# SERIES 6300 PARTS MANUAL

**ENGLISH MARK DARTS**™

**Arachnid** INC
The Originator of Electronic Darts

## TABLE OF CONTENTS

This manual contains description, unpacking/assembly, operation, and troubleshooting information for the model 6300 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 or 815-654-0212.

# SECTION 1 - GENERAL DESCRIPTION

The 6300 Series English Mark Darts machine is a patented microprocessor controlled dart game (patent #4057 251) where players may select one of several different games. It is a coin operated game offering players a choice of 1 credit games or more challenging 2 credit 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 players an instantaneous displayed score.
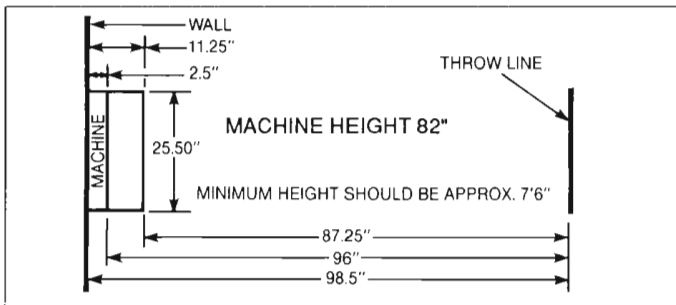


Figure 1. Plan view of the 6300 Series play field.

# SECTION 2 - UNIQUE FEATURES OF THE 6300 SERIES GAME

There are several features that are unique to the 6300 series English Mark Dart Game from previous series games, such as:

1. There are several games on the 6300. These games are: 301, Count-Up, Tic Tac Darts, 501 Team Doubles-Open in/open out, 701, 301 Double in/double out, three versions of Cricket: Regular, Cut Throat and Team.

### A. 301 - 1 credit per player - 20 round maximum
A count down game for one to four players where each player starts with 301 points. The first person to hit zero exactly or the lowest score after 20 rounds wins the game.

### B. Count up - 1 credit per player - 8 round maximum
A 24 dart game for one to four players where each player tries to score the most points in 24 darts thrown (three per round.)

### C. Tic Tac Darts - 1 credit per player - 20 round maximum
A game for two players. The numbers will come up at random to start the game. The bull is always in the center square. 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 and the bull scores 1 hit. 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.

### D. 501 Team Doubles - Open in/open out - 2 credits per player. 35 round maximum.
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 - 2 credits per player - 35 round maximum
One to four teams or players, played the same as 301 except to go out a double or bullseye must be hit (Inner bull if double bull active). Count down game popular with three or four person teams.

### F. 301 Double in/double out - 2 credits per player - 35 round maximum
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 the bullseye (Inner bull if double bull active).

### G. Cricket - Two to four players - 2 credits per player - 35 round maximum.
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 or equal score. Cricket can be limited to 200 points over opponents at the operator's discretion. See section 4.3 for instructions on how this is done.
Three options are offered when playing Cricket on the 6300:
   1) Two to four players can use the regular game. The highest or equal score with all the numbers closed wins.
   2) Two to four can play the game of Cut Throat Cricket. Close a number and give points to your opponents. In this game, the lowest or equal score wins.
   3) Four players participate as two teams. Both you and your partner must close the number before your team can score.

2. **Credit Accumulation.** Players may insert as much money as they wish, and the game will accumulate up to 99 credits, using only the amount that is necessary for the particular game chosen. This feature allows the use of large denomination coin mechanisms and bill acceptors with this game. See special insert on the Coin Credit option for information on how to use this feature to its full advantage.

3. **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 locations. 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.)

4. **Warm Up Mode.** The target lamps come on when coins are inserted, and a warm-up round consisting of 3 darts per credit can be thrown. After all darts are thrown, the lamps will go dim until a game is selected. The operator may also choose to have the game emit a tone whenever a dart is thrown during this "dim" state. This is accomplished with a small set up routine, done during the game's test mode (see section 4.2A). The tone will also sound when there are no credits on the game. This feature will call attention to the fact that someone is throwing darts without inserting coins.

5. **Bullseye Options.** By flipping a single D.I.P. switch on the main P.C. board (described in section 4.3), the operator can choose to have a 25 point/50 point bullseye, or our original 50 point only bullseye. Also, with a small setup routine done during the game's test mode, the operator may choose to enable the game to sound off in a special way if a player throws a hattrick (3 bullseyes in one round) in 301, 501, 701 and Count-Up only. When the double bull is activated, the outer bull (25 points) counts as a single hit, and the inner bull (50 points) counts as a double hit. This is important to know when playing cricket and double/in or out games.
**Note: 25/50 point bullseye is only active on 2 credit games.**

6. **League Slot™** In the 6300 Series game, a league money slot is provided so that league captains may deposit their money envelopes into the safety of the game cabinet for operators to collect later.
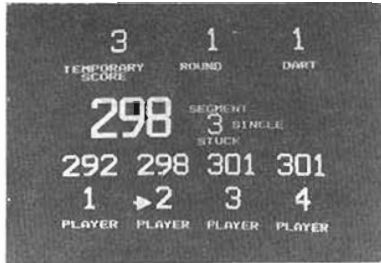
Figure 2. Stuck segment indicator display



Figure 3A. Hex cap bolt holding top to bottom



Figure 4. Attaching speaker harness

7. **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.

8. **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 4.2 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.

9. **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 indicates which segment is closed by flashing its location on the screen. (See Figure 2.)

10. **Instructions** can be read 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 of the menu.

11. **Other On-Screen Features.** On the 6300 series game, the temporary score will flash while the remove darts indicator is on, to help alert the player that it is not yet time to throw darts.

At game over, the screen will show if the winner went out in 6,7,8, or 9 darts (Known as 9 dart out or better) in 301, 301 double in/double out and 501 only.

When a game is over and game select screen is called up again, the pointer will be resting at the last game selected. This will be convenient for those who wish to replay a previous game selection, or for locations where there are only one or two popular games.

# SECTION 3 - UNPACKING/ASSEMBLY

### 3.1 Unpacking
a) Using a sharp knife, cut the plastic bands.
b) Slide the top of the container straight up.
c) Remove the individual pieces from the cardboard base. The machine is now ready for assembly.
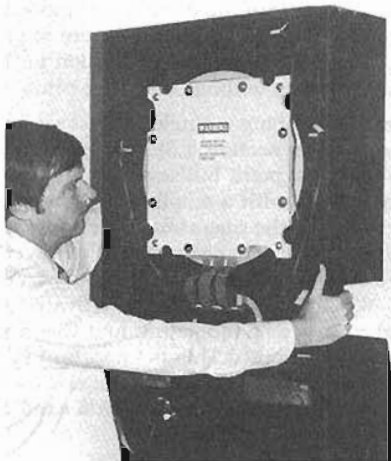-CAUTION-
DO NOT LIFT BASE UNIT BY ITS INSTRUCTION PANEL.


