer to Figure 21.

1. Solder Interface Board is for use ONLY with "NON JAMMA" Kit Game PC Boards.
2. Take a pair of wire cutters and cut the "NON JAMMA" Kit Game Harness wires at an even length approximately nine inches from the Solder Interface Board connector. Using the manual provided with the Kit Game, select the wire for each function and solder the wire to the solder strip.
3. For example, if the wire on pin 7 of the "NON JAMMA" Kit Game Harness is "One Player Start", solder that wire to the solder strip on the Solder Interface Board at pin No. 17 of the DYNAMO 56 pin double-sided PC board edge connector. Refer to Figure -23.
4. Continue to solder the Kit Game Harness wires to the Solder Interface Board until ALL the necessary wires of the "NON JAMMA" Kit Game Harness are attached to the Solder Interface Board.
5. Carefully insert the completed Solder Interface Board into the Dynamo harness 56 pin double-sided edge connector, being careful to align pins No. 1/A and 28/f.
6. The Solder Interface Board may be purchased from Dynamo Corporation.

Interface Wiring Board©: **Wire Insertion Connectors**

The Interface Wiring Board is an exclusive new copyrighted idea from Dynamo Corp. It is designed to make the hardest part of the game conversion, the wiring of a "NON JAMMA" Kit Game, simple and very easy by matching the functions of your Kit Game to the cabinet wiring system. Refer to Figure -22.

DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
HS-1, HS-2, HS-3, AND HS-4

"NON JAMMA" SOLDER INTERFACE BOARD PART NO. H-52

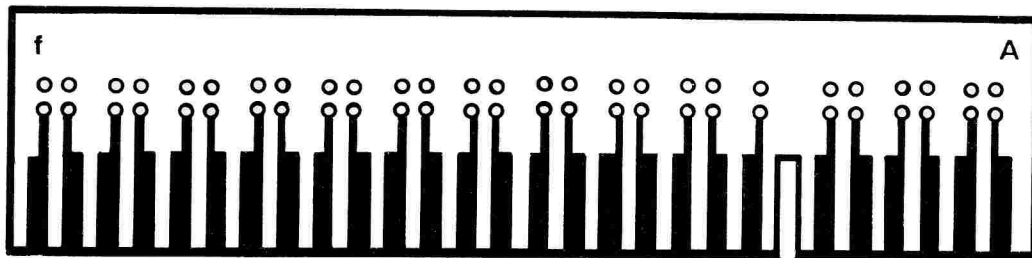
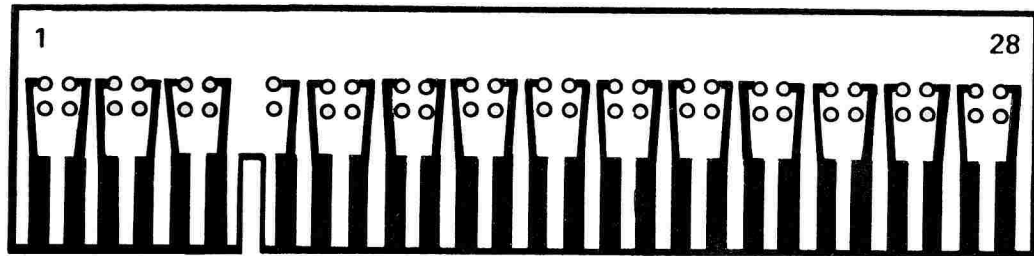


FIGURE — 21

DYNAMO CORP INTERFACE WIRING BOARD ©

INSULATION DISPLACEMENT METHOD (NO WIRING STRIPPING OR SOLDERING IS NECESSARY)

The Interface Wiring Board©, part No. 1838B JAMMA, is available as a parts item from your local Dynamo distributor. A drawing of the Interface Wiring Board is shown in Figure -22, and a sample "NON JAMMA" Kit game wiring diagram is shown in Figure -23. The wire connections are made by the "insulation displacement" method, using a Wire Installation Tool, part No. H35. The tool is available as a parts item from your local Dynamo distributor. Refer to Figure -24.

