ENGLISH MARK DARTS™

SERIES 6000 PARTS MANUAL

Arachnid INC.™
The Originator of Electronic Darts

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INTRODUCTION

This manual contains description, unpacking/assembly, operation, and troubleshooting information for the model 6000 English Mark Darts machine.

The purpose of this manual is to provide the user with a basic installation and field service guide. If you should encounter a problem that is not covered, please call the factory using our toll-free number, 800-435-8319. In Illinois use 815-654-0212.

SECTION 1 - GENERAL DESCRIPTION

The 6000 series English Mark Darts machine is a patented microprocessor controlled dart game (patent #4057 251) where players may select one of eight different games. It is a coin operated game offering players a choice of quarter games or more challenging fifty-cent games.

Occupying only 2.5 square feet of floor space (see Figure 1), this unit uses a revolutionary sealed switch matrix scoring system behind the dart face. As the darts strike the target, the machine's computerized digital scoring system gives the player an instantaneous displayed score.

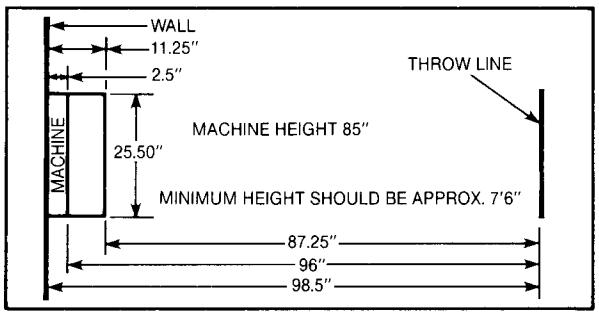

Figure 1. Plan view of the 6000 Series play field.

SECTION 2 - UNIQUE FEATURES OF THE 6000 SERIES GAME

There are several features that are unique to the 6000 series English Mark Dart Game from previous series games, such as:

1. The first eight games listed (A-H) are standard on the 6000 series game. On the Plus Version Cutthroat and Baseball are replaced by Tic Tac Darts and Horse.
   A. **301 — 25 cents per player**
   A count down game for one to four players where each player starts with 301 points and must hit zero exactly first to go out (win).
   B. **Count up — 25 cents per player**
   A 24 dart game for one to four players where each player tries to score the most points in 24 darts thrown three at a time.
   C. **Cut Throat — 25 cents per player**
   One to four players where each player shoots one dart to establish their number. On subsequent turns each player is given three darts to shoot at the opponents number where seven hits eliminates that player.
   D. **501 Team Doubles — Open in/open out. 50 cents per player.**
   One to four players or teams, played the same as 301. This is usually played by two-person teams.
   E. **701 — Open in/double out. 50 cents per player.**
   One to four teams, played the same as 301 except to go out a double or a bullseye must be hit. Count down game popular with three or four person teams.
   F. **301 — Double in/double out. 50 cents per player.**
   This is for the more experienced players. One to four players, played the same as 301 except the player must start counting down and end the game by hitting a number in the outer double score ring, or by hitting bullseyes.
   G. **Baseball — 50 cents per player**
   A U.S. game where two players play nine innings of baseball. The first inning the only scoring number is the "one." Each subsequent inning the number used corresponds to the inning. On any of the three darts per inning a single number gives a single, a double a double, a triple a triple. The last scoring dart of every three can be thrown for the Bull's eye which scores a home run. The winner is determined by the player with the highest score at the end of nine innings.
   H. **Cricket — 50 cents per player**
   Two players or teams per game. The game of Cricket is played with the numbers 15 through 20 and the bullseye. Each player must hit a number three times to close the number and score before the number is closed by the opponent. The winner is the first person to close all the numbers and have the highest score.
   I. **Tic Tac Darts — 25 cents per player**
   A game for two players. The numbers will come up random to start the game. To mark an X or O a player must hit a number 4 times. Hitting a number more than 4 times will score points for that player. Singles score 1 hit, doubles score 2 hits, and triples score 3 hits. When one player gets 3 X's or 3 O's in a row, he wins. In case of a tie game where it is not possible to have 3 in a row, the high score wins. The bull is always in the center.
   J. **Horse — 50 cents per player**
   A game for 2 thru 4 players. Played as the basketball game. The first player throws, the first hit being the set hit. Additional hits will determine the total number that the opponent must hit to match or steal. Singles score 1 hit, doubles score 2 hits, and triples score 3 hits. The next player must at least equal the number of hits or he will get a letter. If the second player hits it more times than the set player he steals and becomes the set player. This means he will shoot two rounds in a row.
2. **Warm up mode.** The target light comes on when quarters are inserted. The microprocessor counts the number of quarters and will allow three free warm-up shots (for each quarter inserted) after which the target lamp is turned off. The player can then select game to be played at which time the target lamp will come back on and stay on till the game is finished.
3. **Attract mode** continuously displays messages and sample game screens. Following completion of a game, attract mode starts again after about a minute and a half.
4. **Reset mode.** If there is no play within a 10 minute period, the game will reset as if it had just been turned on. This will help when a player leaves the game, as other players will know that no one is currently playing.
5. **Target lamps** surround the target head with light. Darts already stuck in the board no longer cast shadows on other segments. In the "off" condition, the lamps go dim, just enough to let the dart player see the target without giving him enough light to play for free. The level of light is adjustable internally to suit the ambient light conditions at the location. The fact that the lamp doesn't get "cold" gives longer life as the surges of current when turned on are reduced (i.e. a warm bulb has a higher resistance than a cold bulb).
6. **External video** is available for displaying the scores to large crowds at tournaments or to attract other player's attention. Section 5.8 shows how to do this.
7. **Electronic popularity meter and coin meter** to keep track of statistics. You can tell how many times each game was selected and total number of coins inserted. See section 4.1 Test Mode for further information. A mechanical counter is mounted inside the coin door as well due to the fact that the electronic meter can be reset.
8. **Stuck segment indication** on screen to immediately let the player know to check for broken tips or any other foreign objects holding a segment back. It also indicates which segment is closed (i.e. S1 for single one; D3 for double three; T20 for triple 20; and Bull for Bullseye).

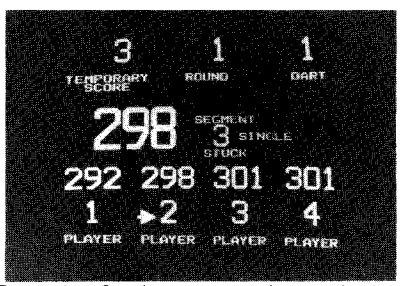

Figure 2. Stuck segment indicator display

9. **Instructions** can be read at any time a game is not being played by pressing "ENTER" to bring up the instruction menu, selecting the game you want to see instructions on with "SELECT", and pressing "ENTER" again. Return to attract mode is automatic after approximately a minute and 30 seconds or by inserting a coin or pressing "ENTER." After inserting coins, instructions can still be selected as it is the last item on the menu.

SECTION 3 - UNPACKING/ASSEMBLY

3.1 **Unpacking**

a) Using a sharp knife, cut around top edge and remove.
b) Take out bag containing darts, tips, manuals, and bolts/nuts.
c) Slit all four sides from top to bottom allowing the sides of the container to fall away from the machine. The machine is now ready for assembly.

—CAUTION—
DO NOT LIFT BASE UNIT BY ITS INSTRUCTION PANEL.

3.2 **Assembly**

a) Remove back to top unit.
b) Feed ribbon cable and lamp plugs through the hole in center of bottom.
c) Attach top assembly into base assembly as shown in Fig. 2 using four 1/4-20 carriage bolts and nuts and two 1/4" hex cap bolts as shown in Fig. 3A.
d) Feed speaker connector up through hole in base of top assembly and connect (Fig. 4).
e) Bring power cord out round hole in back of game and plug into a 120V AC (or proper input voltage for your country) GROUNDED wall outlet. The machine is now ready for power up sequence.

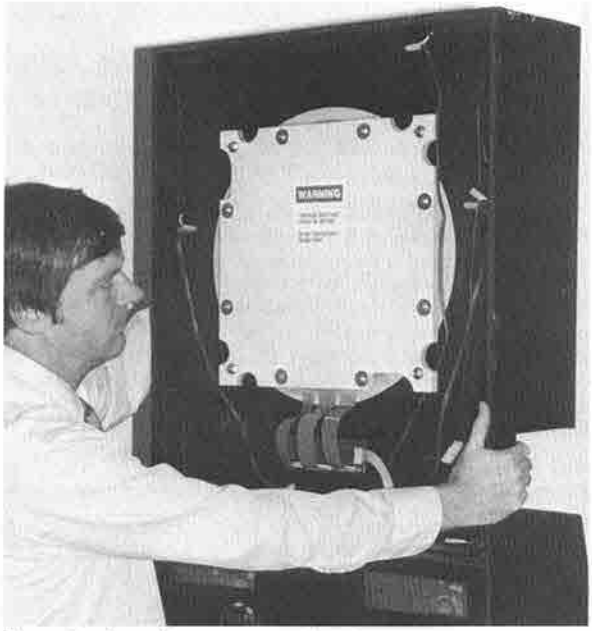

Figure 3. Attaching top assembly to base

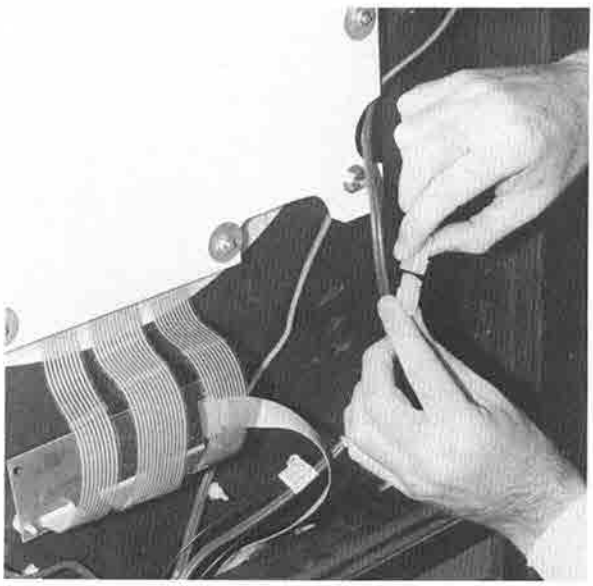

Figure 4. Attaching speaker harness

SECTION 4 - OPERATION

4.1 **Power Up, Checkout, and Test**

a) Turn on dart machine using on/off switch on the back of the machine. The remove darts/throw darts lamps should start to flash alternately. After a few seconds, the monitor should come on displaying the attract sequence.
b) Inside the coin doors you will find a slam switch, Fig. 5, which when activated will cause the game to reset, and a slide switch which will put the game into test mode when depressed and released.
c) Slide the test switch down and release. The screen will show a hatch test pattern plus a message that the lamp test is starting. At this time all lamps on the machine will illuminate to check for proper operation. These lamps are:

1. target lamps (3)
2. remove darts (2) on PC board
3. throw darts (2) on PC board
4. select pushbutton lamp
5. enter/player change lamp

While the lamps are lit, the sounds of the game are played. Next the lamps will go out and the message "DART HEAD TEST" will appear at the top and "PRESS ENTER FOR TEXT INPUT" and "PRESS SELECT FOR REPORT" at the bottom. If you press any segment at this time, the score should appear in the center of the screen (Fig. 6).

After testing the segments in the dart head, pressing *select* will display the *report* screen (Fig. 7). From this screen, you can tell how many times each game has been played. The last item is an electronic coin counter. The numbers displayed on the report screen can be cleared by pressing the Bull's eye while in this mode.

Information on the popularity screen is retained when the power is turned off (see Section 5.2.6).

Pressing ENTER instead of SELECT will put you into the SPIDER WRITER mode. See SPIDER WRITER page (Fig. 10) for more information.

Pressing the test switch, inserting a coin, closing the slam switch, or turning power off and on will cancel test mode.

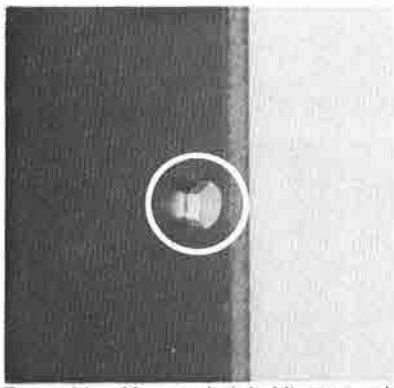

Figure 3A. Hex cap bolt holding top to bottom

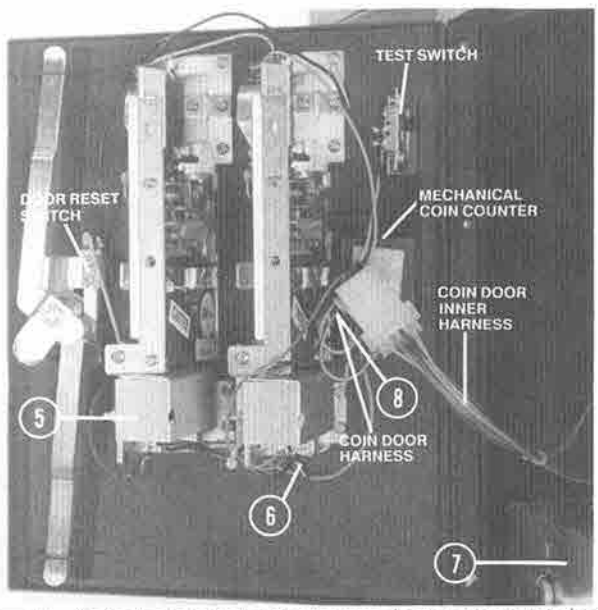

Figure 5. Coin door open showing coin mechanism, reset switch, and test switch

Figure 6. Test mode ready for dart head test

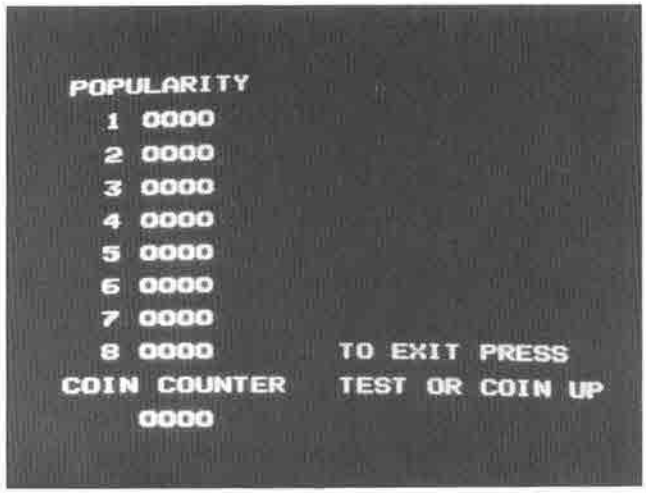

Figure 7. Report Screen

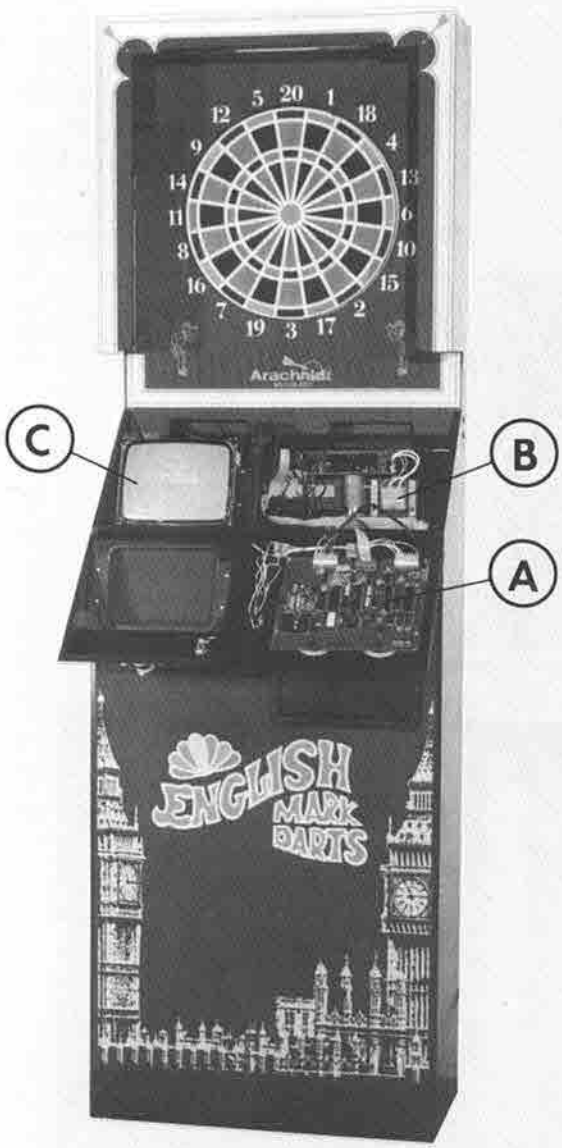

Figure 8. Front view of 6000 series game

SECTION 5 - TECHNICAL DESCRIPTION

5.1 **General**

Figure 8 and Figure 9 show the main components of the game.

a) Main CPU Board
b) Power Supply
c) 9" Monitor
d) Target Interface Board
e) Dart Head Assembly

The assembly containing the main board, monitor, and power supply is designed for easy access as shown in Fig. 8. Most service can be performed by swinging the front door open. However, if desired, the component tray can be removed entirely by unscrewing three screws in the bottom of the tray, disconnecting target lamp wires (3), ribbon cable, and coin harness. This way the unit can be bench tested by attaching a dart head w/target interface, a low wattage (40W) lamp, and switches to simulate the coin in, test, and reset.

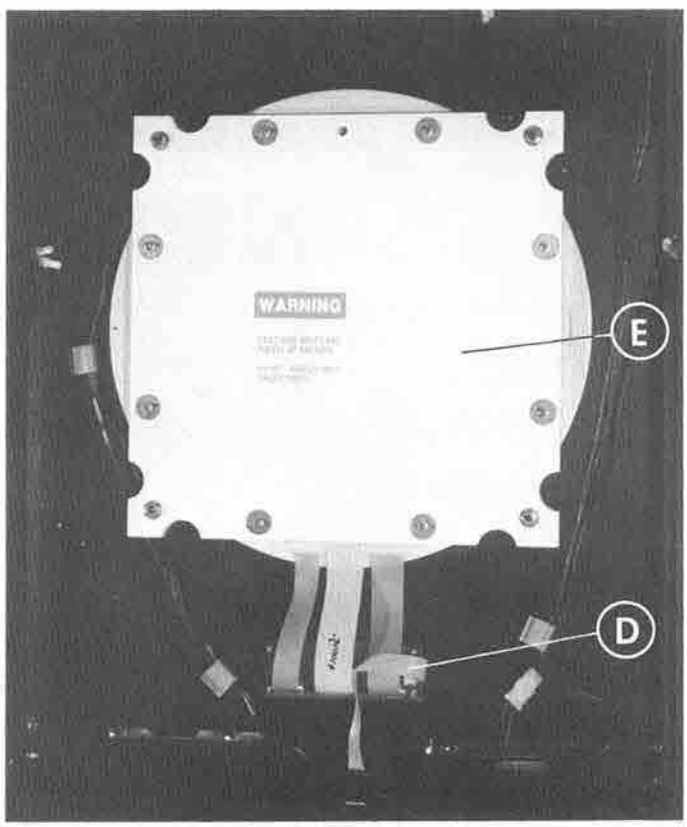

Figure 9. Rear view of 6000 series game

"Super 6" Spider Writer T.M.

