Congo Bongo

Owner's Manual

Manufactured By

SEGA®

TLX 910-335-1621

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Introduction

CONGO BONGO^{TM} is a micro-processor based coin-operated electronic game, that makes extensive use of digital integrated circuitry and television monitor concepts. This manual is intended for the use of maintenance technicians who possess a general working knowledge of solid-state circuitry and video monitor theory. Any individual NOT knowledgeable in these areas SHOULD NOT attempt repair of the electronic portions of the game.

In addition to this manual and training in electronics, troubleshooting and repair will be facilitated by: access to general electronic type handtools, a multimeter, a 50 to 100 MHz oscilloscope and a logic probe would be helpful.

Technical assistance is available toll-free by calling:

    1-800-854-1938 outside California

    1-800-722-8576 inside California

Parts Information assistance is available toll-free by calling:

    1-800-854-1900 outside California

    1-800-722-8575 inside California

Questions or comments concerning CONGO BONGO^{TM} or any of our games are welcome and should be directed to:

Customer Service Manager

SEGA Electronics, Inc.

16250 Technology Drive

San Diego, California   92127-1985

Important Notes

The following note is included in compliance with FCC rules:
WARNING: This equipment generates and uses radio frequency energy and if not installed and used properly, i.e., in strict accordance with the instruction manual, may cause harmful interference to radio communications. it has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

Other Notes

NEVER replace any components with anything other than exact replacement
    parts.

NEVER remove circuit board connections while power is on.

DO NOT replace fuses with anything other than the proper value. A blown
    fuse indicates an overload condition within the game. Replacing
    fuses with a higher value can cause severe damage to internal
    components if an overload occurs.

ALWAYS consult the manual before attempting repairs.

SPARE PARTS will be maintained at SEGA Electronics, Inc. for a period
    of five (5) years after the date of manufacture of the game
    concerned.

Game Concept

Jungle drums pound as CONGO BONGO^{TM}, the cartoon adventure that pits man against monkey, takes you on the craziest, most action-packed safari ever! With fantastic 3-dimensional-like graphics and wonderful native sounds, SEGA's CONGO BONGO lures explorers of all ages to chase Bongo, the mischievious gorilla, through four vivid scenes of jungle fun. By use of an 8-way joystick and a jump button, the player maneuvers his hunter through the various scenes and avoids obstacles and dangers in his path.

In the first scene, Bongo roars defiantly from the top of Steep Peak as the hunter approaches. The hunter must climb the treacherous cliffside to reach the bridge above, while avoiding the bouncing coconuts Bongo throws down. Once accross the bridge, the hunter must slide down a slope and knock the green monkey off the ledge. Green monkeys will block the hunter's path and if not pushed over a cliff or jumped over, the hunter cannot pass.

Next the hunter must jump over a perilous, collapsing chasm and climb the cliff to Primate Plateau. Here several friendly-looking monkeys scamper about playfully. Be careful though, as the cheerful chimps will cling to the hunter, slowing him down. By using the jump button, the player can shake the chimps off the hunter, but it must be done quickly, because if three chimps grab the hunter, they will pick the hunter up and throw him over the side and into the river. Once past the monkeys, the hunter must jump the river again and climb up to the top where a chagrined Bongo loses his smile and runs off into the jungle.

In the second scene, Bongo taunts the hunter from across Snake Lake. Immediately scorpions descend upon the hunter and he must decide which route to take quickly. Snake Lake is a maze of bridges and islands with snakes guarding every route. The hunter must avoid the snakes by jumping over them. The hunter should attempt to reach the island nearest Bongo and jump onto the back of the hippo and then safely to shore. Beware of the hippo as he dives and surfaces. Once safely to shore, Bongo gets worried and scampers off again.

The third scene opens with the hunter in a mole hole on Rhino Ridge. A herd of charging rhinos must be avoided in the hunter's attempt to capture Bongo. The hunter can avoid the rhinos by jumping over them or ducking into a mole hole. When ducking into a mole hole, the player must depress the jump button for the hunter to duck down and avoid the rhinos.

In the fourth scene, a weary Bongo naps in a chair on the far side of Lazy Lagoon. To reach Bongo, the hunter must cross Lazy Lagoon by jumping on lily pads, hippos and fish, that might sink at minute. Once across Lazy Lagoon, the hunter must dodge the last charging rhinos and climb the last bluff to capture Bongo. After Bongo is captured, the scenes repeat with increasing difficulty.

CONGO BONGO is a one or two player game with players alternating at the loss of each hunter. Each scene is timed by the bonus counter in the upper left corner of the screen. As time passes, the bonus decreases. If the bonus counter reaches zero, the player loses that hunter, the bonus counter is reset and play continues if he has other hunters available. Game ends with the loss of the last hunter.

Scoring

	POINTS
EACH STEP TAKEN	10
JUMPING ONTO HIPPO, FISH OR LILY PAD	100
(INCREASES BY 50 EACH ROUND)	
JUMPING INTO A MOLE HOLE	1000
JUMPING ACROSS A CHASM	500

AT THE SUCCESSFUL COMPLETION OF EACH ROUND, THE PLAYER IS AWARDED THE NUMBER OF POINTS REMAINING IN THE BONUS BOX.

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Option Selection
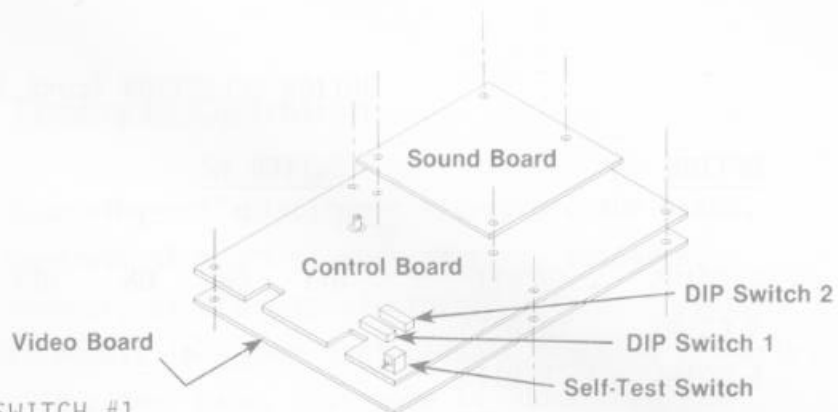
OPTION	SWITCH #1							
	1	2	3	4	5	6	7	8
UPRIGHT	X	X	X	X	X	X	X	OFF
TABLE	X	X	X	X	X	X	X	ON
SOUND ON	X	X	X	X	X	X	ON	X
SOUND OFF	X	X	X	X	X	X	OFF	X
FREE PLAY	X	X	X	X	OFF	OFF	X	X
5 EXTRA HUNTERS	X	X	X	X	OFF	ON	X	X
4 EXTRA HUNTERS	X	X	X	X	ON	OFF	X	X
3 EXTRA HUNTERS	X	X	X	X	ON	ON	X	X
DIFFICULTY: EASY	X	X	ON	ON	X	X	X	X
MEDIUM	X	X	ON	OFF	X	X	X	X
HARD	X	X	OFF	ON	X	X	X	X
HARDEST	X	X	OFF	OFF	X	X	X	X
BONUS AT: 10,000	ON	ON	X	X	X	X	X	X
20,000	ON	OFF	X	X	X	X	X	X
30,000	OFF	ON	X	X	X	X	X	X
40,000	OFF	OFF	X	X	X	X	X	X

OPTION	SWITCH #2							
	1	2	3	4	5	6	7	8
4 COINS 1 CREDIT	ON	ON	ON	ON	ON	ON	ON	ON
3 COINS 1 CREDIT	ON	ON	ON	OFF	ON	ON	ON	OFF
2 COINS 1 CREDIT	ON	ON	OFF	ON	ON	ON	OFF	ON
1 COIN 1 CREDIT	ON	ON	OFF	OFF	ON	ON	OFF	OFF
1 COIN 2 CREDITS	ON	OFF	ON	ON	ON	OFF	ON	ON
1 COIN 3 CREDITS	ON	OFF	ON	OFF	ON	OFF	ON	OFF
1 COIN 4 CREDITS	ON	OFF	OFF	ON	ON	OFF	OFF	ON
1 COIN 5 CREDITS	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
1 COIN 6 CREDITS	OFF	ON	ON	ON	OFF	ON	ON	ON

OPTION		SWITCH #2							
		1	2	3	4	5	6	7	8
2 COINS	1 CREDIT	OFF	ON	ON	OFF	OFF	ON	ON	OFF
4 COINS	2 CREDITS								
5 COINS	3 CREDITS								
6 COINS	4 CREDITS								
2 COINS	1 CREDIT	OFF	ON	OFF	ON	OFF	ON	OFF	ON
3 COINS	2 CREDITS								
4 COINS	3 CREDITS								
1 COIN	1 CREDIT	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
2 COINS	2 CREDITS								
3 COINS	3 CREDITS								
4 COINS	4 CREDITS								
5 COINS	6 CREDITS								
1 COIN	1 CREDIT	OFF	OFF	ON	ON	OFF	OFF	ON	ON
2 COINS	2 CREDITS								
3 COINS	3 CREDITS								
4 COINS	5 CREDITS								
1 COIN	1 CREDIT	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
2 COINS	3 CREDITS								
1 COIN	2 CREDITS	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
2 COINS	4 CREDITS								
3 COINS	6 CREDITS								
4 COINS	8 CREDITS								
5 COINS	11 CREDITS								
1 COIN	2 CREDITS	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
2 COINS	4 CREDITS								
3 COINS	6 CREDITS								
4 COINS	9 CREDITS								

Theory of Operation

CONGO BONGO^{TM} is a "state-of-the-art" electronic microprocessor based, video game. The result of hundreds of hours of work, design, research, experiment and more work. However, as with any electronic device, component failure or other problems can result in a game that doesn't function properly, or doesn't function at all. In either case, your game is "down", and so critically, are your profits.

Your objective is to fix it as quickly as possible, and logical trouble-shooting goes a long way toward that repair. Although many troubleshooting methods may be familiar to you, procedural logic is common among them, and might be stated in this order: visual inspection, symptom recognition, symptom isolation, function isolation, component isolation and repair. Familiarity with the equipment in question will allow you to bypass one or more of these steps, as any particular problem may be obvious to you, or may have happened before. In general though, these 6 steps form a good premise upon which to approach your "down" game.

An extremely important item in our procedure is the first mentioned, giving the gear the "once over". A large percentage of failures found in electronics, show themselves visually and often a great deal of time can be saved by inspecting for burnt or blown components, loose or disconnected wiring or connectors, or PCB traces burnt or pulled up. Thorough visual inspections become increasingly important the closer you get to the faulty item, and should be repeated each time another portion of the game is eliminated. Symptom recognition (as with all electronic troubleshooting) in your CONGO BONGO^{TM} depends first, on knowing what a proper display is, and second, knowing how your display differs from a normal one. Symptom isolation follows naturally; (i.e., "I have no picture", "I have no sound", "I have no control over the ship", "the picture is scrambled"), ergo, a video, audio, input or logic problem. Function isolation, such as a sync problem with the video, requires that you consider those functions that go to make up video sync. Is it a monitor problem, or an "on-the-board" problem? A monitor input check to verify the signal will tell you. Does the board have the voltage (from the power supply) that it needs? Yes? We must have a board failure, as we've just isolated down to function. Taking our sync problem further, before we begin our search for an individual component, let's reapply that first item in

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our "Logical Troubleshooting Procedure". Look at the board. Open resistors, diodes, and capacitors often give themselves away.

Noticing a trace literally burned open can save you serious "down-time". The board looks OK, so on we go. Specific component isolation relates to the specific nature of the failure, component commonality, proper inputting (both signal and power) and proper outputting (as in the case of an output held high, low, or floating by input port failure in the succeeding state). More general problems (such as a total loss of video sync) requires the more involved procedure of systematic elimination of possibilities. This operation can be expedited however, by dividing the circuit in half, establishing a "go-no/go" at that point, and again dividing the suspect circuit portion in half. The largest possible areas can be eliminated in this manner, dividing and sub-dividing until the individual component failure is found.

CONGO BONGO^{TM} is a microprocessor based, digital-integrated circuit computer video game. The heart of the computer is the CPU (U4, Zone 7-C, Sht. 1, Control Bd., 834-5166), a Z80A (P/N 315-0041). The Alpha type device MUST ALWAYS be used, as the Z80 is not fast enough to run the programs.

Master timing is IC-driven by U122, a G501533 that provides a stable frequency for J-K flip flops U46 & U47, located on the Video Board, Zone 4-B of Sht. 2 (834-5167). The "Phase Three X" signal (O3X) is applied to U-15 P-2 (Zone 3-D, Sht. 3, 834-5167) & is clocked out at pin 13 as the 1H frequency that appears thru P3 p-9 at the input to the CPU. U6 & Q10 (Zone 8-D, Sht. 1 of the Control Bd. 834-5166) polarize & reference 1H for input timing for U4 (Zone 7-C, Sht. 1, Control Board, 834-5166).

Manual system reset (Power-On) appears as a LO at P5 p-L (Zone 8-D, Sht. 2, Control Bd., 834-5166) and is then felt through filter BF8, & is applied to pin-26 of the CPU (U4, Sht. 1, Zone 7-C, Control Bd., 834-5166). Normal program interrupts (INT) are felt at pin-16 of the Z80A (an edge-triggered LO), and are the result of Input/Output activity timing with vertical blanking (an approx. 2 msec. instruction interrupt). The WAIT signal is used to synchronize that I/O activity during an interrupt to the CPU. U5 and 7 (Zone 7-C, Sht. 1, Control Bd., 834-5166) are address bus drivers. Three of the sixteen address lines pass through U56 (Zone 5-C, Sht. 1, Control Bd., 834-5166) and subsequently drive the Chip Enable inputs of EPROM IC's 32-35 and RAM IC's 36 & 37 (Sht. 1, Control Bd., 834-5166). U48 & 9, 62 & 63 (Sht. 4, Control Bd., 834-5166) are input ports on the data bus. U64 supplies service switch, game start and coinage to the input ports. U14 and 18 input

Coin B, and U15 and 18 input Coin A.   U16 & 19 input service switch, while U64
& drives player start to I/O processor U9 (Zone 5-C, Sht. 1, Control Bd.,
834-5166).   IC111, 112 and 114 accesses/buffers Player Left/Right data, IC111
and 113 interfaces Fire data, and Option Selection is shared by all 4
74LS244's.   Located on the Control Board is the Self-Test switch.   When
closed, it applies a LO to U4 p-17 (Zone 7-C, Sht. 1, Control Bd., 834-5166)
initiating a systems/function verification outlined on the following page:

Self-Test

CONGO BONGO[TM] is equipped with a diagnostics self-testing program that is initiated by pressing the Self-Test button located on the Control Board Assembly. The test is used to detect malfunctions in Video alignment, I/O interface and P.C.B. electronics.

The test will appear in the following order, with the words "OK" or "BAD" being displayed on the screen in accordance with the condition of the tested circuit. Self-Test step sequencing is done by pressing the Player 1 button after each individual test.

```
        ┌──────────────┐
        │  SELF TEST   │
        │    START     │
        └──────┬───────┘
               │
    ┌──────────┴──────────┐
(1) │  ROM TEST           │
    │  SUM CHECK          │
    └──────────┬──────────┘
               │
    ┌──────────┴──────────┐
(2) │  WORK RAM           │
    │  TEST               │
    └──────────┬──────────┘
               │
    ┌──────────┴──────────┐
(3) │  BACK SCENE         │
    │  TEST               │
    └──────────┬──────────┘
               │
    ┌──────────┴──────────┐
(4) │  TARGET             │
    │  PATTERN            │
    │  TEST               │
    └──────────┬──────────┘
               │
              (1)
```

```
              (1)
               │
    ┌──────────┴──────────┐
(5) │  INPUT              │
    │  SWITCH             │
    │  TEST               │
    └──────────┬──────────┘
               │
    ┌──────────┴──────────┐
(6) │  OUTPUT             │
    │  TEST               │
    └──────────┬──────────┘
               │
    ┌──────────┴──────────┐
(7) │  DIP SWITCH         │
    │  TEST               │
    └──────────┬──────────┘
               │
    ┌──────────┴──────────┐
(8) │  VIDEO RAM          │
    │  TEST               │
    └──────────┬──────────┘
               │
    ┌──────────┴──────────┐
(9) │  CHARACTER          │
    │  PATTERN            │
    │  TEST               │
    └──────────┬──────────┘
               │
    ┌──────────┴─────────────┐
(10)│  COLOR REFPRENCE       │
    │  VIDEO BANK SELECT     │
    │  COLOR BANK SELECT     │
    │  TEST                  │
    └──────────┬─────────────┘
               │
              (2)
```

```
              (2)
               │
    ┌──────────┴──────────┐
(11)│  SOUND              │
    │  TEST               │
    └──────────┬──────────┘
               │
        ┌──────┴───────┐
        │     END      │
        └──────────────┘
```
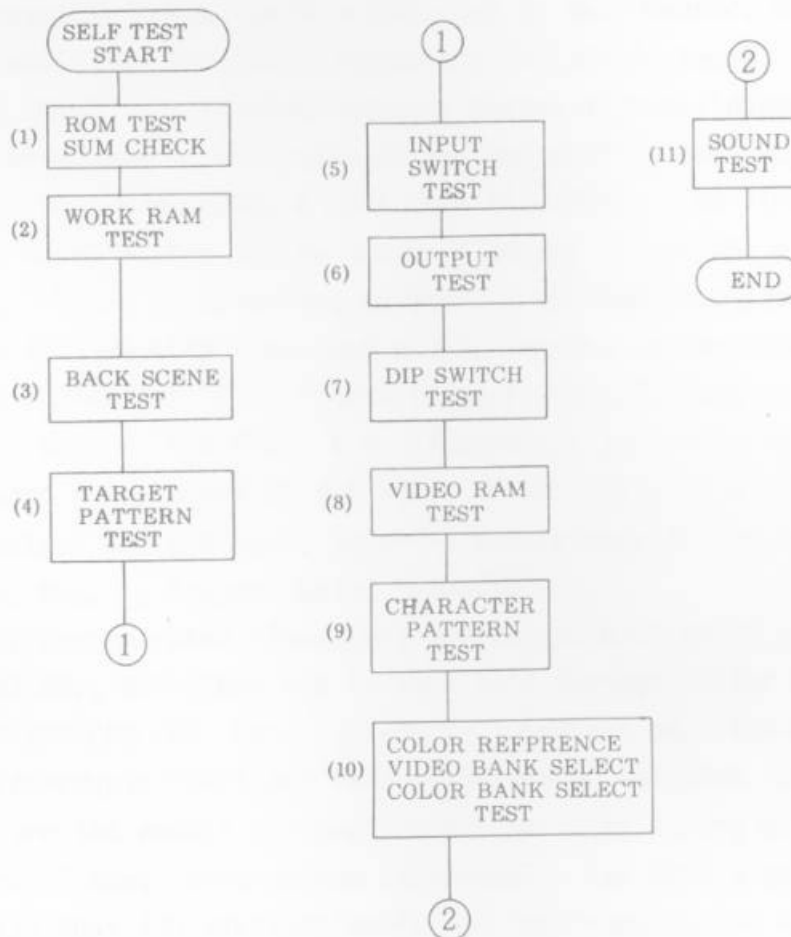
1. ROM Test

   This test checks the four main program EPROMs by performing individual "check sum" tests. These EPROMs are located on the Control Board.

```
        ROM TEST

        ROM  1  OK              IC  #  35
        ROM  2  OK              IC  #  34
        ROM  3  OK              IC  #  33
        ROM  4  OK              IC  #  32

        RAM TEST

        RAM  1  OK
        RAM  2  OK
```
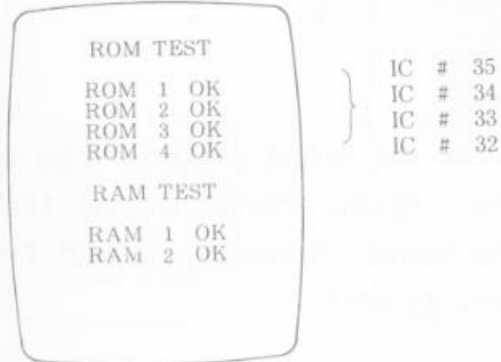
2. RAM Test

   This test checks RAM 1 and RAM 2 by performing a cross-talk test between each adjacent bit in the RAMs. These RAMs are located on the Control Board.

```
        ROM TEST

        ROM  1  OK
        ROM  2  OK
        ROM  3  OK
        ROM  4  OK

        RAM TEST

        RAM  1  OK              IC  #  U36
        RAM  2  OK              IC  #  U36
```
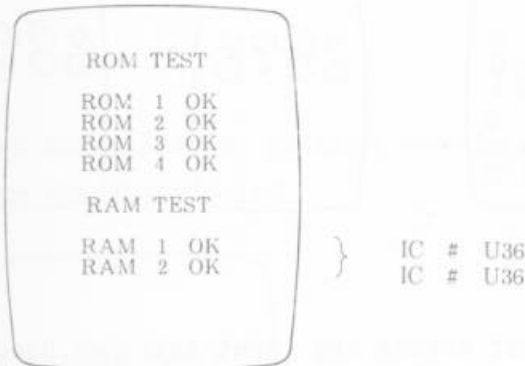
3. Background Scene Test

   This test checks the background displays of the game in eight (8) individual steps. Advance through the steps by pressing the Player 1 button, until the eighth display (a blank screen) is reached.