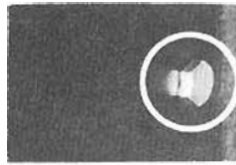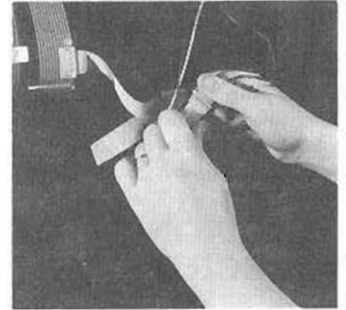
Figure 3. Attaching top assembly to base.

### 3.2 Assembly
a) Remove back of top assembly.
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. 3 using four 1/4-20 carriage bolts and nuts and two 1/4" hex cap bolts (Fig. 3A) and washers. See hardware instructions (37-0134) in your accessory kit for detailed assembly information.
d) Feed speaker connector up through the hole in base of top assembly and connect (Fig. 4).
e) Power cord plugs into a 120V AC (or proper input voltage for your country) GROUNDED wall outlet.
The machine is now ready for power up sequence.

# 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 door you will find a slam/reset 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.
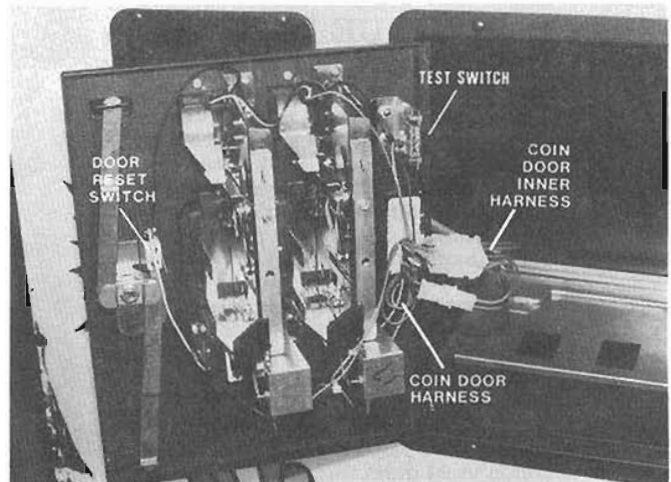


Figure 5. Coin door showing coin mechanism, reset switch and test switch

c) Slide the test switch down and release. The screen will show a crosshatch 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 push button 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 "TEST TARGET HEAD" will appear at the top and other messages will appear at the bottom, as shown in figure 6. If you press any segment in the dart head at this time, the score should appear in the center of this screen.
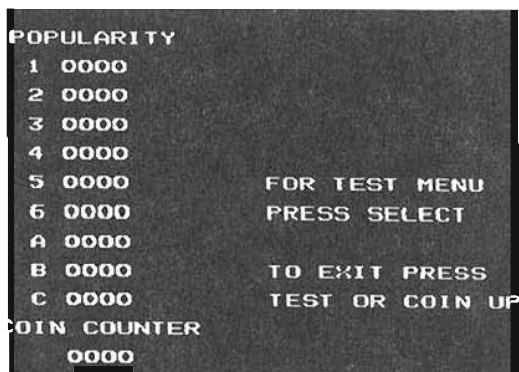
Figure 6. Test mode ready for dart head test



Figure 7. Report screen

**4.2 Test Mode Setup and Report Screens.** From the screen displayed in Fig. 6, you can select several different modes to view or change screens or operations of your dart game.

**A. Setup Screen.** Press the test switch again, and the setup screen for free dart sound appears. If you wish to enable this option, press enter. If not, press select. Next the screen for hattrick sound will appear. Do the same for this option. (See section 2.4 and 2.5 for description of these options.) Once both options are selected, the game will return to the selection screen (Fig. 6 except crosshatch and target head test will be gone). Pressing the test switch or inserting a coin will bring you out of this mode.

**B. Spider Writer screen.** Press enter, and the spider writer screen will become accessable. See Spider Writer page (Fig. 10) for instructions on how to use it. If you press select while in this mode, it will bring you back to the selection screen.

**C. Popularity Report Screen.** Press select, and the popularity report screen appears. From this screen, you can tell how many times each game has been played. In the bottom left corner is an electronic coin counter, which keeps track of the number of credits issued by the game (Fig. 7). The numbers displayed on the popularity report screen can be cleared by pressing the bullseye when this screen is on. NOTE: the electronic coin counter will also reset to zero when this is done.

All screen options listed above will be retained when the power is turned off. (See section 5.2.6) Closing the slam switch or turning the power off and on will always cancel any mode you're in. Otherwise, follow these written instructions or screen instructions to change modes or exit.

**4.3 Main P.C. Board dip switch options**
There is a four position D.I.P. (S1) located near U20 on the Main P.C. Board. This switch package has many functions. Switch numbers 1 and 2 are used for certain coin accumulation options. See Coin Credit insert for more information on the settings of these. Switch number 3 is used to select a single, 50 point bullseye, or a 25/50 point double Bullseye. In the "Off" position, the Bullseye is 50 points. In the "On" position the Bullseye's outer ring is 25 points and its inner ring is 50 points for 2 credit games. This option makes games like Cricket more challenging to expert dart players. If you opt for the 25/50 point double Bullseye, you may change the Bullseye to the two-piece double Bullseye included in your accessory kit. Simply follow the instructions for disassembling the Dart Head in Section 5, replace the Bull segment, and reassemble per instructions.

Switch number 4 is used to select cricket 200. When this switch is in the "on" position, the player with the highest score cannot score more than 200 points above the closest opponent's score. This discourages extended "practice" play during a game. "Cricket 200" will be displayed on the screen during the cricket game when this option is activated.

