

GALAXY SERIES

Operator's Manual




Arachnidz[®]
The Originator of Electronic Darts

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Table of Contents

INTRODUCTION	1
SECTION 1: GENERAL DESCRIPTION	1
SECTION 2: FEATURES OF THE GALAXY DART GAME	1
2.1 UNIQUE FEATURES	1
2.2 THE GAMES: OLD FAVORITES, NEW CHALLENGES	2
SECTION 3: UNPACKING/ASSEMBLY	4
Test Mode Function Chart	6
Spider Writer Instructions	6
SECTION 4: OPERATION	8
4.1 POWER UP, INITIAL SETUP & DIAGNOSTIC TESTS	8
4.2 TEST/SETUP MODE AND REPORT SCREENS	8
Darthhead Debug Mode Charts	9
4.3 LEAGUE/TOURNAMENT PLAY MODE & TEAM/OPERATOR CARDS..	12
Collecting League Data with the Operator Card	13
Collecting League Statistics Through Phone Lines with a Modem	13
Making a Setup Card	13
SECTION 5: TECHNICAL DESCRIPTION	14
5.1 GENERAL INFORMATION	14
5.2 MAIN P.C. BOARD	14
5.3 VIDEO AND MONITOR	15
5.4 SMART TARGET INTERFACE BOARD	16
5.5 TARGET ILLUMINATION	16
5.6 POWER SUPPLY	16
5.7 DARTHEAD	16
5.8 DARTHEAD DISASSEMBLY/REASSEMBLY	16
5.9 ARACHNID WEB AND MISSED DART DETECTOR	17
SECTION 6; PARTS LISTING	19
SECTION 7: TROUBLESHOOTING GUIDE	25

INTRODUCTION

This manual contains assembly, operation and troubleshooting information for Arachnid, Inc.'s English Mark Darts Galaxy Series dart game.

If you should encounter a problem that is not covered in this manual, or if you have any questions, call Arachnid, Inc. using our toll free number: 1-800-435-8319 from 8 a.m. to 5 p.m. CST.

SECTION 1 GENERAL DESCRIPTION

The Galaxy Series English Mark Darts machine is a patented microprocessor controlled dart game (patents 4057251, 4561660, 4793618, 4824121; other patents pending). It is a coin operated unit offering players a wide variety of game choices to challenge all skill levels. The more challenging or longer playing games require more credits per play. It will accumulate, store, and transfer dart league data and statistics. This information is kept in battery backed up memory, so a power failure will not cause data loss. The unit occupies only 3.6 square feet (25 1/2" x 16") of floor space.

The Galaxy uses a sealed switch matrix scoring system behind the dart face. As the darts strike the target, the machine's computerized scoring system instantly displays the score.

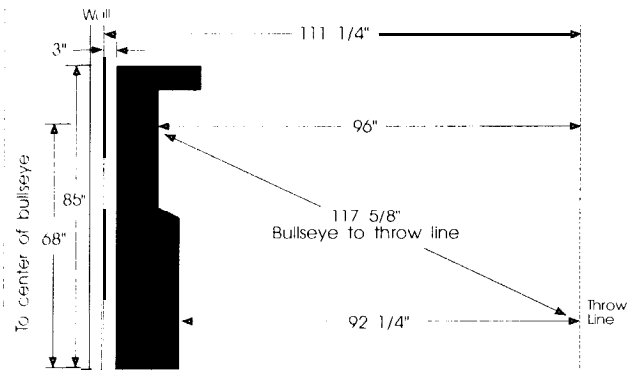


Figure 1: Side view of the Galaxy play field

SECTION 2 FEATURES OF THE GALAXY DART GAME

There are several features on the Galaxy Series game which make it unique from any other dart game that Arachnid, Inc. has ever built. These features are listed in this section.

NOTE: See Section 4.2 for information on how to select the options described in entries A thru E. All selections made are retained in battery backed memory, so they need only be set once.

2.1 UNIQUE FEATURES

A. Automatic Player Change

The Galaxy is equipped with automatic player change, which is operator selectable in the test/setup mode. If this option is used, the game will change players automatically. The remove and throw darts delay time is also operator selectable.

B. No DIP switches for number of coins per credit. All coinages are "software selectable". Free play is also available

A selection of coins (1-20) can give 1 thru 20 credits. The number of coins-per-credit, credits-per-coin, meter clicks-per-coin, or free play is selectable through the test/setup mode.

