

Set-up
Procedures
Spectra IV
Pinball Table
by Valley

THE VALLEY COMPANY

Subsidiary of Walter Kidde & Company, Inc.

KIDDE

P.O. Box 656, 333 Morton Street, Bay City, Michigan 48707

spectra IV Pinball Table

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Spectra IV Pinball Table

. . . is an innovative concept in advanced pinball design. It is rooted in Valley's position as leader in the field of coin-operated pool tables for many years, based upon outstanding features and quality in craftsmanship.

In extending this expertise to the pinball field, we have developed this new game to assist you in gaining new markets and profit levels. Utilizing our experience in manufacturing pool tables, we have taken advantage of the best talent available in designing and building the SPECTRA IV Pinball Table.

The electronic systems in SPECTRA IV were designed and built in cooperation with Applied Research, Incorporated, who are totally familiar with the requirements of such a game, as well as the demands of the entire coin-operated game industry. As a result, the electronic functions and layouts have been engineered and constructed to provide maximum trouble-free operation, and -- at the same time -- they can be quickly and easily serviced should this be required.

Valley recognizes that consistent, trouble-free operation in the field is the key to profitability for all of us. This manual has been developed to assist you with any problems that might occur. In addition, our service capabilities provide any needed back-up.

Your SPECTRA IV Pinball Table has been thoroughly tested before shipment and, after the simple set-up procedures described in this manual, will give you long and profitable service.

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SECTION I SET-UP PROCEDURE

The Valley Pinball table comes completely assembled and ready for testing and feature settings. To assure trouble-free performance, please follow the installation instructions prior to making any test or settings.

A. INSTALLATION INSTRUCTIONS

1. Remove keys from Coin Door and unlock Top Glass cover. Lift Top Cover from table. (See Step #1, Section I-D). Remove foam packaging from playfield and replace Top Cover. DO NOT lock the Top Cover down.
2. Level table by adjusting leg levelers on the bottom of each leg. (See Illustration No. 1)
3. The large Base Pan Assembly has four locking detent recesses located on bottom side of Pan. Rotate the Base Pan until the metal springs are seated in the four recesses of Pan. (See Illustration No. 2)
4. Check The Fuse Holder for proper seating and for possible damage during shipment. (See Illustration No. 3)
5. As part of the liberal-conservative settings of this machine, we have furnished a High/Low switch on the bottom of the machine. This High/Low switch controls power to the solenoid and should be completely to the right or left position. (See Illustration No. 3)
6. Plug in the line cord to any live 110V outlet. CAUTION: Table should be at room temperature prior to power-up.
7. Check Power On/Off switch to assure it is in the On position should machine fail to power-up. (See Illustration No. 3) Check 110V outlet to be sure the line is live if there is still no indication that the table has power.
8. The Rotational Tilt and the Plum Bob Tilt should be adjusted after the test and settings have been made. Refer to illustration for location and adjustments. (See Illustrations 4 and 5)
9. Play Balls should be put in playfield; one in the center ball trap area and the other on the shooter lane.

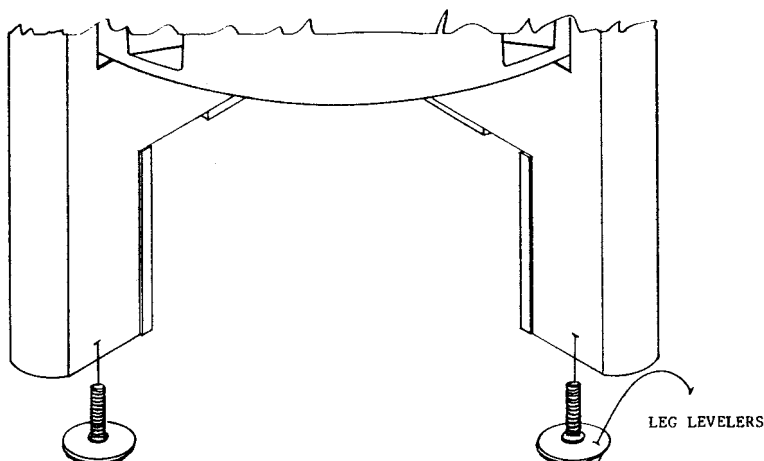


ILLUSTRATION 1

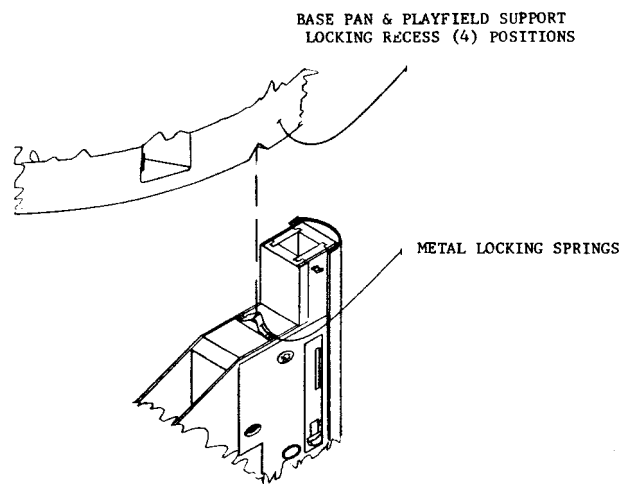


ILLUSTRATION 2

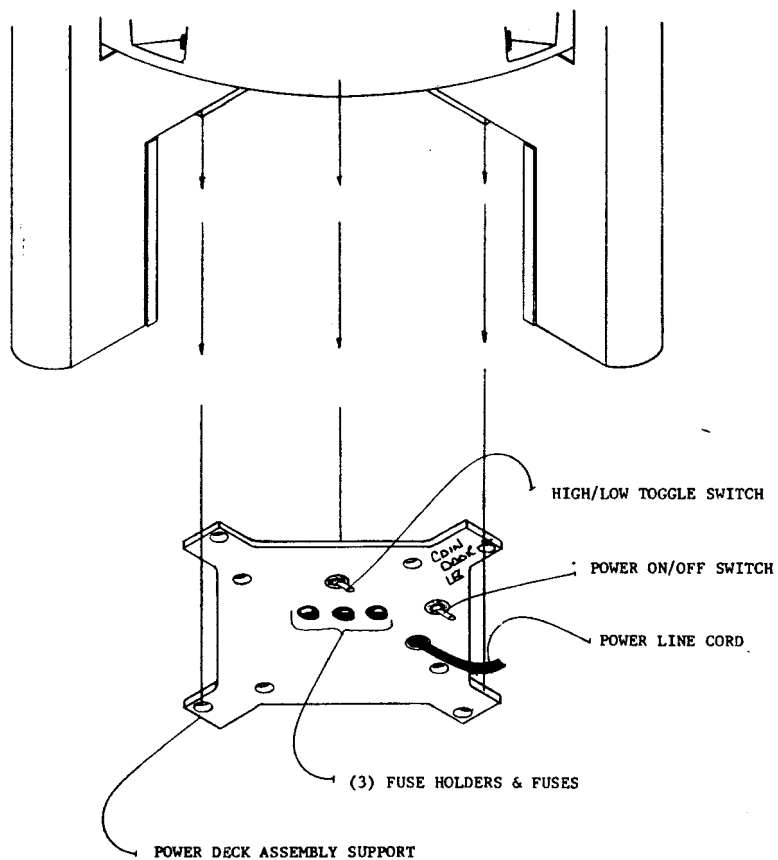


ILLUSTRATION 3

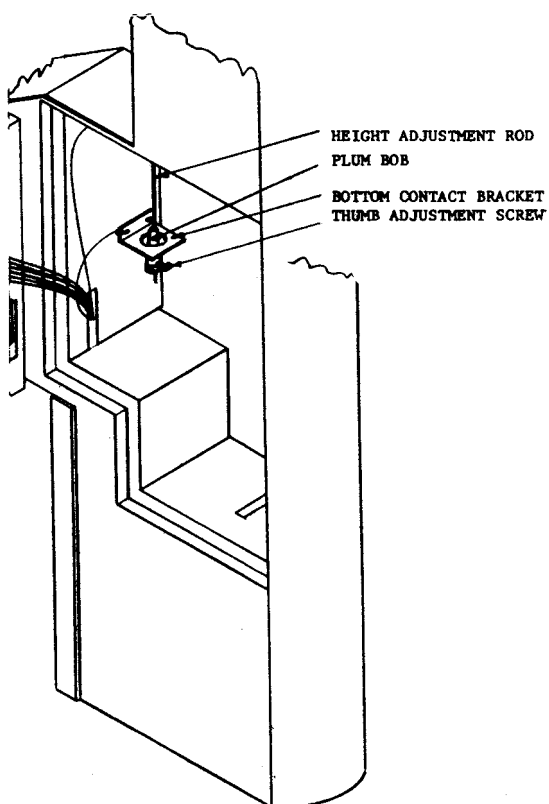


ILLUSTRATION 4

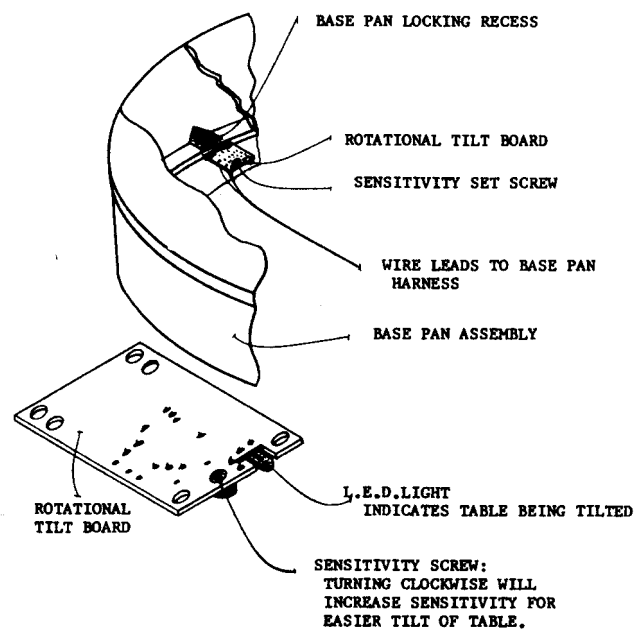


ILLUSTRATION 5

B. TEST AND SET MODE INSTRUCTIONS

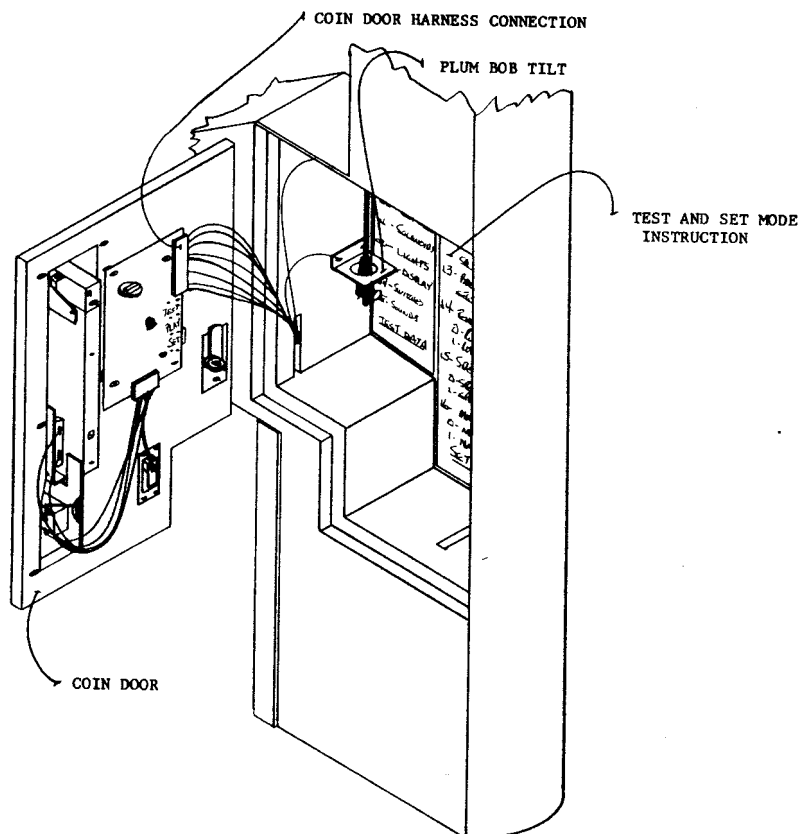
Complete control of Spectra IV has easy accessibility in that the self-test system and all settings are located on a board attached to the Coin Door.

Unlock Coin Door and remove from leg - DO NOT take door away from leg to assure wire harness remains connected. The Test Data and Set Mode Instructions have been attached inside the coin door opening for convenient reference. On the back of the Coin Door the Test, Play and Set switch and the Reset Button will be found. Refer to Coin Door drawing for location of all switches and buttons.

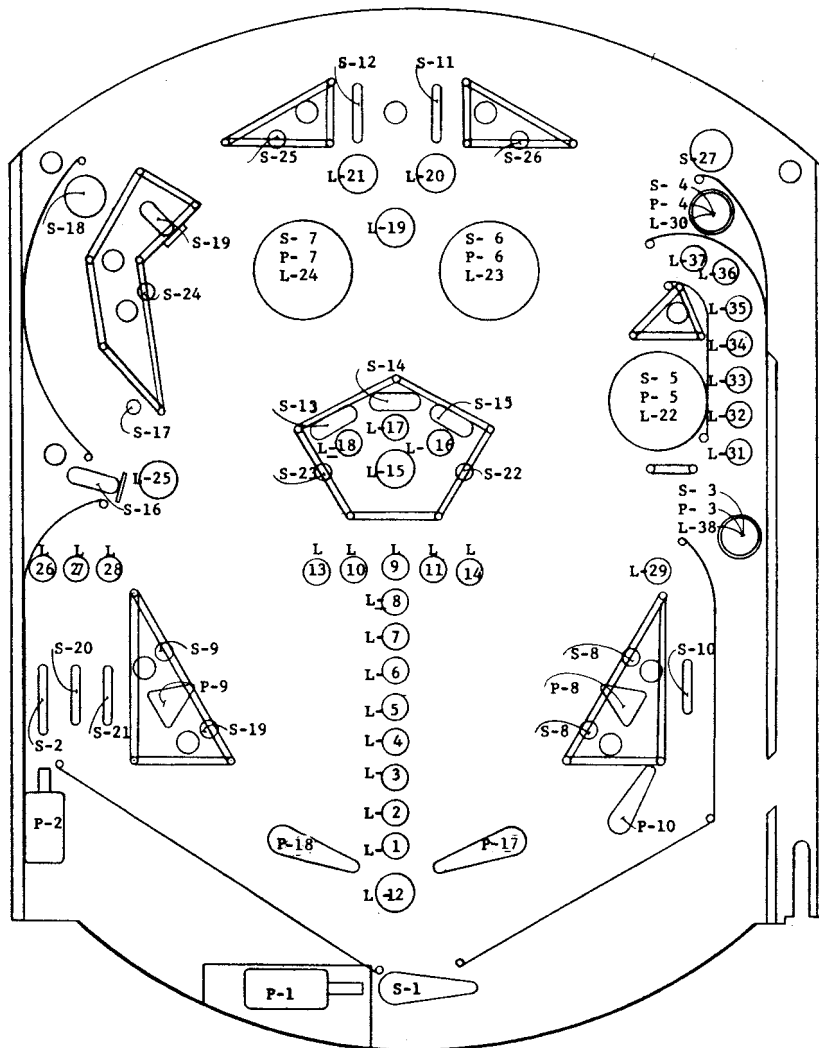
TEST DATA INSTRUCTIONS

(Refer to Playfield layout for location of switches, solenoids, and lights)

To start test sequence move the Test, Play and Set switch (S-30) to the Test position. By depressing the Red Demand button on the front of Coin Door the Display board should clear for testing and 01 will read out. Each additional depression of the Red Demand button will advance the test to the next step. The test sequence has 5 steps; 01 - Solenoids; 02 - Lights; 03 - Display; 04 - Switch Closures; and 05 - Sounds.



PLAYFIELD LAYOUT FOR ALL SWITCHES, SOLENOID AND LIGHTS



NOTE: The letter L indicates lights
The letter P indicates Solenoids
The letter S indicates Switches

NOTE: Refer to test mode instructions for check reference.

NOTE: Solenoid 13 is not used on this program.

VALLEY

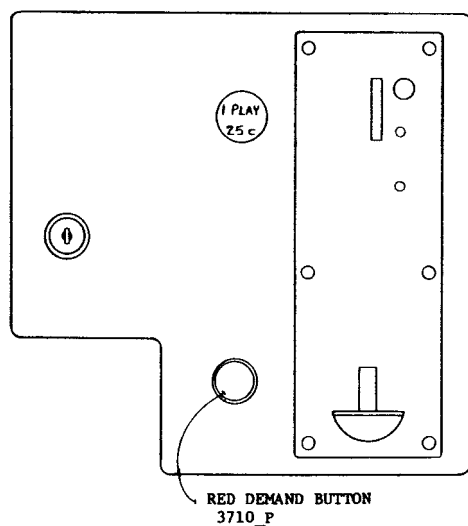
PART DESCRIPTION

PLAYFIELD ASSEMBLY

PART NO.
PF-3401

DATE
5-30-79

REV.



COIN ACCEPTOR
3712-P

RELAY P-11

COIN DOOR HARNESS CONNECT
J-11

L-12V

RESET SWITCH

S-28B

DOOR LOCK
3704-P

J-10

TEST, PLAY & SET MODE
SWITCH

S-29

DEMAND BUTTON SWITCH
3706-P

CHERRY LIMIT SWITCH
S-28A

C.R.E.M. COIN
P-12

RED DEMAND BUTTON
3710_P

VALLEY

PART DESCRIPTION

COIN DOOR ASSEMBLY

PART NO.
96-110-001

DATE
5-30-79

REV.

I-B-4

01 - SOLENOIDS:

The first sequence runs through each of the 13 solenoids activations. The Display board will read 01 and step down from solenoid 13 to solenoid 1. Each solenoid will activate as the number appears on the Display board. If a solenoid fails to activate, the number will appear but the solenoid will not be heard. Refer to playfield layout for location of all solenoids.

02 - LIGHTS:

The second sequence will flash all lights on and off so light failure can be checked. The Display will read 02 but will not indicate which light is being flashed on and off. Observe the playfield for any light failure.

03 - DISPLAY:

The third sequence will illuminate all displays by sequencing 999999 through 000000 to assure that all displays are functioning properly.

04 - SWITCH CLOSURES:

All switches should be Normally Opened (NO). The Display board will read 04 -- when all switches are opened. If a switch, or several switches, are closed the Display board will indicate the switch (or switches) by flashing their number on and off. Refer to playfield layout for location of switches.

NOTE: If Switch 30 (Test, Play and Set) is not functioning properly unit will not go into test sequence.

05 - SOUNDS:

The fifth sequence runs through a series of audio sounds used to indicate achievement of awards, bonus, credits and scores. The Display board will read 05 and the number of the assigned sound. If a number appears on the Display board and no sound is heard, refer to Audio-troubleshooting for correction.

SET MODE INSTRUCTIONS

(Refer to Score and Bonus Layout Sheet on following page for point options)

To start the set adjustments move the Test, Play and Set Switch (S30) to the Set position. The Display board should clear and read-out 01. By depressing the Red Demand button on the front of Coin Door, the set sequence will advance to the next step. The setting can be reset or advanced by depressing the Reset button (S-28B).

SET POSITIONS

The following 5 set positions have no reset functions and will only read out data on Display Board.

01 - COIN POSITION

02 - GAMES PLAYED

03 - FREE CREDITS AWARDED

04 - NUMBER OF TIMES HIGH SCORE

05 - NUMBER OF TIMES TILTED

The next 5 positions can be reset and advanced by depressing the Reset button (S-28B). First depress Reset button to set Score at 10,000 points on Display. Then each additional depression of the Reset button will advance the score by 5,000 points. Continue depressing Reset button until score desired is achieved.

06 - AWARD LIMIT ONE (Points should correspond with
07 - AWARD LIMIT TWO points written
08 - AWARD LIMIT THREE on Play Instruc-
tion decal.)

09 - HIGH SCORE TO DATE (Should be set
when install-
10 - AVERAGE SCORE ing table.)

The remaining set positions can be changed by depressing the Reset button (S-28B) to advance or reset values.

11 - PRICE OF A GAME

Selectable pricing for 1 through 6 coins per game.

12 - DISCOUNT BONUS CREDIT

Selectable for 0 through 5 credits.
Example:

Price = 1 - Bonus = 0
then each game 1 coin
Price = 1 - Bonus = 2
then 1 game 1 coin
3 games 2 coins
Price = 2 - Bonus = 2
then 1 game 2 coins
3 games 4 coins

13 - BALLS PER GAME

Selectable for 1 through 5 balls per player.

14 - FEATURE LANE OPTIONS

- 0 - Position resets for each players ball.
- 1 - Position restores each players prior condition.

15 - SPECIAL AWARD OPTION

- 0 - Position awards one free Ball.
- 1 - Position awards one free Game.

16 - MATCH OPTION

To allow a match for free game, position 15 has to be selected at 1 Position - free Game award.

- 0 - Position gives No match award.
- 1 - Position gives each player a possible match award.

Test, Play and Set switch (S30) should be moved to the play position and coin deposited to play game. Check all switch contacts on playfield for adjustments. Top Cover should be removed when testing machine out in play position for any needed adjustments.

SCORE AND BONUS LAYOUT SHEET

Switch No.	Description	Not Lit	Lit	Action	Switch No.	Description	Not Lit	Lit	Action
1	Ball Home	-----	----	Counts down Bonus at 1x, 2x, 3x or 5x - Fires P1 if new ball needed	11	Top Right Rollover	500 to Score	1000 to Score OFF L-20	If both lights are out L-19 "2x" is lighted. Each closure thereafter adds 500 to Score, 1000 to Bonus
2	Refeed Lane	0 to Score 1000 to Bonus	0 to Score 5000 to Bonus OFF L-26	Fires P2	12	Top Left Rollover	500 to Score	1000 to Score OFF L-20	
3	Feature Lane	1st Ball 2400 to Score 1000 to Bonus Lites Left 500 L-28	2nd Ball 4500 to Score 2000 to Bonus Lites refeed L-26	3rd Ball 6600 to Score 3000 to Bonus Lites right side gate Lane L-29	13	Left Capture Ball Target Switch	1000 to Score	2000 to Score OFF L-18	
		4th Ball 8700 to Score 4000 to Bonus Lites Special Lite L-27	5th Ball 10,800 to Score 5000 to Bonus Lites "Shoot Again" L-12	6th Ball 12,900 to Score 6000 to Bonus Free Ball or game	14	Center Capture Ball Target Switch	1000 to Score Lites refeed L-26	2000 to Score L-26 OFF L-17	If all 3 lights are out, L-15 "3x" is lighted and each closure thereafter adds 1000 to Score and 2000 to Bonus
		Each ball advances feature lane lights, L-31 thru L-37, until the top is reached. Thereafter, each ball adds 12,600 to Score and 6000 to Bonus. P3 is fired after every switch closure.			15	Right Capture Ball Target Switch	1000 to Score	2000 to Score OFF L-16	
4	Upper Right Outhole Kicker	Adds 500 to Score	5000 to Score OFF L-30	Fires P4	16	Target by Spinner	-----	-----	1000 to Bonus Lites Spinner L-25
5	Right Thumper	100 to Score	1000 to Score OFF L-22 ON L-24	Fires P5	17	Spinner	100 to Score	1000 to Score	
6	Upper Right Thumper	100 to Score	1000 to Score OFF L-23 ON L-22	Fires P6	18	Switch in Top of Spinner Lane	-----	-----	1000 to Bonus Lites outhole L-30
7	Upper Left Thumper	100 to Score	1000 to Score OFF L-24 ON L-23	Fires P7	19	Open Gate Target Switch	-----	-----	1000 to Score Opens gate, Lights gate lane L-29
8	Lower Right Side Band	-----	-----	90 to Score Fires P8	20	Mid Left Lane "Special"	3000 to Bonus	3000 to Bonus awards "Special" OFF L-27	
9	Lower Left Side Band	-----	-----	90 to Score Fires P9	21	Inside of 3 Left Lanes-"500 Bonus"	500 to Score	500 to Score 1000 to Bonus	
10	Right Side Gate Lane	500 to Score	500 to Score 1000 to Bonus allows gate to close on next (any) switch closure		22	Right Center Side Band	-----	-----	90 to Score
					23	Left Center Side Band	-----	-----	90 to Score
					24	Upper Left Side Band	-----	-----	90 to Score
					25	Top Left Center Side Band	-----	-----	90 to Score
					26	Top Right Center Side Band	-----	-----	90 to Score
					27	Ball Entry to Playfield	-----	-----	90 to Score

SECTION I GENERAL TROUBLE SHOOTING

INSTALLATION PROBLEMS

<u>SYMPTOM</u>	<u>ACTION</u>
1. TOP COVER WILL NOT LOCK DOWN ON LEG ASSEMBLY.	1. Apply pressure either down or up on Top Glass or to either side so leg locks line-up with lock holes in Top Cover. Also Check to make sure the Spectra IV emblem that reads "deposit coin below" is located on Coin Door leg.
2. TILT LIGHT REMAINS ON AND GAME CAN NOT BE PLAYED.	2. a) Base Pan Assembly is not in locking position. b) Rotational Tilt not adjusted for proper sensitivity. c) Table must be leveled properly.
3. ELECTRICAL FAILURE AFTER LINE CORD HAS BEEN PLUGGED IN.	3. a) Electrical parts have not been allowed to reach Room Temperature. b) Fuse Holders are not seated properly. c) Fuses are either damaged or bad. d) Power On/Off switch is in the off position - move switch to opposite side. e) High/Low switch is in center position - move to either right or left.
NOTE: If electrical power still fails refer to Section III.	

TEST AND SET MODE ADJUSTMENT PROBLEMS

<u>SYMPTOM</u>	<u>ACTION</u>
1. TEST, PLAY & SET SWITCH DOES NOT CLEAR DISPLAY.	1. a) Check Coin Door harness to insure it is properly seated. b) Check Display Board harness to insure proper connection. Playfield must be removed to check under Red Display board for harness connection. c) Check all Playfield harness connections for proper connection.
2. RED DEMAND BUTTON FAILS TO ADVANCE STEPS.	2. a) Check Limit switch harness for proper connection. Check wire leads to Cherry Limit switch and others.

NOTE: IF MACHINE FAILS TO FUNCTION AFTER ALL ACTIONS HAVE BEEN TAKEN REFER TO ELECTRONIC TROUBLESHOOTING PROCEDURE FOR CORRECTION.

SPECTRA IV
VALLEY PINBALL

D. TAKE APART INSTRUCTIONS

The Valley Pinball table comes completely assembled and ready for test and settings. Should you need to disassemble your table please read and follow the step by step procedures for taking apart and reassembling. Use only those steps you find necessary for your purpose.

TOP COVER REMOVAL:

Release the four (4) locks (located 1" below top of each leg) on left side of four (4) legs. Lift top up and off leg assembly.

PLAYFIELD REMOVAL:

Lift playfield up by holding shooter out with one hand and lifting up on one of metal gates. Support playfield up so the display harness (located on underside of red display board), the slip ring harness and the base pan harness can be disconnected. Remove playfield.

