CHAPTER 9

MIDWAY HOME PINBALL GAMES

Although one might first think that these amusement devices are electromechanical machines, it is not true with today's pinball games. What was a maze of wires and switches has become the playground of the microprocessor.

This chapter deals with four pinball machines: 606-1000 (Fireball), 614-1000 (Evel Knievel), 614-2000 (Captain Fantastic or Elton John), and 614-3000 (Fireball II).

These games have been built with the owner in mind. Solid-state electronic circuitry and plastic encapsulated switches have been utilized extensively because of their high degree of dependability. This system makes the game virtually trouble free.

OPERATION & FEATURES

1. Depress the start button, located on the front of the game, one time for each player. The number of participating players is indicated by lit areas in the player section of the score glass (1, 2, 3, 4).
2. After each ball is played the score unit will scan through each player's score and come up to rest on the next player light, located in the player section of the score glass.
3. The game is equipped with a memory unit. Each participant plays his own game. That is, any features or partial features scored by a player (top rollovers; targets 1, 2 or 3; or the extra ball lights) are only his. The partial feature is called over to the player's next ball and is reset only after the indicated bonus is collected.
4. All target and rollover switches are scored as indicated on the playfield. A ball passing through a top rollover switch scores 1000 points, turns out its light, and advances the bonus score 1000 points. When all top rollover switches are scored, a 24,000-point bonus is awarded, the top rollover lights are reset, and the lower outside extra ball lights are lit.
5. Hitting targets 1, 2, and 3 in any order advances the bonus score 2000 points and awards double when targets 1 and 2 are made. It awards triple when targets 1, 2, and 3 are made. The points are awarded after the ball leaves the play area.
6. An **ex**tra ball is awarded when the ball played passes over the lower-outside rollover switch while the extra-ball lights are lit. When the top rollover switches are made and the extra ball switch in the easy position (50K), scores of 50,000, 100,000, and 150,000 are awarded; if the switch is in the hard position (100K), scores of 100,000, 200,000, and 300,000 are awarded. Refer to Fig. 9-1 for the location of the easy/hard extra ball switch. Extra balls may be accumulated if more than one feature is scored and are indicated by the same-player-shoots-again light on the lower playfield.
7. The diagnostic switch is provided only for test purposes and must be in the play position for the game to operate. See Fig. 9-1.

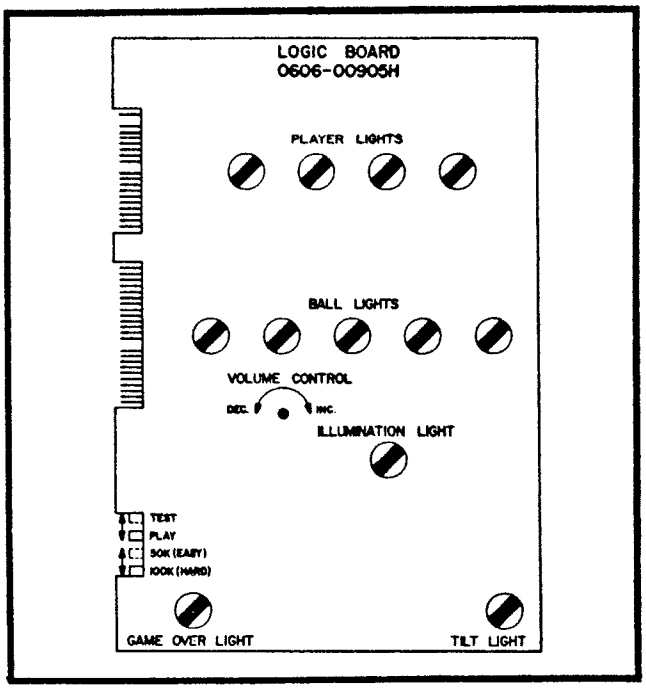


Fig. 9-1. Layout of logic board showing locations of 50K/100K switch and diagnostic test switch.

8. The volume control is located on the logic board. The volume can be varied by rotating the control as indicated in Fig. 9-1.
9. Shaking or pounding on the machine will result in a tilt. When the machine is tilted, all switches and bumpers are disabled and no bonus points are awarded. If an extra ball has been awarded previous to the tilt, the same player plays his extra ball.
10. There are five tones and seven songs played during different parts of a game. Tones and songs for the Evel Knievel game are listed below. Other games are similar.

- Tone 1. Sound associated with a score of 1000.
- Tone 2. Sound associated with a score of 500.
- Tone 3. Sound associated with a score of 100.
- Tone 4. Sound associated with a score of 50.
- Tone 5. Sound associated with multiple players at the start of the game.
- Beethoven's *Fifth Symphony* plays when the reset button is depressed.
- *William Tell Overture* plays when the top rollovers are made.
- *Zippideedooda* plays when a double bonus is made.
- *Notre Dame Fight Song* plays when a triple bonus is made.
- *We're in the Money* plays when an extra ball is awarded.
- *Funeral March* plays when the game is tilted.
- *The Party's Over* plays when the game is over.

An overall schematic diagram for the 614-1000 (Evel Knievel) and the 614-3000 (Fireball II) is shown in Fig. 9-2. The 606-1000 (Fireball) is similar. The schematic diagram for the 614-2000 (Captain Fantastic) is shown in Fig. 9-3. You'll notice that the power supply sections of these overall schematics are not detailed. They show only input/output lines and connections. Detailed schematics of the 0606-00906 and 0614-00912 power supplies are shown in Figs. 9-4 and 9-5.

In addition, certain driver stages on the overall schematics are not detailed. They are only coded to references such as A, B, L, or Q and enclosed in logic symbols representing inverters or buffers. Figures 9-6 and 9-7 illustrate the drivers used in all pinball games covered here. Also in the diagrams are tables listing the values of bias components used by the drivers.

DIAGNOSTIC TEST

These games have a special feature incorporated in them. This is the diagnostic test. It is strongly believed that this test can be effectively utilized to identify a good logic board and game, and help focus the problem area on an improperly functioning game.

The test is started by switching the diagnostic switch on the logic board to the test position. It will test the logic, the program, the drivers, the score display, the switches, the solenoids and the lamps.

606-1000 & 614-1000/3000

When the diagnostic switch is placed in the test position, the following sequence of testing takes place:

1—Logic and program test. When the program is correct, the machine will show 600c on the score display. When the logic or

program is wrong the score display will show gibberish or be off.

2—Score display and its driver plus switches and their drivers. The machine will go through a scanning sequence from 000000 to 999999.

a. When a segment driver (lamp buffer) fails, the same segment on all digits will be permanently off or on.

b. When a digit driver fails, that digit will be permanently off or on.

c. When the score display fails, only one or more unrelated segments will be permanently off.

d. When a switch is stuck or a driver fails, it is shown in a code on the display when the test is finished. See Fig. 9-8 for a cross-reference of these codes. Any other number shown in the display indicates that there is more than one stuck switch. In this case, the displayed number is the sum of these stuck-switch codes. Examples of this condition are as follows:

DISPLAY	SWITCHES
00 00 11	S-20 and S-1
04 00 05	S-11, S-20, and S-9
␣0 00 01	S-20, S-13, and S-19
00⊏0␣0	S-6, S-14 (or S-15), S-8, and S-18

Switch locations are shown in Fig. 9-9.

3—The solenoids and drivers are activated in the following sequence:

a. Ball return
b. Left slingshot
c. Right slingshot (not used by 614-1000)
d. Left thumper bumper
e. Right thumper bumper

614-2000

The 50K/100K free ball switch must be in the 100K position. When the diagnostic switch is placed in the test position, the following sequence of testing takes place:

1—Logic and program test. When the program is correct, it will display 600d on the score readout. If it is wrong, the score display will be gibberish or be off.

2—Score display and its drivers plus the switches and their drivers.

a. The score display will go through a scanning sequence from 000000 to 999999.

b. When a segment driver (lamp buffer) fails, the same segment in all digits will either be permanently off or on.

c. When a digit driver fails, that digit will be permanently off or on.

d. When the score display itself fails, one or more unrelated segments will be permanently off.

e. With the 50K/100K switch in the 100K position, 000000 will be shown on the score display. A stuck switch will not be indicated unless it was stuck prior to the test being started. See Fig. 9-8 for a cross-reference of stuck switch codes. Any other number in the score display indicates that there is more than one stuck switch. In this case, the displayed number is the sum of these stuck-switch codes. Examples of this condition are as follows:

DISPLAY	SWITCHES
00 00 11	S-20 and S-1
04 00 05	S-11, S-20, and S-9
␣0 00 01	S-20, S-13, and S-19
00⊏0␣0	S-6, S-14 (or S-15), S-8, and S-18

Switch locations are shown in Fig. 9-9.

f. With the 50K/100K switch in the 100K position, the diagnostic test will continue until the test/play switch is moved into the play position.

g. During the diagnostic test the lights on the game will alternate in two groups as listed below:
Group 1—P-1, P-2, B-1, B-2, L-1, L-2, L-4, L-10, L-11, L-14, L-15, L-16, L-17, L-18*, and L-22.
Group 2—P-3, P-4, B-3, B-4, B-5, L-3, L-6, L-7, L-8, L-9, L-12, L-13, L-18*, L-19, L-20, L-21, and game over.

*—L-18 illuminated in both groups.

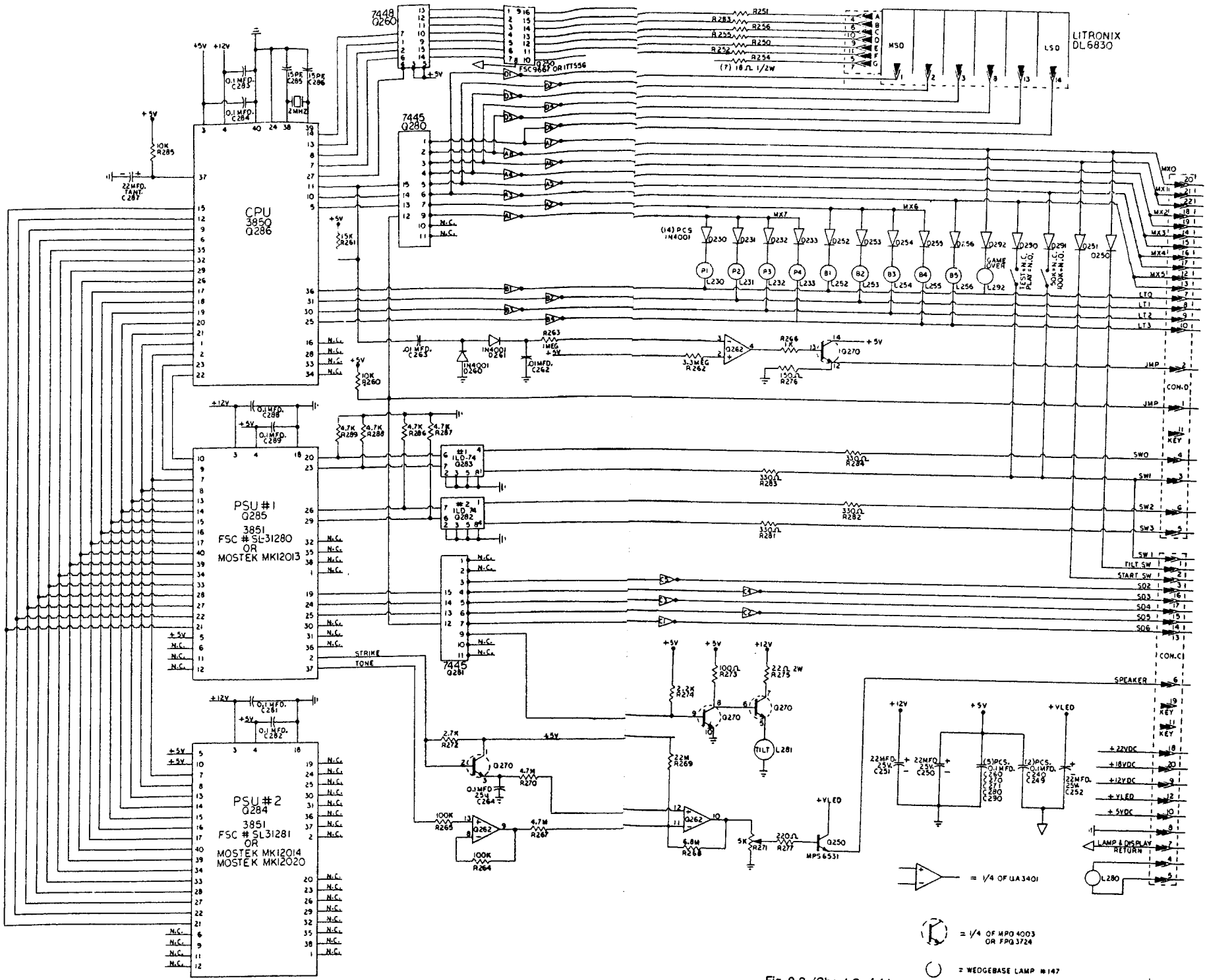


Fig. 9-2. (Sheet 2 of 4.)

Fig. 9-2. Overall schematic diagram of the 614-1000 (Evel Knievel) and 614-3000 (Fireball II). The 606-1000 (Fireball I) is similar. See Fig. 9-4 for a detailed schematic of the 606-00906 power supply and Fig. 9-6 for driver stage information (sheet 1 of 4).

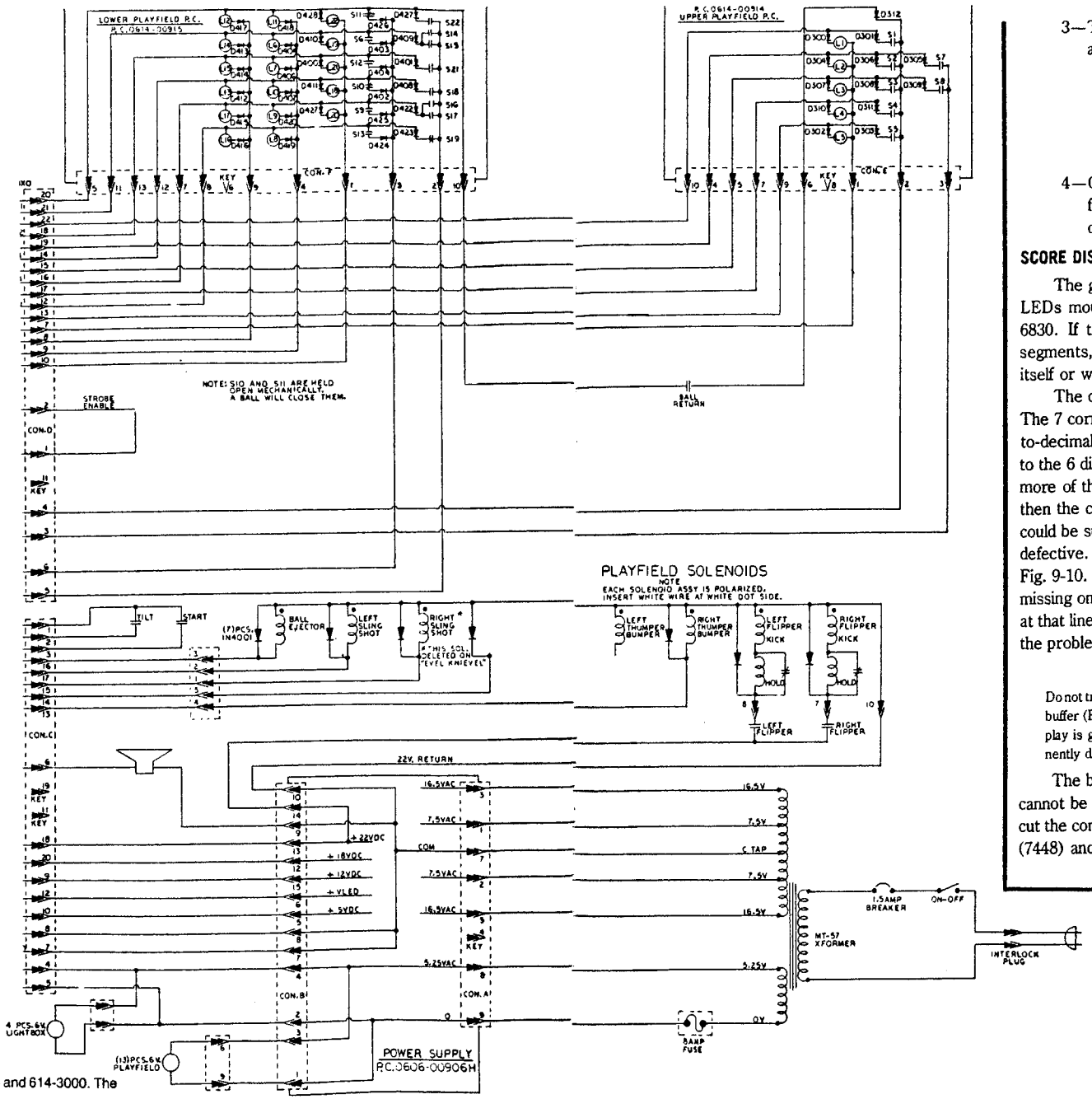


Fig. 9-2. Schematic diagram of 614-1000 and 614-3000. The 606-1000 is similar (sheet 3 of 4).

3—The solenoids and their respective drivers are activated in the following sequence:
   a. Ball return
   b. Left slingshot
   c. Right slingshot
   d. Left thumper bumper
   e. Right thumper bumper

4—One light out during the test indicates bulb failure. Four or eight lights out indicates driver failure.

SCORE DISPLAY

The game score is displayed using an array of LEDs mounted in one package, the Litronix DL-6830. If the numerals on the display miss some segments, it could be either due to a bad display itself or wrong information being fed into it.

The display can be viewed as a 7 × 6 matrix. The 7 corresponding to the 7 outputs of the BCD-to-decimal decoders (7448) and the 6 corresponding to the 6 display drivers (D1 through D6). If one or more of the numerals are completely blanked out, then the corresponding driver transistor (TIP115) could be suspected and should be replaced if found defective. A typical display driver output is shown in Fig. 9-10. If one particular segment of the display is missing on all the numerals (e.g., segment a), then at that line should be followed backwards to isolate the problem.

CAUTION

Do not try to ground the outputs of the lamp buffer (FSC 9667) to determine if the display is good or bad, as this could permanently damage the display.

The best way to check for a good display, if it cannot be determined by the diagnostic test, is to cut the connection pin 3 (lamp test) on the decoder (7448) and ground it. This should light up all the

Fig. 9-2. (Sheet 4 of 4.)

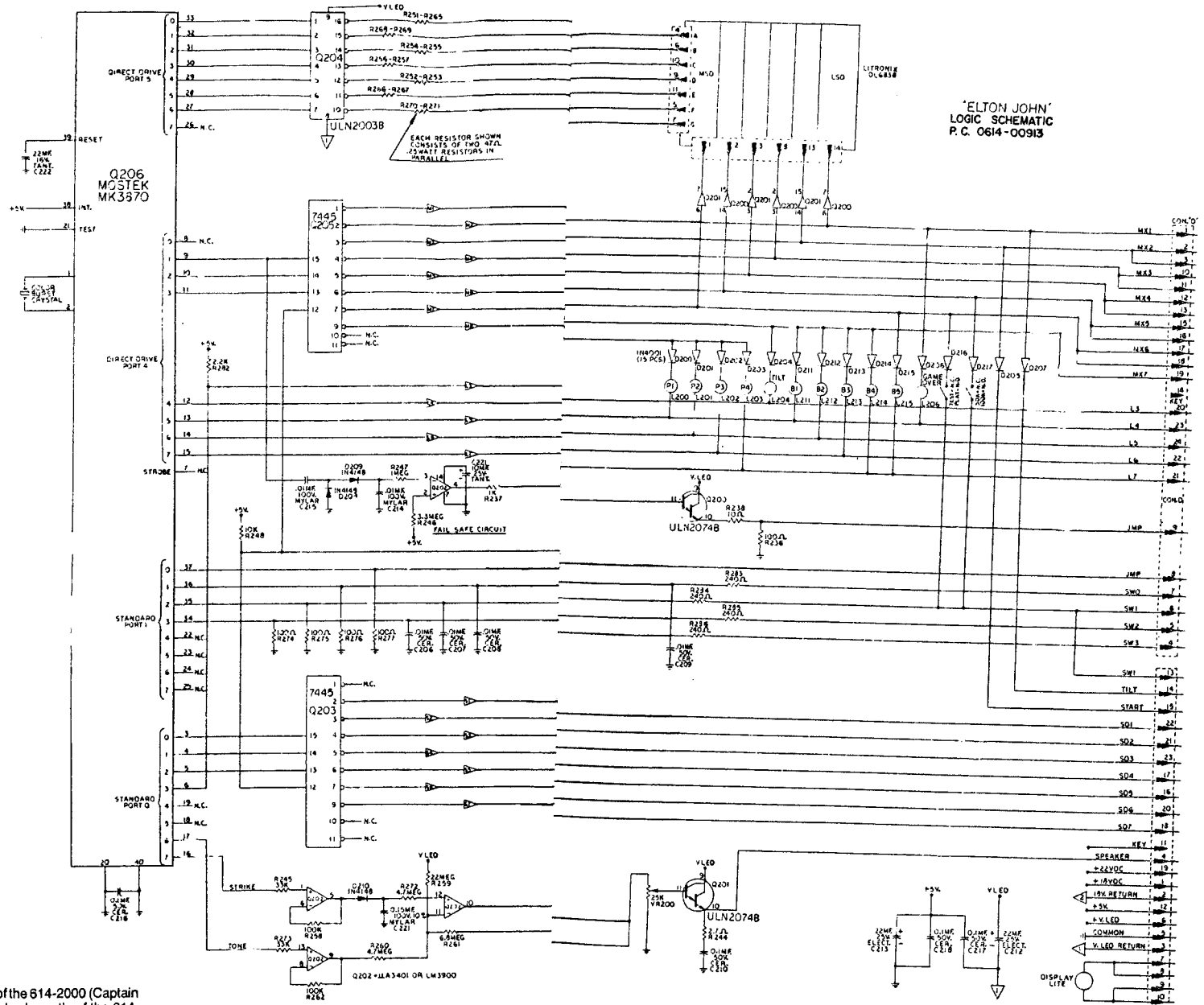


Fig. 9-3. Overall schematic diagram of the 614-2000 (Captain Fantastic). See Fig. 9-5 for a detailed schematic of the 614-00912 power supply and Fig. 9-7 for driver stage information (sheet 1 of 4).

Fig. 9-3. (Sheet 2 of 4.)

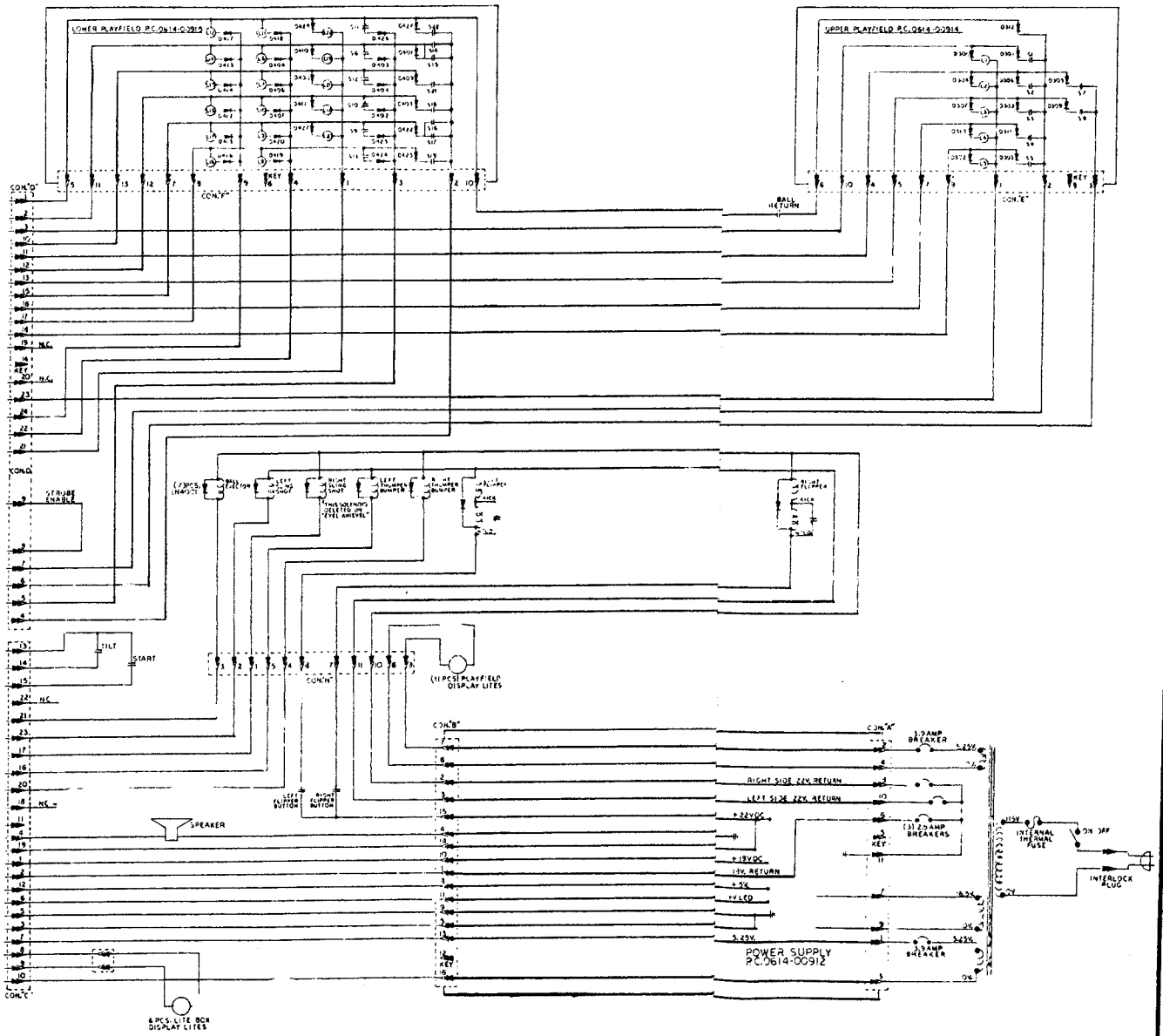


Fig. 9-3. Schematic diagram of the 614-2000 (sheet 3 of 4).