1   2   3   4
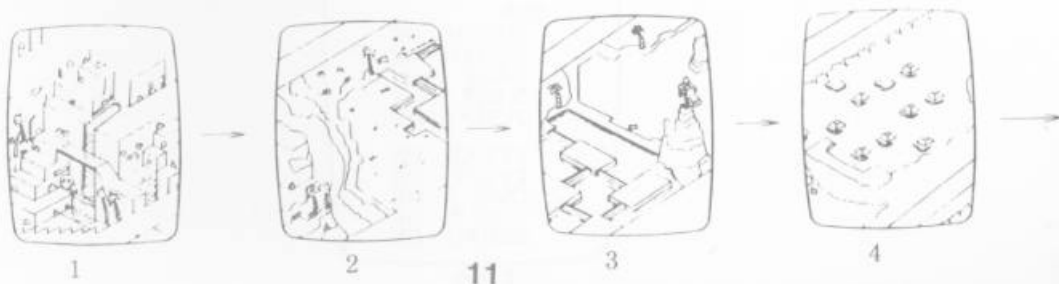
6. Output Test

This test verifies output ports used to interface computer software to game hardware.

```
 _____         _____         _____
|                |       |                |       |                |
|  OUTPUT TEST   |       |                |       |  OUTPUT TEST   |
|                |       |                |       |                |
|  COINAER   OK  |       |                |       |  COINAEN   OK  |
|  COINBER   OK  |       |                |       |  COINBEN   OK  |
|  SERVCEN   OK  |       |           FLIP |       |  SERVCEN   OK  |
|  COUNTA    OK  |       |    OK   COUNTB |       |  COUNTA    OK  |
|  COUNTB        |       |    OK   COUNTA |       |  COUNTB    OK  |
|                |       |    OK   SERVCEN|       |  FLIP          |
|                |       |    OK   COINBEN|       |                |
|                |       |    OK   COINAEN|       |                |
|                |       |                |       |                |
|                |       |  OUTPUT TEST   |       |                |
|_____|       |_____|       |_____|
```

7. DIP Switches

Operation of the DIP Switches are checked here, internally, by simultaneously turning on, and then off, all odd switch positions, followed by all even switch positions. "Test 1" is displayed at the end of the cycle. Pressing the Player 1 button initiates "Test 2" for DIP Switch 2.

8. Video RAM Test

Here Video RAMs used for character pattern display are tested. These RAMs are located on the Video Board.

```
         _____
        |                |
        |                |
        |                |
        |   VRAM TEST    |
        |                |
        |   VRAM   OK    |
        |                |
        |                |
        |_____|
```

9. Character Pattern Test

This test checks the ROMs used for character patterns and picture patterns. During this test all the patterns contained within each ROM will be displayed. Character pattern ROMs are located on the Video Board.

10. Color Control Reference Test

Character pattern and background picture color control is checked here by color reference changes with each pressing of the Player 1 button.
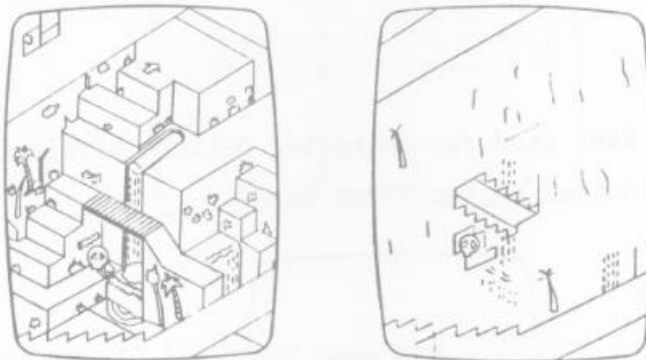
11. Sound Port Test

This test verifies that proper sound outputs are generated with each pressing of the Player 1 button. Twenty-nine individual sounds are generated, one at a time, sequenced by the Player 1 button, and appear in order on the following page.

SOUND TEST
01
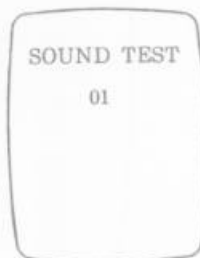
11. Sound Port Test (cont.)

   01   No sound

   02   Gorilla lullaby

   03   Player victory music

   04   Player clear music

   05   "Player goes to Heaven" music (in the water)

   06   "Player goes to Heaven" music (other than in the water)

   07   Fire

   08   Player step sound

   09   Player drop sound

   10   Player jump sound

   11   "Monkey on my back" sound

   12   Held by monkey sound

   13   Hit by coconuts sound

   14   "Crumbling crevasse" sound

   15   Passage of snake sound

   16   Rush of rhino sound (A)

   17   Rush of rhino sound (B)

   18   Rhino screeching to a stop sound

   19   Player digging sound

   20   Fish sound

   21   Special Bonus sound

   22   Credit sound

   23   Gorilla laughing

   24   Hippo sinking sound

   25   Background music for scene # 1

   26   Background music for scene # 2

   27   Background music for scene # 3

   28   Background music for scene # 4

   29   Bonus score up sound

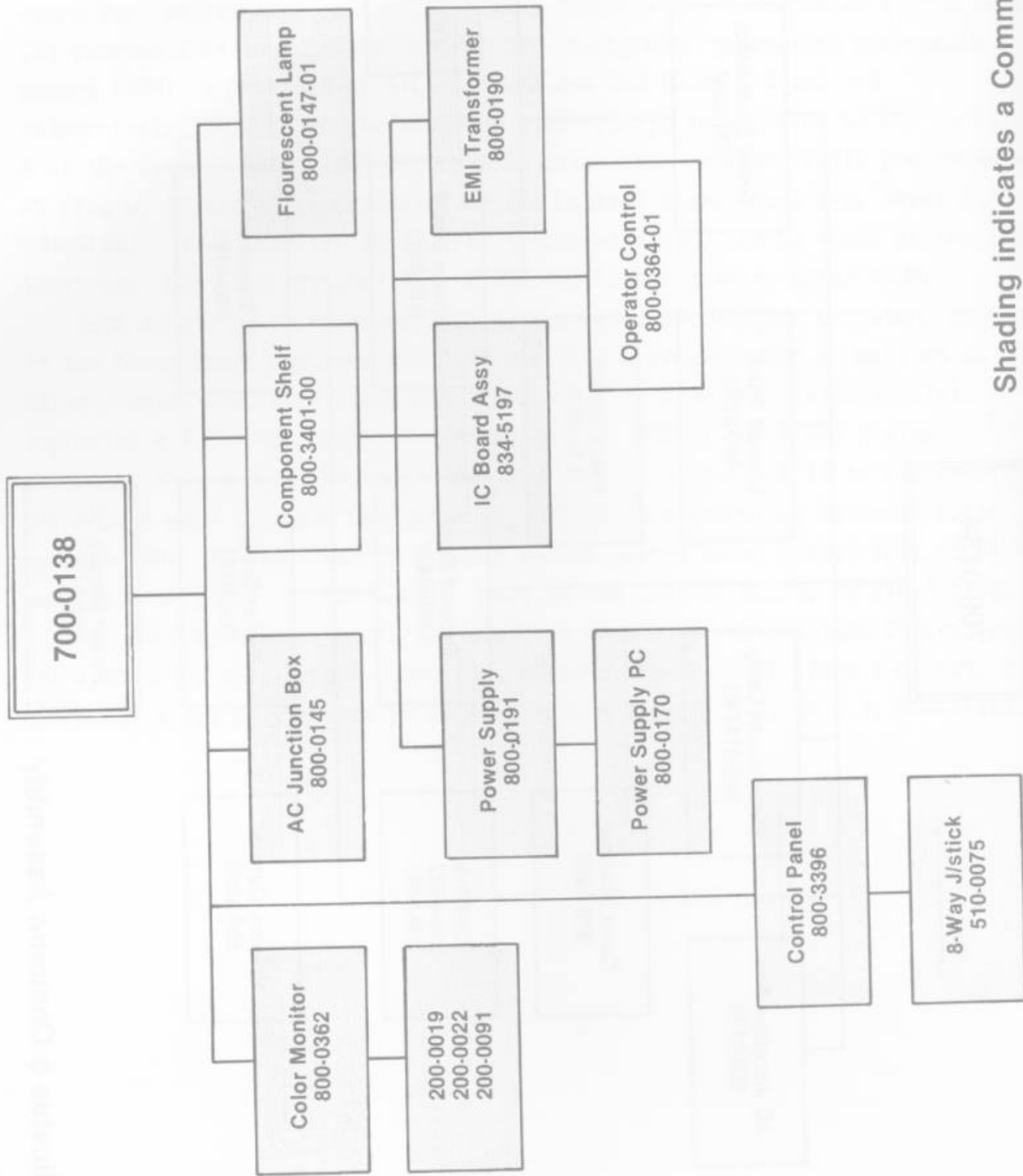Due to the striking graphics employed in CONGO BONGO^{TM}, memory requirements for background generation are significant. On the VIDEO Bd. (834-5167) there are nine (9) 2764-30 64K X 8 EPROMs that hold video character, positioning, color and timing information, in addition to the five (5) program 2764-30's on the Control Bd. Background generation accessable memory (RAM) is provided by TTL IC's U12 and U53 (Zone 7-C and 3-D respectively, Sht. 2, on the VIDEO Bd., 834-5167), in addition to U59 on Sht. 4 of the Control Board (834-5166). RGB color data is found fully processed at P5 pins w, 19 and X respectively, on the Control Board (Zone 6-D, Sheet 2, 834-5166). Video COMPSYN (Composite Synchronization) can be found at the same location. U68 (Sht. 2, Zone 4-D, 834-5166) is the primary color PROM.

Just as the microprocessor Z80A is the heart of the game computer, so too is the Sound Board equipped with its own Z80A microprocessor as well as an 8255A-C Sound Generator (Zone 4-C & 7-C, Sht. 1, 834-5168, respectively). Imploying a 4.00 MHz crystal-driven (Zone 6-D, Sht. 1 834-5168) timing frequency at pin 6, U3 processes program data held by U10 & 11 to set enable parameters used by Sound Generator U1. U1 in turn processes external noise sources (Sht. 2, 834-5168) to produce an integrated sound output felt at P1 p-9 (Zone 8-C, Sht. 1, 834-5168). Back on the Control Board, P4 pin-3 (Sht. 3, Zone 5-C, 834-5166) inputs our sound to OP Amp U2, thru Volume Control pot. VR1 (Zone 8-D, Sht. 3, 834-5166) to the Audio Amplifier U1 (Zone 7-C, Sht. 3, 834-5166) & out to the speaker at P5 pins H & 7 (Zone 8-B, Sht. 3, 834-5166).

Assembly Organization

700-0134

- Game Electronics
  800-3397
  - IC Board Assy
    834-5197
  - Interface Board
    800-0435
    - EMI Transformer
      800-0190

- Control Panel
  800-3396
  - 8-Way J/stick
    510-0075

- Flourescent Lamp
  800-0147-01

- Ground Plane
  800-0477
  - Power Supply
    800-0191
    - Power Supply PC
      800-0170
  - Volume Control
    800-3350

- AC Junction Box
  800-0145
  - Color Monitor
    800-0362
    - 200-0019
      200-0022
      200-0091