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SPIDER WRITER INSTRUCTIONS: EASY AS 1 2 3

1. Put the "Super 6" into the test mode by depressing the slide switch inside the coin door. At the end of the test mode the message "press Enter for text input - press Select for report" will appear. Press the Enter button.

2. A cursor will appear in the upper left corner of the screen. Use the dart head as a "keyboard" to move the cursor around and to enter your custom message. The diagram to the right illustrates which symbols are represented by segments in the single, double and triple rings.

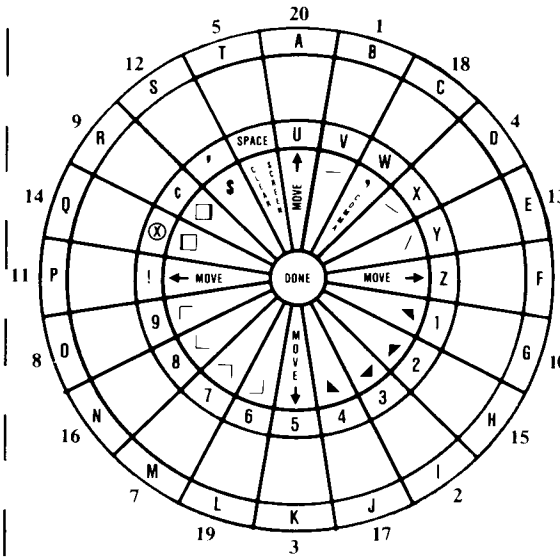
3. Press the bullseye when you are satisfied with the screen you have created. The Spider Writer will remain in the input mode for ten minutes before returning to normal game operations. If time expires while you are entering a screen, simply put the game back in Test mode and continue where you left off. The screen you were working on was automatically saved.

HELPFUL HINTS:

Use the 32x16 grid below to create the screen on paper before putting it on the "Super 6." It will save you time in deciding where to place words or graphics. Make copies of this original and draw on the copies, saving the original to make additional copies from.

Be careful of the Single 5! It clears the screen completely and should only be pressed when you wish to change the entire screen.

Note: A game that is not properly grounded may place strange characters in random locations on the screen. Please make sure the ground plug on the wall receptical is properly connected.



Keyboard Legend

Each Segment in the Singles, Doubles, and Triples rings correspond to the letter, number or graphic represented on the diagram above. Use "Move" segments to position the cursor on the screen. Be careful of the single 5 - It clears the screen completely.

"Super 6" Spider Writer T.M.

SPIDER WRITER WORKSHEET

Use this grid to design your custom screen

Arachnid INC
The Originator of Electronic Darts
P.O. Box 2901
Rockford, IL 61132-2901
800-435-8319 (IL) 815-654-0212

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
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Figure 10. Spider Writer instruction page

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5.2 Main CPU Board

The main CPU board (Figure 19, page 11) contains a 6809 microprocessor and associated IC's consisting of:

TMS4416	16KX4 Dynamic Memory - U12, U13
TMS9118	Video Generator - U11
74LS32	2 Input OR Gate - U10
MK48Z02	2KX8 Memory W/Battery - U23
27256	32K Eprom - U15
74LS04	Hex Inverter - U1
556	Dual Timer - U2
6821	Peripheral Interface Adapter - U4, U17
74LS138	3 Line to 8 Line Decoder - U14
LM7815CT	15V Regulator - U22
LM383T	Audio Amp - U21
6840	Programmable Timer - U16
ULN2003	Transistor Network - U7, 18, 24
	Capacitor Network, 01UFDX8 - U8, 9
	Resistor Network 2KX8 - U5
	Resistor Network 10KX8 - U19, 20
	Diode Network, IN4148X8 - U6

5.2.1 Monitor - See monitor manual

5.2.2 Player Change - Select

The player change and select pushbutton is located on the front slanted panel. When the player change is closed, pin 3 of U17 is shorted to ground. When select is closed, it shorts pin 2 of U17 to ground. When the switches are open, the inputs are held high by 10K OHM resistor network. C22 and C23 (.01ufd) are used for noise suppression.

5.2.3 Sound Circuit

Sound is generated in U16 by programming timer 1 (of three timers) to free run at specific frequencies. The sound is output at pin 27 (01) and is fed thru R9 which is the volume control accessible from the top of the main PC board. U21 (LM383T) is an 8 watt audio power amplifier whose gain is controlled by the ratio of R23 and R24. The voltage for U21 is controlled by U22 (LM7815CT) a 15 volt regulator. Input should be 21 to 24 volts DC depending on line voltage.

5.2.4 Reset

The microprocessor can be reset either by shutting off power for a few seconds and then turning back on, or by closing the slam switch inside the coin door.

a) The slam switch on the coin door is buffered with two sections of U7. When the switch is closed, pin 2 of U7 is grounded. U7 inverts this signal twice so the effect on the reset line is that it goes low. C6 is used for preventing electrical noise from triggering a reset.

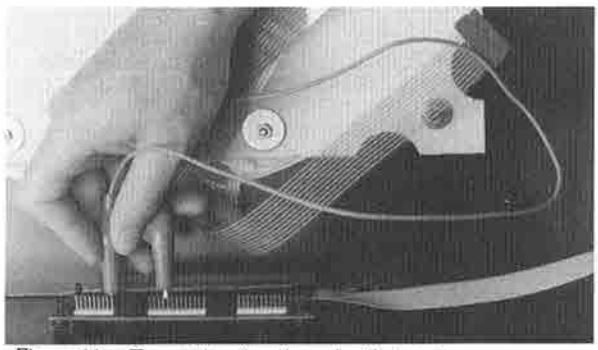


Figure 11. Target interface board with test jumper

TABLE 1
Letter Designation of Scores

SCORE	SINGLE	DOUBLE	TRIPLE
1	DN	EN	FN
2	AL	BL	CL
3	AN	BN	CN
4	DL	EL	FL
5	AP	BP	CP
6	GL	HL	GP
7	DO	EO	FO
8	GI	HI	GM
9	AO	BO	CO
10	AI	BI	CI
11	AK	BK	CK
12	DP	EP	FP
13	AM	BM	CM
14	GK	HK	GO
15	GJ	HJ	GN
16	AJ	BJ	CJ
17	DM	EM	FM
18	DI	EI	FI
19	DJ	EJ	FJ
20	DK	EK	FK
BULL		HM	

b) The purpose of half of the 556 timer is to give a short delay to the reset line after power up. The reset line cannot come to 5 volts at the same time as the 5 volts on Pin 7 on U3, but must be delayed a few clock cycles for reset to work properly.

5.2.5 Interrupts

The microprocessor can be interrupted in three different ways at which time it will jump to the part of the program that controls that particular interrupt.

a) Two of the three timers (U16 - 6840) are cascaded to give approximately a ten-minute delay before an interrupt will occur, at which time the game resets as if you had just turned it on. Any activity during a game automatically resets the timer back to 10 minutes (i.e., as long as there is someone playing the game it will not reset, only if it is left unattended for 10 minutes).
b) The coin input switch will override any game or other mode that the game may be in.
c) The test switch will also be acknowledged any time.

5.2.6 Memory

Memory in this system consists of 2K of RAM (U23-MK4BZ02) with internal lithium batteries. This gives data retention when power is off for the popularity screen. The manufacturers data sheet (MOSTEK) states the minimum expected data retention time as 10 years based on statistical studies made by MOSTEK.

Eprom memory (U25-27256) holds the main program. The window on this IC should always be covered with our stick-on label as Eproms are erasable when exposed to ultraviolet light over a period of time.

5.2.7 Address Decoding

Address decoding is done with U14, a three line to one of 8 line decoder. This IC determines if the microprocessor is addressing memory, one of the two peripheral interface adapters, the 6840 sound IC, memory, or the video IC.

5.3 Target Interface Board

The target interface board is used to combine the 33 conductors from the switch matrix into 16 conductors. At times it can be important to know which pins on the target interface board will give a particular score. This information is in Table 1 and Figure 12. With the game in test mode (at the end of test when the dart head is sensitive) or in game mode, shorting, momentarily, the correct pair of pins in the target interface board with a jumper wire will give a score (see Figure 11). Doing this might save troubleshooting time as you can determine if a problem is in the switch matrix or the electronics.

—NOTE—
THE SCORE WILL NOT APPEAR UNTIL THE JUMPER WIRE IS REMOVED.

You will note from Table 1 that the 13 pin connector is common to all switches. Since the microprocessor won't score until the switch opens, pulling off the 13 pin connector while in test mode will give you the score of a stuck segment or switch. The effect is that the switch gets opened so the microprocessor can give the score. This can save troubleshooting time. Another method of operating the switch is to pull the ribbon cable from the main 6000 series board.

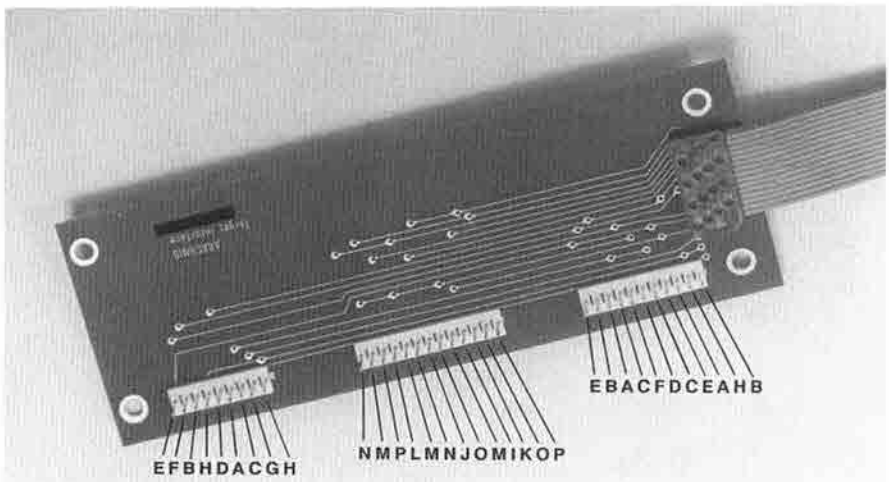


Figure 12. Target interface board letter designations

5.4 **Target Illumination**

The target illumination consists of three "showcase" bulbs 5-1/2" long frosted inside. These are used for illuminating the game during attract mode as well as during play. In the attract mode, the brightness of the lamps should be adjusted so the dart head is barely visable, not bright enough to allow free play. This is adjusted with a screwdriver on the base of the power supply inside the component tray (see Figure 13).