# SECTION 5 - TECHNICAL DESCRIPTION

### 5.1 General

Figure 8 and Figure 9 show the main components of the game.
    a) Main CPU Board (Behind front door)
    b) Power Supply
    c) 9" Monitor
    d) Target Interface Board
    e) Dart Head Assembly
    f) Coin Credit Card

The assembly containing the main board, monitor, Coin Credit Card, 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 unplugging game, unscrewing three screws in the bottom of the tray, disconnecting target lamp wire, ribbon cable, speaker wire, and coin door 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 up, test, and reset.
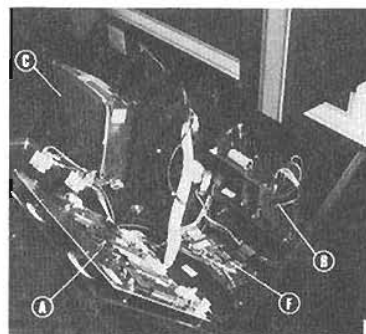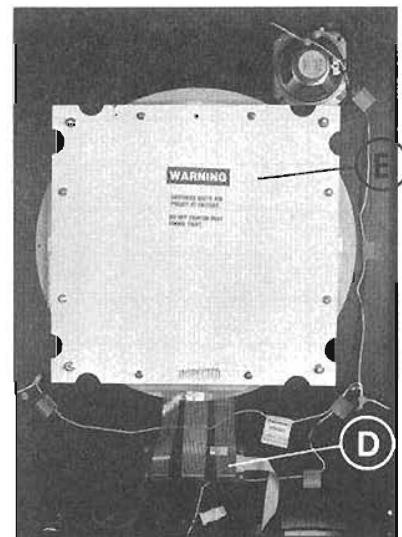


Figure 8. Front view of 6300 game.



Figure 9. Rear view of 6300 series game.

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# SPIDER WRITER INSTRUCTIONS: EASY AS 1 2 3

1. Put the game 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 32 x 16 grid below to create the screen on paper before writing it on the game. 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 receptacle is properly connected.
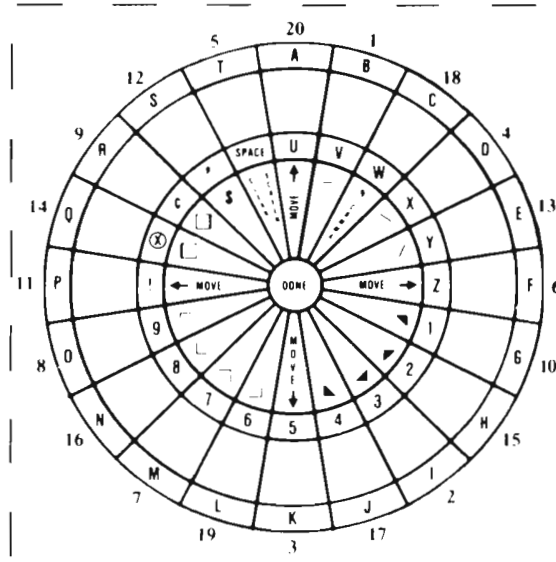
**Keyboard Legend**

Each segments 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.

# SPIDER WRITER WORKSHEET
### Use this grid to design your custom screen

Figure 10.  Spider Writer instruction page

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## 5.2 Main CPU Board

The main CPU board (Figure 19, page 14) 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  32 K Eprom - U15
    74LS04  Hex Inverter - U1
    556  Dual Timer - U2
    6821  Peripheral Interface Adapter - U4, U17
    74LS138  3 Line to 8 Line Decoder - U14
    LM340-15 15 V 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 push buttons are 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 a 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 (LM340-15) 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

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-MK48Z02) 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 (U15-27256) holds the main program. The window on the 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 opening the switch is to disconnect the ribbon cable from the main P.C. board.
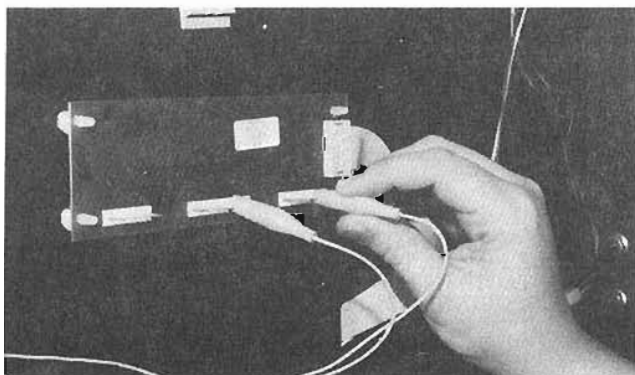
Figure 12. Target interface board letter designations
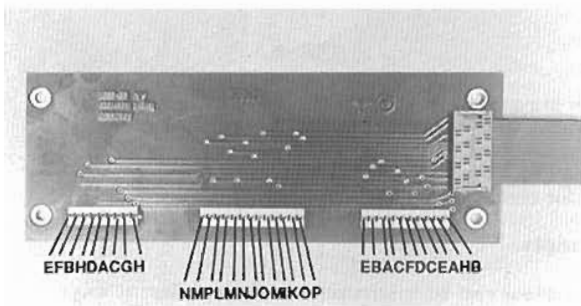
| TABLE 1 |||||
|---------|||||
| Letter Designation of Scores |||||
| SCORE | SINGLE | DOUBLE | TRIPLE |
|--------|--------|--------|--------|
| 1 | DN | EN | FN |
| 2 | AL | BL | CL |
| 3 | AN | BN | CN |
| 4 | DL | EL | FL |
| 5 | AP | BP | CP |
| 6 | GL | HL | GP |
| 7 | DO | EO | FO |
| 8 | GI | 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 |
| OUTER BULL | | HM | |
| INNER BULL | | HN | |

## 5.4 Target Illumination

The target illumination consists of three frosted "show case" bulbs 5 1/2" long. These are used for illuminating the dart head 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 visible, not bright enough to allow free play. This is adjusted with a screwdriver or thumb and forefinger turning knob on the base of the power supply inside the component tray (see Figure 13).
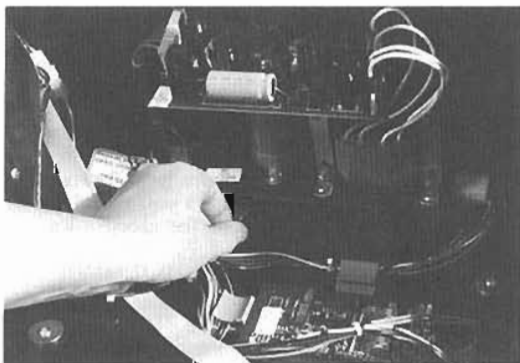


Figure 13. Adjusting "off" condition target illumination

The off brightness is a result of (see power supply schematic) R4, C10, and a ST-4 DIAC. These components turn on the gate of the Triac (SC146D) 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.

## 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 MC78T12 for the monitor rated at 2 amps and a LM340-12 for the lamps rated at 1 amp.