BASE PAN AND PLAYFIELD SUPPORT REMOVAL:

Use a screwdriver and remove four (4) 3/8" x #10/32 bolts from inside bottom of base pan. Lift base pan straight up and out of leg assembly.

SLIP RING ASSEMBLY AND TRANSFORMER COVER REMOVAL:

Place hands on top of slip ring, rotate ring until large hole is directly over one of the 3/4" x #10/32 bolts. Use a screwdriver and remove bolts. Continue rotating top of slip ring until all four (4) bolts have been removed. Lift slip ring up and disconnect power deck harness on bottom side. Remove slip ring from support. Lay slip ring down with Brush holders UP.

DISASSEMBLY OF SLIP RING SUPPORT, LEGS, AND POWER DECK ASSEMBLY.

At least two (2) people should assist in removing leg assembly. Unlock and remove coin door, disconnect door harness and wires from plum bob tilt. Use a 1/2" socket and loosen eight (8) 3/8" x 4 1/2" bolts from top of slip ring support. Lower power deck assembly and pull coin door harness thru leg opening. Now remove the eight (8) bolts and lift slip ring support up and out of legs - legs will collapse.

REASSEMBLING OF TABLE

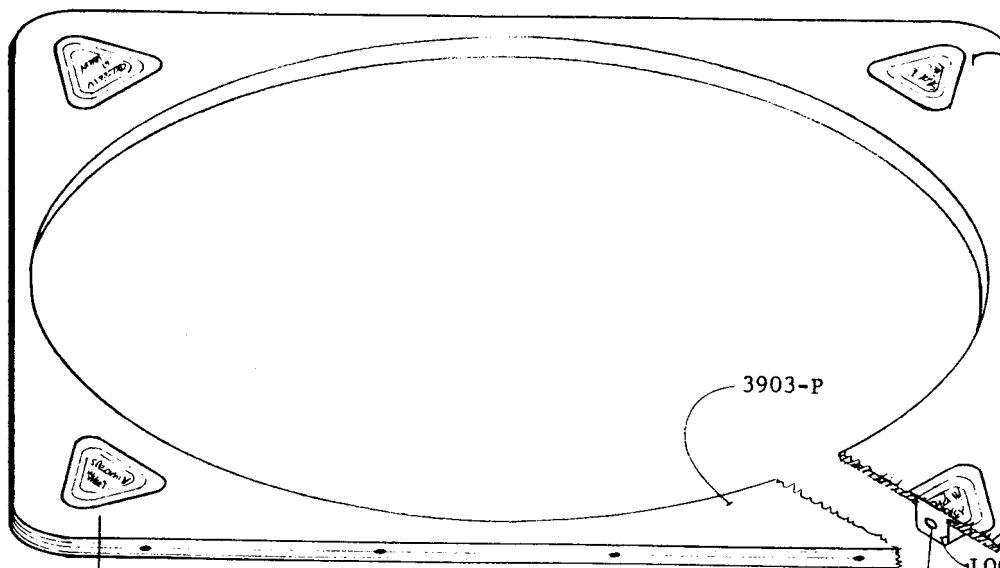
At least two (2) people should assist. Stand legs up and place slip ring support in place. Run coin door harness through coin door leg and lift power deck assembly support into place. Place the eight (8) bolts in slip ring support and tighten them down. Before advancing to next step, place top cover down on legs to check lock hole alignment.

Connect power deck harness to slip ring and bolt down slip ring. Reconnect coin door harness and replace coin door.

Place base pan and playfield support on slip ring and replace the four (4) bolts and washers.

Place playfield in base pan assembly and support it up so the three harnesses can be reconnected. Lower playfield into support by holding shooter out and holding on the metal gates.

To replace top cover - the Spectra IV emblem that reads "deposit coin below" must be located on coin door leg. Then push locks into lock hole of top cover.

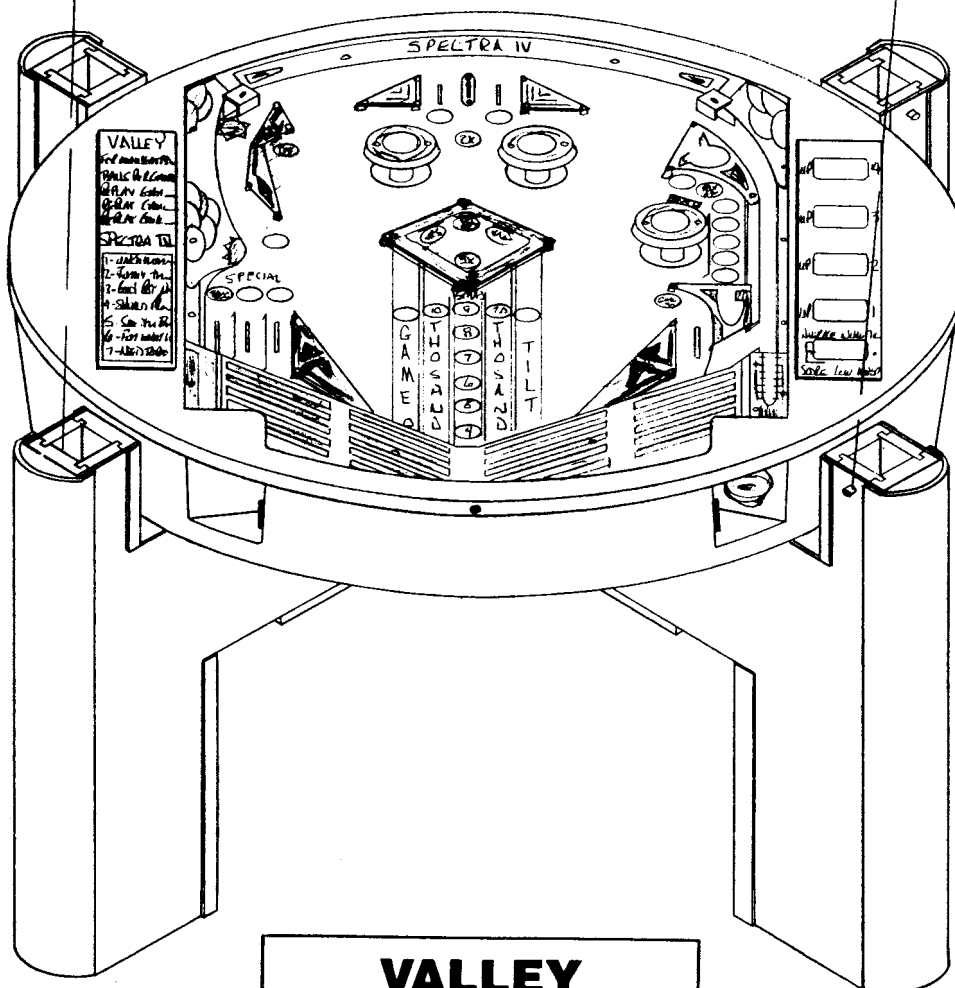


SPECTRA IV CORNER EMBLEM
3721-P

TOP COVER AND GLASS ASSY:

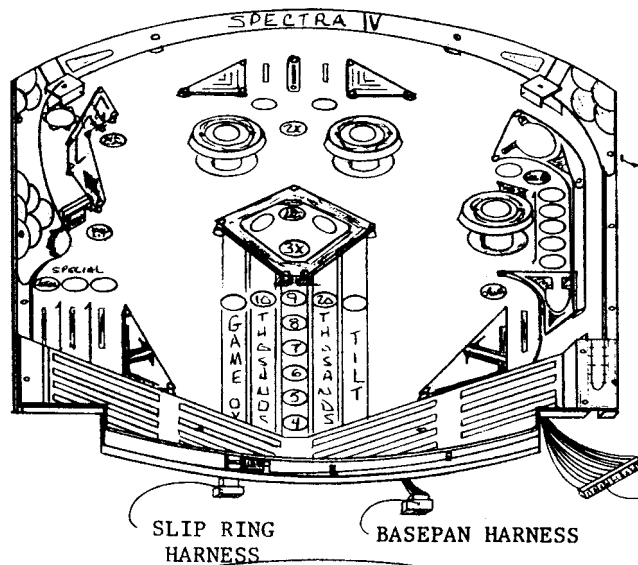
REMOVE TOP ASSY BY RELEAS-
ING 4 LOCKS (LOCATED 1"
BELOW TOP OF EACH LEG) ON
LEFT SIDE OF EACH LEG. TO
REPLACE TOP ASSY PLACE TOP
ON LEG SO CORNER EMBLEM
WITH COIN DOOR BELOW IS ON
COIN DOOR LEG. PUSH LOCKS
INTO LOCK HOLES OF TOP ASSY.

LOCK HOLE FOR
LOCKING DOWN
TOP ASSY TO
LEG ASSY. (1) PER CORNER.



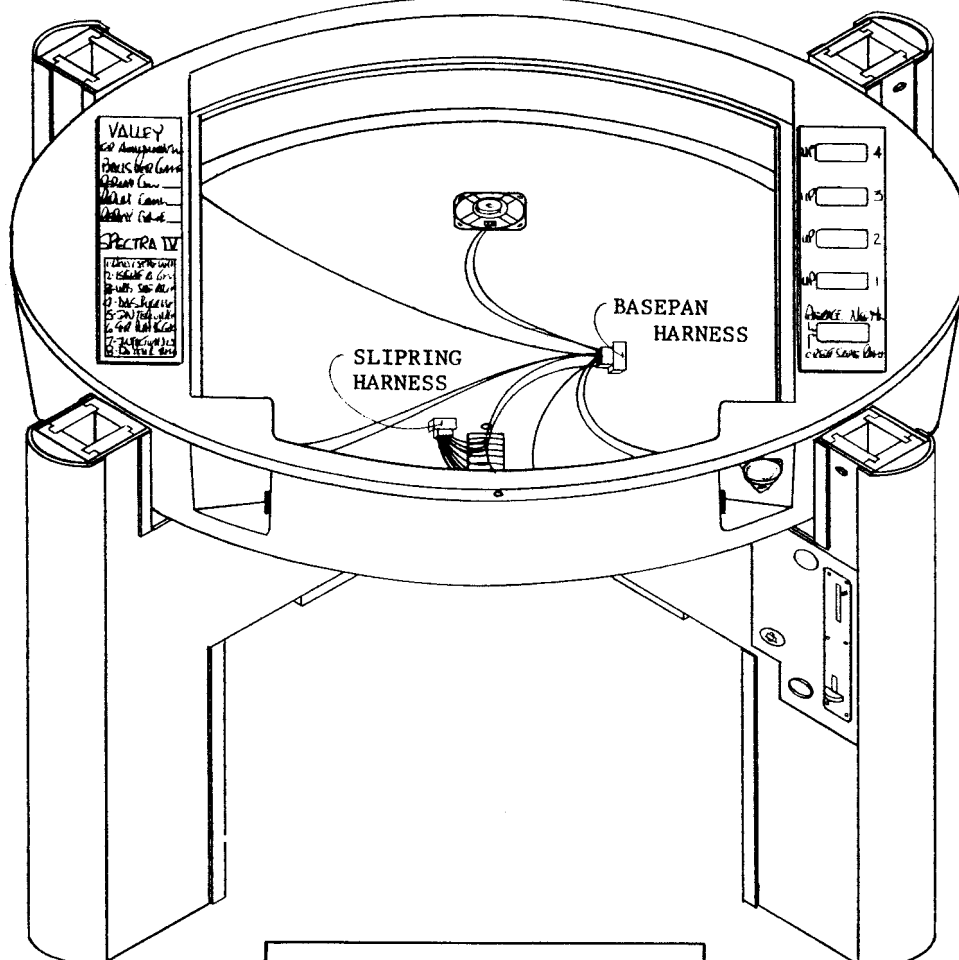
TOP COVER REMOVAL.
STEP 1

VALLEY		
PART DESCRIPTION		
TOP COVER ASSEMBLY		
PART NO.	DATE	REV.
	5-30-79	



PLAYFIELD :

LIFT PLAYFIELD OUT OF SUPPORT BY USING HOLDING SHOOTER OUT AND LIFTING UP ON BUMPER. SUPPORT PLAYFIELD UP AND DISCONNECT THE DISPLAY HARNESS, THE SLIPRING HARNESS AND THE BASE PAN HARNESS.



**PLAYFIELD REMOVAL.
STEP 2**

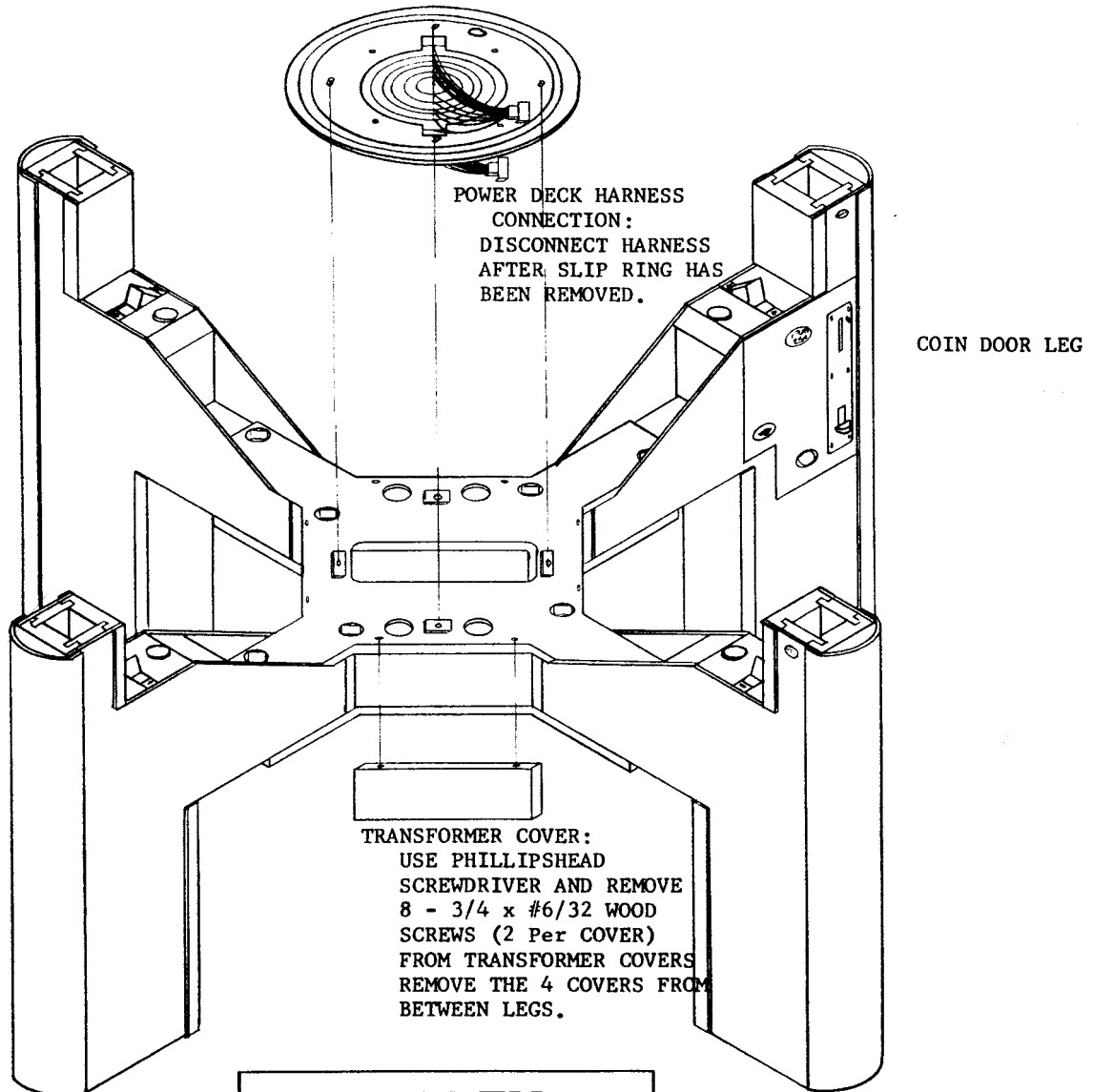
VALLEY		
PART DESCRIPTION		
PLAYFIELD ASSEMBLY		
PART NO.	DATE	REV.
	5-30-79	

I-D-12

SLIP RING ASSY AND TRANSFORMER COVER REMOVAL.

STEP 4

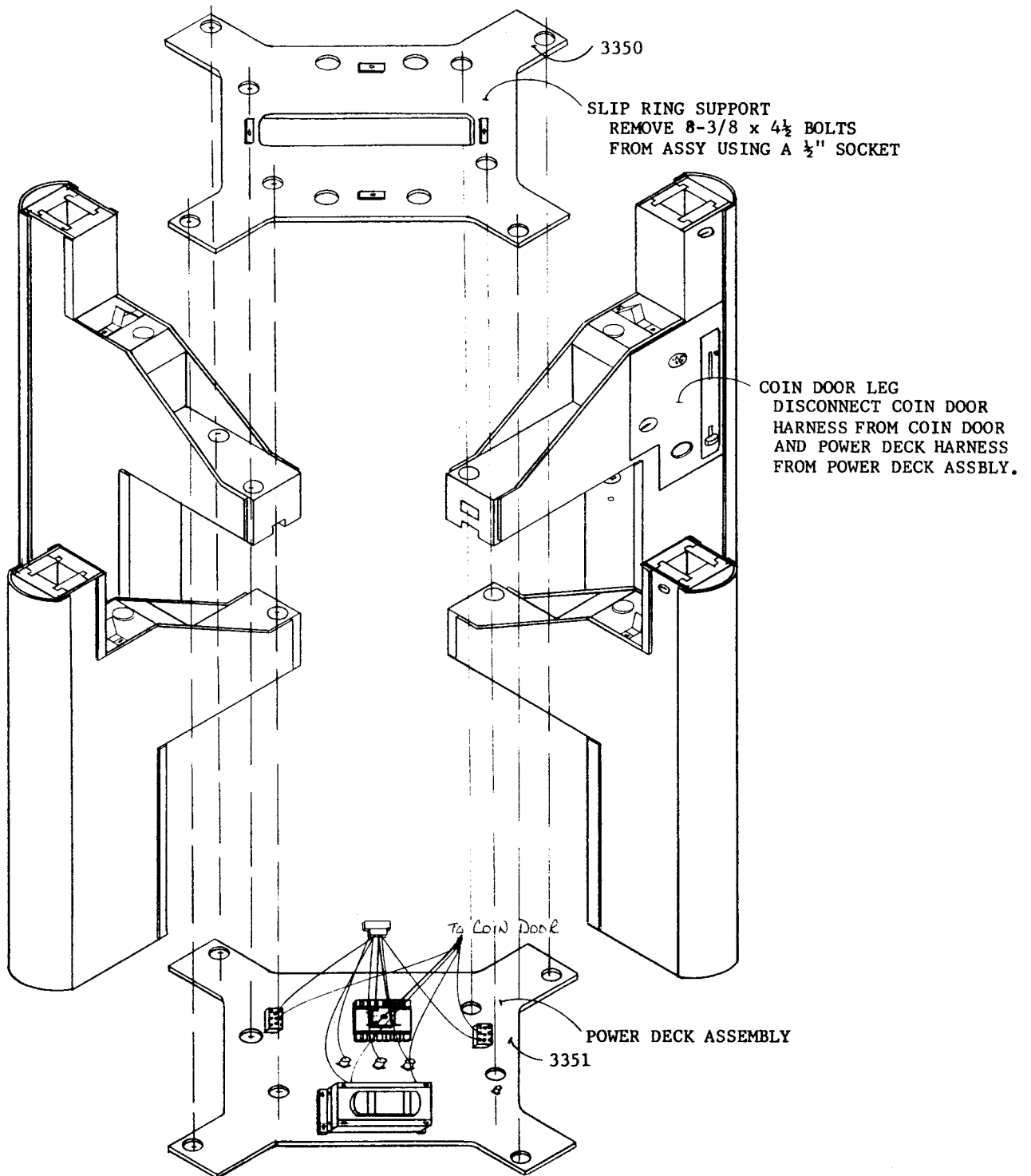
SLIP RING: ROTATE TOP OF SLIP RING UNTIL LARGE HOLE IS
DIRECTLY OVER 1 3/4 x #10/32 BOLT, REMOVE THE
BOLT AND REPEAT UNTIL ALL 4 BOLTS HAVE BEEN REMOVED.
PLAYFIELD HARNESS CONNECTION: HAS BEEN REMOVED PRIOR TO PLAYFIELD REMOVAL.



VALLEY		
PART DESCRIPTION		
SLIP RING ASSEMBLY		
PART NO.	DATE	REV.
	5-30-79	

DISASSEMBLY OF SLIP RING SUPPORT, LEGS AND POWER DECK.

STEP 5



VALLEY		
PART DESCRIPTION		
POWER DECK 8 LEG ASS'Y		
PART NO.	DATE	REV.
	5-30-79	

SECTION II COMPONENT DESCRIPTION

- A. POWER DECK ASSEMBLY
P/N 96-350-001
 - 1. Brief Description
 - 2. Schematic Drawing
 - 3. Component Layout
 - 4. Parts List
- B. COIN DOOR ASSEMBLY
P/N 96-110-001
 - 1. Brief Description
 - 2. Schematic Drawing
 - 3. Component Layout
 - 4. Parts List
- C. SLIP RING ASSEMBLY
P/N 97-280-001
 - 1. Brief Description
 - 2. Schematic Drawing
 - 3. Component Layout
 - 4. Parts List
- D. ROTATIONAL TILT
P/N 96-380-001
 - 1. Brief Description
 - 2. Schematic Drawing
 - 3. Component Layout
 - 4. Parts List
- E. DISPLAY BOARD ASSEMBLY
P/N 96-160-001
 - 1. Brief Description
 - 2. Schematic Drawing
 - 3. Component Layout
 - 4. Parts List
- F. DIODE ISOLATION
P/N 96-170-001
 - 1. Brief Description
 - 2. Schematic/Component Drawings
 - 3. Parts List
- G. POWER SUPPLY/VOLTAGE
REGULATOR - P/N 96-360-001
 - 1. Brief Description
 - 2. Schematic Drawing
 - 3. Component Layout
 - 4. Parts List
- H. MICRO-PROCESSOR (CPU)
P/N 96-120-001
 - 1. Brief Description
 - 2. Input/Output Schematic Drawing
 - 3. CPU/Memory Schematic Drawing
 - 4. Component Layout
 - 5. Parts List
- I. SOLENOID/AUDIO ASSEMBLY
P/N 96-420-001
 - 1. Brief Description
 - 2. Schematic Drawing
 - 3. Component Layout
 - 4. Parts List
- J. LAMP DRIVER ASSEMBLY
P/N 96-300-001
 - 1. Brief Description
 - 2. Schematic Drawing
 - 3. Component Layout
 - 4. Parts List
- K. LAMP BOARDS ASSEMBLIES
With Assembly Numbers
 - 1. Brief Description
 - 2. Schematic Drawings
and Component Layouts
for the following:
 - a) Lamp Board 96-305-001
 - b) Lamp Board 96-305-002
 - c) Lamp Board 96-305-003
 - d) Lamp Board 96-305-004
 - e) Lamp Board 96-305-005
 - f) Lamp Board 96-305-006

POWER DECK

The Power Deck consists of a bottom platform on which is mounted a transformer, three fuses, two switches and one diode bridge.

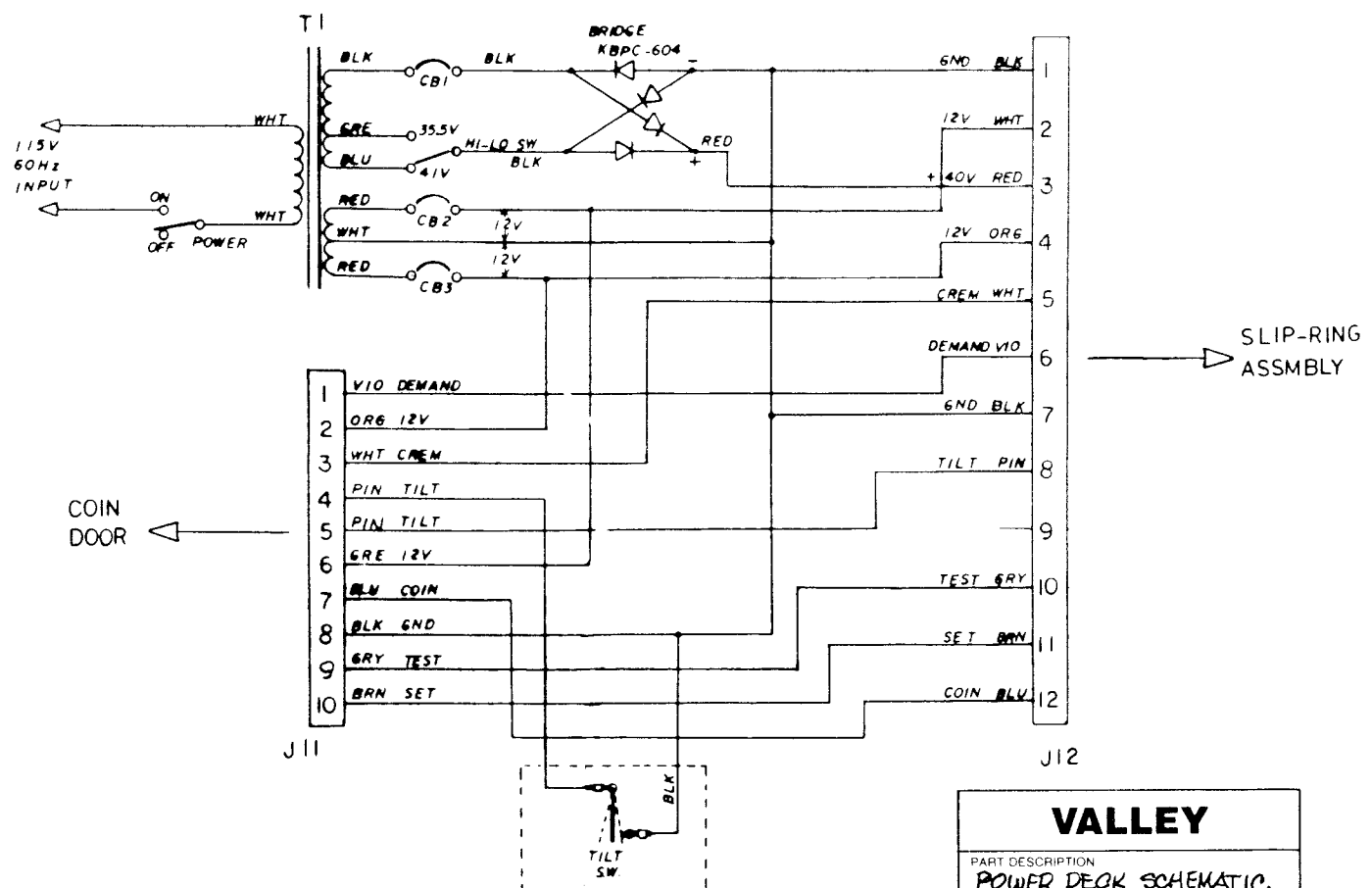
The transformer has a 115VAC primary and two secondary windings: one winding of 24VAC, center tapped, for the power supply input, and another winding for solenoid power. The solenoid winding is tapped to give either 40 or 35 VAC. This level is selected by one of the switches and feeds to a bridge rectifier for conversion to DC. The second switch turns A.C. mains on and off to the unit.

Three fuses are used to protect the secondary windings. Each fuse is a 10 amp Slo-blow MDL type.