C. Credits required per game is now "software selectable" for each individual game on the menu

The number of credits required to play each game is preset at the factory, but can be changed as desired for any game through the test/setup mode.

D. No DIP switches for game options; all features are software selectable

All selectable options are set in the test/setup mode (Cricket 200, double bullseye, etc.).

E. Sounds for Triple Scores

If a triple that scores more than 50 points (triple 17,18,19 or 20) is hit, the game plays a set of sounds during 301, 501,701 and Count Up games. This option can be turned off in test/setup mode if not desired.

F. Tic Tac Darts beeps the same as Cricket on doubles and triples (three beeps for triples, two beeps for doubles)

This option can be turned on or off through the test/setup mode.

G. Target Lamps

Two standard 40 watt bulbs above the target head area provide illumination. The bulbs can be dimmed to discourage practice play when not in use.

H. External Video

A standard TV can be connected to the game to display the scores to large crowds at tournaments or to attract other players. See Section 5.3 for further instructions.

I. Stuck Segment Indication

The number of a stuck segment will flash on the screen to immediately let the player know there is a problem. The darthead may then be examined for broken tips or other foreign matter, or the bar owner can be alerted that the game needs to be serviced.

J. Redesigned darthead is controlled by a separate microprocessor (Smart Target)

This is a more efficient and reliable way of monitoring dart hits. The switch matrix has also been redesigned to allow for more versatility and easier troubleshooting. Segments are electrically isolated, and there is a single connector on the end to minimize edge connection problems.

K. Special "Throw Darts" Sound

Tones play as the THROW DARTS light comes on to indicate that it is time to throw.

L. Missed Dart Detector

Arachnid's exclusive dart catching front (web) will detect a dart hit, and count it as a dart thrown, without giving a score.

M. Three Spider Writer Screens

Use for messages, advertising, league information, etc! See the spider writer section in this manual for details. Screens can be transferred from game to game with the use of an "operator card" (see Section 4.3 E for details).

N. Cricket Variations

Single player Cricket will allow players to practice individually and sharpen their playing skills. Lowball Cricket sharpens skills on the low numbers, and gives the game exciting new strategies. Wild Card Cricket provides a random challenge; numbers change until they are marked.

O. Top Gun Challenge

A competitive dart ladder which displays the top 10 players' names on the screen. Promotes dart play before and after leagues as the players try to work their way to the top of the ladder (see Section 2.2 H for more information).

P. League Slot

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.

Q. Normal Game Play Statistics

The Galaxy displays statistics on the screen at the end of

every game (see Section 4.3 for a list of statistics displayed).

R. League Mode

Uses team card (see Section 4.3 A). Holds league data until transferred via modem, or until collected with an operator card (see Section 4.3 B). Statistics are displayed at the end of the game the same as non-league mode.

R. League Handicapping

When this option is used, the team card defines spot darts allowed for each player(see Section 4.3 A). The Galaxy then automatically runs handicap rounds at the beginning of league play. Handicapping will not affect dart outs or other feats, as the game counts actual darts thrown.

S. Cricket and Tic Tac Darts - Now shows number of darts out on screen

Tic Tac Darts shows 6, 7, 8, 9 darts out at end of game. Cricket shows 8 and 9 darts out at end of game (an 8 dart out is possible in Cricket if double bull is used).

T. Credit Retention Capability

Beginning with EPROM version 3.2, the game will retain any remaining credits if power is turned off, or a power outage occurs. These credits can be removed when the game is powered up again by pressing SELECT during the test/setup mode screen (see Section 4.1, Figure 7).

2.2 THE GAMES: OLD FAVORITES, NEW CHALLENGES

The Galaxy Series game will play all the old favorite games, and also some new, challenging games. Coins needed per credit, round limits, as well as credits needed per game, are preset at the factory to standard settings; but they can be changed in the test/setup mode (see Section 4.2).

The games and their descriptions are listed below:

A. 301 Open In/Open Out - 20 Rounds (default setting)

A count-down game for one to four players where each player starts with 301 points. The first person to reach exactly zero, or the lowest score after 20 rounds, is the winner.

B. Count Up - 8 Rounds (default setting)

A 24 dart game for one to four players where each player tries to score the most points in 8 rounds (three darts per round).

