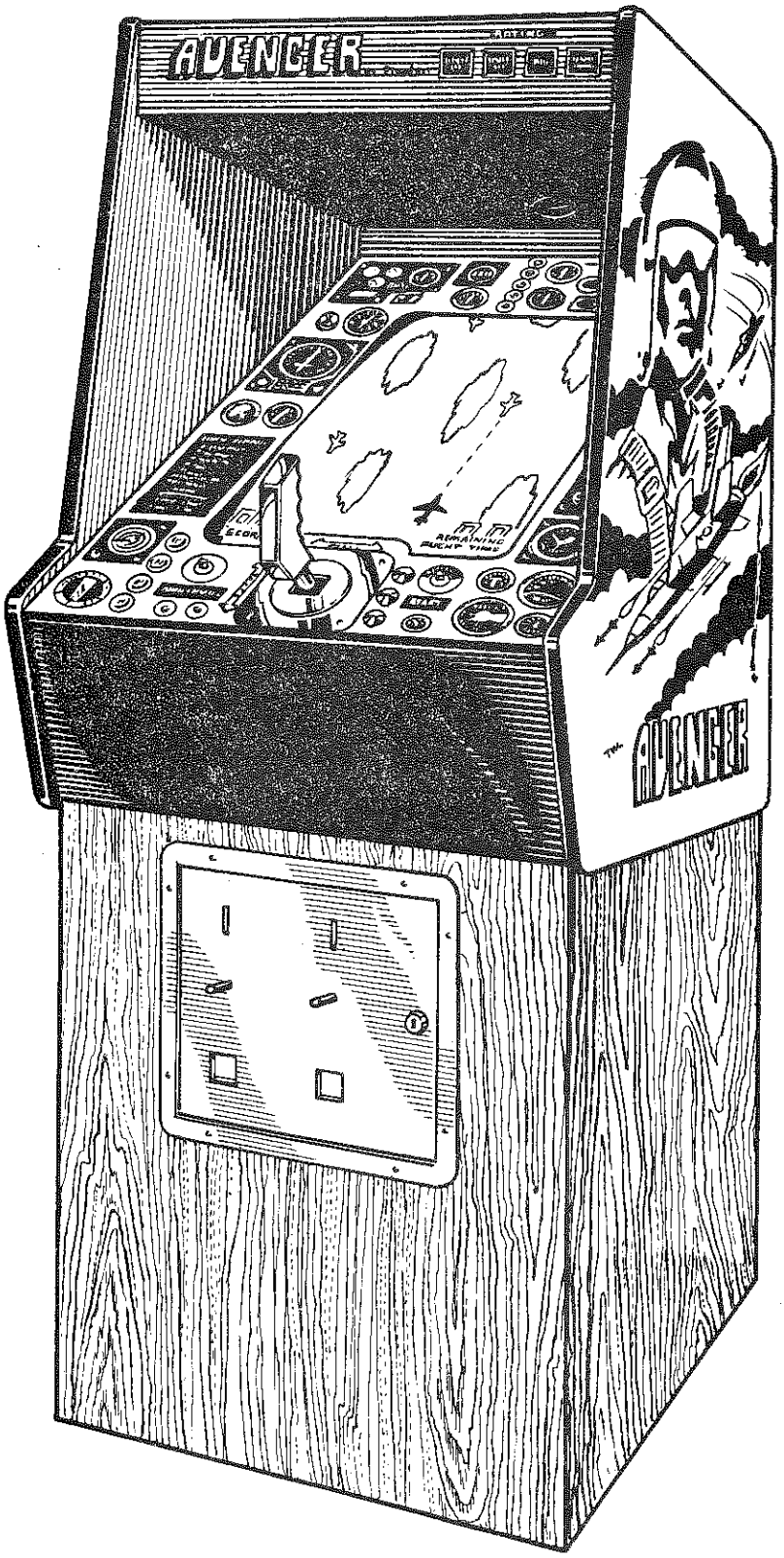
AVENGER



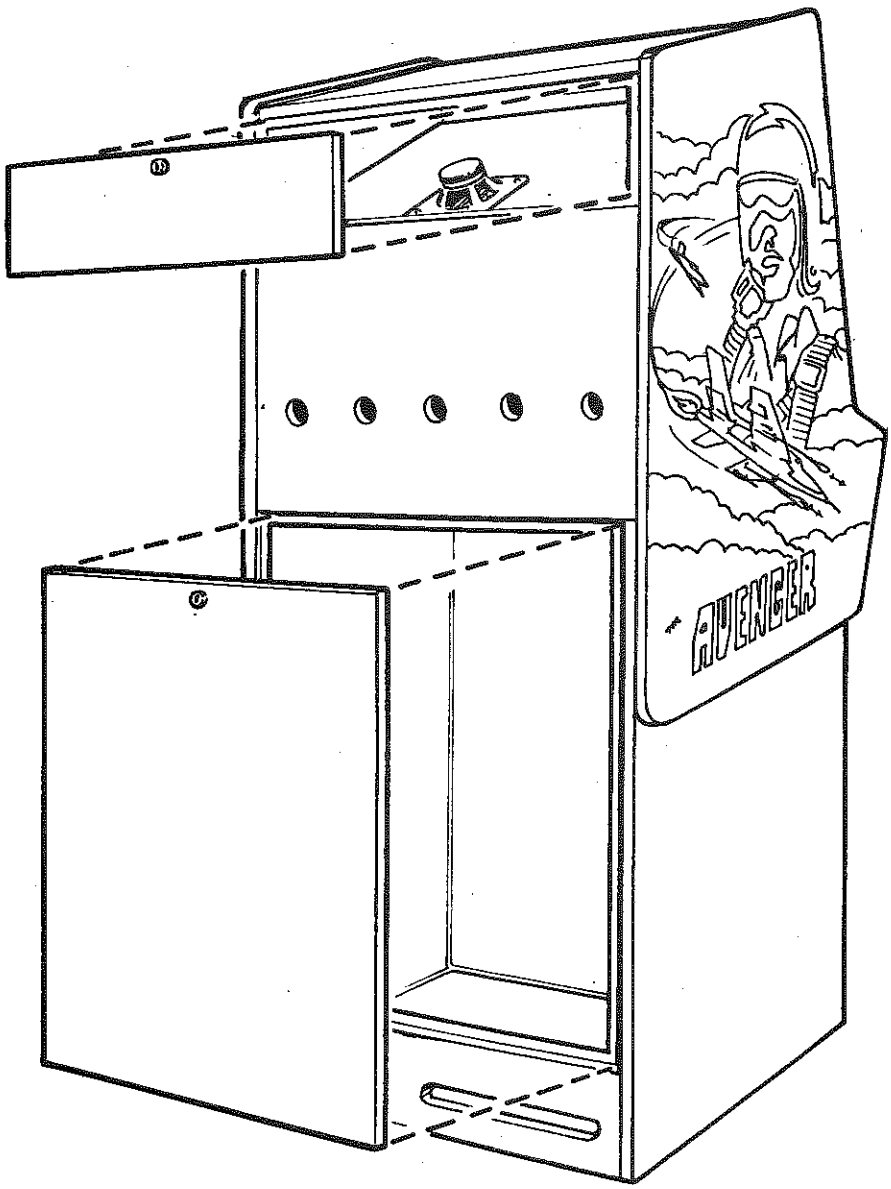


FIG. 1

CABINET ACCESS INFORMATION

- Access into the back of the Cabinet is gained by removal of two Back Doors (Refer to Figure 1); the key for these doors is in the Instruction Manual Envelope. The Monitor Adjustments, the type EG-1020 Logic Board, the type PS-3 Power Supply Board, LD-1 Lamp Driver Board, FRB-2 Filter and Relay Board, and Sound Simulator may be reached by removal of the back doors.

- Removal of the Front Control Panel allows access to the "Joystick" Control and all Front Panel Switches. (Refer to Figure 3.)

- TO REMOVE THE FRONT CONTROL PANEL:

  - Remove the Back Door (See Figure 1).
  - Unloosen and remove the two Wing Nuts which secure the Front Panel. (See Figure 3.)
  - Grip the Front Panel at the lower edge and PULL UP SLOWLY.
  - Access to the Dual Coin Equipment is thru the Front Door. The keys are located in the Instruction Manual Envelope.

INSPECTION AND PRELIMINARY SET-UP

With the Back removed, a thorough inspection for shipping damage should be made.

- Inspect complete Cabinet (Base, Sides, Control Panel) for obvious damage. If any damage is discovered, contact the Freight Carrier immediately.

- Inspect the Video Monitor for obvious damage; then inspect the Power Supply unit in the Base. (Refer to Figure 4.) The PS-3 Power Supply Board should be connected and securely in position.

- Inspect all Printed Circuit Boards to ensure that they are properly mounted and that edge connectors are fully seated. (Refer to Figure 5.)

- Inspect the Sound Simulator Chassis. All Printed Circuit Modules should be fully seated.

- Open the Front Door and check the Coin Mechanisms to see that both are properly mounted. Operate rejector mechanism and check for any "binding". Use WD-40 Silicone Lubricant to lubricate any binding parts.

The Game is now ready to be set-up!