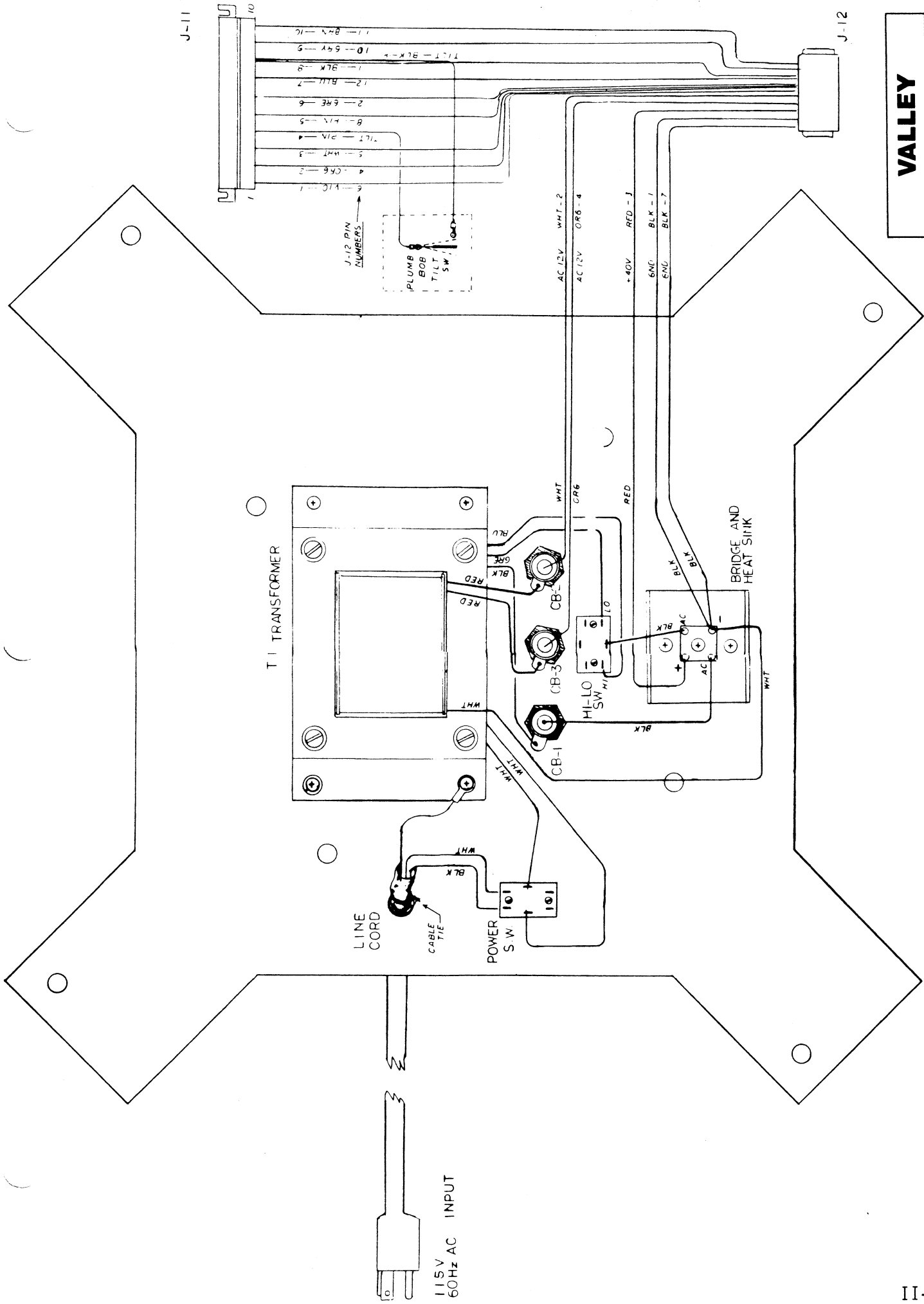
Interconnection from the Power Deck to the slip ring is made through a 12 pin quick disconnect header. The coin door, 10 pin edge card connector, is also connected through this header.

POWER DECK SUB-ASSEMBLY

REQ'D	PART NO.	DESCRIPTION
1	96-350-001	POWER DECK SUB ASSEMBLY
1	71-900-001	POWER TRANSFORMER
1	92-200-001	CORD, SET, SJT-18-3-8
1	73-600-001	SWITCH-POWER, D.P.D.T. 125V3A
1	73-600-001	SWITCH, HI-LO SPDT 125V3A
1	67-085-002	BRIDGE - 400 V.D.C., 6A
1	28-400-003	HEAT SINK
6	20-500-004	SCREW-#6 x 1/2
1	20-500-010	SCREW-#6 x 3/4
1	94-320-006	CABLE HARNESS SUB-ASSEMBLY
3	28-300-300	HOLDER-FUSE 15A 240V
3	28-300-001	FUSE
1	59-047-001	BUSHING LINE CORD
3	20-040-001	NYLON CABLE TIES
1	92-400-500	JUMPER, 3" WHITE 18GA WIRE
1	92-400-501	JUMPER, 6" BLACK 18GA WIRE



VALLEY		
PART DESCRIPTION POWER DECK SCHEMATIC		
PART NO. 96-350-001	DATE 5-30-79	REV.



VALLEY			
PART DESCRIPTION			
POWER DECK ASSY COMPONENT AND WIRING LAYOUT			
PART NO.		DATE	REV.
96-350-001		5-30-79	

COIN DOOR

Total set up and test control is provided by the coin door. The unit can be put in any of the three modes of operation, test, play or set.

In the test mode, the solenoids, lamps, display, switches and Audio can be tested by using the demand switch to activate each test area desired.

In the play mode, the coin switch will allow coins to fall into the cash box for up to 15 credits. Then the CREM will return all coins until credits are consumed to less than 15. The coin door demand switch will bring the unit into a game and allow up to four players to play.

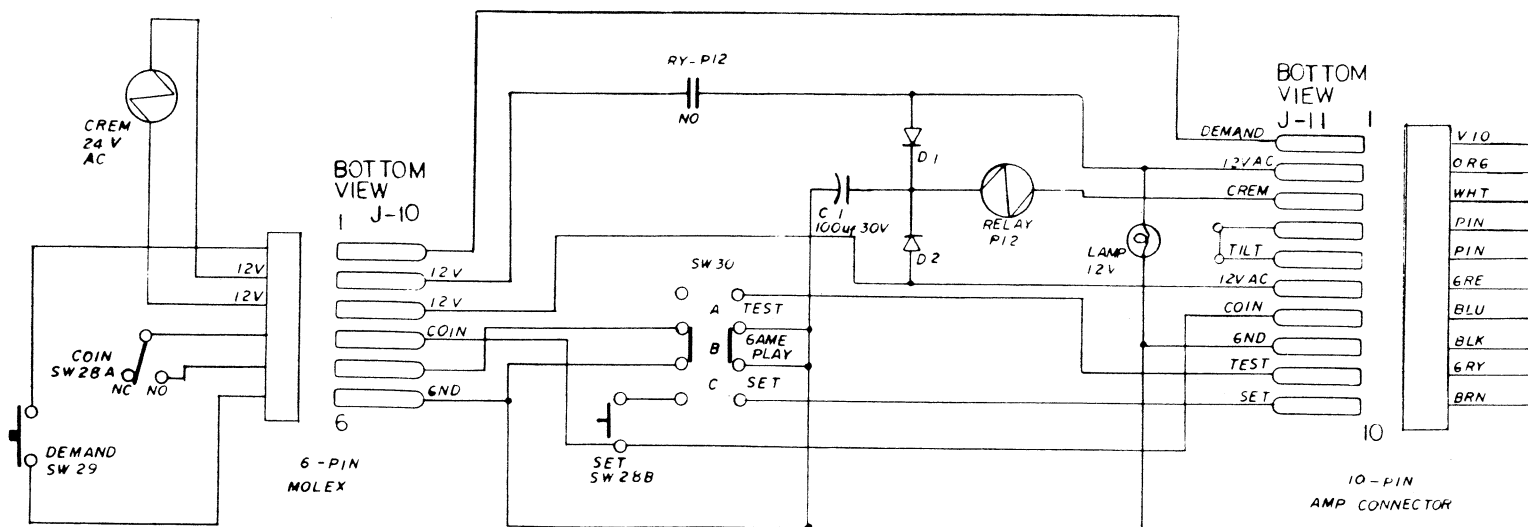
In set mode, the controlling limits of the game can be displayed and set. By depressing the red demand switch on the front of the coin door, the set sequence will advance to the next step. The reset button, located on the coin door board, is used to reset limits within each step.

Instructions for using the mode Select Switch is located behind the coin door.

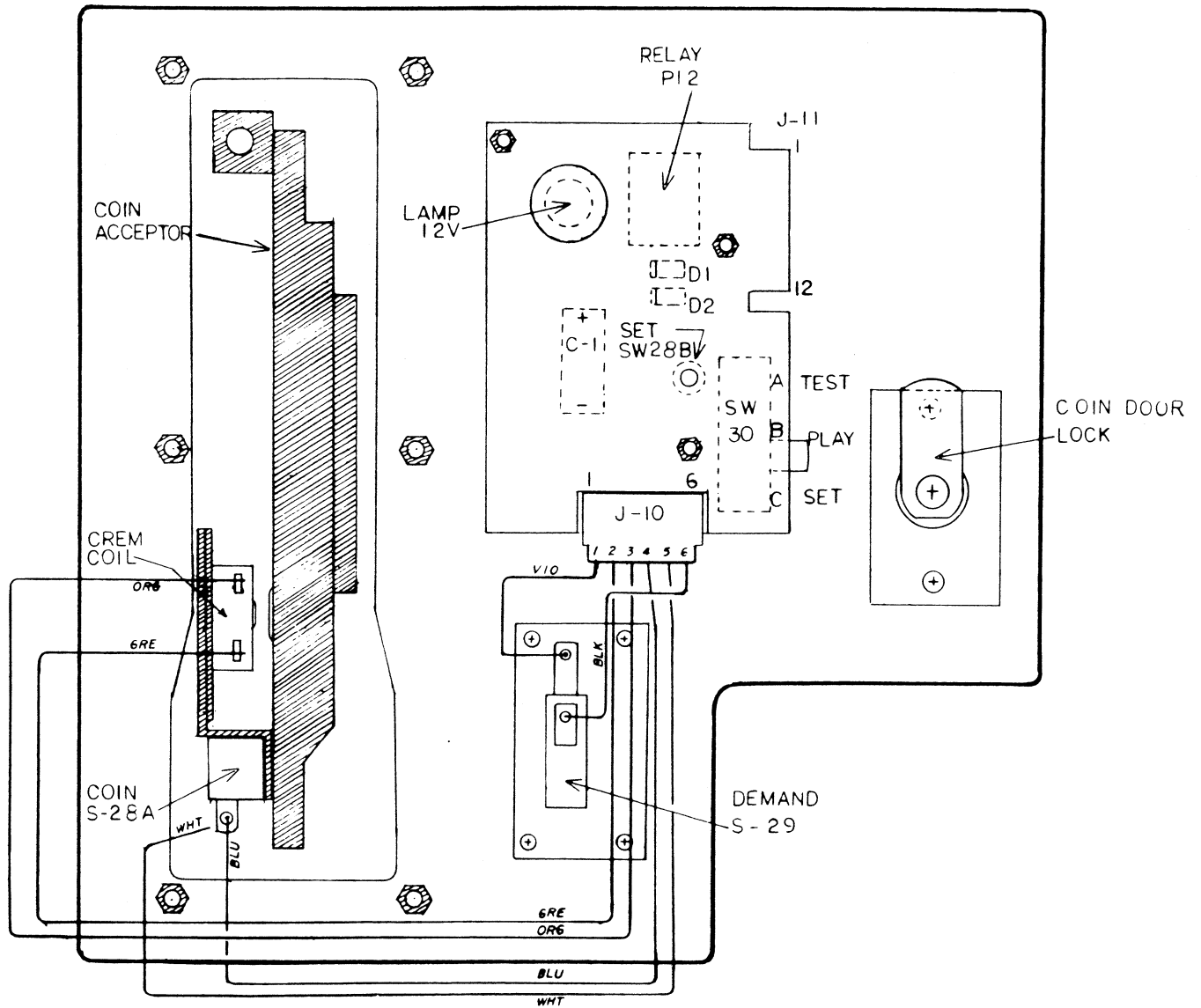
The tilt device is also located behind the coin door.

COIN DOOR BOARD SUB-ASSEMBLY

REQ'D	PART NO.	DESCRIPTION
1	96-110-001	COIN DOOR BOARD SUB-ASSEMBLY
1	57-120-001	PC BOARD (ARI-9090)
2	67-080-003	DIODE, POWER 1A (IN 4001, 2, 3 or 4)
1	14-152-320	CAPACITOR, 22 MFD, 50V
1	71-700-400	RELAY, DPDT, 12V COIL
1	28-420-001	HOLDER-WEDGE BASE BULB
1	54-300-001	BULB, (GE #194)
1	73-300-001	SWITCH, SPST, N.O. PUSH
2	73-400-001	SWITCH, SLIDE 3 POS.
1	92-400-006	JUMPER, .6", ORANGE
1	92-400-004	JUMPER, .4", WHITE
1	94-320-002	WIRING HARNESS
4	25-510-002	SCREW, SHOULDER, #6 WOOD
4	20-300-004	NUT, 6x32
1	20-540-001	STAPLE, INSULATED



VALLEY		
PART DESCRIPTION		
COIN DOOR SCHEMATIC		
PART NO.	DATE	REV.
96-110-001	5-30-79	



VALLEY		
PART DESCRIPTION		
COIN DOOR - PARTS LAYOUT		
PART NO.	DATE	REV.
96-110-001	5-30-79	

SLIP RING

SLIP RING SUB-ASSEMBLY

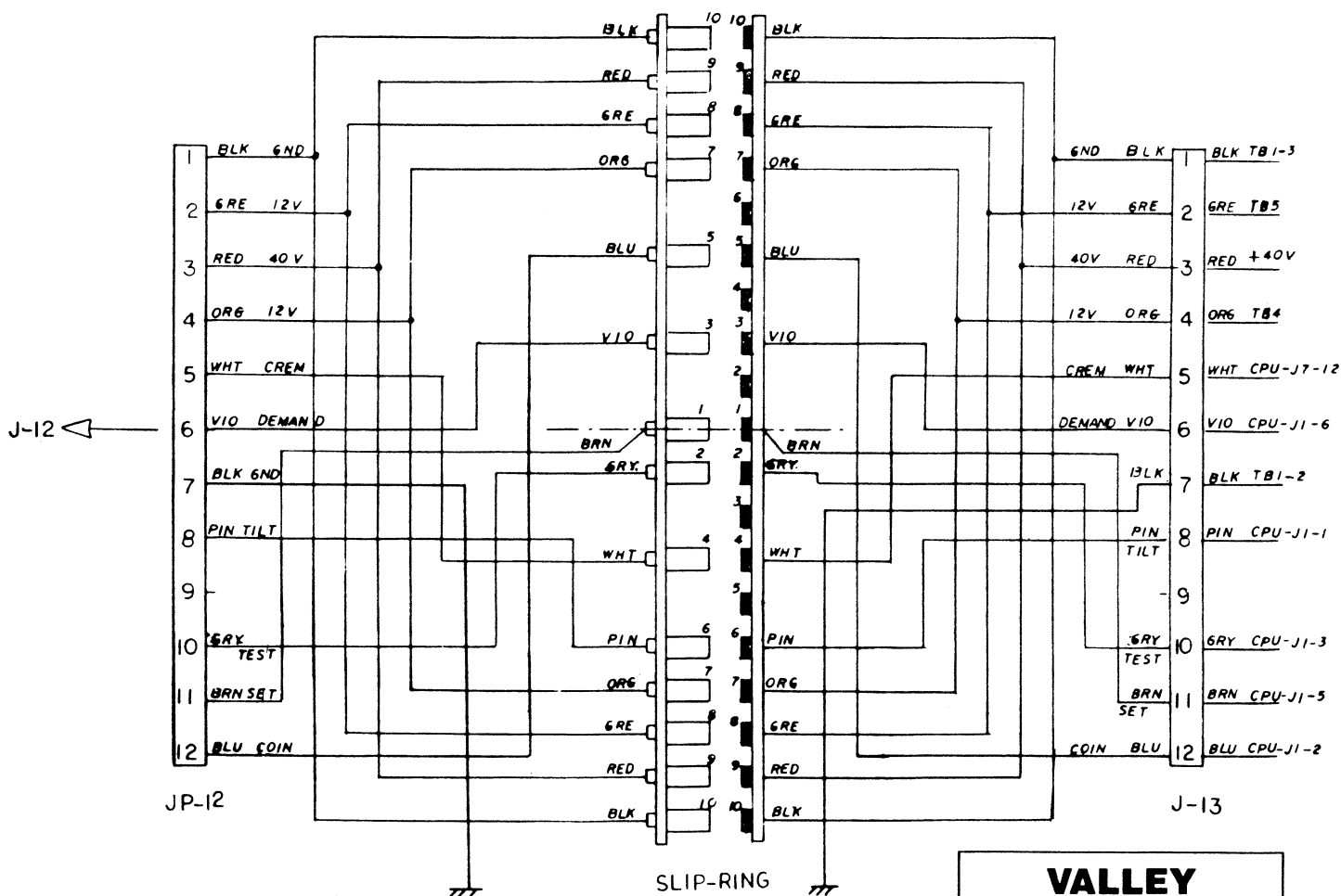
The Slip Ring assembly allows continuous rotation in either direction while maintaining contact between the Power Deck and Coin Door Printed Circuit Board to the upper tub and playfield electronics.

The Slip Ring assembly consists of twenty-two carbon brushes and holders, a 4-ounce copper Slip Ring Printed Circuit Board, and a metal rotation ring to hold the assembly together.

Interconnections are made between the Power Deck and upper tub assembly by the use of two 12 pin quick disconnect headers.

Four brushes each are used on the ground, +40VDC and the two 24 VAC lines. The six remaining lines from the Coin Door Printed Circuit Board are made through single brushes. Extra ground lines are made by using the metal rotation ring as a conductor. The rotation ring is the base support for the upper tub assembly.

REQ'D	PART NO.	DESCRIPTION
1	97-280-001	SLIP RING SUB-ASSEMBLY
1	97-280-002	SLIP RING CASE (UPPER & LOWER)
14	28-100-101	HOLDER-BRUSHES 1/4"
6	28-100-102	HOLDER-BRUSHES 3/16"
1	96-400-001	P.C. BOARD
14	28-100-001	BRUSHES 1/4" SQ.
6	28-100-002	BRUSHES 3/16" SQ.
4	20-500-009	SCREW #5-40 x 1/4" MACH.
4	20-300-005	NUT #5-40
14	93-360-005	SPRING-FOR 1/4" BRUSH
6	93-360-006	SPRING-FOR 3/16" BRUSH
1	94-320-004	WIRE HARNESS PC BOARD SIDE
1	94-320-005	WIRE HARNESS BRUSH SIDE
1	72-160-001	METAL PLATE-BRUSH HOLDER
4	20-500-008	SCREW MACH.#4-40x1/4"
4	20-300-003	NUT, 4-40



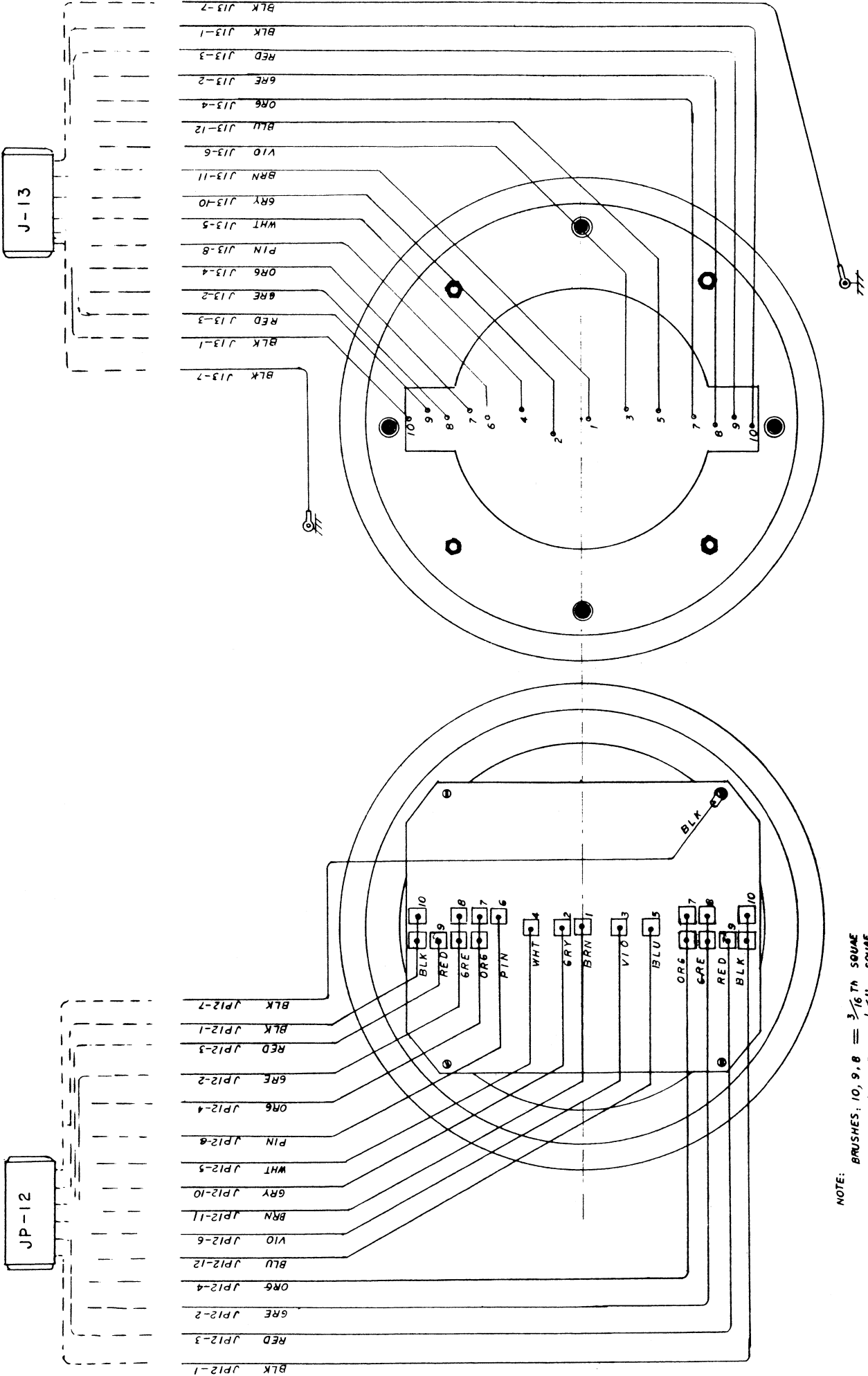
VALLEY		
PART DESCRIPTION SLIP RING SCHEMATIC		
PART NO. 97-280-001	DATE 5-30-79	REV.

VALLEY			
PART DESCRIPTION SLIP RING ASS'Y COMPONENT LAYOUT			
PART NO.	DATE	REV.	
97-280-001	5-30-79		

TOP VIEW

BOTTOM VIEW

NOTE: BRUSHES: 10, 9, 8 = $\frac{3}{16}$ " SQUARE
1, —, 7 = $\frac{1}{4}$ " SQUARE



ROTATION TILT

The Rotation Tilt is used to insure that once in a home position and play has started the tub is not moved off of home position. If this happens, play will stop and player's turn will end but will not lose score or bonus.

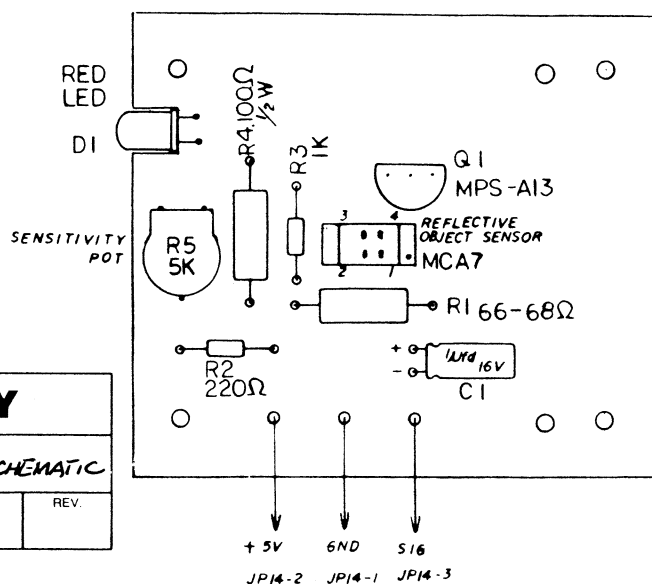
This is accomplished by a small Printed Circuit Board bolted to the inside bottom of the upper tub. When in a home position, an infra-red transmitter will bounce a beam of light off one of the four support glides and turn out the tilt light on the playfield. If after play has started and the infrared transmitter is moved off the glide, the unit will tilt.

Adjusting procedure calls for positioning the tub in a home position and turning the Pot on the Printed Circuit Board until a small red L.E.D. comes on, indicating a tilt, then backing off the adjusting Pot until the L.E.D. goes out. Check operation in all four home positions. Sensitivity can be set to operator's desire.

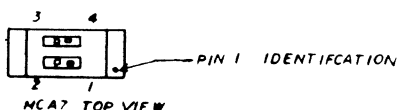
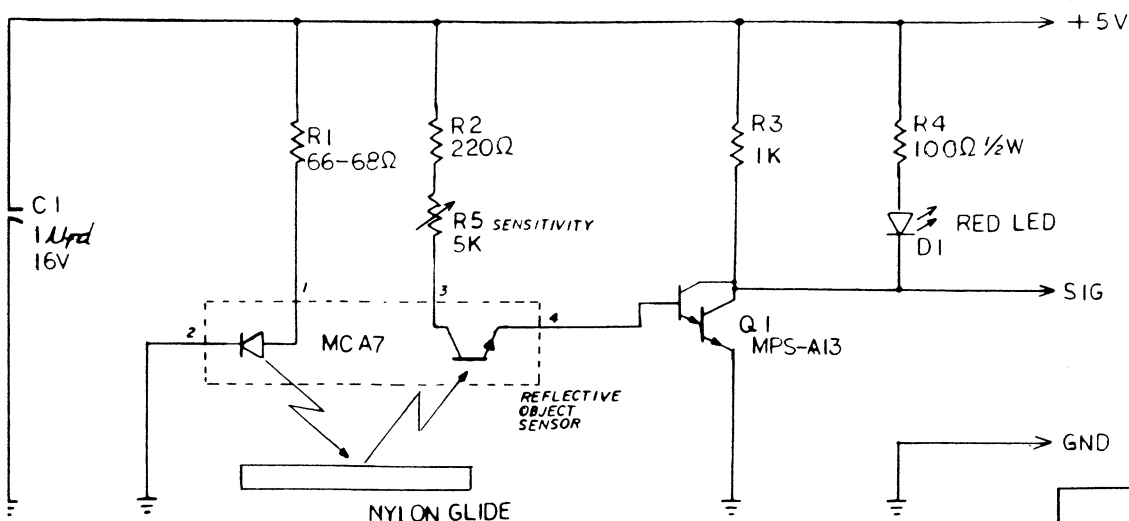
Interconnects are made along with Audio to speaker and flipper push button switch by a 9 pin quick disconnect header.