The 5V regulator should be ±.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 2.0 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 and 12 volt circuits. 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 darthead remove the back of the game and set it aside. Then disconnect the three switch matrix connectors from the target interface P.C. board, remove the four large nuts holding the darthead in place, and gently pull darthead assembly out of the cabinet. Now, disassemble and assemble the darthead as follows:
a) Remove the 8 nuts and lift off target back.
b) Remove the switch matrix.
c) Remove the matrix cushion.
d) Check for dirt and broken tips or other foreign matter between spider, cups, matrix and cushion, etc.
e) Replace any worn or broken cups.
f) Clean and re-install matrix cushion. (Also see note below)

- IMPORTANT -
THERE SHOULD BE A SMALL U SHAPE CUTOUT ON THIS CUSHION. POSITION IT TO THE LEFT OF CENTER (BEHIND THE "DOUBLE ONE" SEGMENT) AT THE TOP AS SHOWN IN FIGURE 14. THE SWITCH MATRIX ALSO HAS A CUTOUT IN A SIMILAR LOCATION.

g) Place the switch matrix with the tails on the left and the 9 pin connector on top, lining up the U shape cutout close to the one on the matrix cushion.
h) Clean and re-install target back and 8 nuts, tighten 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.
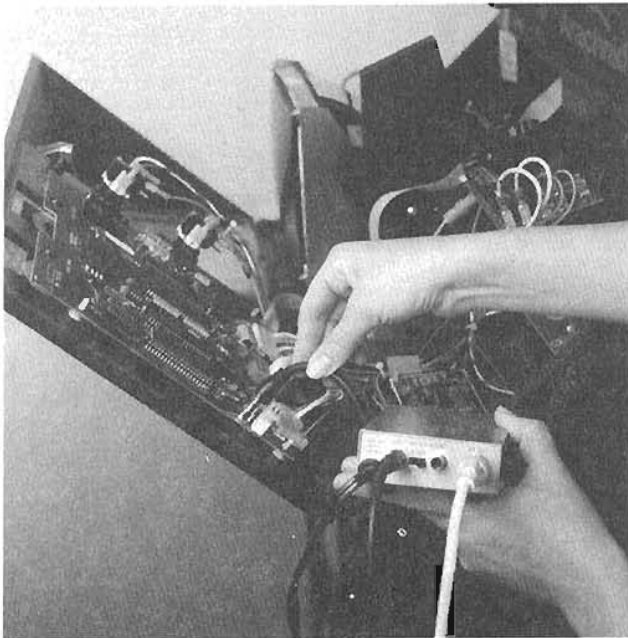
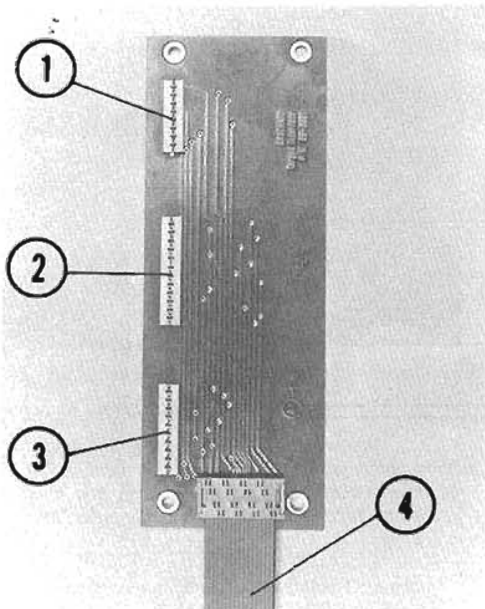Figure 15. Hooking up a modulator for external TV





Figure 16. External TV



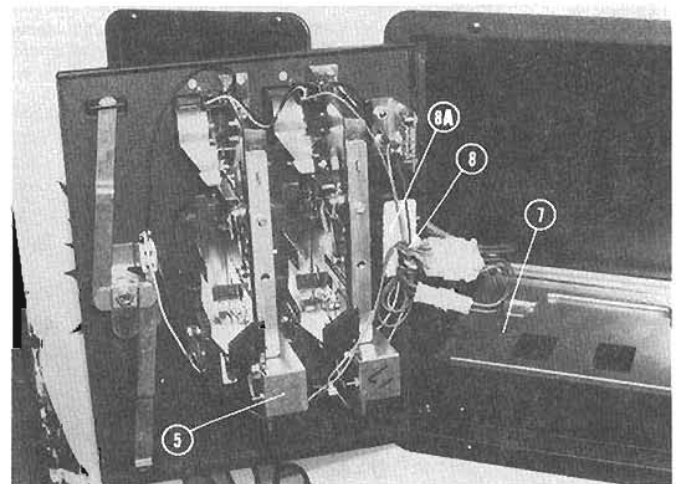Figure 17   Target interface
P.C. board



Figure 18   Coin door assembly

# COIN DOOR ASSEMBLIES

| FIG. # | ITEM # | PART # | DESCRIPTION |
|---|---|---|---|
| | | 00-6200-04R | U.S.A. 25 Cents |
| | | 00-6201-04R | German 1DM/5DM |
| | | 00-6202-04R | Belgium 20 Bel. Francs |
| | | 00-6203-04R | Sweden 1 Krone/5 Krone |
| | | 00-6204-04R | Holland 1 Guilder |
| | | 00-6205-04R | France 5F/10F |
| | | 00-6206-04R | Italy 500 Lire |
| | | 00-6207-04R | Spanish 25 Pesentas |
| | | 00-6208-04R | England 10 Pence |
| | | 00-6209-04R | Swiss 1 Swiss Franc/5 SW. FR. |
| | | 00-6210-04R | Japan 100 Yen |
| | | 00-6211-04R | New Zeland 50 Cents |
| | | 00-6212-04R | Canada 25 Cents |
| | | 00-6213-04R | Austria 10 Shillings |
| | | 00-6214-04R | Australia 20 Cents |
| 18 | 5 | 13-0043-01 | Coin Mechanism - U.S. |
| 18 | 5 | 13-0043-02 | Coin Mechanism - Canadian |
| 18 | 7 | 18-0131 | Cash Box, Plastic |
| 18 | 7 | 18-0130 | Lid for Plastic Cash Box |
| 18 | 8 | 15-0209 | Coin Door Harness |
| 18 | 8A | 18-0029 | CoinCounter,4.5V,w/Int.Diode |