1. Using a pair of wire cutters cut the "NON JAMMA" Kit Game Harness wires at an even length, approximately nine inches from the Connector.
2. Using the manual provided with the "NON JAMMA" Kit Game, select the wire for each function.
3. Insert the unstripped wire into the barrel of the connector on the Interface Wiring Board, put the tool over the wire and connector with the slot in the tool over the wire and push down. When you hear a "click", the connection is made.
4. All the connectors are labeled. Control panel wires are labeled as to color. Make a note of what color you select for each control panel function in your "NON JAMMA" Kit game service manual. **BE SURE** to connect the color you selected to the correct control on the control panel.

**DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
MODELS HS-1, HS-2, HS-3, AND HS-4**

**DYNAMO CORP INTERFACE WIRING BOARD © PART NO. 1838B
(FOR "NON JAMMA" PC BOARDS)**

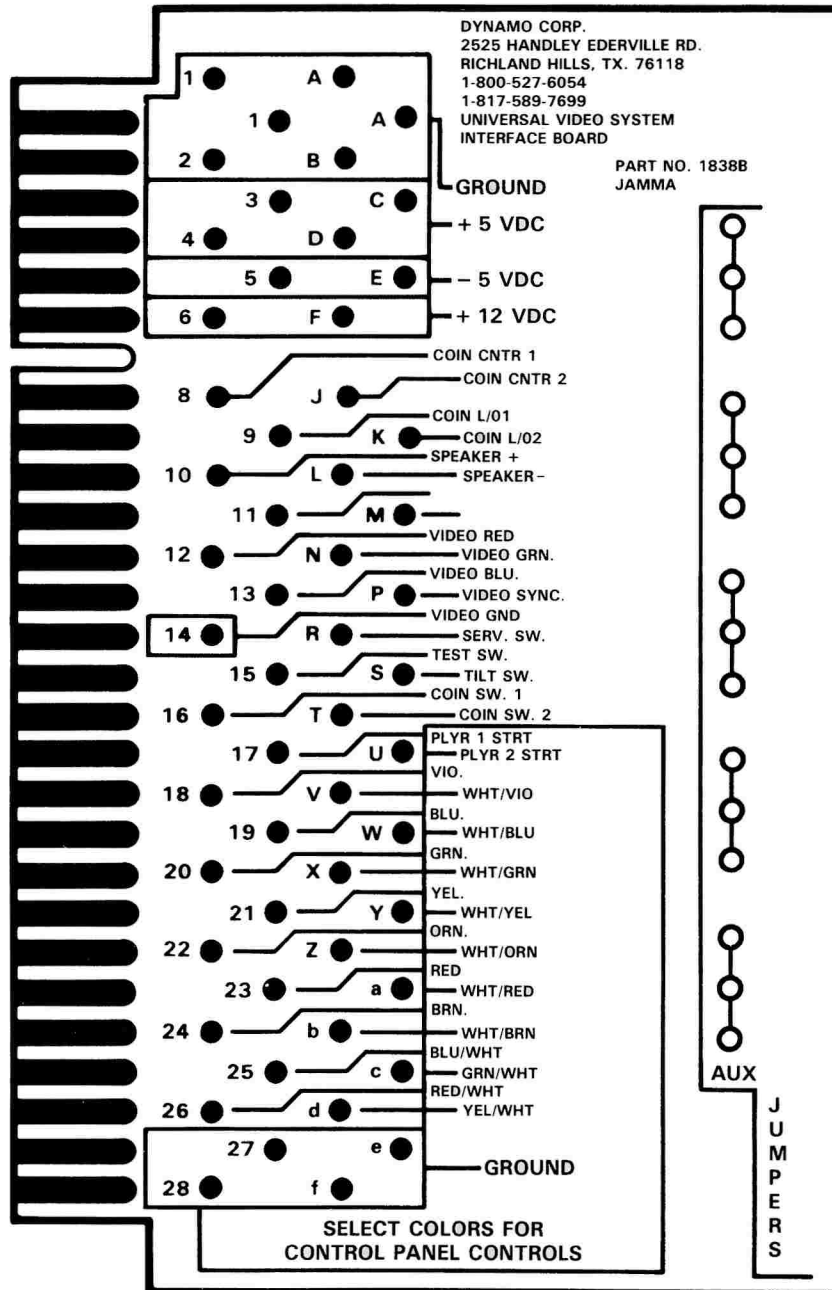


FIGURE — 22

DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
 MODELS HS-1, HS-2, HS-3, AND HS-4