Fig. 9-3. (Sheet 4 of 4.)

segments of the display. If one or more segments blank out on some numerals while being lit on others, then the display is bad and should be replaced. If all the numerals miss the same segment, then that line stould be followed backwards to isolate the problem. This could happen due to a bad lamp buffer (FSC 9667) or a broken 18Ω resistor. In some instances, the decoder (7448) could also cause such problems, but it is usually not so.

The display of the 614-2000 can be viewed also as a 7 × 6 matrix, the 7 corresponding to the 7 outputs of the CPU-to-decimal decoder, ULN2003B, and the 6 corresponding to the outputs of the Q-drivers in the ULN2074Bs. Each of the ULN2074Bs drives three numerals. If any of the numerals are missing, the output of the respective ULN2074B should be checked. A typical output is shown in Fig. 9-11. If one particular segment of the display is missing on all the numerals (e.g., segment a), then that line should be followed backwards to isolate the problem. This could happen due to a bad ULN2003B or one or more broken 47Ω resistors. In some instances the CPU could also cause such problems, but it is not usually so.

MATRIX SECTION

All the lights (except the tilt light and the 5.25V AC lights) and all the switches located on the logic board and upper and lower playfields are included in this section.

The lights form an 8 × 4 matrix comprised of 8 multiplex (MX) lines and 4 light (LT) lines. The switches can similarly be viewed as a 6 × 4 matrix comprised of 6 multiplex (MX) lines and 4 switch (SW) lines. The MX lines are driven by the A-drivers (TIP115), the LT lines are driven by the B-drivers (TIP110), and the SW lines feed into the optical isolators (ILD74).

For the 614-2000, the MX lines are driven by the M-drivers (TIP125) and the LT lines are driven by the L-drivers (TIP110). The SW lines are fed into the CPU.

As can be seen from Fig. 9-12, the A-drivers (all models except 614-2000) control 4 lights each and the B-drivers 8 each. Therefore, anytime there is a problem with the lights, the best procedure would be to note the light numbers of missing lights, then check the matrix in Fig. 9-12 for the driver

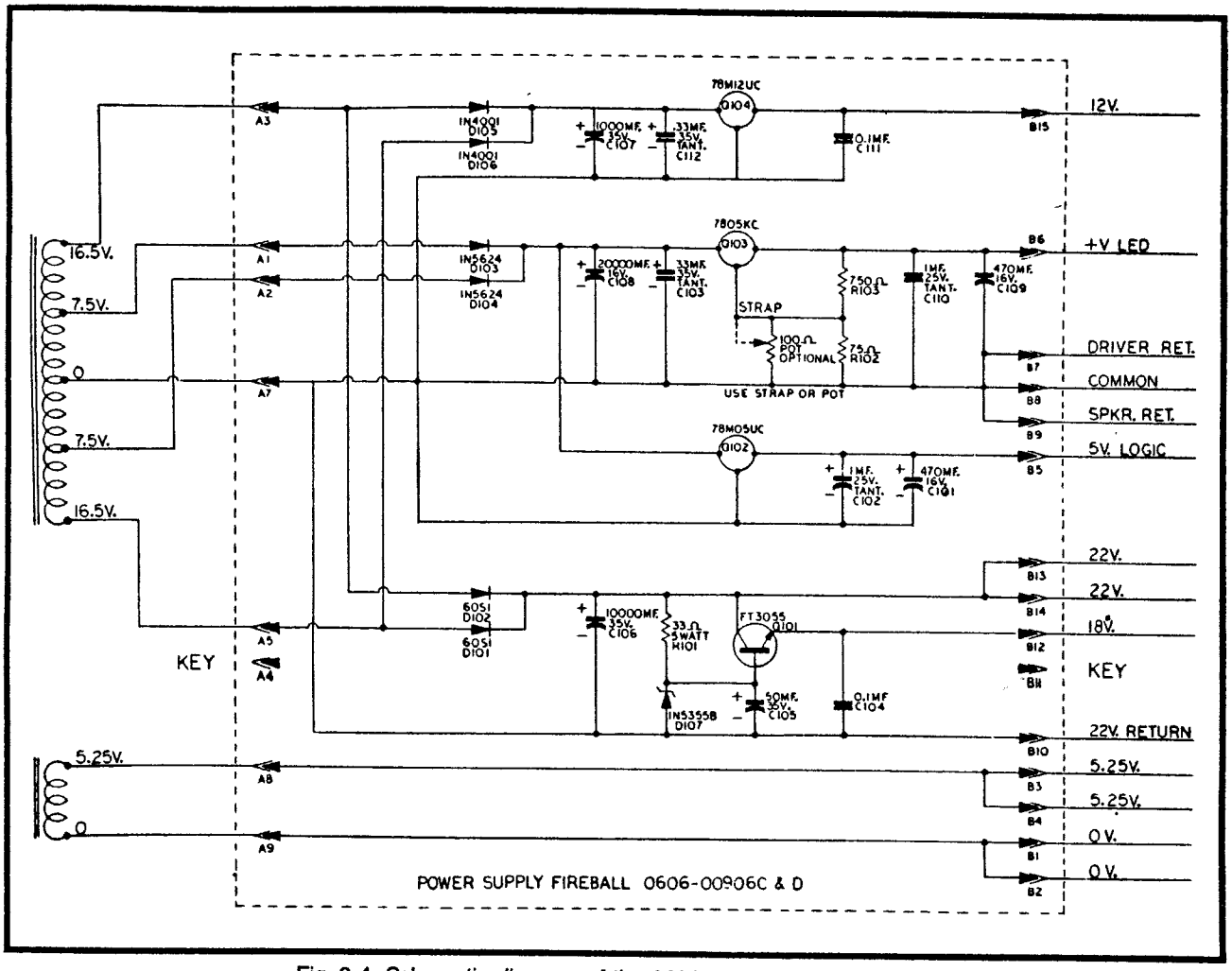


Fig. 9-4. Schematic diagram of the 0606-00906 power supply.

responsible. For example, if all 4 lights for the players (P1–P4) do not light up, then possibly driver A1 could be bad. A typical A-driver output is shown in Fig. 9-13. However, if light P1, light B1, and the game-over light on the logic board, together with lights L5, L4, L3, L2, and L1, do not light up, then possibly driver B1 is bad.

As can also be seen from Fig. 9-12 the M-drivers (model 614-2000) control 4 lights each and the L-drivers 8 lights each. Therefore, anytime there is a problem with the lights, the best procedure would be to note the light numbers of the missing lights, then check the matrix to find the responsible driver. For example, if all 4 lights for the players (P1–P4) do not light up, then possibly driver M8 could be bad. A typical M-driver output is shown in Fig. 9-13. However, if lights P1, B1, and the game-over light on the logic board, together with lights L1, L2, L3, L4, and L5, do not light up, then possibly driver L4 is bad.

Concerning models 606-1000, 614-1000, and 614-3000, if all the lights on the game and the logic board remain on after the diagnostic test as required, then all A-drivers and B-drivers are most likely good. Any problem with the switches on the game would then be associated with the switch (SW) lines. The best bet in a situation of this kind would be to note all switch numbers that do not function properly and, referring to the matrix, identify the SW line. Follow that line to the optical isolator (ILD74) and check it out both at the input and output. This could be done with the scope probe on the output and by closing the switches on the corresponding SW line. When one of the switches is closed, there should be pulses on the output of the ILD74. If this is not so, change the chip. If the pulses are present, make sure they reach the corresponding pin on the PSU #1 (pins 20, 23, 26, or 29). If the pulse is present at the input to the PSU and still the switch does not do its job, then change PSU #1.

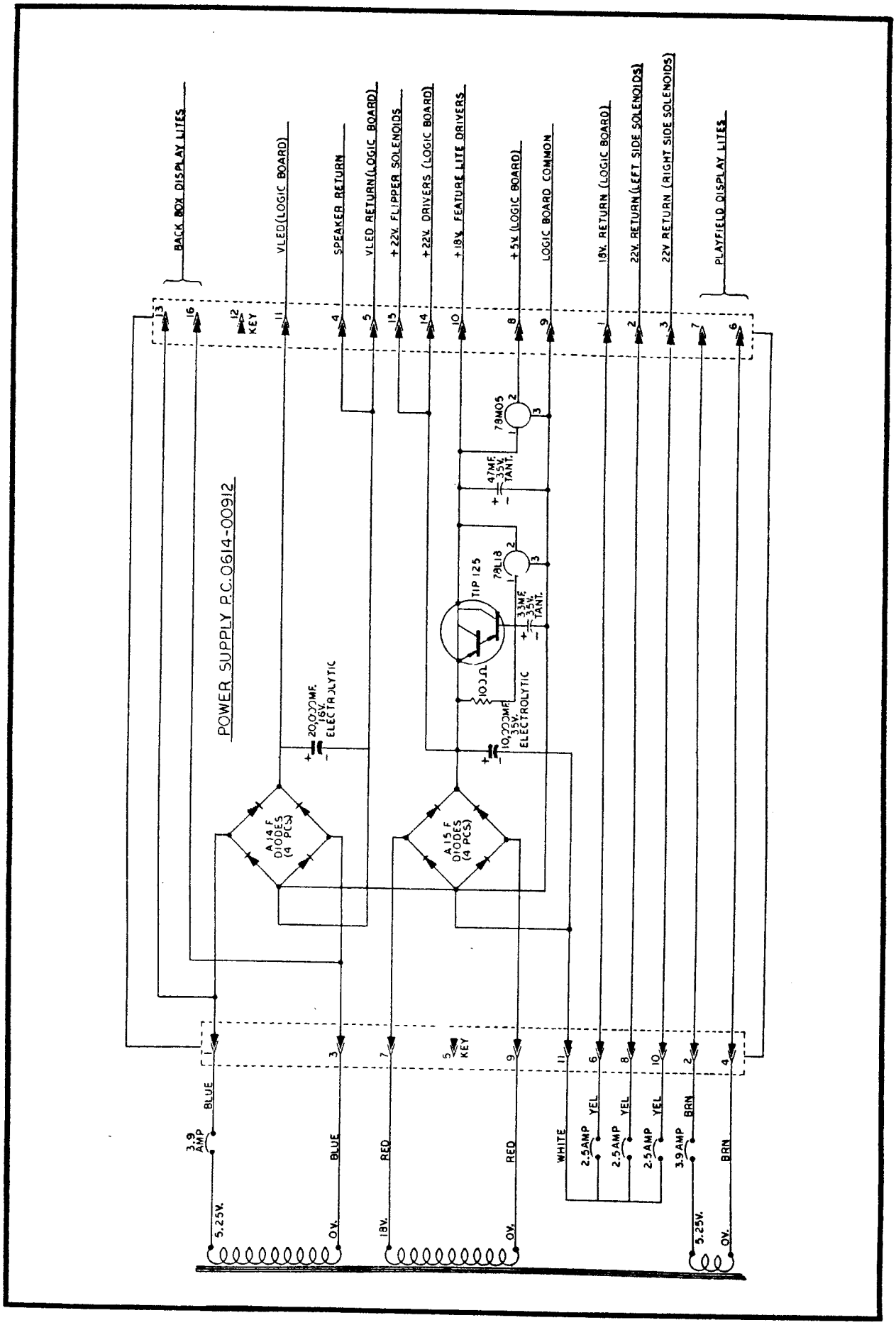


Fig. 9-5. Schematic diagram of the 0614-00912 power supply.

DRIVERS "A"

	2200 OHM	1000 OHM	TIP-115	IN 4001
A-1	R212	R213	Q212	----
A-2	R214	R215	Q214	----
A-3	R216	R217	Q216	D216
A-4	R218	R219	Q218	D218
A-5	R220	R221	Q220	D220
A-6	R222	R223	Q222	D222
A-7	R224	R225	Q224	D224
A-8	R226	R227	Q226	D226

DRIVERS "B"

	2700 OHM	2200 OHM	TIP-110	0.005 MFD
B-1	R242	R243	Q242	C242
B-2	R244	R245	Q244	C244
B-3	R246	R247	Q246	C246
B-4	R248	R249	Q248	C248

DRIVERS "C"

	2200 OHM	1000 OHM	TIP-145
C-1	R228	R229	Q228
C-2	R230	R231	Q230
C-3	R232	R233	Q232
C-4	R234	R235	Q234
C-5	R236	R237	Q236

DRIVERS "D"

	PULL-UP 1000 OHM	BASE 1000 OHM	TIP-115	IN 4001
D-1	R200	R201	Q200	D200
D-2	R202	R203	Q202	D202
D-3	R204	R205	Q204	D204
D-4	R206	R207	Q206	D206
D-5	R208	R209	Q208	D208
D-6	R210	R211	Q210	D210

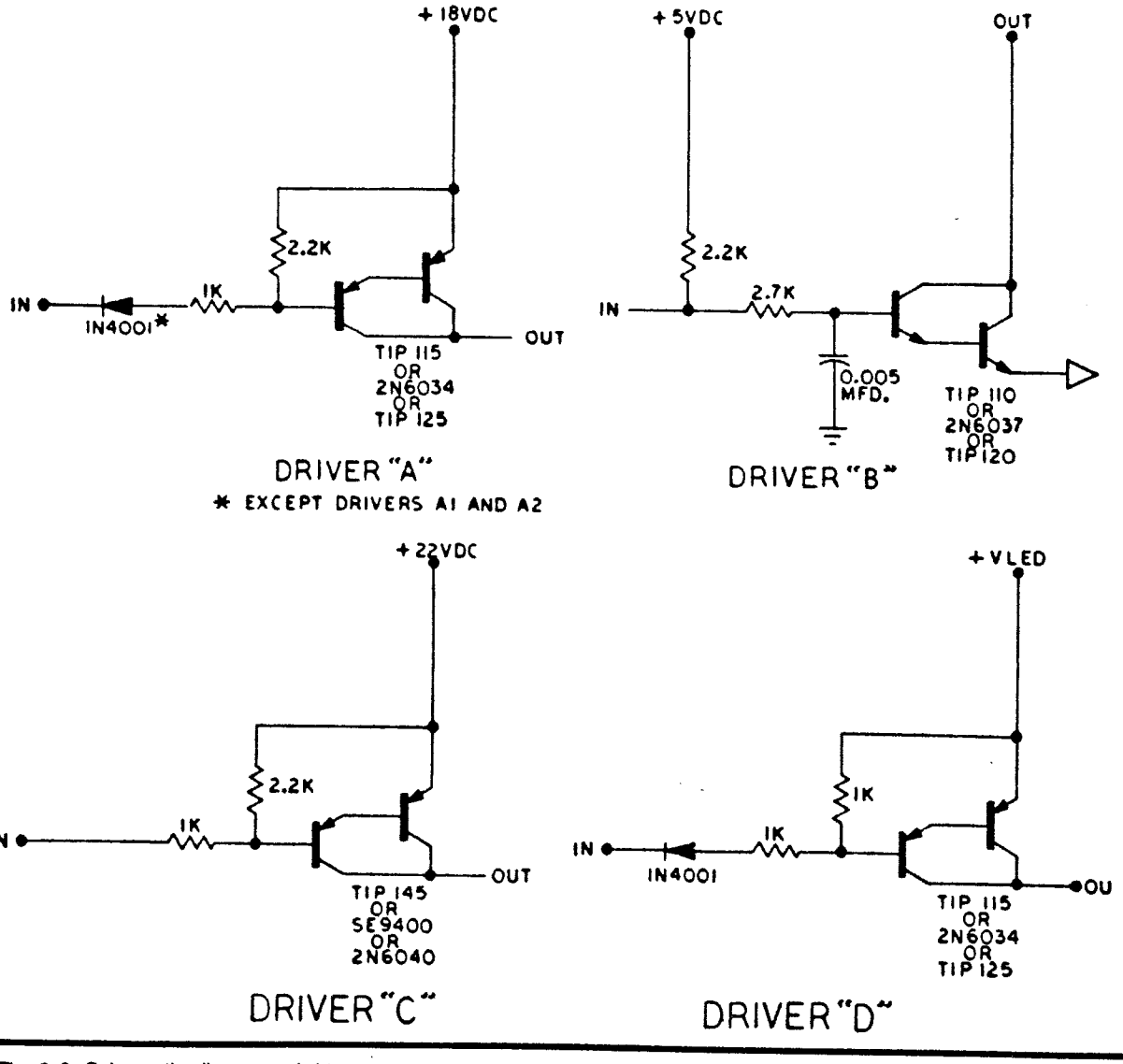


Fig. 9-6. Schematic diagram of driver stages used in the 614-1000 and 614-3000. Table lists component values.

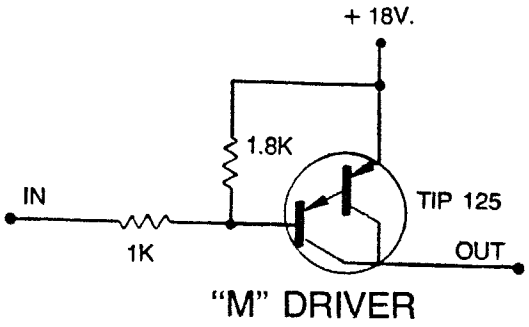
On the 614-2000. If all the lights on the game and logic boards flash during the diagnostic test as required, then all the M-drivers and L-drivers are most likely good. Any problem with the switches on the game would then be associated with the switch (SW) lines. The best bet in a situation of this kind would be to note all the switch numbers that do not function properly and, referring to the matrix, iden-

tify the SW line. Follow that line to the respective 240Ω resistor. Check carefully for a broken resistor or capacitor (0.01 μF) in this section. There should be a pulse on both sides of the resistor every time one of the switches on that switch line is closed. If the pulses are present, make sure that they reach the CPU. If they reach the CPU, check the outputs of the CPU at pins 9, 10, 11, 12, 13, and 14. If these are not present change the CPU.

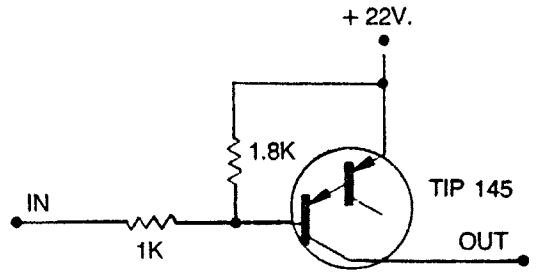
SOLENOID SECTION

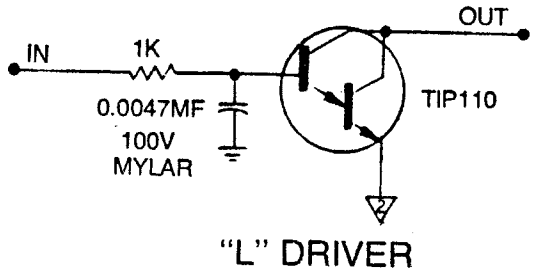
This section can be easily checked by performing the diagnostic test. On performing this test, all five of the solenoids controlled by the logic board should be energized in the following order:

1. Ball return
2. Left slingshot (not used in 614-1000)
3. Right slingshot



TRANSISTOR OR I.C.	BASE RES.	BIAS RES. OR CAP
M-1	R222	R221
M-2	R212	R211
M-3	R220	R219
M-4	R210	R209
M-5	R218	R217
M-6	R208	R207
M-7	R206	R205
M-8	R216	R215
L-3	R204	C204
L-4	R200	C200
L-5	R201	C201
L-6	R202	C202
L-7	R203	C203
S-1	R232	R233
S-2	R224	R225
S-3	R213	R214
S-4	R280	R281
S-5	R279	R279
S-6	R249	R250
S-7	R263	R264
Q200-3	R227	R235
Q200-6	R226	R234
Q200-14	R229	R228
Q201-3	R231	R240
Q201-6	R230	R239
Q201-14	R237	R241





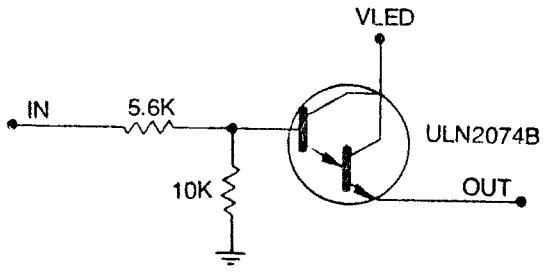


Fig. 9-7. Schematic diagram of driver stages used in the 614-2000. Table lists component values.

READ OUT ON DISPLAY

LOCATION ON DISPLAY	1	2	4	8	3	5	6	7	9	⊏	⊐	⊔	⊑	⊢	⊬
1	S20	TILT	S11	S22	S20 TILT	S20 S11	TILT S11	S20 TILT S11	S20 S22	TILT S22	S20 TILT S22	S11 S22	S20 S11 S22	TILT S11 S22	S20 TILT S11 S22
10	S1	START	S6	S14 or S15	S1 START	S1 S6	START S6	S1 START S6	S1 S14 or S15	START S14 or S15	S1 START S14 or S15	S6 S14 or S15	S1 S6 S14 or S15	START S6 S14 or S15	S1 START S6 S14 or S15
100	S2	S7	S12	S21	S2 S7	S2 S12	S7 S12	S2 S7 S12	S2 S21	S7 S21	S2 S7 S21	S12 S21	S2 S12 S21	S7 S12 S21	S2 S7 S12 S21
1K	S3	S8	S10	S18	S3 S8	S3 S10	S8 S10	S3 S8 S10	S3 S18	S8 S18	S3 S8 S18	S10 S18	S3 S10 S18	S8 S10 S18	S3 S8 S10 S18
10K	S4	50K	S9	S16 or S17	X	S4 S9	X	X	S4 S16 or S17	X	X	S9 S16 or S17	S4 S9 S16 or S17	X	X
100K	S5	X	S13	S19	X	S5 S13	X	X	S5 S19	X	X	S13 S19	S5 S13 S19	X	X

Fig. 9-8. Stuck switch cross-reference diagram. See Fig. 9-9 for switch locations.

4. Left thumper bumper
5. Right thumper bumper

When one or more of these solenoids do not energize, then the components that could be suspected would be the driver transistor or the solenoid itself. In model 614-2000, the driver transistors are S1 through S5. In all others they are C1 through C5. A good and easy way to eliminate the solenoid is to connect the leads of the suspected solenoid to a good one and test again. Using a scope, the transistor could be checked out by performing the test again. In most cases, replacing the TIP145 transistor should set things right. However, if this does not solve the problem, check at the input to the transistor, before the 1K resistor, and see if it goes low or not when the diagnostic test is performed. If this does not occur, change the decoder IC(7445).

SOUND SECTION

The sound section of the logic board is simple and straightforward. As can be seen from the schematic (Fig. 9-2) it is comprised of (1) PSU #1, (2) transistor array Q270 (FPQ3724), (3) op amp Q262 (μA3401 or LM3900), and transistor Q250 (MPS6531).

The frequency of the sound signal is varied internally in PSU #1 as required and is outputted at pin 37 of PSU #1 as TONE. The strike is what makes the sound audible. In other words, when pin 2 of PSU #1 goes high, there will be a sound signal at pin 10 of op amp Q262.

If the logic board loses its sound, the first place to check would be pins 37 and 2 of PSU #1. Turn the power switch on and put the game in the 1-player, first-ball mode by pushing the start switch once. There should be a square wave at pin 37 as shown in Fig. 9-14.