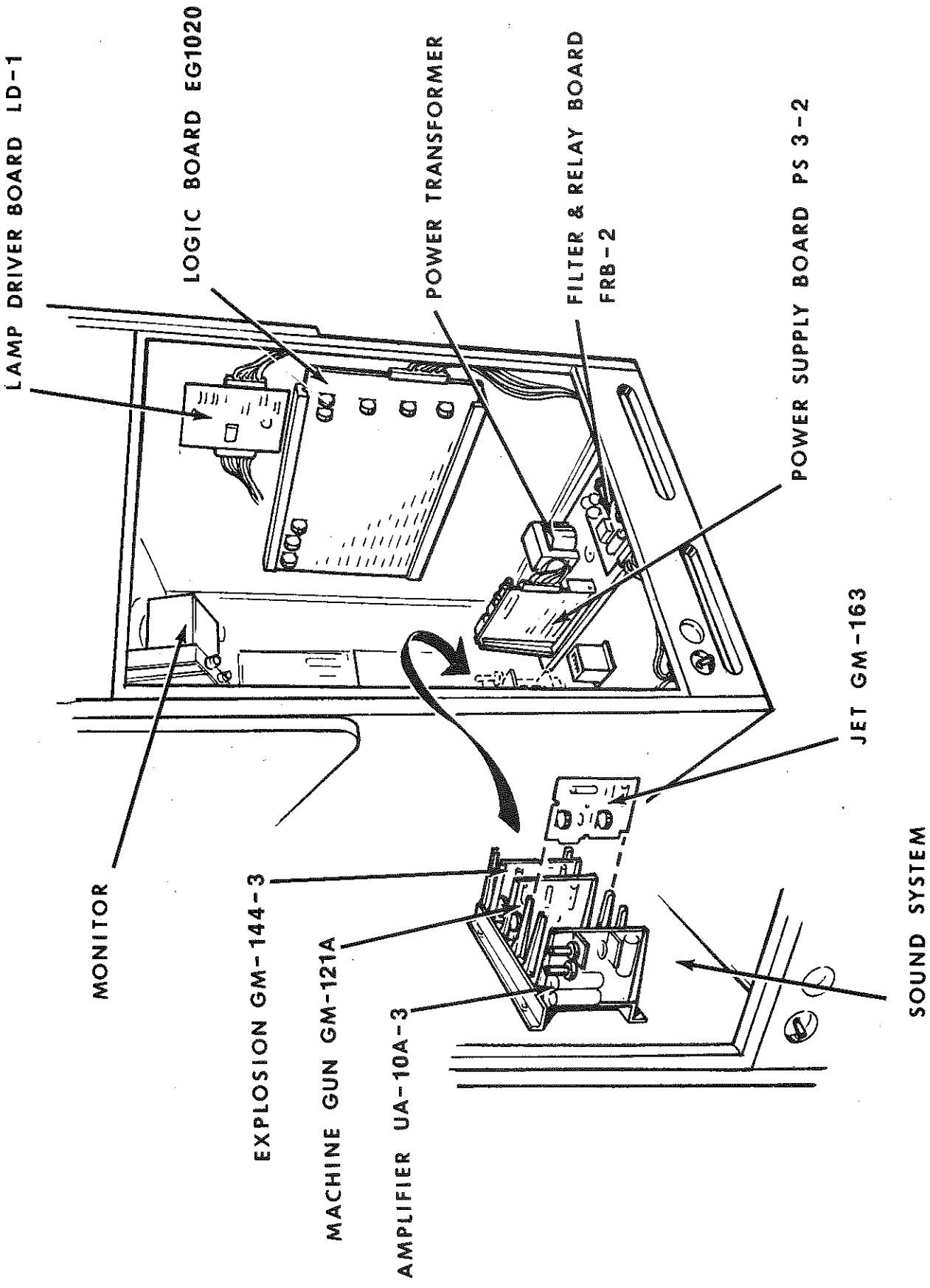

LAMP DRIVER BOARD LD-1
LOGIC BOARD EG1020
POWER TRANSFORMER
FILTER & RELAY BOARD FRB-2
POWER SUPPLY BOARD PS 3-2
JET GM-163
SOUND SYSTEM
MONITOR
EXPLOSION GM-144-3
MACHINE GUN GM-121A
AMPLIFIER UA-10A-3