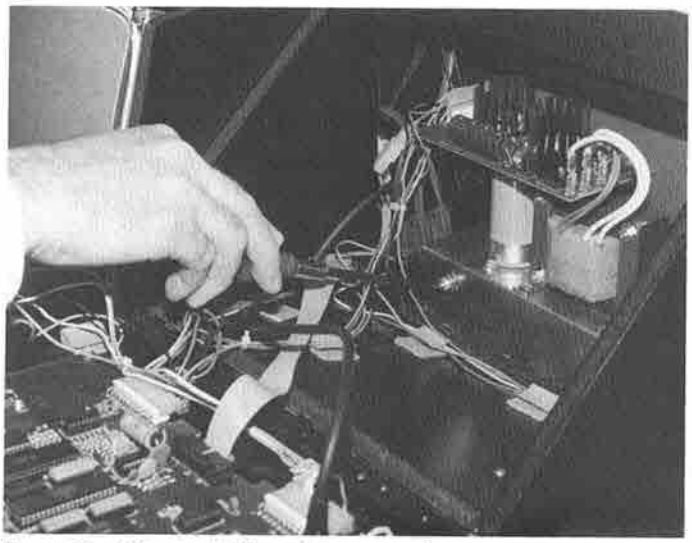


Figure 13. Adjusting "off" condition target illumination

The off brightness is a result of (see power supply schematics) R4, C10, and a ST-4 DIAC. These components turn on the gate of the Triac (SC1461D) for only a portion of each cycle of AC, the same as a wall dimmer switch would do.

When the game is coined up, the gate of the Triac is turned on all the time through the MOC3030. This off brightness also keeps the filament of the bulb warm which greatly reduces the turn-on shock and should give longer life to the lamps and Triac.

—CAUTION—

NOTHING EXCEPT FOR THE TARGET LIGHTS SHOULD BE PLUGGED INTO THE RECEPTICALS IN THE COMPONENT TRAY AS IT HAS SPECIAL WIRING.

5.5 **Power Supply**

The power supply consists of three voltage levels, +5V, +12V, and +21VDC. The 5V and 12V come from the same transformer output. The 12V supply consists of two regulators, a LAS1612 for the monitor rated at 2 Amps and a LM340-12 for the lamps rated at 1 amp.

The 5V regulator should only vary ±.1V with load and line. All of the logic is powered from this supply.

The +21V supply is unregulated and will vary with line and load. This supply feeds the +15V regulator located on the main PC board. The 15V regulator powers the audio circuit.

There are three fuses in the power supply. The main fuse is located on the chassis. It is a 1.5 amp 250 volt slow blow 3AG size. Nothing will function if this fuse blows.

The other 2 fuses are located on the small printed circuit board on top of the power supply. The one closest to the edge is FS1, a 5 amp 250 volt slow blow 3AG size. This protects the lamps and 5 volt circuit. The fuse next to it (FS2) protects the sound circuit. It is a .75 amp 250 volt slow blow 3AG size.

—NOTE—

THE GROUND ON THIS GAME IS FLOATING AND MUST NOT BE CONNECTED TO THE POWER SUPPLY CHASSIS GROUND. THEREFORE, ALL VOLTAGE MEASUREMENTS SHOULD BE REFERENCED TO THE GROUND ON THE SMALL PC BOARD ON TOP OF THE POWER SUPPLY OR GROUND ON THE MAIN BOARD.

5.6 **Dart Head**

The dart head is set to exact specifications at the factory. The bolts that hold the board together are tightened to finger tight only. Do not tighten any further as this can close switches in the switch matrix and cause the dart head to lock up or misscore.

5.7 **Dart Head Disassembly/Reassembly**

To clean or replace parts in the dart head, it is necessary to disassemble and reassemble as follows:

a) Remove 8 nuts holding the target back to the spider.
b) Remove switch matrix.
c) Remove .020" gasket.
d) Remove rubber damper.
e) Check for dirt and broken tips between spider and cups.
f) Replace any worn or broken cups.
g) Clean and re-install rubber damper.
h) Re-install gasket, making sure that it is installed right side up and in the right rotation. There should be a small U shaped cutout to the left of center at the top as shown in Figure 14.
i) Place the switch matrix with the tails on the left and the 9 pin connector on top.
j) Clean and re-install target back and 8 nuts, tightening only finger tight.

—NOTE—

BOLTS MUST BE FINGER TIGHT ONLY. ANY TIGHTER WILL CLOSE CONTACTS IN THE MATRIX AND CAUSE INACCURATE SCORING OR NO SCORING AT ALL.

—NOTE—

IT IS IMPORTANT TO KEEP DIRT OUT OF THE AREA BETWEEN THE SPIDER AND SEGMENTS AS THIS CAN CAUSE NON-SCORING OR IMPROPER SCORING. ON A HEAVILY PLAYED GAME IT IS A GOOD IDEA TO DO PREVENTIVE MAINTENANCE ON A REGULAR BASIS IN THE FORM OF DISASSEMBLING THE DART HEAD, CLEANING, AND REASSEMBLING. THIS CAN HELP PREVENT SERVICE CALL IN BETWEEN REGULAR VISITS.

—NOTE—

ALTHOUGH THE DART HEAD IS DIS-ASSEMBLED AND RE-ASSEMBLED AS IN THE PAST (WITH 4500 AND 5000 SERIES GAMES), WITH THE 6000 IT IS INSTALLED WITH THE 3 LEADS IN THE DOWNWARD DIRECTION. THIS MEANS THAT THE "20" ON THE YELLOW SPIDER IS NOT AT THE TOP. THE PROGRAM WAS CHANGED TO REFLECT THIS CHANGE. MAKE SURE THAT IF USING A DART HEAD FROM ANOTHER SERIES GAME THAT THE RED AND BLACK SEGMENTS ARE IN THEIR PROPER PLACE (SINGLE 20 IS RED).

5.8 **Video**

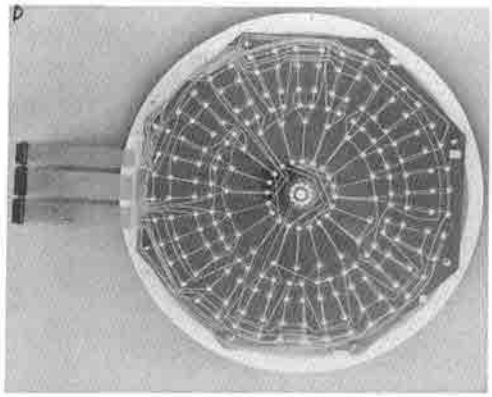
The video signal is created with the TMS9118, U11, along with video RAM chips U12 and U13, TMS4416 dynamic memory. The output signal is at pin 36 of the TMS9118 and is buffered to protect the video chips with TR1.

On the main printed circuit board there are two RCA style phono jacks. Either may be used for the monitor (see Fig. 15 and 16). The second is to be used if external TV's are desired to be set up. To do this, run a cable from the second video jack to an RF modulator or the video input of a VCR. The output of the modulator or VCR is usually on channel 3 or 4 and should be connected appropriately to the TV. This is a great way to display for tournaments or just to create added interest in the location.

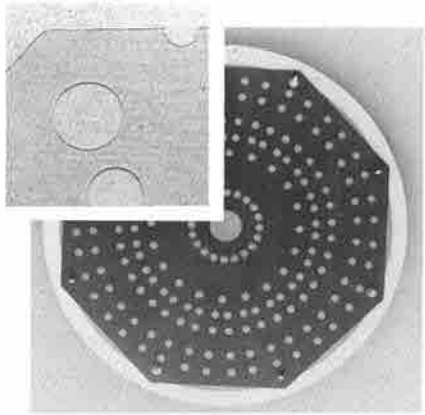
The TMS9118 contains circuitry for an 10.7 MHZ crystal and divides it by 3 to create a CPUCLK signal. This way a separate crystal is not necessary for the microprocessor.