ROTATIONAL TILT SUB-ASSEMBLY

REQ'D	PART NO.	DESCRIPTION
1	96-380-001	ROTATIONAL TILT SUB-ASSEMBLY
1	57-720-001	P.C.BOARD (ARI-9095)
1	54-600-001	REFLECTIVE PHOTO SENSOR (MCA7)
1	67-320-001	TRANSISTOR, NPN DARL. (MPS-A13)
1	54-140-001	VISIBLE LED. (FLV-110)
1	65-500-680	RESISTOR, 68r, $\frac{1}{2}$ W
1	65-250-221	RESISTOR, 220r, $\frac{1}{4}$ W
1	65-250-102	RESISTOR, 1Kr, $\frac{1}{4}$ W
1	65-250-101	RESISTOR, 100r, $\frac{1}{4}$ W
1	65-100-001	POTENTIOMETER, 5Kr
1	14-151-001	CAPACITOR, IMFD, 16v



VALLEY		
PART DESCRIPTION		
ROTATIONAL TILT SCHEMATIC		
PART NO.	DATE	REV.
96-380-001	5-30-79	



VALLEY		
PART DESCRIPTION		
ROTATIONAL TILT - COMPONENT LAYOUT		
PART NO.	DATE	REV.
96-380-001	5-30-79	

DISPLAY BOARD

The Display Printed Circuit Board is a low voltage, 5 volt, solid state L.E.D. display array consisting of five levels of displayed information. The top four rows are scoring for each of four players with one point L.E.D. at each side; the right side L.E.D. indicates how many players are playing, the left side L.E.D. will show which player is up.

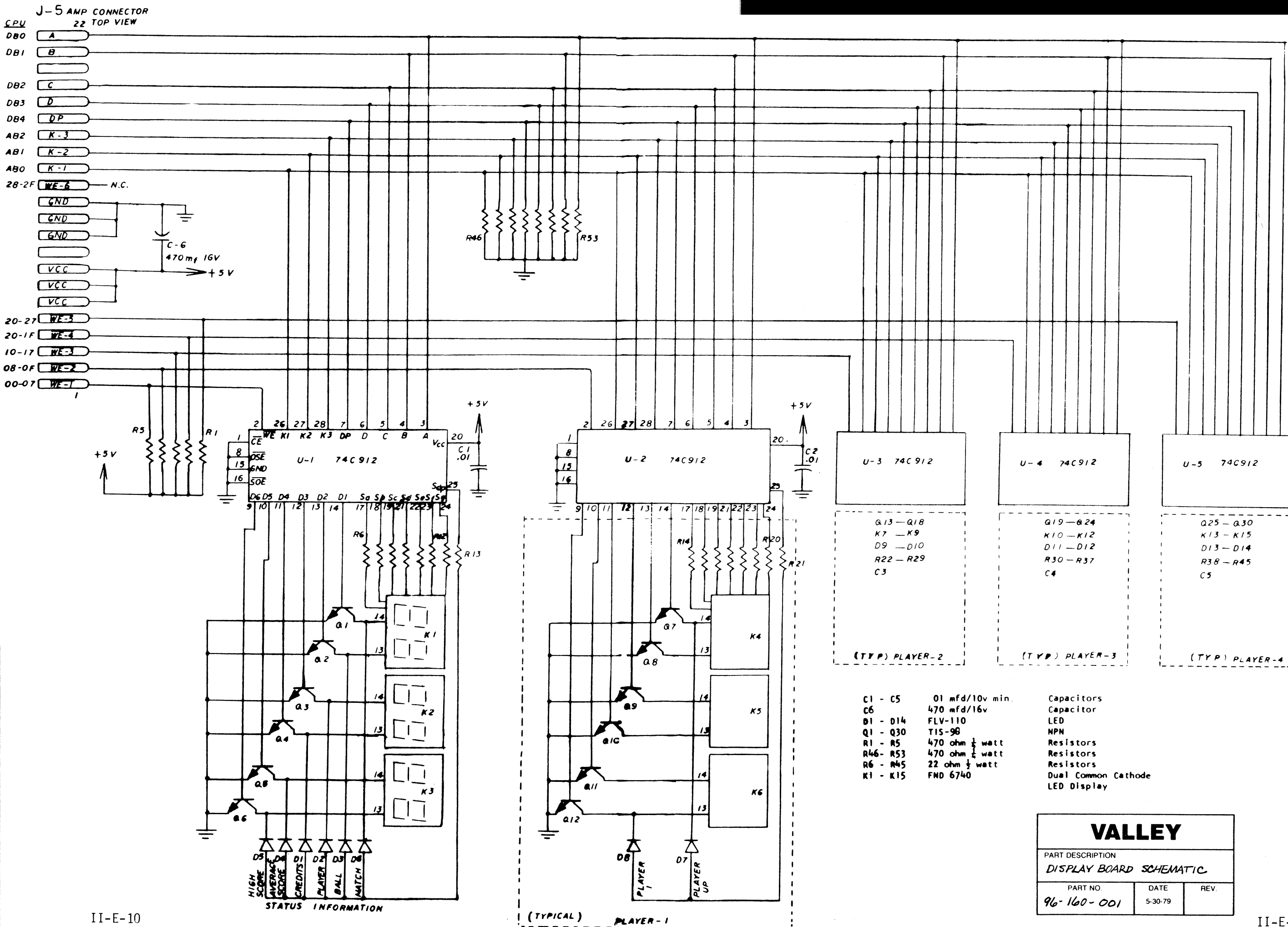
During a game the bottom row of six digits show; which ball is being played on digit one, the number of players playing on digit three, and credits on digits five and six.

When the game is over, the bottom row will alternately show; high score to date, average score of the last 10 games, number of credits and match point if so set on position sixteen of the set mode.

Cable connections are made by a 22 pin edge card connector at the bottom edge of the display.

DISPLAY BOARD

REQ'D	PART NO.	DESCRIPTION
1	96-160-001	DISPLAY BOARD SUB-ASSEMBLY
1	57-170-001	PC BOARD (ARI-9010)
5	67-035-001	CMOS DISPLAY DRIVER (74C912)
30	67-320-002	TRANSISTOR, NPN (TIS-98)
14	54-140-001	LED, RED (FLV-110)
15	54-200-001	LED DISPLAY, DUAL 7 SEG. (FND-6740)
5	14-064-000	CAPACITOR, DISC, .01MFD, 16v(10v MIN)
1	14-153-641	CAPACITOR, 470 MFD, 16v(6v MIN)
5	65-250-471	RESISTOR, 470r, $\frac{1}{4}$ W
40	65-500-220	RESISTOR, 22r, $\frac{1}{2}$ W
8	65-250-471	RESISTOR, 470r, $\frac{1}{4}$ W



DIODE BOARD SUB-ASSEMBLY

REQ'D	PART NO.	DESCRIPTION
1	96-170-001	DIODE BOARD SUB-ASSEMBLY
1	57-160-001	P.C. BOARD
10	*67-080-001	POWER DIODE, 1 AMP (IN 4001, 2, 3 or 4)
5	65-500-101	RESISTOR, 100r, $\frac{1}{2}$ W
2	20-040-001	CABLE TIE, NYLON
2	59-480-003	CLEAR PLASTIC COVER

DIODE ISOLATION PRINTED CIRCUIT BOARD

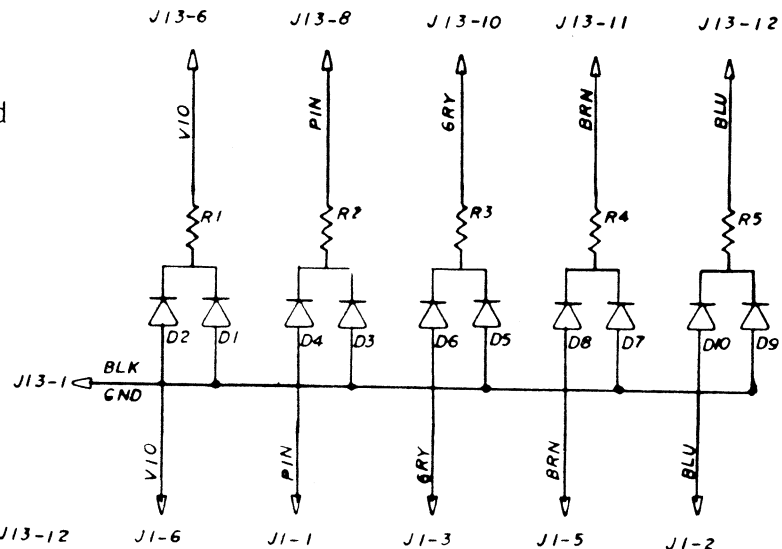
The Diode Isolation Board is located between the slip ring and CPU board in the cable harness.

The Isolation Board provides protection for the CPU by clamping the switch signals from the coin door to a ground reference. This is done with a resistor diode network for each of the six switch lines.

The Diode Printed Circuit Board is soldered in place and has a protective covering. It is not readily replaceable since it is part of the cable harness.

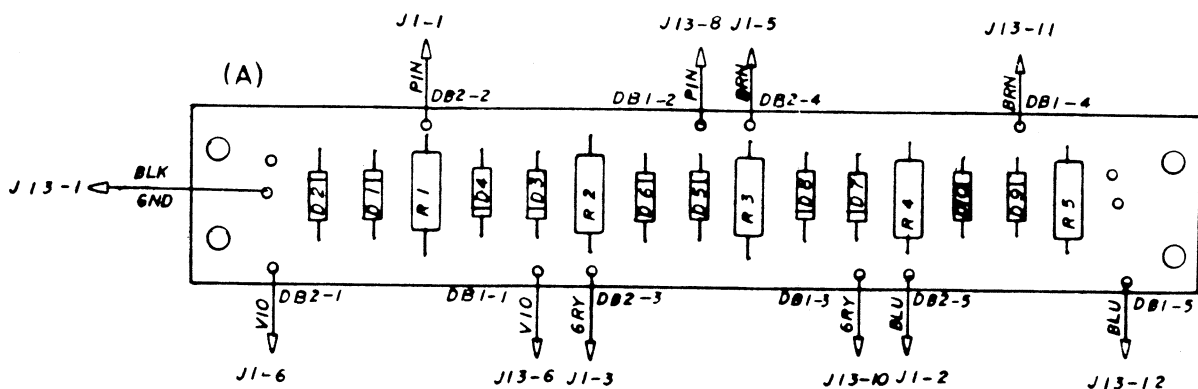
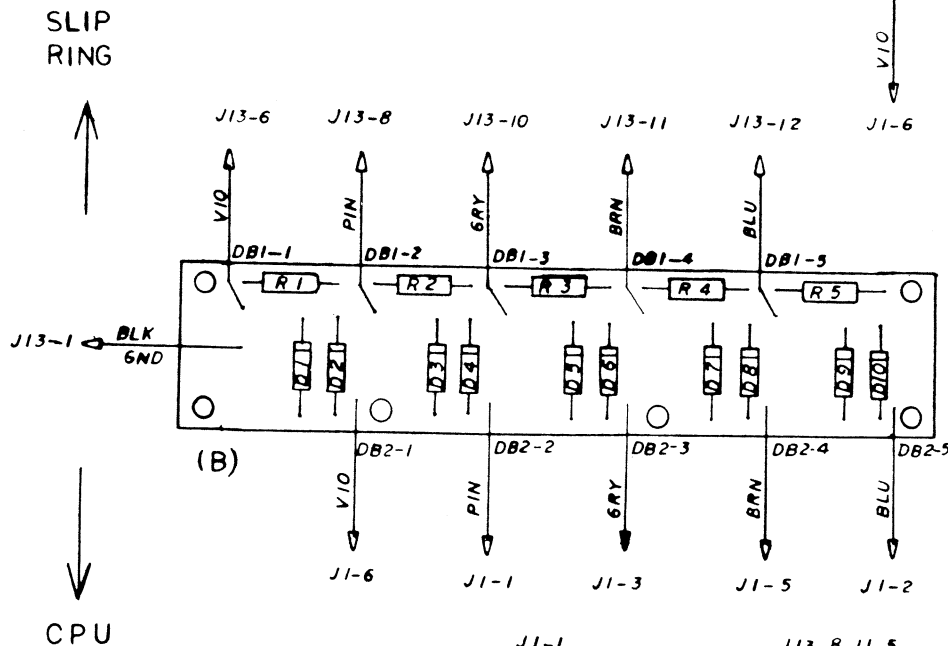
ALTERNATE

*67-080-002
67-080-003
67-080-004



NOTE:
D1 — D10 1N4001, 2, 3
R1 — R5 100Ω $\frac{1}{2}$ W

VALLEY		
PART DESCRIPTION DIODE BOARD SCHEMATIC & COMPONENT LAYOUT (VERSION A.B.)		
PART NO.	DATE	REV.
96-170-001	5-30-79	



POWER SUPPLY/VOLTAGE REGULATOR

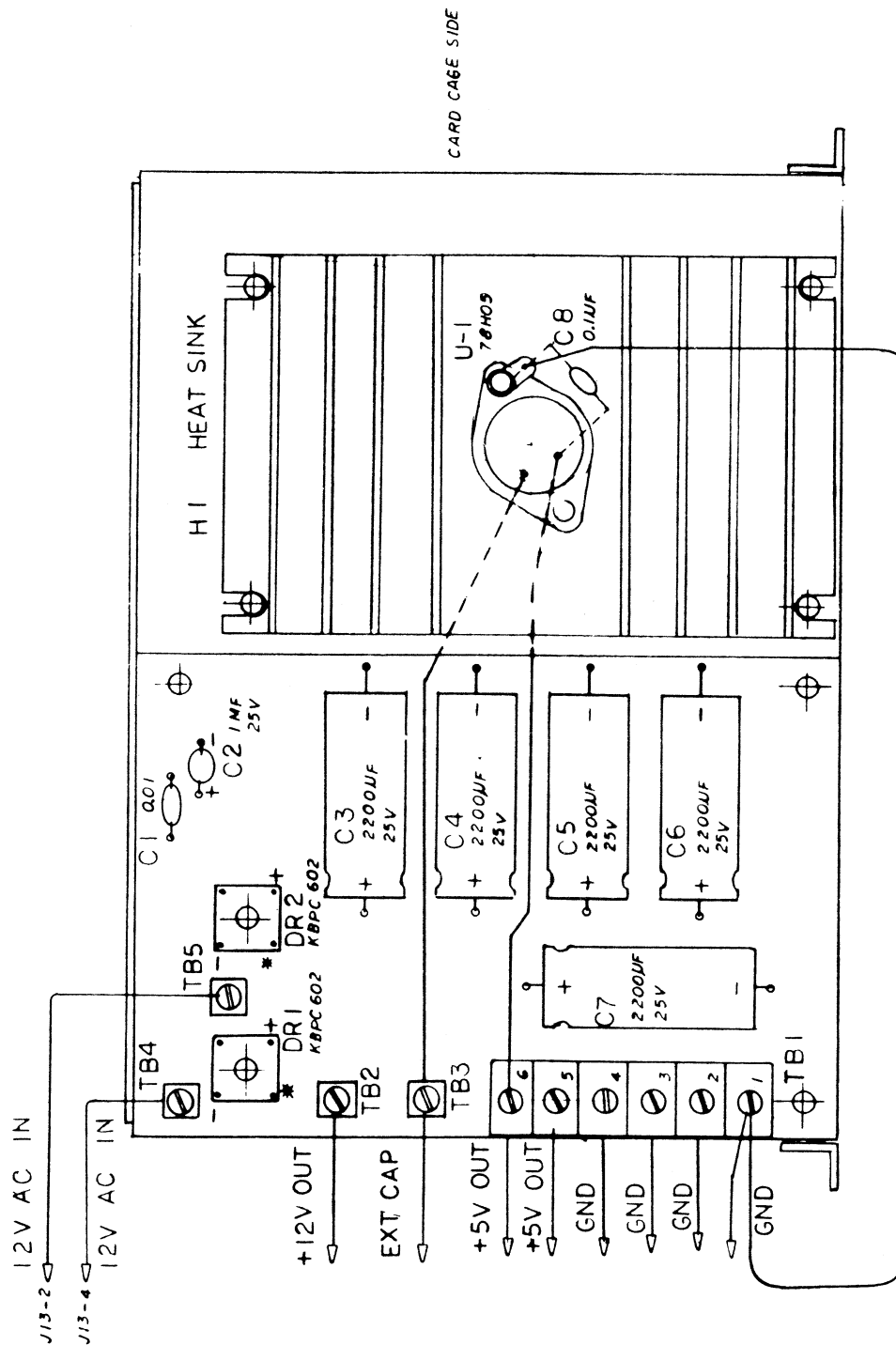
The Power Supply consists of a Printed Circuit Board on which is mounted filtering capacitors, two diode bridges and screw terminals for the interconnects. The regulator is mounted on a heat sink and wired to the Power Supply Printed Circuit Board. The regulator used is a 5 amp linear I.C.

The Power Supply assembly is mounted on the side of the card cage and uses the card cage as a heat sink. The two diode bridges on the Printed Circuit Board are also bolted to the card cage as a sink.

The inputs are 24VAC, center tapped for ground; outputs are two different +12VDC unregulated supplies and one +5VDC regulated supply.

POWER SUPPLY (REGULATOR) SUB-ASSEMBLY

REQ'D	PART NO.	DESCRIPTION
1	96-360-001	POWER SUPPLY SUB-ASSEMBLY
1	57-680-001	P.C.BOARD (ARI 9060)
1	67-540-100	REGULATOR 5v 5 AMP (78H05)
2	67-085-001	DIODE-BRIDGE, 6A, 50v (KBPC-602)
1	#1 14-204-000	CAPACITOR, .01 MFD, 50v (25v MIN.)
1	14-151-001	CAPACITOR, 1 MFD, 50v (25v MIN)
5	14-154-320	CAPACITOR, 2200MFD 25v (25v MIN)
1	14-205-001	CAPACITOR, 1MFD., 50v(25vMIN)
1	17-850-003	TERMINAL, 6 POSITION, SCREW
4	17-850-002	TERMINAL, 1 POSITION, SCREW
1	28-400-002	HEAT SINK (WAKEFIELD 421A)
1	94-320-003	WIRE HARNESS
10	20-500-006	BOLT, 6-32x $\frac{1}{4}$ "
3	28-750-001	SPACERS, 6-32x3/4, METAL THREADED
8	20-300-004	NUTS, 6-32
2	20-500-005	BOLT, 6-32x 3/8"
2	20-500-004	BOLT, 6-32 x $\frac{1}{2}$ "
	#1 14-064-010	ALTERNATE .01 MFD 50v DISC



*- BOTTOM OF PCB

VALLEY

PART DESCRIPTION

POWER SUPPLY-COMPONENT LAYOUT

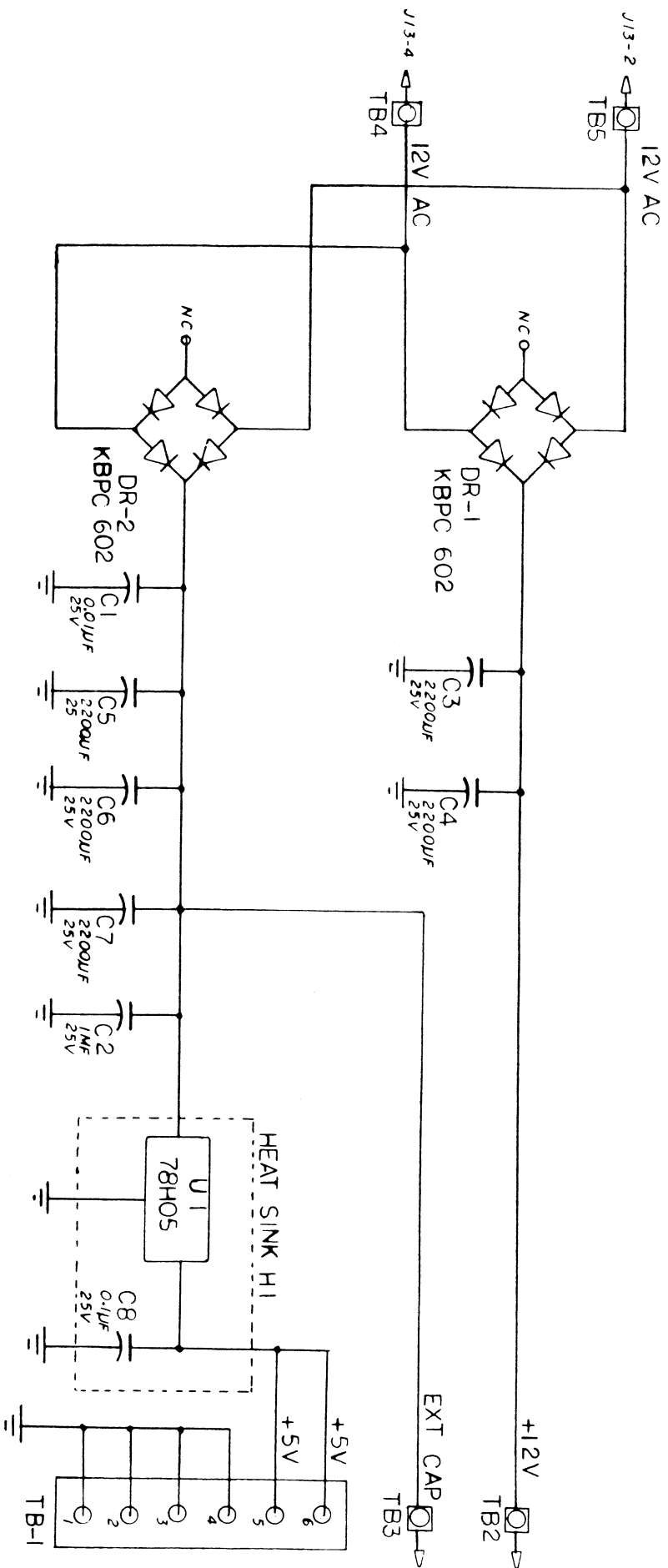
PART NO.

PART NO.
96-360-001

DATE _____

DATE 5-30-79

REV.



VALLEY			
PART DESCRIPTION			
POWER SUPPLY SCHEMATIC			
PART NO.	DATE	REV.	
96-360-001	5-30-79		

MICRO PROCESSOR (CPU)

The CPU Printed Circuit Board, located in the card cage, is the controlling element in this unit. It consists of a central processing unit (6503), a RAM I/O timer (6532), three Read Only Memories (82S181's) and two Read and Write Memories (5101's). The rest of the I.C.'s on this board are for interface and a support function.

The three ROMs (82S181's) contain the program which determines how the CPU (6503) controls the rest of the system. The RIOT (6532) supplies the I/O ports and timing necessary for the interface functions. The two RAMs (5101's) are battery backed for non destructive memory and acts as a scratch pad for such things as scoring and the playing limits which are set through the coin door board. The RAMs are also used for storage of such information as number of coins through machine, number

of games played, free credits, times high score has been beaten and number of tilts. These last items are not changed through the coin door during the set mode. They can be changed only by a procedure which requires special technique.

Requirements are +5VDC for power and 24 VAC for timing function.

Playfield switches are scanned for any closures and the proper action is taken by the CPU when this happens, which generates information to be transmitted to the Lamp Driver, Solenoid Driver/Audio and Display Boards.

Interconnects are made from the CPU board to the rest of the system by three 22 pin edge card connectors and one 10 pin edge connector.

CPU SUB-ASSEMBLY

REQ'D PART NO. DESCRIPTION

1	96-120-001	CPU SUB-ASSEMBLY	1	65-250-335	RESISTOR, 3.3M, $\frac{1}{2}W$
1	57-140-001	P.C. BOARD (ARI-9040)	1	65-250-154	RESISTOR, 150K, $\frac{1}{2}W$
1	67-160-021	RAM I/O TIMER (6532)	1	65-250-187	RESISTOR, 180K, $\frac{1}{2}W$
1	67-160-020	CPU (6503) *	1	65-250-103	RESISTOR, 10Kr, $\frac{1}{4}W$
3	67-160-005	PROMS (82S181)	4	14-204-000	CAPACITOR, .01MFD, 16v (6v MIN)
2	67-035-003	CMOS RAM (5101-INTEL or NEC)	11	14-205-000	CAPACITOR, .1MFD, 100v (6v MIN)
2	67-420-138	1 to 8 LINE DECODER (74LS138)	1	14-205-320	CAPACITOR, .22 MFD, 100v (6v MIN)
1	67-030-093	CMOS QUAD 2 INPUT NAND (4093-RCH ONLY)	1	14-061-320	CAPACITOR, 22 PFD, 16v (6v MIN)
1	67-030-098	CMOS DUAL ONE SHOT (4098 BE)	3	14-151-320	CAPACITOR, 2.2 MFD 25v TANT (6vMIN)
2	67-160-004	HEX BUFFER (8T97)	1	14-151-320	CAPACITOR, 2.2 MFD, 25v TANT. (6v MIN)
2	67-420-032	QUAD 2 INPUT OR (74LS32)	2	14-153-642	CAPACITOR, 470 MFD 16v (6v MIN)
4	67-030-051	CMOS 8 CHANNEL MUX. (4051)	1	14-153-000	CAPACITOR, 100 MFD, 35v (20v MIN)
1	67-420-000	QUAD 2 INPUT NAND (74LS00)	7	92-400-010	JUMPER, 1.0", WHITE
1	67-080-751	DIODE, 5.1v FENER, 500 MW (IN751A)	1	92-400-008	JUMPER, .8", BLUE
4	67-080-003	DIODE, POWER, 1A (INV001, 2, 3 or 4)	4	92-400-004	JUMPER, .4", WHITE
1	65-500-680	RESISTOR, 68r, $\frac{1}{2}W$	9	92-400-006	JUMPER, .6", ORANGE
1	65-500-221	RESISTOR, 220r, $\frac{1}{2}W$	3	17-800-500	SOCKET -24 PIN
1	65-250-103	RESISTOR, 10Kr, $\frac{1}{4}W$	1	17-800-600	SOCKET -28 PIN
2	65-250-104	RESISTOR, 100Kr, $\frac{1}{4}W$	1	17-800-700	SOCKET -40 PIN
1	65-250-224	RESISTOR, 220Kr, $\frac{1}{4}W$	3	09-600-001	BATTERIES, NICAD-1.2v
1	65-250-222	RESISTOR, 2.2Kr, $\frac{1}{4}W$	1	67-030-011	CMOS QUAD 2 INPUT NAND (4011)
4	65-250-472	RESISTOR, 4.7Kr, $\frac{1}{4}W$			
9	65-250-473	RESISTOR, 47Kr, $\frac{1}{4}W$			

II-

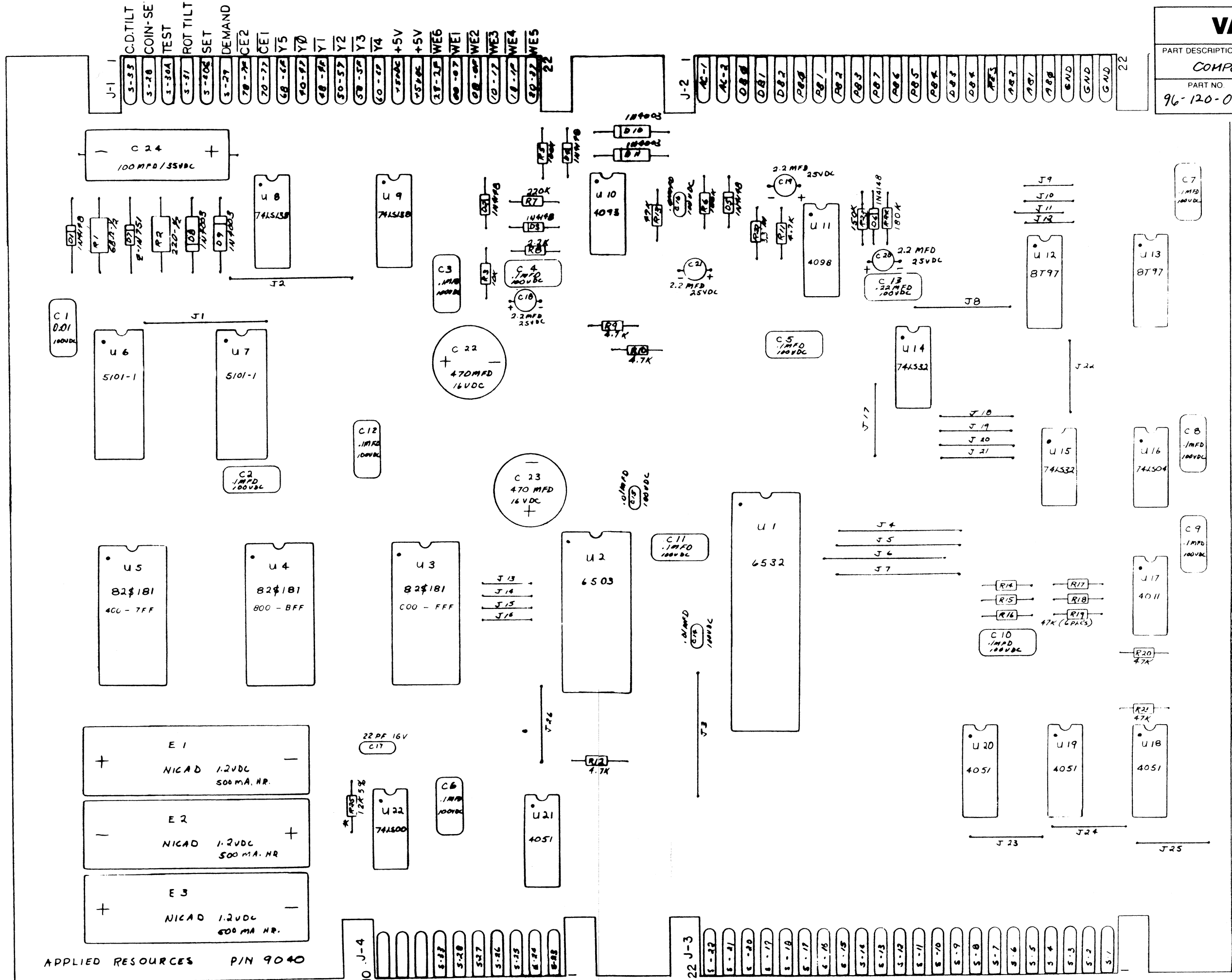
*FOR REPLACEMENT, SUPPLY COMPLETE DATA FROM LABEL.