C. Tic Tac Darts - 20 Rounds (default setting)

A game for two players where dart numbers selected by the game at random will fill the squares (the bull is always in the center square). To mark an X or an O a player must hit a number 4 times. Additional hits on a “closed” number will score points for that player. Singles score as 1 hit, doubles score as 2 hits, and triples score as 3 hits. The bull scores 1 hit each time. When one player gets three X’s or three O’s in a row, he wins. In the case of a tie or “cat” game where it is not possible to have three in a row, the high score wins. New!! The game can be set up to beep on hits similar to Cricket: 1 beep for singles, two beeps for doubles, three beeps for triples (see Section 4.2 F for details).

D. 301 Double In/Double Out - or Masters Out

35 Rounds/20 Rounds (default setting)

These games are for more experienced players (one to four players) and are played the same as 301, except the player must start and end the game by hitting a number in the outer “doubles” score ring, or by hitting the bullseye (inner bull if double bull is active). In the Masters game, the doubles, triples, or bullseye may be used to end the game, and the default rounds of play are shortened to 20.

E. 501 Team Doubles, Open In/Open Out or Double In/Double Out - 35 Rounds (default settings)

One to four players or teams; played the same as 301 (usually with two-person teams). The players select Open In/Open Out, or Double In/Double Out.

F. 701 Open In/Double Out - 35 Rounds (default setting)

One to four teams or players; played the same as 301 except to go out a double or bullseye must be thrown (inner bull if double bull is active). Usually played with 3 or 4 person teams.

G. Cricket, One to Four Players - 35 Rounds (25 Rounds for Low Ball - default settings)

Cricket is played with the numbers 15 through 20 (except Low Ball) and the bullseye. Each player must hit a number three times before the number is “closed” by an opponent (except in single-player mode). Points scored by players may be governed by spread limits in some games (see the following game descriptions). Section 4.2 C describes how to activate the spread limits.

There are four types of Cricket games to choose from:

1. Original Cricket - one to four players

The highest or equal score with all the numbers closed wins. A 200 point spread limit can be activated for two or

more players (Cricket 200). In the single player mode, it acts as a practice game.

2. Cut-Throat Cricket - two to four players

Close a number and give points to your opponents. In this game, the lowest or equal score with all the numbers closed wins. There is no point spread limit option for Cut Throat Cricket.

3. Team Cricket - four players compete as two teams

Both team partners must close a number before the team can score on that number. The highest or equal score with all the numbers closed wins. A 400 point spread limit can be activated for Team Cricket (Cricket 400).

4. Low Ball Cricket - played the same as original Cricket, with the following exceptions:

A Bullseye scores 8 points (4 and 8 if the double bull is used), and a player can win the game by scoring a “Wicket” (closing the previously unmarked triple 1, 2, and 3 all in the same round). Low Ball Cricket uses a 20 point spread limit which cannot be deactivated.

5. Wild Card Cricket - plays like original Cricket, except the numbers change!

A “wild card” number can be any number between 7 and 20 (a single or double bullseye is always present on the screen). Any unmarked number will become wild and change between players. What was a 20, might now be a 12, or even a 7! This number will stay wild and continue to change until it is marked. Wild Card Cricket can be set (by turning the Cricket spread limit ON) to never score more than 200 points over an opponent’s score, eliminating point run-up. There is a 35 round limit on the game.

H. Top Gun Challenge - For 301, 301 Double In/Double Out, or original Cricket

Be the best on the board with the Top Gun Challenge! Players select the game they wish to play, enter their name on the ladder if it is not already there, then challenge any one of three opponents above their name. The game is preset to a best out of 3 series, but the operator may change this to a best out of 5 or 7 series. Their name will appear under their score throughout the match; for game #1 the challenger will shoot first, after that whoever loses a game will shoot first the next time. Individual statistics (as well as average scores for the first three rounds in 01 games) will be displayed after each game. If a challenger wins the match, that person’s name will replace the opponent and vice versa on the ladder. If a player doesn’t return to defend their position, their name will drop off the ladder after a number of days, as specified by the operator in the test/setup mode. The ladder can also be modified in the test/setup mode.

- I. **Bermuda Triangle** - one to eight players. An exciting variation of a game popular in England for years.

Players aim at a new darthead segment type each round. The segments used are 12, 13, 14, DOUBLES, 15, 16, 17, TRIPLES, 18, 19, 20, BULL and DOUBLE BULL (if selected). Points are accumulated by hitting any part of the current segment. For example: The first segment is 12. A single 12 will give 12 points, a double 24 points, and a triple 36 points. When DOUBLES is the current segment, any double (except the double bull) is acceptable. The same applies to TRIPLES, when triples is the current segment type. When a player misses the desired number with all three darts, *a spinning triangle explodes and releases a lightning bolt that slices the player's score in half!* The highest score at the end of the game wins. In the event of a tie for high score, the player with the fewest halves wins.