Shading indicates a Common Assembly

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700-0138

Flourescent Lamp
800-0147-01

Component Shelf
800-3401-00

AC Junction Box
800-0145

Color Monitor
800-0362

200-0019
200-0022
200-0091

EMI Transformer
800-0190

IC Board Assy
834-5197

Operator Control
800-0364-01

Power Supply
800-0191

Power Supply PC
800-0170

Control Panel
800-3396

8-Way J/stick
510-0075

Shading indicates a Common Assembly

```
                        ┌─────────────┐
                        │  700-0139   │
                        └──────┬──────┘
         ┌──────────────┬──────┴──────┬──────────────┐
  ┌──────┴──────┐ ┌─────┴──────┐ ┌────┴──────┐ ┌─────┴──────┐
  │Color Monitor│ │AC Junction │ │ Component │ │ Flourescent│
  │  800-0362   │ │    Box     │ │   Shelf   │ │    Lamp    │
  │             │ │ 800-0145   │ │800-3401-02│ │ 800-0147-01│
  └──────┬──────┘ └────────────┘ └───────────┘ └────────────┘
  ┌──────┴──────┐ ┌────────────┐ ┌───────────┐ ┌────────────┐
  │  200-0019   │ │Power Supply│ │ IC Board  │ │    EMI     │
  │  200-0022   │ │ 800-0191   │ │   Assy    │ │ Transformer│
  │  200-0091   │ │            │ │ 834-5197  │ │  800-0190  │
  └─────────────┘ └─────┬──────┘ └─────┬─────┘ └────────────┘
                  ┌─────┴──────┐       │       ┌────────────┐
                  │Power Supply│       └───────│  Operator  │
                  │     PC     │               │  Control   │
                  │  800-0170  │               │ 800-0364-01│
                  └─────┬──────┘               └────────────┘
            ┌───────────┴──┐
            │Control Panel │
            │  800-3396    │
            └───────┬──────┘
            ┌───────┴──────┐
            │ 8-Way J/stick│
            │  510-0075    │
            └──────────────┘
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Shading indicates a Common Assembly

Parts Catalog

700-0134 Top Assembly

ITEM NO.	PART NO.	QTY. REQD.	DESCRIPTION
1	130-0002-00	1	Speaker Cover 6 x 9
2	130-0020-00	1	Speaker 6 x 9, 8 OHM, 10W
3	140-0021-00	1	Cover Junction Box
4	140-0055-03	1	Cabinet Universal Game
5			
6			
7	220-0008-00	1	Counter Digital 6V
8	220-0178-00	2	Draw Catch
9	220-0194-00 or 220-0195-00	2	Coin MECH W/Lamp
10			
11			
12	250-0038-00	1	Moulding Strip
13	250-0492-00	1	Moulding logo
14			
15	253-0222-00	2	Coin Receptacle
16	253-0238-00	1	Plastic Bag 3.00 x 4.00
17	253-0254-00	1	Mask CRT 19 IN.
18	253-0228-00	1	Monitor Panel Clear
19	253-0284-00	1	Bezel Plastic CRT Vertical
20	253-0328-00	1	Panel logo
21			
22			
23	260-0001-00	1	Fan Axial Cooling
24			
25			
26	280-0005-00	40	Cable Tie
27	280-0362-00	2	Electrical Crimp Sleeve
28	280-0475-00	30	Staple
29	280-0495-00	1	Spring, CPRSN .360 OD
30			

ITEM NO.	PART NO.	QTY. REQD.	DESCRIPTION
31	281-0004-12	1	SCR 8-32 x .750 PN HD PHIL MACH
32	281-0006-08	4	SCR 10-32 x .500 PN HD PHIL MACH
33	281-0014-28	4	SCR 8-32 x 1.75 OVH PHIL MACH
34	281-0042-12	2	SCR 6-20 x .750 PN HD PHIL Sheet Metal Type AB
35	281-0042-32	4	SCR 6-20 x 2.00 PN HD PHIL Sheet Metal Type AB
36	281-0045-12	15	SCR 10-16 x .750 PN HD PHIL Sheet Metal Type AB
37	281-0134-12	4	SCR 8-18 x .750 PN HD PHIL Sheet Metal Type AB, Black
38	283-0062-05	1	Washer #8 Lock INT Tooth
39	282-0005-20	14	Bolt 10-24 x 1.25 CRG HD, MACH, Black
40	282-0017-24	4	Bolt 1/4-20 x 1.50 HEX HD MACH
41	283-0060-23	1	Washer #8 Flat, STL, Wide
42	283-0060-24	2	Washer #10 Flat, STL, Narrow
43	283-0060-18	6	Washer #6 Flat, STL, Narrow
44	283-0060-22	5	Washer #8 Flat, STL REG
45	283-0060-25	26	Washer #10 Flat, STL, REG
46	283-0060-34	4	Washer # 1/4 Flat, STL, LGE
47	283-0061-05	4	Washer #8 Lock, Split, STL
48	283-0061-06	33	Washer #1- Lock, Split, STL
49	283-0061-08	4	Washer # 1/4 Lock, Split, STL
50	283-0072-16	1	Nut 10-32 HEX MACH
51	283-0071-14	1	Nut 10-24 Wing, STL, MACH
52	283-0072-13	5	Nut 8-32 HEX, MACH
53	283-0072-15	14	Nut 10-24 HEX, MACH
54	289-0002-02	2	Cable Clamp .250 Nylon
55	320-0020-00	2'	Sealant Foam
56	320-0051-00	1'	Tie Ribbon Wire Plastic Coated
57			

ITEM NO.	PART NO.	QTY. REQD.	DESCRIPTION
58	390-0019-00	1	Lamp Fluorescent
59			
60	420-0030-00	1	Decal Caution 115V
61	420-0624-00	1	Light Baffle
62	420-0793-00	1	Decal Toll Free No.
63	420-0912-00	1	Decal FCC Rules Compliance
64	420-0914-07	1	Decal Original Game Seal
65	420-0917-00	1	Decal FCC Warning
66	420-0977-00	1	Graphic Interior
67	420-0978-00	1	Decal, Box
68	420-0979-00	1	Manual
69	420-0982-0	1	Decal Dip SW Settings
70	420-0993-00	1	Graphic Side Right
71	420-0994-00	1	Graphic Side Left
72	420-1007-00	1	Decal Game Instructions
73			
74			
75			
76			
77			
78	800-0145-00	1	Assy. AC Junction Box
79	800-0147-01	1	Fluorescent Lamp Assy. 2 UL
80	800-0232-00	1	Assy. Harn. GND
81	800-0322-00	1	Assy. Cord Fan
82	800-0329-00	1	Assy. Harn. Monitor AC
83	800-0330-00	1	Assy. Harn. GND Monitor
84	800-0362-00	1	Assy. Monitor CLR Vertical
85	800-0370-00	1	GND Strap
86	800-0371-00	1	Assy. Speaker Harn.
87	800-0372-00	1	Harn. Coin MECH
88	800-0423-06	1	Assy. GND Strap

ITEM NO.	PART NO.	QTY. REQD.	DESCRIPTION
89	800-0423-07	1	Assy. GND Strap
90	800-0477-00	1	Assy. Ground Plane
91	800-3396-00	1	Control Panel Assy.
92	800-3397-00	1	Assy. Game Electronics
93	800-3399-00	1	Master Harn. Assy.
94	800-0478-00	1	Power Harn. Assy.
	420-0780-00	REF	Game Shipping Kit
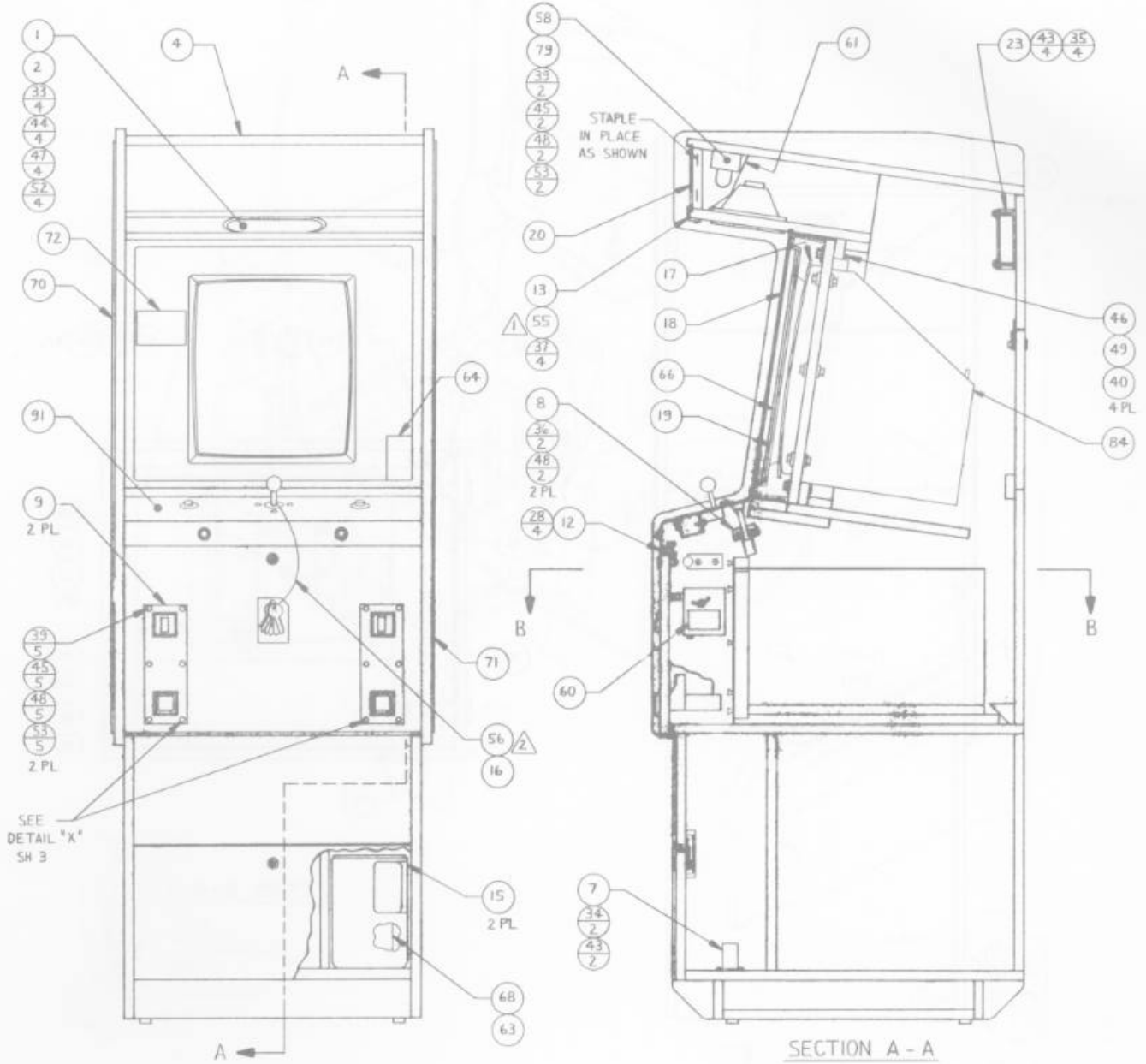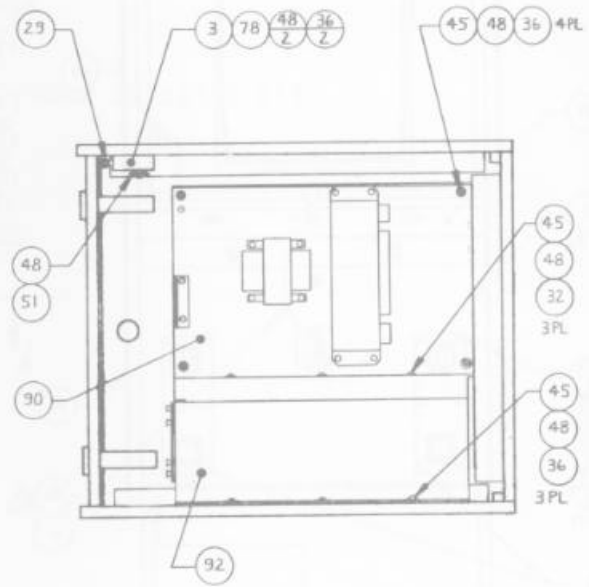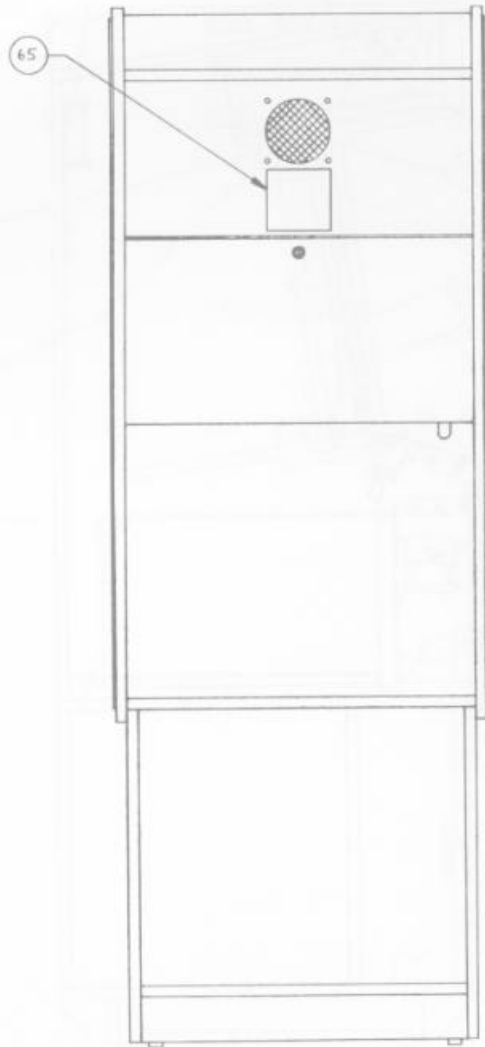
SECTION A - A

SECTION B-B

DETAIL V

DETAIL Y
APPROX 40 PL

DETAIL W

DETAIL X 2 PL
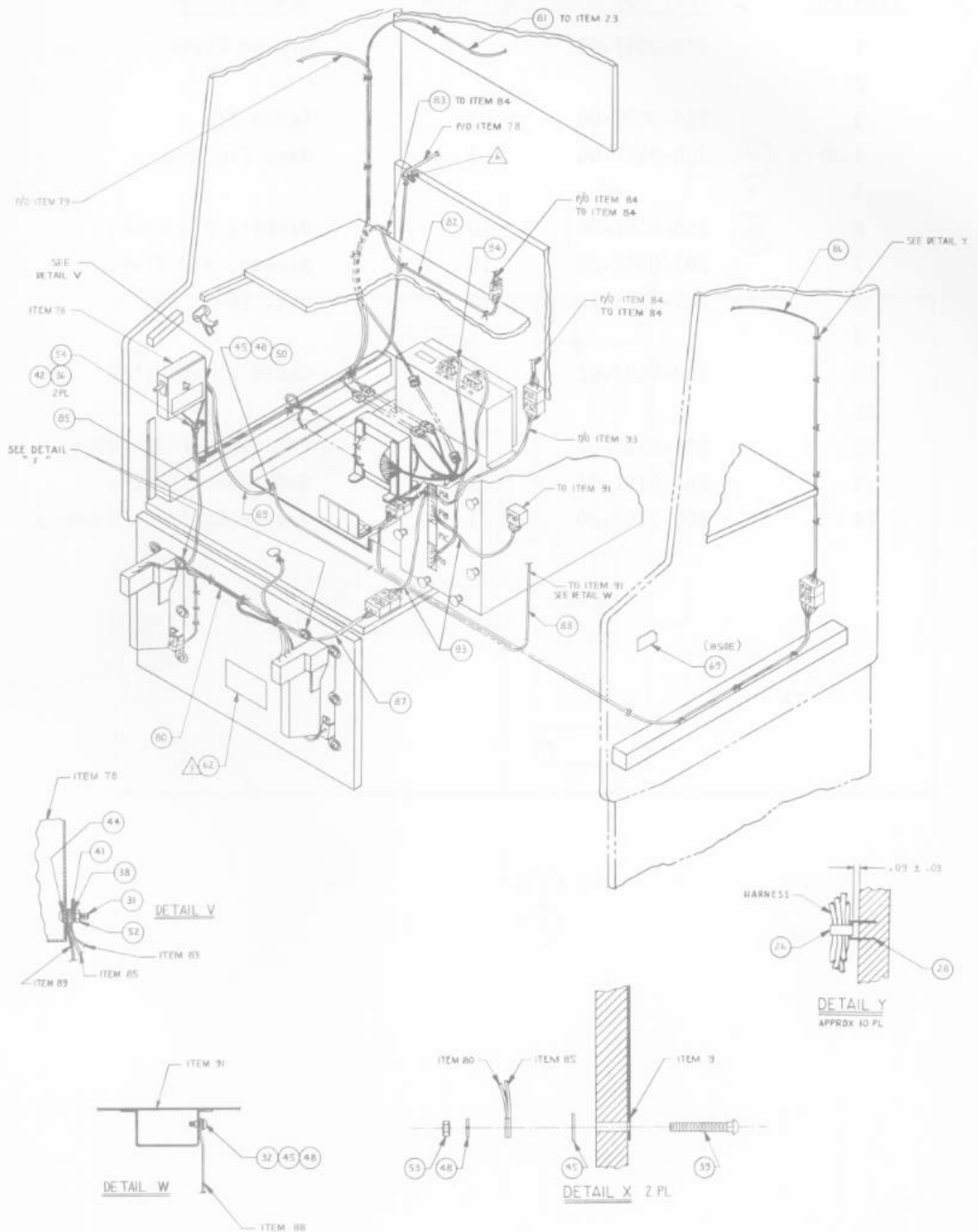
ITEM NO.	PART NO.	QTY REQD.	DESCRIPTION
1	250-0647-00	1	Ground Plane
2			
3	280-0005-00	3	Cable Tie
4	280-0327-00	3	Base Tie Wrap
5			
6	283-0061-06	10	Washer, #10 Lock.