# SECTION 6 - PARTS LISTING

## 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 |

# MAIN P.C. BOARD ASSEMBLY
### 00-6300-01R (USA)
### 00-6301-01R (German)
### 00-6305-01R (French)
### 00-6307-01R (Spanish)

| 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) |
| 19 | 15 | 01-0053 | TMS9118 Video |
| 19 | 16 | 01-0054 | 74LS32 |
| 19 | 17 | 01-0055 | MK48Z02 Memory w/ battery |
| 19 | 18 | 01-0120R | Eprom U.S.A. Plus II |
| 19 | 18 | 01-0122R | Eprom Spanish Plus II |
| 19 | 18 | 01-0123R | Eprom German Plus II |
| 19 | 18 | 01-0124R | Eprom French Plus II |
| 19 | 19 | 01-0039 | 6840 |
| 19 | 20 | 02-0045 | Resistor Network-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 | LM340-15 (15V Regulator) |
| 19 | 25 | 01-0027 | LM383T |
| 19 | 26 | 06-0005 | Crystal 10.738635 MHZ |

| FIG. # | ITEM # | PART # | DESCRIPTION |
|---|---|---|---|
| 19 | 27 | 13-0020 | Heat Sink |
| 19 | 28 | 11-0013 | Lamp with Socket (4) |
| 19 | 29 | 02-0003 | Resistor 2.2 ohm 1/4W |
| 19 | 30 | 02-0055 | Resistor 75 ohm 1/4W |
| 19 | 31 | 02-0011 | Resistor 220 ohm 1/4W |
| 19 | 32 | 02-0056 | Resistor 470 ohm 1/4W |
| 19 | 33 | 02-0017 | Resistor 1K ohm 1/4W (10) |
| 19 | 34 | 02-0047 | Resistor 3.3K ohm 1/4W(5) |
| 19 | 35 | 02-0021 | Resistor 10K ohm 1/4W (3) |
| 19 | 36 | 02-0048 | Resistor 12K ohm 1/4W |
| 19 | 37 | 02-0049 | Resistor 510K ohm 1/4W |
| 19 | 38 | 02-0036 | Resistor 1 MEG ohm 1/4W (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 .01x8 (2) |
| 19 | 51 | 19-0007 | Diode 1N4148 (3) |
| 19 | 52 | 19-0011 | Transistor, 2N4400 |
| 19 | 53 | 10-0076 | Phono Jack, Panel Mount |
| 19 | 53A | 08-0020 | Dip Switch, 4 Position |
| 19 | 54 | 10-0069 | Video Connector, 2 Pin |
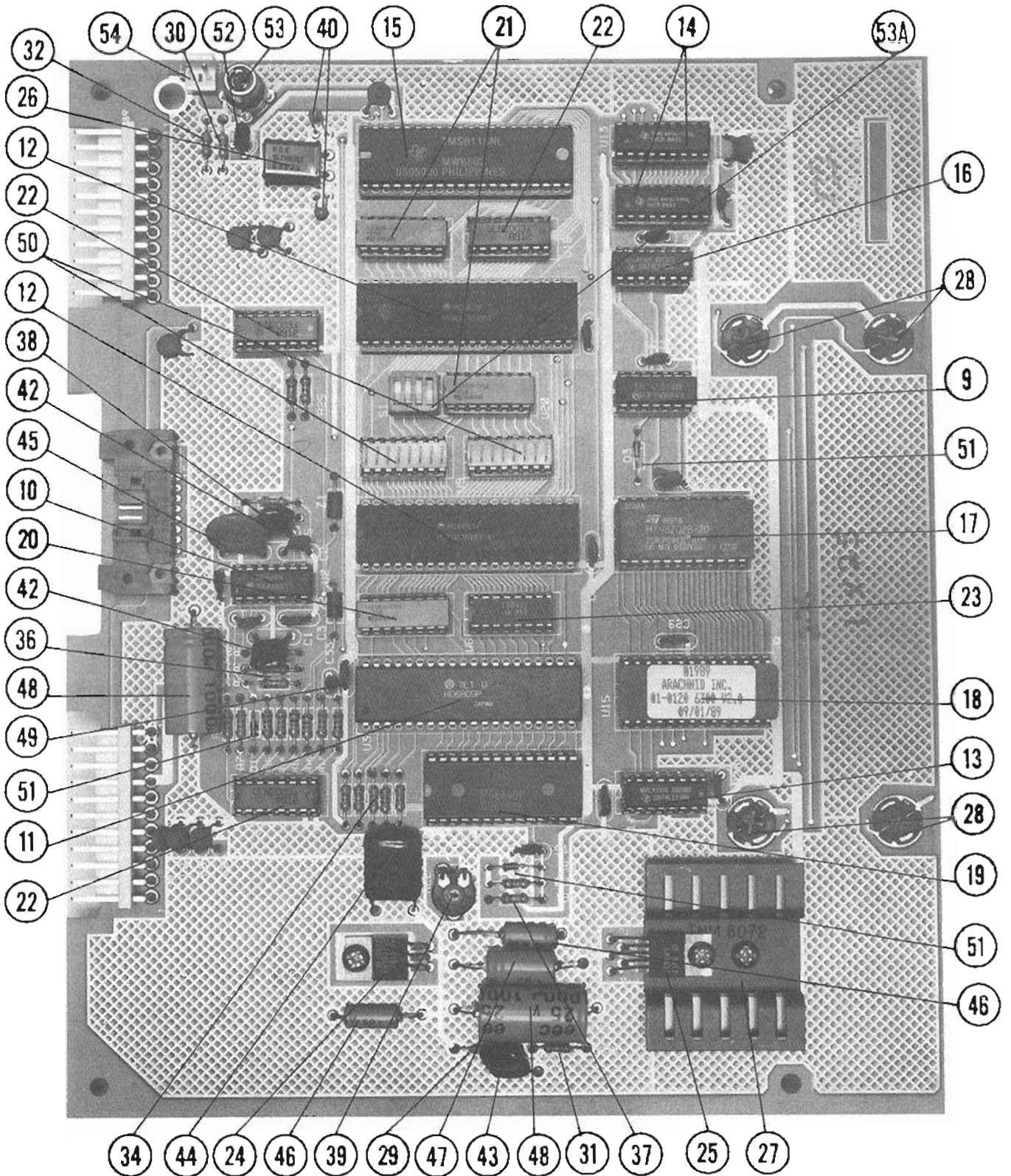
Figure 19