Figure 14. Dart Head Assembly

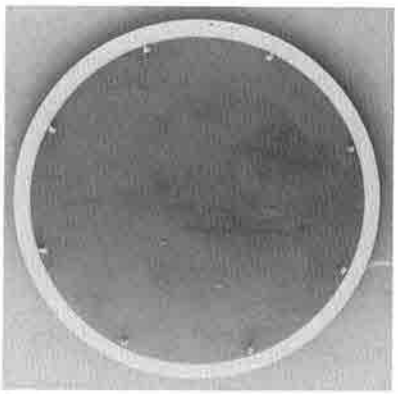
A - Complete Assembly from back



B - Matrix, on top of Dart Head Assembly

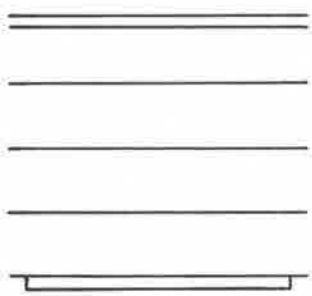


C - .020 gasket



D - Silicone Rubber Gasket

E - Spider Assembly



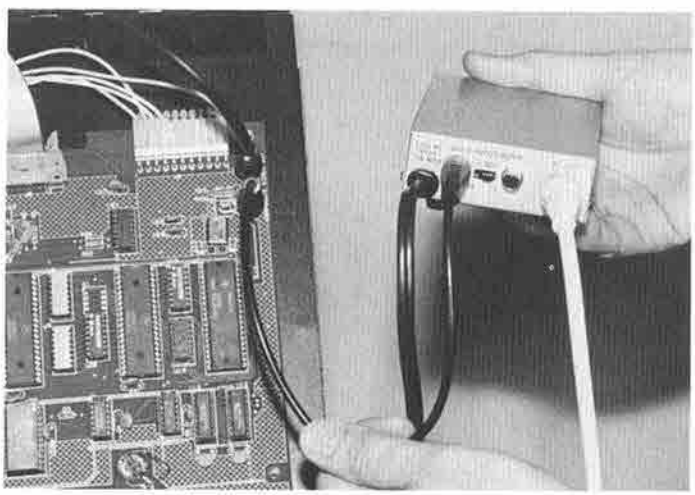


Figure 15. Hooking up a modulator for external TV

Figure 16. External TV

TARGET INTERFACE BOARD

00-6000-02R

FIG. #	ITEM #	PART #	DESCRIPTION
17	1	10-0020	Connector - 9 Pin
17	2	10-0022	Connector - 13 Pin
17	3	10-0021	Connector - 11 Pin
17	4	15-0144	Ribbon Cable - 16 Wire

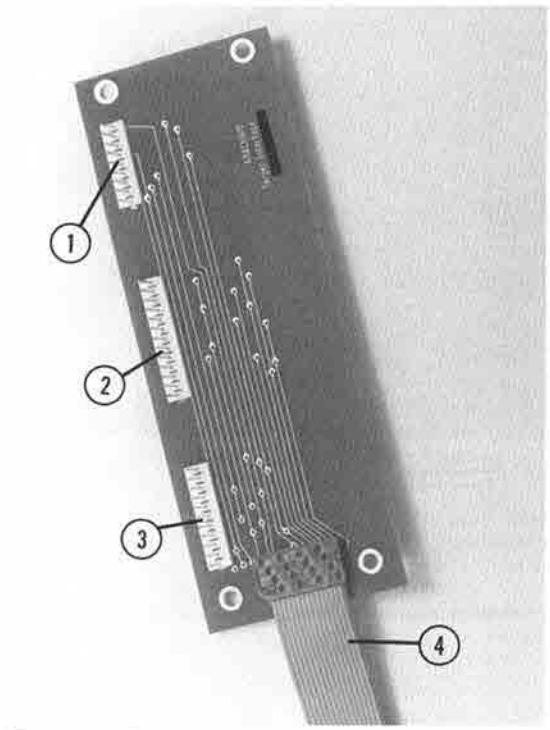


Figure 17. Target interface board

COIN DOOR ASSEMBLY

00-6000-04R U.S.A. - 25 cents	00-6006-04R England - 20p
00-6001-04R German - 1 DM	00-6008-04R Japan - 100 Yen
00-6002-04R French - 1 Franc	00-6009-04R Kenya - 1 Shilling
00-6005-04R Spanish - 25 Pesetas	

FIG. #	ITEM #	PART #	DESCRIPTION
18	5	13-0043	Coin Mechanism - U.S.
18	5	13-0044	Coin Mechanism - Canadian
18	6	03-0005	Capacitor .1 mfd 16V (2)
18	7	18-0014	Cash Box
18	8	00-4500-10	Coin Door Harness

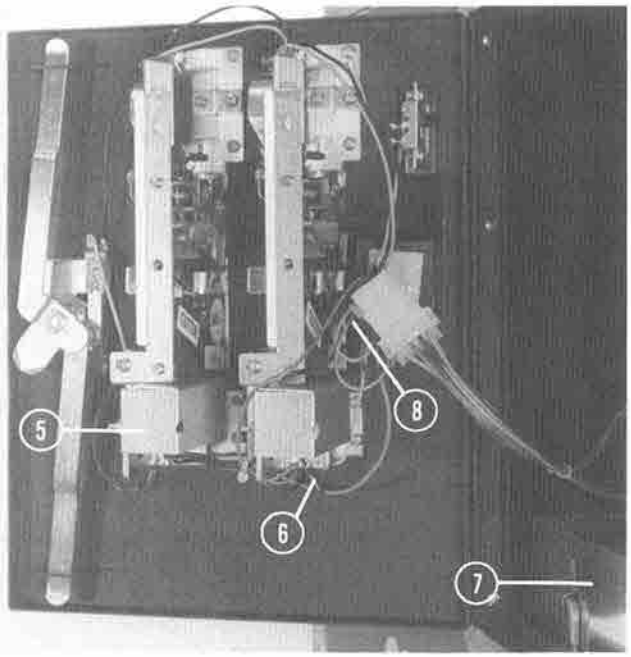


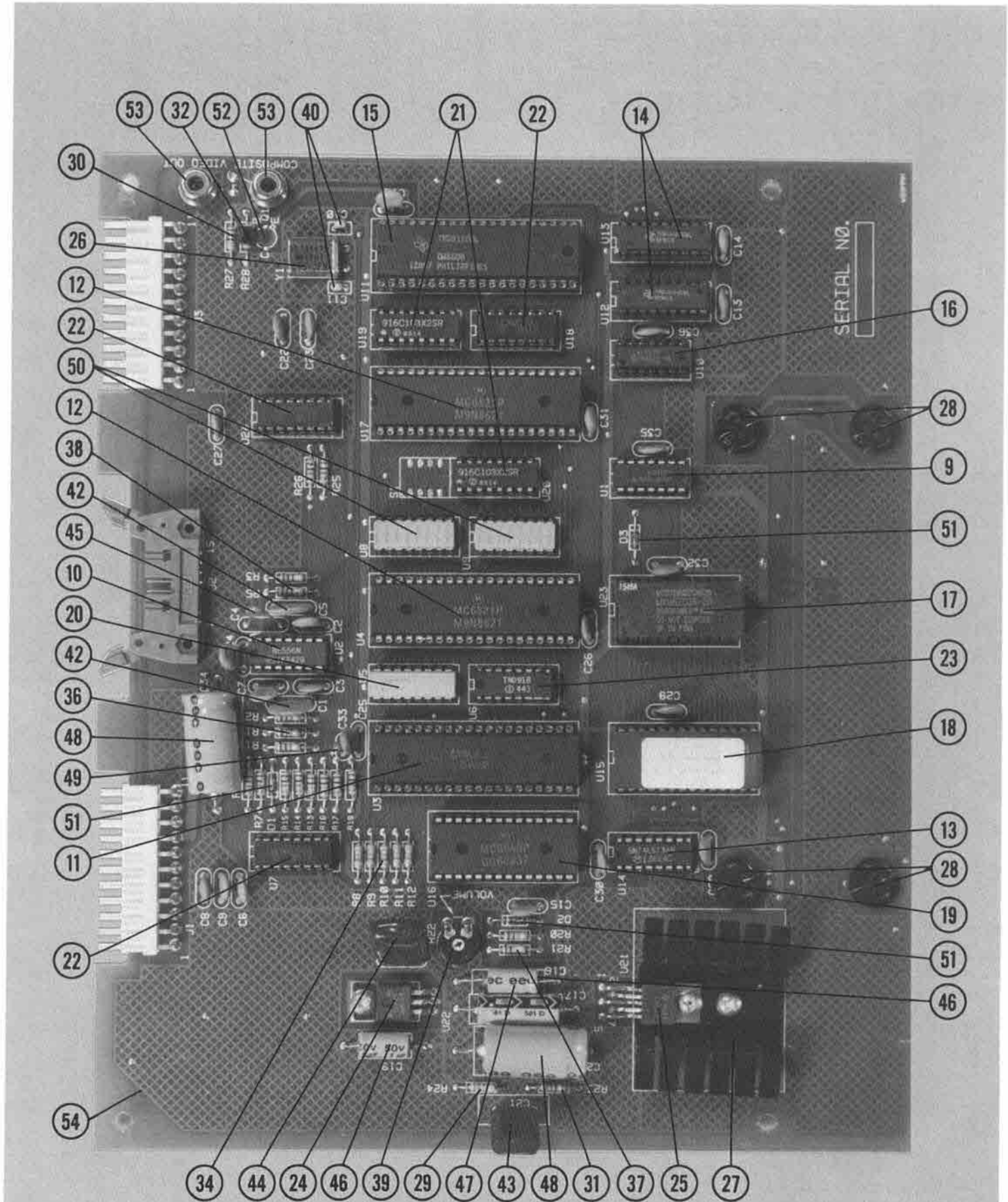
Figure 18. Coin door

MAIN P.C. BOARD ASSEMBLY

00-6000-01R

FIG. #	ITEM #	PART #	DESCRIPTION
19	9	01-0014	74LS04
19	10	01-0035	556
19	11	01-0056	6809
19	12	01-0037	6821 (2)
19	13	01-0015	74LS138
19	14	01-0052	TMS4416 Memory (2) 16K x4
19	15	01-0053	TMS9118 Video
19	16	01-0054	74LS32
19	17	01-0055	MK48202 Memory w/Battery DS1220Y
19	18	01-0068	Eprom-U.S.A.-Spider Writer
19	18	01-0120	EPROM - USA - PLUS II+
19	18	01-0065	Eprom-Spanish-Spider Writer
19	18	01-0071	Eprom-England-10p/20p-S.W.
19	18	01-0072	Eprom-England-20p/40p-S.W.
19	18	01-0073	Eprom-German-Spider Writer
19	18	01-0074	Eprom-Japan-Spider Writer
19	18	01-0076	Eprom-U.S.A.-SUPER 6 PLUS
19	19	01-0039	6840
19	20	02-0045	Resistor Nework - 2K ohm
19	21	02-0001	Resistor Network - 10K ohm (2)
19	22	19-0018	Transistor Network — HLN2003A (3)
19	23	19-0020	Diode Network — TND903
19	24	01-0033	MC7815CT SK3593/968
19	25	01-0027	LM383T SK3852/1232
19	26	06-0005	Crystal 10.738635 MHZ
19	27	13-0020	Heat Sink
19	28	11-0013	Lamp with Socket (4)