7	283-0060-25	10	Washer, #10 Flat
8	283-0072-16	10	Nut, 10-32 Hex
9			
10	289-0002-02	1	Cable Clamp Nylon
11			
12	800-0190-00	1	EMI Xformer Assembly
13	800-0191-04	1	G-80 Power Supply
14	800-3350-00	1	Volume Control Assembly
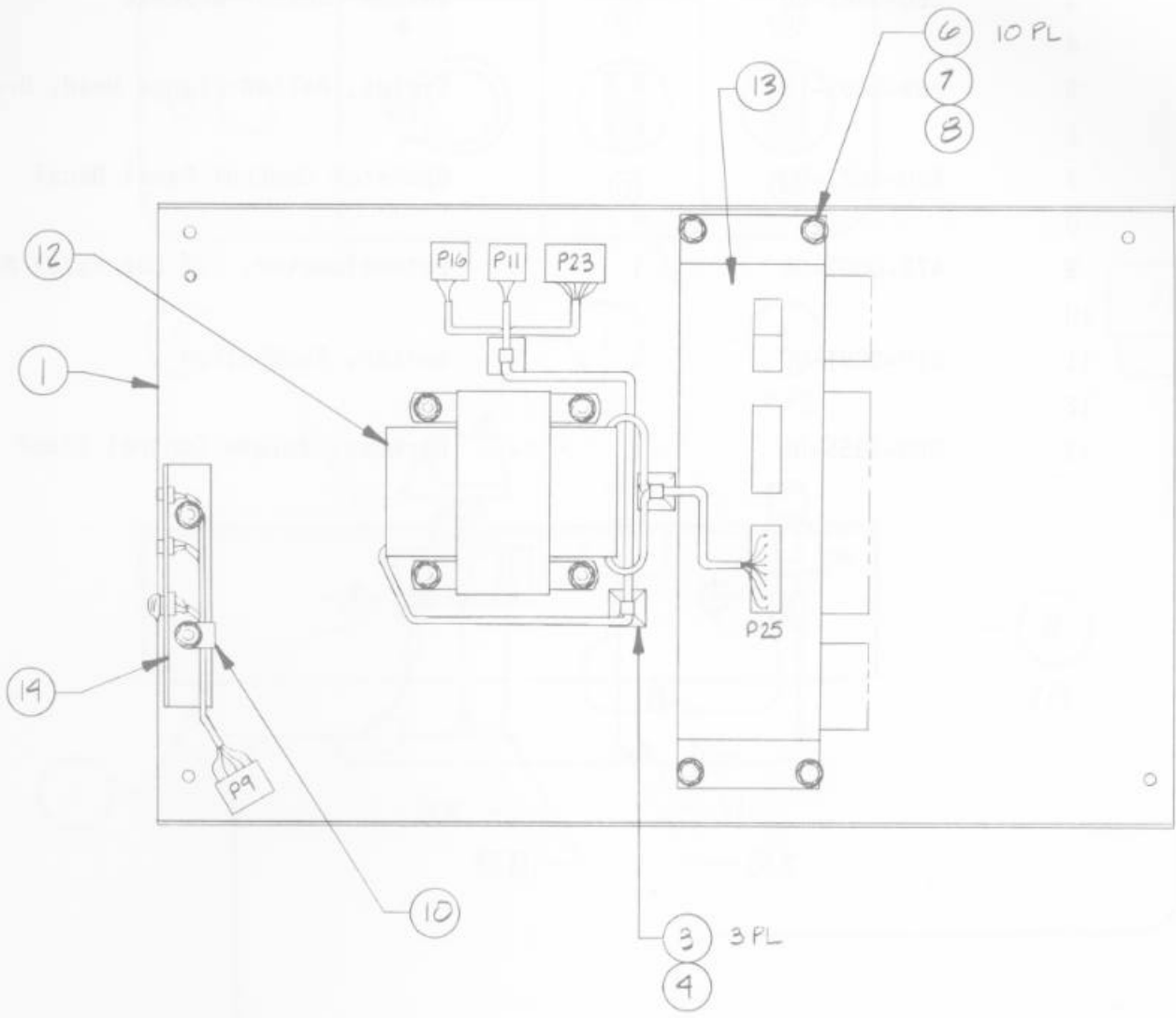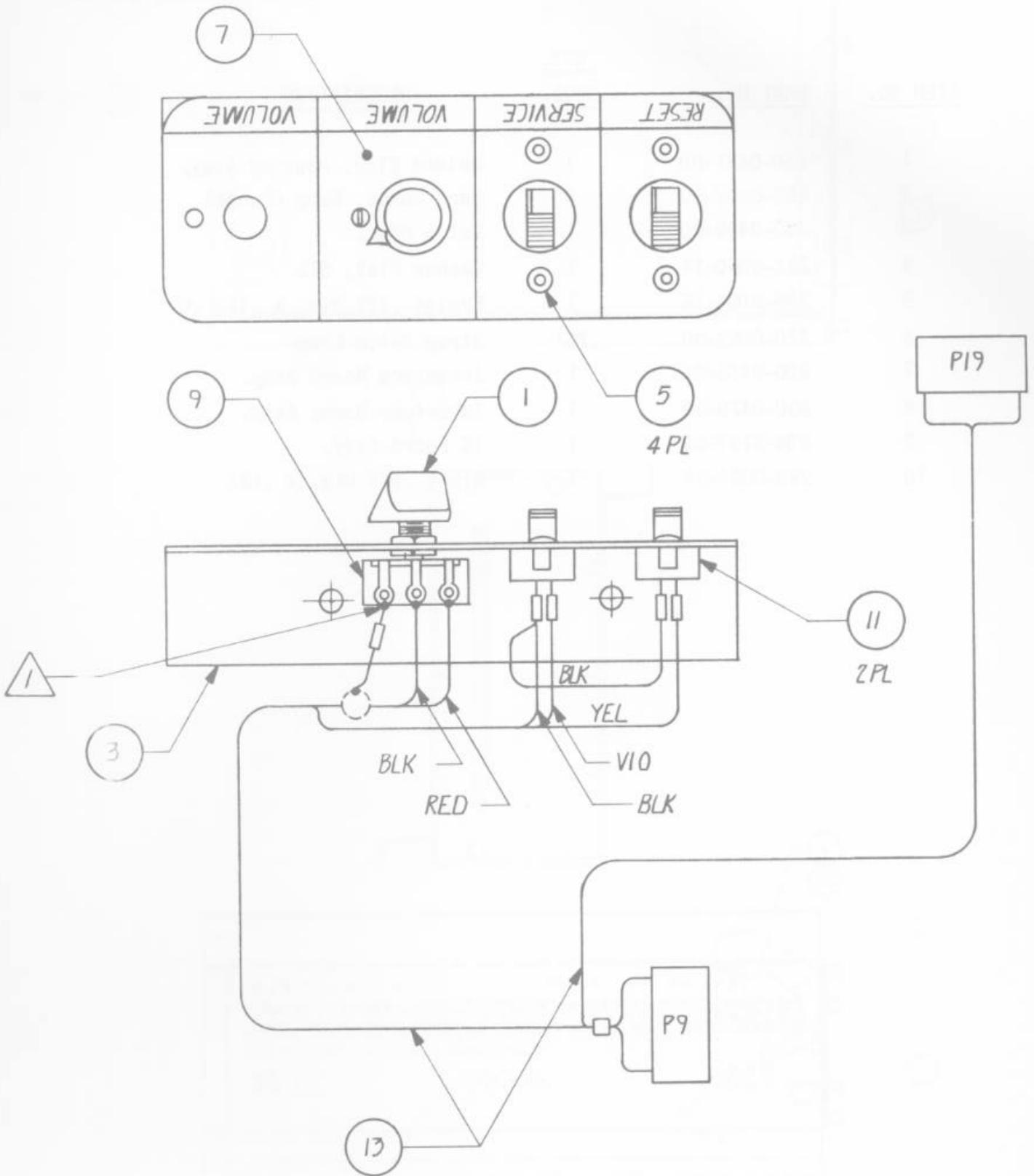
VOLUME CONTROL BLOCK ASSEMBLY

DRAWING NUMBER 800-3350

ITEM NO.	PART NO.	QTY REQD.	DESCRIPTION
1	240-0001-00	1	Volume Control Knob
2			
3	250-0462-00	1	Volume Control Bracket
4			
5	289-0003-18	4	Eyelet, Rolled Flange Head, Brass
6			
7	420-0623-00	1	Operator Control Panel Decal
8			
9	475-0007-00	1	Potentiometer, 10K Car Panel Mnt.
10			
11	510-0051-00	2	Switch, Pushbutton
12			
13	800-3355-00	1	Harness, Volume Control Block

4 PL

2 PL

BLK

YEL

BLK

RED

VIO

BLK

P19

P9

ITEM NO.	PART NO.	QTY. REQD.	DESCRIPTION
1	250-0621-00	1	Welded Elec. Housing Assy.
2	253-0309-00	8	Card Guide, Deep Channel
3	280-0499-00	1	Velco Disc.
4	283-0060-14	1	Washer Flat, STL
5	289-0003-16	1	Eyelet .121 Dia. x .187 LG
6	320-0062-00	.75'	Strap Velco Loop
7	800-0435-00	1	Interface Board Assy.
8	800-0479-00	1	Interface Harn. Assy.
9	834-5197-00	1	IC Board Assy.
10	283-0064-04	1	Rivet .125 Dia. x .187

-00 ASSY
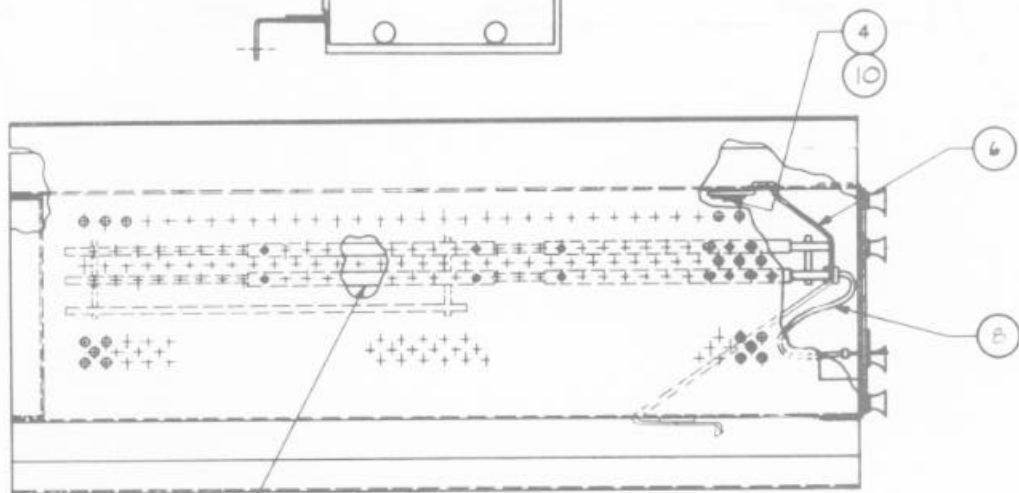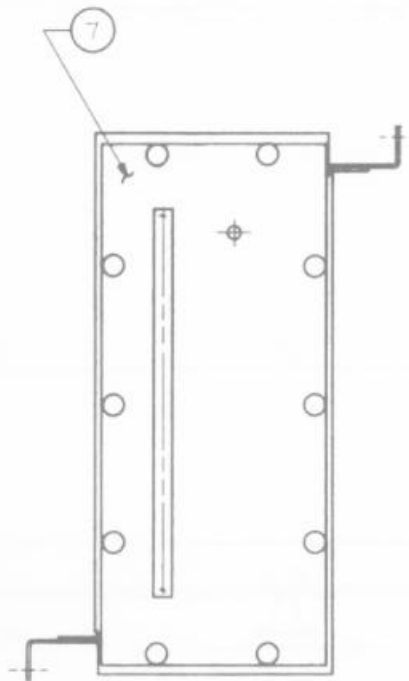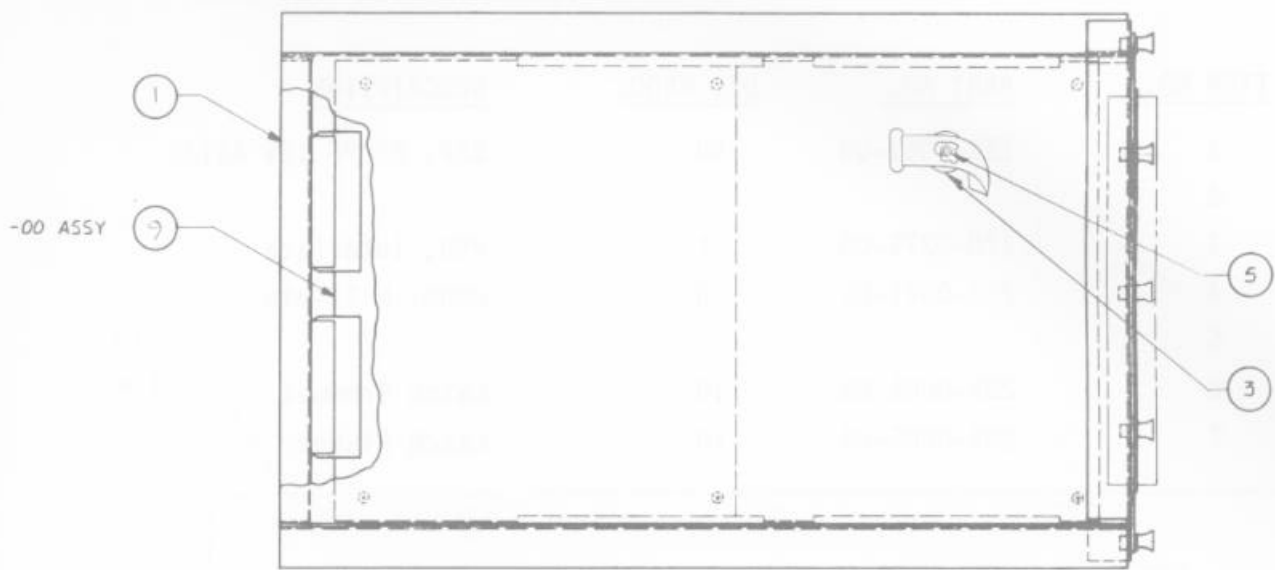
INTERFACE BOARD ASSEMBLY   DRAWING NUMBER 800-0435

ITEM NO.	PART NO.	QTY REQD.	DESCRIPTION
1	151-0061-00	60	CAP, 220PF 16V AXIAL
2			
3	170-0275-00	1	PCB, Interface
4	212-0021-00	6	CONN. M 10-pin
5			
6	289-0005-05	10	Latch Grommet
7	289-0005-06	10	Latch Plunger
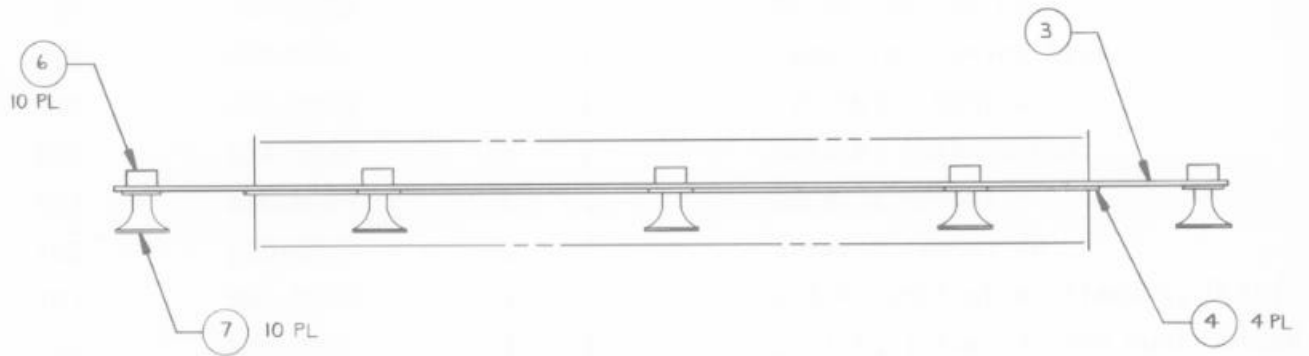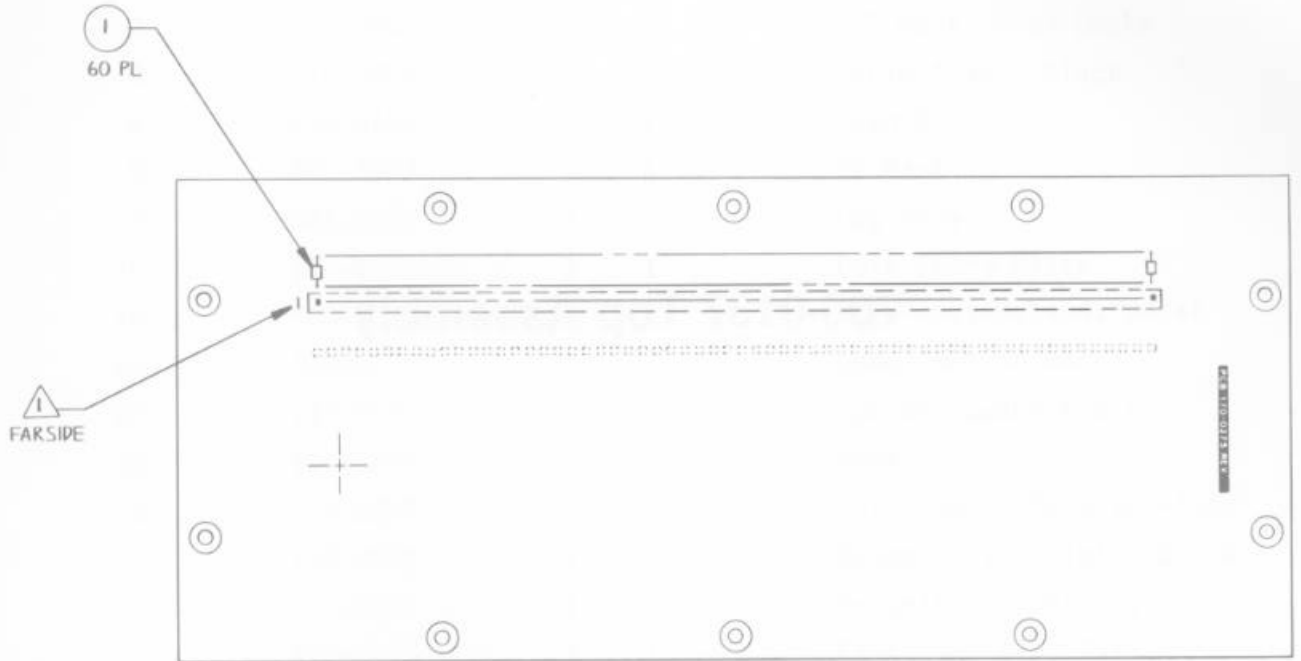
① 60 PL

⚠️
FARSIDE

⑥ 10 PL

③

⑦ 10 PL

④ 4 PL

700-0137 Top Assembly

ITEM NO.	PART NO.	QTY REQD. -00	QTY REQD. -01	DESCRIPTION
1	834-0327	1	1	T8 Cabinet Accessory Assy
2	220-0190	2	2	Lower Coin Chute
3	601-0662	1	1	CRT Mask, Grey Smoke
4	275-0078	1	1	Table Glass, Black
5	220-0191	1	1	Cash Box
8	601-0663	1	1	TV Mask
9	601-0664	2	2	Leg Assy
15	117-0169	1	1	Coin Entry Plate
16	420-1010	1	1	Play Instructions Decal
20	420-0755	1	1	Denomination Decal
22	117-0170	1	1	Speaker Guard Plate
23	601-0542	1	1	Hook
25	220-0084	2	2	Coin Chute, Rejector-type
30	117-0202	1	1	Denomination Plate, 25¢ X 2
	117-0171	1	1	Denomination Plate, 25¢
31	834-0125	1	1	Cable and Plug Assy
32	240-0120	2	2	Reject Button Assy
39	834-5165	1	1	Game Electronics Assy
40	200-0039	1	1	19" Color Monitor
102	509-0039	1	1	Switch, Push Button
103	420-0979	1	1	Owner's Manual
106	130-0017	1	1	Speaker, 8ohm, 3W
107	601-0444	1	1	C & R Combination Element, 0.1uf
108	509-0117	1	1	Switch, Illum. Yellow Push Button
109	601-0429	1	1	Noise Filter, AC 250V, 4A
111	420-1008	1	1	Volume Control Decal
	420-0982	1	1	DIP Switch Decal
	420-0914-07	1	1	Game Seal Decal
	420-0912	1	1	FCC Compliance Decal
	117-0234	1	1	Control Panel Overlay
	117-0204	-	1	8-Way Guide Plate
	250-0656	-	1	Bracket (WF-0001X)
	250-0657	-	1	Bracket (WF-0002)

ITEM NO.	PART NO.	QTY REQD.		DESCRIPTION
		-00	-01	
	250-0658	-	1	Bracket (WF-0003)
	283-0072-07	6	-	Nut, 4-40 Hex
	283-0060-13	6	-	Washer, #4 Flat
	283-0061-02	6	-	Washer, #4 Lock
	211-0173-00	6	-	Shorting Clip

ITEM NO.	PART NO.	QTY REQD.	DESCRIPTION
1	140-0074	1	Wooden Cabinet, T8
2	601-0761	1	Service Door
3	280-0451	2	Hinge, 95
4	105-0275	2	Cabinet Support Bracket
5	601-0762	1	Table
6	102-0047	2	Locking Base
7	105-0276	2	Locking Bracket
8	280-0452	2	Adjust Screw
9	117-0200	2	Nut Plate
10	109-0057	2	TV Holder
11	601-0763	1	Net
12	601-0698	1	Door Protector A
13	601-0699	1	Door Protector B
14	601-0700	1	Door Protector C
15	220-0204	1	Cash Box Door
16	601-0657	1	Reject Cup Cover
17	601-0764	2	Rubber Cushion
18	601-0416	1	Reject Cup & Flap Door Assy
19	140-0075	2	Hole Cover
20	280-0405	2	Hinge, 95
21	105-0198	4	Hook Bracket
22	220-0097	1	Cylinder Lock, L-S type
23	117-0062	3	Lock Retainer Plate
24	601-0587	1	Lock Tongue
25	280-0453	1	Spacer Ring
26			
27	280-0454	1	Locking Tongue
28	834-0328	1	Locking Tongue Assy
29			
30	109-0058	1	Stay Holder
31	280-0463	2	Locking Tongue
32			
33	117-0201	1	Guard Plate

ITEM NO.	PART NO.	QTY REQD.	DESCRIPTION
101	601-0765	1	Stay
201		7	Screw, M4X10 PN.HD. PHIL
202		6	Screw, M5X10 PN.HD. PHIL
203		13	Bolt, Carriage, M4X20
204		4	Bolt, Carriage, M5X20
205		12	Bolt, Carriage, M5X25
206		44	Screw, Wood, RND.HD. PHIL 3.5X13
207		16	Screw, Wood, RND.HD. PHIL 3.5X16
208		4	Screw, Wood, FLT.HD. PHIL 3.5X13
209		4	Screw, Wood, RND.HD. PHIL 3.1X13
210		15	Nut, Flange, M4
211		16	Nut, Flange, M5
212		1	Onime Nut, M4
213		2	Washer, Flat, 44-16X16
214		2	E Washer, 5mm
215		2	Screw, PN.HD. PHIL M3X14
216		2	Bolt, Carriage, M4X25
217		2	Screw, PN.HD. PHIL M4X18
218		2	Washer, Flat, M4
219		2	Spring Washer, M4
220		1	Screw, Tapping, #1, PN.HD. PHIL 4X14
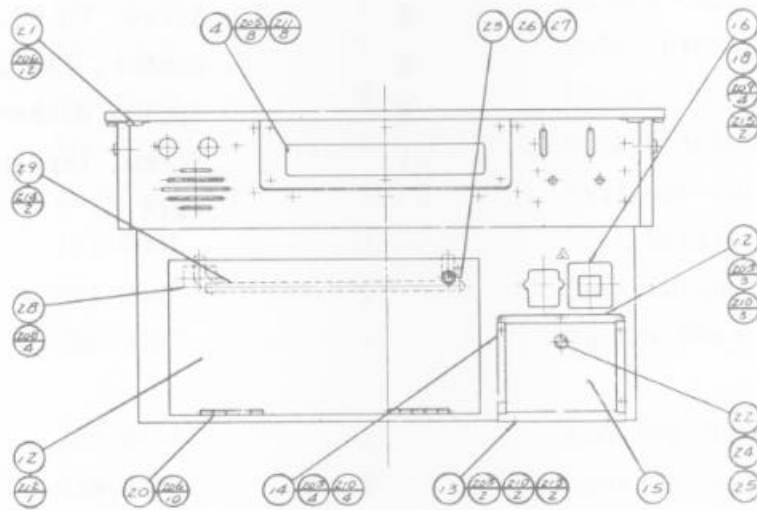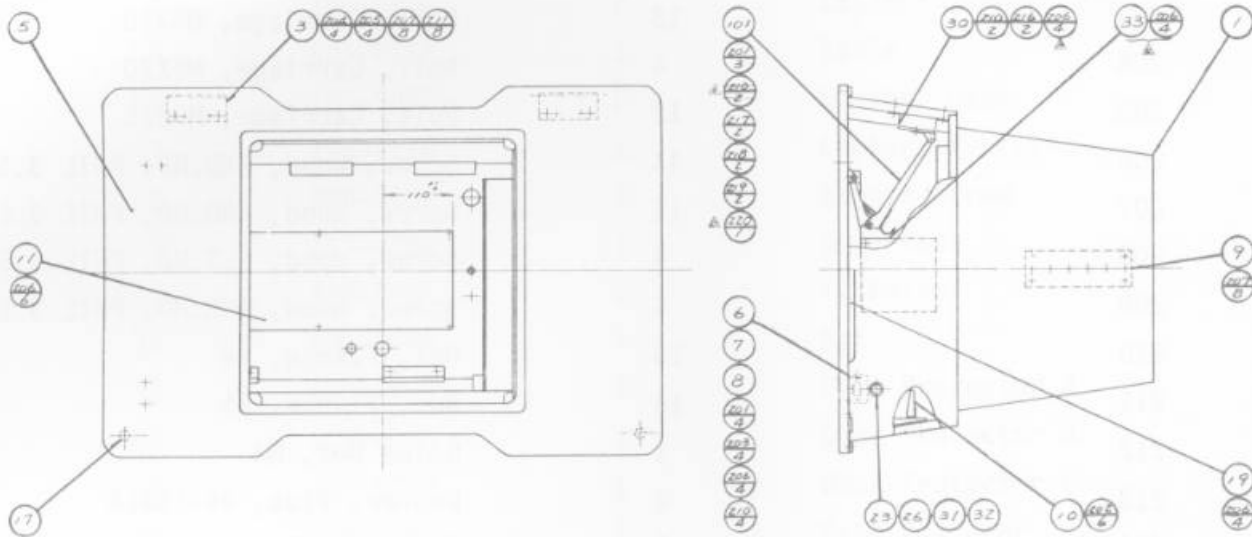
ITEM NO.	PART NO.	DESCRIPTION
1	117-0203	Control Panel Plate
2	834-0331	8-Way Joystick Assembly
3	117-0164	Slider Plate
4		
5	102-0048	Control Panel Base, Upper
6	102-0049	Control Panel Base, Lower
7	601-0766	Ornament Board, A
8	601-0767	Ornament Board, B
101	109-0042	Handle Ball, Red
102	509-0146	Switch, Push Button, Red
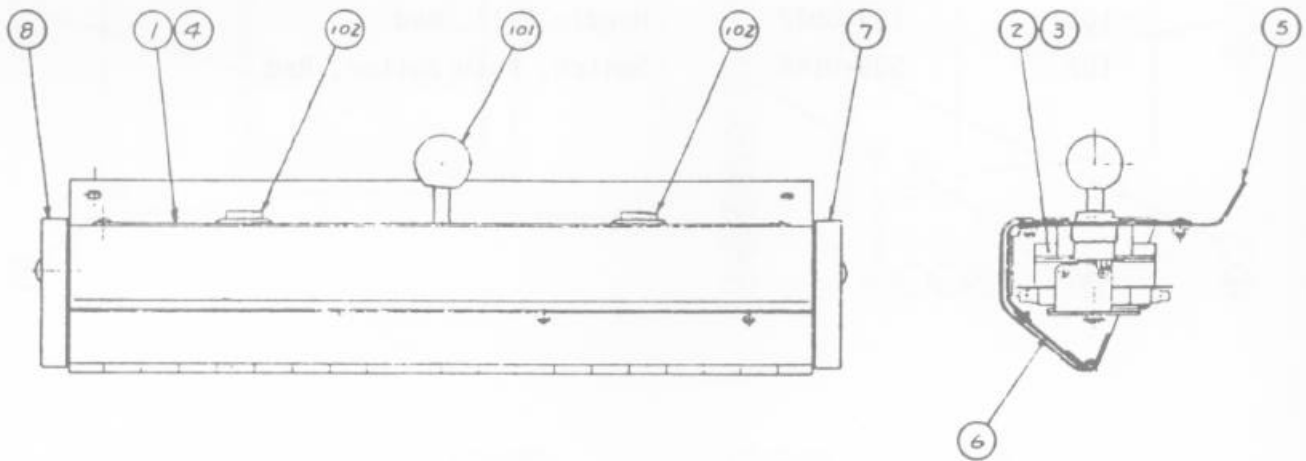
ITEM NO.	PART NO.	DESCRIPTION
1	105-0277	Bracket
2	117-0204	Guide Plate, 8-Way
3	834-0332	Handle Assembly
4	601-0768	Sleeve
5	125-0102	Compression Spring
6	104-0007	Actuator
7	834-0333	Bracket w/Bearing Assembly
8		
9	117-0164	Slider Plate
10	280-0455	Plastic Washer
101	509-0131	Switch, Micro-type
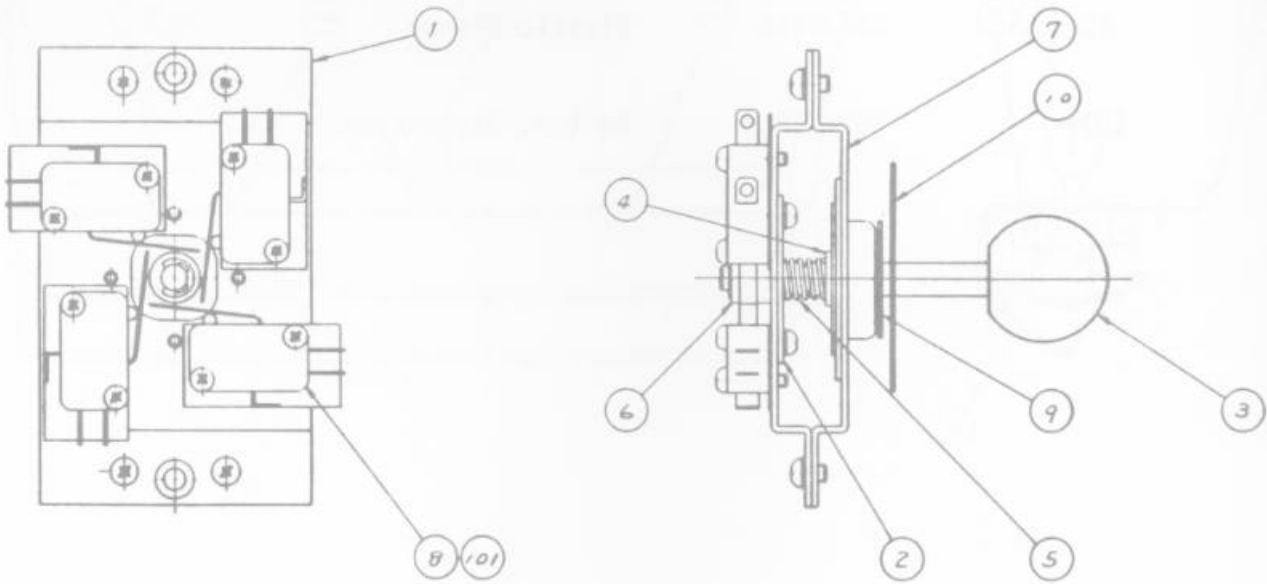
ITEM NO.	PART NO.	DESCRIPTION
1		
2	601-0612	Regulator Unit
3		
4		
5	560-0067	Power Transformer, 90-240VAC