Now every time one of the switches on the playfield is closed, pin 2 of PSU #1 should go high momentarily. If this checks out, check pin 3 of transistor array Q270 (FPQ3724). It should be noted here that the 0.1 μF (Z5U) capacitor is very critical

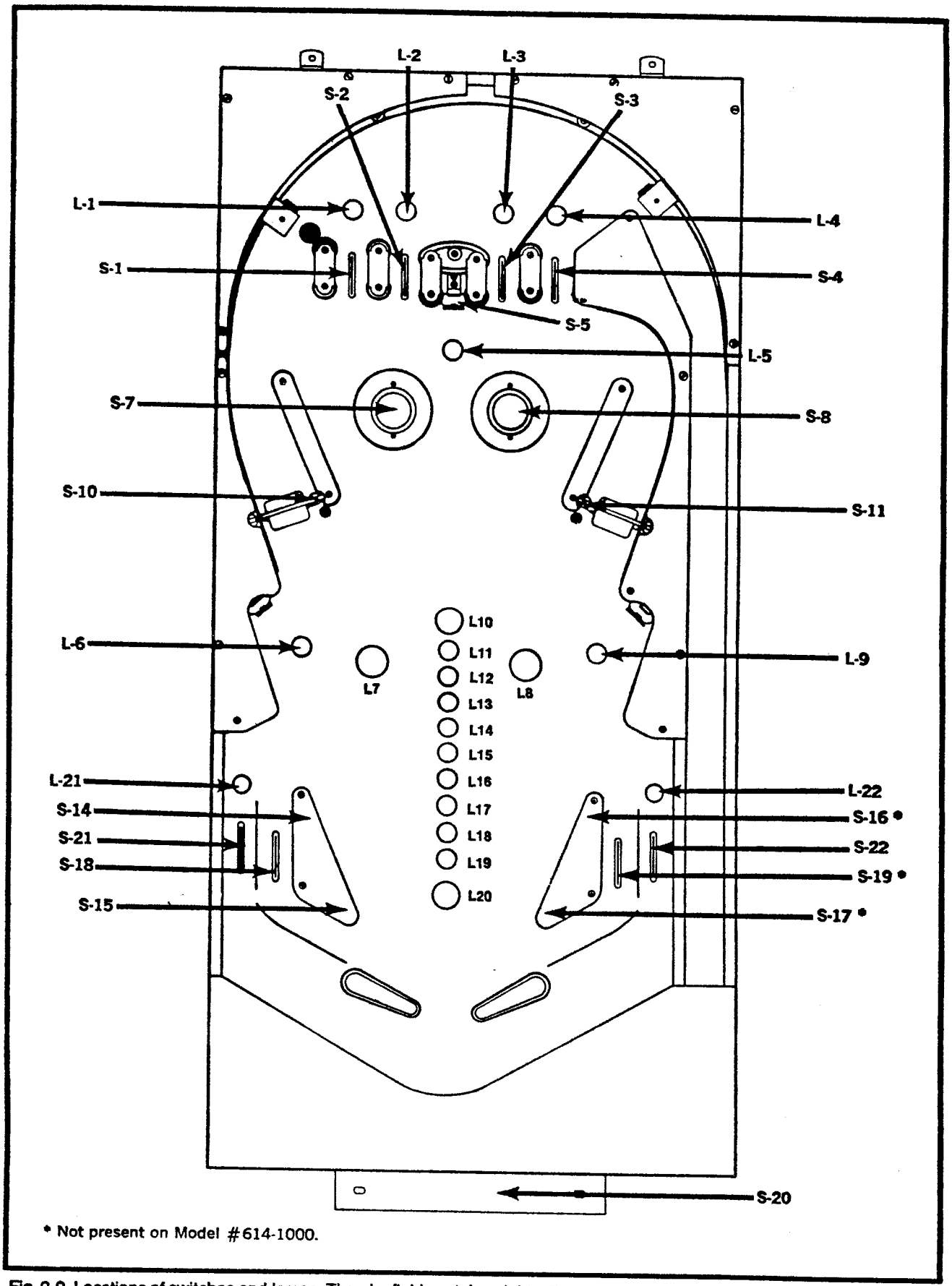
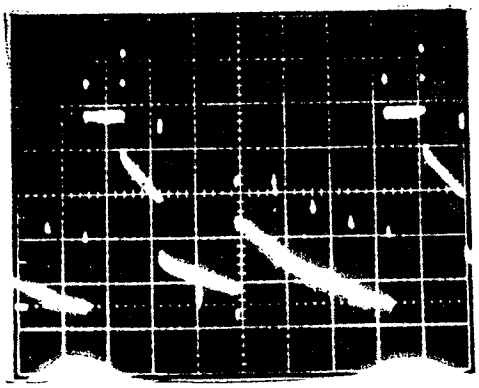


Fig. 9-9. Locations of switches and lamps. The playfield contains eight rollover switches (S1, S2, S3, S4, S18, S19, S21, and S22), six sling shot and side rubber switches (S12 through S17), three target switches (S5, S6, and S9), two thumper bumper switches (S7 and S8), one ball return switch (S20), and two spinner target switches (S10 and S11).



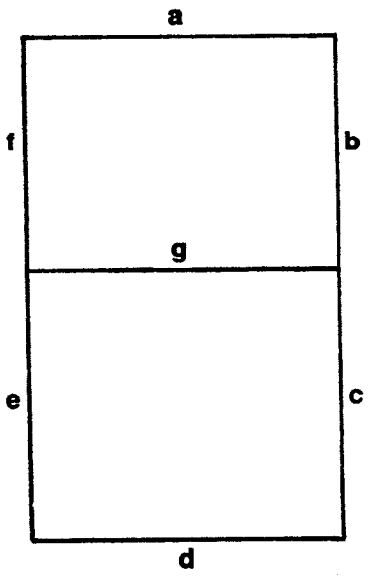


Figure #1A — Typical display driver output
Horz: 2ms/div.
Vert: 1v/div.

Fig. 9-10. Waveform of a typical display driver (D-driver). Scope horizontal controls are set for 2 ms/div with vertical controls set for 1V/div.

and should be replaced if suspected. Also, check if any of the resistors in this section are broken. If the sound signal appears at pin 10 of the op amp each time one of the switches is closed, check out transistor Q250 (MPS6531) and replace it if necessary.

The sound section of the 614-2000 is comprised of (1) CPU Q260 (MK3870), (2) op amp Q202 (LM3900), and (3) a portion of the ULN2074B (Q201).

The frequency of the sound signal is varied internally in the CPU as required and is outputted at pin 17 of the CPU as tone. When pin 16 of the CPU goes high there will be a sound signal at pin 10 of op amp Q202 (LM3900).

If the logic board loses its sound, the first place to check would be pins 16 and 17 of the CPU. Turn the power switch on and put the game in the 1-player first-ball mode by pushing the start switch once. There should be a square wave at pin 17, as shown in Fig. 9-14. Now every time one of the switches on the playfield is closed, pin 16 of the CPU should go high momentarily. If this checks out, check pin 5 of op amp Q202 (LM3900). Check closely to see if any of the resistors are broken in this section. If the sound signal appears at pin 10 of the op amp, check out Q201 (ULN2074B). Replace it if necessary.

THE INSIDE WORLD

The inside world, naturally, is comprised of the information processing of the central processing unit (CPU, Fig. 9-15) in conjunction with the instructions of the program storage unit (PSU, Fig. 9-16). It is anticipated that if all things in *the outside world* (electromechanical devices, etc.) remain normal, the inside world should function correctly. The famous computer science adage GIGO (garbage in-garbage out) applies to this minicomputer as well. If the right input is furnished to this computer,

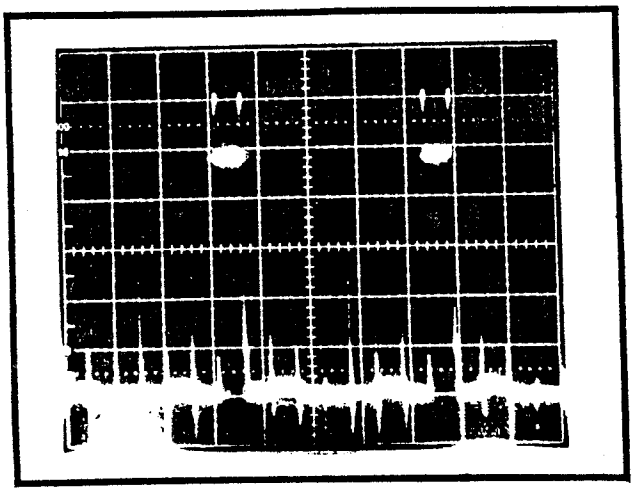


Fig. 9-11. Waveform of a typical Q-driver in the 614-2000. Scope controls are 2 ms/div for the horizontal and 1V/div for the vertical.

there is no reason why the right output should not be obtained.

A quick and easy way to check if the CPU and PSUs are functioning properly would be to perform the diagnostic test. If the display shows the characters 600c at the beginning of the test as it is supposed to, then it is confirmed that the CPU and PSUs are linked and functioning correctly.

If the display does not read 600c at the beginning of the test, that is, if the score display shows

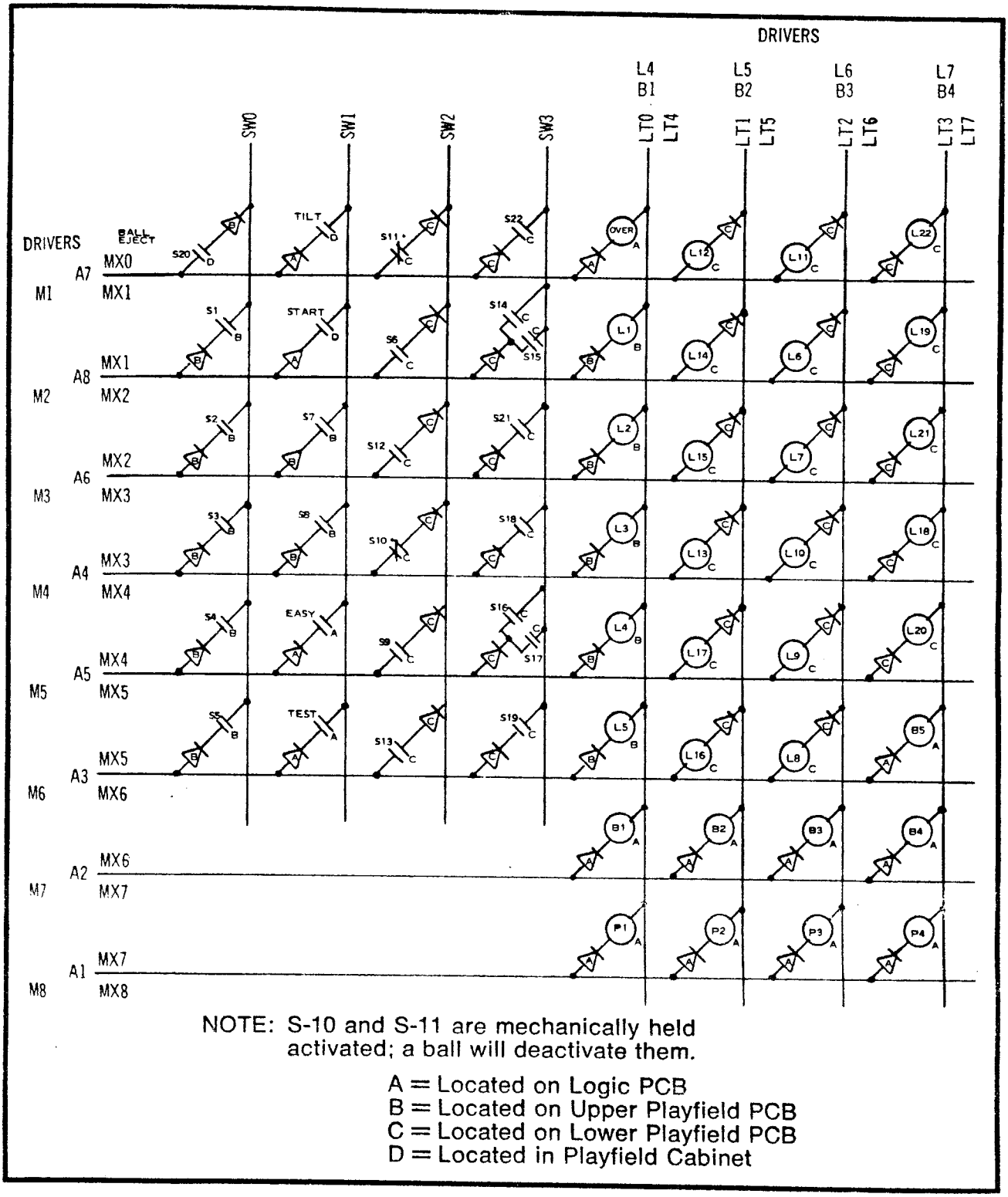


Fig. 9-12. The matrix. Data concerning the 614-2000 (Captain Fantastic) is shown in italics. To determine which lights driver A1 (614-1000 and 614-3000) controls, follow the horizontal plane, where driver A1 is located, across the figure. Lights P1 through P4 are controlled by driver A1. For the 614-2000, driver M8 controls the same set of lights, P1 through P4.

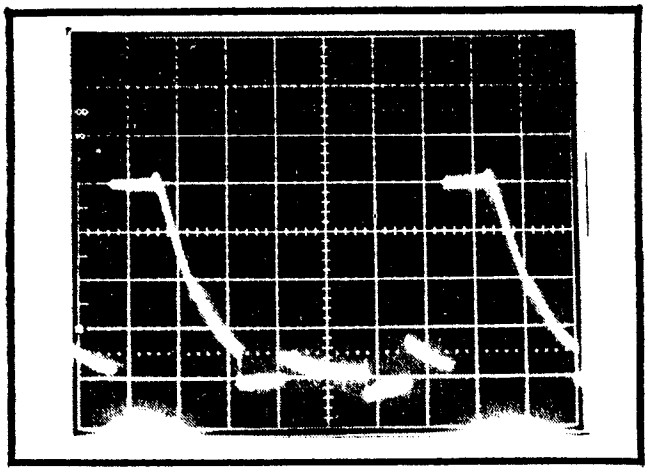


Fig. 9-13. Typical A-driver or M-driver output. Scope controls are 2 ms/div for the horizontal and 5V/div for the vertical.

gibberish or is off, then the logic and program are incorrect.

If the display is off, determine if the board is dead. If so, refer to the *Dead Board* symptom in this chapter. If not, change PSU #1 before changing PSU #2. If this does not help, change the CPU. The possibility of damage to either the CPU or a PSU is very remote unless the power supplied on the 12V and 5V lines changed drastically. It should be noted here that PSU #1 and PSU #2 act as one unit. The only purpose of using PSU #2 is to provide more memory to the system. In other words, PSU #2 is used only as an ROM (read-only memory).

If the 614-2000 display does not read 600d at the beginning of the test, then the logic and program are incorrect. If the display is off, determine if the board is dead and, if so, refer to the *Dead Board* symptom in this chapter. The possibility of damage to the CPU is very remote unless the 5V supplied to it has changed drastically, or the CPU, due to its static nature, has been mishandled.

DEAD BOARD

When none of the light except the 5.25V AC lights upon turning the power on, and the diagnostic test cannot be performed, or the game cannot be started, the board is referred to as *dead*. Although this is not expected to happen, when it does happen, it could be due to various reasons. Some of the more common ones, along with the methodology to identify and rectify them, are listed below:

1. Check out the power supply. If another one is handy, replace the power supply.
2. Check all the voltages: 22V, 18V, 12V (not in 614-2000), +5V and VLED (5 to 6V) on the logic board. If any of these voltages are missing and it is found that the power supply is not responsible for it, check for possible shorts and bad capacitors. Regain the lost voltage first.

3A. If all the voltages seem good and the board remains dead, check the clock section (pins 39 and 38 of the CPU). These waveforms are shown in Figs. 9-17 and 9-18.

3B. For model 614-2000, pins 1 and 2 of the CPU are used instead of 38 and 39. Refer to Figs. 9-19 and 9-20 for these waveforms.

4. If these waveforms, as shown in Figs. 9-17 through 9-20, are not present, check the fail-safe circuit.

NOTE

Steps 5 through 8 do not apply to model 614-2000.

5. If pins 38 and 39 look good, check the timing pulses on pins 1 and 2 of the CPU. These are shown in Figs. 9-21 and 9-22. If this is missing, check for +5V and +12V on the CPU at pins 3 and 4, respectively. If pins 1 and 2 do not have the right pulses with these voltages present at pins 3 and 4, change the CPU.
6. Now, check the control signals on pins 17, 18, 19, 20, and 21 of the CPU. Make sure these reach pins 13, 14, 15, 16, and 17 of PSU #1 and PSU #2. A typical waveform

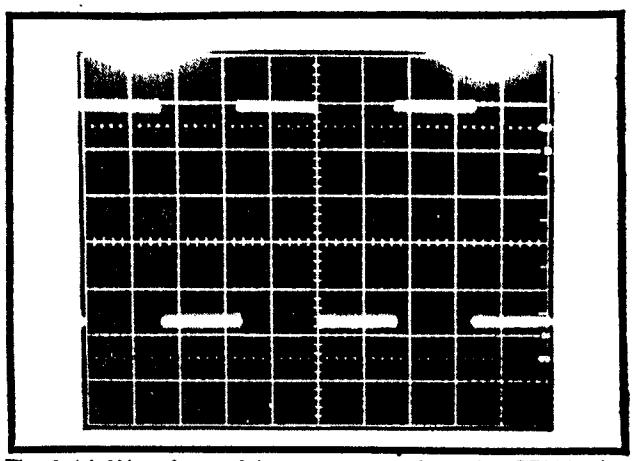
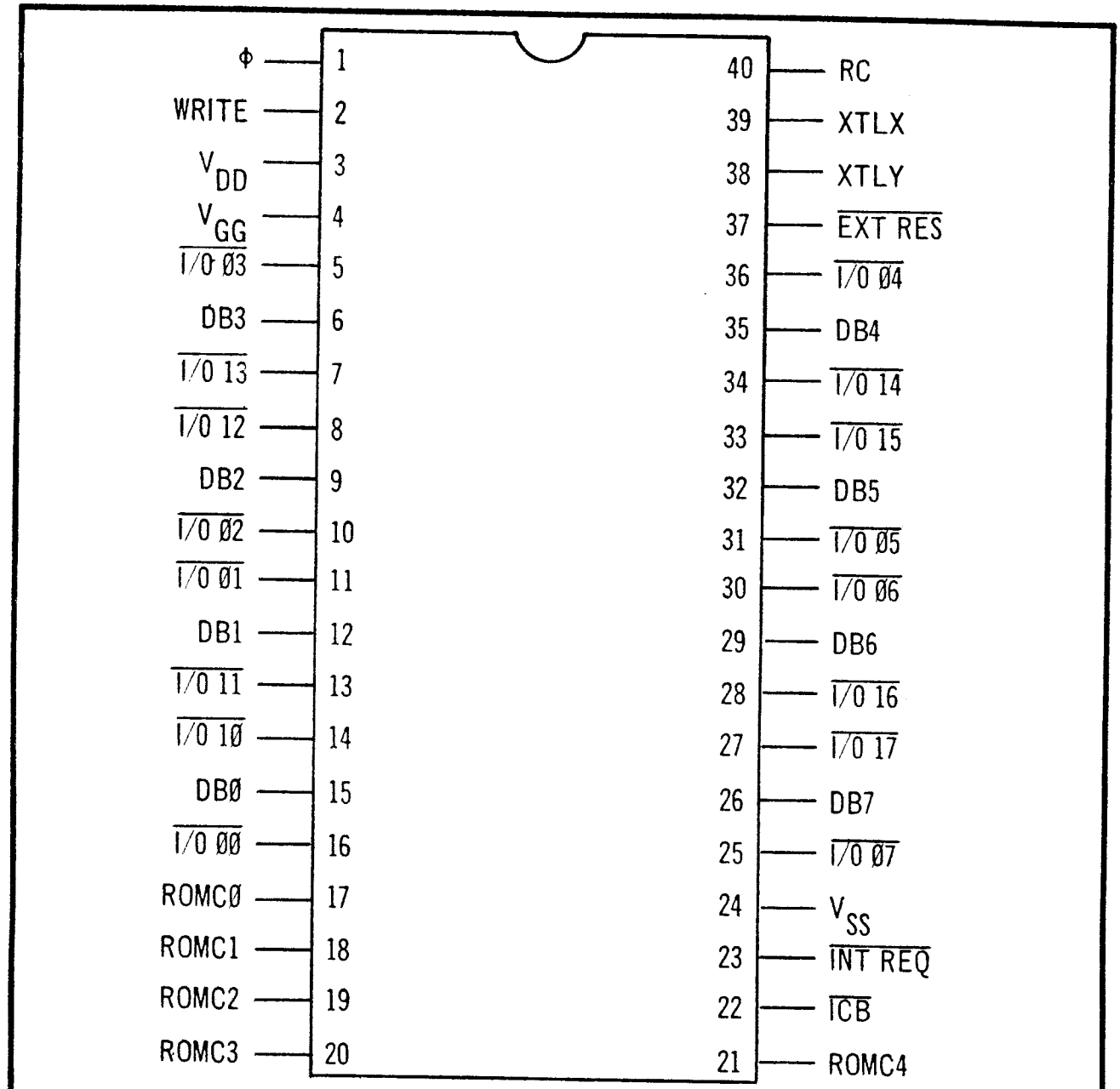
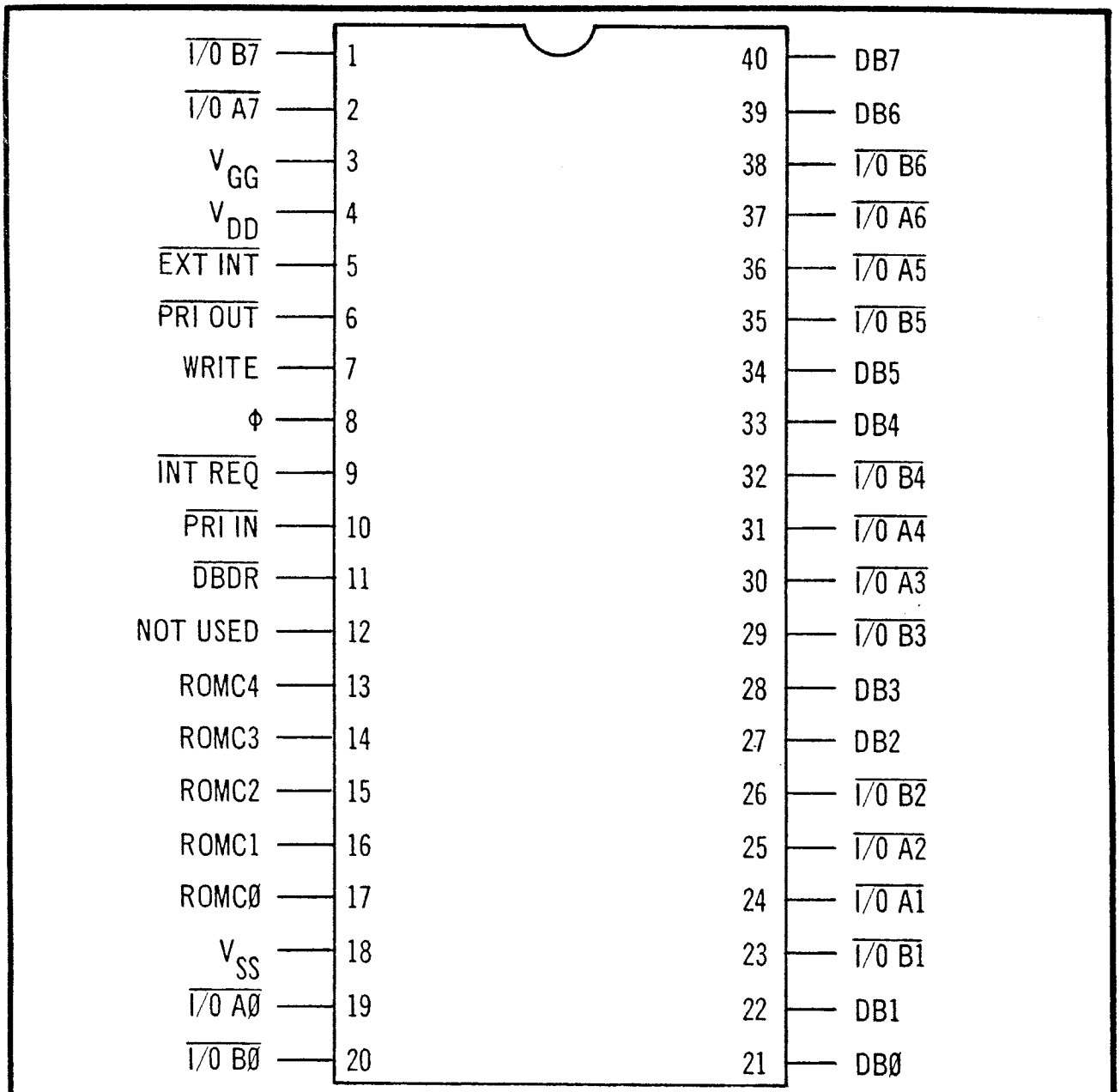


Fig. 9-14. Waveform of the tone output from the CPU in the 1-player, first-ball mode. Scope controls are 2 ms/div for the horizontal and 1V/div for the vertical.



PIN NAME	DESCRIPTION	TYPE
DBØ - DB7	Data Bus Lines	Bidirectional
Φ, WRITE	Clock Lines	Output
I/Ø ØØ - I/O Ø7	I/O Port Zero	Bidirectional
I/O 1Ø - I/O 17	I/O Port One	Bidirectional
RC	RC Network Pin	Input
ROMCØ - ROMC4	Control Lines	Output
EXT RES	External Reset	Input
INT REQ	Interrupt Request	Input
ICB	Interrupt Control Bit	Output
XTLX	Crystal Clock Line	Output
XTLY	External Clock Line	Input
V_{SS}, V_{DD}, V_{GG}	Power Lines	Input

Fig. 9-15. Pin layout for the 3850 CPU.