FIG. 2

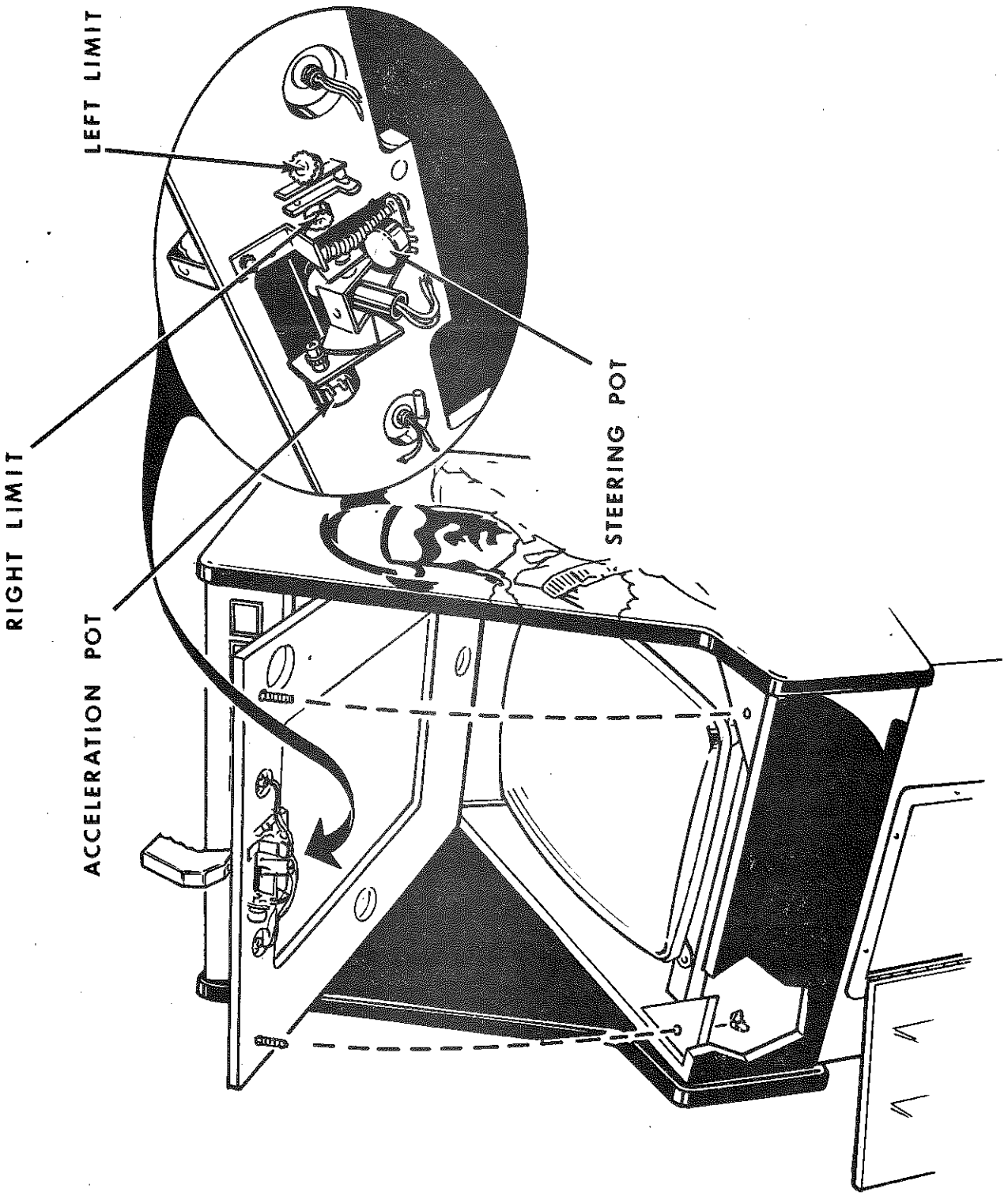


FIG. 3

DISASSEMBLING SHIPPING PALLET:

- Unbolt the Game from the shipping pallet by removing four 3/8" bolts from inside base of Cabinet.

SETTING UP THE GAME:

- Install the Four Adjustable Legs (located in Cash Box) into threaded "T" nuts in Cabinet Base.

  NOTE: These Legs must be installed so that the Cabinet will be properly ventilated. If the Game is to be operated on a carpeted floor, adjust Legs to a height sufficient to allow air circulation into the vent holes in the bottom of the Cabinet.

- Locate the Power Cord inside the Game and push plug thru hole provided in the lower back. (Strain Relief on the Cord restricts the Cord from being pulled entirely out of the Game.)

- Plug into a 120 volt 60 hertz receptacle and turn on Power Switch located at the lower back of the Cabinet. (Refer to Figure 5.) After approximately a 15 second warm-up period, the Display shown in Figure 4 will appear on the Cathode Ray Tube.

GAME OPERATION AND SEQUENCE:

- Definitions:
  - Standby Condition - Game Power On, no Credits established.
  - Credit Condition - One or more Credits established. One quarter=one credit, two quarters=three credits.
  - Play Condition - Start Button activated - Game in progress.

1.0 Power On - The Game is powered up by setting the POWER toggle switch ON (located on the rear of the Cabinet, lower left hand corner). After the initial warm-up period, the Game display will appear on the screen (Refer to Figure 4). Clouds and white enemy planes will be moving across the face of the screen. Game is in STANDBY CONDITION.

2.0 Game Credit - Credit is established by inserting one coin for one game or two coins for three games. When credit is established, the credit lamp near the start switch will flash and continue to flash as long as one or more games are credited. The AVENGER plane (black) will appear when credit is established.

3.0 Game Start - Play starts when the START switch is pressed. Scores reset to 0000 and remaining flight time resets to 90 and begins counting down. Players use the AVENGER PLANE JOYSTICK and GUN switch to shoot down as many enemy planes as possible during the allotted game time.

4.0 Scoring - Score is accumulated by the total number of "Hits" (enemy planes shot down) during the allotted game time. The value of each "Hit" is determined by the speed of the enemy planes. Speed is increased by pushing the joystick forward. Initially, each hit scores 10 points. As speed is increased, hit point values increase to 20 and finally 30 points as indicated by the hit score value lamps (Refer to Figure 4). When the AFTERBURNER switch is pressed and held, a maximum of 40 points per hit is possible and the fastest flight speed attained. The following total scores determine a player's rating.