“NON-JAMMA” INTERFACE WIRING BOARD ©
 (SAMPLE WIRING BOARD)

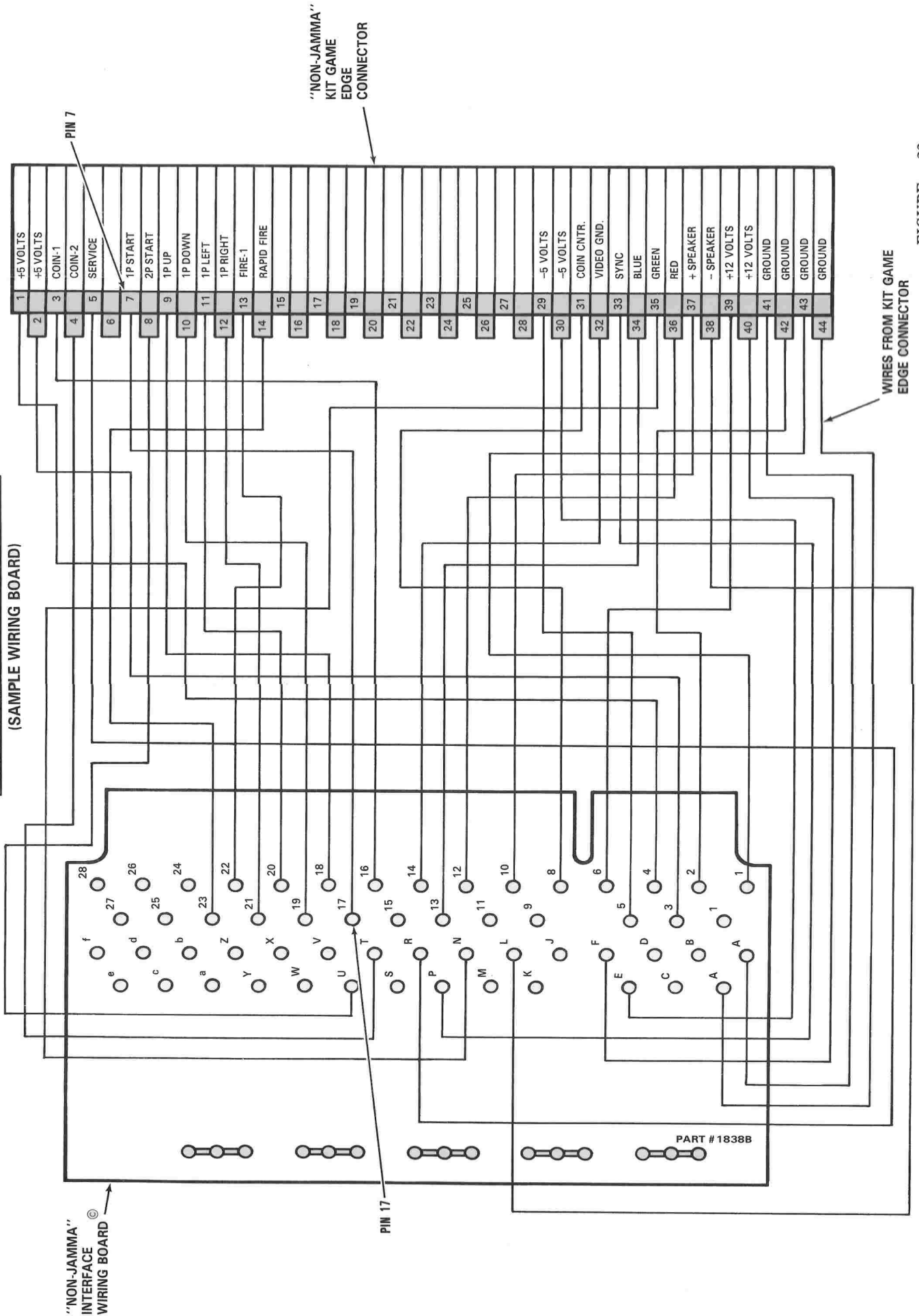
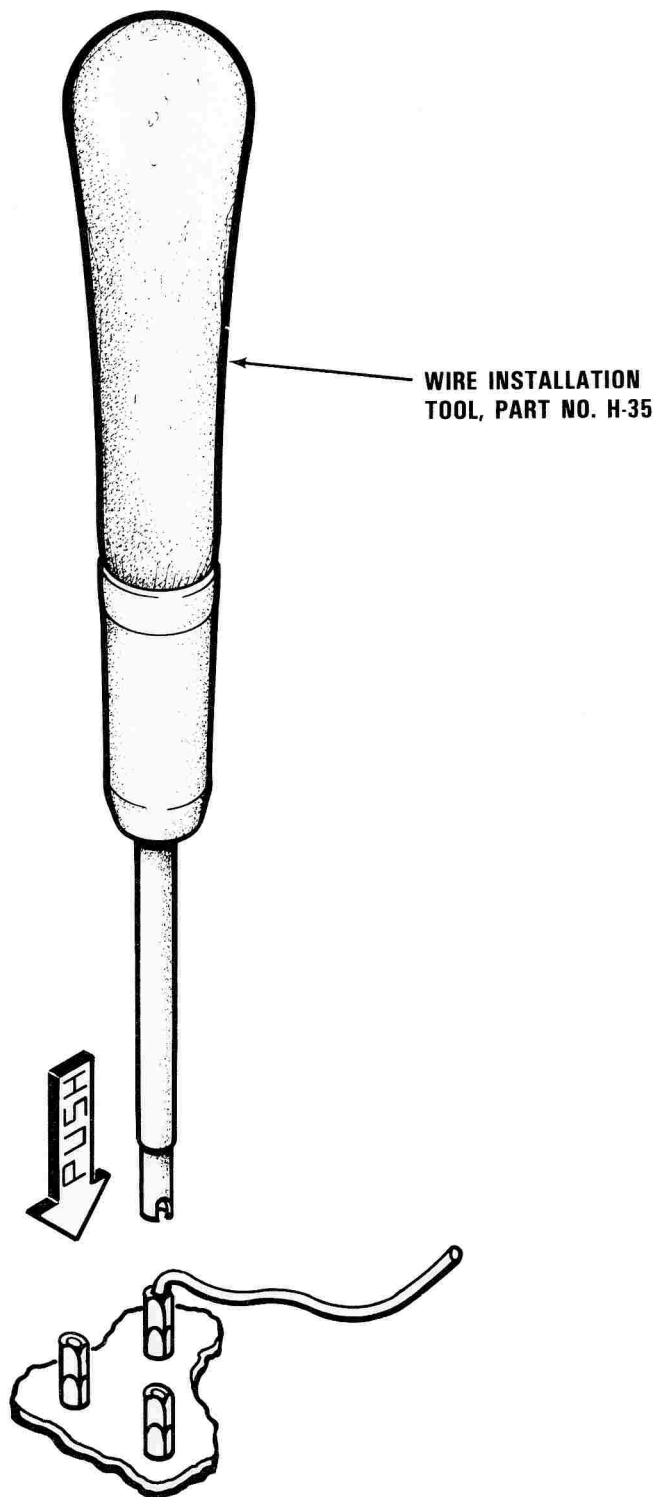


FIGURE — 23

**DYNAMO — UNIVERSAL VIDEO HARDWARE SYSTEMS
MODELS HS-1, HS-2, HS-3, AND HS-4**

WIRE INSTALLATION TOOL, PART No. H35



NOTE: TOOL IS AVAILABLE
AT THE LOCAL
DYNAMO DISTRIBUTOR

FIGURE — 24