PIN NAME	DESCRIPTION	TYPE
I/Ø AØ - I/O A7	I/O Port A	Bidirectional
I/O BØ - I/O B7	I/O Port B	Bidirectional
DBØ - DB7	Data Bus	Input
ROMCØ - ROMC4	Control Lines	Input
Φ, WRITE	Clock Lines	Input
EXT INT	External Interrupt	Input
PRI IN	Priority In	Input
PRI OUT	Priority Out	Output
INT REQ	Interrupt Request	Output
DBDR	Data Bus Drive	Output
V_{SS}, V_{DD}, GG	Power Supply Lines	Input

Fig. 9-16. Pin layout for the 3851 PSU.

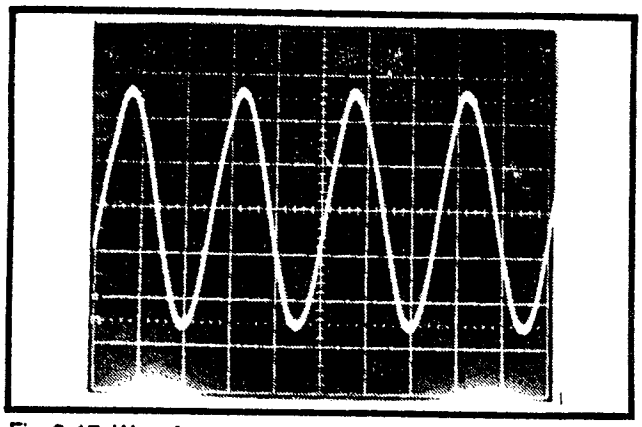


Fig. 9-17. Waveform at pin 37 of the 3850 CPU in 614-1000 and 614-3000. This is the clock input. Scope controls are 0.2 μs/div for horizontal and 1V/div for vertical.

of the control pulse is shown in Fig. 9-23. If these check good, and in most cases they should, then proceed to step 7. If any of them do not seem right, proceed to step 8.

7. Check the data bus lines at pins 6, 9, 12, 15, 26, 29, 32, and 35 of the CPU. Make sure the signals on these lines read PSU #1 and PSU #2. There should be fast-switching pulses on these pins. A typical data bus line is shown in Fig. 9-24. Also make sure these are not shorted together. This could be done by holding the scope probe on one and momentarily grounding the others.
8. Check pins 11, 10, and 5 of the CPU. There should be square wave outputs on them. If pin 11 has a pulse (as shown in Fig. 9-25), then the CPU and PSU are functioning normally. If it is just a high, then there is something wrong on the data bus or the control lines, or PSU #1 may be bad. Refer back to step 6 and change PSU #1 before changing the CPU.

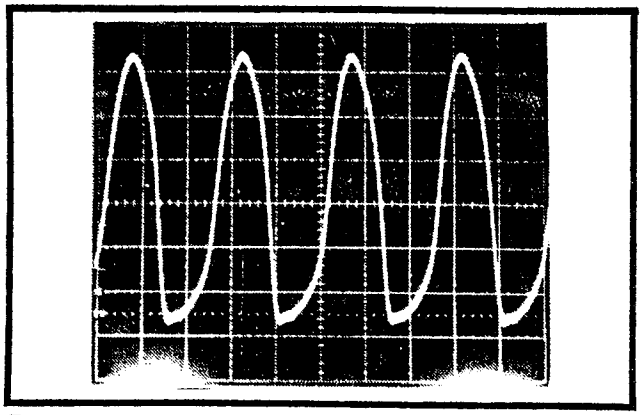


Fig. 9-18. Clock output at pin 39 of the 3850 CPU in the 614-1000 and 614-3000. This waveform was taken with the scope control at 0.2 μs/div for the horizontal and 1V/div for the vertical.

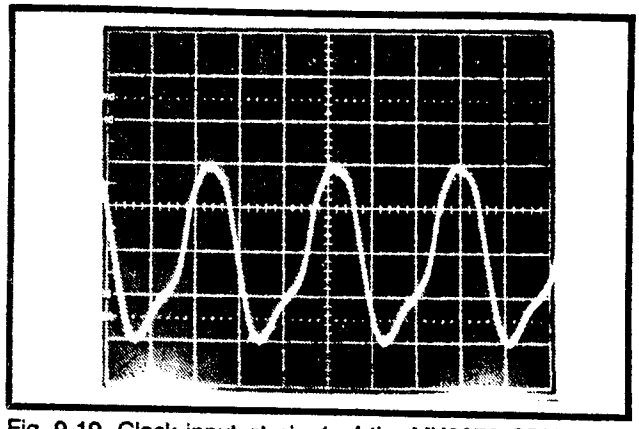


Fig. 9-19. Clock input at pin 1 of the MK3870 CPU in the 614-2000. Scope controls are at 1 μs/div for the horizontal and 1V/div for the vertical.

FAIL-SAFE CIRCUIT

This circuit is designed to prevent multiplexing if the CPU or PSU do not strobe properly. This protects the display and light bulbs from getting damaged. In other words, if pin 11 of CPU is high, pin 4 of op amp Q262 (μA3401) would be high, which results in preventing the decoders (7445s) from decoding. If there is a pulse on pin 11 of the CPU (as shown in Fig. 9-25) and pin 4 of the op amp remains high, then check the fail-safe circuit thoroughly. Check the external strapping on connector D, pins 1 and 2 (strobe enable). Check for broken resistors or diodes in that section. If they seem good, replace the 0.01 μF capacitors and IN4004 diodes before changing the op amp itself.

Concerning model 614-2000, if pin 9 of CPU is high, pin 4 of the op amp (LM3900) could be high, which results in preventing the decoders (7445)

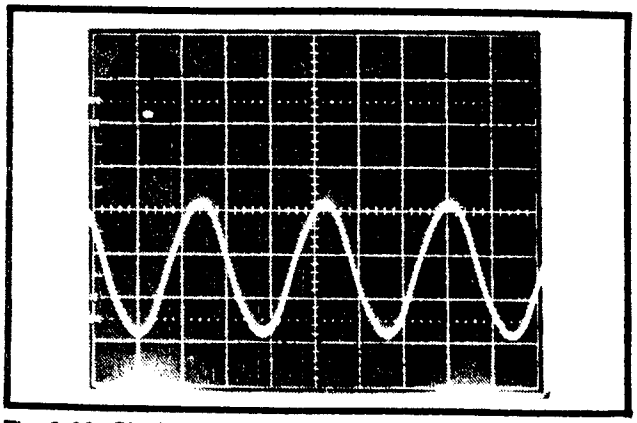


Fig. 9-20. Clock output at pin 2 of the MK3870 CPU in the 614-2000. Scope controls are at 1 μs/div for the horizontal and 1V/div for the vertical.

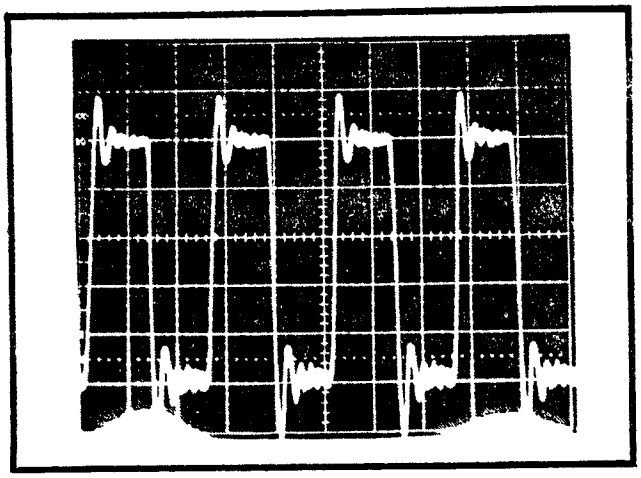


Fig. 9-21. Timing pulse output to both PSUs from pin 1 of the 3850 CPU in the 614-1000 and 614-3000. Scope controls are at 0.2 μs/div for the horizontal and 1V/div for the vertical.

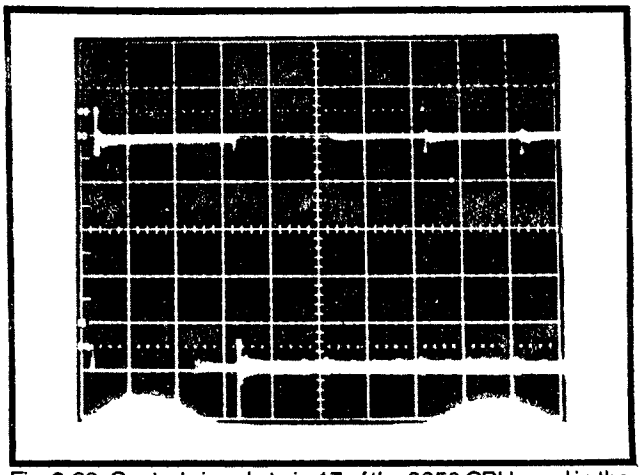


Fig. 9-23. Control signal at pin 17 of the 3850 CPU used in the 614-1000 and 614-3000. Scope controls are at 1 μs/div for the horizontal and 1V/div for the vertical.

from decoding. If there is a pulse on pin 9 of the CPU (as shown in Fig. 9-25) and pin 4 of the op amp remains high, then check the fail-safe circuit thoroughly. Check the external strapping on connector D, pins 8 and 9 (strobe enable). Check closely for broken resistors or diodes in that section. If they seem good, replace the 0.01 μF capacitors and the IN4004 diodes before changing the op amp itself.

TILT LIGHT

This is the only light other than the 5.25V AC lights which is not in the matrix but is controlled by the logic board. If the tilt light does not light when the tilt switch is closed, check the bulb and socket first. Then check pins 24 and 25 of PSU #1 and see if they go high when the tilt switch is closed with the game in the play mode. If this checks out, check the

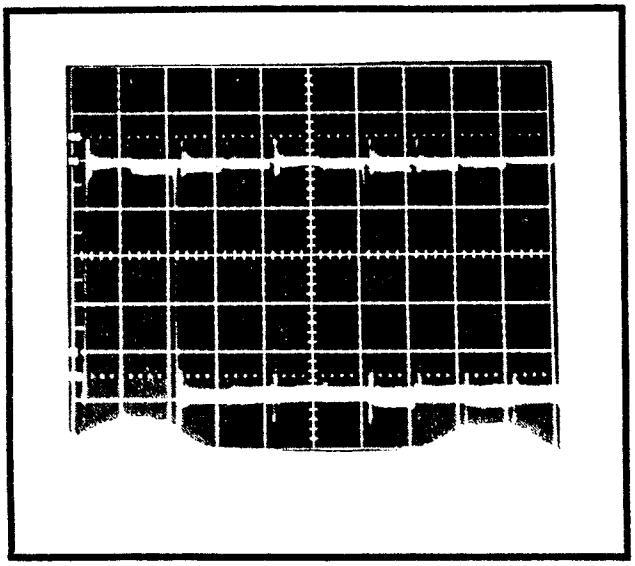


Fig. 9-24. Data bus line signal at pin 6 of the 3850 CPU. Scope controls are at 1 μs/div for the horizontal and 1V/div for the vertical.

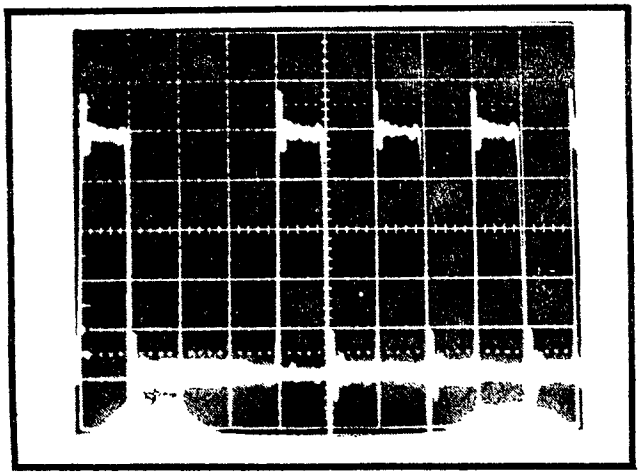


Fig. 9-22. Timing pulse output from pin 2 of the 3850 CPU to both PSCs in the 614-1000 and 614-3000. Scope controls are at 0.5 μs/div for the horizontal and 1V/div for the vertical.

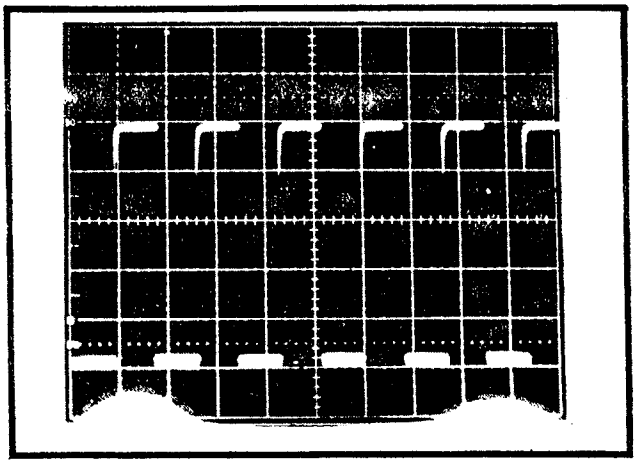


Fig. 9-25. Square wave output at pin 11 of the 3850 CPU. If this signal is present, the CPU and PSUs are working normally. Scope controls are at 2 ms/div for the horizontal and 1V/div for the vertical.

output of the decoder (7445) at pin 9 and see if it goes low or not. If it does, the decoder is good; change transistor array Q270 (FPQ3724). If pin 9 does not go low, change the decoder.

On the 614-2000, the tilt light is the only light, other than the 5.25V AC light, that is not in the matrix but is controlled by the logic. If the tilt light does not light when the tilt switch is closed, check the bulb and socket first. If the bulb appears to be good, check pin 6 of the CPU and see if it goes high when the tilt switch is closed with the game in the play mode. If this is okay, check driver L3's output. If the tilt light remains on all the time, check driver L3 for a short. If it appears to be good, check pins 6 of the CPU. If it is high without the tilt switch being closed, change the CPU.

SERVICE PROCEDURES

The following procedures cover switch adjustments, cleaning the playfield, lamp replacement, and fuse replacement. Figure 9-9 indicates the locations of various switches and lamps on the playfield.

Rollover Switch

The ball must actuate the switch when rolling through the rollover area from both directions. To adjust the actuator proceed as follows:

1. Form the actuator as shown in Fig. 9-26 to ensure that the switch is actuated when the ball rolls over it in either direction. The actuator should be centered in the slot when adjusted and not resting above the playfield surface.
2. Check the operation of the switch by rolling a ball over the actuator. The ball should not stop or hang up.
3. Check for spring return after the ball has passed over the actuator. The spring should return to the up position.

Sling Shot & Side Rubber Switch

The rubber bumper must be evenly stretched around all posts. The switch actuator blade must be adjusted to make the switch actuate (clicking sound) when it moves 0.0625 inches (1.587 mm) from the rubber bumper. If the switch is adjusted too close, the sling shot will chatter. Refer to Fig. 9-27.

Target Switch

The switch must actuate and reset (click, click) freely in the playfield slot. The rear stop bracket must be adjusted for 0.1562 inches from the actuation point of the switch. Make this adjustment by bending the stop bracket. Refer to Fig. 9-28.

Thumper Bumper Switch

The thumper bumper spoon must be centered about the thumper bumper actuating point in all directions. Refer to Fig. 9-29. When the thumper bumper wafer is depressed at any point on the

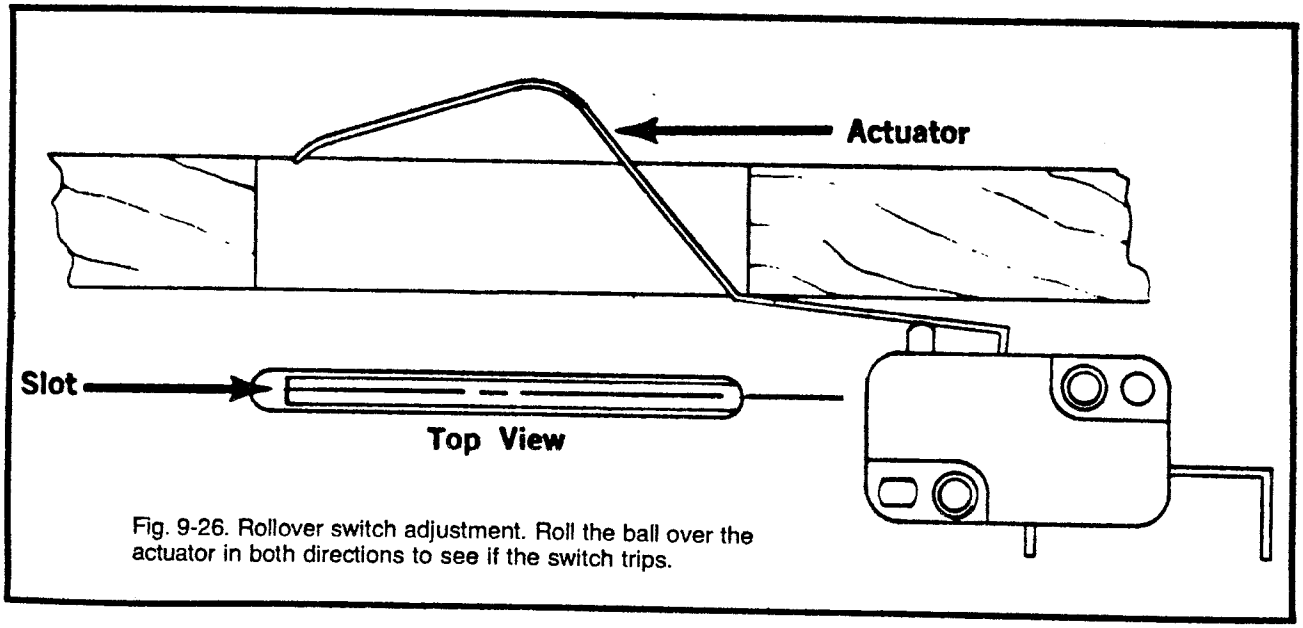


Fig. 9-26. Rollover switch adjustment. Roll the ball over the actuator in both directions to see if the switch trips.

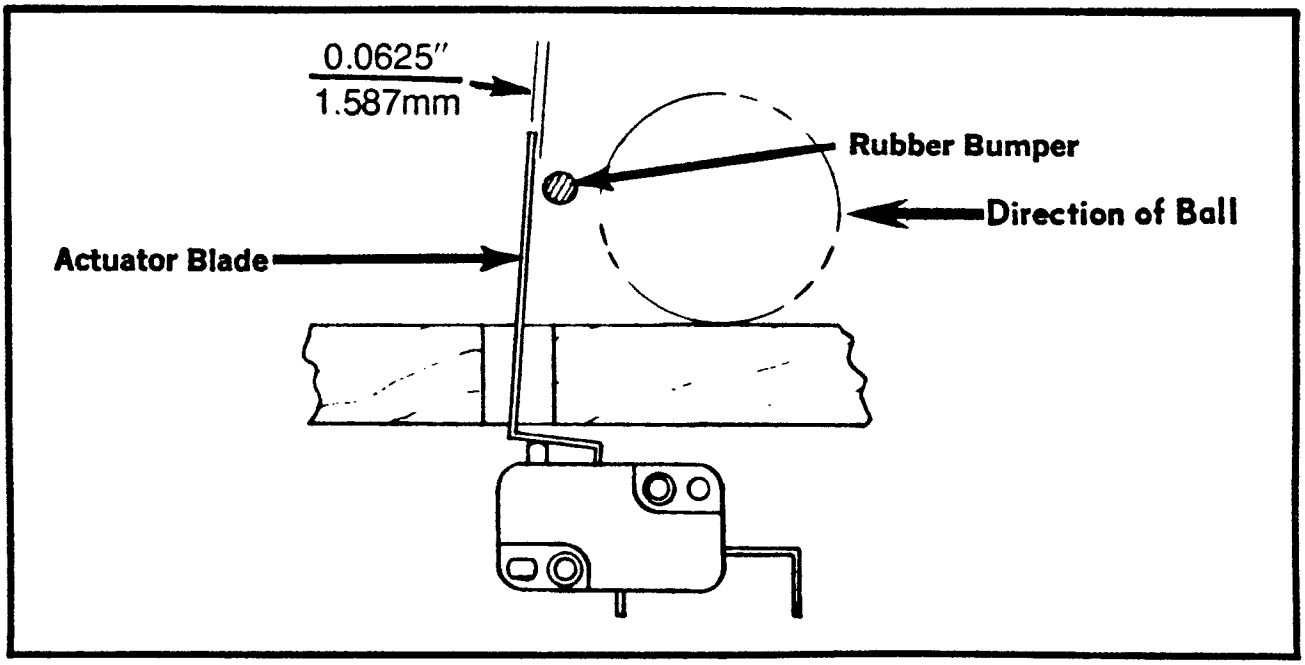


Fig. 9-27. Sling shot and side rubber switch adjustment. Adjust the actuator so that the switch trips within the limits shown.

periphery the switch must actuate. Adjust the switch actuator arm by bending it to meet this requirement. Note the 0.0625-inch (1.587 mm) clearance of the bumper wafer in the resting position.

Ball Return Switch

To adjust the ball return switch, adjust the switch actuator to actuate when the ball stops in the position shown in Fig. 9-30. If the switch actuates before the ball returns to the position shown, ball ejection will start prematurely and cause the ball to hang up.

Spinner Target Switch

Adjust the switch actuation arm by bending it until the switch actuates (flick) in the lower third of spinner travel. See Fig. 9-31.

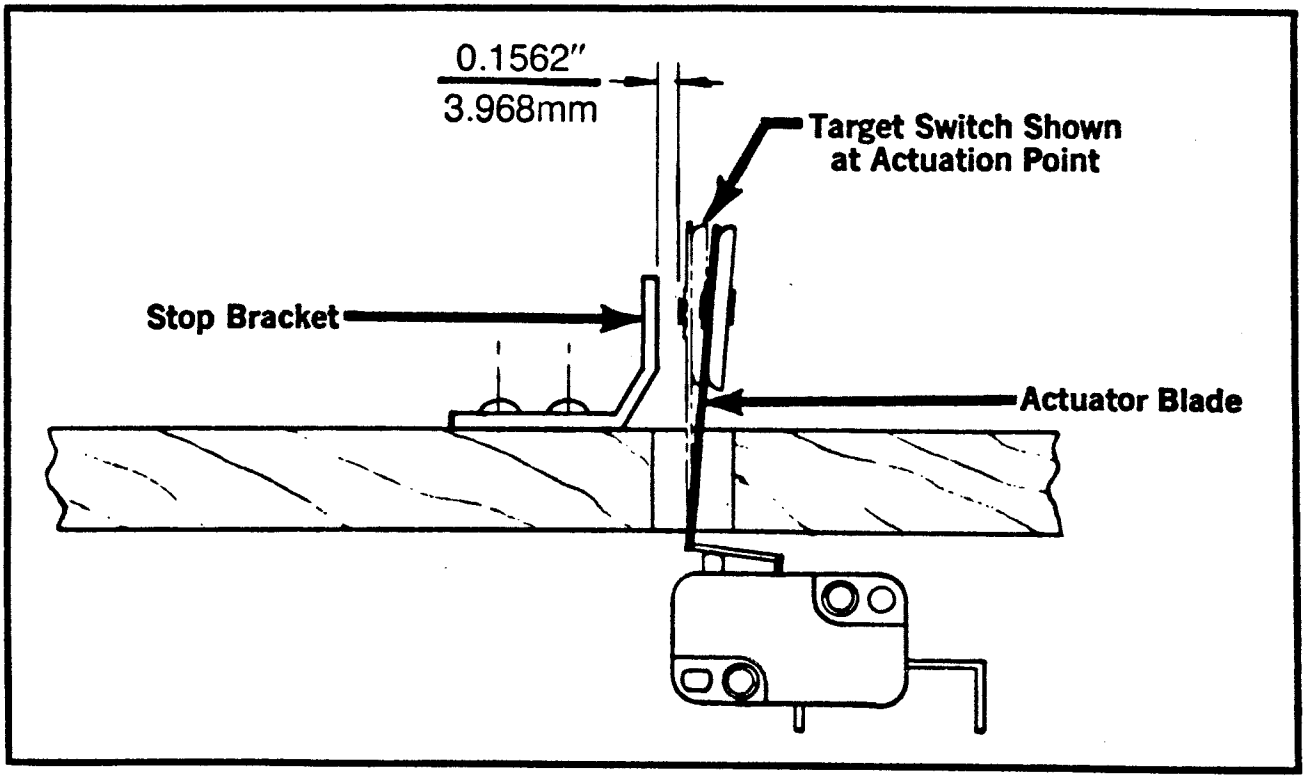


Fig. 9-28. Target switch adjustment. Bend the stop bracket to make the switch operate as indicated.