Bermuda Triangle is particularly exciting as it often comes down to the very last dart thrown to determine the winner.

- J. **Gotcha!** - two to four players, 35 round maximum, our newest strategy game.

The object of the game is to be the first to get from 0 to 301 points, without going over. Players try to match the score of their opponent(s) with each dart thrown. Every time there is a match, a bomb is detonated which destroys their opponent's score and puts it back to zero (up to 3 bombs may be detonated per round). If as you approach 301 points, you go over, the amount exceeded will be deducted from your original score, and no matching bomb, if earned, will be detonated for that throw. For an additional challenge, there is also an expert's game, which requires players to reach their final score of 301 with doubles, triples, or the bullseye only for the winning shot.



Figure 2A

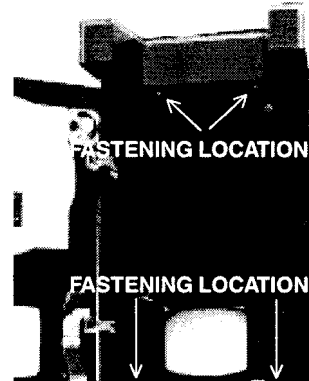


Figure 2B

- B. Remove the shroud assembly from inside the upper cabinet (in back, see Figure 3).
- C. Mount the shroud assembly to top of the game using 1/4-20x1" bolts provided (Figure 2B). Plug lamp connectors from shroud into the main harness of the game.

Assembled game can be folded for easy transportation.

K. Automated Dart League Play

During automated league play (using team cards), games must be selected through the League Play menu, and results of the match will be retained in memory for collection with an operator card or modem. **Bullseye options are set by the team cards. There are no game round limits during league play.** Statistics are displayed at the end of all games (see Section 4.3 for more information).

SECTION 3 UNPACKING/ASSEMBLY

3.1 UNPACKING

Unpack the game per the instructions listed on the carton.

3.2 ASSEMBLY

- A. Grasp the upper cabinet and lift to an upright position on the lower base(see Figure 2A). Bolt the upper cabinet to the lower cabinet using 1/4" x 20x2" bolts and 1/4" flat washers provided (see Figure 2B).