0 - 799	Crop Duster
800 - 1399	Student Pilot
1400 - 1999	Ace
2000 & over	Avenger

5.0 General Play - Obviously, players must shoot enemy planes down at the fastest speeds possible in order to obtain an AVENGER rating. In addition, collisions with enemy planes must be avoided, since a collision results in loss of time available to shoot down enemy planes. Collisions cause the AVENGER PLANE to "break up" or crash momentarily and no score may be accumulated during this time. Clouds enhance scoring difficulty by obscuring enemy planes.

Adjustments

All units are factory adjusted and need not normally be readjusted. The following lists some adjustments should they be necessary.

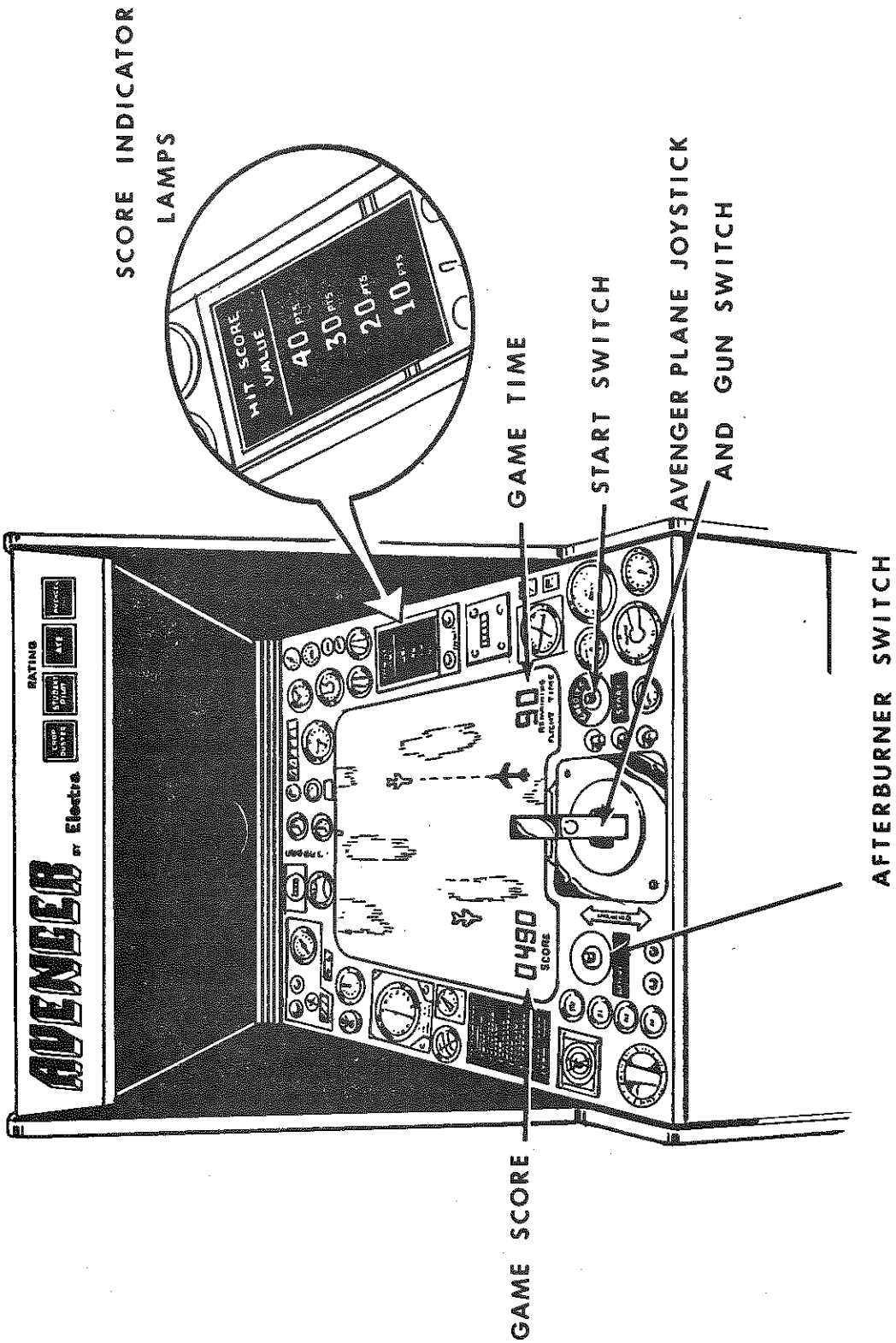

SCORE INDICATOR LAMPS
HIT SCORE VALUE
40 PTS
30 PTS
20 PTS
10 PTS
GAME TIME
START SWITCH
AVENGER PLANE JOYSTICK AND GUN SWITCH
AFTERBURNER SWITCH
GAME SCORE
AVENGER
RATING
0490
SCORE
90

FIG. 4

1.0 Monitor

Generally speaking, the monitor adjustments are the same for most commercial television receivers. The adjustments of most concern are Horizontal Hold, Vertical Hold, Contrast and Brightness. (Refer to Monitor Service Manual for the location of these adjustments.)