# MAIN CABINET ASSEMBLY

| FIG# | ITEM# | PART# | DESCRIPTION |
|------|-------|-------|-------------|
| 20 | 55 | 16-0130 | Bottom decal lexan |
| 20 | 57 | 18-0034 | Top cabinet unassembled |
| 20 | 58 | 16-0036 | Top decal |
| 20 | 59 | 17-0001 | Competitor strip |
| 20 | 60 | 18-0033-02 | Cabinet bottom unassembled |
| 22 | 61 | 13-0009 | Lock back door |
| 23 | 62 | 00-4500-12R | Speaker and harness |
| 20 | 63A | 16-0128 | Decal, Games List, USA, Plus II |
| 20 | 63A | 16-0136 | Decal, Games List, Spain, Plus II |
| 20 | 63A | 16-0171 | Decal, Games List, England, Plus II |
| 20 | 63A | 16-0138 | Decal, Games List, France, Plus II |
| | | | |
| 20 | 63 | 16-0129 | Decal, Instructions, USA, Plus II |
| 20 | 63 | 16-0137 | Decal, Instructions, Spain, Plus II |
| 20 | 63 | 16-0139 | Decal, Instructions, France, Plus II |
| | | | |
| 21 | 64 | 04-0024 | Socket, Lamp, Med. Base (3) |
| 21 | 65 | 11-0007 | 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 | 00-6200-08R | Main Harness |
| 24 | 68 | 15-0206 | Switch & Lamp Harness |
| 24 | 69 | 15-0193 | Video Harness |
| 20 | 70 | 00-6200-29R | Component Tray Assy. |
| 25 | 71 | 08-0009 | Switch, Illuminated W/O bulb |
| 25 | 72 | 11-0021 | Bulb GE658 |
| 24 | 72A | 11-0019 | Monitor, 9" Amber |
| 24 | 72A | 09-1002 | PC Board, Monitor, Complete, Kristel |
| 24 | 72A | 09-1003 | PC Board, Monitor, Complete, Omnivision |
| 24 | 72A | 11-0022 | CRT for Monitor, (9") |
| 24 | 72B | 00-4500-35R | Coin Credit P.C. Board |
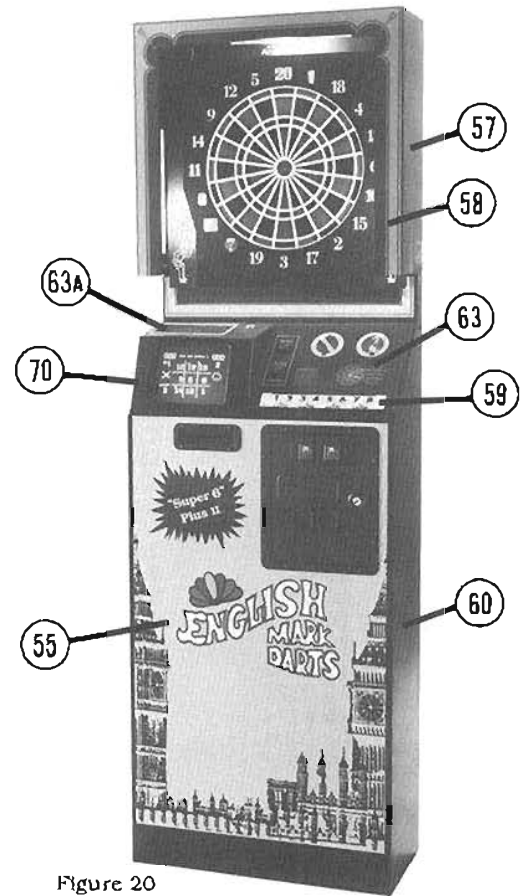


Figure 20
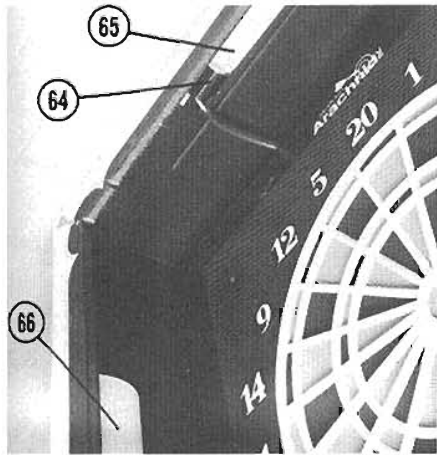


Figure 21
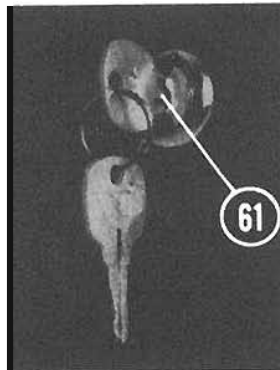


Figure 22.

### - NOTE -

THE PART NUMBERS LISTED ARE THE ARACHNID PART 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.
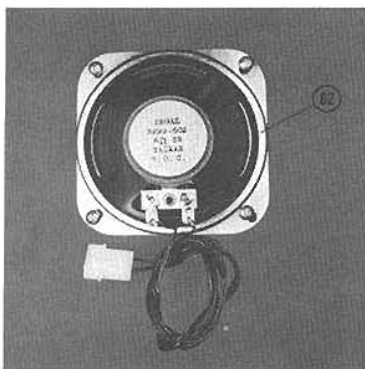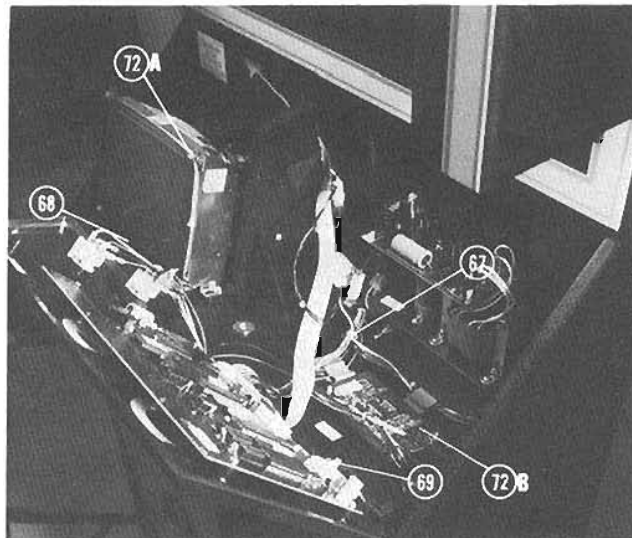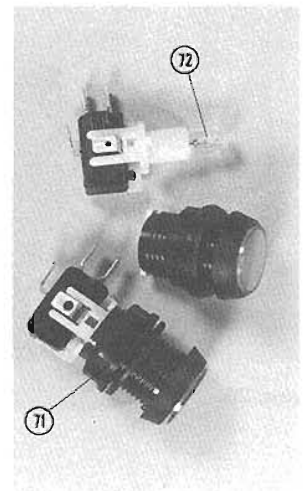


Figure 23.