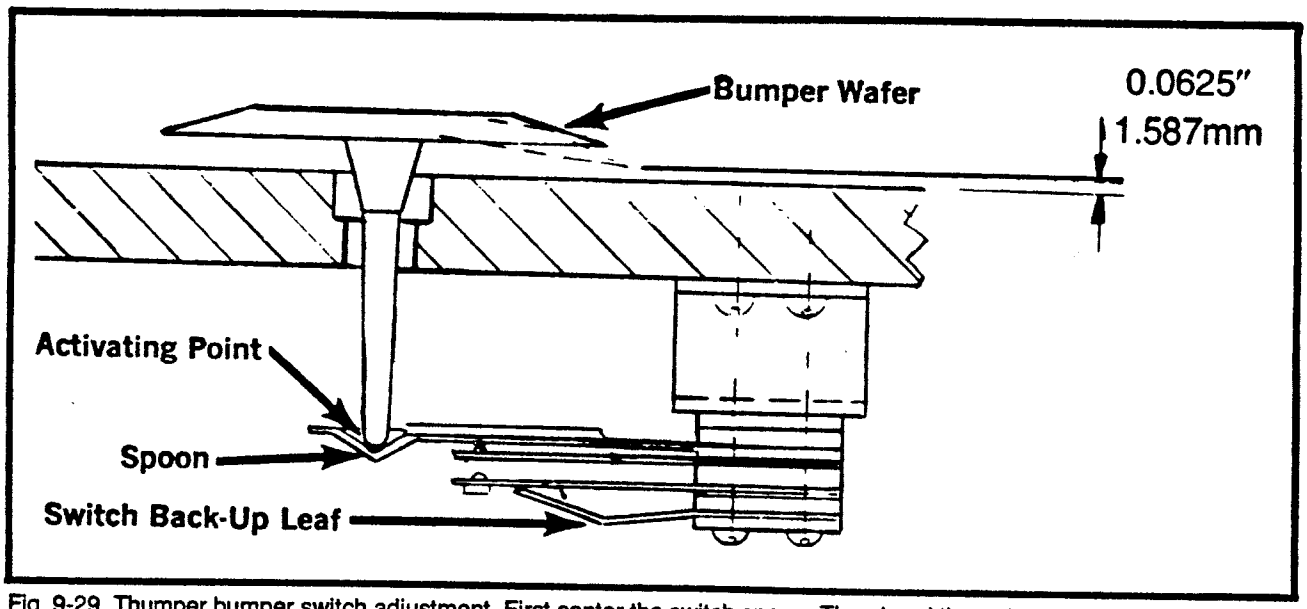


Fig. 9-29. Thumper bumper switch adjustment. First center the switch spoon. Then bend the switch actuator to operate the switch within the specifications shown.

Cleaning Playfield

Remove the playfield glass as shown in Figs. 9-32 and 9-33. Wipe the playfield surface with a soft rag or slightly dampened towel.

Servicing Bottom of Playfield

Remove the three screws in the front of the cabinet as shown in Fig. 9-32. Lift off the trim molding. Carefully slide out the playfield glass as shown in Fig. 9-33. Remove the two screws in the bracket holding down the playfield as shown in Fig. 9-33. Raise the playfield from the front and place it against the cabinet back box with the playfield resting in the notches provided in the playfield support rails. Refer to Fig. 9-34. The playfield bottom (lamps, switches, and solenoids), flipper switches, tilt assembly, and power supply are now easily accessible.

Tilt Pendulum

The tilt pendulum, which is located in the left-front section of the cabinet, can be adjusted as desired. To make the tilt more sensitive, loosen the thumb screw in the tilt bob. Refer to Fig. 9-35.

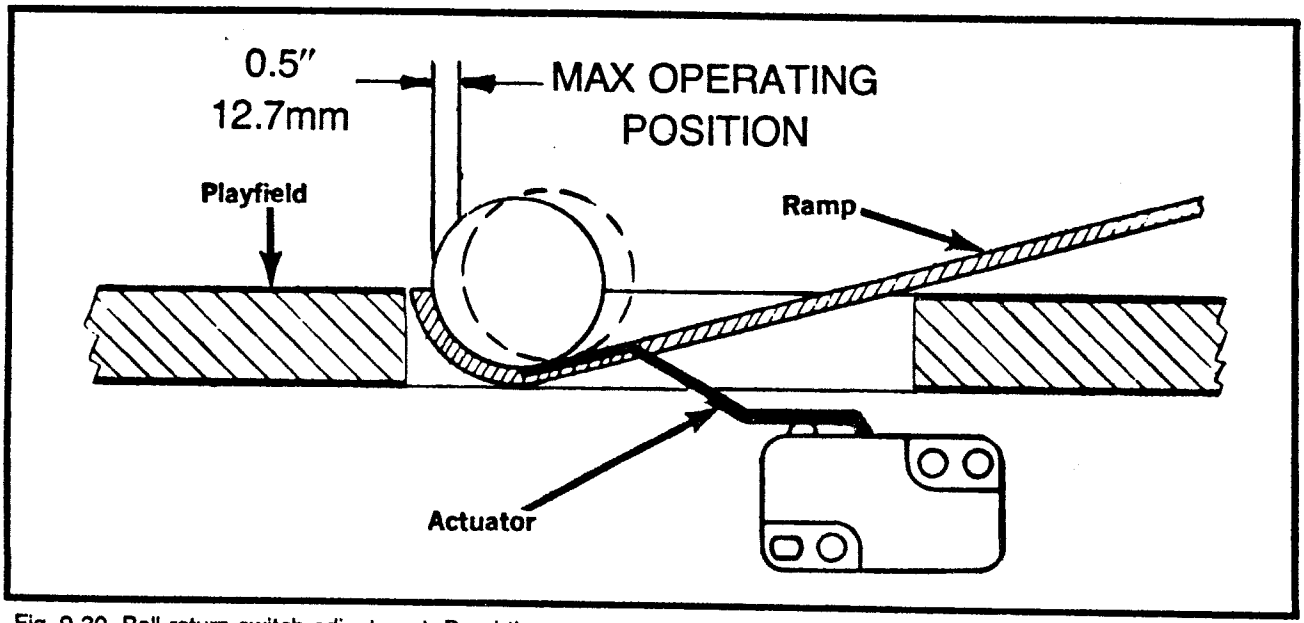


Fig. 9-30. Ball return switch adjustment. Bend the actuator to operate the switch as the ball stops in the position shown.

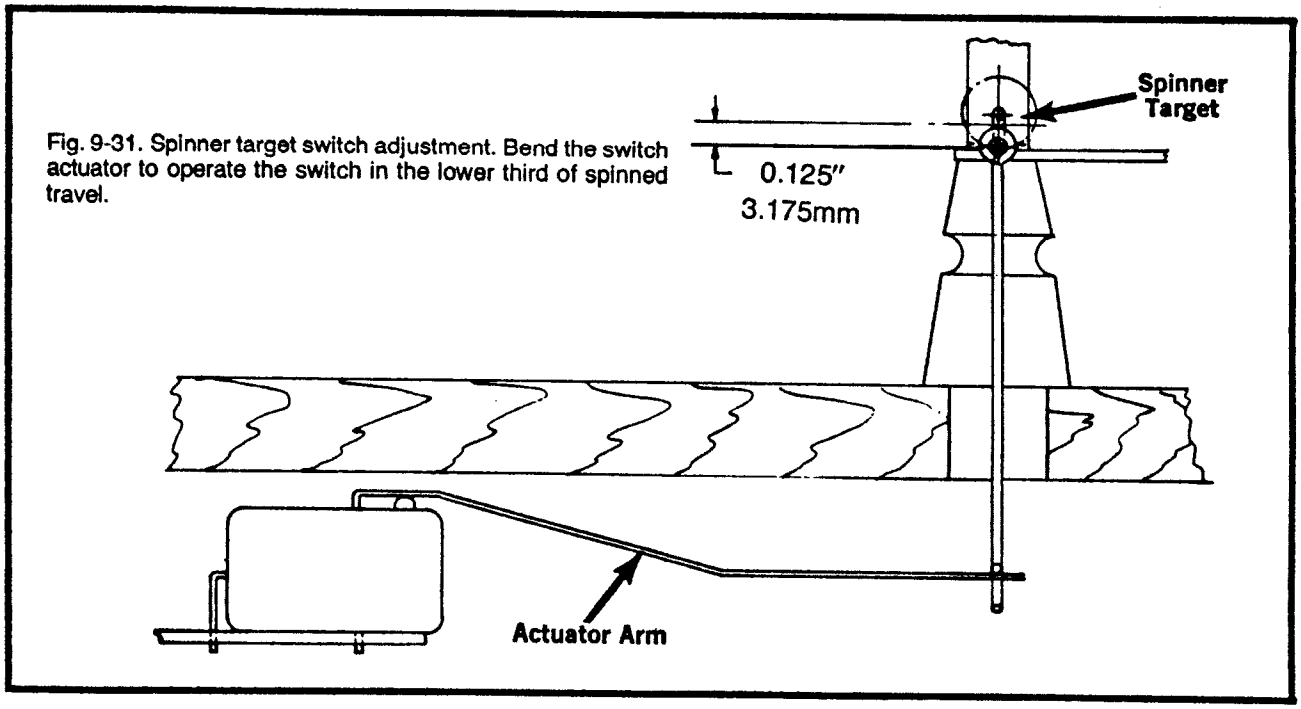


Fig. 9-31. Spinner target switch adjustment. Bend the switch actuator to operate the switch in the lower third of spinned travel.

Raise the bob closer to the bob ring. Then tighten the thumb screw. To make the tilt less sensitive, lower the bob.

Bumper Rubber Replacement

1. Remove the acorn nuts holding the plastic cap as shown in Fig. 9-36.
2. Remove the plastic cap.
3. Remove the worn bumper rubber.
4. Stretch the new bumper rubber around the bumper posts. Tension on the bumper rubber must be evenly distributed about all bumper posts.
5. Replace the plastic cap and acorn nuts. Do not overtighten the acorn nuts. Allow the plastic cap to move slightly on top of the bumper posts.

Playfield Lamp Replacement

1. Remove the acorn nuts from the plastic cap covering the burned out lamp. Refer to Fig. 9-36.
2. Remove the plastic cap.
3. Pull the burned out lamp straight out of the receptacle. Insert a new lamp.
4. Replace the plastic cap and acorn nuts. Do not overtighten the acorn nuts. Allow the plastic cap to move freely on top of the bumper posts.

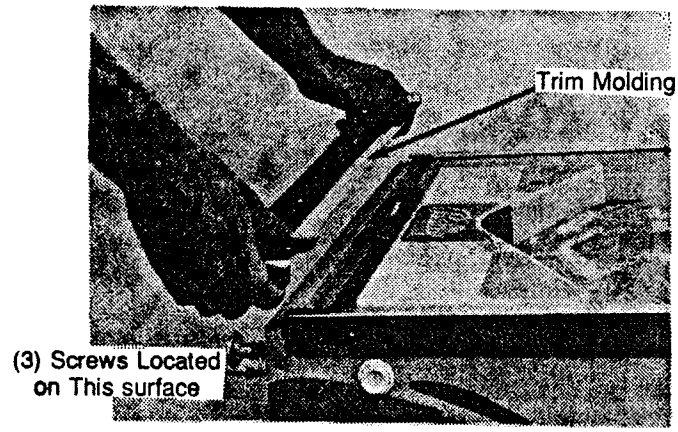


Fig. 9-32. Removing the trim molding to gain access to the playfield. Take out the three screws as indicated to remove the molding.

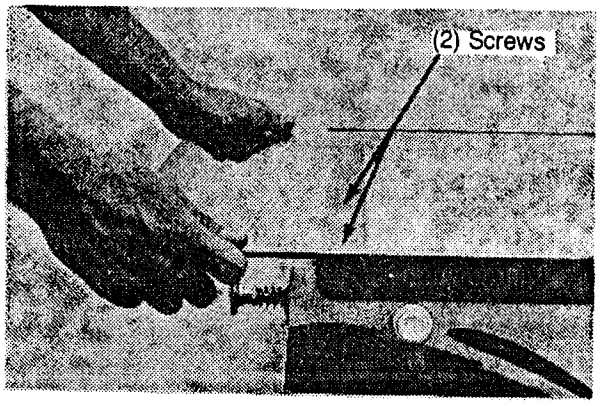


Fig. 9-33. Sliding out the glass. Remove the two screws shown, then carefully slide out the glass.

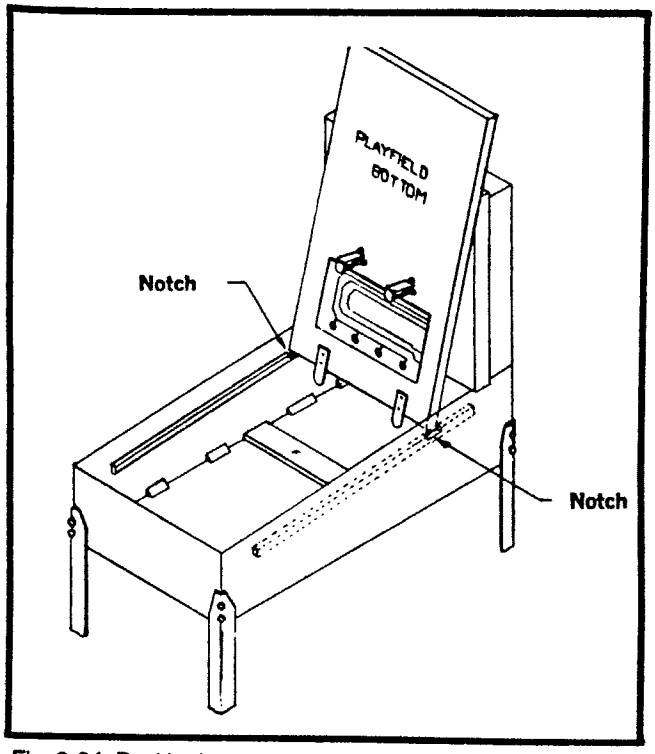


Fig. 9-34. Positioning the playfield. Place the playfield in the two notches shown, then let it rest against the cabinet back.

PC Board Lamp Replacement

1. Twist lamp receptacle counterclockwise to remove it from the PC board. Refer to Fig. 9-37.
2. Pull the burned out lamp straight out of the receptacle. Insert a new lamp.
3. Twist lamp receptacle clockwise to position it back in the PC board.

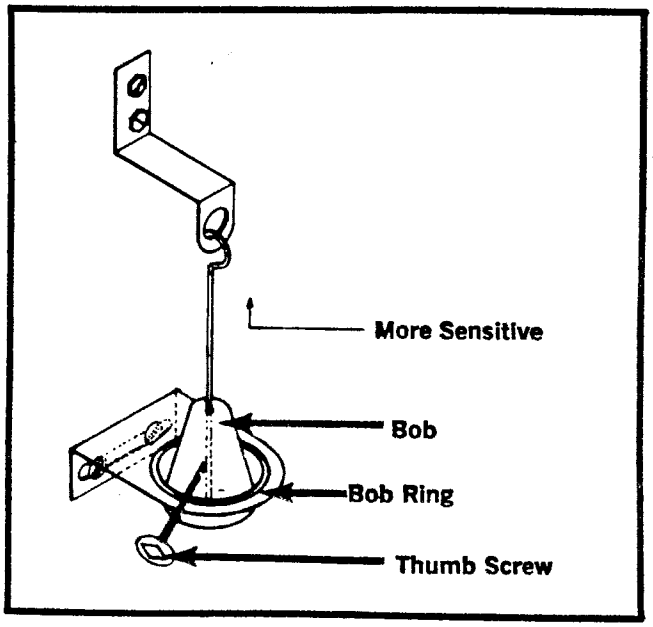


Fig. 9-35. Tilt pendulum adjustment. Raise the bob to make it more sensitive.

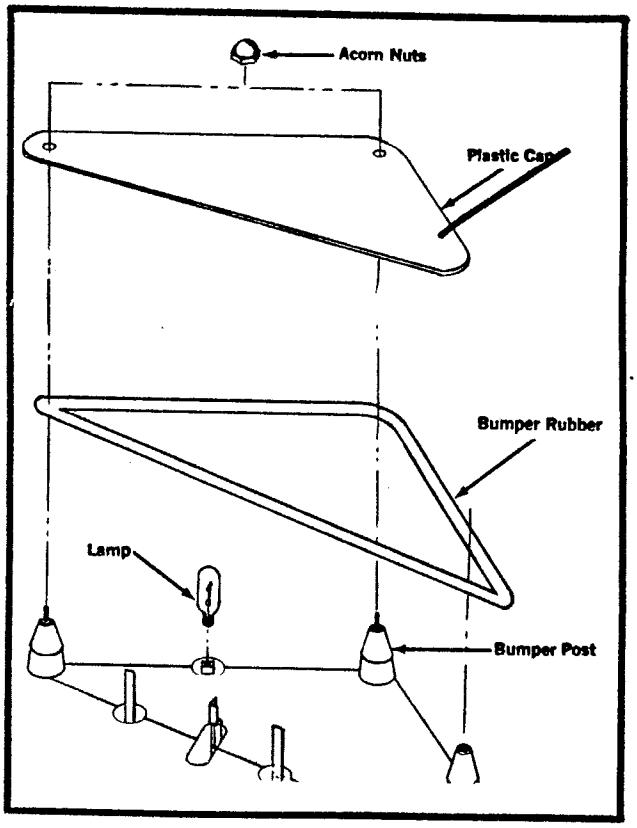


Fig. 9-36. Bumper rubber replacement. Do not overtighten the acorn nuts.

Bumper Lamp Replacement

1. Remove the two screws in the thumper bumper cap.
2. Remove the thumper bumper cap.
3. Twist out the burned out lamp and replace it with a new 455-type bulb. Refer to Fig. 9-38.
4. Replace the thumper bumper cap and screws.

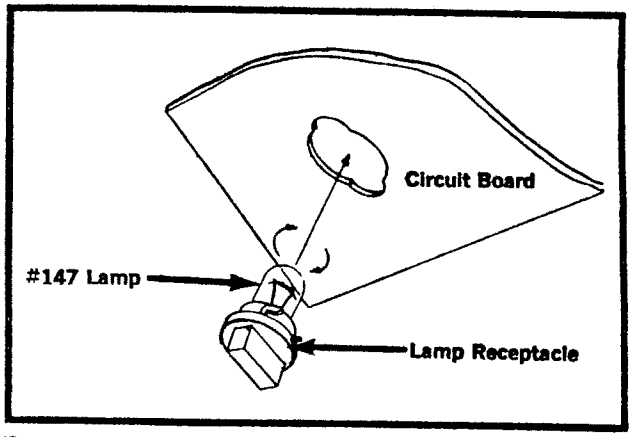


Fig. 9-37. PC board lamp replacement. Turn the lamp assembly counterclockwise to remove and clockwise to install.

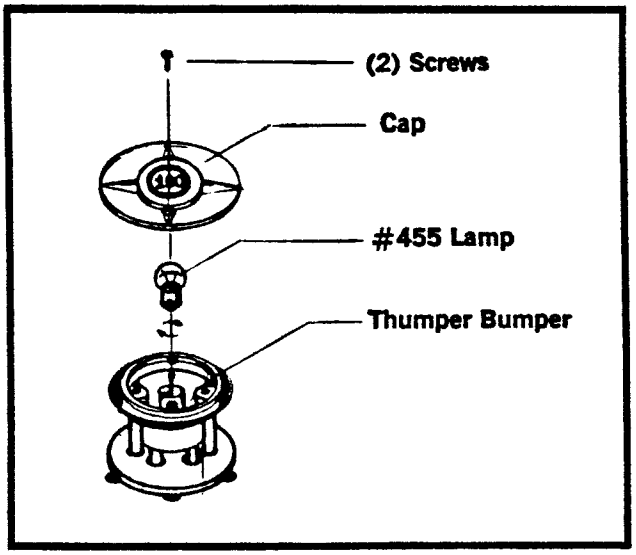


Fig. 9-38. Thumper bumper lamp replacement. Use a 455-type bulb.

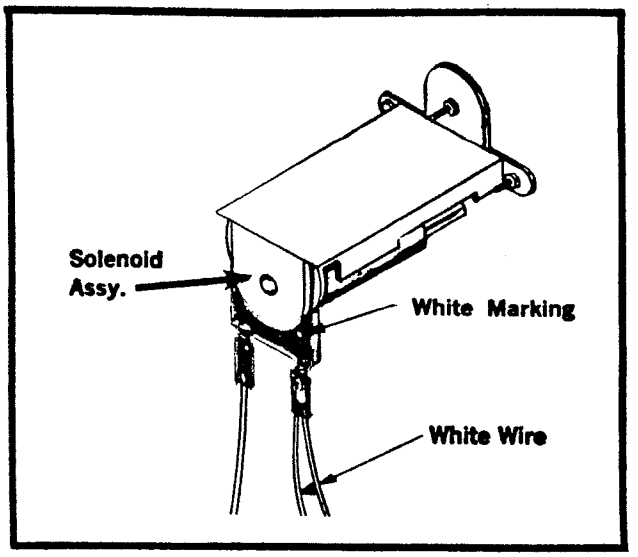


Fig. 9-40. Solenoid wiring. Match the white wire with the white marker on the solenoid.

Insert Lamp Replacement

1. Remove the three screws in the insert molding. Remove the molding. Refer to Fig. 9-39.
2. Remove the insert display glass.
3. Replace the burned out lamp. Use a 147-type lamp.
4. Replace the display glass, molding, and three screws.

Solenoid Wiring

If for any reason the wiring of any solenoid is removed, it must be replaced in the following manner: The white wire must be connected to the terminal identified with a white marking. The wire is attached by pushing the connector on the spade terminal. Refer to Fig. 9-40. Failure to connect the solenoids as instructed will result in serious damage to electronic components on the logic board.

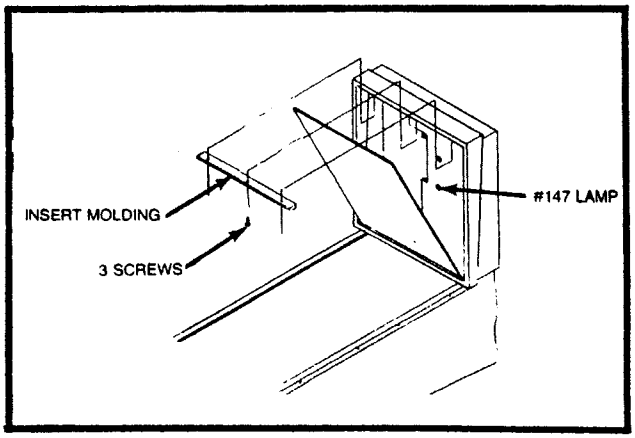


Fig. 9-39. Display insert lamp replacement. Use a 147-type bulb.

Fuse Replacement

This procedure does not apply to the 614-2000 since there is no replaceable fuse in that model.

1. Remove the playfield glass as shown in Figs. 9-32 and 9-33. Raise the playfield as shown in Fig. 9-34.
2. The transformer assembly is located in the right-rear corner of the bottom of the cabinet. Remove the fuse from this assembly by twisting the fuse cap as shown in Fig. 9-41.
3. Replace the blown fuse with a new 8A fuse.

614-2000 CIRCUIT PROTECTION

Aside from the difference in the logic circuitry and physical appearance, the 614-2000 has one other distinct feature which is not present in the other pinball machine. This feature is the addition of five circuit breakers, two at 3.9A and three at 2.5A. These are all located in the secondary of the power transformer.

These circuit breakers have been added to prevent solenoid or transformer burnup. An explanation of the responsibilities of each circuit breaker is as follows:

3.9A Circuit Breakers

As stated, there are two circuit breakers of this rating. One is inserted in the playfield illumination line. It monitors the current through nine display lights on the periphery of the playfield and both thumper bumper lamps.

The other 3.9A circuit breaker is located in the scorebox illumination line. It monitors current through the six display lights behind the scorebox.

2.5A Circuit Breakers

As mentioned above, there are three circuit breakers in the 614-2000 of this rating. One of these monitors light current, while the other two monitor solenoid current. The circuit breaker monitoring light current is in the feature light line, which supplies current to all lights connected with switches and bonus scoring.

One of the 2.5A circuit breakers monitors current through the solenoids located on the right side of the playing surface, including the ball return solenoid. The final 2.5A circuit breaker monitors current through all solenoids located on the left side of the playing surface.