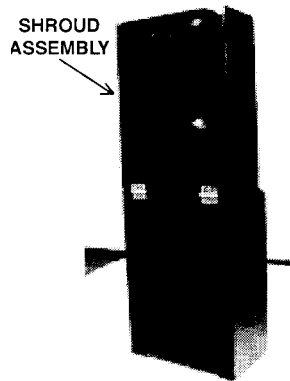


Figure 3



Figure 4: Harness Connection

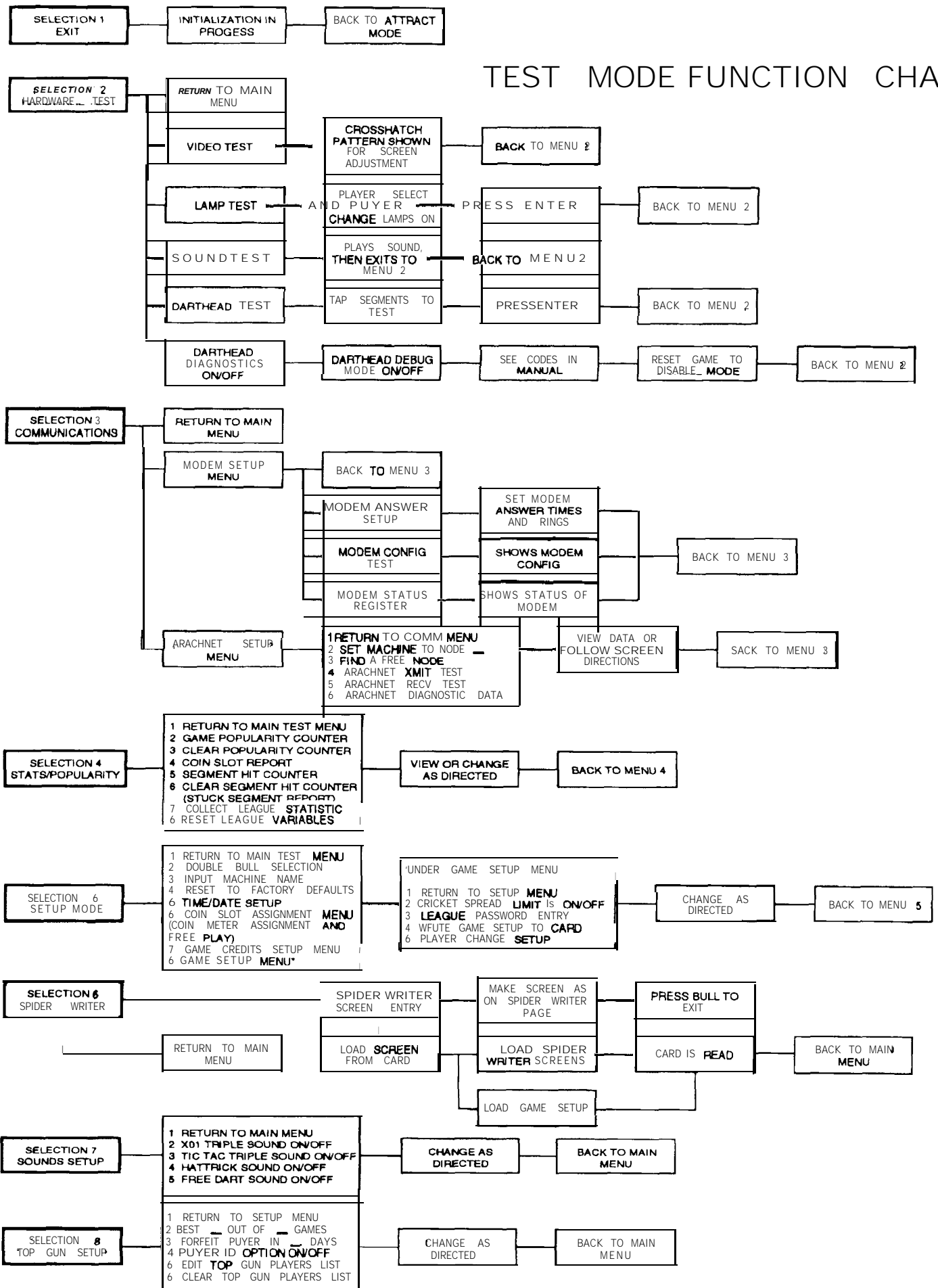
- D. Feed the coin door harness connector up through the large hole to the left of the monitor. Attach it to the matching main harness connector, as shown in Figure 4.
- E. Attach the competitor strip (if provided) directly above the coin door. A black triangular wood piece and wood screws are provided for this purpose. Position it behind the competitor strip and secure both to the game front using the wood screws.
- F. Plug the power cord into a 110VAC (or proper line voltage for your country) GROUNDED wall outlet. The game is now ready to be powered up.

IMPORTANT : Proper outlet wiring is essential for the memory retaining features of this game. The wall outlet used must be properly grounded, and hot/neutral should not be reversed. Have it checked electrically for proper wiring and grounding, even if it does have a three prong receptacle.

Do not cut or alter the power cord plug on the game.

Do not use an extension cord unless it is the heavy-duty grounded type.

TEST MODE FUNCTION CHART





MANUAL ENTRY INSTRUCTIONS

- Put the game into test/setup mode by turning the game off, then back on, or by pressing the reset button on the main PC board. When the message PRESS TEST SWITCH NOW appears on the monitor, press and release the test switch on the main PC board. See Figure 6 on page 7 for the locations of these switches. A menu will appear on the screen; Option 6 says SPIDER WRITER. Select this option. The next menu has three options: EXIT, SPIDER WRITER SCREEN ENTRY, and LOAD A SCREEN FROM CARD (see the next section for information on loading a screen from a card). Select SPIDER WRITER SCREEN ENTRY.
- A spider cursor will appear on the top left corner of the screen. Use the darthead as a keyboard to move the cursor around, and to enter the message or drawing desired. The diagram to the right illustrates which symbols are represented by segments in the single, double, and triple rings. **NOTE:** Since the Galaxy darthead can differentiate between dart hits and finger touches, the segments must be tapped sharply and quickly for the characters to appear. This can be mastered with a little practice.
- The spider writer feature has three available screens for your custom text. Print your message on the first screen, then press SELECT to go to screen 2. When this screen is finished, press SELECT again to go to screen 3. If SELECT is continually pressed, the screens will scroll one after the other so you can view all of them. Press the bullseye when satisfied with the screen(s) created. If the bullseye is not pressed, or the dat-head is not touched for ten minutes, the game will automatically exit the test mode, and any unfinished screens will be lost.