1.10 Horizontal Hold - Adjust if the picture is warped or broken into diagonal lines.

1.20 Vertical Hold - Adjust if the picture rolls across the screen.

1.30 Vertical Size - Vertical size and vertical linearity are interdependent. The vertical size adjustment changes the vertical dimensions of the picture.

1.40 Vertical Linearity - Adjust if the AVENGER PLANE appears to be compressed at either side of the screen when the joystick is moved to the extreme left or right.

1.50 Brightness - Adjust the brightness before contrast. Adjust so that the picture tube background is as dark as possible without diminishing the brightness of the clouds.

1.60 Contrast - Adjust so that the images of clouds and enemy planes are as bright as possible against the preadjusted dark background without being blurred.

2.0 Printed Circuit Boards

Refer to Figure 5 for the location of all printed circuit board adjustments.

2.1.0 EG-1020 Logic Board

2.1.1 Contrast - Adjust to obtain the best picture. There should be no smearing of clouds or enemy plane images. When misadjusted, the picture will break up into vertical lines. (Note: TV monitor contrast admustments should be made before optimizing the Logic Board Contrast adjustment when monitor replacement is necessary.)

2.1.2 Vertical Picture Position - Adjusts the vertical position of the picture on the screen. Adjust so that the score and flight time readouts rest just above the lettering on the monitor screen cover.

2.1.3 Game Time Adjustment - The game length can be adjusted from 50 to 200 seconds. This adjustment varies the rate at which the "Remaining Flight Time Counter", counts down from 90 to 00.

2.1.4 The following adjustments are factory set and locked. Readjustment is not necessary.

2.141 30 point score level
2.142 20 point score level
2.143 Ramp Voltage for AVENGER plane positioning.
2.144 Speed adjustments (Flight Speed).

2.2.0 Sound Simulator System - Individual level controls are provided on each Sound Module. In this way the individual sounds can be adjusted for a combination that works best in that particular location.

2.2.1 Master Volume and Tone - Both controls are located on the Amplifier Board (UA-10A-3). The master volume controls the level of all sounds and should be adjusted after individual sound modules are set. The tone control is a treble cut control and should also be adjusted after the sound levels are set.

2.2.2 Jet Volume and Tone - Both controls are located on the Jet Sound Board (GM-163). Set volume and tone as desired.

2.2.3 Machine Gun Volume - Located on GM-121A. Set volume as desired.

2.2.4 Explosion Sound Volume - Located on GM-144-3. Set volume as desired.

3.0 Joystick trimmer pots (Refer to Figure 3) - Two trimmer pots are used to set the left and right limits of the AVENGER Plane.

3.1.0 Procedures: Set the joystick to the extreme left. Adjust left limit trimmer pot until the black plane disappears on the left hand side of the screen. Readjust until plane just appears. Set joystick to the extreme right and repeat above procedure using the right limit trimmer pot. (Note: the joystick adjustments can be reached thru the coin mechanism door.)

TROUBLE SHOOTING GUIDE

A general trouble shooting guide follows to help identify malfunctions should they occur.

1.0 Game Breakdown - (Major sections)

1.1.0 Video Monitor

AVENGER uses a Motorola solid state video monitor to display the game picture. The video signal and video ground from the EG-1020 Logic Board are routed to plug P1 on the rear chassis of the monitor. A +5 VDC power supply within the monitor is tapped via plug P1 to supply +5 VDC and ground for Lamp Driver Board (LD-1) and Filter and Relay Board (FRB-2). Refer to Motorola Service Manual File VP12 for servicing information.