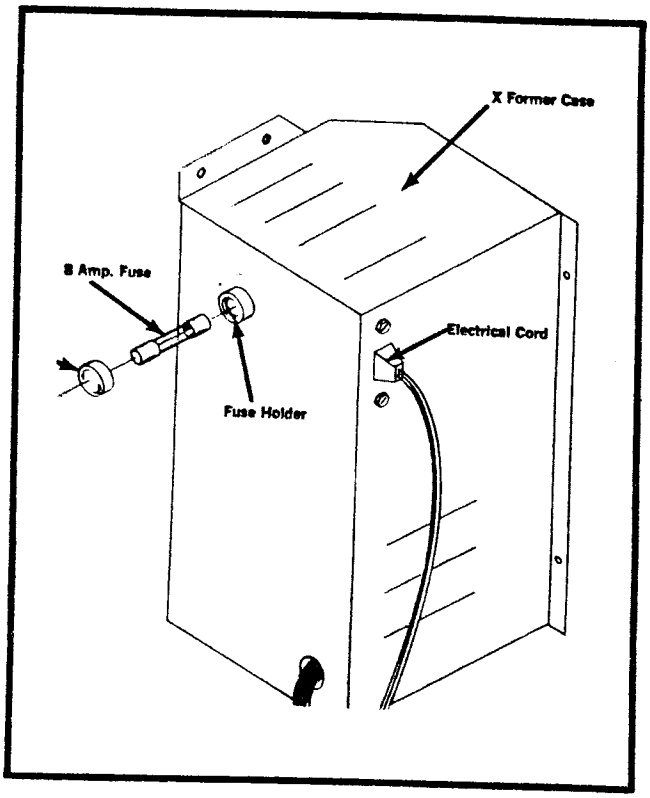


Fig. 9-41. Fuse replacement in the 614-1000 and 614-3000. The transformer assembly is located in the right-rear corner of the cabinet. Use an 8A fuse when replacing.

ELECTROMECHANICAL TROUBLES

The following information is a list of some typical electromechanical symptoms that could occur to a pinball machine. Each symptom is displayed in boldface type as a heading. Directly below each symptom is a step-by-step procedure that can help locate the malfunctioning component or components. Or, in some cases, the steps indicate a remedy or adjustment procedure.

No Lites—Nothing Works

1. Make sure the electrical cord is firmly inserted in the wall outlet.
2. Depress the on/off switch.
3. Reset the circuit breaker.
4. Check the 8A fuse.
5. Check the power supply connections.

Insert Lites Okay—Playfield Lites Off

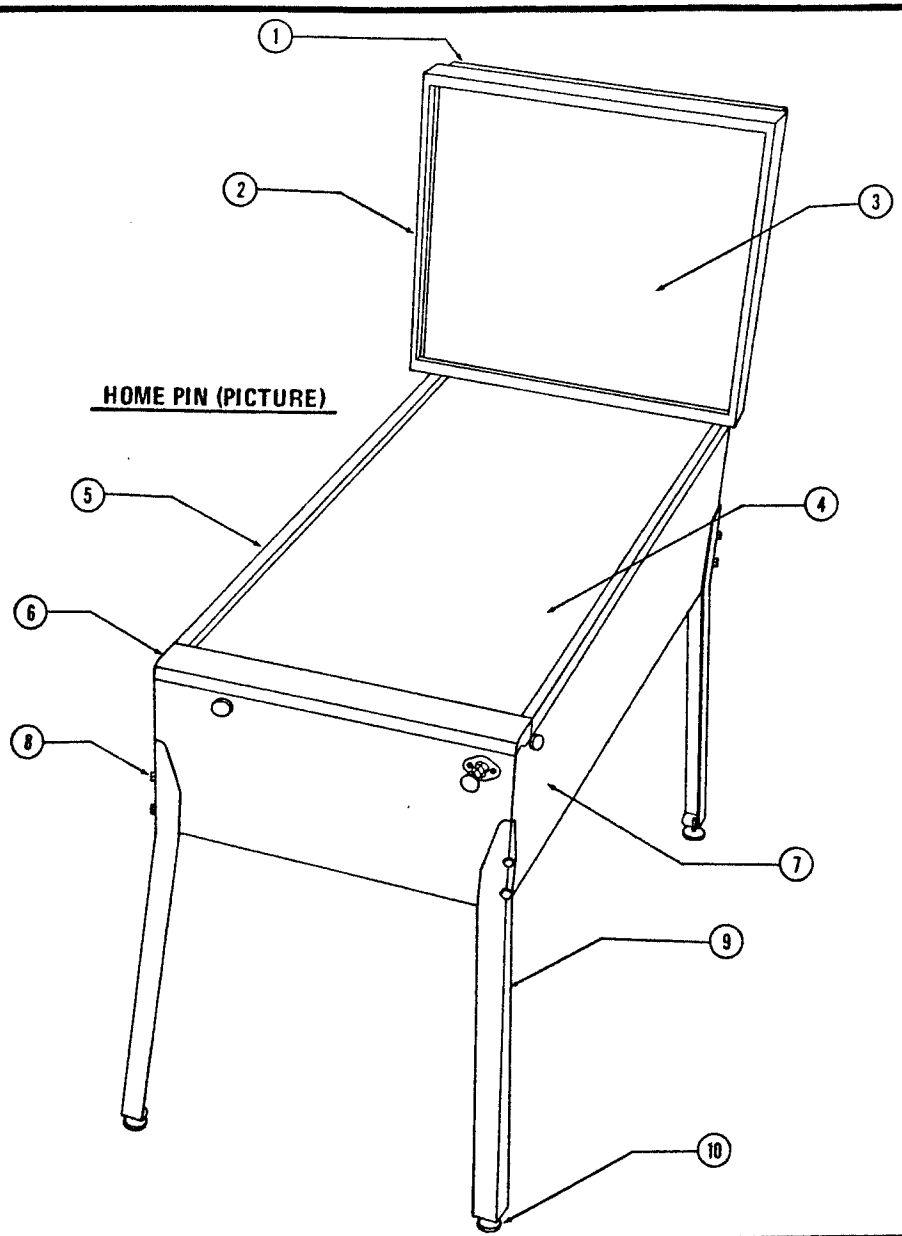
1. Remove the rear cabinet panel.
2. See that the connectors on the logic board are firmly in place.
3. Remove the playfield glass as shown in Figs. 9-32 and 9-33. Raise the playfield as shown in Fig. 9-34.
4. See that the connectors on the upper and lower playfield are firmly in place.

Playfield Lites Okay—Insert Lites Off

1. Remove the rear cabinet panel.
2. See that the connectors on the logic board and display insert are firmly in place.

Game Will Not Start

1. Remove playfield glass as shown in Figs. 9-32 and 9-33. Raise the playfield as shown in Fig. 9-34.
2. Make sure that the push-on connectors are firmly attached to the start switch terminals.
3. Actuate the start switch via the start button and listen for a clicking sound.
4. If the start button stroke is too short to actuate the switch, the switch blade can be bent slightly to obtain actuation.



ORDER BY PART NUMBER ONLY

ITEM	PART Nº	DESCRIPTION
1	0614-00516-0100	BACK BOX - EVEL KNIEVEL
	0614-00501-0200	BACK BOX - CAPTAIN FANTASTIC
	0614-00516-0200	BACK BOX - FIREBALL II
	0017-00102-0021	1/4 - 20 x 1-3/4 HEX HD. BOLT, (2)
	0017-00104-0039	STEEL WASHER (2)
2	0614-00902-0100	BACK BOX FRAME - EVEL KNIEVEL
	0614-00902-0200	BACK BOX FRAME - CAPTAIN FANTASTIC & FIREBALL II
3	0614-00920-0100	BACK BOX GLASS - CAPTAIN FANTASTIC
	0614-00920-0200	BACK BOX GLASS - EVEL KNIEVEL
	0606-00901-0000	BACK BOX GLASS - FIREBALL II
	0017-00101-0062	#6 x 3/4 PHIL. PAN, HD S.M.S.
4	0606-00919-0000	NICKEL PL. (10)
5	0614-00100-000	DECORATIVE SIDE CHANNEL (2)
	0017-00101-0357	#5 x ½ PHIL. PAN. HD. S.M.S. (10)
6	A614-0019-0000	FRONT DECORATIVE MLDG. ASSY.
	0017-00101-0055	#10 x 1-1/4 PHILIPS PAN HD. S.M.S. NICKEL PL. (3)
7	0614-00515-0100	BOTTOM CABINET - EVEL KNIEVEL
	0614-00509-0200	BOTTOM CABINET - CAPTAIN FANTASTIC
	0614-00515-0200	BOTTOM CABINET - FIREBALL II
8	0017-00102-0063	3/8 - 16 x 2-3/8 ACORN HD. MTG. BOLTS (8)
9	0606-00101-01PA	LEGS (4)
10	0017-00102-0048	LEG LEVELERS (4)
	0017-00103-0026	LEG LEVELER NUTS (4)

Fig. 9-42. Layout and parts list for major cabinet items.

Ball Won't Eject to Shooter

1. Remove the playfield glass as shown in Figs. 9-32 and 9-33. Raise the playfield as shown in Fig. 9-34.
2. Make sure that the push-on connectors are firmly attached to the solenoid terminals and ball return switch terminals.
3. Check the switch adjustment. Refer to Fig. 9-30.

Switch Won't Score

1. Remove the playfield glass. See Figs. 9-32 and 9-33.
2. Operate the switch manually and listen for actuation (clicking sound).
3. Adjust the switch indicated. Refer to Figs. 9-26 through 9-31.

Solenoid Doesn't Operate

1. Remove the playfield glass. See Figs. 9-32 and 9-33.
2. Raise the playfield and position it as shown in Fig. 9-34.
3. Make sure the push-on connectors are firmly attached to the solenoid terminals.
4. Check the adjustment of the solenoid-operation switch for a click. If no click is heard, adjust it as indicated.

Weak/Dead Flipper Solenoid

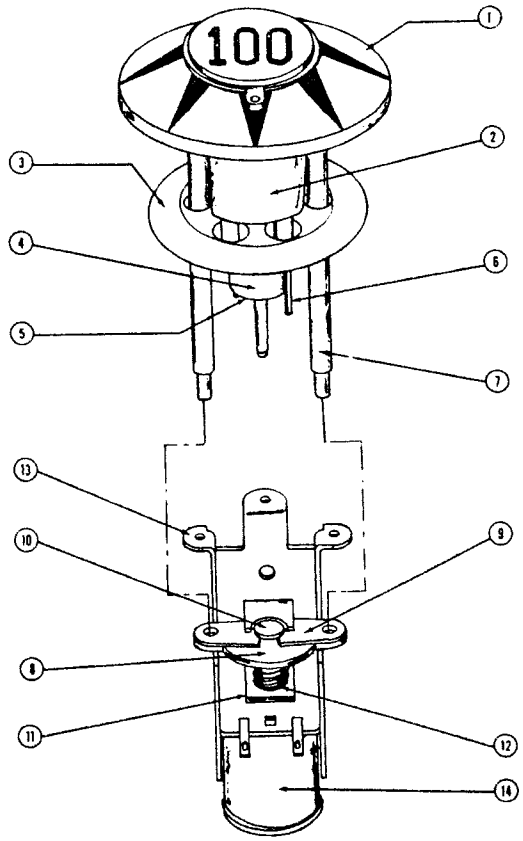
1. Remove the playfield glass. See Figs. 9-32 and 9-33. Raise the playfield into position. See Fig. 9-34.
2. Make sure that the push-on connectors are firmly attached to the flipper solenoid terminals.
3. Make sure that the flipper button switch is making solid contact. The switch may be adjusted by bending the switch blade slightly.
4. Clean the flipper button switch with a piece of fine emery cloth to ensure continuity.
5. When the flipper operates weakly, the switch on the coil assembly can be adjusted by bending it so that solid switch contact is made when the flipper is at read. These contacts must be open when the solenoid is at the end of its stoke. This condition can be simulated by moving the flipper to an up position manually.

Fig. 9-42. Layout and parts list for major cabinet items.

REPLACEMENT PARTS

Replacement parts for these pinball machines should be ordered from the manufacturer whenever possible. Parts information and pictorials of subassemblies are shown in Figs. 9-42 through 9-62. When ordering replacement parts be sure to indicate the manufacturer's part number. Also include a description of the desired part, but be sure to state the part number. These parts lists cover 614-1000 (Evel Knievel), 614-2000 (Captain Fantastic), and 614-3000 (Fireball II).

A list of what information is contained in each figure and the number is given below:

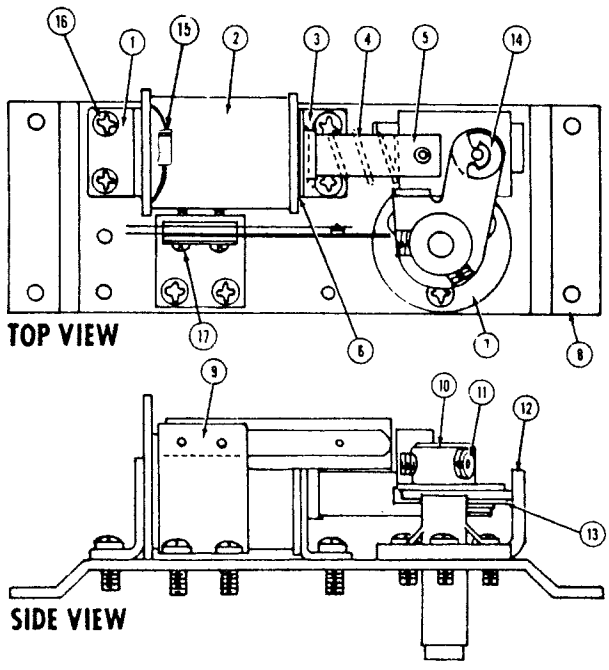


ORDER BY PART NUMBER ONLY

ITEM	PART Nº	DESCRIPTION
1	0017-00042-0124	THUMPER CAP
2	0017-00042-0122	BUMPER BODY
3	0017-00042-0121	THUMPER WAFER
4	0017-00042-0123	BUMPER BASE
5	0010-00236-0000	SPRING (INSIDE BUMPER BASE)
6	0017-00031-0031	SOCKET (LAMP)
7	0606-00040-0000	FLANGE & STUD ASSY.
8	0017-00009-0339	BAKELITE PLATE
9	0017-00009-0338	STEEL PLATE
10	0606-00728-0000	PLUNGER
11	0017-00009-0337	COIL BRACKET
12	0010-00237-0000	SPRING
13	0606-00033-0000	CORE PLUG ASSY.
14	A614-00014-0000	COIL ASSY.
	0606-00011-0000	UPPER THUMPER BUMPER ASSY. COMPLETE (MINUS CAP & SCREWS)
	0606-00010-0000	COIL & BRACKET ASSY.
		ITEMS NOT ILLUSTRATED
	0017-00003-0061	THUMPER BUMPER LAMP (2) (UNDER CAP)
	0064-030XX-XXDX	DIODE (UNDER COIL BRACKET)
	A614-00004-0000	MAKE BREAK - THUMPER BUMPER SWITCH ASSY.
	0017-00009-0411	SWITCH BRACKET
	0020-00202-0000	SWITCH PLATE
	0520-00138-0000	SWITCH PLATE - TAPPED
	0017-00101-0528	#5 - 40 X 3/4 R.H. M.S.

Fig. 9-43. Exploded view and parts list of the thumper bumper and coil assembly.

NO. 614 FLIPPER UNIT ASSY.
(LEFT & RIGHT) CAPT. FANTASTIC & FIREBALL II
(LEFT) EVEL KNIEVEL



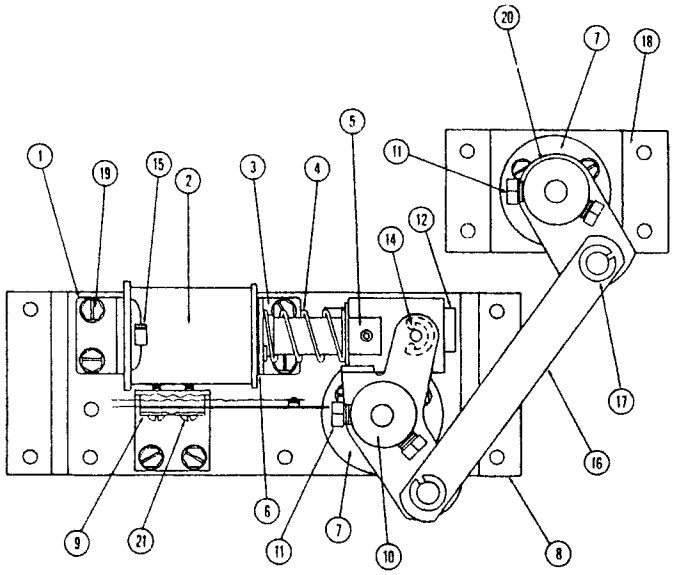
LEFT & RIGHT FLIPPER UNIT ASSY. – CAPT.FANTASTIC & FIREBALL II
LEFT FLIPPER UNIT ASSY.–EVEL KNIEVEL

ORDER BY PART NUMBER ONLY

ITEM	PART Nº	DESCRIPTION
1	0606-00030-0000	CORE PLUG & BRACKET ASSY.
2	A614-00016-0000	COIL
3	0017-00009-0343	COIL BRACKET
4	0010-00246-0000	SPRING
5	0606-00029-0000	PLUNGER & LINK ASSY.
6	0017-00104-0073	SPRING WASHER
7	0017-00009-0330	BEARING (FLIPPER)
8	0017-00009-0360	MTG. BRKT. (FLIPPER)
9	0606-00017-0000	SWITCH ASSY. (FLIPPER)
10	0606-00038-0000	LEVER ARM ASSY. (LEFT)
	0606-00037-0000	LEVER ARM ASSY. (RIGHT)
11	0017-00101-0338	SET SCREW (2)
12	0017-00009-0342	BRACKET (FLIPPER STOP)
13	0017-00104-0074	NYLON WASHER
14	0017-00100-0021	RETAINING RING
15	0064-030XX-0XXX	DIODE (IN 4004)
16	0017-00101-0754	#8 - 32 x 3/8 SLOTTED HEX HD. S.T.M.S. (11)
17	0017-00101-0520	#5 - 40 x 3/8 PAN HD. M.S. (2)
	0606-00007-0000	FLIPPER ASSY. LEFT (COMPLETE)
	0606-00006-0000	FLIPPER ASSY. RIGHT (COMPLETE)

Fig. 9-44. Flipper unit assembly and parts list. Left and right flipper for Captain Fantastic and Fireball II. Left flipper for Evel Knievel.

RIGHT FLIPPER UNIT ASSY. - EVEL KNIEVEL



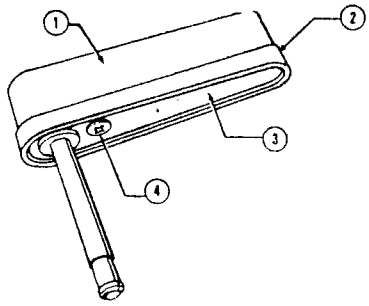
RIGHT FLIPPER UNIT ASSY. - EVEL KNIEVEL

ORDER BY PART NUMBER ONLY

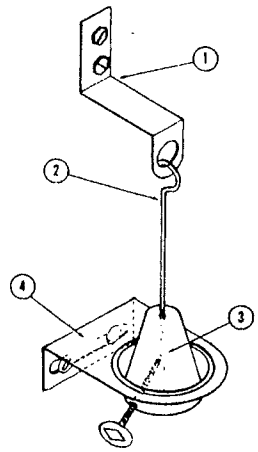
ITEM	PART Nº	DESCRIPTION
1	0606-00030-0000	CORE PLUG & BRACKET ASSY.
2	A614-00016-0000	COIL
3	0017-00009-0343	COIL BRACKET
4	0010-00246-0000	SPRING
5	0606-00029-0000	PLUNGER & LINK ASSY.
6	0017-00104-0073	SPRING WASHER
7	0017-00009-0330	BEARING (FLIPPER) (2)
8	0017-00009-0360	MTG. BRKT. (FLIPPER)
9	0606-00017-0000	SWITCH ASSY. (FLIPPER)
10	A614-00038-0000	LEVER ARM ASSY. (RIGHT) UPPER
11	0017-00101-0338	SET SCREW (4)
12	0017-00009-0342	BRACKET (FLIPPER STOP)
	0017-00104-0074	NYLON WASHER (NOT SHOWN)
14	0017-00100-0021	RETAINING RING
15	0064-030XX-0XXX	DIODE (IN 4004)
	A614-00041-0000	PIVOT LINK ASSY. (CONSISTING OF)
16	0614-00113-0000	PIVOT LINK
17	0017-00042-0093	NYLINER (2)
	A614-00042-0000	MTG. BRKT. ASSY. (CONSISTING OF)
18	0614-00014-0000	MTG. BRKT. (FLIPPER)
19	0017-00101-0754	#8-32 x 3/8 SLOT. HEX HD. S.T.M.S. (11)
20	0614-00039-0000	LEVER ARM ASSY. (RIGHT) LOWER
21	0017-00101-0520	#5-40 x 3/8 PAN HD. MACH. SCR. (2)
	0614-00040-0000	FLIPPER ASSY. RIGHT (COMPLETE)

Fig. 9-45. Right flipper unit assembly and parts list for Evel Knievel.

FLIPPER ASSY.



BALL TILT ASSY.

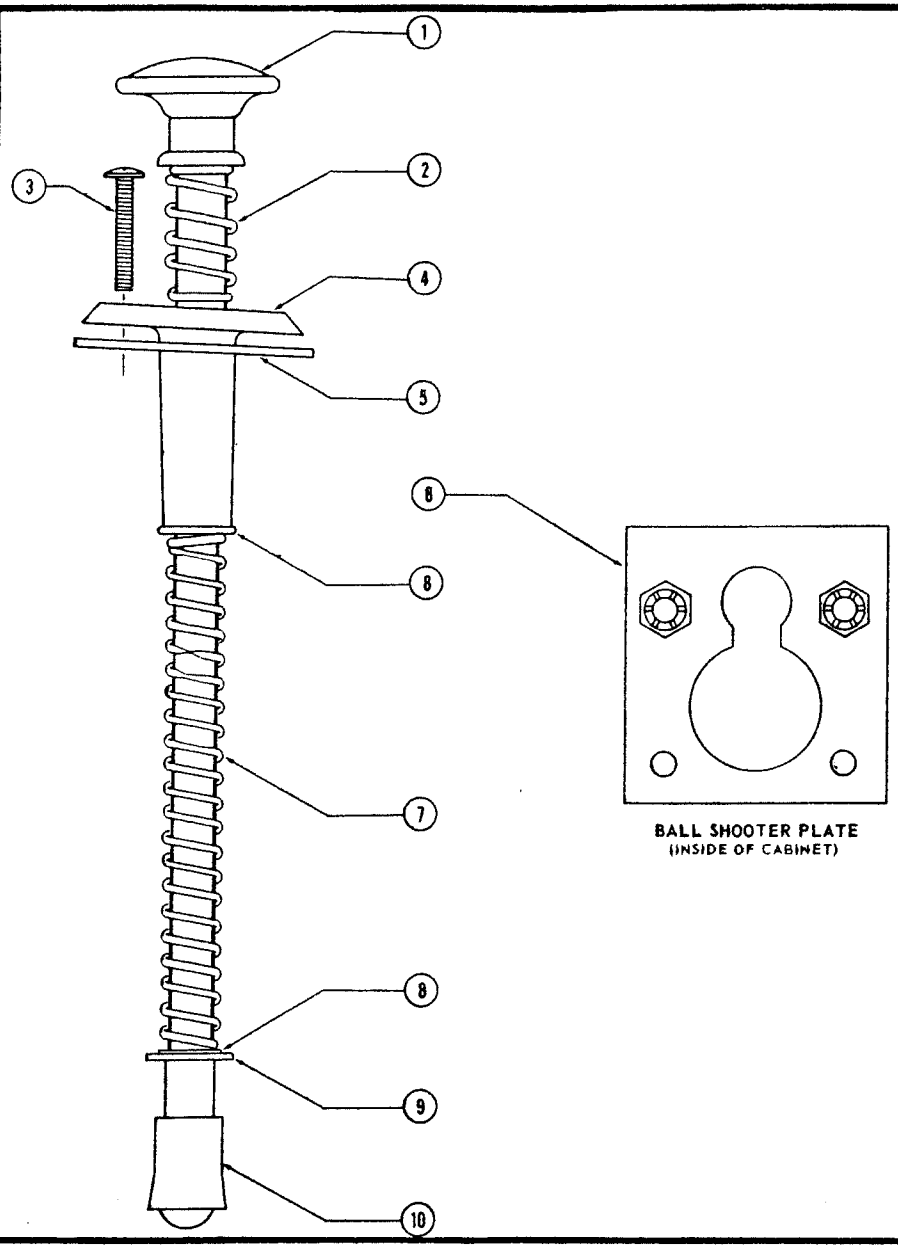


FLIPPER & BALL TILT ASS'YS

ORDER BY PART NUMBER ONLY

ITEM	PART Nº	DESCRIPTION
		FLIPPER ASSY.
1	0017-00042-0142	FLIPPER HOUSING
2	0017-00009-0357	FLIPPER RUBBER
3	0606-00039-0000	SHAFT & MTG BRKT. ASSY.
4	0017-00101-0014	#6 x 1/2 SELF TAP SCREW
	A614-00032-0000	FLIPPER ASSY. (COMPLETE) CAPT. FANTASTIC & FIREBALL II (2 REQ'D.) EVEL KNIEVEL - (3 REQ'D.)
		BALL TILT ASSY.
1	0017-00009-0371	TILT HANGER
2	0010-00241-0000	PLUMB BOB WIRE
3	0017-00009-0373	PLUMB BOB W/THUMB SCREW
4	0017-00009-0372	TILT CONTACT BRACKET

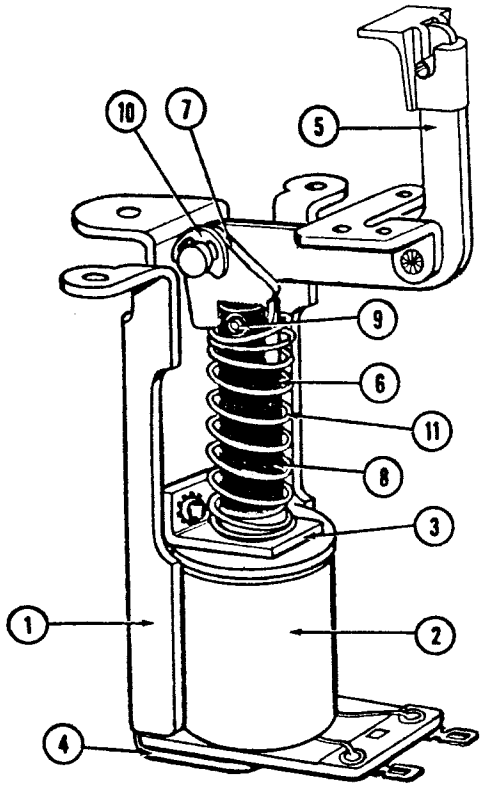
Fig. 9-46. Flipper arm and tilt mechanism with parts lists.