II-H-17

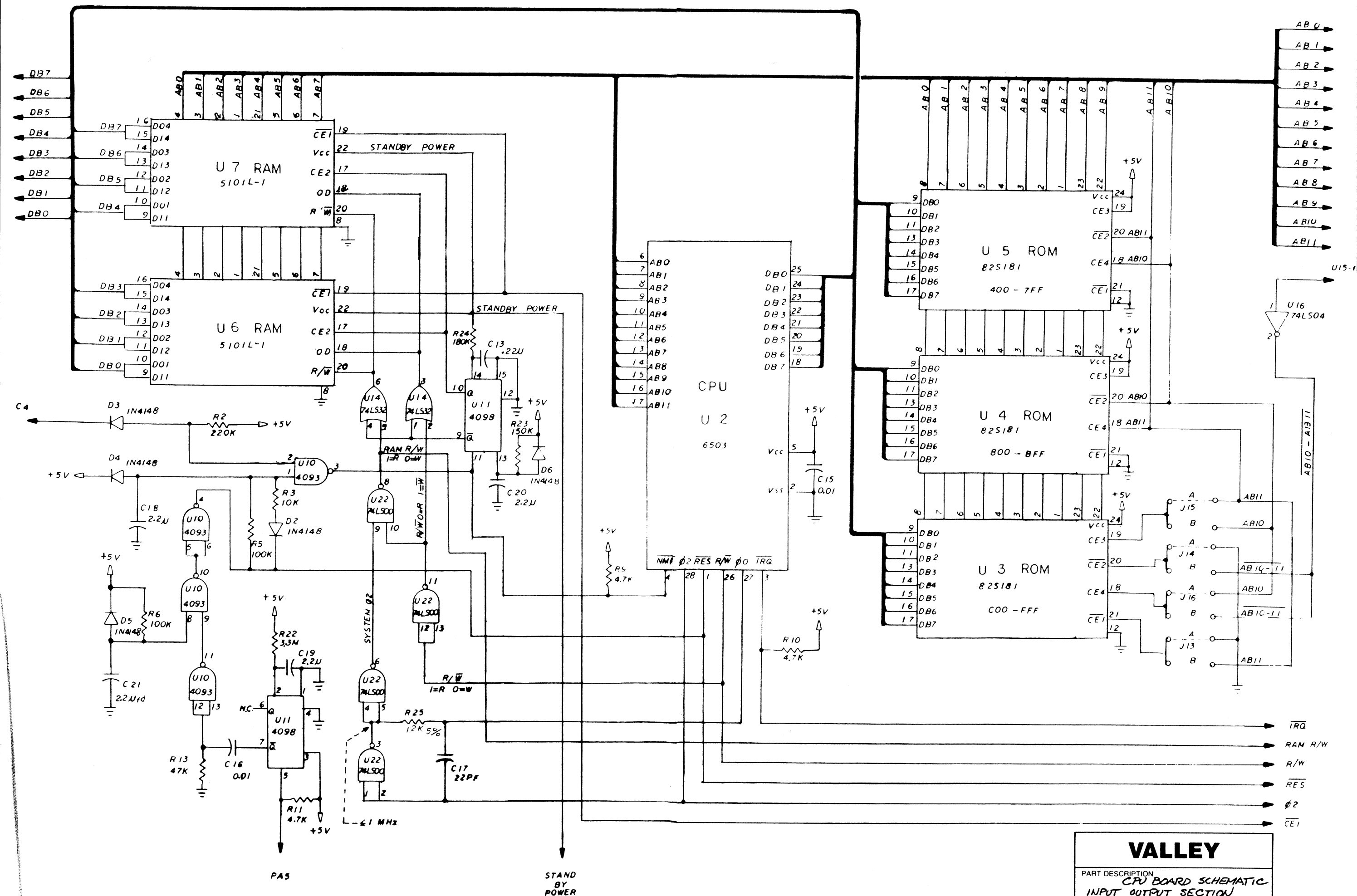
VALLEY

PART DESCRIPTION CPU BOARD
COMPONENT LAYOUT

PART NO. 96-120-001 DATE 5-30-79 REV.



APPLIED RESOURCES PIN 9040



VALLEY		
PART DESCRIPTION CPU BOARD SCHEMATIC INPUT OUTPUT SECTION		
PART NO.	DATE	REV.
96-120-001	5-30-79	

J-4
10

TOP VIEW

J-3
22

TOP VIEW

-H-22

VALLEY		
PART DESCRIPTION		
CPU BOARD SCHEMATIC		
CPU & MEMORY SECTION		
PART NO.	DATE	REV.
96-120-001	5-30-79	

J-1 TOP VIEW

S-33 C.O. TILT
S-28 COIN-SET
S-30A TEST
S-31 ROT TILT
S-30C SET
S-29 DEMAND

78-7F CE2
70-77 CE1
68-6F Y5
40-47 Y0
48-4F Y1
50-57 Y2
58-5F Y3
60-67 Y4
+5VDC +5V
+5VDC +5V
78-2F WE6
00-07 WE1
08-0F WE2
10-17 WE3
18-1F WE4
20-77 WE5

AC 1 12V
AC 2 12V

AC-1
AC-2

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SOLENOID/AUDIO

The Solenoid Driver and Audio Printed Circuit Board is located in the card cage and is really two different distinct circuits.

The Solenoids are driven by one of two 8 bit latches through SE 9301 transistors. The 8 bit latches (NE 591's) are addressed by the CPU board which causes the solenoids to turn on and off at the proper time.

Audio for the system is generated by a sound I.C. (76477). The different tones are a function of the commands from the

CPU board as decoded by the 76477 and the 74C14 I.C.. Tone range can be adjusted by the 5k ohm tone Pot located in the Audio section. Volume can also be adjusted by a 5k ohm Pot also located at the edge of the Audio section.

Power requirements are +40DC, +12DC and +5VDC.

The interconnections are made through one 10 pin edge card connector, one 15 pin edge card connector and one 22 pin edge card connector.

SOLENOID DRIVER/AUDIO SUB-ASSEMBLY

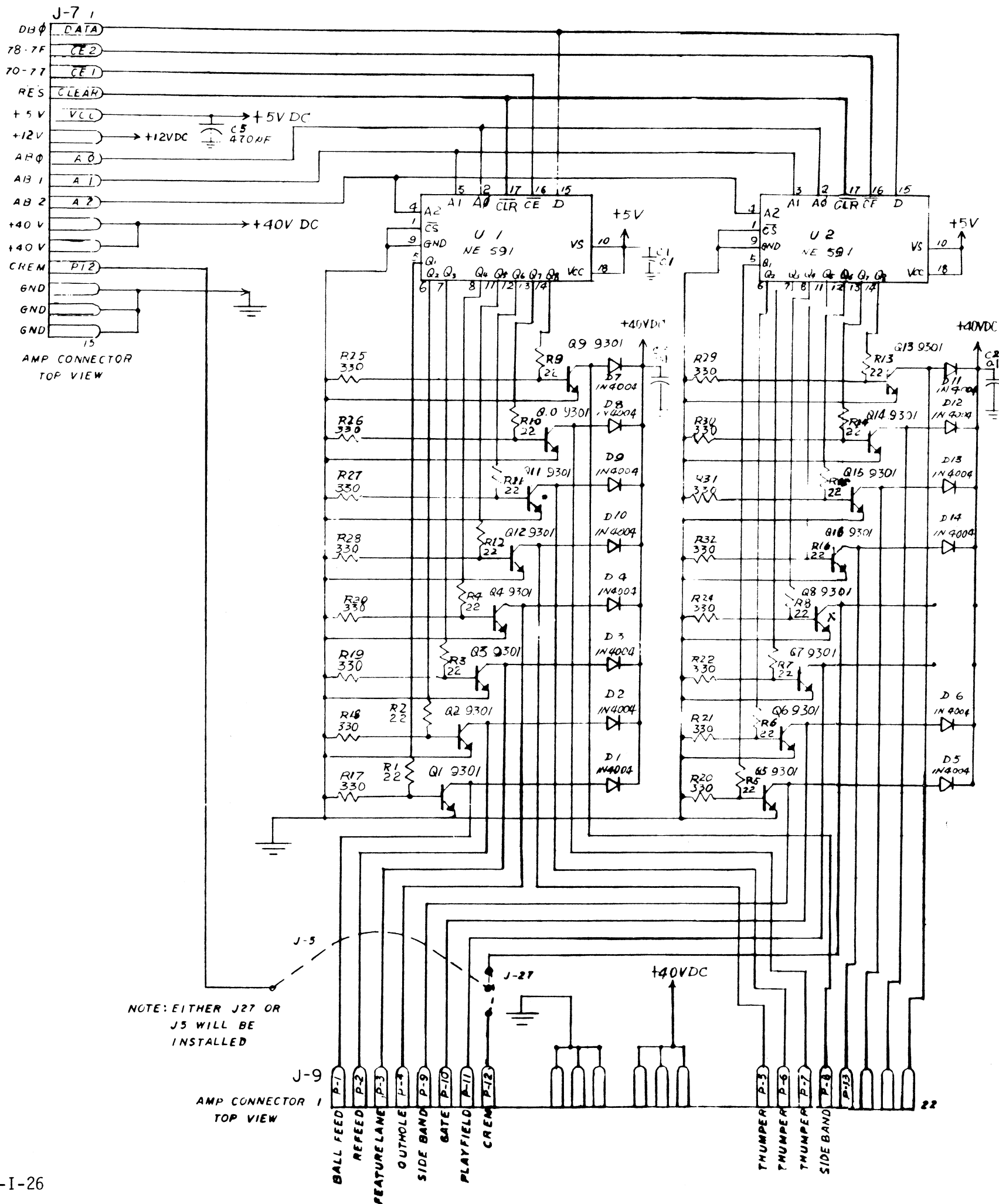
REQ'D PART NO. DESCRIPTION

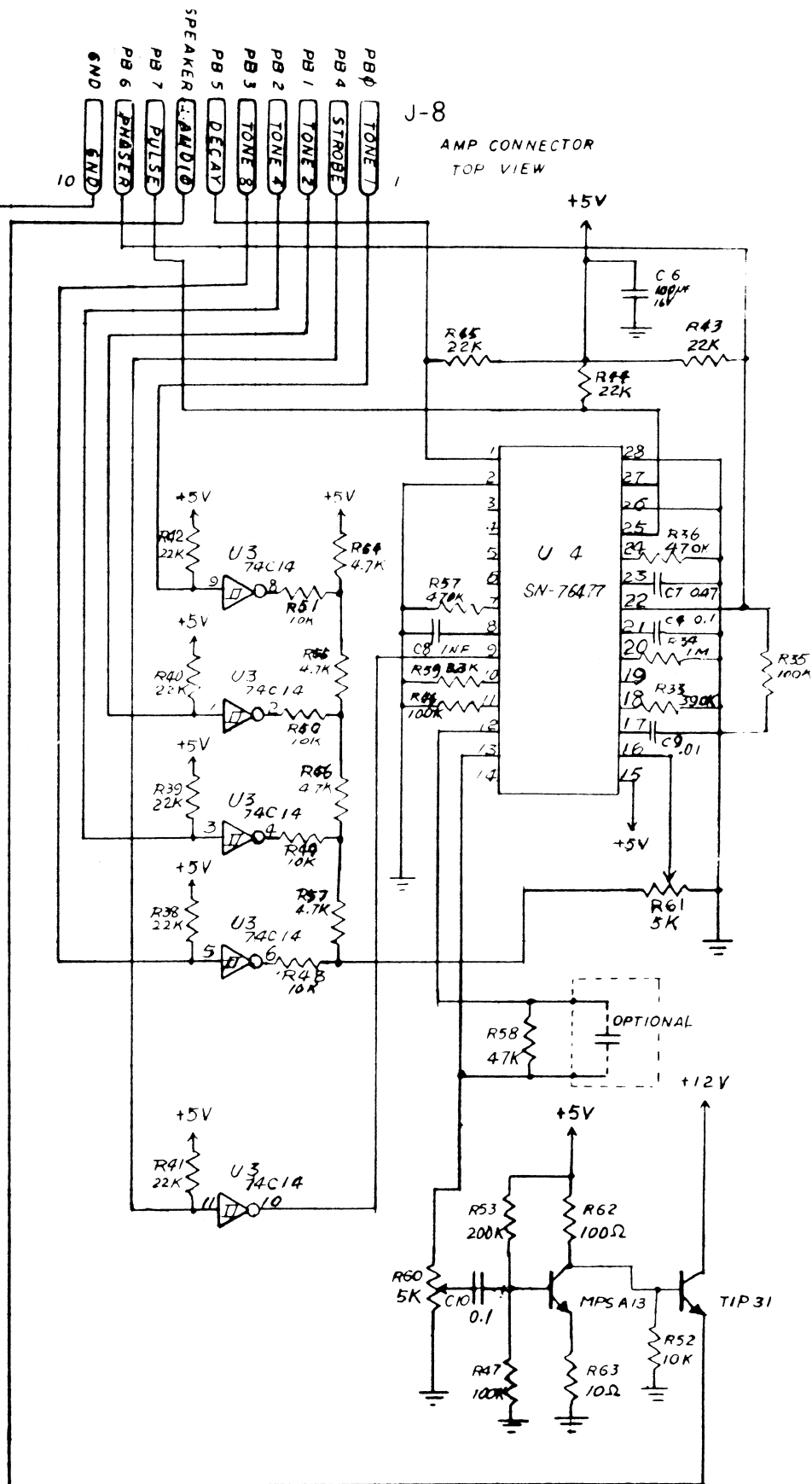
1	96-420-001	SOLENOID DRIVER/AUDIO SUB-ASSEMBLY
1	57-760-001	P.C.BOARD (ARI-9030)
2	67-160-002	8 BIT ADDRESSABLE LATCH (NE591)
1	67-035-002	CMOS HEX SCHMITT BUFFER (74614N)
1	67-160-001	T.I.SOUND GENERATOR (SN76477)
14	67-080-003	POWER DIODE (IN4001,2,3 or 4) *
16	67-320-003	TRANSISTOR, N.P.N. (SE9301)
1	67-320-001	TRANSISTOR, NPN (TIP31)
16	65-600-220	RESISTOR, 22 or 1/2W
16	65-500-331	" ,330r 1/2W
1	65-250-394	" ,390Kr 1/4W
1	65-250-105	" ,1M 1/4W
3	65-250-104	" ,100K 1/4W
2	65-250-474	" ,470K 1/4W
8	65-250-223	" ,22K 1/4W
5	65-250-103	" ,10K 1/4W
1	65-250-201	" ,200K 1/4W
4	65-250-472	" ,4.7K 1/4W
1	65-250-473	" ,4.7K 1/4W
1	65-250-332	" ,3.3K 1/4W
1	65-100-001	POTENTIOMETER, 5K-1/4W
1	65-250-101	RESISTOR, 100r 1/4W
1	65-250-100	RESISTOR, 10r 1/4W
1	65-100-002	POTENTIOMETER, 5K-1/4W UPRIGHT

1	14-065-000	*CAPACITOR, .1MFD. 16v (6v MIN)
3	14-205-000	CAPACITOR, .1MFD. 100v (50v MIN)
2	14-153-641	CAPACITOR, 470 MFD. 16v (6v MIN)
1	14-205-640	CAPACITOR, .47 MFD. 250v (6v MIN)
1	14-151-000	CAPACITOR, 1 MFD, 16v (6v MIN)
1	14-064-000	CAPACITOR, .01 MFD 16v (6v MIN)
1	14-205-000	CAPACITOR, .1 MFD 100v (10v MIN)
1	28-100-001	HEAT SINK
4	92-400-034	JUMPER, 3.4", GREEN
1	92-400-018	JUMPER, 1.8", ORANGE
2	92-400-016	JUMPER, 1.6", BLUE
1	92-400-014	JUMPER, 1.4", WHITE
6	92-400-012	JUMPER, 1.2", BLACK
2	92-400-010	JUMPER, 1.0", WHITE
5	92-400-008	JUMPER, .8", BLUE
4	92-400-006	JUMPER, .6", ORANGE
2	92-400-004	JUMPER, .4", WHITE
17	20-380-001	POP RIVETS, COPPER

*ALT=67-080-001,002,004

*ALT=14-064-000 .01 MFD,16v





VALLEY

PART DESCRIPTION

SOLENOID DRIVER/AUDIO SCHEMATIC

PART NO.

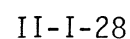
96-420-001

DATE

5-30-79

REV

II-I-27



LAMP DRIVER PRINTED CIRCUIT BOARD

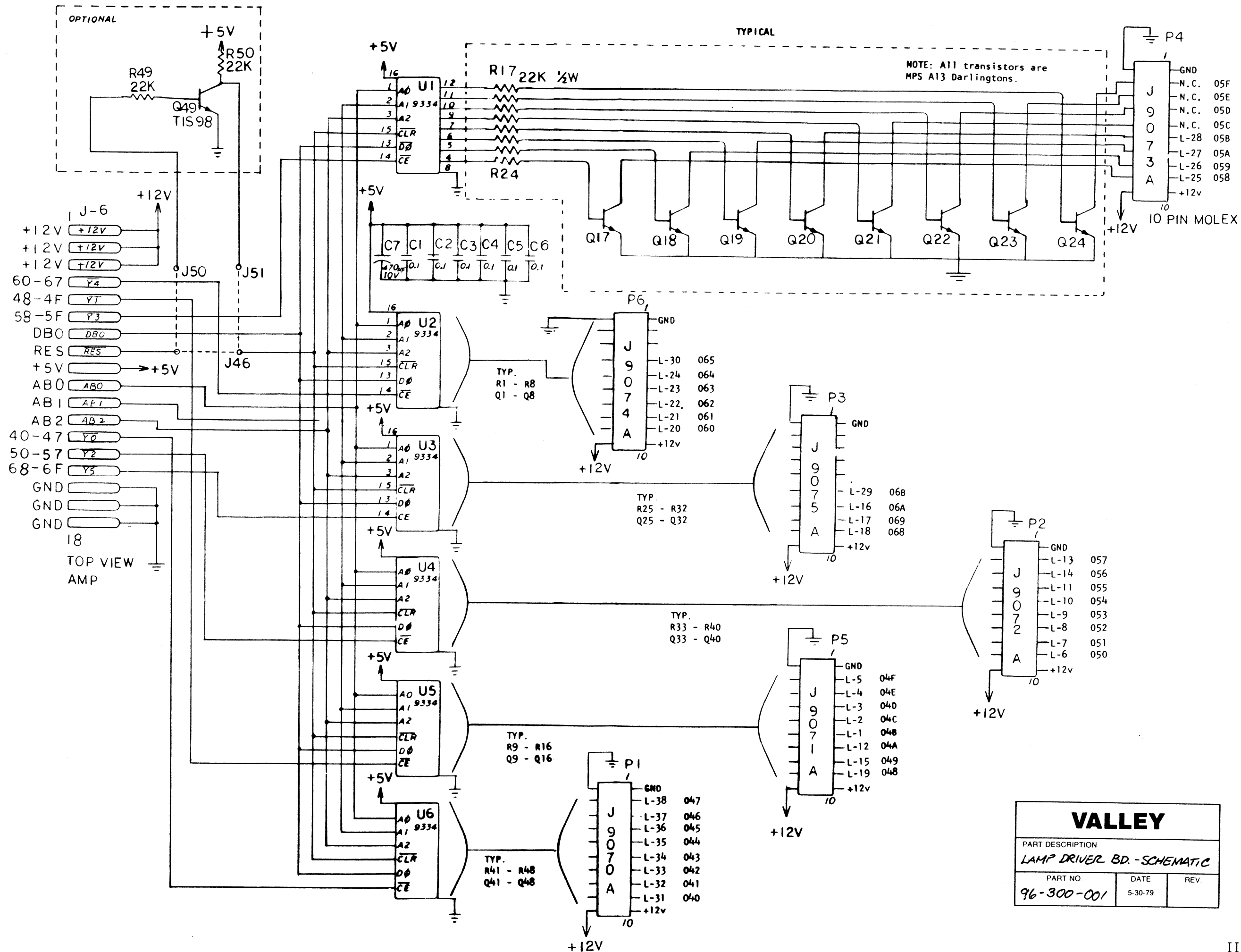
The Lamp Driver Printed Circuit Board, which is located in the card cage, is used to decode the CPU control signals and cause the correct light to come on at the proper time.

This is done with six 9334's, 8 bit latches. Each Lamp Holder Printed Circuit Board has one 9334 which is used to turn on the respective boards lights on and off. Drive capability is furnished to each light by a MPSA 13 transistor. Interconnects to the Printed Circuit Board are made through one 18 pin edge card connector. Interconnections are made from the Lamp Driver Printed Circuit Board to each of the six Lamp Holder Printed Circuit Boards through the use of six 10 pin-pin and post connectors.

Power requirement is +5VDC also +12VDC is distributed from the Lamp Driver Printed Circuit Board to the lamp holders but not used on the Lamp Driver itself.

LAMP DRIVER BOARD ASSEMBLY

REQ'D	PART NO.	DESCRIPTION
1	96-300-001	LAMP DRIVER BOARD ASSEMBLY
1	57-520-001	P.C.BOARD (ARI9020)
6	67-360-259	8 BIT ADDRESSABLE LATCH (9334)
48	67-320-001	TRANSISTOR-NPN DERLINGTON (MPSA13)
48	65-250-223	RESISTOR, 22Kr, $\frac{1}{4}$ W
6	14-065-001	CAPACITOR, .1MFD, 16v (6vMIN)
1	14-153-640	CAPACITOR, .470 MFD 50v (6vMIN)
6	17-200-001	CONNECTOR, 10 PIN MOLEX
23	92-400-018	JUMPER, 1.8 ORANGE
5	92-400-016	" , 1.6 BLUE
7	92-400-014	" , 1.4 WHITE
3	92-400-012	" , 1.2 BLACK
1	92-400-010	" , 1.0 WHITE
1	92-400-008	" , .8 BLUE
5	92-400-006	" , .6 ORANGE
3	92-400-004	" , .4 WHITE



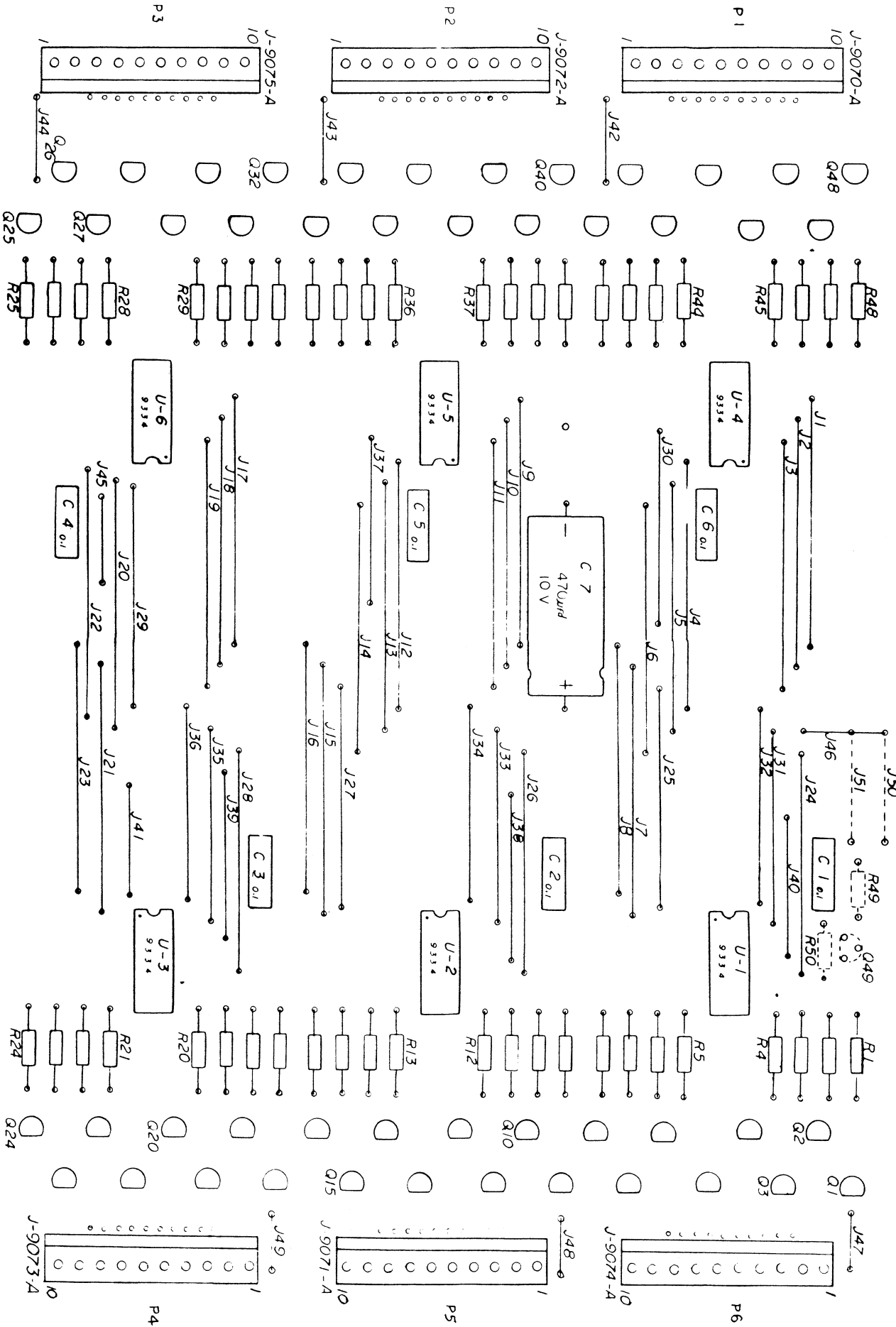
VALLEY		
PART DESCRIPTION		
LAMP DRIVER BD. - SCHEMATIC		
PART NO.	DATE	REV.
96-300-001	5-30-79	

VALLEY

PART DESCRIPTION		
AMP DRIVE BOARD -		
COMPONENT LAYOUT		
PART NO	DATE	REV
96-300-001	5-30-79	

18	GND	GND
	GND	GND
	GND	GND
	Y5	68-6F
	Y2	50-57
	Y0	40-47
	A2	AB2
	A1	AB1
	A0	AB0
	+5V	Vcc
	RES	RES
	DB0	DB0
	Y3	58-5F
	Y1	48-4F
	Y4	50-67
	+12V	+12V
	+12V	+12V
	+12V	+12V

J-6 TOP VIEW AMP



LAMP HOLDER PRINTED CIRCUIT BOARDS

The playfield playing lights are held in six different Lamp Holder Printed Circuit Boards. Each light is held in place with a base mount, self locking lamp holder.