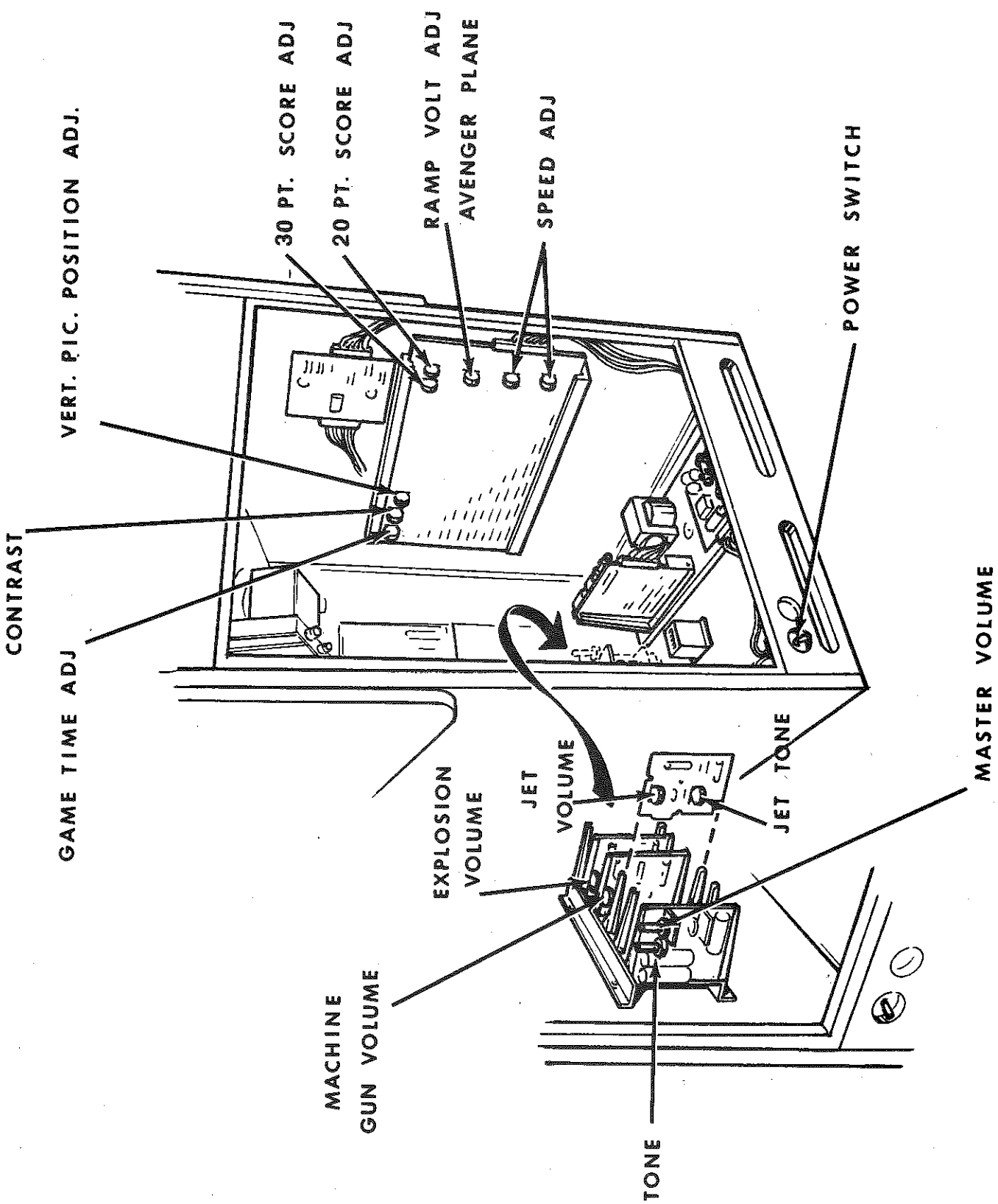

VERT. PIC. POSITION ADJ.
30 PT. SCORE ADJ
20 PT. SCORE ADJ
RAMP VOLT ADJ
AVENGER PLANE
SPEED ADJ
POWER SWITCH
CONTRAST
GAME TIME ADJ
EXPLOSION VOLUME
JET VOLUME
JET TONE
MASTER VOLUME
MACHINE GUN VOLUME
TONE

FIG. 5

1.2.0 FRB-2 Filter and Relay Board

FRB-2 provides line voltage filtering, holds the main fuse (2.5A SLO BLO) for the game and routes the filtered 120 VAC to the primary of the power transformer. In addition, the FRB-2 routes the coin switch credit signal to the logic board and routes +5 VDC from the Video Monitor to drive the coin counter.

1.3.0 Power Supply

Consists of power transformer (108015) and Power Supply Board (PS3-2). The power transformer supplies 18 VAC and 24 VAC off the secondary windings to PS3-2. Power Supply PS3-2 supplies +5 VDC for the Logic Board EG-1020.

1.4.0 Logic Board EG-1020

AVENGER logic board EG-1020 generates all picture information as well as controls game action, scoring and game time. The logic board also supplies the appropriate signals to drive the Lamp Driver board (LD-1) and the Sound Simulator System. Logic Board power requirements are supplied by the PS3-2 (+5 VDC) and the Sound Simulator System (+20 VDC).

1.5.0 Lamp Driver Board LD-1

Lamp Driver board LD-1 uses high current lamp drivers to drive all front panel lamps. Power supply requirements for LD-1 as well as all panel lamps are supplied by the Video Monitor,

1.6.0 Sound Simulator System

A modular system which has four plug in boards provides all simulated sounds for the game. The system power requirements are provided from 110 VAC input and regulated DC from the amplifier board.

1.6.1 Amplifier Board UA-10A-3 - This board provides a +20 VDC regulated voltage for all the plug in modules as well as providing amplification for all sounds and driving the speaker.

1.6.2 Jet Sound Board GM-163 - Provides simulated jet plane sound. Sound is on continuously throughout the game but is reduced in volume when there is a collision, explosion or machine gun sound.

1.6.3 Machine Gun Sound Board GM-121A - Provides simulated machine gun sound when the GUN BUTTON is pressed.

1.6.4 Explosion Sound GM-144-3 - Provides simulated explosion sound when there is a collision or when an enemy plane is shot down.

1.7.0 Wiring Harness

Consists of all interface cabling between printed circuit boards, video monitor, panel lamps, switches and joystick control. Refer to EG-1020 Hook-Up Diagram.