FIG. #	ITEM #	PART #	DESCRIPTION
19	29	02-0003	Resistor - 2.2 ohm ¼ W
19	30	02-0055	Resistor - 75 ohm ¼ W
19	31	02-0011	Resistor - 220 ohm ¼ W
19	32	02-0056	Resistor - 470 ohm ¼ W
19	33	02-0017	Resistor - 1K ohm ¼ W (10)
19	34	02-0047	Resistor - 3.3K ohm ¼ W (5)
19	35	02-0021	Resistor - 10K ohm ¼ W (3)
19	36	02-0048	Resistor - 12K ohm ¼ W
19	37	02-0049	Resistor - 510K ohm ¼ W
19	38	02-0036	Resistor - 1 MEG ohm ¼ W (2)
19	39	02-0041	Resistor - 10K ohm Variable
19	40	03-0044	Capacitor 33pf, 16V (2)
19	41	03-0002	Capacitor .01 mfd 50V (23)
19	42	03-0005	Capacitor .1 mfd 16V (2)
19	43	03-0007	Capacitor .22 mfd 16V
19	44	03-0008	Capacitor .33 mfd 100V
19	45	03-0009	Capacitor .47 mfd 16V
19	46	03-0012	Capacitor 1 mfd 50V (2)
19	47	03-0021	Capacitor 100 mfd 25V
19	48	03-0031	Capacitor 1000 mfd 25V (2)
19	49	03-0032	Capacitor 4.7 mfd 25V Tantalum
19	50	03-0042	Capacitor Network .01 x 8 (2)
19	51	19-0007	Diode IN4148 (3)
19	52	19-0011	Transistor, 2N4400
19	53	10-0067	Phono Jack, Panel Mount (2)
19	53	10-0076	Phono Jack, PC Mount
19	54	00-6000-01	Main P.C. Board Complete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SERIAL NO.

FIG. #19

MAIN CABINET ASSEMBLY

FIG. #	ITEM #	PART #	DESCRIPTION
20	55	16-0032	Bottom Decal — Lexan
20	56	00-6000-04R	Coin Door Assembly With Cash Box - U.S.A.
20	57	18-0034	Top Cabinet — Unassembled
20	58	16-0031	Top Decal
20	58a	16-0036	Top Edge Decal
20	59	17-0001	Competitor Strip
20	60	18-0033	Cabinet Bottom — Unassembled
22	61	13-0009	Lock — Back Door
23	62	00-4500-12R	Speaker & Harness
20	63	16-0037	Decal, Instructions, U.S.A.
20	63	16-0041	Decal, Instructions, Spanish
20	63	16-0042	Decal, Instructions, Italian
20	63	16-0043	Decal, Instructions, Dutch
20	63	16-0044	Decal, Instructions, French
20	63	16-0040	Decal, Instructions, German
20	63A	16-0038	Decal, Game List, Super6, U.S.A.
20	63A	16-0045	Decal, Game List, Super6, Dutch
20	63A	16-0046	Decal, Game List, Super6, German
20	63A	16-0047	Decal, Game List, Super6, Spanish
20	63A	16-0048	Decal, Game List, Super6, Italian
20	63A	16-0049	Decal, Game List, Super6, French
20	63A	16-0068	Decal, Game List, Super6, PLUS, U.S.A.
21	64	04-0024	Socket, Lamp, Med. Base (3)
21	65	11-0017	Lamp, 120V, 40W, 5-1/2" Long (3)
21	66	17-0036	Deflectors, Lamp (3)
21	66A	13-0069	Aluminum Foil Light Reflectors
24	67	00-6000-08R	Main Harness
24	68	00-6000-14R	Switch & Lamp Harness
24	69	00-6000-27R	Video Harness
20	70	00-6000-29R	Component Tray Assy.
25	71	08-0009	Switch, Illuminated W/0 Bulb
25	72	11-0021	Bulb GE658
24	72A	11-0019	Monitor, 9" Amber
24	72A	09-0026	PC Board, Monitor, Complete
24	72A	11-0022	CRT for Monitor, 9"
24A	—	00-6000-34R	Arachnid Web Kit
24B	—	00-6000-35	Super 6 Plus Kit - U.S.A.

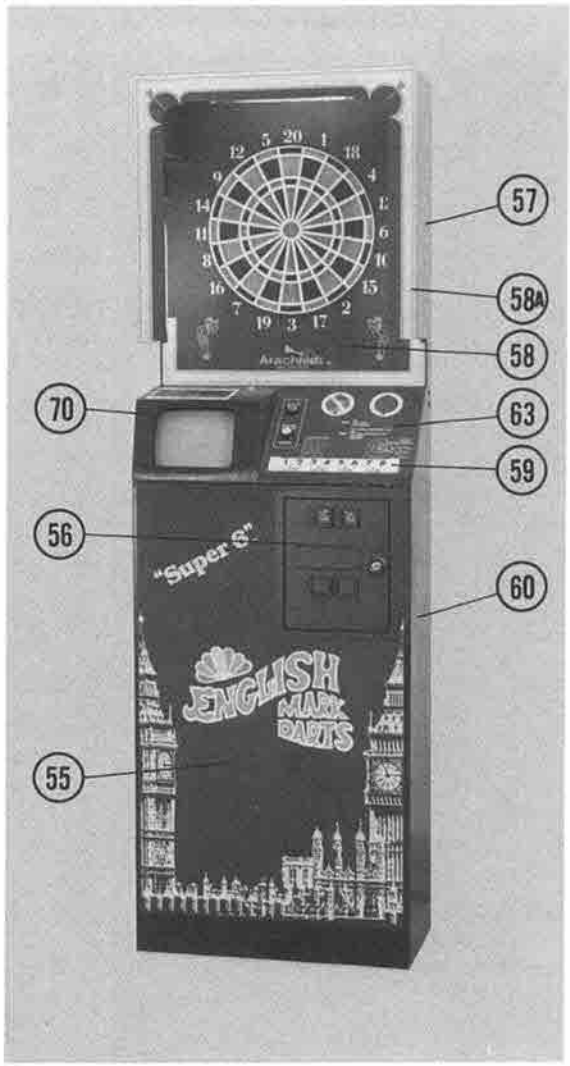
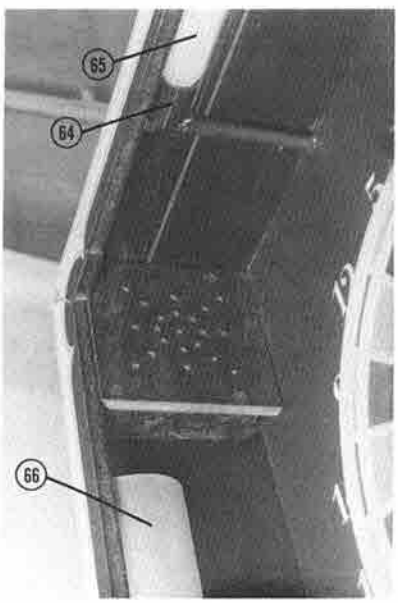


Figure 20.



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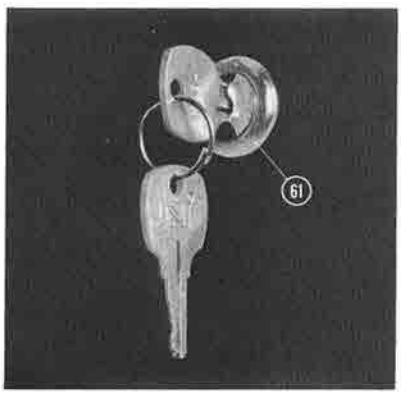


Figure 22.

—NOTE—

THE PART NUMBERS LISTED ARE THE ARACHNID PARTS NUMBERS. PLEASE USE THESE NUMBERS WHEN PLACING YOUR ORDER. SOME DESCRIPTIONS ARE FOLLOWED BY A NUMBER IN PARENTHESES. THIS NUMBER IS THE QUANTITY USED IN THAT ASSEMBLY.

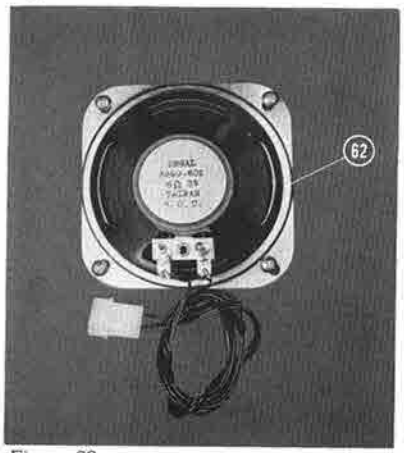
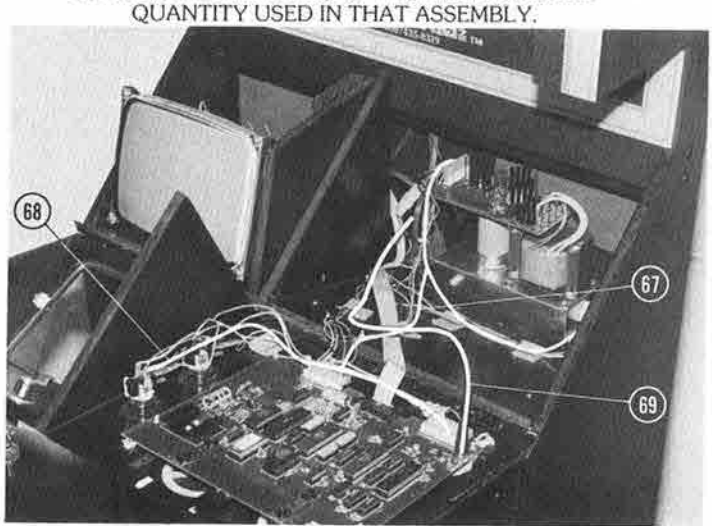


Figure 23.