Figure 24



Figure 25

15

# POWER SUPPLY CHASSIS ASSEMBLY

00-6006-17R (230V Version)   0-6000-17R (110V Version)
00-6008-17R (100V Version)

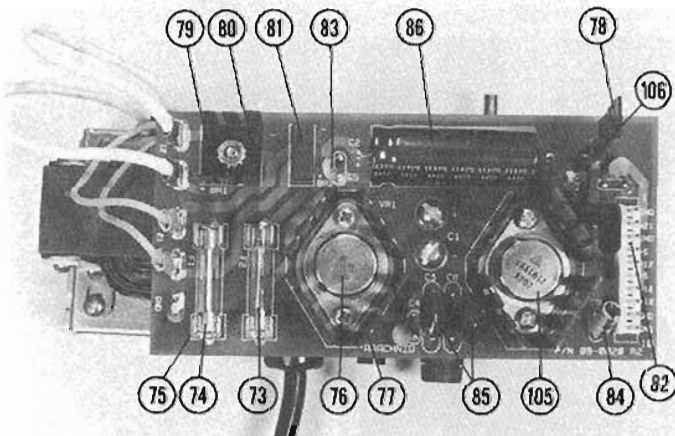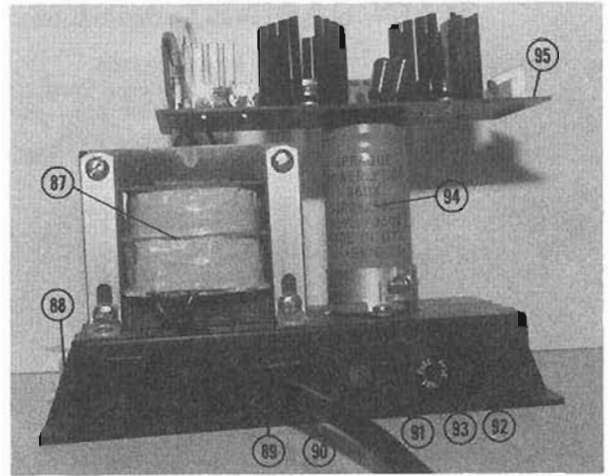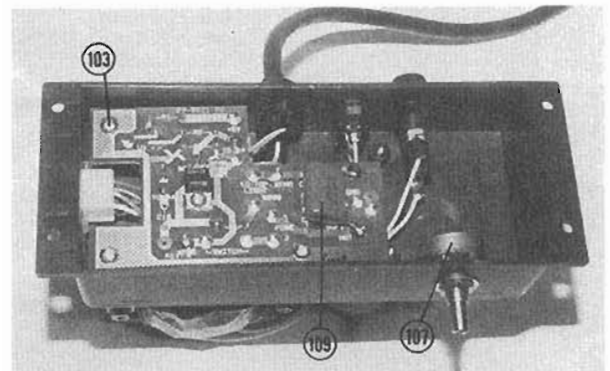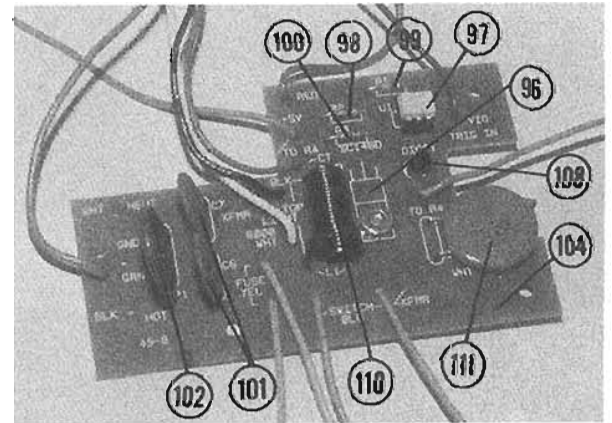| FIG# | ITEM# | PART# | DESCRIPTION |
|------|-------|-------|-------------|
| 26 | 73 | 07-0007 | Fuse 3/4 A 250V Slow Blow |
| 26 | 74 | 07-0003 | Fuse 5A 250V Slow Blow |
| 26 | 75 | 13-0003 | Fuse clips P.C. mount (4) |
| 26 | 76 | 01-0032 | Regulator 5V - LM323K |
| 26 | 77 | 13-0040 | Heat Sink TO3 (2) |
| 26 | 78 | 13-0020 | Heat sink |
| 26 | 79 | 13-0041 | Heat sink, square |
| 26 | 80 | 19-0021 | Bridge rectifier 8A 200PIV |
| 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 | 03-0032 | Capacitor 4.7 mfd 25V (3) |
| 26 | 85 | 03-0008 | Capacitor .33 mfd 100V (2) |
| 26 | 86 | 03-0026 | Capacitor 4700 mfd 35V |
|  |  |  |  |
| 27 | 87 | 20-0015 | Transformer 100V Primary |
| 27 | 87 | 20-0011 | Transformer 115V 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' USA |
| 27 | 90 | 15-0173 | Power cord 10' French/German |
| 27 | 90 | 15-0174 | Power cord 10' England |
| 27 | 91 | 08-0004 | Switch, on/off, push button, round |
| 27 | 91 | 08-0031 | Switch, on/off, rocker, square |
| 27 | 92 | 13-0125 | Fuse holder, chassis mount |
| 27 | 93 | 07-0005 | Fuse 2.0A 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) |
| 29 | 104 | 00-6000-24R | Printed Circuit Assy. bottom |
| 29 | 104 | 00-6001-24R | Printed Circuit Assy. bottom, 230V |
| 26 | 105 | 01-0059 | 12V regulator  MC78T12ACK, TO3-2A |
| 26 | 106 | 01-0060 | 12V regulator, LM 340-12, TO-220 |
| 28 | 107 | 02-0057 | Resistor, 1 MEG Variable |
| 29 | 108 | 19-0026 | Asymetrical bilateral switch, ST4 |
| 28 | 109 | 03-0045 | Capacitor .47 ufd 400V |
| 29 | 110 | 20-0012 | Inductor, 50 mh, 3 amp |
| 29 | 111 | 03-0043 | Capacitor, .1mfd 600V |