2.0 Trouble Symptoms and Possible Causes

2.1.0 No Power - Video Monitor screen is dark, front panel lamps are not on.

2.1.1 Causes - Faulty power switch, fuse blown on FRB-2 board, faulty FRB-2 board, fuse blown in video monitor, faulty video monitor power supply.

2.2.0 No Video - Video monitor screen is bright but has no picture information.

2.2.1 Causes - Bad power transformer, faulty power supply board PS3-2, faulty EG-1020 logic board, faulty video monitor.

2.3.0 No Vertical Sync - Picture rolls from side to side.

2.3.1 Causes - Misadjusted monitor vertical hold, faulty monitor, faulty EG-1020 logic board.

2.4.0 No Horizontal Sync - Picture is warped or broken into diagonal lines.

2.4.1 Causes - Misadjusted monitor horizontal hold, faulty monitor, faulty EG-1020 logic board.

2.5.0 Distorted Picture Information - Picture is broken into vertical segments or image detail is distorted or missing.

2.5.1 Causes - Misadjusted EG-1020 logic board contrast adjustment, faulty EG-1020 logic board.

2.6.0 No Flight Speed - All picture information is present but planes and clouds are stationary.

2.6.1 Causes - Loss of +20 VDC supply on Amplifier board (UA-10A-3), faulty EG-1020 logic board, fuse blown in sound simulator system.

2.7.0 Avenger Plane Missing - The black fighter plane does not appear on the screen during the game.

2.7.1 Causes - Misadjusted left and right limit trimmer pots on the joystick assembly, faulty EG-1020 logic board.

2.8.0 No Sound - All or some of the game sounds are missing.

2.8.1 Causes - Fuse blown in sound system (would also show problem described in item 2.6.0), faulty sound modules or EG-1020 logic board.

2.9.0 No Credit - No credit is established when a coin is deposited, the credit lamp does not flash, main plane does not appear and the game will not start.

2.9.1 Causes - Faulty coin switch, bad relay on FRB-2, faulty EG-1020 logic board.

2.10.0 No Start - Credit is established but game will not start.

2.10.1 Causes - Faulty start switch or EG-1020 logic board.

2.11.0 Panel Lamps Not Illuminating

2.11.1 Causes - Bulbs burned out, faulty LD-1 lamp driver board, faulty EG-1020 logic board.

Effective 1/28/76

AVENGER PARTS LIST

Item#	Part#	Description
1	505030	EG1020 logic board
2	505035	ACS-2 complete power supply assy.
3	701045	FRB-2 filter and relay board
4	701050	LD-1 light driver board
5	501905	PS-3 power supply board
6	701055	sound simulator system
7	505039	control panel assy. w/o joystick
8	901121	23" Motorola monitor XM701-10
9	505047	coin counter 6VDC
10	901074	coin mechanism
11	901076	coin box
12	901077	coin box lid
13	505038	marquee light board assy.
14	119045	marquee plexiglass (screened)
15	901122	EG1020 cabinet: side panel w/screening
		cabinet top
		cabinet base
16	109067	6 ft. external 3 prong line cord
17	112019	toggle switch DPST (power switch)
18	117013	lock, offset

Sub-assembly breakdown

	505035	ACS-2 complete power supply assy.
19	901118	mounting block
20	501905	PS-3 power supply board
21	118098	PS-3 bracket
22	119012	channel strip 6" long & 2" long
23	108015	power transformer
24	116012	aluminum heat sink
25	105050	rectifier diode
26	111047	A.C. accessory outlet
27	701045	FRB-2 P.C. board
28	119022	¼" plastic spacer
	505039	control panel assembly w/o joystick
29	505041	control panel backing board
30	119047	acetate film, blue
31	119044	control panel plexiglass (screened)
32	112012	pushbutton otto switch (start & afterburner)
33	120010	3 lug terminal strip
34	107048	5K trimmer pot
35	113011	#47 miniature bayonet lamps
36	111061	miniature bayonet lamp socket
37	181176	spring tension retainer
38	118182	spring pin carbon steel
39	118183	spring compression
40	118184	spring rod

Palmetto State

Item#	Part#	Description
		joystick assembly
41	505042	joystick assy. w/o handle grip
42	505042/43	joystick assy. with handle grip
43	505043	grip (joystick handle only)
44	112013	pushbutton gun switch
45	107053	5K potentiomater
	701055	sound simulator system
46	501555	UA10A-3 10 watt amp. module
47	501616	GM144-3 explosion sound module
48	501670	GM163 jet sound module
49	501675	GM121A machine gun sound module
		connectors
50	111039	18 pin connector w/pins
51	111041	9 pin connector w/pins
52	111045	single pin connector w/pins
53	111046	single pin receptacle
54	111050	female quick disconnect
55	111053	1625-3P female connector w/pins
56	111054	1625-3P male connector w/pins
57	111058	6 pin plug w/pins
58	111059	6 pin receptacle
59	111067	50 pin connector w/pin
60	111076	Waldom SS-1187 quick disconnect