The Lamp Holder Printed Circuit Boards are mounted to the playfield and the interconnects are made through a 10 pin

edge card connector on each printed circuit board.

Power requirements are +12VDC.

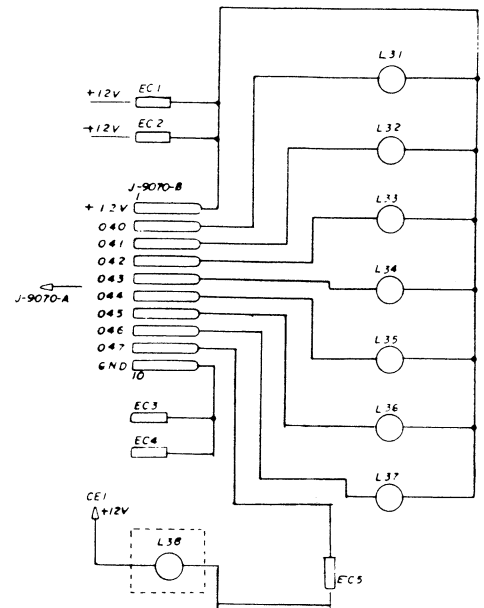
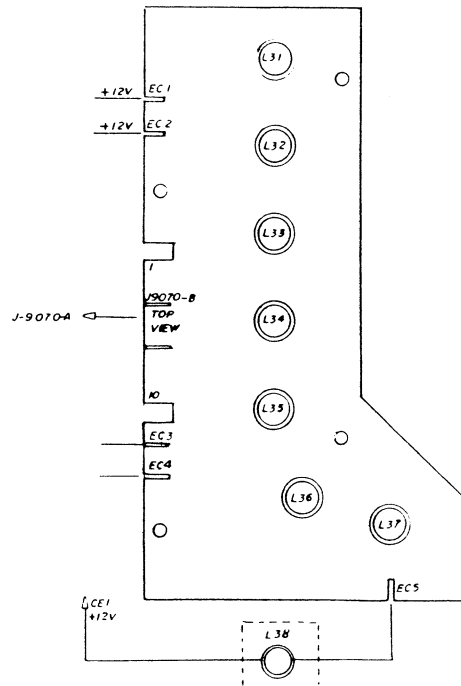
All lamps used thru out the machine are number 194; common automotive style.

LAMP BOARD ASSEMBLY

ITEM	REFERENCE DESIGNATION	DESCRIPTION
1	L31-L37	LAMP AND HOLDERS (12V GE 194 RC)

LAMP BOARD SUB-ASSEMBLY LOWER KICKOUT

REQ'D	PART NO.	DESCRIPTION
1	96-305-001	LAMP BOARD, LOWER KICKOUT
1	57-525-001	P.C. BOARD (ARI -9070)
6	28-420-001	HOLDER-BULB
6	54-300-001	LIGHT BULB G.E.#194



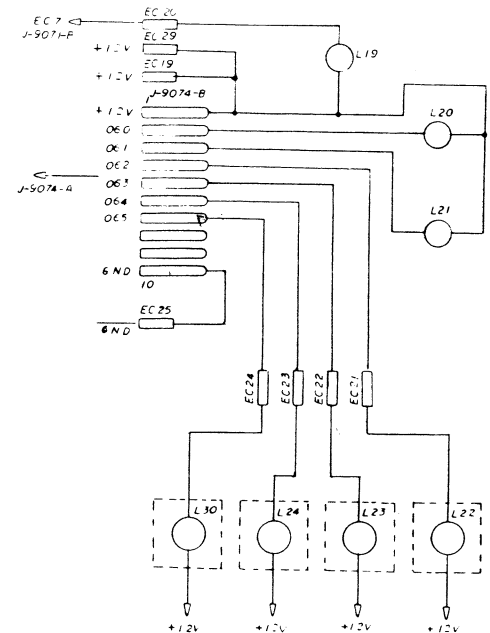
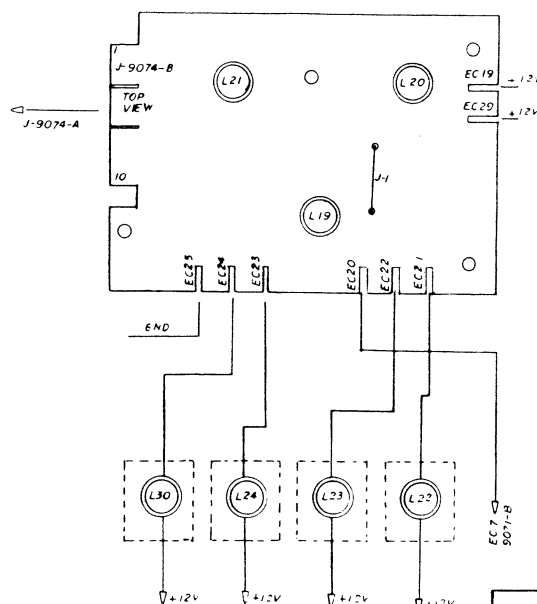
VALLEY		
PART DESCRIPTION LAMP BOARD		
COMPONENT LAYOUT		
PART NO.	DATE	REV
96-305-001	5-30-79	

LAMP BOARD ASSEMBLY

ITEM	REFERENCE DESIGNATION	DESCRIPTION
1	L19-L21	LAMP AND HOLDERS (12V GE 194 RC)
2	J1	JUMPER, .8" BLUE

LAMP BOARD - ROLLOVER SUB. ASSEMBLY

REQ'D	PART NO.	DESCRIPTION
1	96-305-002	LAMP BOARD - ROLLOVER SUB. ASSEMBLY
1	57-525-002	P.C. BOARD ARI-9074
3	28-420-001	HOLDER, BULB
3	54-300-001	LIGHT BULB-GE #194
1	02-400-008	JUMPER, 8", BLUE



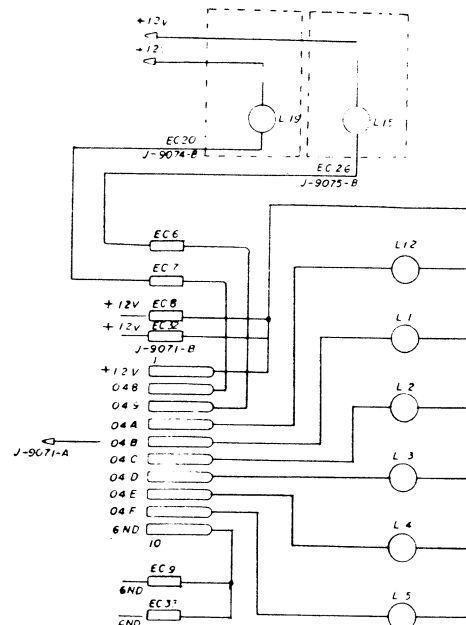
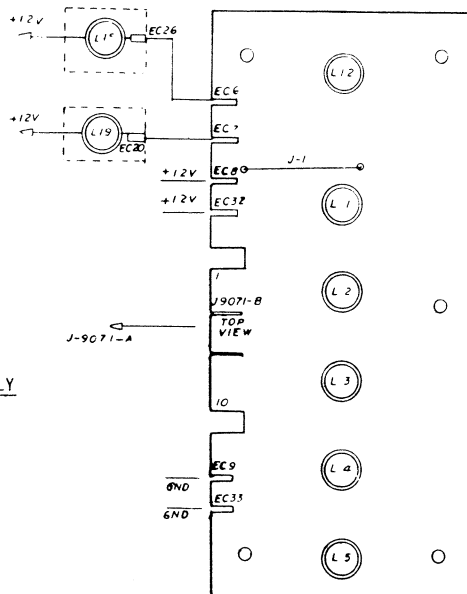
VALLEY		
PART DESCRIPTION LAMP BOARD		
ROLLOVER SUB ASSEMBLY		
PART NO.	DATE	REV
96-305-002	5-30-79	

LAMP BOARD ASSEMBLY

ITEM	REFERENCE DESIGNATION	DESCRIPTION
1	L1-L5, L12	LAMP HOLDERS (12V GE 194 RC)
2	J-1	JUMPER, 1.4" WHITE

LAMP BOARD BOTTOM BONUS LANE SUB-ASSEMBLY

REQ'D	PART NO.	DESCRIPTION
1	96-305-003	LAMP BOARD BOTTOM BONUS LANE
1	57-525-003	P.C. BOARD (ARI-9011)
6	28-420-001	HOLDER BULB
6	54-300-001	LIGHT BULB G.E.#194
1	92-400-014	JUMPER, 1.4" WHITE



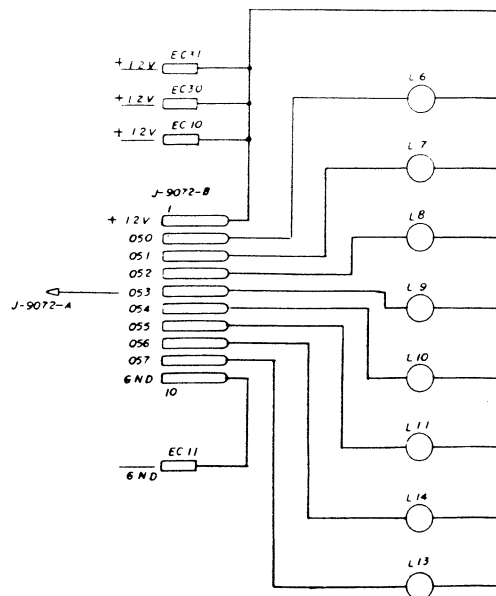
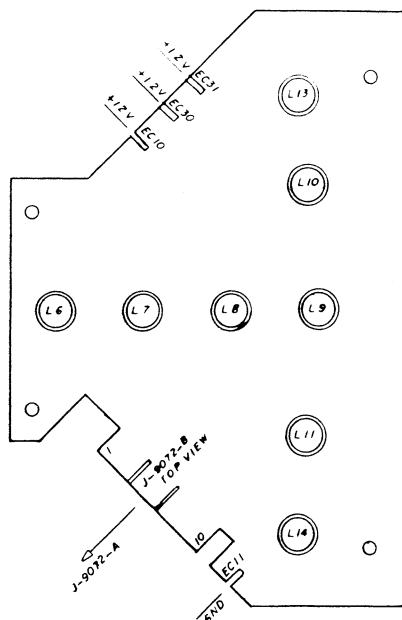
VALLEY		
PART DESCRIPTION LAMP BOARD BOTTOM BONUS LANE		
PART NO 96-305-003	DATE 5-30-79	REV.

LAMP BOARD ASSEMBLY

ITEM	REFERENCE DESIGNATION	DESCRIPTION
1	L6-L14	LAMP AND HOLDERS (12V GE 194 RC)

LAMP BOARD SUB ASSEMBLY TOP BONUS LANE

REQ'D	PART NO.	DESCRIPTION
1	96-305-004	LAMP BOARD SUB ASSEMBLY TOP BONUS LANE
1	57-525-004	P.C. BOARD ARI-9072
8	28-420-001	HOLDER, BULB
8	54-300-001	LIGHT BULB GE #194



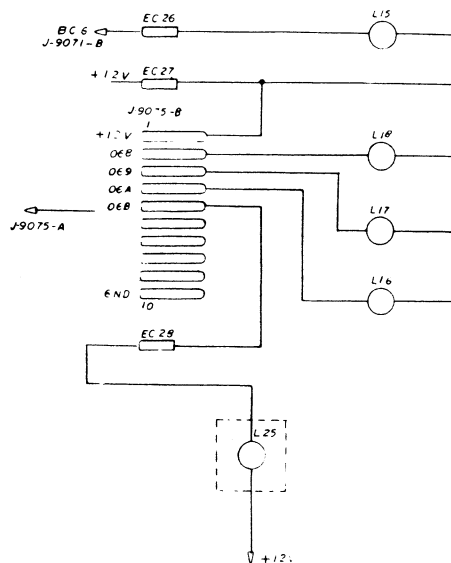
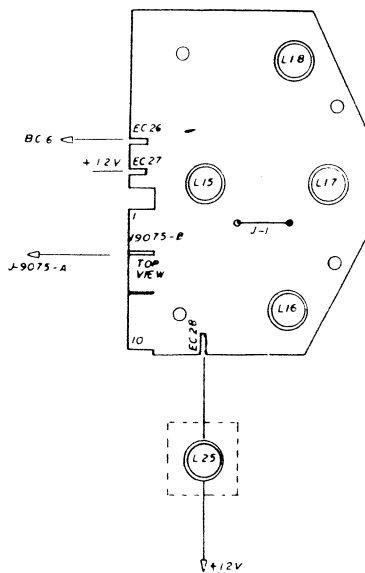
VALLEY		
PART DESCRIPTION LAMP BOARD SUB ASS'Y TOP BONUS LANE		
PART NO 96-305-004	DATE 5-30-79	REV.

LAMP BOARD ASSEMBLY

ITEM	REFERENCE DESIGNATION	DESCRIPTION
1	L26-L28	LAMP AND HOLDERS (12V GE 194 RC)
2	J1-J3	JUMPER, .6" ORANGE

LAMP BOARD-REFEED SUB-ASSEMBLY

REQ'D	PART NO.	DESCRIPTION
1	96-305-005	LAMP BOARD - REFEED SUB-ASSEMBLY
1	57-525-005	P.C.BOARD (ARI 9073)
3	28-420-001	HOLDER-BULB
3	54-300-001	LIGHT BULB G.E.#194
3	92-400-006	JUMPER, .6" ORANGE



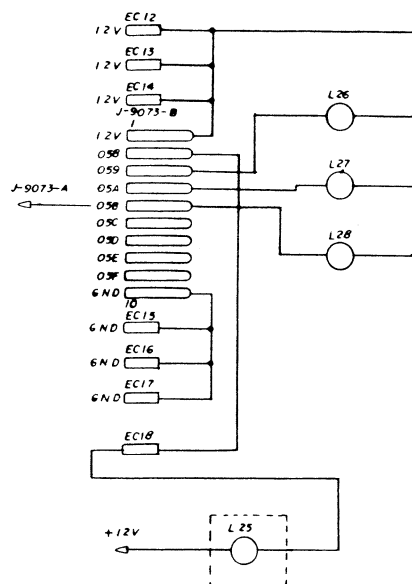
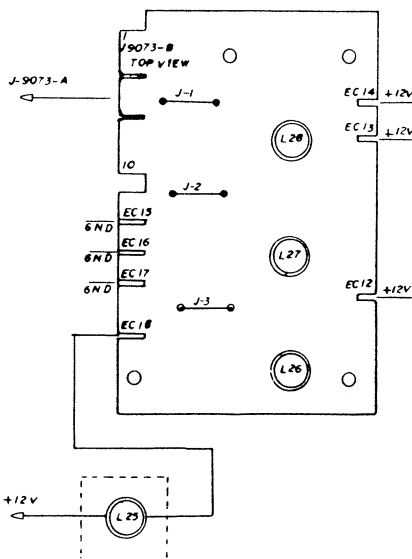
VALLEY		
PART DESCRIPTION COMPONENT LAY'OUT & SCHEMATIC		
PART NO.	DATE	REV.
96-305-005	5-30-79	

LAMP BOARD ASSEMBLY

ITEM	REFERENCE DESIGNATION	DESCRIPTION
1	L15-L18	LAMP AND HOLDERS (12V GE 194 RC)
2	J1	JUMPER, .6" ORANGE

LAMP BOARD - CENTER CAPTURE BALL

REQ'D	PART NO.	DESCRIPTION
1	96-305-006	LAMP BOARD ASSEMBLY CAPTURE BALL AREA
1	57-525-006	P.C.BOARD ARI-9075
4	28-420-001	HOLDER BULB
4	54-300-001	LIGHT BULB GE#194
1	92-400-006	JUMPER, .6", ORANGE



VALLEY		
PART DESCRIPTION LAMP BOARD ASSEMBLY CAPTURE BALL AREA		
PART NO.	DATE	REV.
96-305-006	5-30-79	

ELECTRONIC TROUBLE SHOOTING PROCEDURE

In order to take advantage of the self testing features of the Valley Spectra IV, a working knowledge of the different components is needed. Refer to Component Description.

Power is brought into the bottom of the Power Deck in the base of the unit and stepped down through a transformer. The low voltage is then brought up through the slip ring in the tub and to the playfield power supply.

The power supply gives you +5V DC and +12 V DC.

The +5V DC is supply voltage for logic on the 96-160-001 Printed Circuit Board (Display), 96-300-001 Printed Circuit Board (Lamp Driver), 96-420-001 Printed Circuit Board (Solenoid Drive & Audio), and 96-120-001 Printed Circuit Board (CPU).

The +12V DC supply is used for playfield lights.

Solenoid power, +40V DC, is brought up to the playfield power relay, through the slip ring, and switched on during game play.

The machine is put into test mode by the three position slide switch located on the Coin Door Printed Circuit Board. The top position is the Test position, middle position is the Play position (normal operating) the bottom position is the Set position.

When the mode selection switch is in the Test position, the CPU, 96-120-001 Printed Circuit Board, will start Test No.1.

Test No. 1 is the solenoid test and all solenoids will now start to fire one at a time. During this test the display will show, on the bottom row of digits, the number 01 in the Most Significant Digit position. This shows which test is being performed. In the Least Significant Digit position the number of the solenoid being fired will be displayed.

By pressing the Demand Button, the CPU will increment to Test No.2. The display will show the number 02, indicating Test No.2 is being performed.

Test No.2 is the playfield light test, and the Lights should flash on and off in sequence.

Test No.3 is the display test and should load all 9's into the display and count down to all 0's, then the display should blank out except Row 5, the Most Significant Digit will show 03, indicating Test No.3 has been performed.

Test No.4 is the switch closure test and will indicate the number of the switch being closed in the Least Significant Digit position. If no switch is closed, two straight bars -- will appear.

Test No.5 is the Audio tone test. As each different tone or sound is generated, the appropriate number will be indicated on the display.

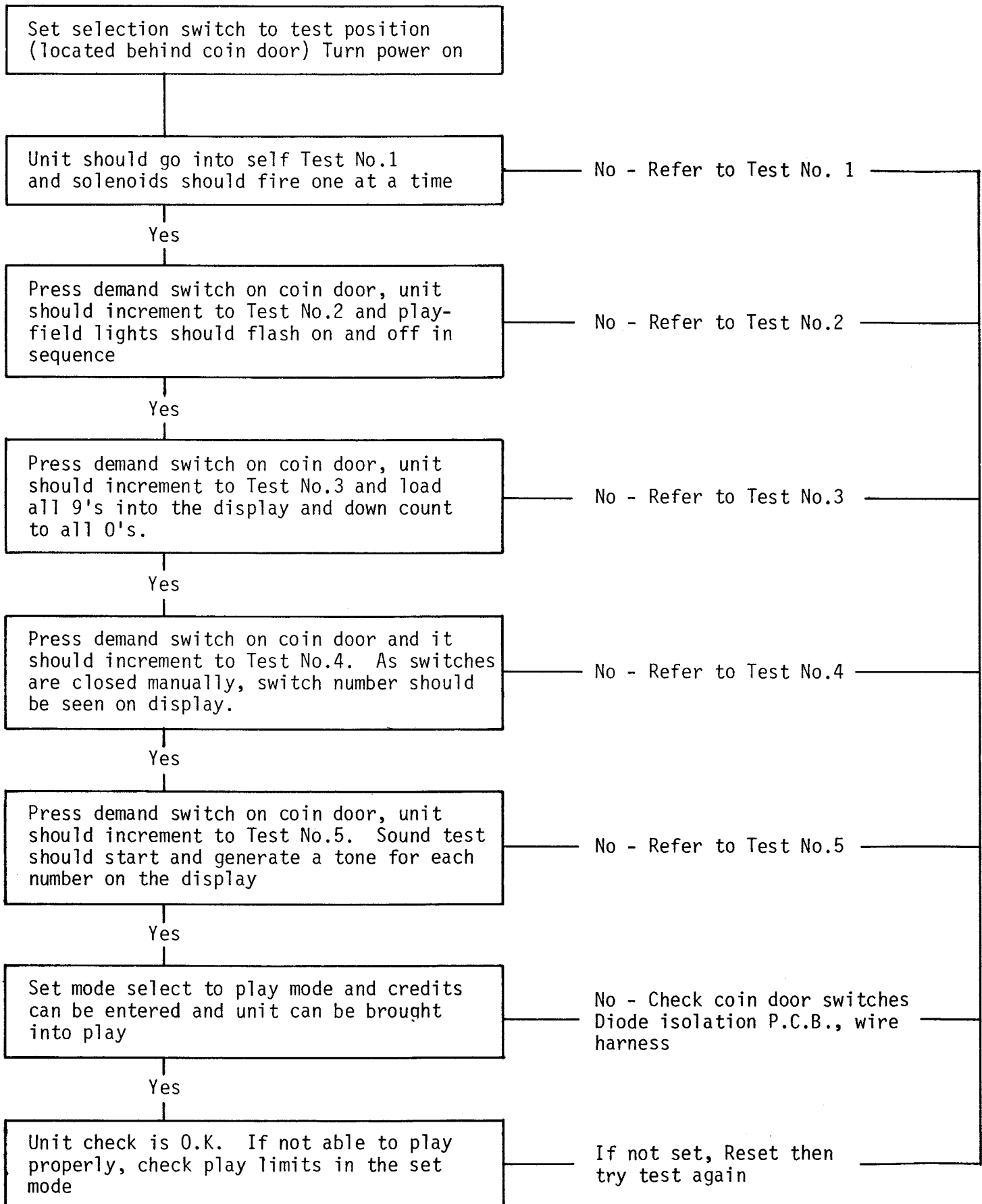
If during the test sequence a faulty indication is seen, merely go to the related Printed Circuit Board and try component substitution to locate the problem.

If the test mode cannot be performed or the machine does not play at all, be suspect of the CPU (96-120-001 Printed Circuit Board) or power problems.

Keep in mind the CPU 96-120-001 Printed Circuit Board is the controlling element and the rest of the Printed Circuit Boards are merely extensions for load driving. Each Printed Circuit Board, (1=96-160-001) (2=96-300-001) (3=96-420-001) can be disconnected and only that board's related function will be disabled. The rest of the machine will operate properly.

THE RECOMMENDED TROUBLE SHOOTING PROCEDURE IS BOARD SUBSTITUTION BASED ON THE CPU TEST RESULTS.

CPU SELF TEST PROCEDURE



Test No.1 - Solenoid Firing

In the test mode, position No.1, the CPU will fire each solenoid and relay one at a time. The Display will show on the bottom row digits 5 and 6; the test being performed which is No.1 in this case. Digits 1 and 2 will show the solenoid being fired. Note that P11 is the playfield power relay and when it is fired, P11 will stay on throughout the test to supply power to the solenoids.

The solenoids and relays are driven by SE9301 Transistors which are located on the 96-420-001 Printed Circuit Board. The CPU sends control signals to the 96-420-001 Printed Circuit Board to address the two NE591 Integrated Circuits which are 8 bit latches capable of decoding 8 solenoids each. NOTE: CHECK FUSES

Test No.1

Symptom	Action
A. Does not power up	1. Check power supply and 24V AC to CPU 96-120-001 Printed Circuit Board 2. Substitute CPU Printed Circuit Board 96-120-001
B. Powers up in wrong mode	1. Check mode selection switch on Printed Circuit Board 96-110-001 2. Check Diode isolation Printed Circuit Board 96-170-001 3. Substitute CPU Printed Circuit Board 96-120-001
C. Solenoid (s) not firing or not firing in sequence	1. Check +40V DC to solenoids 2. Check solenoids 3. Substitute solenoid driver Printed Circuit Board 96-420-001 4. Substitute CPU Printed Circuit Board 96-120-001 5. Check wire harness 6. Check unit play limits in set mode

Test No.2 - Lamp Test

In the test mode, position No.2, the CPU will cause each playfield light to flash on and off in sequence. The display will show in digits 5 and 6, bottom row, Test No.2 is being performed.

The playfield lamps are driven by MPSA13 Transistors which are located on the 96-300-001 Printed Circuit Board. The CPU sends control signals to the 96-300-001 Printed Circuit Board to address the six 9334 Intergrated Circuits which are 8 bit latches capable of decoding 8 lamps each. The output of each latch and transistor drive group is connected directly to the corresponding lamp holder Printed Circuit Board. NOTE: CHECK FUSES

Symptom	Test No.2	Action
A. Does not increment to Test No.2		1. Check demand switch on coin door
B. Lamp(s) not flashing on and off		1. Check lamp and +12V DC supply 2. Substitute lamp driver Printed Circuit Board 96-300-001 3. Substitute CPU Printed Circuit Board 96-120-001 4. Check wire harness

Test No.3 - Display

In the test mode, position No.3, the CPU will cause the display to load all digits with a number '9', and down count all digits one at a time to a number '0'. At the same time all Light Emitting Diodes on the display will be on. When down count to Zero is finished, the display will blank out and flash an 03 in digits 5 and 6, bottom row to show Test No.3 has been performed.