HELPFUL HINTS:

Use the 32 x 16 grid provided to create the screen on paper before entering it in the game. It will save 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.

Be *careful of the single 5!* It clears the screen completely and should only be pressed when clearing or changing an entire screen. See the instructions for entering the spider writer screen(s) using an operator card. This is a much more efficient way to do them, and screens can be saved on the cards and used to program several games with the same messages.

NOTE: A game that is not properly grounded may get strange characters in the spider writer screens due to static discharge from the players. If this happens, simply enter the spider writer mode and hit the single 5 to clear the screen(s), or erase each bad character separately using the triple 5 seg-

ment (to salvage an existing design). Hit the bullseye to exit. Make sure the ground plug on the wall receptacle is properly connected. This will greatly minimize static that can cause garbage to foul the screen.

USING A SPIDER WRITER CARD TO MAKE SPIDER WRITER SCREENS

With the use of a card programmer kit and an IBM PC compatible computer, an operator can now make spider writer screens ahead of time, save them on a spider writer card, and quickly transfer them to the games! Follow the instructions included with the kit on how to program the cards. **NOTE:** Spider writer cards are made from operator cards (see Dartman II manual).

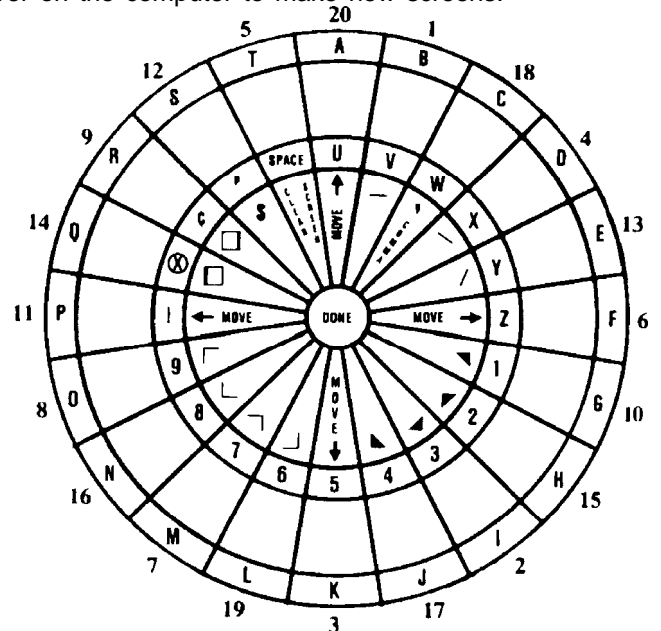
Loading Spider Writer Screens from the Attract Mode

This is the easiest way to load a spider writer card: Insert a programmed card into the slot on the front of the game at any time while the game is in its attract mode. Wait 5 to 30 seconds, the game will automatically sense that the card is there. Select A: "Load Spider Writer Screens"; the game will record all the screens. Remove card and press ENTER when prompted to return to normal operation.

Loading Spider Writer Screens from the Test Mode

Another way to read the cards is to enter the spider writer mode as described above, then when the second menu is brought up, select LOAD A SCREEN FROM CARD. Insert the card in the slot on the front of the game; the game will read the card, and load the screen(s) automatically. The program will then return to the menu, where the operator may remove the card and exit spider writer.

NOTE: The same card can be used on several games to write the same screens, and can be reprogrammed over and over on the computer to make new screens.



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.

SPIDER WRITER WORKSHEET

Use this grid to design your custom screen


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	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		
1																																		
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SECTION 4 OPERATION

4.1 POWER UP, INITIAL SETUP & DIAGNOSTIC TESTS

- A.** Turn on the dart game using the on/off switch on the back of the cabinet. There is also a switch on the side of the cabinet which should be ON. It controls the target lamps and the bottom half of the outlet powering the monitor (the upper half is unswitched and allows external modem hookup). The side switch is used for automated league play (see Section 4.3). After a few seconds, the monitor displays the test/setup mode screen (see Figure 6).
- B.** Immediately press and release the test switch located at the lower left corner of the main PC board (see Figure 7) to put the game into test/setup mode. The screen will then show a selection menu that lists all the test and setup options available. This menu will hereafter be referred to as the main menu for the test/setup mode. The chart in Figure 5 shows the function of each option. The screens themselves are easy to follow; select the test or setup option desired, and follow the screen directions. Refer to this chart as necessary to determine which option is needed to perform the test or function desired.