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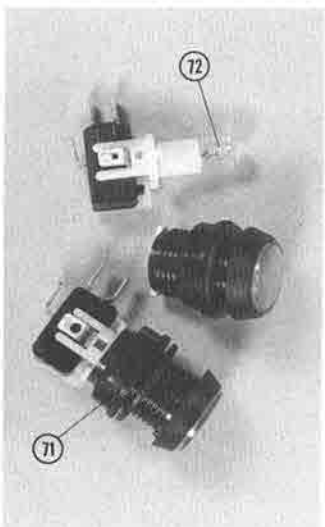
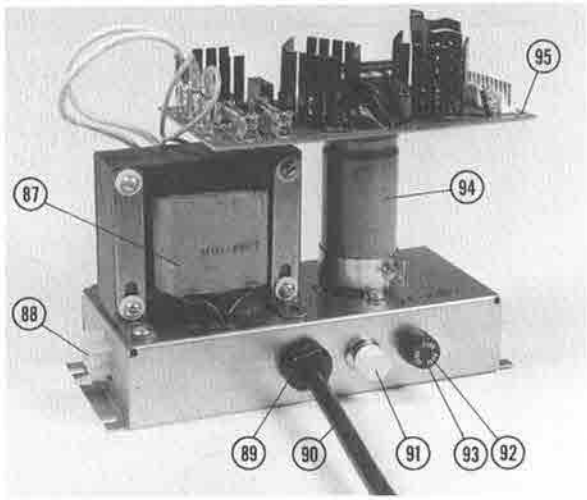


Figure 25.

POWER SUPPLY CHASSIS ASSEMBLY

00-6000-17

FIG. #	ITEM #	PART #	DESCRIPTION
26	73	07-0007	Fuse 3/4A 250V Slow Blow
26	74	07-0003	Fuse 5A 250V Slow Blow
26	75	13-0003	Fuse Clips P.C. Mount (4)
26	76	01-0032	Regulator 5V-LM323K
26	77	13-0040	Heat Sink T03 (2)
26	78	13-0020	Heat Sink
26	79	13-0041	Heat Sink, Square
26	80	19-0021	Bridge Rectifier 8A 200 PIV
26	81	19-0022	Bridge Rectifier 2A 200 PIV
26	82	10-0035	Connector 10 PIN
26	83	03-0002	Capacitor .01 mfd 50V (2)
26	84	03-0012	Capacitor 1 mfd 50V
26	85	03-0008	Capacitor .33 mfd 100V (2)
26	86	03-0026	Capacitor 4700 mfd 35V
27	87	20-0011	Transformer 115V Primary
27	87	20-0015	Transformer 100V Primary
27	87	20-0013	Transformer 230V Primary
27	88	10-0009	Connector 6 Pin Chassis Mount
27	89	13-0034	Strain Relief
27	90	15-0002	Power Cord 12'
27	91	08-0004	Switch, On/Off
27	92	13-0039	Fuse Holder, Chassis Mount
27	93	07-0008	Fuse 1.5A 250V Slow Blow
27	94	03-0033	Capacitor 8900 mfd 25V
27	95	00-6000-05R	Printed Circuit Assy. Top
29	96	19-0015	Triac SC 146D
29	97	01-0025	Opto Isolator MOC 3030
29	98	02-0010	Resistor 180 ohm 1/4 W
29	99	02-0007	Resistor 120 ohm 1/4 W
29	100	02-0017	Resistor 1K ohm 1/4 W
29	101	03-0034	Capacitor .022 mfd 600V (2)
29	102	19-0014	Varistor V150LA20A (110V units)
29	102	19-0024	Varistor V250LA20A (220V units)
28	103	13-0042	Standoffs 5/8" (3)
29	104	00-6000-24R	Printed Circuit Assy. Bottom
26	105	01-0059	12V Regulator, LAS1612, T03 - 2A
26	106	01-0060	12V Regulator, LM340-12, TO-220
28	107	02-0057	Resistor, 500K, Variable
29	108	19-0026	Asymetrical Bilateral Switch, ST4
28	109	03-0043	Capacitor .1 ufd 600V
29	110	20-0012	Inductor, 50 mh, 3 amp



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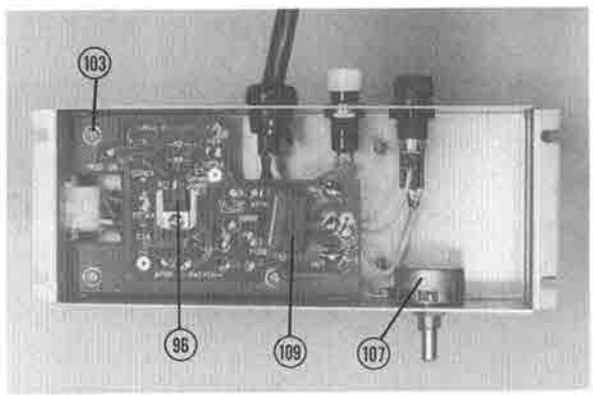

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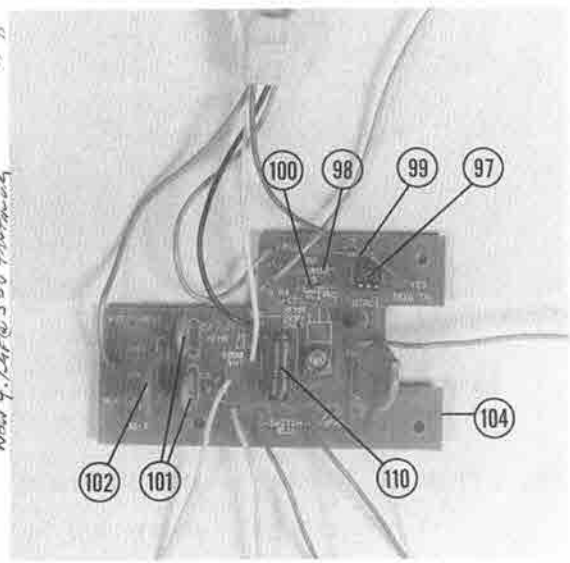

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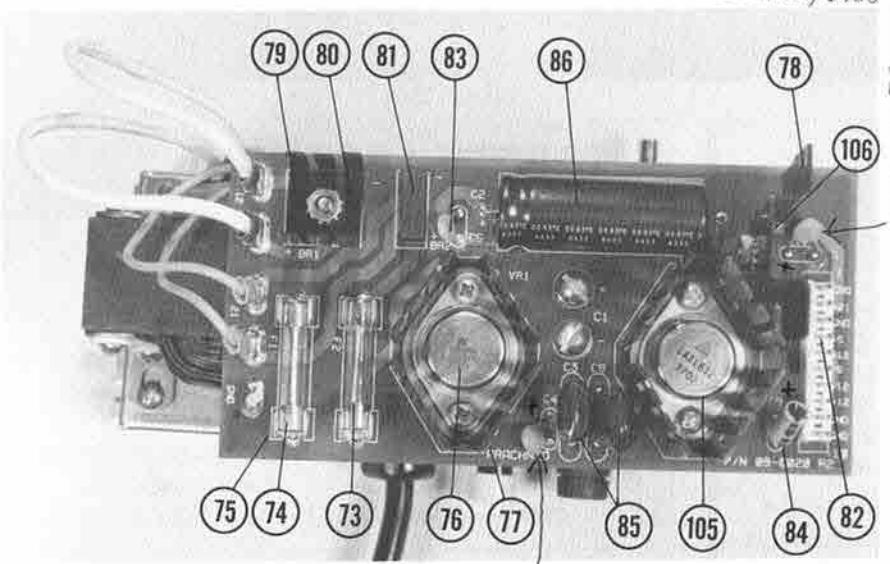

Figure 26.

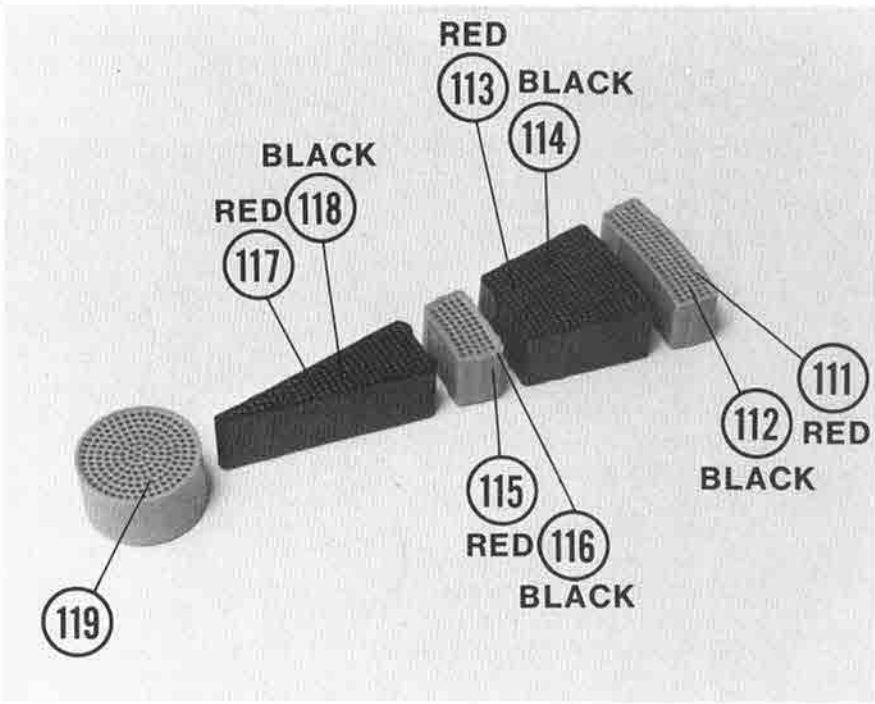

Figure 30.