The 30 digits and 14 Light Emitting Diodes on the display Printed Circuit Board 96-160-001 are broken down into 5 rows of displayed information. Each row has a 74C912 Integrated Circuit which is a display controller for that row. The 5 display controllers are addressed from the CPU which causes the correct information to be displayed. NOTE: CHECK FUSES

Symptom	Test No.3	Action
A. Display not loading 9's and down counting to 0's.		1. Check display Printed Circuit Board 96-160-001 2. Check wire harness to display 3. Check CPU Printed Circuit Board 96-120-001

NOTE: MAKE SURE CONNECTOR IS PROPERLY INSTALLED

Test No.4 - Switch Closure

In the test mode, position No.4, the CPU will scan for switch closures and display the number of the switch closed in the bottom of the display digits 1 and 2. In digits 5 and 6 of the bottom row the number 04 will be displayed showing Test No.4 is being performed. If no switch closures are present, two bars -- will be seen on digits 1 and 2.

Switch inputs are multiplexed into the RIOT I/O parts of the CPU Printed Circuit Board 96-120-001 through four 4051 Intergrated Circuits as each switch is closed, the CPU will take the correct action and display the desired information. NOTE: CHECK FUSES

Symptom	Test No.4	Action
A. Display indicating switch closed		1. Check switch indicated, adjust if needed 2. If switch is O.K., check CPU Printed Circuit Board 96-120-001
B. Display does not indicate a switch when closed		1. Check switch contacts, adjust if needed 2. Check wire harness 3. Check CPU Printed Circuit Board 96-120-001

Test No.5 - Audio Generation

In the test mode, position No.5, the CPU will generate control signals to the solenoid/ audio Printed Circuit Board 96-420-001, to cause the audio section to go through the tones that this unit is capable of making. The display, bottom row, digits 5 and 6 will show the number 05, indicating test No.5 is being performed. Digits 1 and 2 will display the number of each tone as it is generated.

Audio is generated on Printed Circuit Board 96-420-001 by a sound Intergrated Circuit, the 76477. The output is amplified through a TIP31 power transistor. Audio range and volume can be controlled by two 5k ohm pots on this Printed Circuit Board.

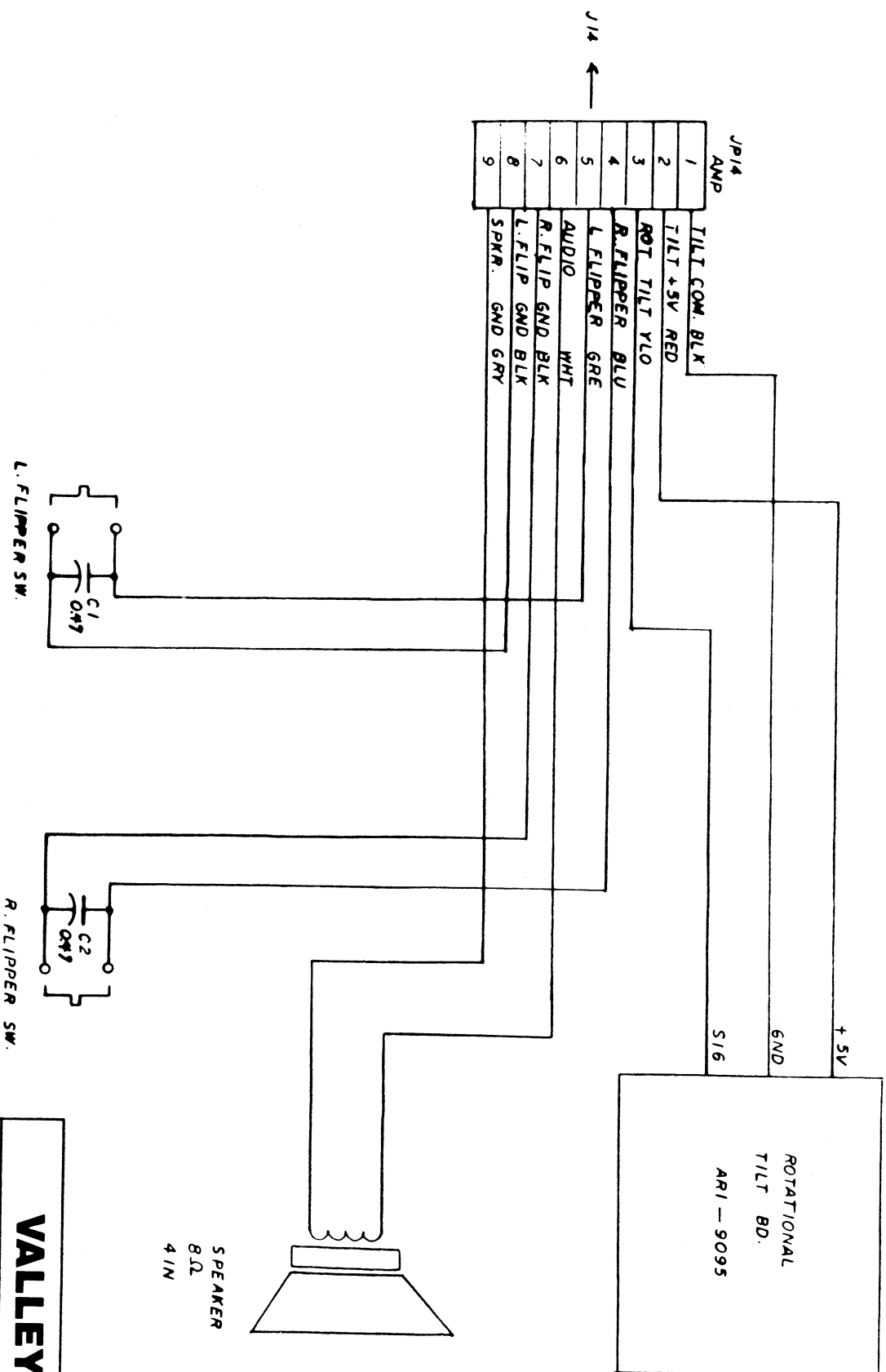
NOTE: CHECK FUSES

Test No.5

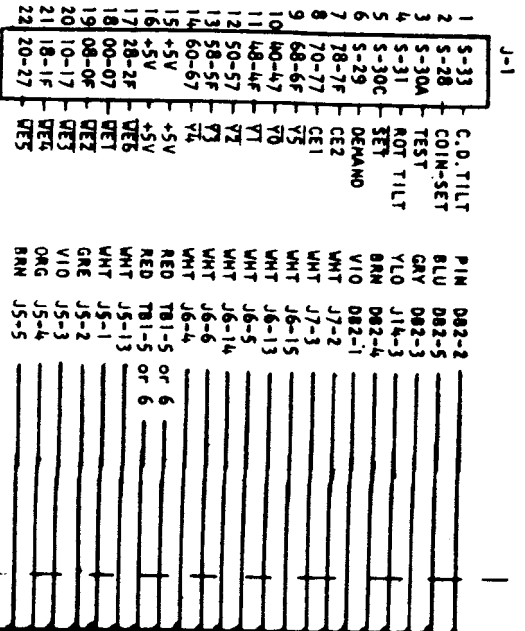
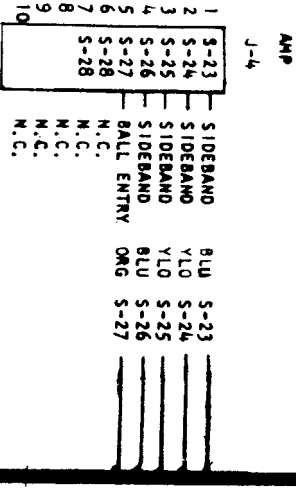
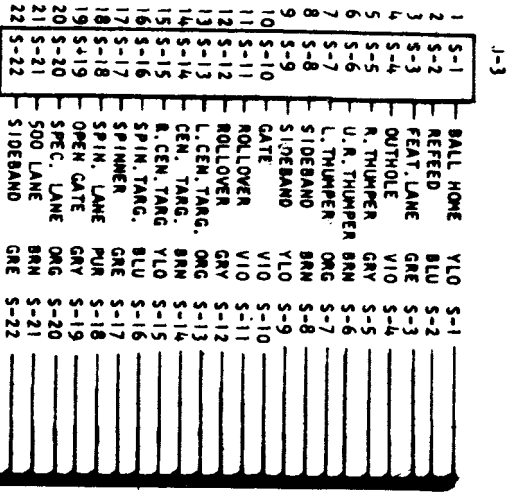
Symptom	Action
A. No audio or missing audio tones	1. Check speaker 2. Check volume control pot- Printed Circuit Board 96-420-001 3. Substitute audio Printed Circuit Board 96-420-001 4. Substitute CPU Printed Circuit Board 96-120-001 5. Check wire harness
B. Wrong audio pitch range	1. Check range control pot- Printed Circuit Board 96-420-001 2. Substitute audio Printed Circuit Board 96-420-001 3. Substitute CPU Printed Circuit Board 96-120-001

SECTION IV
WIRING DIAGRAMS

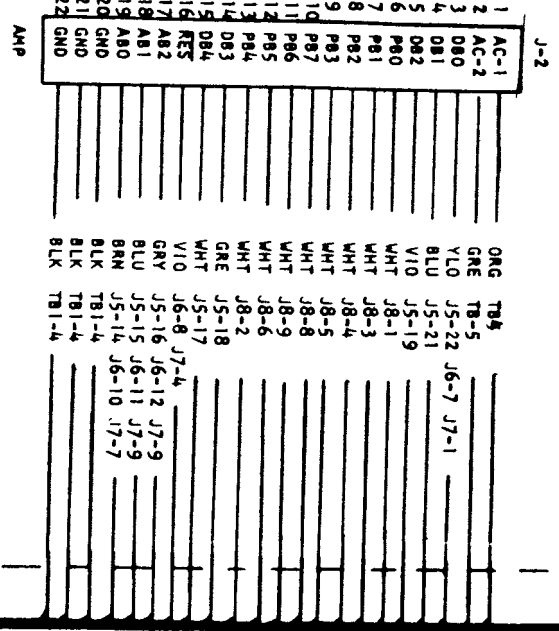
- A. COIN DOOR, POWER SUPPLY AND
SLIP RING DRAWING
- B. PINBALL BASE PAN WIRING DIAGRAM
- C. PLAYFIELD WIRING DIAGRAM
- D. SOLENOID AND RELAY WIRING DIAGRAM



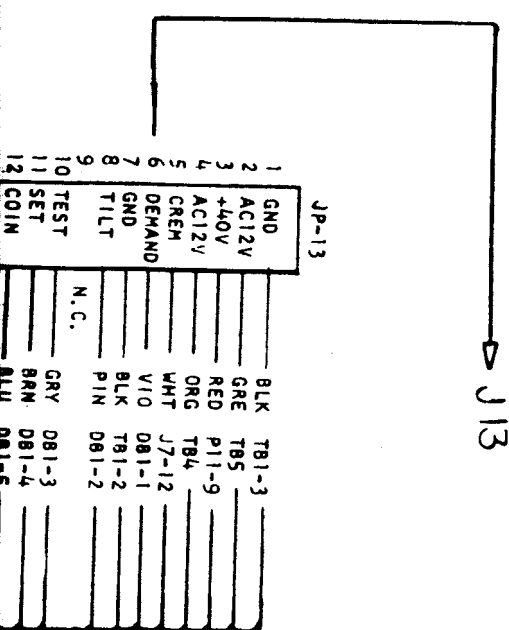
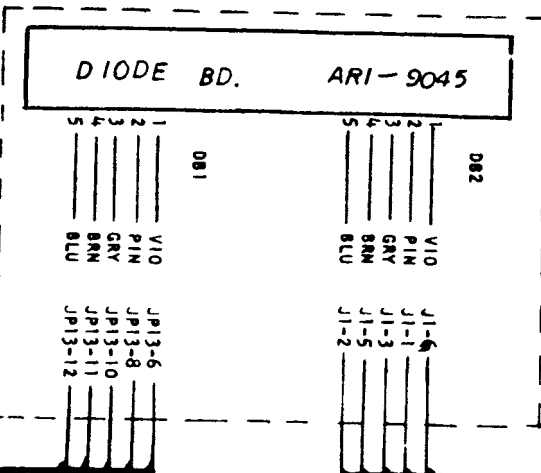
VALLEY		
PART DESCRIPTION		
BASE RAY WIRING DIAGRAM		
PART NO.	DATE	REV.
	5-30-79	

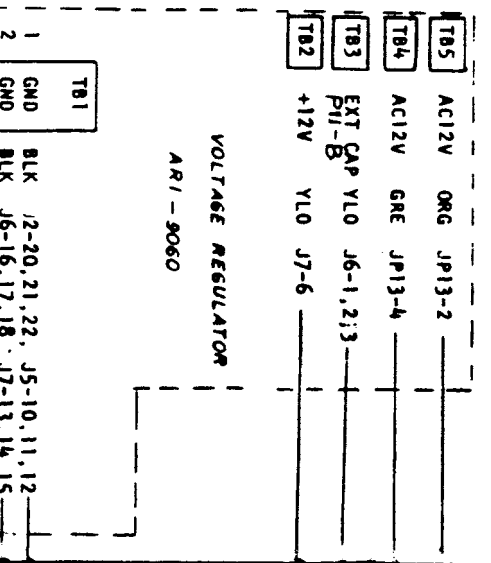
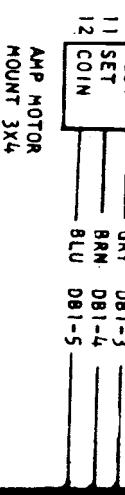


CPU
ARI 9040

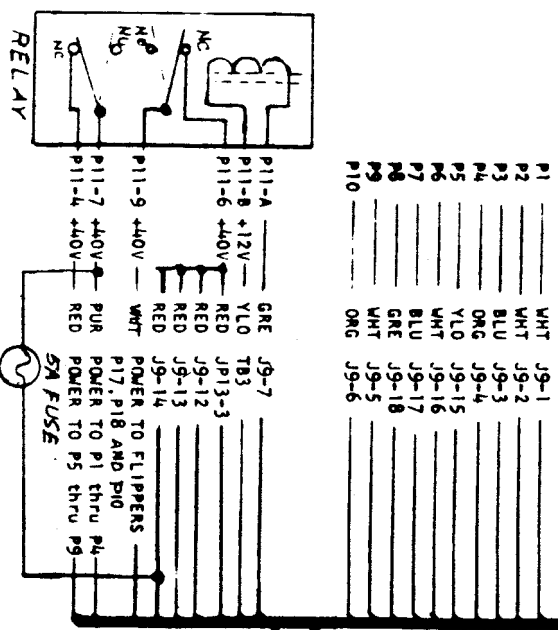


TO ONE SIDE OF PLAYFIELD
SWITCHES S-1 TO S-27. THE
OTHER SIDE OF THE SWITCHES
ARE CONNECTED TO GROUND (TB1-1 to 4)

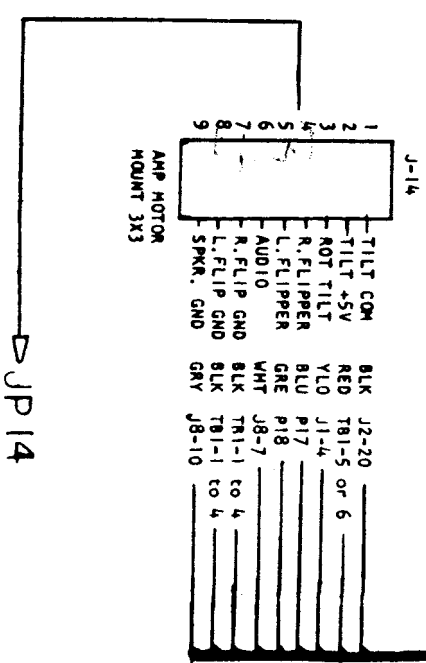
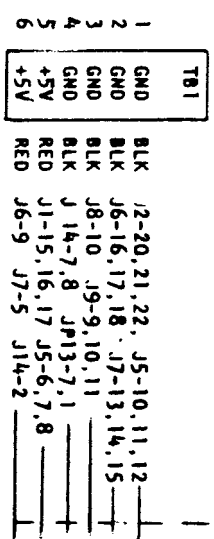




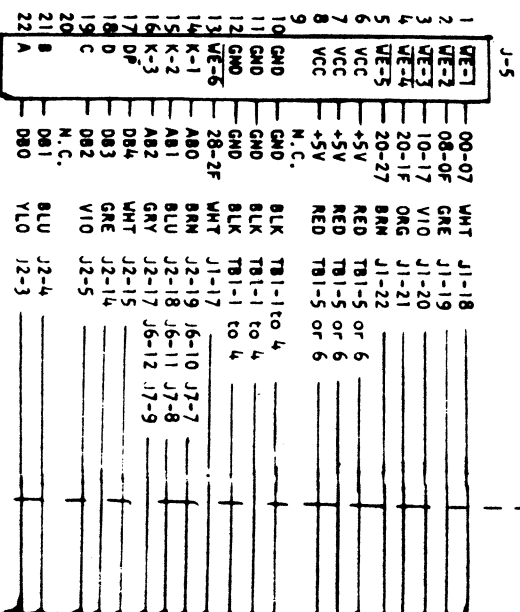
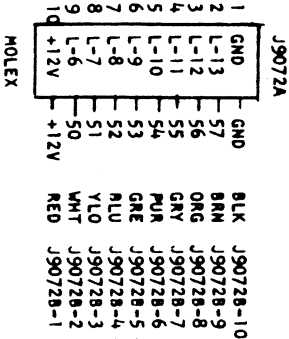
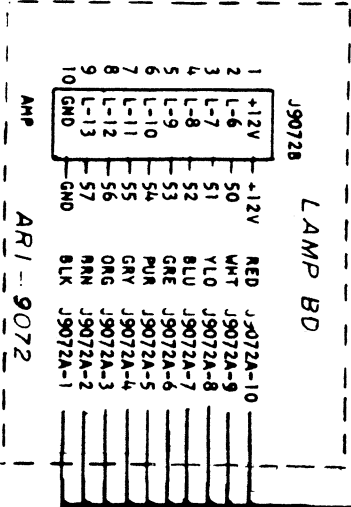
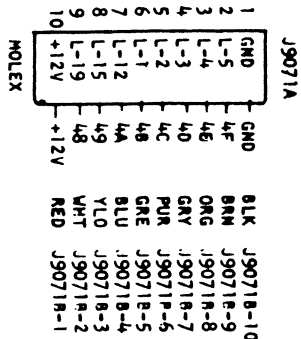
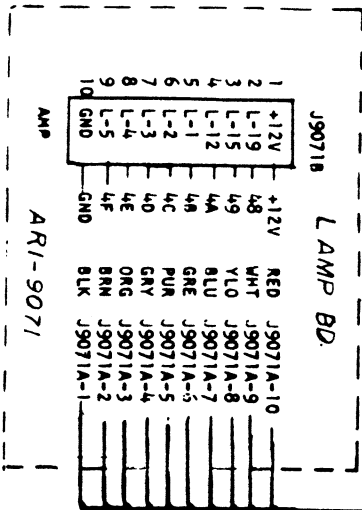
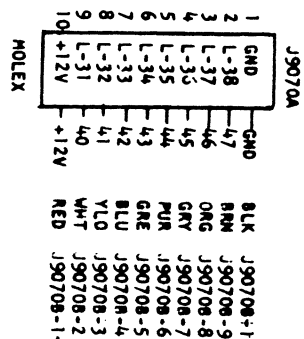
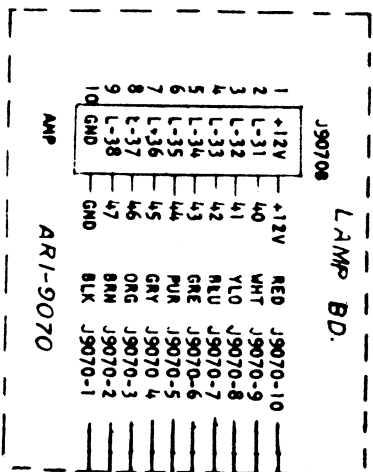
SOLENOID AND RELAY
CONNECTIONS



J14-4 BLU P17
J14-5 GRE P18



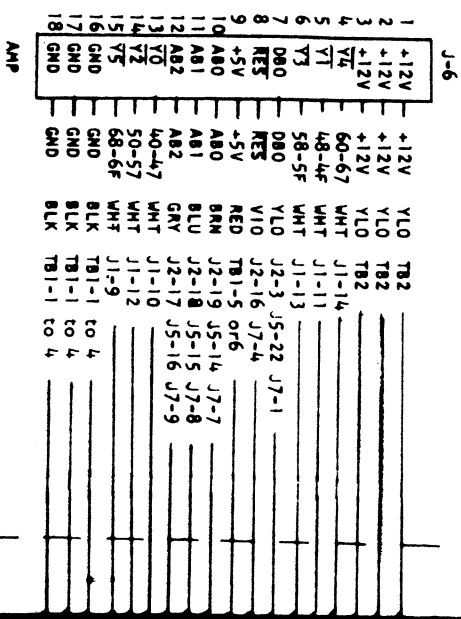
VALLEY		
PART DESCRIPTION		
PLAYFIELD WIRING DIAGRAM		
PART NO.	DATE	REV.
	5-30-79	

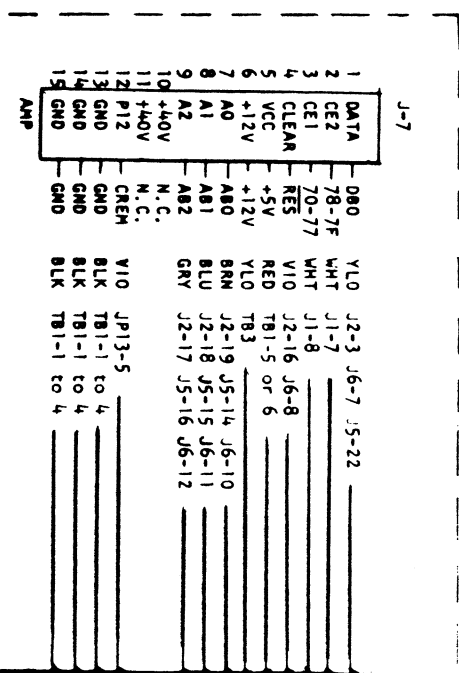
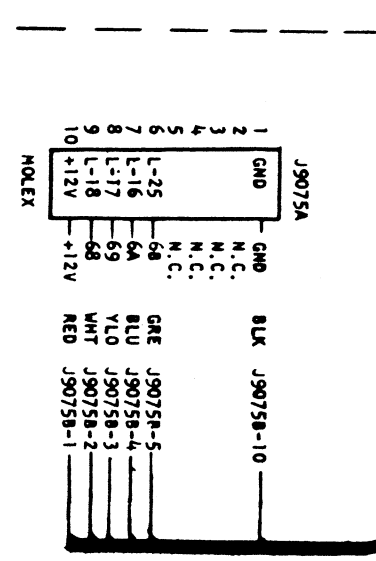
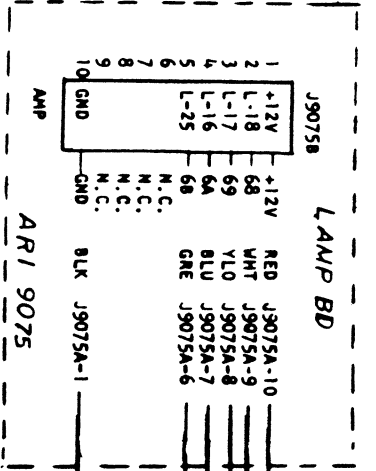
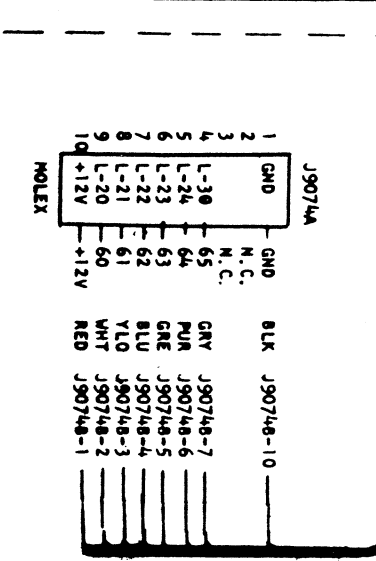
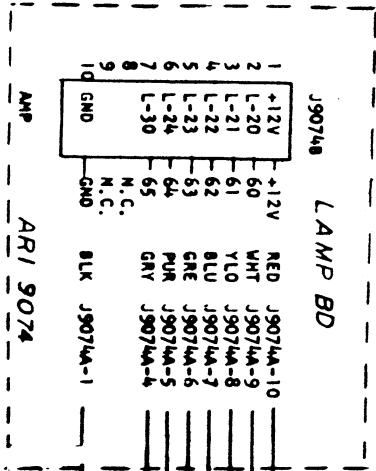
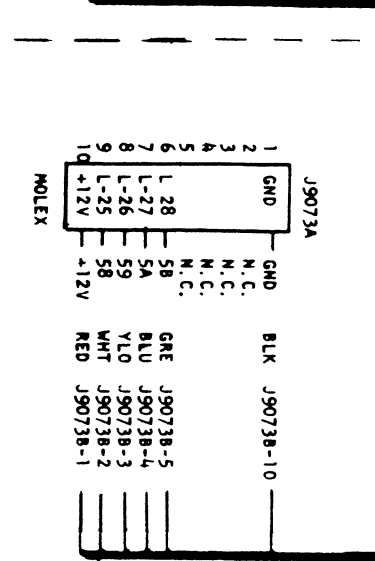
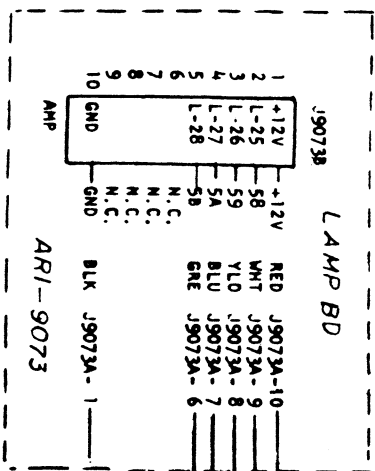


DISPLAY BD ARI-9010

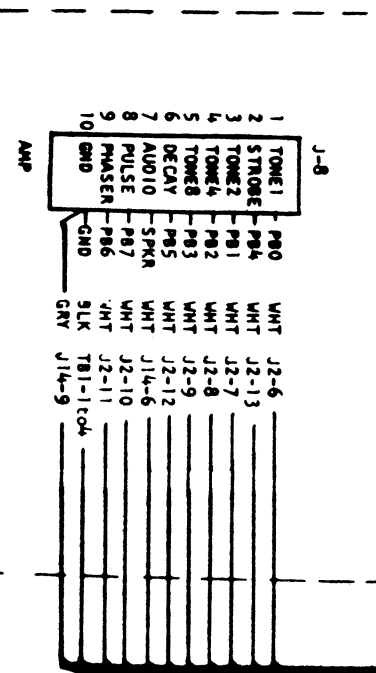
LAMP DRIVER BD.