NOTE: The test/setup mode switch will only work immediately after power-up, or after reset is pushed (during the time that the test screen is displayed). It will not operate at any other time. The reset switch is located at the right/center of the main PC board (see Figure 7).

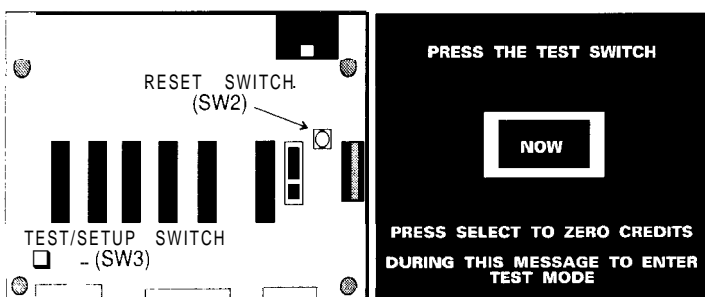


Figure 6: Depress Test Mode switch during this screen.

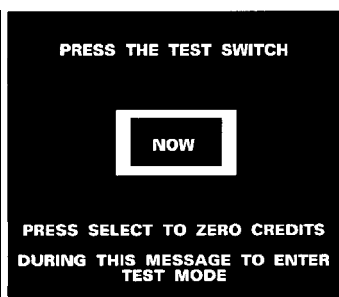


Figure 7: Test Mode and Reset Switches

4.2 TEST/SETUP MODE AND REPORT SCREENS

All game options (various sounds, Cricket 200, double bull, and coinages/credits) are selectable through software via the test/setup mode. The chart in Figure 5 shows functions of the test/setup mode, and where to access them. The following are descriptions of the various options available in the test/setup mode. Use the chart and these descriptions as references, and follow the instructions on the screen to make changes or move from one screen to another.

A. Hardware Tests

There are seven categories for hardware tests: Video Test, Lamp Test, Sound Test, RAM Integrity Test, Segment Test, Darthead Test, and Darthead Diagnostics. The first six (with the exception of RAM Integrity Test) are simple one-step tests, but Darthead Diagnostics is a feature in which the technician can verify specific dart hits. Each darthead segment displays a number when hit that should match the ones listed in Tables 2A and 2B. If a number appears that does not correspond to the table, the technician can determine which segment the number actually does correspond to, and use that information to troubleshoot the problem. **NOTE:** The screen displays numbers from right to left. A stuck dart will first display the code number "0", then will display the code number for the segment that is stuck.

The RAM Integrity test runs a check on several sectors of RAM, to insure that information is being stored properly. It is recommended that league stats be collected before running this diagnostic. Also, at initialization of the game, there is a RAM Clock Status Indicator which automatically tests the game's clock, resets it if it has been corrupted, and notifies you of the change. It disables Happy Hour and League pricing times if it needs to reset the clock, until the operator can put in the correct time. Also, modem answer times are set to the highest ring until the clock is reset, to prevent the modem from answering at the wrong times.

B. Communications

This section is for setting up Galaxy games to download statistics through a modem to a computer at the operator's location.

Modem Setup Menu - Set up answer times under the modem setup menu, and check the modem's configuration and status registers.

Arachnet Setup Menu - This section covers setting up a network of games, testing the network functions, and diagnosing information transmitting problems. See the Dartman Manual for detailed information on setting up the Arachnet modem networks.

SET MACHINE TO NODE - gives each machine a unique node number in the network.

FIND A FREE NODE - is used to examine the entire network of games to find an unused node number, or determine which games are assigned to which number. This procedure also provides a functional test of the communications in both send and receive modes.

ARACHNETTRANSMITTEST - tests the ability of the games in the network to transmit information to the modem game.

Table 2A: Darthead Debug Mode Codes listed in numerical order

SEGMENT NUMBER	INNER	TRIPLE	OUTER	DOUBLE
1	40	39	38	37
2	12	11	10	9
3	4	3	2	1
4	32	31	30	29
5	48	47	46	45
6	24	23	22	21
7	76	75	74	73
8	68	67	66	65
9	56	55	54	53
10	20	19	18	17
11	64	63	62	61
12	52	51	50	49
13	28	27	26	25
14	60	59	58	57
15	16	15	14	13
16	72	71	70	69
17	8	7	6	5
18	36	35	34	33
19	80	79	78	77
20	44	43	42	41