102	601-0158	Switching Regulator, 100VAC, 5V 6A
103	509-0115	Switch Toggle, SP-DT, 15A
105	514-0046	Fuse Holder, 1P, 125V 10A
106	514-0045	Fuse Holder, w/Cover 250V 10A
107	514-0033	Fuse, 1A
108	514-0002	Fuse, 3A
109	514-0034	Fuse, 5A
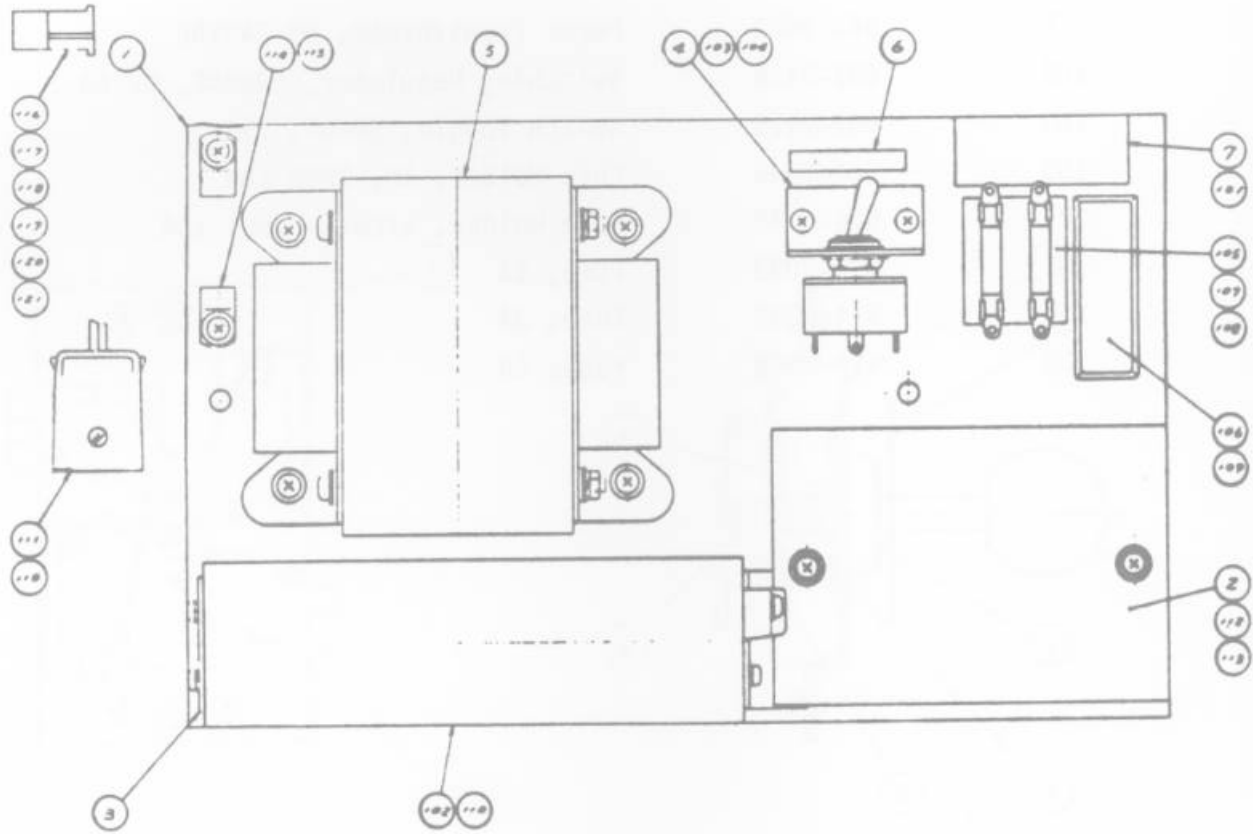
ITEM NO.	PART NO.	DESCRIPTION
1	312-0070	IC, uA 78M12UC
2	313-0014	IC, uA 7812UC
3	312-0042	IC, uA 7805UC
4	481-0042	Rectifier, Silicon Diode
5	481-0065	Rectifier, Silicon Diode
6	481-0049	Rectifier, Silicon Diode
7	150-0008	Condenser, 2200uf, 25V
8	150-0182	Condenser, 3300uf, 25V, CE04
9	150-0206	Condenser, 3300uf, 16V, CE04
10	153-0002	Condenser, 1uf, 25V, Solid Tantalum
11	151-0041	Condenser, 0.1uf, 25V, Ceramic
12	470-0332	Resistor, 3.3K, $\frac{1}{4}$W, Solid Type
13	150-0154	Condenser, 470uf, 25V, CE04
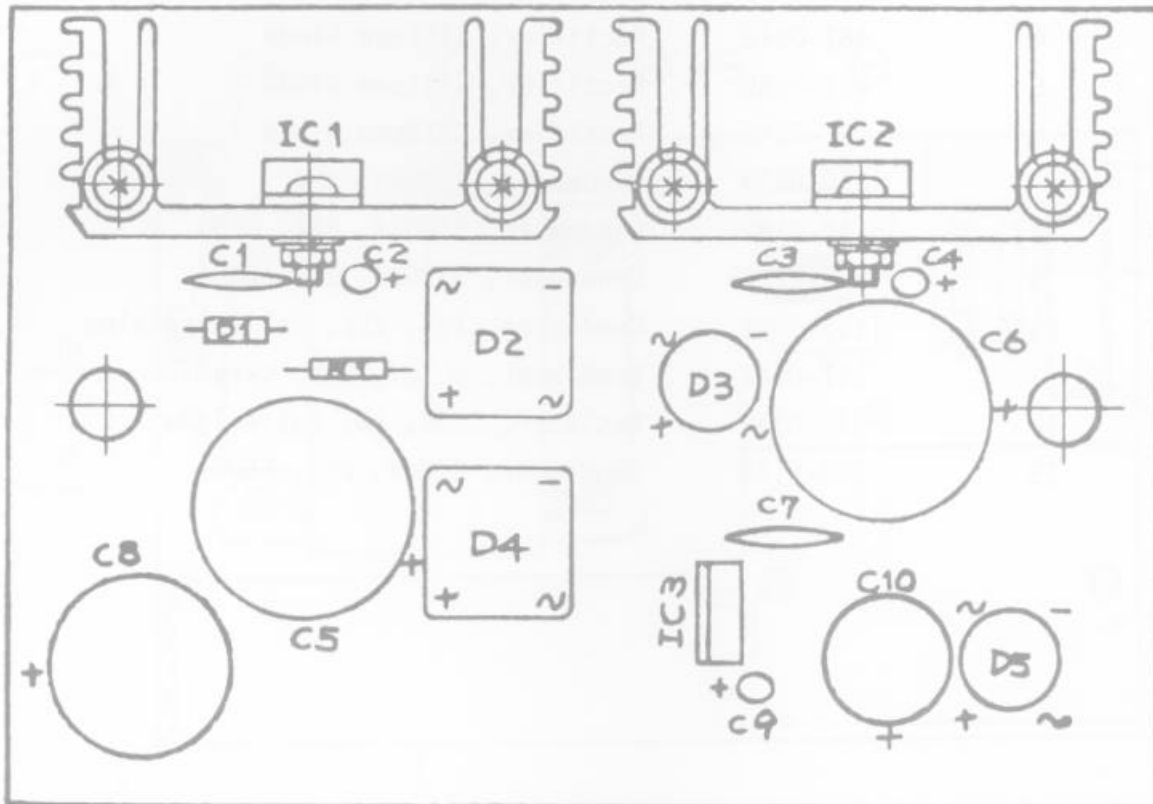
PCB ASSEMBLY

Part No.	Description	Ref Des.
Resistors	R carbon 1/4 sb 680 Ohm	R101
	R carbon 1/4 sb 680 Ohm	R102
	R carbon 1/4 sb 2.2k Ohm	R103
	R carbon 1/4 sb 390 Ohm	R104
	R carbon 1/4 sb 2.2k Ohm	R105
	R carbon 1/4 sb 390 Ohm	R106
	R carbon 1/4 sb 1K Ohm	R107
	R carbon 1/4 sb 680 Ohm	R111
	R carbon 1/4 sb 780 Ohm	R112
	R carbon 1/4 sb 15K Ohm	R113
	R carbon 1/4 sb 390 Ohm	R114
	R carbon 1/4 sb 2.2K Ohm	R115
	R carbon 1/4 sb 390 Ohm	R116
	R carbon 1/4 sb 1K Ohm	R117
	R carbon 1/4 sb 680 Ohm	R121
	R carbon 1/4 sb 680 Ohm	R122
	R carbon 1/4 sb 390 Ohm	R124
	R carbon 1/4 sb 2.2K Ohm	R125
	R carbon 1/4 sb 390 Ohm	R126
	R carbon 1/4 sb 1K Ohm	R127
	R carbon 1/4 sb 10K Ohm	R401
	R carbon 1/4 sb 8.2K Ohm	R402
	R carbon 1/4 sb 3.3K Ohm	R403
	R carbon 1/4 sb 8.2K Ohm	R404
	R carbon 1/2 sb 270 Ohm	R405
	R carbon 1/4 sb 10K Ohm	R406
	R carbon 1/4 sb 680 Ohm	R407
	R carbon 1/4 sb 2.2K Ohm	R408
	R carbon 1/4 sb 12K Ohm	R409
	R carbon 1/4 sb 10K Ohm	R410

Part No.	Description	Ref Des.
Resistors (cont)	R fuseable FMR1/4W 100 Ohm	R413
	R carbon 1/4 sb 2.2K Ohm	R414
	R metal 10K Ohm	R415
	R fuseable FMR1/4C 22 Ohm	R416
	R cement RGBIOH(V) 220 Ohm	R417
	R metal 4.7K Ohm	R418
	R carbon 1/2 sb 2.2K Ohm	R419
	R carbon 1/4 sb 68K Ohm	R421
	R carbon 1/4 sb 6.8 Ohm	R422
	R carbon 1/4 sb 470 Ohm	R423
	R fuseable FMR1/4W	R424
	R carbon 1/2 sb 390 Ohm	R425
	R carbon 1/4 sb 6.8K Ohm	R426
	R fuseable FMR1/2W 1.2 Ohm	R427
	R fuseable FMR2W 1.2 Ohm	R428
	R carbon 1/4 sb 330 Ohm	R501
	R carbon 1/4 sb 10K Ohm	R502
	R carbon 1/4 sb 10K Ohm	R504
	R carbon 1/4 sb 27k Ohm	R505
	R carbon 1/4 sb 390K Ohm	R506
	R carbon 1/4 sb 18K Ohm	R507
	R carbon 1/4 sb 68K Ohm	R508
	R carbon 1/4 sb 6.8K Ohm	R509
	R carbon 1/4 sb 10K Ohm	R510
	R carbon 1/4 sb 1.2K Ohm	R511
	R carbon 1/4 sb 470 Ohm	R512
	R metal RNL1/4 3.3K Ohm	R513
	R metal RNL1/4 560K Ohm	R514
	R metal 6.8K Ohm	R515
	R carbon 1/2 sb 8.2K Ohm	R516
	R metal 3.3K Ohm	R517
	R carbon 1/4 sb 8.2K Ohm	R518

Part No.	Description	Ref Des.
Resistors (cont)	R carbon 1/2 sb 4.7K Ohm	R519
	R carbon 1/2 sb 33 Ohm	R520
	R carbon 1/4 sb 10K Ohm	R521
	R fuseable FMR1/4W 330 Ohm	R522
	R fuseable FMR1/4W 330 Ohm	R523
	R fuseable FMR1/4W 330 Ohm	R524
	R fuseable FMR1/2 4.7 Ohm	R525
	R carbon 1/4 sb 22K Ohm	R527
	R carbon 1/4 sb 22K Ohm	R528
	R carbon 1/4 sb 680 Ohm	R529
	R carbon 1/4 sb 4.7K Ohm	R530
	R carbon 1/4 sb 470 Ohm	R531
	R carbon 1/4 sb 680 Ohm	R532
	R carbon 1/4 sb 47 Ohm	R533
	R fuseable FMR1/4W 330 Ohm	R901
	R carbon 1/4 sb 47K Ohm	R902
	R fuseable FMR1/4W 68 Ohm	R903
	R metal 15K Ohm	R904
	R carbon 1/4 sb 1M Ohm	R905
	R carbon 1/4 sb 15K Ohm	R906
	R carbon 1/4 sb 68K Ohm	R907
	R carbon 1/4 sb 68K Ohm	R908
	R carbon 1/4 sb 4.7K Ohm	R909
	R variable V8K4-1 5K Ohm	RV101
	R variable V8K4-1 5K Ohm	RV102
	R variable V8K4-1 5K Ohm	RV103
	R variable V8K4-1 5K Ohm	RV104
	R variable RVA0911H320-7-502M	RV404
	R variable RVG0911H320-7-303M	RV402
	R variable RVA0911H320-7-501M	RV403
	R variable RVA0911H320-7-302M	RV501
	R variable RVG0911H320-7-303M	RV502

Part No.	Description	Ref Des.
Resistors (cont)	R variable RVG0911H320-7-303M	RV503
Capacitors		
	C electro CE04 16V100(M)	C101
	C electro CE04 50V 1(M)	C401
	C polyester DEP50V 333K	C402
	C polyester DEP50V 333K	C403
	C tantal D 16V 2.2 uf K	C404
	C ceramic DD104-63B561K50V	C405
	C electro CE04 16V 470 (M)	C406
	C electro CE04 25V 10 (M)	C407
	C tantal D 25 10 uf K	C408
	C electro CE04 100V 10 (M)	C409
	C electro CE04 50V 1 (M)	C410
	C electro CE04 35V 220 (M)	C411
	C electro CE04 63V 470 (M)	C412
	C electro CE04 16V 470 (M)	C413
	C electro CE04 25V 10 (M)	C414
	C ceramic DD09]63B222K500V	C415
	C electro CE04 100V 10 (M)	C416
	C electro CE04 35V 220 (M)	C417
	C electro CE04 160V 22 (M)	C418
	C ceramic DD09-63B222K500V	C419
	C electro CE04 25V 10 (M)	C501
	C electro CE04 25V 10 (M)	C502
	C electro CE04 50V 1 (M)	C503
	C ceramic DD105-63E222P50V	C504
	C electro CE04 50V 1 (M)	C505
	C polyester DEP 50V 473K	C506
	C polyester DEP 50V 473K	C507
	C polypro DTW100V 562-G	C508
	C electro CE04 50V 1 (M)	C510
	C electro CE04 16V 220 (M)	C511

Part No.	Description	Ref Des.
Capacitors (Cont)	C ceramic DD05-63B561K500V	C512
	C ceramic DD10 63E472P500V	C513
	C ceramic DE151OR 222K	C514
	C ceramic DE151OR 222K	C515
	C ceramic DE141OR 182K	C516
	C ceramic DE111OR 821K	C517
	C ceramic DD104-63B821K 50V	C518
	C polipro DTW200VDC 0.47 uf M	C520
	C electro CE04 50V 47 (M)	C523
	C electro CE04 160V 47 (M)	C524
	C ceramic DD09-63B222K500V	C525
	C electro CE04 160V 1 (M)	C526
	C electro CE04 160V 10 (M)	C527
	C p]oripro DTW630VDC 0.01 uf - M	C528
	C electro CE04 25V 10 (M)	C529
	C polypro UL LHX125VAC 0.1 uf	C901
	C ceramic MVDE0807E222ZAC250V	C902
	C ceramic MVDE0807E222ZAC250V	C903
	C ceramic DD09-63B 22K 500V	C904
	C electro RPE 180V (30o) 680 (M)	C905
	C electro CE04 160V 22 (M)	C906
	C ceramic DD05-63B 221K 500V	C907
Coils		
180-0033	L choke	L401