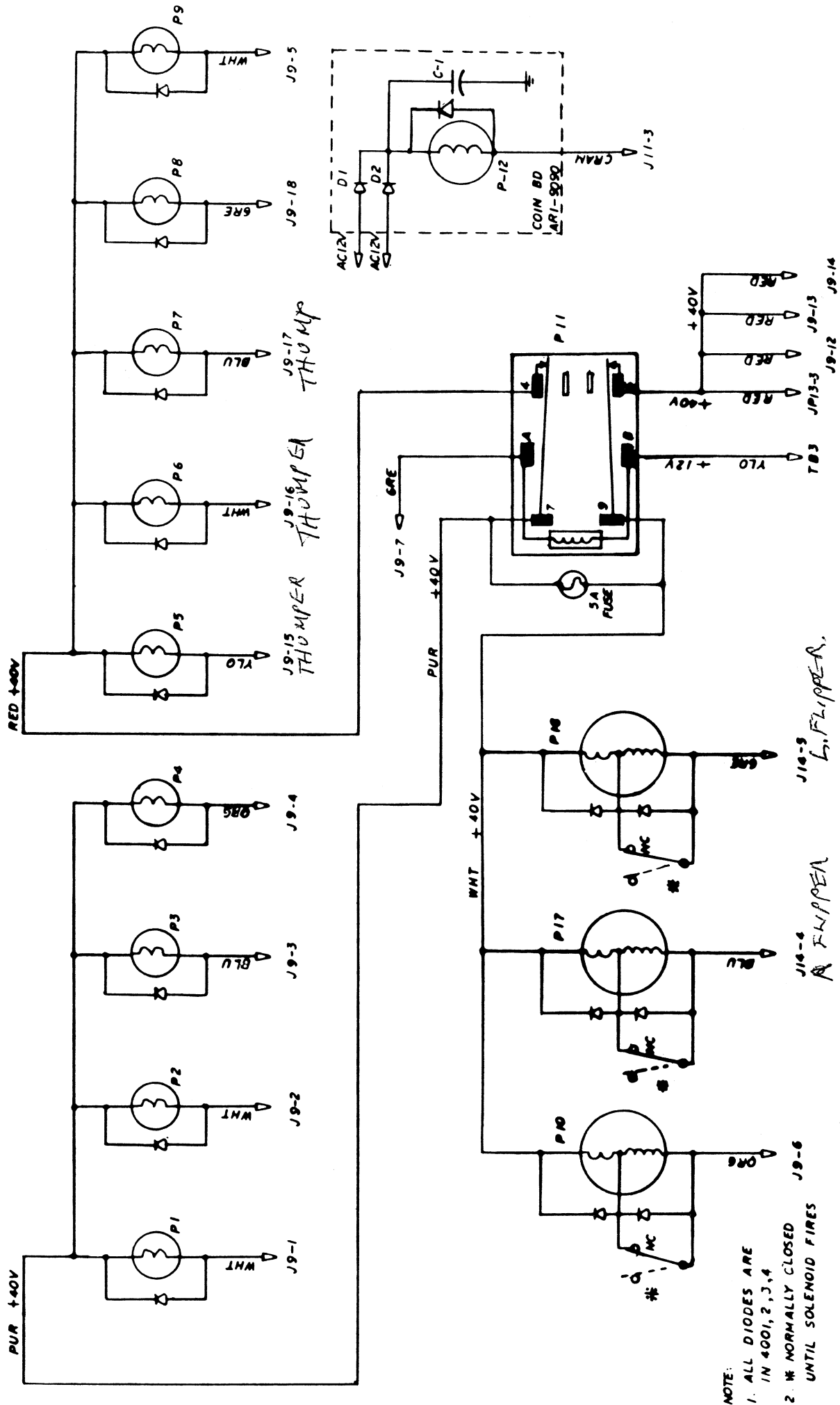
ARI-9020





SOLENOID DRIVER
AND
AUDIO
ARI-9030





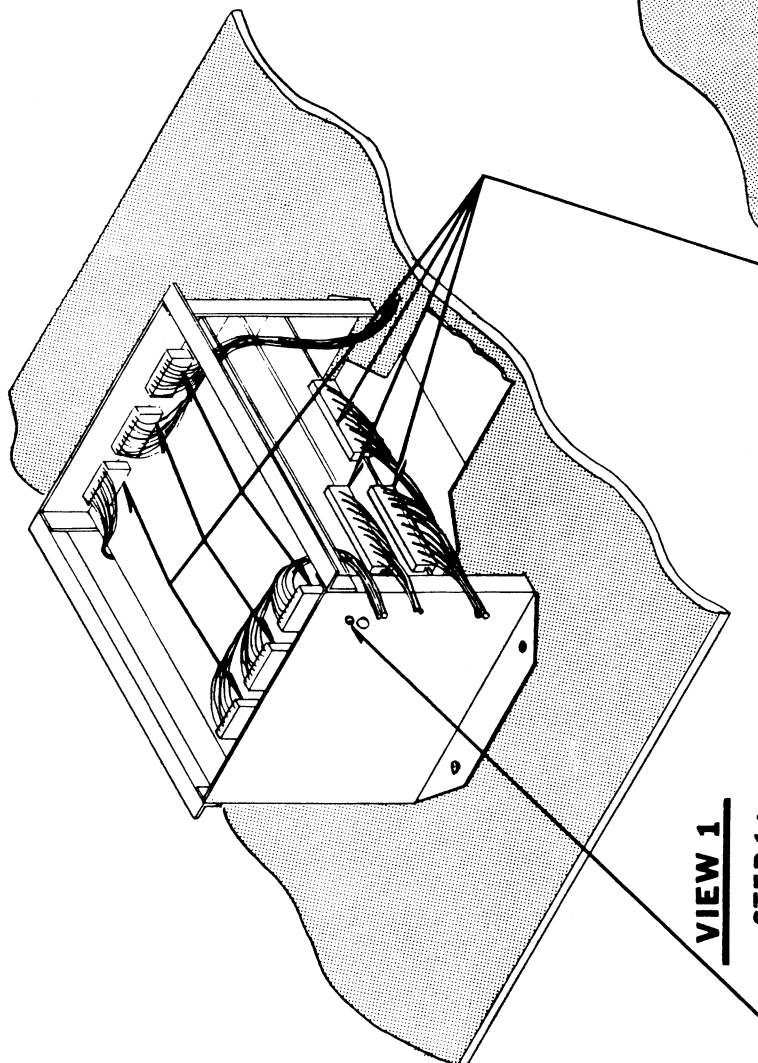
VALLEY		
PART DESCRIPTION SOLENOID AND RELAY WIRING DIAGRAM		
PART NO.	DATE	REV.
	5-30-79	

Section V

Playfield Sub-Assembly

- A. Card Cage
- B. Playfield Top Drawing
- C. Playfield Back Drawing
- D. Playfield Parts List

INSTRUCTIONS: REMOVAL OF P.C. BOARDS FROM FRAME.



VIEW 1

STEP 1;
REMOVE ASSY. SCREW NO. 4 x $\frac{3}{8}$ LG. SHT. METAL
SCREW TYPE 'A' FROM P.C. BOARD FRAME HOLDER.
RED DOT UNDER SCREW.

STEP 2;
DISCONNECT ALL P.C. BOARD PIN CONNECTORS
FROM P.C. BOARDS. TYP. 13 PLACES.

STEP 3;
LIFT BOARDS TO POSITION SHOWN IN VIEW 2.
BOARDS CAN NOW BE REMOVED FOR SERVICE.

ARI P/N 96 300 001
lamp driver
ARI P/N 96 420 001
solenoid audio driver
ARI P/N 96 120 001
C.P.U.

LIFT TO
REMOVE

REMOVE

VIEW 2

VALLEY

PART DESCRIPTION

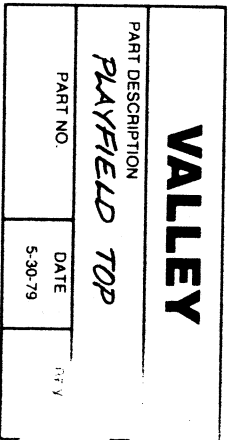
CARD CAGE

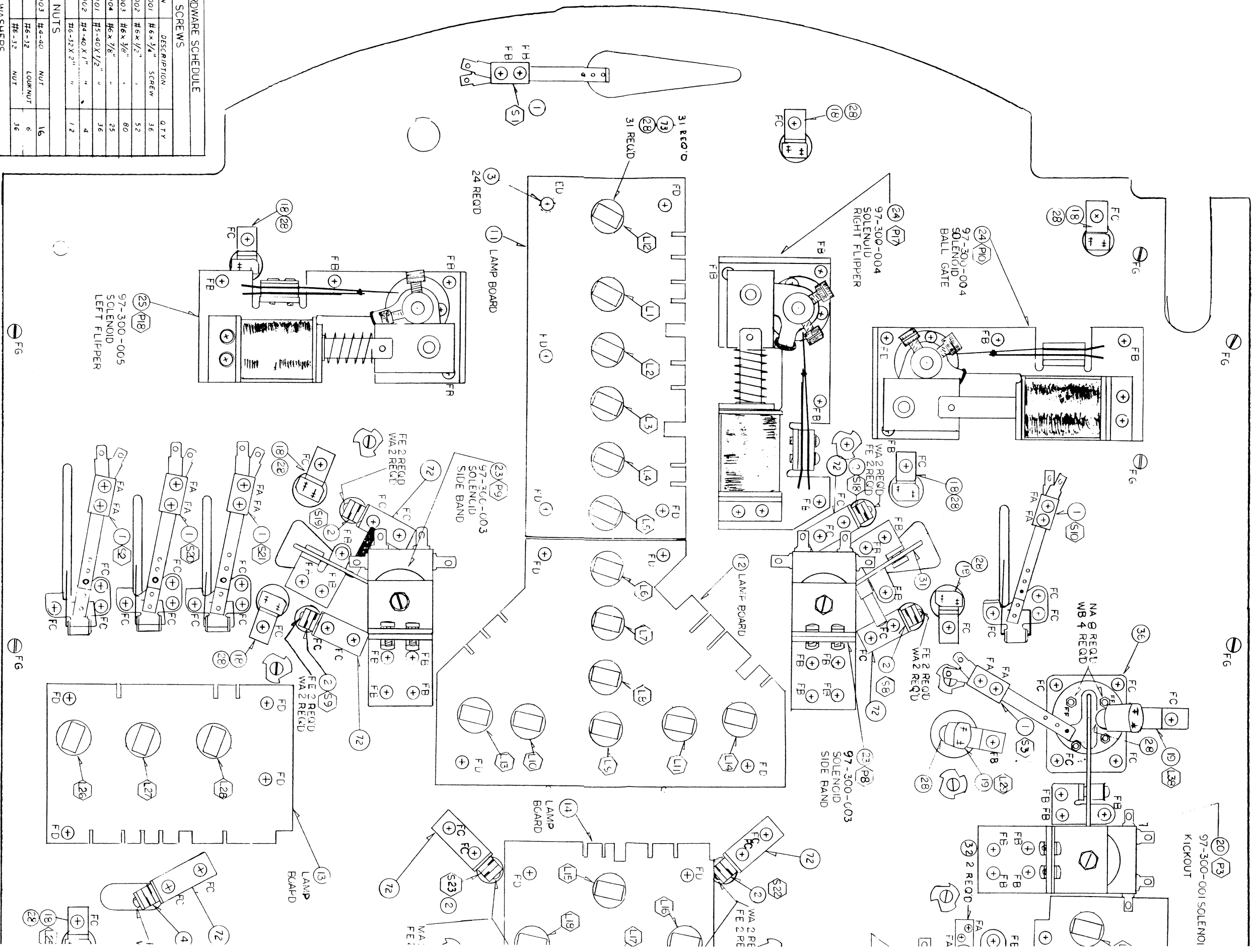
PART NO.

DATE

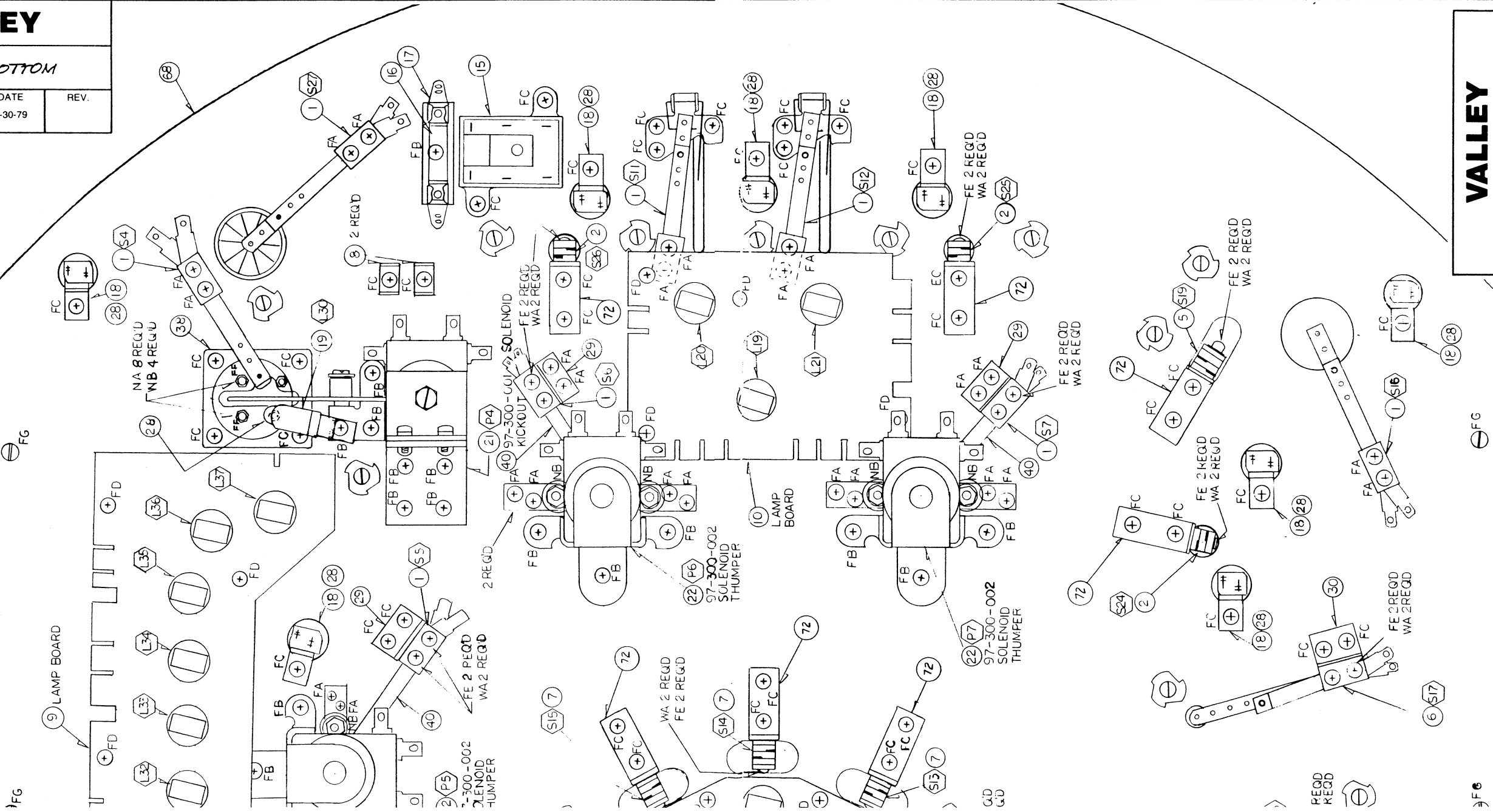
5-30-79

REV.





PART DESCRIPTION		
PLAYFIELD BOTTOM		
PART NO.	DATE	REV.
	5-30-79	



PART DESCRIPTION		
PLAYFIELD BOTTOM		
PART NO.	DATE	REV.
	5-30-79	

PARTS LIST - 97-160-001 PLAYFIELD SUB-ASSEMBLY		
DRAWING DESIGNATION	ARI PART NO.	DESCRIPTION QTY/UNIT

1	73-240-001	SWITCH-LEAF SHORT	14
2	73-240-002	SWITCH-LEAF LONG	9
3	59-485-001	SPACER-LAMP BOARD	24
4	73-240-004	SWITCH-LEAF-TARGET	1
5	73-240-005	SWITCH-LEAF-TARGET	1
6	73-240-006	SWITCH-LEAF-SPINNER	1
7	73-240-008	SWITCH-LEAF-TARGET	3
8	17-850-001	TERMINAL .187 QUICK DISCONNECT	2
9	96-305-001	LAMP BOARD-LOWER KICKOUT ASSEMBLY	1
10	96-305-002	LAMP BOARD-ROLLOVERS ASSEMBLY	1
11	96-305-003	LAMP BOARD-BOTTOM BONUS LANE ASSEMBLY	1
12	96-305-004	LAMP BOARD-TOP BONUS LANE ASSEMBLY	1
13	96-305-006	LAMP BOARD-REFEED ASSEMBLY	1
14	96-305-005	LAMP BOARD-CAPTURED BALL ASSEMBLY	1
15	71-700-001	RELAY-PLAYFIELD	1
16	28-300-002	12 VDC COIL	1
17	28-300-301	FUSE-SLOW BLOW 5 AMP HOLDER-FUSE	1
18	97-019-001	BRACKET-LIGHT HOLDER 16 SUB-ASSEMBLY 90°	16
19	97-019-002	BRACKET-LIGHT HOLDER 3 SUB-ASSEMBLY	3
20	97-019-003	GOOSENECK BRACKET-LIGHT HOLDER 3 SUB-ASSEMBLY THUMPER	3
21	97-300-001	SOLENOID-KICKOUT HOLE 2	2
22	97-300-002	SOLENOID-THUMPER 3	3
23	97-300-003	SOLENOID-SIDE BAND 2	2
24	97-300-004	SOLENOID-RIGHT FLIPPER	2
25	97-300-005	SOLENOID-LEFT FLIPPER 1	1
26	97-300-006	SOLENOID-REFEED 1	1
27	97-300-007	SOLENOID-BALL FEED 1	1
28	54-300-001	LIGHT-G.E.#194	53
29	72-035-008	BRACKET "Z" LONG-SWITCH	3
30	72-035-009	BRACKET "Z" SHORT-SWITCH	1
31	97-013-001	ARM SIDE BAND LINKAGE	2
32	59-120-003	GUIDE-THUMPER POST 6	6
33	59-120-001	BALL GUIDE-PLASTIC 1	1
34	59-120-002	BALL GUIDE-PLASTIC 1	1
35	59-380-001	BUMPER POST 36	36
36	59-440-001	RING-MYLAR PROTECTOR 3	3
37	59-069-001	CIRCLE-MYLAR PROTECTOR 2	2
38	59-480-001	SHIELD-KICKOUT HOLE 2	2
39	59-480-002	SHIELD-DEFLECTOR 2	2
40	59-340-001	KICKOUT HOLE PADDLE-SWITCH THUMPER 3	3
41	66-080-001	CAP-PORT-RUBBER 29	29
42	66-380-001	"0" RING-FLIPPER 2	2
43	66-380-002	"0" RING-5/16" I.D. 4	4
44	66-380-003	"0" RING-1" I.D. 3	3
45	66-380-004	"0" RING-1½" I.D. 2	2
46	66-380-005	"0" RING-2½" I.D. 3	3
47	66-380-006	"0" RING-3" I.D. 1	1
48	66-380-007	"0" RING-MINI POST 5	5
49	72-035-006	BRACKET-RIGHT ANGLE-BALL GUIDE 8	8
50	72-035-010	BRACKET-BALL GUIDE 1	1
51	72-120-001	GUIDE-BALL 1	1
52	72-120-002	GUIDE-BALL 1	1
53	72-120-003	GUIDE-BALL 1	1
54	93-100-001	WIRE FORM-TOP 1	1
55	93-100-002	WIRE FORM-1½" 2	2
56	93-100-003	WIRE FORM-1-7/8" 1	1
57	93-100-004	WIRE FORM-2-7/8" 2	2
58	93-100-005	WIRE FORM-3" 2	2
59	93-100-006	WIRE FORM-4-3/8" 4	4
60	93-100-007	WIRE FORM-7" 1	1
61	93-100-008	WIRE FORM-9" 1	1
62	97-060-001	FLIPPER 2	2
63	97-060-002	FLIPPER-BALL GATE 1	1
64	97-090-001	GATE-BALL-LEFT 1	1
65	97-090-002	GATE-BALL-RIGHT 1	1
66	20-510-001	SCREW SHOULDER #6-32 23	23
67	20-510-002	SCREW SHOULDER #6 WOOD 18	18
68	10-500-001	BOARD PLAYFIELD VALLEY #9000 1	1
69	97-305-001	SPINNER TARGET SUB-ASSEMBLY 1	1
70	97-315-001	THUMPER SUB-ASSEMBLY 3	3
71	59-485-003	SPACER-BOTTOM ART GLASS 1	1
72	72-035-006	BRACKET 90°-SWITCH 14	14
73	28-420-002	HOLDER-BULB 22	22
74	18-360-001	LABEL-SPINNER 2	2

Section VI

Suggested Replacement Parts Inventory

- A. Electronic/Playfield Parts
- B. Non-Electronic Parts
- C. Table Illustration
with Parts Listing

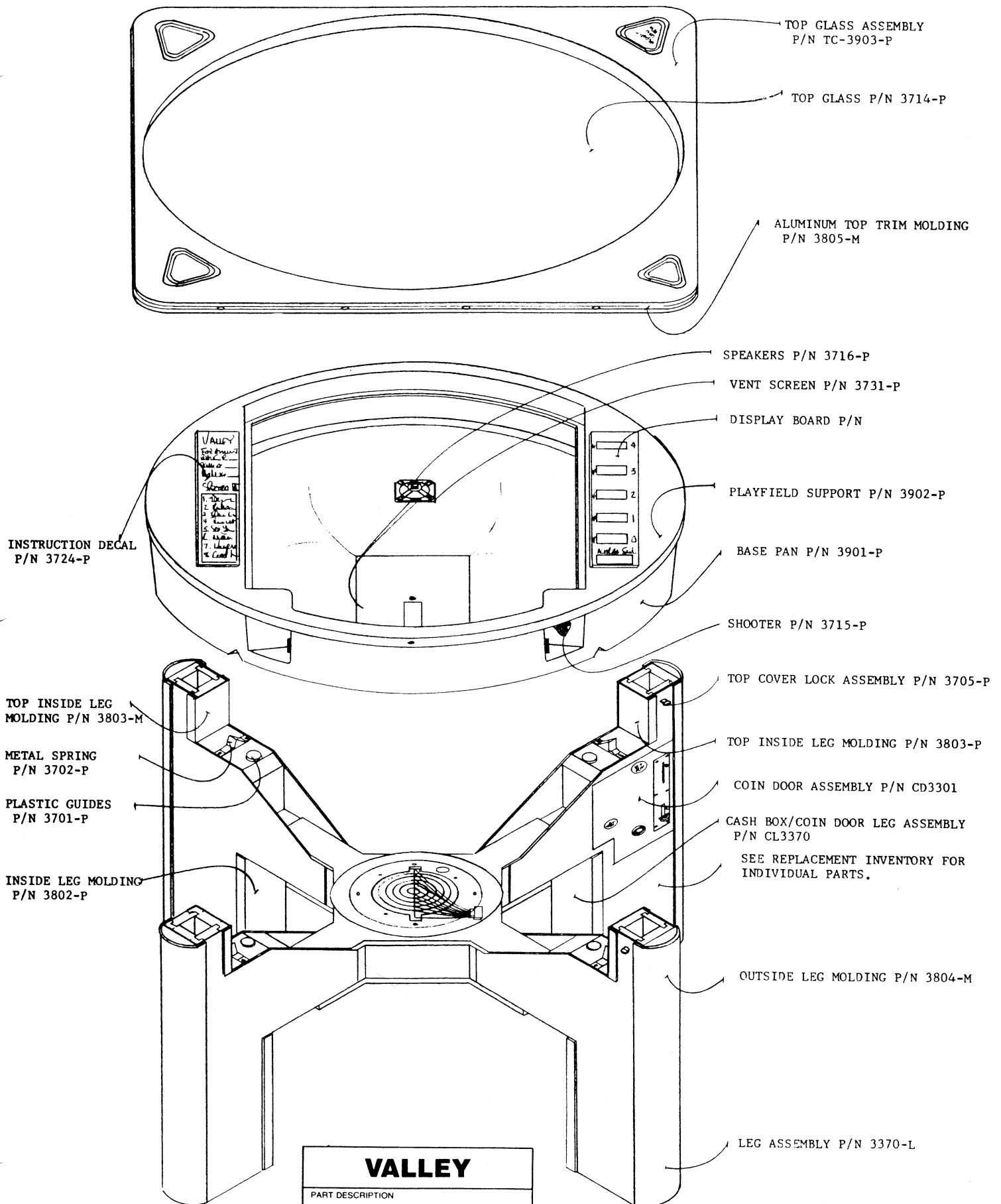
A. Electronic/Playfield Parts

Fuses--5 amp Slo-Blow MDL	28-300-002
Fuses--10 amp Slo-Blow MDL	28-300-001
Slip Ring Assembly--Complete	97-280-001
Rotary Tilt Board	96-380-001
Diode Board	96-170-001
Display Board	96-160-001
Solenoid/Audio Board	96-420-001
Lamp Driver Board	96-300-001
Micro-Processor (CPU)	96-120-001
Bracket-Light Holder	
Sub-Assembly-90	97-019-001
Goose Neck	97-019-002
Thumper	97-019-003
Voltage Regulator	67-540-100
Lamp-#194	54-300-001
Holder Lamp	28-420-001
Coils--With Sleeve-STD Coil	71-200-001
Push Solenoid	71-200-002
Flipper Coil	71-200-003
Top Butyrate Artwork Set	97-096-001
Wireforms--Set	97-500-001

B. Non-Electronic Parts		
1. Top Glass Assembly		TC-3903-P
(a) Top Glass With Decals		3714-P
(b) Plastic Vacuum Top Cover		3903-P
(c) Aluminum Top Trim Moulding		3805-M
(d) Top Cover Lock Assembly		3705-P
2. Base Pan and Playfield Support Assembly:		
(a) Plastic Vacuum Base Pan		3901-P
(b) Plastic Vacuum Playfield Support		3902-P
(c) Red Display Board		3950-P
(d) Play Instruction Decal		3724-P
3. Speaker		3716-P
4. Vent Screens		3731-P
5. Shooter		3715-P
6. Leg Assembly with Panelite:		L-3370
(a) Leg		3370
(b) Panelite		3601-PP
(c) Outside Leg Moulding		3804-M
(d) Inside Leg Moulding		3802-M
(e) Top Inside Leg Moulding		3803-M
7. Coin Door Leg Assembly		CL-3370
(a) Coin Door Leg		3370
(b) Cash Box		3703-P
(c) Cash Box Leg Moulding		3801-M
(d) Cash Box Lock Assemble		3704-P
8. Coin Door Assembly		CD-3301
(a) Coin Mechanism		3712-P
(b) Cherry Limit Switch Assembly		3710-P
(c) Coin Door Board		
(d) Coin Door Lock Assembly		3704-P
(e) Light Shield		3729-P
(f) 25¢ Decal		3737-P
9. Metal Springs		3702-P
10. Metal Spring Spacers		3604-PP
11. Plastic Guides		3701-P

SECTION VI

C. Table Illustration for Non-Electronic Parts



VALLEY		
PART DESCRIPTION		
TABLE ILLUSTRATION		
PART NO	DATE	REV
	5-30-79	