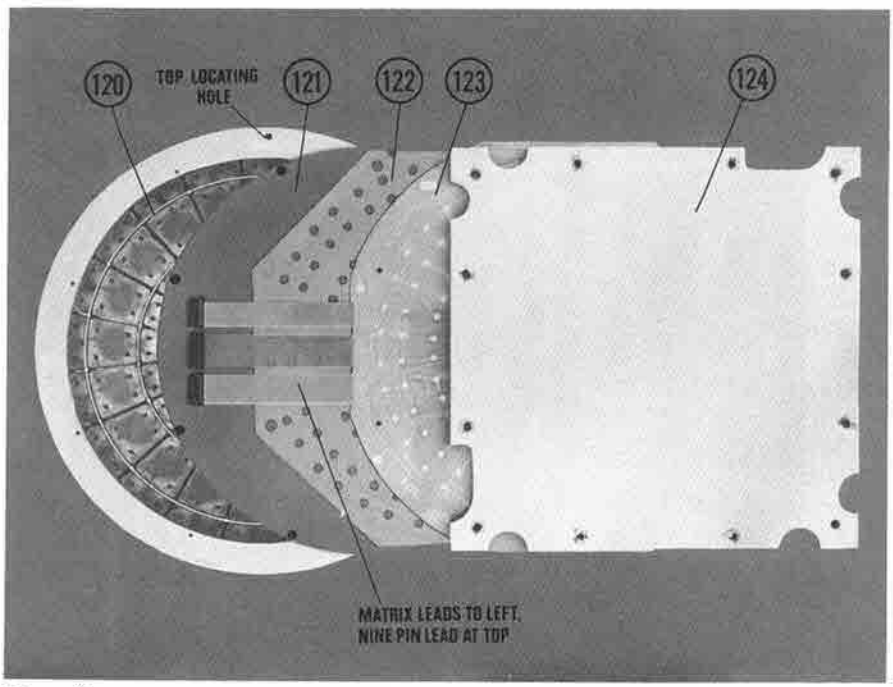

Figure 31.

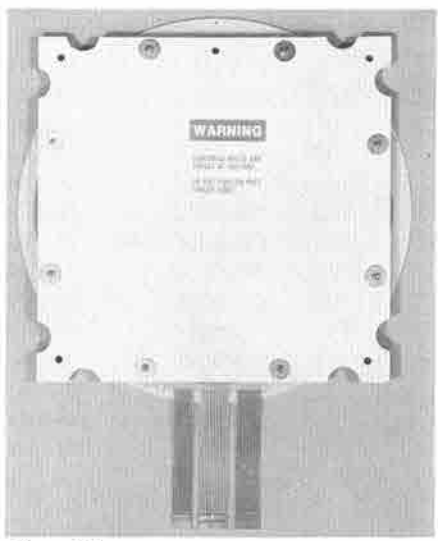

Figure 32.

BOARD SEGMENTS

FIG. #	ITEM #	PART #	DESCRIPTION
30	111	17-0003	A Segment, Red, Double
30	112	17-0008	A Segment, Black, Double
30	113	17-0005	C Segment, Red, Single
30	114	17-0009	C Segment, Black, Single
30	115	17-0006	D Segment, Red, Triple
30	116	17-0010	D Segment, Black, Triple
30	117	17-0007	E Segment, Red, Pie, Single
30	118	17-0011	E Segment, Black, Pie, Single
30	119	17-0004	B Segment, Red, Bullseye

TARGET ASSEMBLY

FIG. #	ITEM #	PART #	DESCRIPTION
31	120	17-0002	Spider Without Segments
31	121	12-0001	Rubber Damper
31	122	12-0004	Gasket .020"
31	123	08-0001	Switch Matrix 6" Leads
31	124	18-0003	Target Back
32	125	00-4500-06R	Dart Head Assy., Complete

SECTION 7. TROUBLESHOOTING

WARNING — UNPLUG POWER TO GAME BEFORE WORKING ON MACHINE

Problem	Probable Cause	Procedure
Nothing lit on game.	a. Blown fuse.	a. Replace fuse in power supply chassis with 1.5A 250V slow blow fuse.
	b. No power at outlet.	b. Check main breaker in building.
	c. Fuse FS1 on top of power supply blown.	c. Replace fuse with 5A 250V slow blow.
	d. 5 volt regulator bad.	d. Check for 15V on input to regulator and +5V on output. If input is OK but +5 is not present, replace 5V regulator LM323K.
	e. Game not turned on.	e. Turn on switch located on power supply.
Player change and/or game select switches not functioning.	a. Bad U17 6821.	a. Replace.
	b. Broken connection from PC board to switches.	b. Check and repair wire harness.
Coin switch and/or test mode not functioning.	a. If both are not working, plus lamps on coin door are not lighting, there may be a bad ground to the coin door.	a. Repair ground. NOTE - System ground is floating (not connected to power supply chassis) and is connected only to the PC board on top of the power supply.
	b. If both are not working, but the lamps on the coin door are lit, the problem could be U4-6821.	b. Swap U4 with U17 to see if the problem goes away; if so, replace 6821.
	c. If just one switch isn't working, check buffer IC U7.	c. Swap U7 and U24 to see if the problem changes. If so, replace the bad ULN2003.
Small lamps on printed circuit board not lighting.	a. Lamp burned out.	a. Replace lamp
	b. Transistor driver for lamp bad.	b. Replace drive U7 or U24.
	c. Peripheral interface adapter (PIA) bad.	c. replace PIA U4.
Target lamps won't light at all.	a. Lamp burned out.	a. Replace lamp
	b. Triac bad (if triac were shorted the lamp would be on all the time).	b. Replace triac located under power supply chassis.
	c. Opto isolator (MOC3030) bad.	c. Replace; located under power supply chassis.
	d. Buffer U24 is bad.	d. Replace U24 (ULN2003)
	e. PIA U17 bad (6821).	e. Swap with U4 to check. If problem moves, then replace bad PIA.
Sound problems.	a. Blown fuse, FS2, on top of power supply.	a. Replace with 3/4A 250V slow blow.
	b. 15V regulator (LM7815CT) faulty on main board.	b. Check for +24V on pin 1 and +15V on pin 3. If +15V is not present on pin 3 replace regulator. If +24V is zero, replace fuse (FS2 on power supply) or check wiring from power supply to main board.
	c. Amplifier faulty (LM383T).	c. Check input (pin 1) with an oscilloscope to see if square waves are coming in (make sure volume is turned up, R22). If no square waves present, see "d" below. If square waves are present, but not coming out of pin 4, replace U21 LM383T amplifier.
	d. Timer IC U16 (8640).	d. If no square wave is present on pin 27 of U16 (during the time that sound is supposed to be present), replace either U16 or U14 (74LS138 address decoder).
	e. Sound is fuzzy or garbled. Bad 4700 mfd 35V capacitor (C2) on power supply board.	e. Resolder connections first to make sure that the problem is not a cold solder joint. If no improvement, replace C2.

SECTION 7. TROUBLESHOOTING *(continued)*

WARNING — UNPLUG POWER TO GAME BEFORE WORKING ON MACHINE

Problem	Probable Cause	Procedure
No score.	a. Dirt or broken tips in dart head holding a switch in the switch matrix closed (game won't score until switch in the matrix opens).	a. Clean dart head assembly by disassembling/reassembling and removing any foreign material. When reassembling, make sure to tighten the 8 screws and nuts that hold the target head together only finger tight.
	b. If the problem is not in the dart head, may be U4 (6821) on the main board.	b. Swap U4 with U17 to see if problem changes. If it does, replace bad 6821.
Select or player change lamps not working.	a. Lamp burned out.	a. Replace with GE 658 (do not use a GE 194 or GE 161 lamps).
	b. Transistor driver for lamp bad.	b. Replace U18 ULN2003
	c. Peripheral interface adapter (PIA) bad.	c. Replace PIA U17.
	d. If coin door lamps also out, check LM340-12 or 12V. Also check for proper lamps GE 658.	d. Turn off power supply, let cool. If they come on after cooling, then lamps may be drawing too much current. Make sure that the bulbs are NOT GE 194 or GE 161.
Popularity screen has garbage for numbers.	a. Service person has touched main board or wiring going to main board when he was charged with static.	a. Reset popularity screen by pressing bull's eye while popularity screen is being displayed. Discharge static to front coin door before touching electronics in component tray.
	b. Batteries in MK48Z02 ram bad.	b. Batteries inside device are not replaceable; replace IC MK48Z02 U23.
	c. Game not grounded properly.	c. Check that the 3 prong outlet is properly grounded.
Target lamp in off condition doesn't vary in brightness.	a. Variable resistor, DIAC ST-4 or C10 .1 ufd Capacitor bad.	a. With power off, check variable resistor for proper resistance. Replace defective parts.
No video display.	a. No 12V to monitor.	a. Check 12V regulator LAS1612 for 12VDC or plug in external modulator. If external TV works through modulator, then main board circuitry is OK. Problem is with monitor or 12V regulator.
	b. Transistor TR1 bad.	b. With an oscilloscope check output of TMS9118 for about 1-1/2V P-P video signal. Then check for same at center connector of video jack. If not present, replace TR1 (2N4400). TR1 is used as a buffer for the TMS9118 for protection against accidental shorting.
Garbage on display.	a. Video memory bad.	a. Replace U12 and U13, TMS4416.
	b. Video chips bad.	b. Replace U11 TMS9118.

Arachnid Inc™

The Originator of Electronic Darts

6421 Material Avenue
Post Office Box 2901
Rockford, Illinois 61132-2901
800/435-8319 or 815/654-0212 in Illinois

WARNING: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measure may be required to correct the interference. NOTE: Proper grounding through power cord is necessary for compliance.

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