181-0034	L choke	L501
180-0032	L choke	L502
181-0033	L linear	L503
181-0032	L size	L504
180-0031	L choke	L505
180-0030	L choke	L506
180-0029	L choke	L507
180-0028	L choke	L901

Part No.	Description	Ref Des.
180-0027	L choke	L902
180-0026	L choke	L903
Transformers		
560-0102	T H drive	T501
560-0101	T pin corr	T502
560-0100	T FBT MSH1FAC02	T503
Diodes		
481-0164	Diode 1S1588	D101
481-0164	Diode 1S1588	D102
481-0164	Diode 1S1588	D103
481-0164	Diode 1S1588	D104
481-0164	Diode 1S1588	D105
481-0164	Diode 1S1588	D106
481-0164	Diode 1S1588	D401
481-0234	Diode 1S1886	D402
481-0175	Diode 1S2076A	D403
481-0119	Diode RU2	D404
481-0233	Diode EQA01-24	D405
481-0164	Diode 1S1588	D501
481-0137	D zener EQA01-07S	D502
481-0164	Diode 1S1588	D504
481-0175	Diode 1S2076A	D505
481-0175	Diode 1S2067A	D506
481-0119	Diode RU2	D507
481-0232	Diode S5295G	D508
481-0164	Diode 1S1588	D509
481-0232	Diode S5295G	D510
481-0164	Diode 1S1588	D511
481-0137	Diode EQA01-07S	D512
481-0235	D bridge 3D4B41	D901
481-0119	Diode RU2	D902
481-0137	D zener EQA01-07S	D904

Part No.	Description	Ref Des.
481-0137	D zener EQA01-07S	D905
Transistors		
482-0261	Transistor 2SC1740	Q101
482-0261	Transistor 2SC1740	Q102
482-0261	Transistor 2SC1740	Q103
482-0261	Transistor 2SC1740	Q104
482-0261	Transistor 2SC1740	Q105
482-0261	Transistor 2SC1740	Q106
482-0111	Transistor 2SA673	Q107
Miscellaneous		
	Connector	CN201
	Connector	CN202
	Connector	CN203
	Assy accord	CD901
	Connector	CN901
510-0068	Switch SSA042	SW1
510-0068	Switch SSA042	SW2
	Pin terminal	TP1
	Pin terminal	TP2
	Pin terminal	TP3
	Pin terminal	TP4
Transistors		
482-0276	Transistor 2SD1138	Q401
482-0276	Transistor 2SD1138	Q402
482-0261	Transistor 2SC1740	Q501
482-0257	Transistor 2SC2688	Q502
482-0198	Transistor 2SD870	Q503
482-0201	Transistor 2SD763	Q504
482-0201	Transistor 2SD763	Q505
482-0111	Transistor 2SA673	Q506
482-0111	Transistor 2SA673	Q507
	Transistor 2SC2555	Q901

Part No.	Description	Ref. Des.
482-0273	Transistor 2SA1091	Q902
482-0167	Transistor 2SC2482	Q903
482-0167	Transistor 2SC2482	Q904
Miscellaneous		
313-0051	I C HA11235	IC401
	Connector	CN101
	Connector	CN102
	Fuse	F901
	Fuse clip	CF901
	Fuse	
	Fuse clip	
	Shield case	
560-0098	Assy tr (v-out)	
560-0099	Assy tr (h-out)	
200-0081	Assy radiator A	

NECK BOARD PCB

Resistors

	R carbon 1/4 sb 220 Ohm	R301
	R carbon 1/4 sb 220 Ohm	R302
	R carbon 1/4 sb 220 Ohm	R303
	R carbon 1/4 sb 1.2K Ohm	R304
	R carbon 1/4 sb 1.2K Ohm	R305
	R carbon 1/4 sb 1.2K Ohm	R306
	R carbon 1/4 sb 330 Ohm	R307
	R carbon 1/4 sb 330 Ohm	R308
	R carbon 1/4 sb 330 Ohm	R309
	R metal 8.2K Ohm	R310
	R metal 8.2K Ohm	R311
	R metal 8.2K Ohm	R312
	R solid 1/2 2.2K Ohm	R313
	R solid 1/2 2.2K Ohm	R314
	R solid 1/2 2.2K Ohm	R315

Part No.	Description	Ref. Des.
Resistors (cont)	R solid 1/2 1M Ohm	R316
	R variable RVA0911H-306-1 5K Ohm	RV301
	R variable RVA0911H-306-2 5K Ohm	RV302
	R variable RVA0911H-306-3 5K Ohm	RV303
	R variable RVA0911H-306-7 220 Ohm	RV304
	R variable RVA0911H-306-7 220 Ohm	RV305
Capacitors		
	C ceramic DD104-63B 271K 50V	C304
	C ceramic DD104-63B 271K 50V	C305
	C ceramic DD104-63B 271K 50V	C306
	C ceramic DE0705-B 102K 1KV	C309
Transistors		
482-0257	Transistor 2SC2688	Q301
482-0257	Transistor 2SC2688	Q302
482-0257	Transistor 2SC2688	Q303

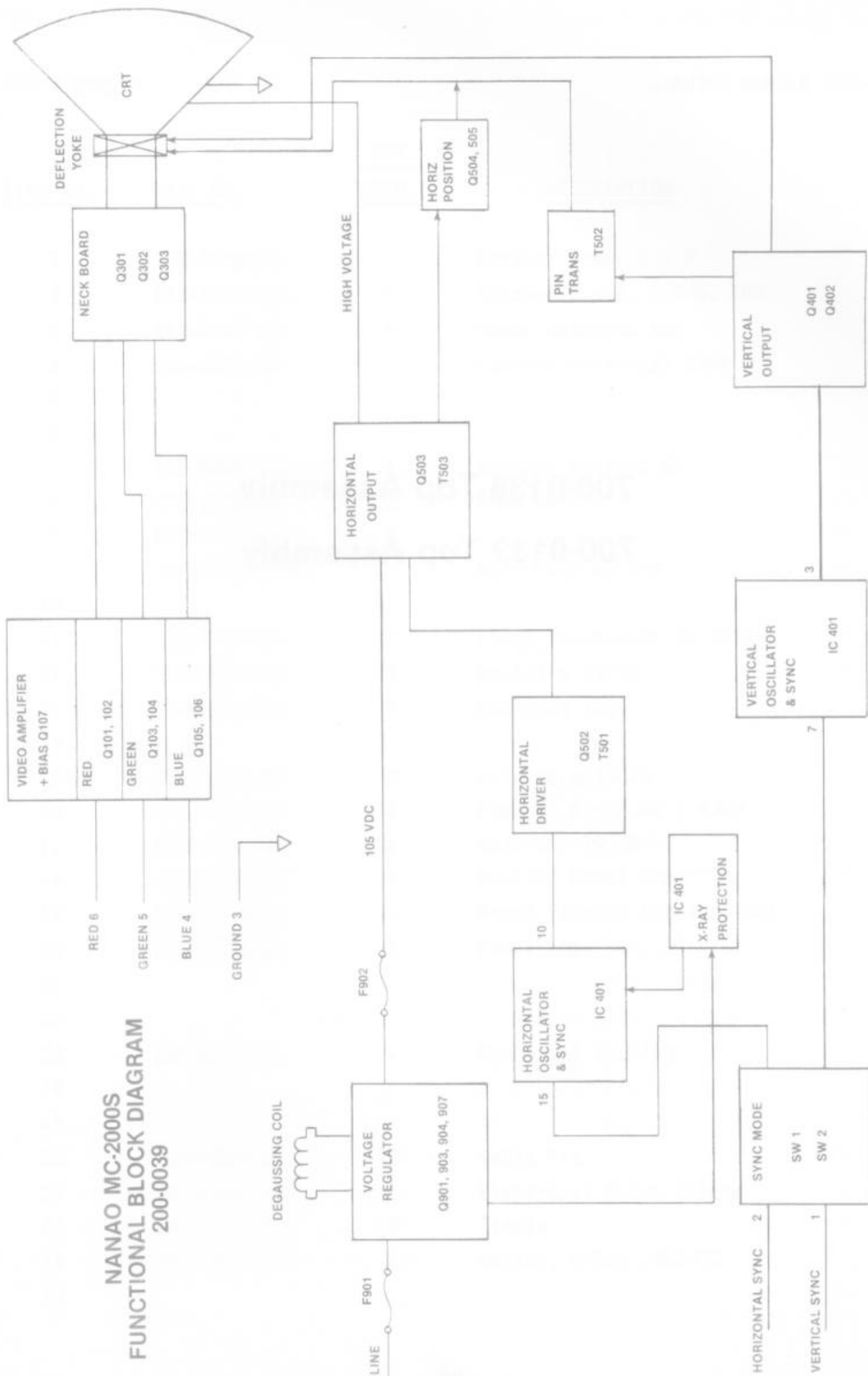ASSY MAIN PC BOARD, NANAO-200 0039
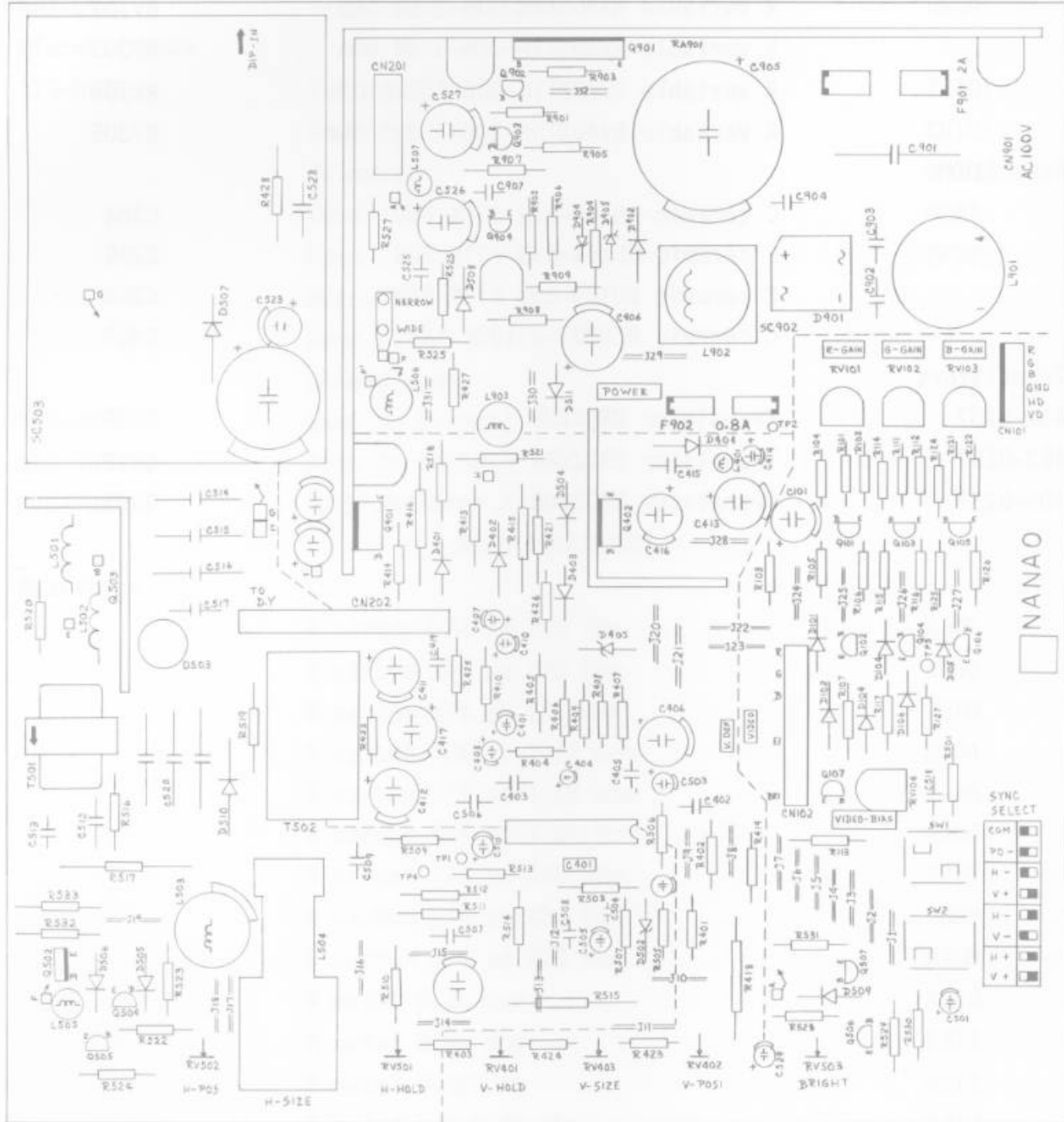
ASSY, NECKBOARD
NANAO   200 0039
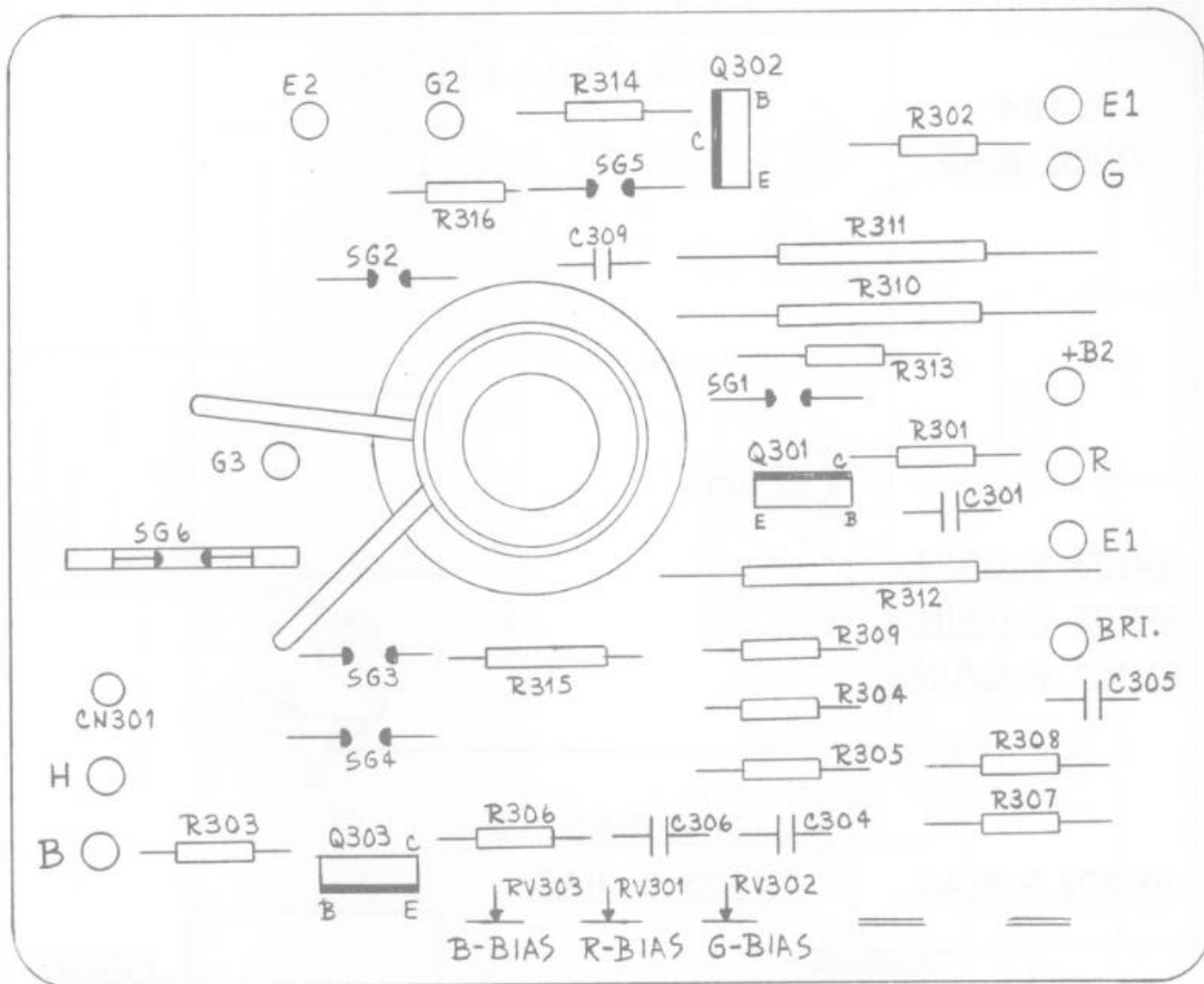
COLOR DISPLAY ADJUSTABLE CONTROLS

NANAO 20"

RV401 V-HOLD
RV403 V-SIZE
RV402 V-POSITION
RV503 BRIGHT

RV501 H-HOLD
L504 H-SIZE
RV502 H-POSITION

RV104 VIDEO-BIAS

RV103 B-GAIN
RV102 G-GAIN
RV101 R-GAIN

RV301 R-BIAS
RV302 G-BIAS
RV303 B-BIAS

FOCUS
SCREEN

421-5005
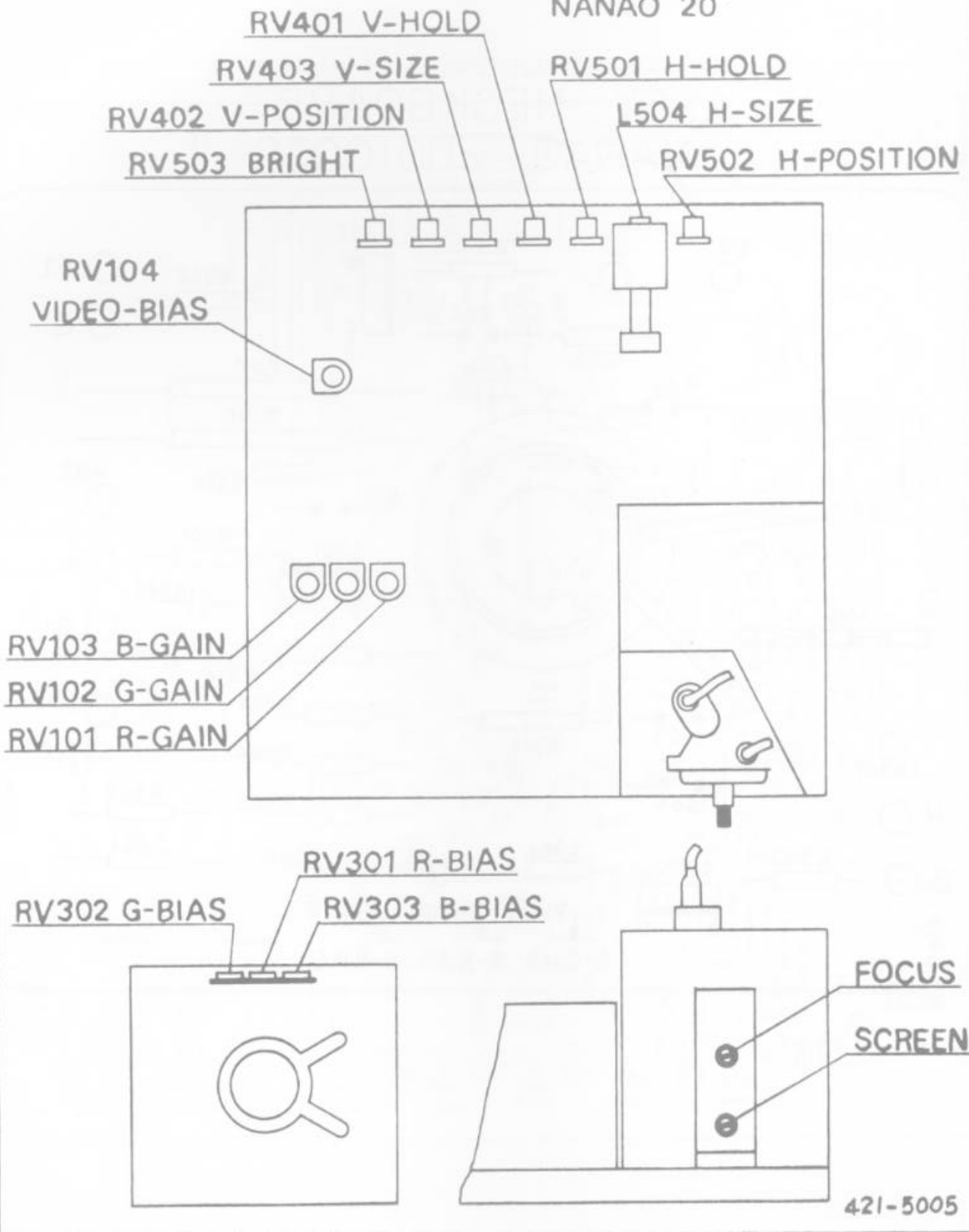
NANAO MC-2000S
FUNCTIONAL BLOCK DIAGRAM
200-0039

700-0138 Top Assembly

700-0139 Top Assembly

ITEM NO.	PART NO.	QTY. REQD.	DESCRIPTION
1	130-0002-00	1	Speaker Cover 6 x 9
2	130-0020-00	1	Speaker 6 x 9, 8 OHM, 10W
3	140-0021 00	1	Cover Junction Box
4	140-0071-00	1	Cabinet Universal Game
5			
6			
7	220-0008-00	1	Counter Digital 6V
8	220-0178-00	2	Draw Catch
9	220-0194-00	2	
	or 220-0195-00		Coin Mech W/Lamp
10			
11	250-0497-00	2	Clamp, Component BD UNIV
12	250-0038-00	1	Moulding Strip
13	250-0492-00	1	Moulding logo
14			
15	253-0222-00	2	Coin Receptacle
16	253-0238-00	1	Plastic Bag 3.00 x 4.00
17	253-0254-00	1	Mask CRT 19 IN
18	253-0228-00	1	Monitor Panel Clear
19	253-0284-00	1	Bezel Plastic CRT Vertical
20	253-0328-00	1	Panel logo
21			
22			
23	260-0001-00	1	Fan Axial Cooling
24			
25			
26	280-0005-00	40	Cable Tie
27	280-0362-00	2	Electrical Crimp Sleeve
28	280-0475-00	30	Staple
29	280-0495-00	1	Spring, CPRSN .360 OD
30			

ITEM NO.	PART NO.	QTY. REQD.	DESCRIPTION
31	281-0004-12	1	SCR, 8-32 x .750 PN HD PHIL
32	281-0006-08	1	SCR 10-32 x .500 PN HD PHIL
33	281-0014-28	4	SCR 8-32 x 1.75 OVH PHIL
34	281-0042-12	2	SCR 6-20 x .750 PN HD PHIL
35	281-0042-32	4	SCR 6-20 x 2.00 PN HD PHIL
36	281-0045-12	6	SCR 10-16 x .750 PN HD PHIL
37	281-0134-12	4	SCR 8-18 x .750 PN HD PHIL, Black
38			
39	282-0005-20	14	Bolt, 10-24 x 1.25 CRG HD, Black
40	282-0017-16	4	Bolt, 1/4-20 x 1.00 HEX HD
41	282-0017-24	4	Bolt,1/4-20 x 1.50 HEX HD
42			
43	283-0060-18	6	Washer #6 Flat, STL
44	283-0060-22	6	Washer #8 Flat, STL
45	283-0060-24	14	Washer #10 Flat, STL
46	283-0060-34	6	Washer #1/4 Flat, STL
47	282-0061-05	5	Washer #8 Lock, Split, STL
48	283-0061-06	21	Washer #10 Lock, Split, STL
49	283-0061-08	6	Washer #1/4 Lock, Split, STL
50			
51	283-0071-14	1	Nut 10-24 Wing, STL
52	283-0072-13	5	Nut 8-32 HEX
53	283-0072-15	14	Nut 10-24 HEX
54			
55	320-0020-00	2'	Sealant Foam
56	320-0051-00	1'	Tie Ribbon Wire Plastic Coated
57			
58	390-0019-00	1	Lamp Fluorescent