Figure 27



Figure 28



Figure 29
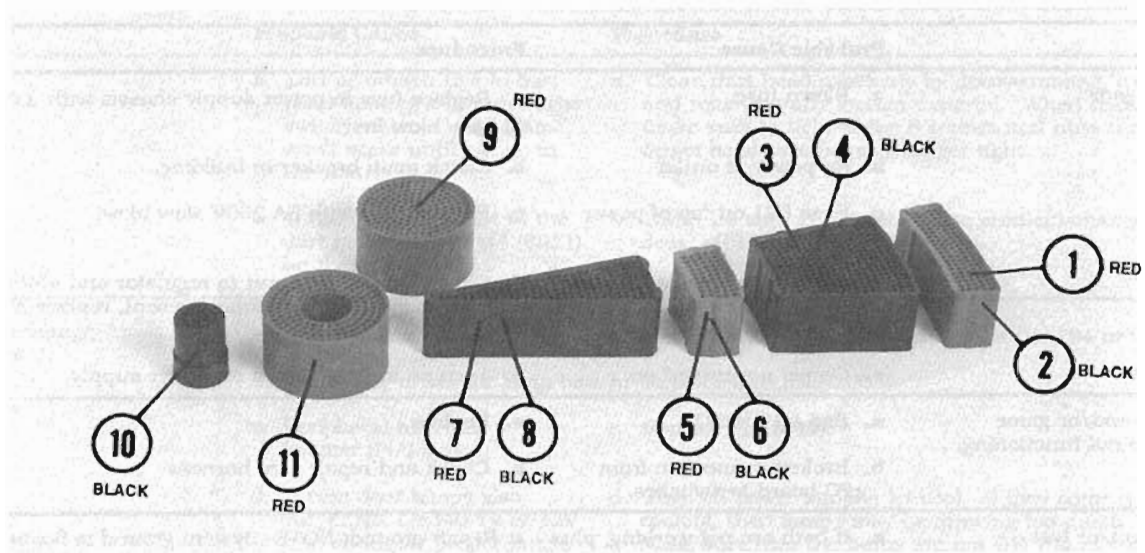


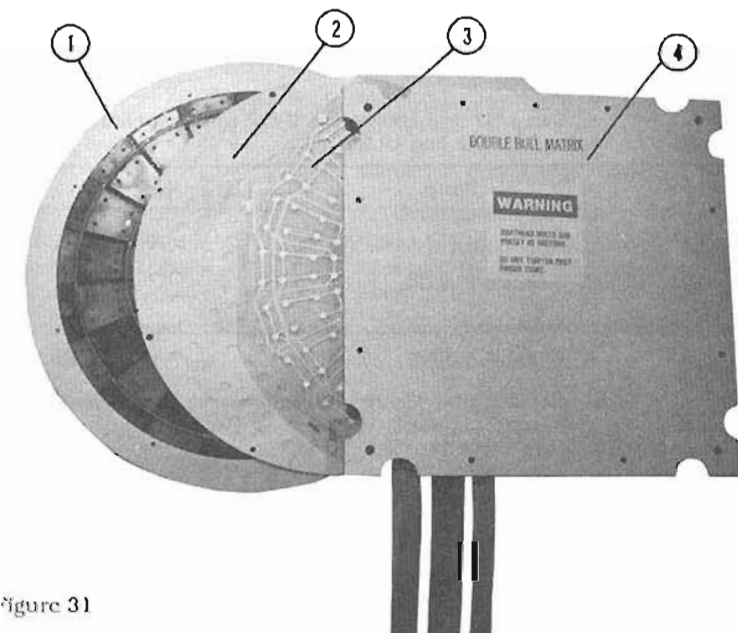Figure 26

Figure 30



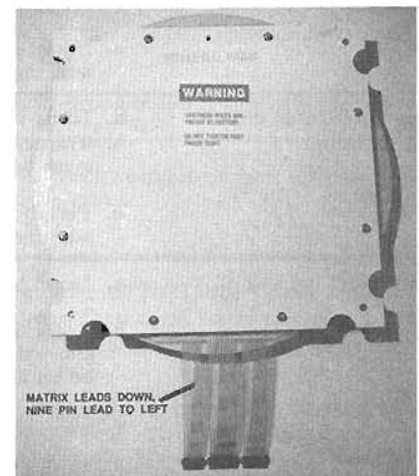Figure 31



Figure 32

## DARTHEAD SEGMENTS

| FIG # | ITEM# | PART# | DESCRIPTION |
|---|---|---|---|
| 30 | 1 | 17-0003 | A segment, red, double |
| 30 | 2 | 17-0008 | A segment, black, double |
| 30 | 3 | 17-0005 | C segment, red, single |
| 30 | 4 | 17-0009 | C segment, black, single |
| 30 | 5 | 17-0006 | D segment, red, triple |
| 30 | 6 | 17-0010 | D segment, black, triple |
| 30 | 7 | 17-0007 | E segment, red, pie single |
| 30 | 8 | 17-0011 | E segment, black, pie single |
| 30 | 9 | 17-0004 | B segment, red Bullseye |
| 30 | 10 | 17-0073 | B segment, double bullseye, Center, Black |
| 30 | 11 | 17-0074 | B segment, double bullseye, outer ring, red |

## DARTHEAD ASSEMBLY

| FIG# | ITEM# | PART# | DESCRIPTION |
|---|---|---|---|
| 31 | 1 | 17-0002 | Spider w/o segments |
| 31 | 2 | 17-0076 | Matrix Cushion |
| 31 | 3 | 08-0018 | Switch matrix double bull |
| 31 | 4 | 18-0003 | Target back |
| 32 | | 00-6300-06R | Dart head assy., Complete |

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| Problem | Probable Cause | Procedure |
|---|---|---|
| Nothing lit on game. | **a.** Blown fuse | **a.** Replace fuse in power supply chassis with 2.0A 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 driver U7. |
| | **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 (LM340-15) 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 wave is 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 cap. on power supply board. | **e.** Resolder connections first to make sure that the problem is not a cold solder joint. If no improvment, replace C2. |
| | **f.** Sound sticks on: game must be shut off to stop it. | **f.** Replace capacitor C19 on the main PC board. |

| 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 is open).<br><br>b. If the problem is not in the dart head, may be U4 (6821) on the main board. | 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.<br><br>b. Swap U4 with U17 to see if the problem changes. If it does, replace bad 6821. |
| Select or player change lamps not working. | a. Lamp burned out<br><br>b. Transistor driver for lamp bad<br><br>c. Peripheral interface adapter (PIA) bad.<br><br>d. If coin door lamps also out, check LM340-12 or 12V Also check for proper lamps GE 658. | a. Replace with GE 658 (do not use a GE 194 or GE 161 lamps).<br><br>b. Replace U18 (ULN2003).<br><br>c. Replace PIA (U17).<br><br>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.<br><br>b. Batteries in MK48Z02 RAM bad.<br><br>c. Game not properly grounded | 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.<br><br>b. Batteries inside device are not replacable; replace (IC MK48Z02) U23.<br><br>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.<br><br>b. Transistor TR1 bad. | a. Check 12V regulator MC78T12 for 12VDC or plug in external modulator, then main board circuitry is OK. Problem is with monitor or 12V regulator or capacitor C9 on power supply PCB.<br><br>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.<br><br>b. Video chips bad. | a. Replace U12 and U13, TMS4416.<br><br>b. Replace U11 TMS9118. |

**Arachnid INC** ™

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