ORDER BY PART NUMBER ONLY

ITEM	PART Nº	DESCRIPTION
1	0606-00047-0000	KNOB & SHOOTER ROD ASSEMBLY
2	0010-00235-0000	COMPRESSION SPRING - SHORT
3	0017-00101-0777	#10 - 32 X 1¼ PHIL. PAN. HD. M.S. - NICKEL PLATED (2 REQ'D.)
4	0017-00009-0406	SHOOTER GUIDE
5	0614-00107-0000	BACK UP PLATE
6	0614-00011-0000	PLATE & NUT ASSEMBLY
7	0010-00234-0000	COMPRESSION SPRING - LONG
8	0017-00009-0369	SPRING CUP (2 REQ'D.)
9	0017-00007-0126	RETAINING RING
10	0017-00041-0049	ROUND TIP SHOOTER
	0614-00010-0000	BALL SHOOTER ASSY. - COMPLETE
		NOT SHOWN
	0017-00101-0025	#8 X ½ HEX. HD. S.M.S. (2 REQ'D.)

Fig. 9-47. Ball shooter assembly and parts list.



ORDER BY PART NUMBER ONLY

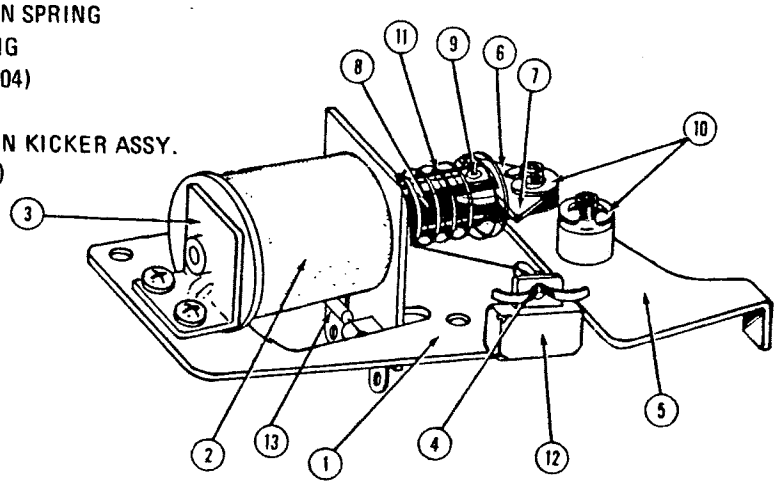
ITEM	PART Nº	DESCRIPTION
1	0606-00033-0000	CORE PLUG ASSY.
2	A614-00017-0000	COIL
3	0017-00009-0341	SOLENOID BRACKET
4	0606-00033-0000	CORE PLUG ASSY.
5	A614-00005-0000	KICKER ARM ASSY.
6	0606-00043-0000	PLUNGER & LINK ASSY.
7	0017-00009-0317	KICKER LINK
8	0606-00707-0000	PLUNGER
9	0017-00007-0073	ROLL PIN 1/8 x 7/16
10	0017-00100-0021	RETAINING RING
11	0010-00239-0000	COMPRESSION SPRING
	0606-00042-0000	CORE PLUG & COIL ASSY.
	A614-00006-0000	SLINGSHOT KICKER COIL ASSY. (COMPLETE)

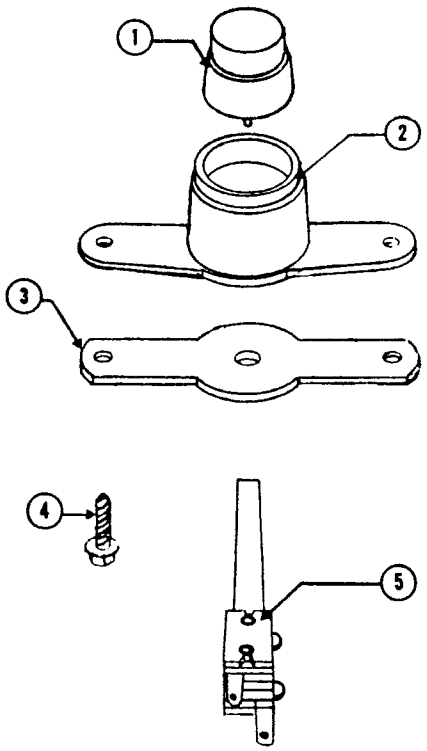
Fig. 9-48. Sling shot kicker coil assembly and parts list.

ORDER BY PART NUMBER ONLY

ITEM	PART Nº	DESCRIPTION
1	0606-00045-0000	BASE PLATE ASSY.
2	A614-00047-0000	COIL ASSY.
3	0606-00032-0000	CORE PLUG ASSY.
4	0017-00007-0124	3/32 x 3/8 COTTER PIN
5	0606-00044-0000	KICKER ARM ASSY.
6	0606-00043-0000	PLUNGER & LINK ASSY.
7	0017-00009-0317	KICKER LINK
8	0606-00707-0000	PLUNGER
9	0017-00007-0073	1/8 DIA. x 7/16 ROLL PIN
10	0017-00100-0021	RETAINING RING (2)
11	0010-00240-0000	COMPRESSION SPRING
12	0017-00042-0120	STRIKER RING
13	0064-030XX-XXXX	DIODE (IN 4004)
	0606-00009-0000	BALL RETURN KICKER ASSY. (COMPLETE)

Fig. 9-49. Ball return kicker assembly and parts list.





FLIPPER BUTTON ASSY.

ORDER BY PART NUMBER ONLY

ITEM	PART Nº	DESCRIPTION
		FLIPPER BUTTON ASSY.
1	0017-00042-0144	FLIPPER BUTTON
2	0017-00042-0143	FLIPPER BUTTON HOUSING
3	0017-00009-0366	FLIPPER BUTTON MTG. PLATE
4	0017-00101-0025	#8 x ½ SCREW (2)
5	0606-00016-0000	FLIPPER BUTTON SWITCH
		ITEMS NOT ILLUSTRATED
	0017-00005-0182	ON SWITCH
	A614-00012-0000	SPEAKER ASSY. WITH RESONATOR CONE
	0614-00048-0000	SPEAKER CABLE ASSY.
	0017-00005-0182	STARTER SWITCH - LOCATED ON FRONT PANEL

Fig. 9-50. Flipper button assembly and parts list.

POWER SUPPLY P.C. BOARD ASSY.
CAPT. FANTASTIC ONLY

ORDER BY PART NUMBER ONLY

ITEM	PART Nº	DESCRIPTION
1	0614-00912-0000	P.C. BOARD
2	0064-168FF-XXXX	RECTIFIER - A14F (4 REQ'D.)
3	0064-169FF-XXXX	RECTIFIER - A15F (4 REQ'D.)
4	0017-00021-0271	WAFER, 90° POL., - 4 PIN (2 REQ'D.)
5	0017-00021-0258	WAFER, 90° POL., - 6 PIN
6	0017-00021-0262	WAFER, 90° POL., - 11 PIN
7	0061-326DX-5EXX	20,000 MFD., 16 V., ELECTROLYTIC AXIAL CAPACITOR
8	0061-322CX-5EXX	10,000 MFD., 35 V., ELECTROLYTIC AXIAL CAPACITOR
9	0061-148G6-4FXX	.33 MFD., 35 V., 20% CAPACITOR TANTALUM CAPACITOR
10	0062-110B3-1XXX	1/4 W, 5% RESISTOR - 100 OHM
11	0066-785AX-XX0X	78L18, 18V. VOLTAGE REGULATOR
12	0065-494XX-XXXX	TIP 125 TRANSISTOR
13	0066-786AX-XXXX	78M05, 5V VOLTAGE REGULATOR
14	0017-00042-1050	CABLE TIES, PANDUIT
15	0017-222GG-4FXX	47MFD., 35V., 20% TANTALUM CAPACITOR
16	0080-00102-0000	HEAT SINK
	0017-00042-0014	SNAP BUSHING - NOT SHOWN

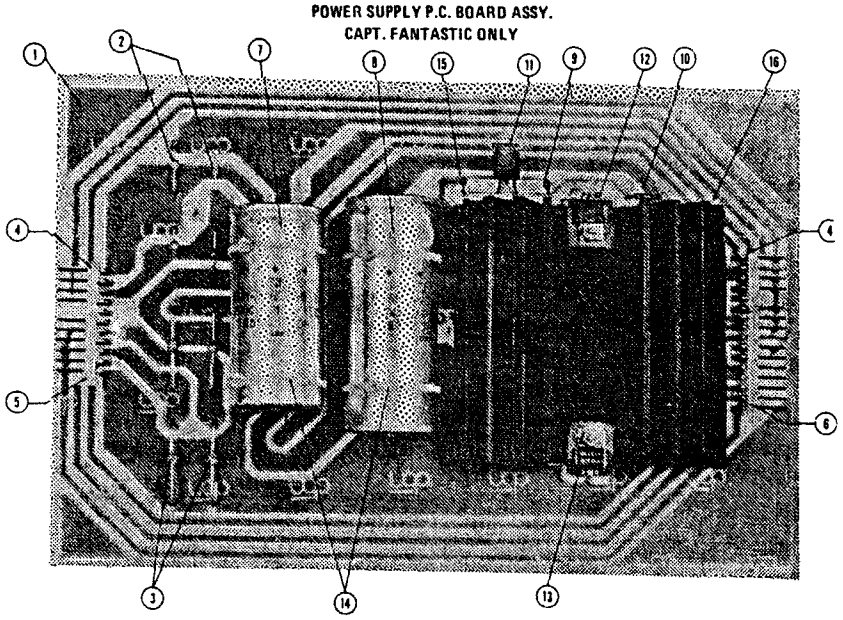


Fig. 9-51. Captain Fantastic (614-00912) power supply and parts list.

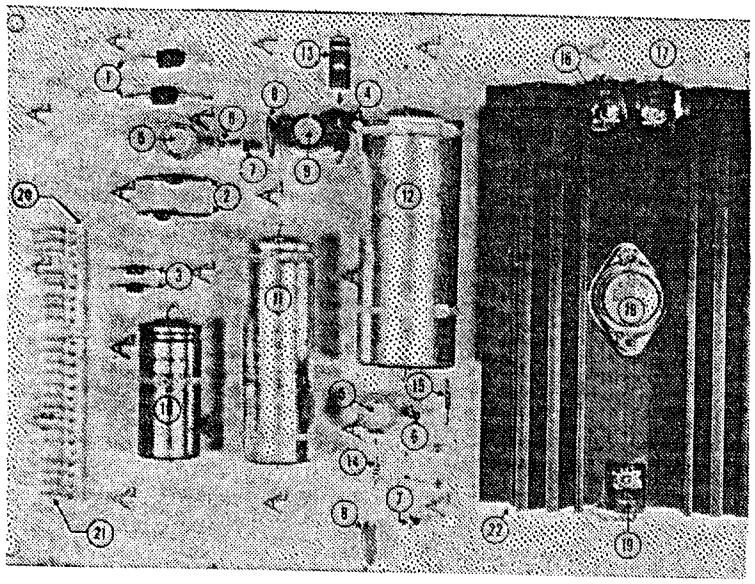


Fig. 9-52. Evel Knievel/Fireball II (606-00906) power supply and parts list.

NO. 0606 POWER SUPPLY P.C. BOARD ASSY.
EVEL KNIEVEL & FIREBALL II

ORDER BY PART NUMBER ONLY

ITEM	PART Nº	DESCRIPTION
1	0064-166XX-XXHX	60SI D10DE (2)
2	0064-150XX-XXGX	IN 5624 D10DE (2)
3	0064-025XX-XXCX	IN 4001 DIODE (2)
4	0064-143XX-XXXX	IN 5355 B 18V ZENER DIODE 5W 5%
5	0061-271DX-5FXX	470 MF 16V ELECTROLYTIC RADIAL CAPACITOR
6	0061-163EX-4FRX	1MF 25V TANTALUM CAPACITOR (2)
7	0061-148G6-4FXX	.33MF 35V 20% TANTALUM CAPACITOR
8	0061-132HX-1AXXX	.1MF 50V CER. DISC. CAPACITOR (2)
9	0061-224GX-5FBX	50MF 35V ELECTROLYTIC RADIAL CAPACITOR
10	0061-291GX-5EXX	1000MF 35V ELECTROLYTIC AXIAL CAPACITOR
11	0061-326DX-5EXX	20,000MF 16V ELECTROLYTIC AXIAL CAPACITOR
12	0061-322GX-5E2X	10,000 35V ELECTROLYTIC AXIAL CAPACITOR
13	0062-074J3-1XXX	30 OHM 5W 5% RESISTOR
14	0062-101B3-1XXX	75 OHM 1/4W 5% RESISTOR
15	0062-171B3-1XXX	750 OHM 1/4W 5% RESISTOR
16	0065-388XX-XXCX	FT. 3055 TRANSISTOR
17	0066-786AX-XXBX	78MD 5 UC VOLTAGE REGULATOR
18	0066-783AX-XXBX	7805 KC VOLTAGE REGULATOR
19	0066-792AX-XXBX	78M12 UC VOLTAGE REGULATOR
20	0017-00021-0253	9 PIN JACK
21	0017-00021-0256	15 PIN JACK
22	0080-00100-0000	HEAT SINK
	0017-00042-0014	SNAP BUSHING - NOT SHOWN
	0606-00906-0000	POWER SUPPLY (COMPLETE)

NO. 614 HOME PIN UPPER P.C. BOARD ASSY.

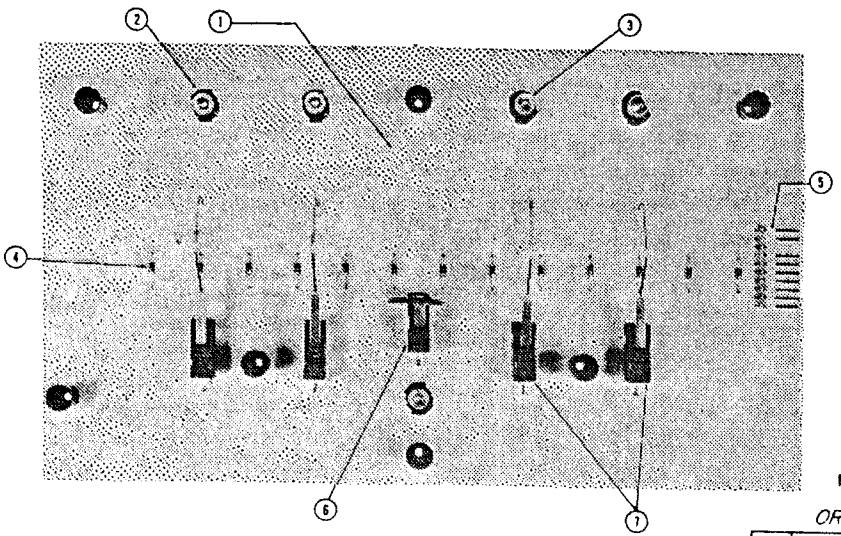


Fig. 9-53. Upper PC board assembly and parts list.

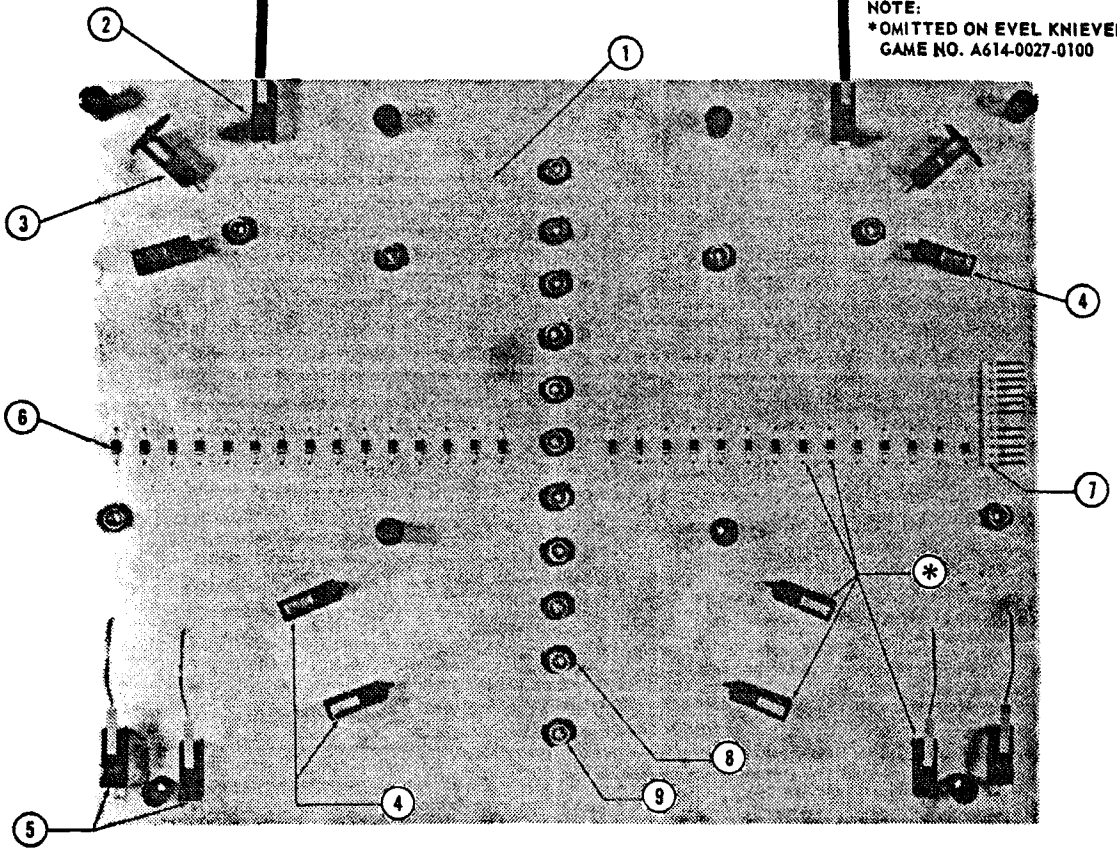
NO. 614 HOME PIN UPPER P.C. BOARD ASSY.

ORDER BY PART NUMBER ONLY

ITEM	PART Nº	DESCRIPTION
1	0614-00914-0000	TOP ROLLOVER P.C. BOARD (COMPLETE)
2	0017-00031-0029	LAMP SOCKET (5 REQ'D.)
3	0017-00003-0182	LAMP #147 (5 REQ'D.)
4	0064-025XX-XXXX	DIODE - IN4001 (13 REQ'D.)
5	0017-00021-0254	CONNECTOR - 10 PIN
6	A606-00004-0000	SWITCH - TARGET ASSY.
7	0017-00005-0184	SWITCH - ROLLOVER (4 REQ'D.)
	A614-00037-0000	JUMPER CABLE ASSY. (4 REQ'D.)
	0614-00911-0100	SPACER WITH LOCATOR COLLAR
	0614-00911-0200	SPACER WITHOUT LOCATOR COLLAR

NO. 614 HOME PIN LOWER P.C. BOARD ASSY.

NOTE:
*OMITTED ON EVEL KNIEVEL
GAME NO. A614-0027-0100



ORDER BY PART NUMBER ONLY

ITEM	PART Nº	DESCRIPTION
1	0614-00915-0000	BOTTOM ROLLOVER P.C. BOARD (COMPLETE)
2	0017-00005-0186	SWITCH - SPINNER (2 REQ'D.)
3	A606-00004-0000	SWITCH - TARGET ASSY. (2 REQ'D.)
4	0017-00005-0185	SWITCH - SLING SHOT (6 REQ'D. - CAPTAIN FANTASTIC & FIREBALL) (4 REQ'D. - EVEL KNIEVEL)
5	0017-00005-0184	SWITCH - ROLLOVER (4 REQ'D. - CAPTAIN FANTASTIC & FIREBALL) (3 REQ'D. EVEL KNIEVEL)
6	0064-025XX-XXXX	DIODE - IN4001 (29 REQ'D. - CAPTAIN FANTASTIC & FIREBALL) (27 REQ'D. - EVEL KNIEVEL)
7	0017-00021-0255	CONNECTOR - 13 PIN
8	0017-00031-0029	LAMP SOCKET (17 REQ'D.)
9	0017-00003-0182	LAMP #147 (17 REQ'D.)
	0614-00911-0100	SPACER WITH LOCATOR COLLAR
	0614-00911-0200	SPACER WITHOUT LOCATOR COLLAR

Fig. 9-54. Lower PC board assembly and parts list.

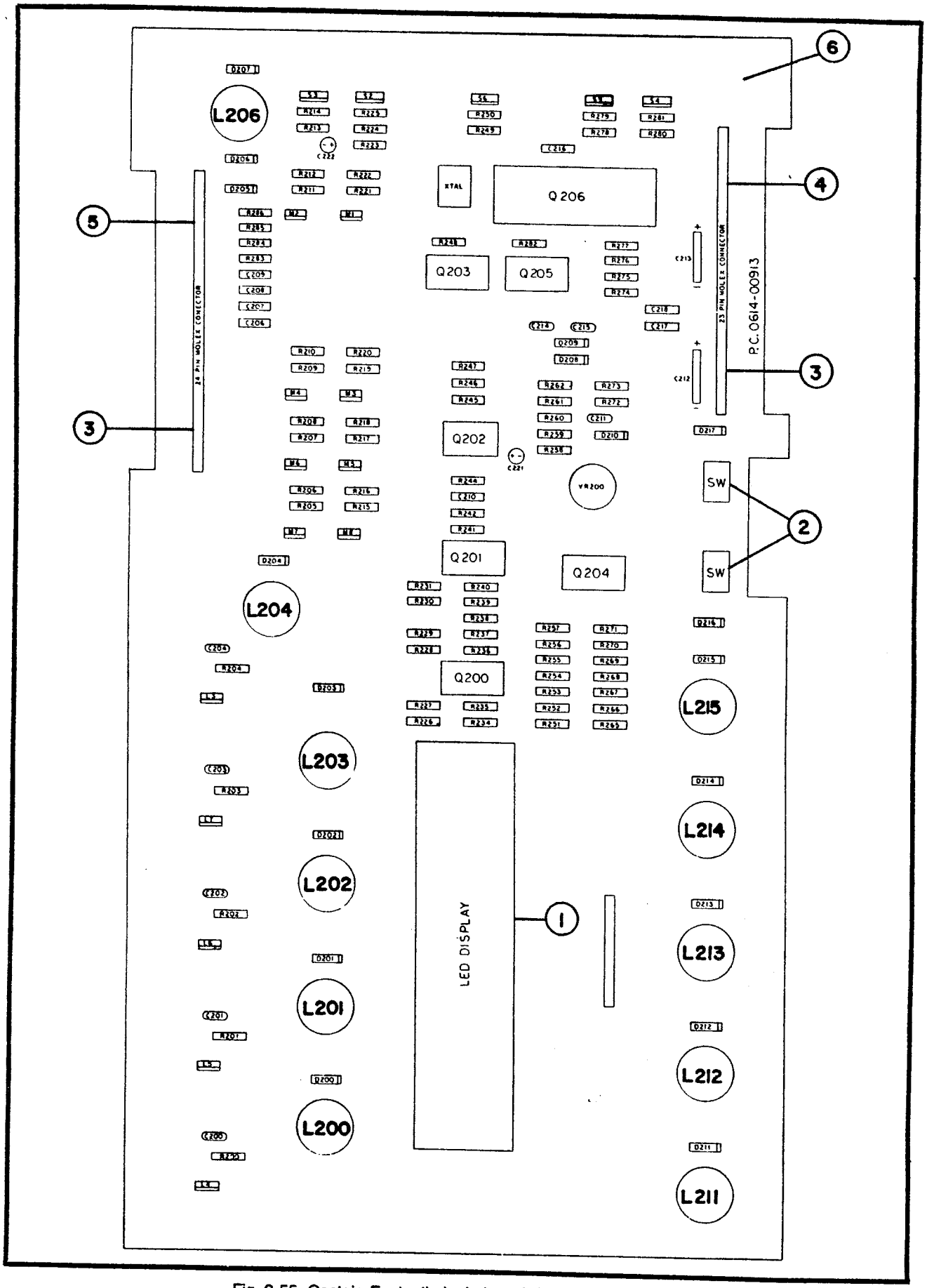


Fig. 9-55. Captain Fantastic logic board diagram.