59			
60	420-0030-00	1	Decal Caution 115V
61	420-0624-00	1	Light Baffle

ITEM NO.	PART NO.	QTY. REQD.	DESCRIPTION
62	420-0793-00	1	Decal Toll Free No.
63	420-0912-00	1	Decal FCC Rules Compliance
64	420-0914-07	1	Decal Original Game Seal
65	420-0917-00	1	Decal FCC Warning
66	420-0977-00	1	Graphic Interior
67	420-0978-00	1	Decal, Box
68	420-0979-00	1	Manual
69	420-0982-00	1	Decal Dip SW Settings
70	420-0994-00	1	Graphic Side Left
71	420-0993-00	1	Graphic Side Right
72	420-1006-00	1	New Game Card
73	420-1007-00	1	Decal, Game Instructions
74			
75			
76			
77			
78	800-0145-00	1	Assy AC Junction Box
79	800-0147-01	1	Fluorescent Lamp Assy 2
80	800-0232-00	1	Assy Harn. GND
81	800-0322-00	1	Assy Cord Fan
82	800-0329-00	1	Assy Harn. Monitor AC
83	800-0330-00	1	Assy Harn. GND Monitor
84	800-0362-00	1	Assy Monitor CLR Vertical
85	800-0370-00	1	GND Strap
86	800-0371-00	1	Assy Speaker Harn.
87	800-0372-00	1	Harn. Coin Mech
88			
89			
90			
91	800-3396-00	1	Control Panel Assy
92			

ITEM NO.	PART NO.	QTY. REQD.			DESCRIPTION
		-00	-01	-02	
93					
94	800-3401-00	1	–	–	Assy, Component Shelf
95	800-3401-01	–	1	–	Assy, Component Shelf
96	800-3401-02	–	–	1	Assy, Component Shelf
	420-0780-00	REF			Game Shipping Kit

SECTION A-A

SECTION B - B

(94) - 00 ASSY
(95) - 01 ASSY
(96) - 02 ASSY

DETAIL "R"

DETAIL "S"

DETAIL "X"

DETAIL "Y" 2 PL

ITEM NO.	PART NO.	QTY. REQD.	DESCRIPTION
1	130-0002-00	1	Speaker Cover 6 x 9
2	130-0020-00	1	Speaker 6 x 9, 8 OHM, 10W
3	140-0021 00	1	Cover Junction Box
4	140-0071-00	1	Cabinet Univ. I
5			
6			
7	220-0008-00	1	Counter Digital 6V
8	220-0178-00	2	Draw Catch
9	220-0194-00	2	
	or 220-0195-00		Coin Mech W/Lamp
10			
11	250-0497-00	2	Clamp, Component BD
12	250-0038-00	1	Moulding Strip
13	250-0492-00	1	Moulding logo
14			
15	253-0222-00	2	Coin Receptacle
16	253-0238-00	1	Plastic Bag 3.00 x 4.00
17	253-0254-00	1	Mask CRT 19 IN
18	253-0228-00	1	Monitor Panel Clear
19	253-0284-00	1	Bezel Plastic CRT Vertical
20	253-0328-00	1	Panel logo
21			
22			
23	260-0001-00	1	Fan Axial Cooling
24			
25			
26	280-0005-00	40	Cable Tie
27	280-0362-00	2	Electrical Crimp Sleeve
28	280-0475-00	30	Staple
29	280-0495-00	1	Spring, CPRSN .360 OD

ITEM NO.	PART NO.	QTY. REQD.	DESCRIPTION
30			
31	281-0004-12	1	SCR, 8-32 x .750 PN HD PHIL
32	281-0006-08	1	SCR 10-32 x .500 PN HD PHIL
33	281-0014-28	4	SCR 8-32 x 1.75 OVH PHIL
34	281-0042-12	2	SCR 6-20 x .750 PN HD PHIL
35	281-0042-32	4	SCR 6-20 x 2.00 PN HD PHIL
36	281-0045-12	6	SCR 10-16 x .750 PN HD PHIL
37	281-0134-12	4	SCR 8-18 x .750 PN HD PHIL, Black
38			
39	282-0005-20	14	Bolt, 10-24 x 1.25 CRG HD, Blk
40	282-0017-16	2	Bolt, 1/4-20 x 1.00 HEX HD
41	282-0017-24	6	Bolt, 1/4-20 x 1.50 HEX HD
42			
43	283-0060-18	6	Washer #6 Flat, STL
44	283-0060-22	6	Washer #8 Flat, STL
45	283-0060-24	14	Washer #10 Flat, STL
46	283-0060-34	6	Washer #1/4 Flat, STL
47	282-0061-05	5	Washer #8 Lock, Split, STL
48	283-0061-06	21	Washer #10 Lock, Split, STL
49	283-0061-08	6	Washer #1/4 Lock, Split, STL
50			
51	283-0071-14	1	Nut 10-24 Wing, STL
52	283-0072-13	5	Nut 8-32 HEX
53	283-0072-15	14	Nut 10-24 HEX
54			
55	320-0020-00	2'	Sealant Foam
56	320-0051-00	1'	Tie Ribbon
57			
58	390-0019-00	1	Lamp Fluorescent
59			

ITEM NO.	PART NO.	QTY. REQD.	DESCRIPTION
60	420-0030-00	1	Decal Caution 115V
61	420-0624-00	1	Light Baffle
62	420-0793-00	1	Decal Toll Free No.
63	420-0912-00	1	Decal FCC
64	420-0914-07	1	Decal Original Game Seal
65			
66	420-0977-00	1	Graphic Interior
67	420-0978-00	1	Decal, Box
68	420-0979-00	1	Manual
69	420-0982-00	1	Decal Dip SW Settings
70	420-1016-00	1	Graphic Side Left
71	420-1017-00	1	Graphic Side Right
72	420-1006-00	1	New Game Card
73	420-1007-00	1	Decal, Game Instructions
74			
75			
76			
77			
78	800-0145-00	1	Assy AC Junction Box
79	800-0147-01	1	Fluorescent Lamp Assy 2 UL
80	800-0232-00	1	Assy Harn. GND
81	800-0322-00	1	Assy Cord Fan
82	800-0329-00	1	Assy Harn. Monitor AC
83	800-0330-00	1	Assy Harn. GND Monitor
84	800-0362-00	1	Assy Monitor CLR Vertical
85	800-0370-00	1	GND Strap
86	800-0371-00	1	Assy Speaker Harn.
87	800-0372-00	1	Harn. Coin Mech
88			
89			

ITEM NO.	PART NO.	QTY. REQD.	DESCRIPTION
90			
91	800-3396-00	1	Control Panel Assy
92			
93			
94	800-3401-02	1	Assy, Component Shelf
95			
96			
	420-0780-00	REF	Game Shipping Kit
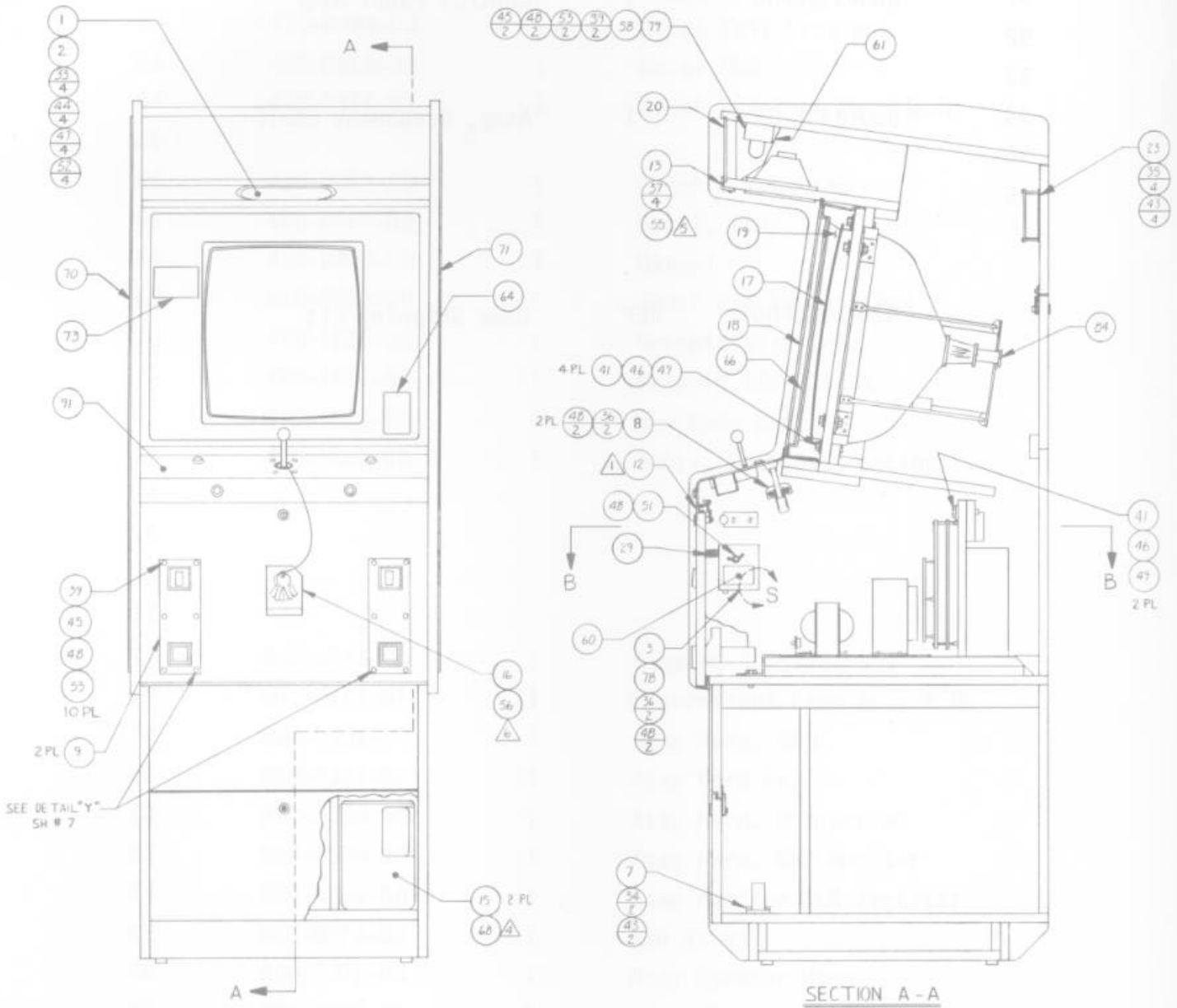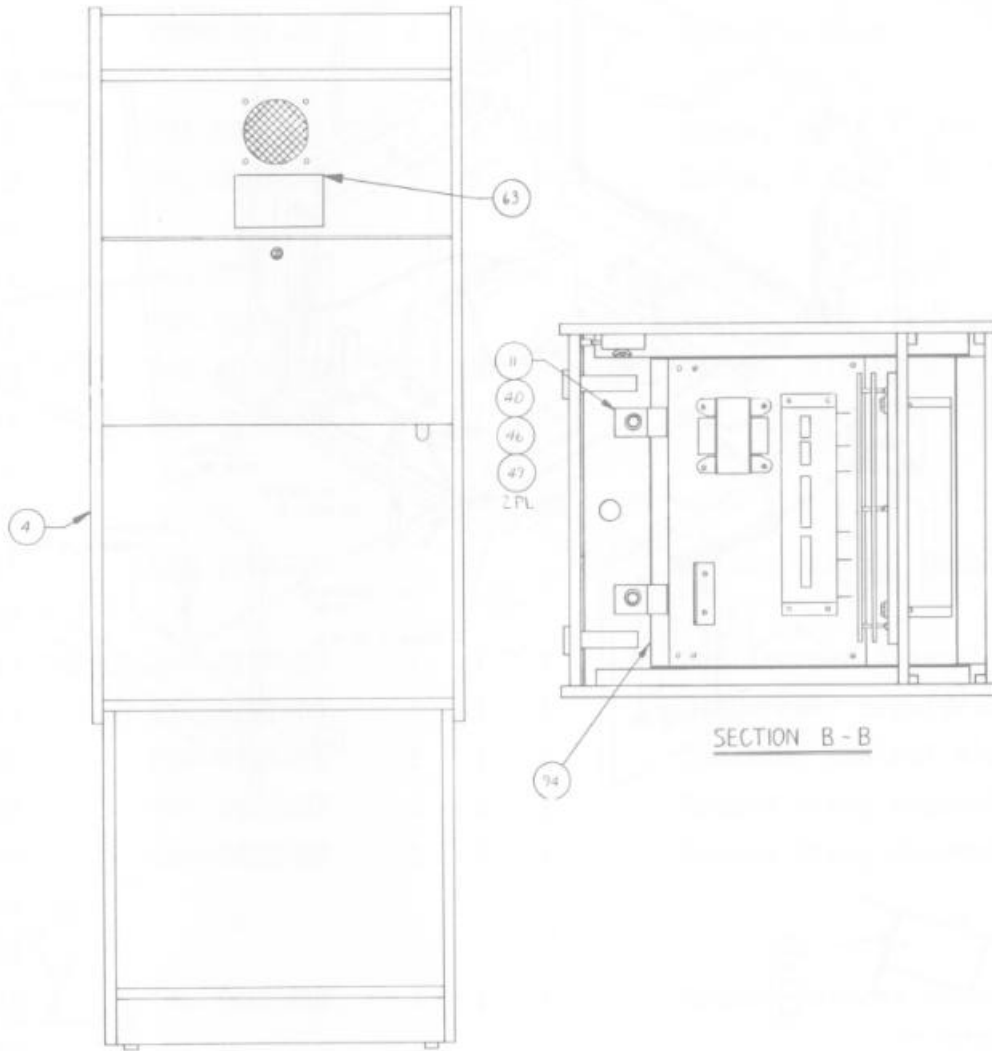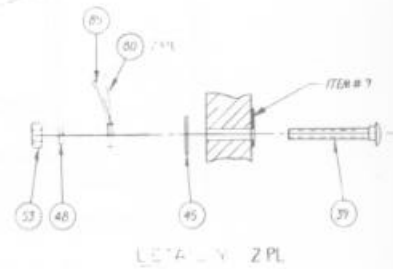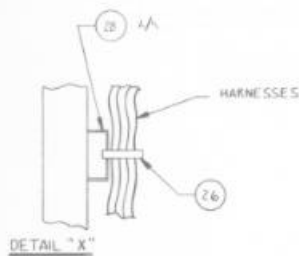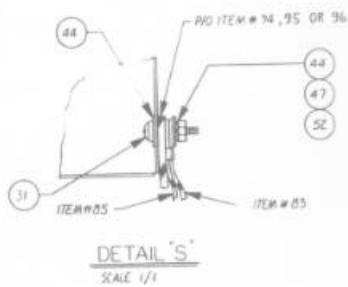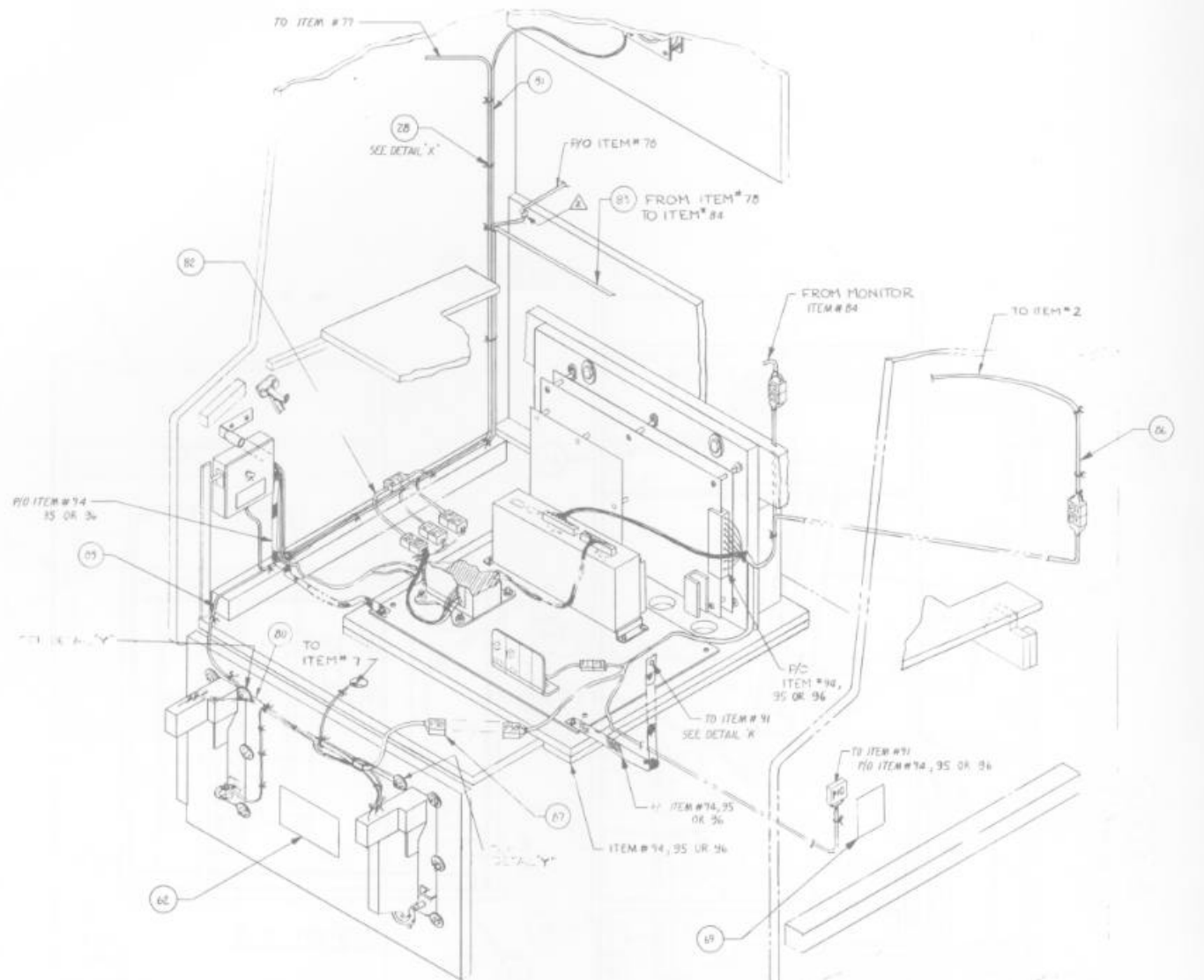
SECTION A - A

SECTION B - B

TO ITEM #77

51

28
SEE DETAIL 'X'

P/O ITEM #78

81 FROM ITEM #78
TO ITEM #84

FROM MONITOR
ITEM #84

TO ITEM #2

82

86

P/O ITEM #94
95 OR 96

85

P/O ITEM #94,
95 OR 96

DETAIL 'Y'

80 TO
ITEM #7

TO ITEM #91
SEE DETAIL 'R'

TO ITEM #91
P/O ITEM #74, 95 OR 96

87

ITEM #74,95
OR 96

62

ITEM #94, 95 OR 96

DETAIL 'Y'

69

ITEM #91

52
45
48

P/O ITEM #
95 OR 96

DETAIL 'R'

85

80

ITEM #7

53 48

45

39

DETAIL 'Y' 2 PL.

44

P/O ITEM #74, 95 OR 96

44
47
52

28

HARNESSES

31

ITEM #85

ITEM #85

26

DETAIL 'S'
SCALE 1/1

DETAIL 'X'

ITEM NO.	PART NO.	QTY REQD.			DESCRIPTION
		-00	-01	-02	
1	250-0654-00	1	1	1	Ground Plane
2					
3	252-0274-00	1	1	1	Component Shelf
4					
5	280-0005-00	3	3	3	Cable Tie
6	280-0327-00	3	3	3	Base Tie Wrap
7					
8	281-0045-12	6	6	6	Screw, 10-16 X .750 PN HD PHIL
9	281-0052-12	5	5	5	Screw, 6-20 X .750 FL HD PHIL
10					
11	283-0060-24	4	4	4	Washer, #10 Flat
12	283-0060-27	2	2	2	Washer, #10 Flat, Large O.D.
13	283-0061-06	18	18	18	Washer, #10 Lock
14	283-0072-16	12	12	12	Nut, #10-32 Hex
15					
16					
17	420-1008-00	1	1	1	Volume Control Decal
18					
19	800-0190-00	1	1	1	EMI Xformer Assembly
20	800-0191-04	1	1	1	G-80 Power Supply Assembly
21	800-0364-01	1	1	1	Operator Control Block Assembly
22	800-0423-07	1	1	1	Ground Strap Assembly
23	800-0423-08	1	1	1	Ground Strap Assembly
24					
25					
26	800-3402-00	1	1	1	Master Harness Assembly
27					
28	834-5197-00	1	-	-	IC Board Assembly
29	834-5165-00	-	1	-	IC Board Assembly
30	834-5180-00	-	-	1	IC Board Assembly

⑧ 6PL

⑫ 2PL
⑬
⑭ △1

㉒

③

⑨ 5PL

⑭
⑪
⑬
4PL

⑲

⑤
⑥ 3PL

①

P16   P11
P23

P9

P25

⑬ 4PL
⑭

㉘ -00 ASSY
㉙ -01 ASSY
㉚ -02 ASSY

㉑

⑬
⑭ △1
2PL

P30

P10

B

B

P32

A ↑

⑳   P19   ㉖   ↑ A

㉓

VIEW B-B

VOLUME
CONTROL

⑰

P32
P19

ITEM 20
ITEM 19

ITEM 3

P3

P10   P30

P16 P11 P23

VIEW A-A

80
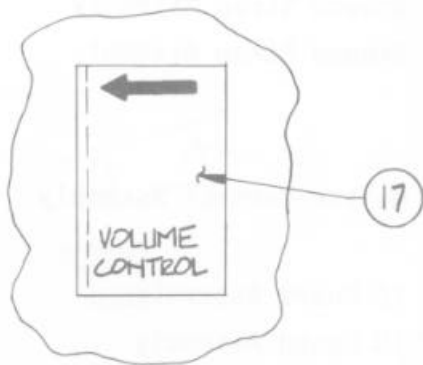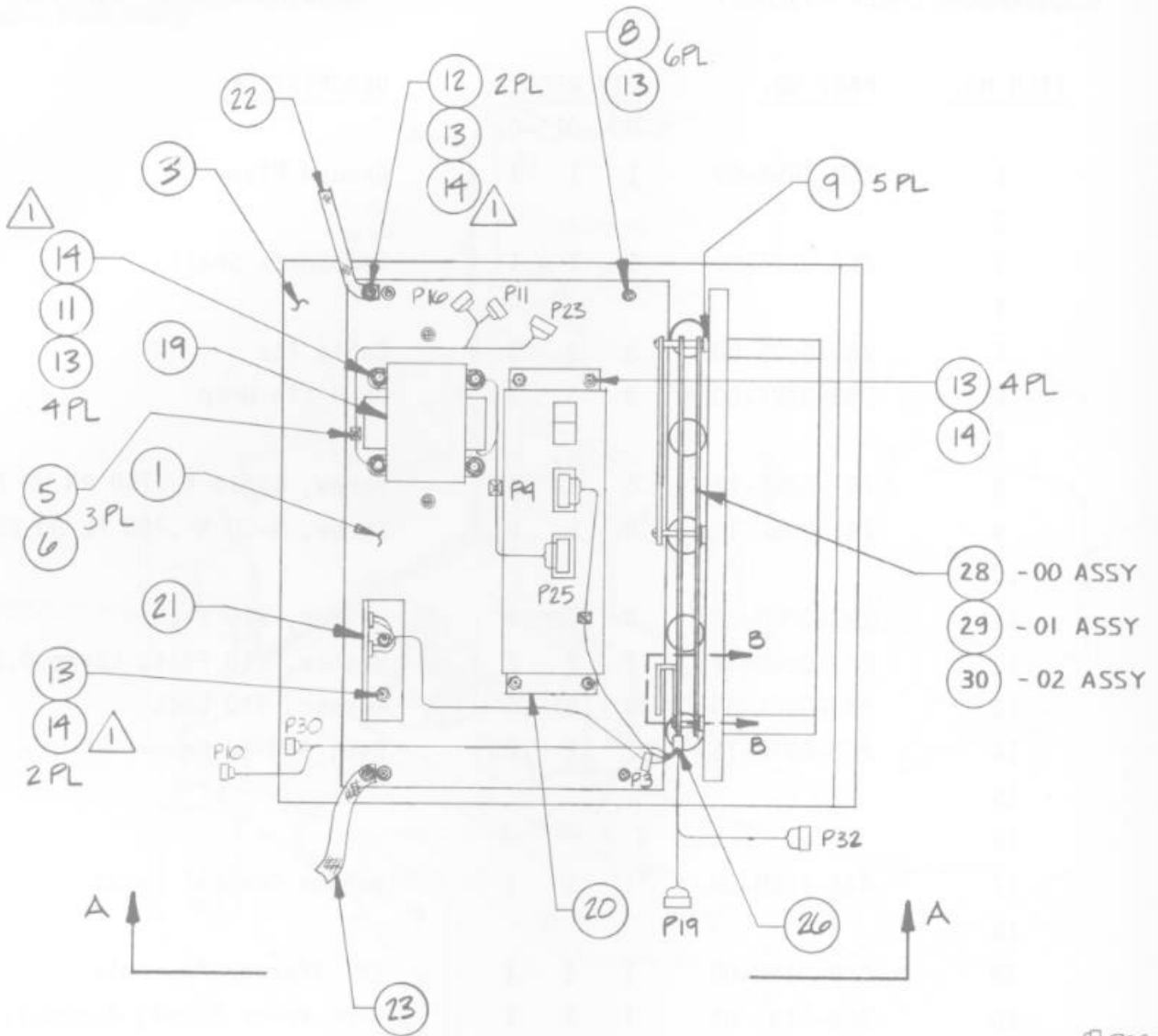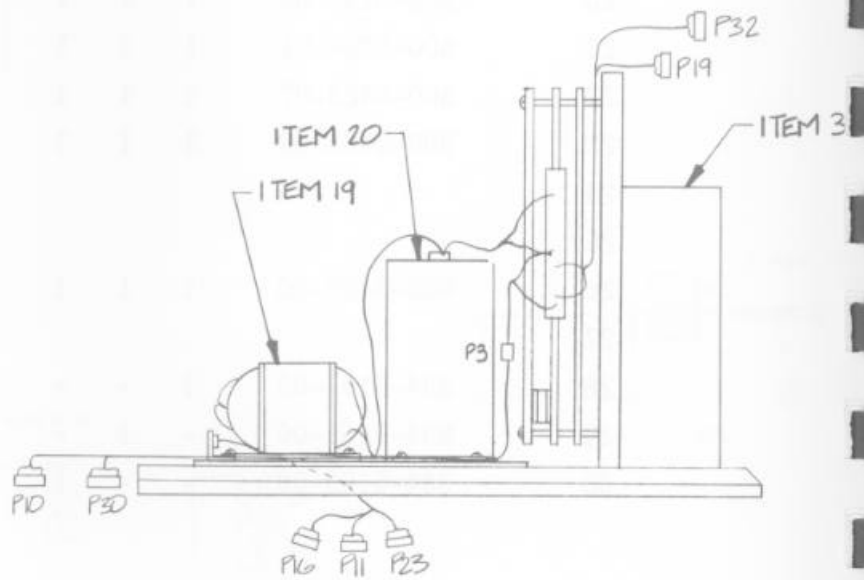
OPERATOR CONTROL BLOCK ASSEMBLY "Z"   DRAWING NUMBER 800-0364

ITEM NO.	PART NO.	QTY REQD.		DESCRIPTION
		-00	-01	
1	800-0387-00	1	-	Operator Cont. Blk. Harness Assy
2	800-0388-00	1	1	Operator Control Block
3	800-0484-00	-	1	Operator Cont. Blk. Harness Assy

Common Assemblies

ITEM NO.	PART NO.	QTY REQD.				DESCRIPTION	REF DES.
		-00	-01	-02	-03		
1	140-0020-00	1	1	1	1	Junction Box Metal	
2	211-0165-00	2	2	2	2	Conn Quick Fem Fully INSL.	.250 x .032 (AWG 18-22)
3	211-0164-00	4	4	4	4	Conn Quick Fem Fully INSL.	.187 x .020 (AWG 18-22)
4							
5	280-0361-00	1	1	1	1	Bushing S/REL AC Cord	
6	270-0001-00	1	1	1	1	Filter EMI	
7	280-0007-00	1	1	1	1	Bushing S/REL 1/2	
8	280-0362-00	4	4	4	4	Electric Crimp Sleeve AWG 24-18	
9	420-0598-00	1	-	-	-	Decal 2 AMP Fuse	
10	510-0013-00	1	1	1	1	Switch Spot Cherry	
11	514-0001-00	1	-	-	-	Fuse 2 AMP 250V S.B.	
12	514-0005-00	1	1	1	1	Holder Fuse	
13	600-0001-00	1	1	1	1	Cord Line 3 Cond.	
14							
15	600-0079-00	2FT	2FT	2FT	3.25	Cord Line Zip	
16	280-0005-00	2	2	2	2	Cable Tie	
17	281-0002-10	2	2	2	2	SCK PN HD PHIL #6-32 x .625 Mach	
18	283-0072-11	2	2	2	2	Nut HEX HD #6-32 Mach	
19	283-0062-04	2	2	2	2	Washer Lock INT. Tooth #6	
20							
21							
22							
23							

ITEM NO.	PART NO.	QTY. REQD.				DESCRIPTION	REF DES.
		-00	-01	-02	-03		
24	283-0060-32	1	1	1	1	Washer Flat Reg. O.D. #1/4	
25	283-0072-15	1	1	1	1	Nut HEX HD #10-24 Mach	
26	282-0005-28	1	1	1	1	Bolt Carriage #10-24 x 1.750 Mach	
27	310-0016-16	1	1	1	1	Insul. TBG .187 ID	
28							
29	420-0597-00	-	-	1	-	Decal 1 AMP Fuse	
30	420-0634-00	-	1	-	1	Decal 5 AMP Fuse	
31	514-0051-00	-	-	1	-	Fuse 1 AMP 250V	
32	514-0053-00	-	1	-	1	Fuse 5 AMP S.B.	
33	211-0044-00	-	-	-	1	Conn Cap AMP 2 Pin	
34	211-0041-00	-	-	-	2	Conn Pin AMP	
35	211-0027-01	-	-	-	2	Conn Ring Lug #6 Insulated	

24 25 26 27

3

10

17 18 19 2 PL

1

16

7

3

16

SMOOTH
WIRE

3.00

15

24.00

2

3
2 PL

2

32 31 11 12
-01 -02 -00

5

6

13

8 ⚠
4 PL

30 29 9
-01 -02 -00
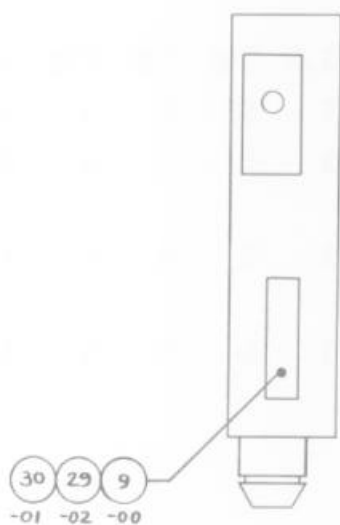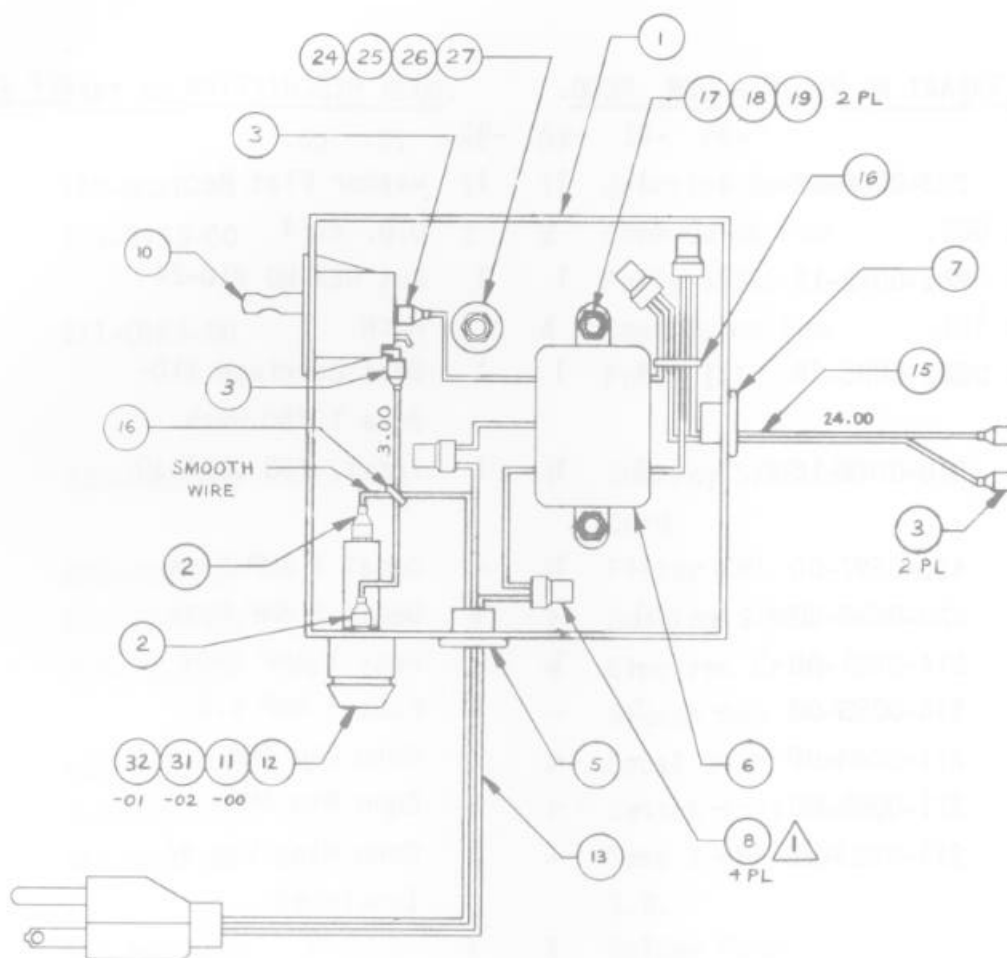
ITEM NO.	PART NO.	QTY. REQD.		DESCRIPTION
1	560-0055-00	1	1	Transformer G-80 PWR Supply
2	212-0016-00	1	1	Conn. FEM 10 Pin
3	211-0005-00	10	10	Conn. Crimp
4	211-0045-00	1	1	Conn. Plug AMP 6 Pin
5	211-0042-00	6	6	Conn. Socket
6	211-0043-00	2	2	Conn. Plug AMP 2 Pin
7	600-0079-00	1.00'	1.25'	Zip Cord
8	280-0005-00	4	4	Cable Tie
9	600-0092-70	.5'	.5'	Wire 18 AWG BLK
10	280-0359-00	3	3	Electric Crimp Sleeve
11	211-0077-00	4	4	Conn. Term Socket 20-14 AWG

① ──────

← 15.00 [381] →

⑧ △3
4 PL

② ③/⑨

P25

A

3.00
[76.2]

2.00
[51]

P23

4.00
[101.6]

1.00
[25]

④ ⑤/⑥

⑦

P16

△2
TYP

8.00
[203.2]

P11

.50 TYP
[13]

8.00
[203]

⑥ ⑪/②
2 PL

18.00
[457]

⑩

△4.

DETAIL A

⑨
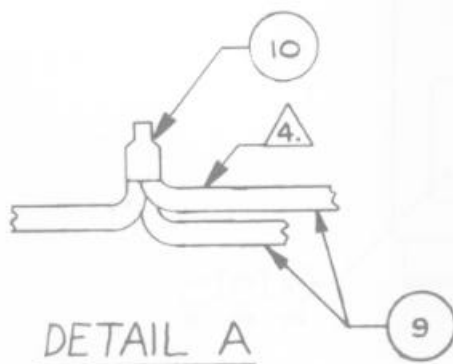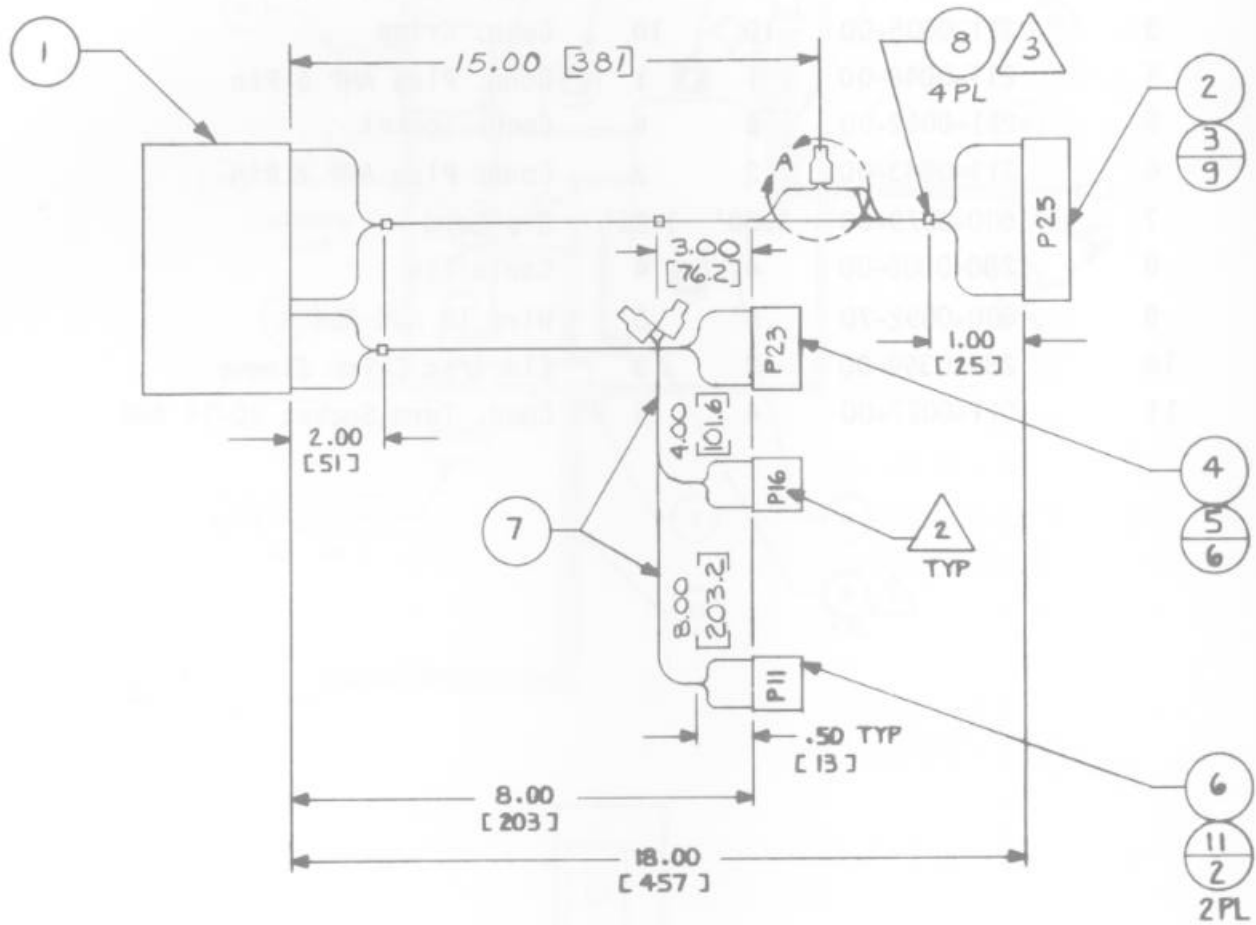
DRAWING NUMBER 800-0147

ITEM NO.	PART NO.	QTY. REQD.					DESCRIPTION
1	211-0041-00	2	2	2	2	2	Conn Pin AMP
2	211-0044-00	1	1	1	1	1	Conn Cap AMP 2 Pin
3							
4	211-0166-00	1	-	-	-	-	Conn Crimp Ring #10
5							
6	280-0361-00	-	1	1	1	1	BSHG STR RLF AC Cord
7	280-0362-00	-	2	2	2	2	Elec. CRP SL 24-18 AWG
8							
9	281-0002-06	1	1	1	1	1	SCR #6-32 x .375 Pan HD PHIL
10							
11							
12							
13							
14	283-0060-19	-	1	1	1	1	Washer #6 Flat, Steel
15							
16							
17	390-0083-00	1	-	-	-	-	Fluor. Lamp FXT 18 IN.
18	390-0117-00	-	1	1	1	1	Fluor. Lamp FXT 18 IN. U.L.
19							
20							
21							
22							
23	600-0079-00	-	5.9'	7.6'	4.0'	4.4'	CA 2 Cond. Zip Cord

-01, -02, -03, -04 & -05
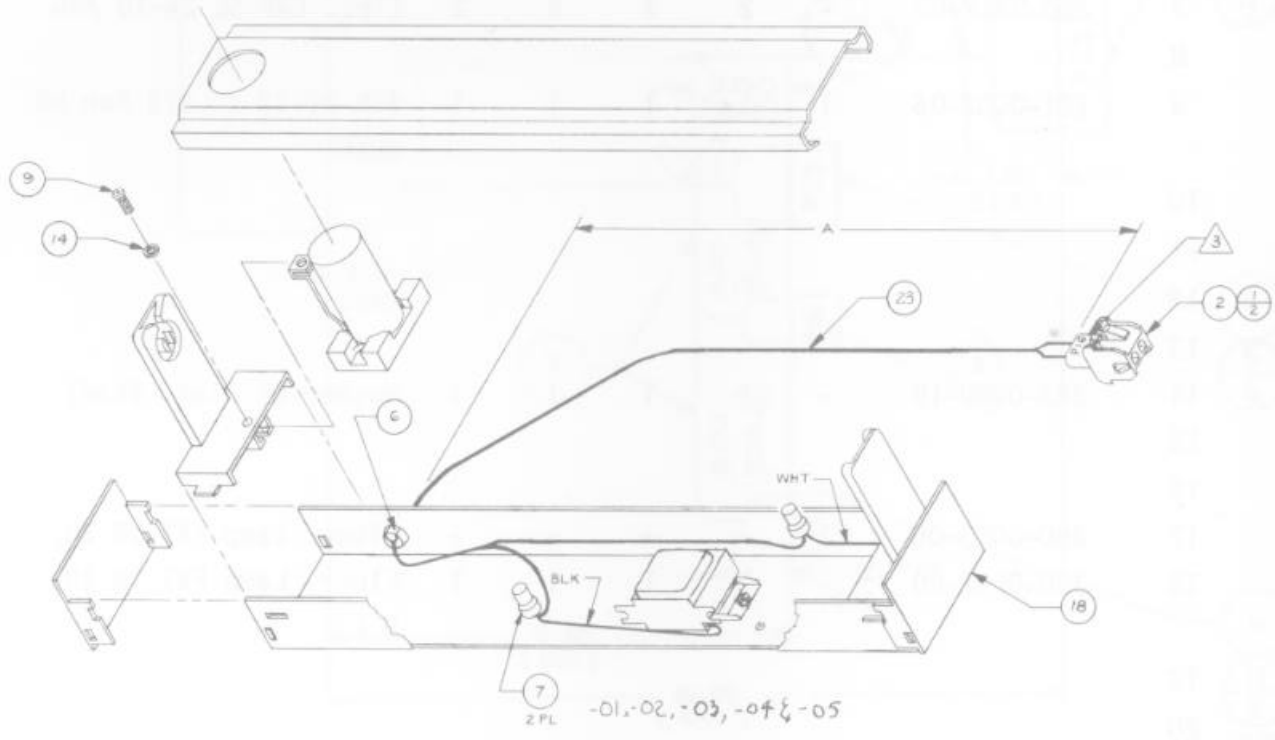
ITEM NO.	PART NO.	QTY. REQD.	DESCRIPTION	REF DES.
1	240-0006-00	2	Button Plunger, Red	
2	240-0009-00	2	Button Plunger, Yellow	
3				
4	250-0648-00	1	Control Panel	
5	253-0329-00	1	Graphic Control Panel	
6				
7	280-0005-00	9	Cable Tie	
8	280-0327-00	3	Base Tie Wrap	
9	280-0329-00	4	Nut, 1/2 IN. -13 HEX PAL	
10				
11	282-0005-12	4	Bolt #10-24 x .750 LG CRG HD, Black	
12				
13	283-0060-25	4	Washer #10 Flat Steel	
14	283-0061-06	4	Washer #10 Lock Split, Steel	
15	283-0072-15	4	Nut #10-24 HEX Mach THD	
16				
17				
18	510-0064-00	4	Switch Pushbutton MTL PNL	S1-S4
19	510-0075-00	1	Joystick, 8-Way	S5-S8
20				
21				
22	800-3398-00	1	Control Panel Harn. Assy.	

REAR VIEW
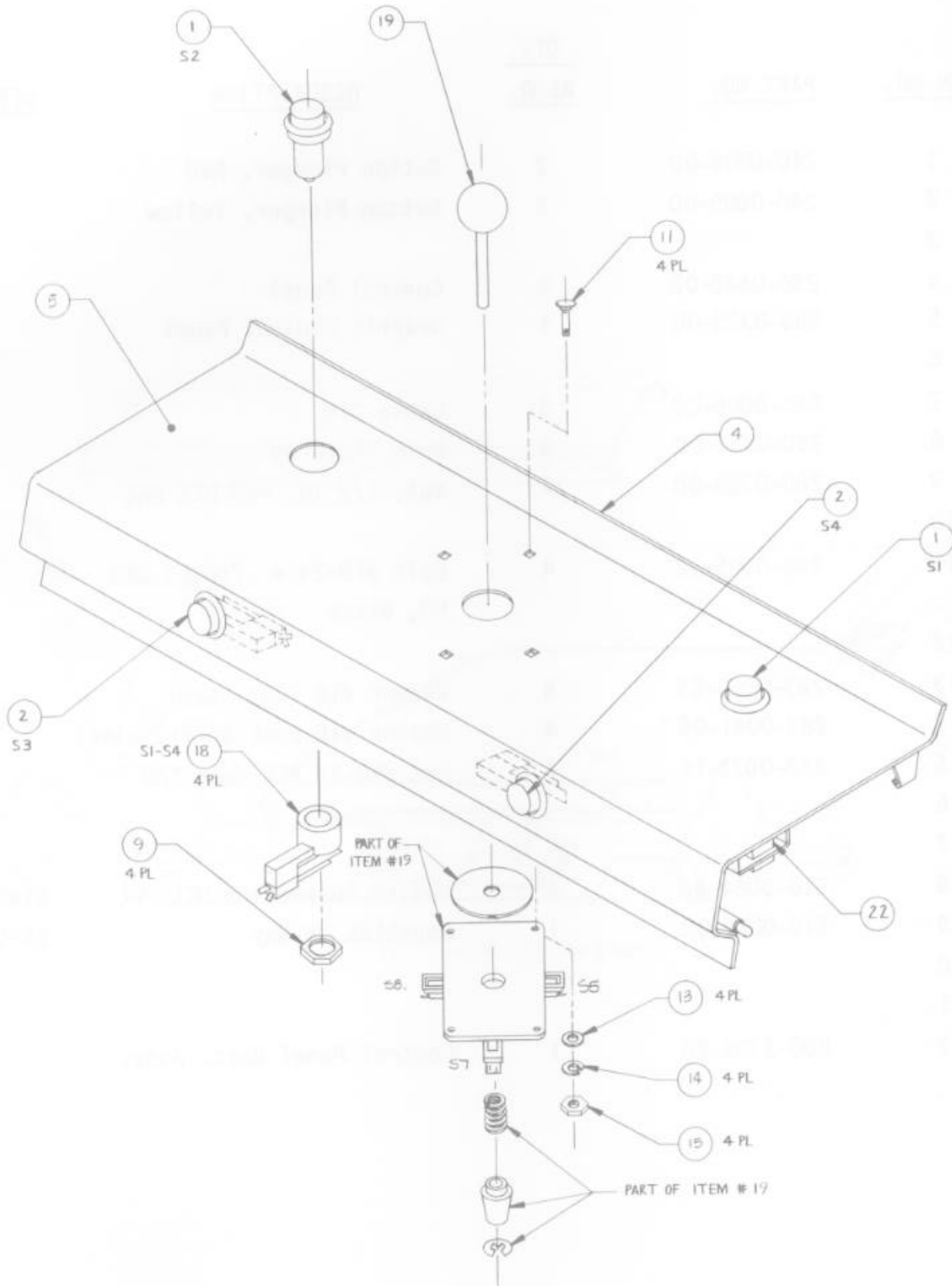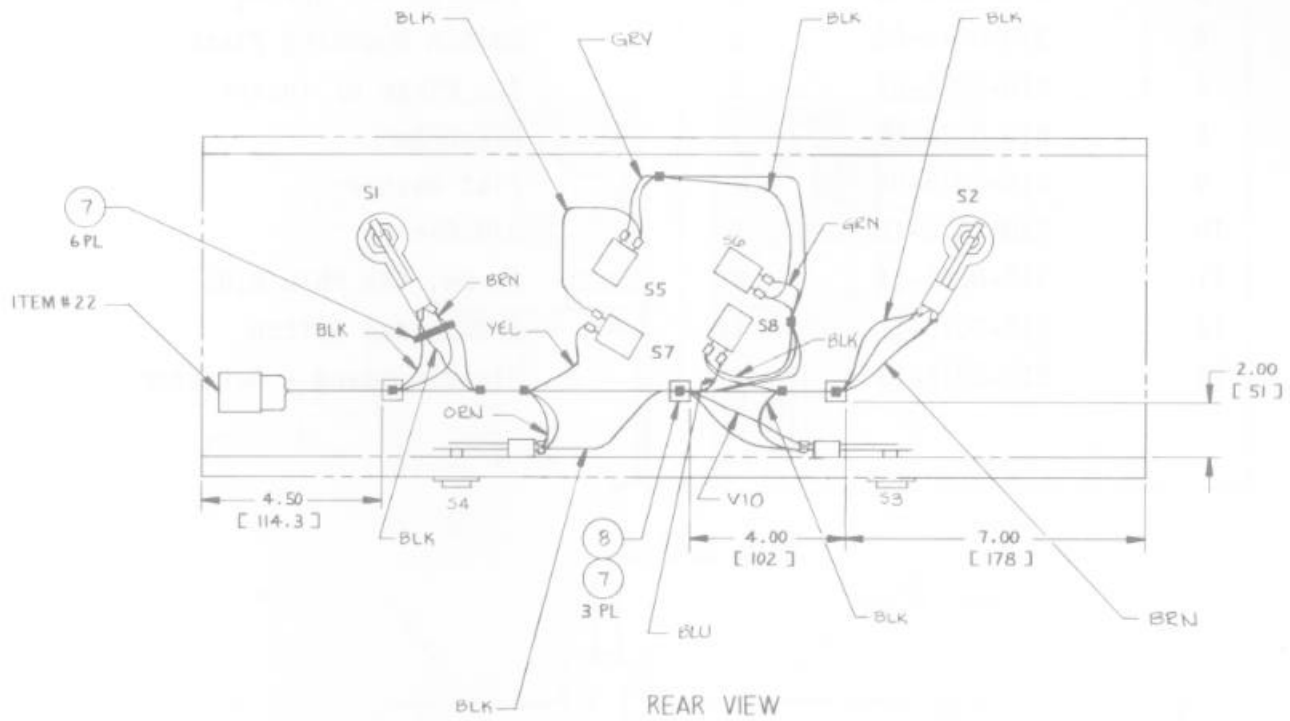
ITEM NO.	PART NO.	QTY REQD.	DESCRIPTION
1	510-0075-01	1	Ball, Handle, Shaft
2	510-0075-02	1	Actuator Switch
3	510-0075-03	1	2" Washer
4	510-0075-04	1	Bottom Washer
5	510-0075-05	1	Compression Spring
6	510-0075-06	1	Switch Mounting Plate
7	510-0075-07	1	Top Plate w/ insert
8	510-0075-08	1	Diaphram
9	510-0075-09	1	Flat Washer
10	510-0075-10	1	3/8 E-ring
11	510-0075-11	4	Screw, 6X1 PHIL R.H.
12	510-0075-12	4	2/2 Molded Switch
13	510-0075-13	4	Plastic Guard - Actuator

①

1 ½" DIA BALL
REF

2 ¾" REF

5" REF

B   B

7/16" DIA
REF

④   ③   ⑦

⑨   ⑧

⑥   ⑤

②

⑩

SECTION A-A

4 PL ⑫   ⑬ 4 PL

4 PL ⑪

3"
REF

A   A

3 ½" REF