ORDER BY PART NUMBER ONLY

ITEM	PART Nº	DESCRIPTION
Q206	0066-197XX-XXWX	MICROPROCESSOR MK3870
Q203, Q205	0066-675XX-XXXX	7445 DECODER (2 REQ'D)
Q200-Q201	0066-261BX-XXLX	DIGIT DRIVER ULN2074B (2 REQ'D.)
Q204	0066-260BX-XXLX	SEGMENT DRIVER UNL2003B
Q202	0066-065BX-XXXX	OP. AMP. LM3900
L3-L7	0065-491XX-XXXX	TRANSISTOR TIP-110 (5 REQ'D.)
M1-M8	0065-494XX-XXXX	TRANSISTOR TIP-125 (8 REQ'D.)
S2-S6	0065-495XX-XXXX	TRANSISTOR TIP-145 (5 REQ'D.)
D208-D210	0064-038XX-XXXX	DIODE IN4148 (3 REQ'D.)
D200-D207, D211-D217	0064-025XX-XXXX	DIODE IN4001 (15 REQ'D.)
R251-R257, R265-R271	0062-086B3-1XXX	47 OHM, ¼W, 5% RESISTOR (14 REQ'D.)
R244	0062-036B3-1XXX	2.7 OHM, ¼W, 5% RESISTOR
R-238	0062-051B3-1XXX	10 OHM, ¼W, 5% RESISTOR
R256, R274-277	0062-110B3-1XXX	100 OHM, ¼W, 5% RESISTOR (5 REQ'D.)
R283-R286	0062-135B3-1XXX	240 OHM, ¼W, 5% RES. (4 REQ'D.)
R200-R204-R206, R208	0062-179B3-1XXX	1 K OHM, ¼W, 5% RESISTOR (19 REQ'D.)
R210, R212, R213, R216, R218, R220, R222, R224, R242, R249, R278, R280		
R226, R227, R229, R231, R237, R239	0062-215B3-1XXX	5.6K OHM, ¼W, 5% RESISTOR (6 REQ'D.)
R205, R207, R209, R211, R214, R215, R217, R219, R221, R225, R250, R279		
R281	0062-191B3-1XXX	1.8K OHM RESISTOR ¼W, 5% (13 REQ'D.)
R228, R234, R235, R239, R240, R241, R248	0062-227B3-1XXX	10K OHM, ¼W, 5% RESISTOR (7 REQ'D.)
R245, R273	0062-251B3-1XXX	33K OHM, ¼W, 5% RESISTOR (2 REQ'D.)
R82	0062-195B3-1XXX	2.2K OHM, ¼W, 5% RESISTOR
R258, R262	0062-275B3-1XXX	100K OHM, ¼W, 5% RESISTOR (2 REQ'D.)
R247	0062-323B3-1XXX	1 MEG OHM, ¼W, 5% RESISTOR
R246	0062-347B3-1XXX	3.3 MEG OHM, ¼W, 5% RESISTOR
R260, R272	0063-355B3-1XXX	4.7 MEG OHM, ¼W, 5% RESISTOR (2 REQ'D.)

ORDER BY PART NUMBER ONLY

ITEM	PART Nº	DESCRIPTION
R261	0062-363B3-1XXX	6.8 MEG OHM, ¼W, 5% RESISTOR
R259	0062-387B3-1XXX	22 MEG OHM, ¼W, 5% RESISTOR
VR200	0063-277DX-31FX	25K, 2W, 20%, POTENTIOMETER LINEAR
XTAL	0069-080XX-XX4X	CRYSTAL, 3.577 MHZ
C222	0061-212D4-4FXX	22 MFD, 16V., TANTALUM CAPACITOR
C221	0061-203D6-4FXX	10 MFD, 16V., TANTALUM CAPACITOR
C212-C213	0061-212EX-5EXX	22 MFD, 25V. ELECTROLYTIC CAP. (2)
C211	0061-136H4-3CXX	0.15 MFD, 50V., 10%, MYLAR CAP.
C206-C210, C216-C218	0061-132HX-1IXX	0.1 MFD, 50V. AXIAL CER. DISC. CAPACITOR
C214-C215	0061-097K4-3CXX	0.01 MFD, 100V, (2) 10% MYLAR CAP.
C200-C204	0061-088K6-3CXX	0.0047 MFD, 100V. 20% MYLAR CAP. (5)
L200-L204, L206, L211-L215	0017-00031-0029	WEDGE BASE LAMP SOCKET (11 REQ'D.)
L200-L204, L206, L211-L215	0017-00003-0182	#147 LAMP (11 REQ'D.)
XTAL	0017-00042-0105	CABLE STRAP
1	0017-00021-0244	DISPLAY SOCKET ON LED DISPLAY 14 POSITION
	0606-00927-0000	CARDBOARD BEZEL
	0017-00081-0078	FOAM ADHESIVE PADS (4 REQ'D.)
	0017-00101-0002	4-3/8 PHL. PAN. HD. SCREWS (2 REQ'D.)
	0017-00041-0606	GROMMET (2 REQ'D.)
2	0017-00005-0187	SLIDE SWITCH (2 REQ'D.)
3	0017-00021-0254	RIGHT ANGLE WAFER - 10 PIN (2 REQ'D.)
4	0017-00021-0255	RIGHT ANGLE WAFER - 12 PIN
5	0017-00021-0294	RIGHT ANGLE WAFER - 13 PIN
6	0614-00913-0000	LOGIC P.C. BOARD - COMPLETE
	0614-00025-0000	VOLUME CONTROL 1 EXTENDER TUBE ASSY. (NOT SHOWN)

Fig. 9-56. Captain Fantastic logic board assembly parts list.

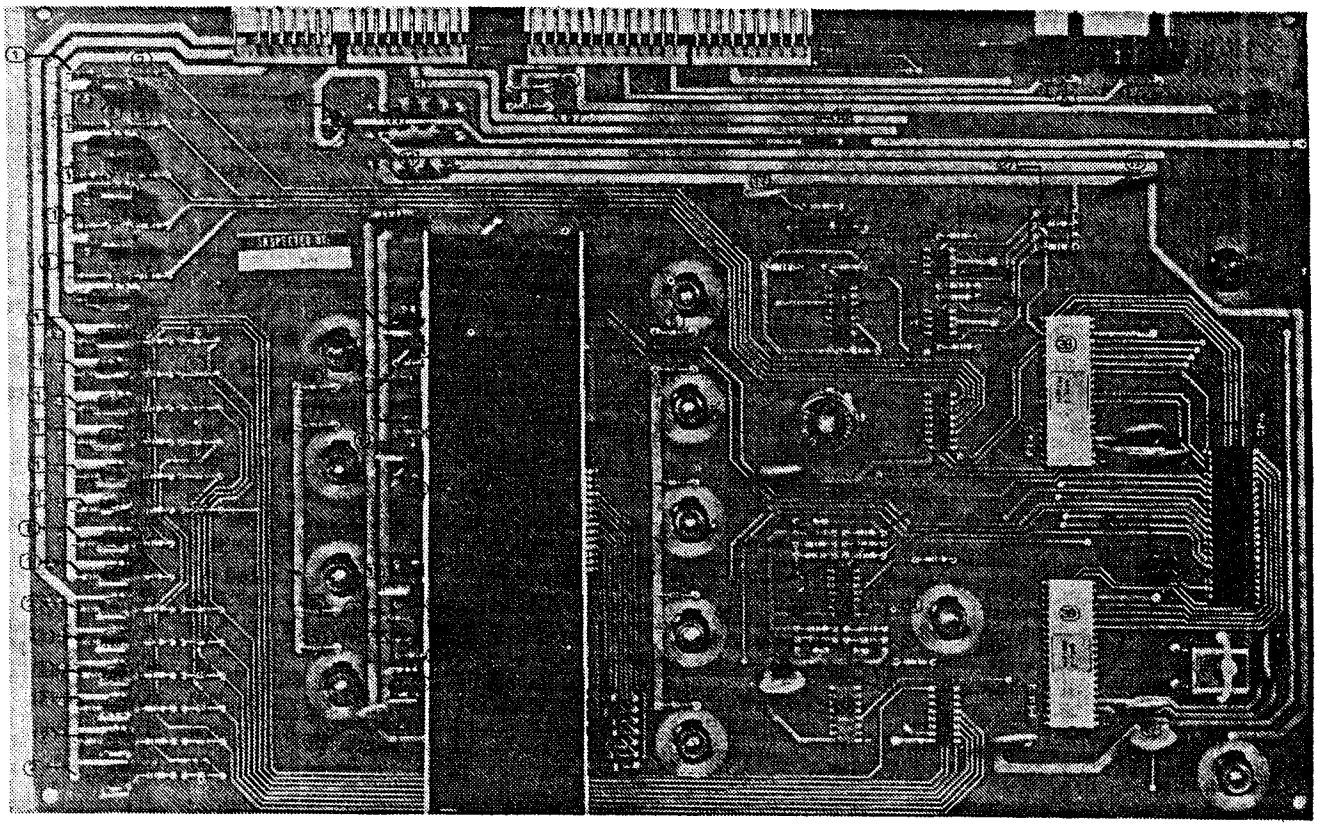


Fig. 9-57. Evel Knievel/Fireball II logic board diagram.

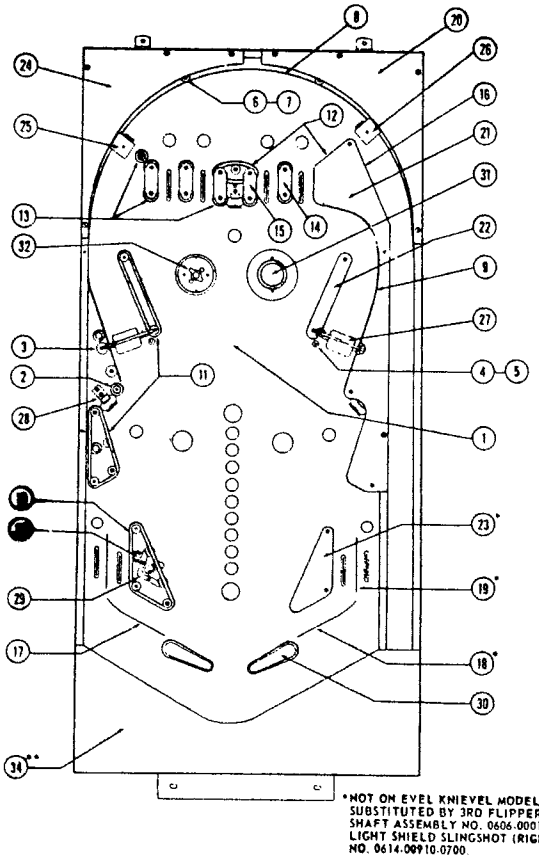
ORDER BY PART NUMBER ONLY

ITEM	PART Nº	DESCRIPTION
1	0062-195B3-1XXX	2.2 K, ¼W, 5% RESISTOR (18)
2	0062-179B3-1XXX	1K, ¼W, 5% RESISTOR (26)
3	0065-495XX-XXMX	T.I.P. 145 TRANS. (5)
4	0065-493XX-XXMX	T.I.P. 115 TRANS. (14)
5	0064-025XX-XXXX	DIODE 1N4001 (28)
6	0017-00021-0253	RIGHT ANGLE WAFER (9 PIN) (1)
7	0017-00021-0254	RIGHT ANGLE WAFER (10 PIN) (2)
8	0017-00021-0255	RIGHT ANGLE WAFER (13 PIN) (1)
9	0017-00005-0187	SLIDE SWITCH SPOT - (2)
10	0065-452XX-XXCX	MPS 6531 (TRANSISTOR) (1)
11	0061-212EX-5EXX	22 MF 25V ELECTROLYTIC CAP. (3)
12	0061-089K6-1A6X	.005 MF 100V., 20%, CER. DISC. CAP.(4)
13	0065-491XX-XXMX	TIP 100 TRANSISTOR (4)
14	0062-199B3-1XXX	2.7 K, ¼W, 5% RESISTOR (5)
15	0062-053D3-1XXX	12 OHM ½ WATT, RESISTOR (5)
16	0062-133B3-1XXX	220 OHM, ¼W, 5% RESISTOR (1)
17	0061-132H8-1AMX	.1 MF, 50V., CER. DISC. CAP. (13)
18	0061-132HX-1AXC	.1 MF , 50V., CER DISC. Z5U CAP. (1)
19	0062-122B3-1XXX	150 OHM, ¼W, 5% RESISTOR (1)
20	0062-063H3-1XXX	22 OHM 2 WATT RESISTOR (1)
21	0062-110B3-1XXX	100 OHM, ¼W, 5% RESISTOR (1)
22	0066-970AX-XXBX	FPQ 3724 TRANSISTOR ARRAY (1)
23	0063-2600X-31FX	5K 2W POT (1)
24	0062-287B3-1XXX	22 MEG OHM, ¼W, 5% RES. (1)
25	0062-355B3-1XXX	4.7 MEG, ¼W, 5% RESISTOR (2)
26	0062-363B3-1XXX	6.8 MEG OHM, ¼W, 5% RES. (1)
27	0062-275B3-1XXX	100K, ¼W, 5% RESISTOR (2)
28	0066-230BX-XXBX	VA 3401 I.C. (1)
29	0062-347B3-1XXX	3.3 MEG, ¼W, 25V., 5% RES. (1)
30	0061-097EX-1ALC	.01 MF 25V. CER. DISC., Z5U CAP (2)
31	0062-323B3-1XXX	1 MEG OHM, ¼W, 5%, RES. (1)
32	0062-227B3-1XXX	10K, ¼W, 5%, RESISTOR (1)
33	0066-690XX-XXXX	7448 I.C. (1)
34	0066-675XX-XXBX	7445 I.C. (2)
35	0062-144B3-1XXX	330 OHM, ¼W, 5%, RESISTOR (4)

ORDER BY PART NUMBER ONLY

ITEM	PART Nº	DESCRIPTION
36	0069-005XX-XXHX	ILD 74 I.C. (2)
37	0062-211B3-1XXX	4.7 K, OHM, ¼W, 5% RESISTOR (1)
38	0066-193XX-XXB1	SL 31 281 PSU #1 (SL 31280) (1)
39	0066-193XX-XXB2	SL 31 281 PSU 2 (1)
40	0061-022P4-2BKX	15 PF, 500V, 10%, MICA CAP. (2)
41	0066-191XX-XXBX	C.P.U. 3850 (1)
42	0069-068XX-XXJX	2 MHZ CRYSTAL (1)
43	0066-870AX-XXBX	FSC 9667 I.C. (1)
44	0069-058XX-XXHX	SCORE DISPLAY DL-6830 NOT SHOWN
	0062-227B3-1XXX	10K OHM, ¼W, 5% RESISTOR (1)
	0062-235B3-1XXX	15K OHM, ¼W, 5% RESISTOR (1)
	0061-212D4-4FPX	22 MF, 16V, 10% TANTALUM CAP. (1)
	0614-00025-0000	VOLUME CONTROL EXTENDER TUBE ASSY.

Fig. 9-58. Evel Knievel/Fireball II logic assembly parts list.



ORDER BY PART NUMBER ONLY

ITEM	PART Nº	DESCRIPTION
1	0614-00502-0100	PLAYFIELD (SCREENED) - EVEL KNIEVEL
	0614-00504-0100	PLAYFIELD (SCREENED) - CAPT. FANTASTIC
	0614-00504-0200	PLAYFIELD (SCREENED) - FIREBALL II
2	0614-00908-0000	PUSH IN POST (31 REQ'D.)
3	0017-00009-0362	SHORT POST (4 REQ'D.)
4	0017-00009-0408	MINI POST (2 REQ'D.)
5	0017-00041-0604	RUBBER BUMPER (2 REQ'D.)
6	0017-00042-0125	RAIL POSTS (5 REQ'D.)
7	0017-00042-0126	RAIL POST CAP (5 REQ'D.)
8	0606-00103-0000	RAIL
9	0606-00104-0000	RAIL (SHORT)
10	0017-00009-0309	RUBBER 3" INSIDE DIAMETER EVEL KNIEVEL (1 REQ'D.) CAPT. FANTASTIC & FIREBALL II (2 REQ'D.)
11	0017-00009-0306	RUBBER 2½" INSIDE DIAMETER EVEL KNIEVEL (5 REQ'D.) CAPT. FANTASTIC & FIREBALL II(4 REQ'D.)
12	0017-00009-0310	RUBBER 1½" I.D. (2 REQ'D.)
13	0017-00009-0365	RUBBER ¼" I.D. (12 REQ'D.)
14	0017-00042-0128	PLASTIC GUIDE (3 REQ'D.)
15	0017-00042-0129	PLASTIC GUIDE (3 REQ'D.)
16	0017-00009-0326	BALL GUIDE (WIRE FORM)
17	0017-00009-0299	BALL GUIDE (WIRE FORM)
18	0017-00009-0300	BALL GUIDE - FIREBALL II & CAPT. FANTASTIC ONLY
19	0017-00009-0293	BALL GUIDE - FIREBALL II & CAPT. FANTASTIC (2) - EVEL KNIEVEL (1 REQ'D.)
20	0614-00909-0100	LIGHT SHIELD (RIGHT) - FIREBALL II
	0614-00909-1100	LIGHT SHIELD (RIGHT) - CAPT. FANTASTIC
	0614-00910-0100	LIGHT SHIELD (RIGHT) - EVEL KNIEVEL

Fig. 9-59. Playfield assembly and parts list (part 1 of 2).

ORDER BY PART NUMBER ONLY

ITEM	PART Nº	DESCRIPTION
	0614-00909-0200	SPINNER GATE LIGHT SHIELD (LEFT) NOT SHOWN - FIREBALL II
	0614-00909-1200	SPINNER GATE LIGHT SHIELD (LEFT) NOT SHOWN - CAPTAIN FANTASTIC
	0614-00910-0200	SPINNER GATE LIGHT SHIELD (LEFT) NOT SHOWN - EVEL KNIEVEL
	0614-00909-0300	SIDE LIGHT SHIELD (LEFT) NOT SHOWN - FIREBALL II
	0614-00909-1300	SIDE LIGHT SHIELD (LEFT) NOT SHOWN - CAPT. FANTASTIC
	0614-00910-0300	SIDE LIGHT SHIELD (LEFT) NOT SHOWN - EVEL KNIEVEL
21	0614-00909-0400	SIDE LIGHT SHIELD (RIGHT) FIREBALL II
	0614-00909-1400	SIDE LIGHT SHIELD (RIGHT) CAPT. FANTASTIC
	0614-00910-0400	SIDE LIGHT SHIELD (RIGHT) EVEL KNIEVEL
	0614-00909-0500	LIGHT SHIELD SLING SHOT (LEFT) NOT SHOWN - FIREBALL II
	0614-00909-1500	LIGHT SHIELD SLING SHOT (LEFT) NOT SHOWN - CAPT. FANTASTIC
	0614-00910-0500	LIGHT SHIELD SLING SHOT (LEFT) NOT SHOWN - EVEL KNIEVEL
22	0614-00909-0600	SPINNER GATE LIGHT SHIELD (RIGHT) - FIREBALL II
	0614-00909-1600	SPINNER GATE LIGHT SHIELD (RIGHT) - CAPT. FANTASTIC
	0614-00910-0600	SPINNER GATE LIGHT SHIELD (RIGHT) - EVEL KNIEVEL
23	0614-00909-0700	LIGHT SHIELD SLING SHOT (RIGHT) - FIREBALL II
	0614-00909-1700	LIGHT SHIELD SLING SHOT (RIGHT) - CAPT. FANTASTIC

ORDER BY PART NUMBER ONLY

ITEM	PART Nº	DESCRIPTION
	0614-00910-0700	LIGHT SHIELD SLING SHOT (RIGHT) - EVEL KNIEVEL
	0614-00909-0800	TOP CENTER LIGHT SHIELD - NOT SHOWN - FIREBALL II
	0614-00909-1800	TOP CENTER LIGHT SHIELD - NOT SHOWN - CAPT. FANTASTIC
	0614-00910-0800	TOP CENTER LIGHT SHIELD - NOT SHOWN - EVEL KNIEVEL
24	0614-00909-0900	LIGHT SHIELD (LEFT) - FIREBALL II
	0614-00909-1900	LIGHT SHIELD (LEFT) - CAPT. FANTASTIC
	0614-00910-0900	LIGHT SHIELD (LEFT) - EVEL KNIEVEL
25	0606-00013-0000	BALL GATE (LEFT)
26	0606-00012-0000	BALL GATE (RIGHT)
27	A606-00005-0100	SPINNER GATE ASSY. (2 REQ'D.) FIREBALL II & EVEL KNIEVEL
	A614-00023-0000	SPINNER GATE ASSY. CAPT. FANTASTIC
	A614-00024-0000	SPINNER GATE ASSY. W/GOGGLES CAPT. FANTASTIC
28	0606-00118-0000	BACK UP BRKT. TARGET (3 REQ'D.)
29	0606-00126-0000	BACK UP BRKT. SLING SHOT (2 REQ'D.) EVEL KNIEVEL (1 REQ'D.)
30	0606-00014-0000	FLIPPER & SHAFT ASSY. (2 REQ'D.) EVEL KNIEVEL (3 REQ'D.)
31	0606-00011-0000	THUMPER BUMPER ASSY. - MINUS CAP & SCREWS (2 REQ'D.)
32	0017-00003-0061	THUMPER BUMPER LAMP (2 REQ'D.)
33	0017-00003-0182	LAMP (NOTE: ALL LAMPS ARE THE SAME ON PLAYFIELD EXCEPT THE 2 THUMPER BUMPER LAMPS)
34	A614-00028-0000	BOTTOM ARCH ASSY. - FIREBALL II
	A614-00018-0000	BOTTOM ARCH ASSY. - CAPT. FANTASTIC
	A614-00035-0000	BOTTOM ARCH ASSY. - EVEL KNIEVEL (NOTE: SEE SEPARATE ILLUSTRATION PAGE 38 FOR BOTTOM ARCH ASSY.)

Fig. 9-60. Playfield assembly parts list (part 2 of 2).

NO. 614 BOTTOM ARCH ASSY.

ORDER BY PART NUMBER ONLY

ITEM	PART Nº	DESCRIPTION
1	0614-00906-0100	BOTTOM ARCH - EVEL KNIEVEL
	0614-00906-0200	BOTTOM ARCH - CAPT. FANTASTIC
	0614-00906-0300	BOTTOM ARCH - FIREBALL II
2	0614-00905-0100	BALL RUNWAY - EVEL KNIEVEL
	0614-00905-0200	BALL RUNWAY - CAPT. FANTASTIC & FIREBALL II
3	0606-00009-0000	KICKER ASSY. - BALL RETURN
4	0614-00924-0000	INSTRUCTION CARD - CAPTAIN FANTASTIC & FIREBALL II
	0614-00925-0000	INSTRUCTION CARD - EVEL KNIEVEL
5	0614-00926-0000	RATING CARD
6	0017-00009-0407	SWITCH - BALL RETURN

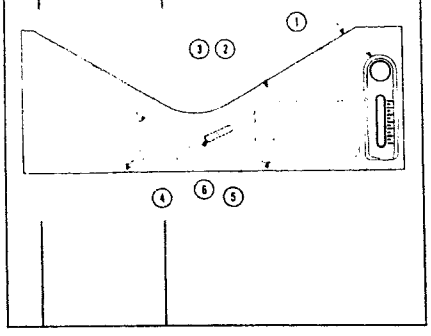


Fig. 9-61. Bottom arch assembly and parts list.

TRANSFORMER (NOT SHOWN)

ORDER BY PART NUMBER ONLY

ITEM	PART Nº	DESCRIPTION
		EVEL KNIEVEL & FIREBALL II
	0017-00032-0039	ON-OFF SWITCH
	0017-00003-0185	CIRCUIT BREAKER
	0017-00003-0155	FUSE HOLDER
	3000-14144-0100	A. C. INTERLOCK
	0017-00003-0184	FUSE 8 AMP
	0606-00021-0000	TRANSFORMER AND MTG. BRKT. ASS'Y.
	0606-00058-0000	TRANSFORMER COVER ASSY.
	0606-00913-0000	LINE CORD
		CAPTAIN FANTASTIC
	0017-00032-0039	ON-OFF SWITCH
	0017-00003-0179	CIRCUIT BREAKER (4)
	0017-00003-0193	CIRCUIT BREAKER
	3000-14144-0100	A. C. INTERLOCK
	0017-00042-0139	PLASTIC GROMMET (7)
	A614-00043-0000	TRANSFORMER MTG. BRKT. ASS'Y.
	A614-00044-0000	TRANSFORMER COVER ASSY.
	0606-00913-0000	LINE CORD

Fig. 9-62. Transformer parts list.