BULL INNER 82
 BULL OUTER 81
 FINGER TOUCH 97
 MISSED DART 96
 STUCK DART 0

Table 2B: Darthead Debug Mode Codes listed in the order they appear on the darthead (counterclockwise from the bottom)

DOUBLE	OUTER	TRIPLE	INNER	SEGMENT NUMBER
1	2	3	4	3
5	6	7	8	17
9	10	11	12	2
13	14	15	16	15
17	18	19	20	10
21	22	23	24	6
25	26	27	28	13
29	30	31	32	4
33	34	35	36	18
37	38	39	40	1
41	42	43	44	20
45	46	47	48	5
49	50	51	52	12
53	54	55	56	9
57	58	59	60	14
61	62	63	64	11
65	66	67	68	8
69	70	71	72	16
73	74	75	76	7
77	78	79	80	19

BULL INNER 82
 BULL OUTER 81
 FINGER TOUCH 97
 MISSED DART 96
 STUCK DART 0

ARACHNET RECEIVE TEST ▪ tests the ability of the game with the modem to receive information from the other games in the network.

ARACHNET DIAGNOSTIC DATA ▪ is a window to the data transmitted from the games. It can be used to determine whether a game is transmitting good or bad information. This data should only be analyzed with the assistance of an Arachnid service technician. The following six fields can be checked:

1. BAD PACKETS ▪ This counts sets of information (called packets) that have been sent by a game which contained a flaw of some kind. This count will help indicate the overall accuracy of the game network.
2. CHBRCVERROR -This counts the number of characters (bits of information) transmitted from game to game which contained errors. This count can give an indication of the integrity of the communications system within a location. Electrical noise, poor wiring, other devices connected to phone lines, etc. can cause these types of errors.
3. CHARCVERROR -This counts the number of characters transmitted from the modem which contained errors. A bad modem, or a modem which is making a bad connection on the main board or to the cables could cause these types of errors.
4. PKTCOUNTER ▪ This counts all packets (defined above) transferred on the network. This can be used to determine how many times the network is called, to analyze failure rates.
5. TOTALRETRIES ▪ The ARACHNET will retry sending information from game to game if not sent properly the first time. This counter keeps a record of these retries.
6. STATE ▪ This displays variables which are used by Arachnid to monitor the internal state of the system.

C. Stats/Popularity

This section contains counters which indicate the number of times games have been played, total number of coins inserted, and how often segments are hit. All counters can be cleared (except coin counters). Stats/Popularity also contains a field where league statistics can be collected (though this is usually done while the game is in attract mode), and a function which clears all old league statistics from memory. This latter field is called reset league variables.

League variables should only be reset prior to the start of a new league season, or when new EPROMS or RAM chips are installed in the game. Always make sure that league stats are collected from the game before resetting, as they will be permanently erased from the game's memory.

D. Setup Mode

Options accessed in this mode are the double bullseye, setting the machine name and the time/date (for stats collection purposes), setting up the game for factory defaults, assigning coin slot credits and game credits, setting the Cricket spread limit, entering the league password, auto player change setup, rounds setup, and matching setup. Also, the game setup can be written to a spider writer card in this mode. These options are described below:

Double Bullseye Setup ▪ Used to choose between a single 50 point bullseye, and a double 25/50 point bullseye for each game. The double bullseye can be made player selectable for any game. **IMPORTANT!** If the double bullseye is chosen, the double bullsegment must be installed in the darthead. Either the solid or double segment may be used with the single bullseye setting. To change the segment, see Section 5.8 (Dart Head Disassembly Instructions).

Last Chance Setup ▪ Used to set the option of allowing players in the X01 games to match the winning score of the player with the first win in a game. This is used often in Europe.

Input Machine Name ▪ Each game within a location should have a unique name to make it easier to track problems with stats should they occur.

Reset to Factory Defaults ▪ These defaults are the factory recommended settings for all functions. Operators can customize each selection to their liking, but this provides a base to start from.

Time/Date Setup ▪ This area is for setting various times for various functions. These functions are listed below:

Set Happy Hour Times -This option provides the operator with the ability to set a specific time aside each day (one or more days) for reduced game prices. The time can vary from day to day.

Set League Training Times - This option is similar to Happy Hour, except it is only for league members. The operator sets specific times (on one or more days) in which league members can play casual darts for a reduced price. During the specified time, a league member can insert his team card into the galaxy game, and while in the game selection screen, watch the credits change to the reduced prices. The card may either be left in the slot or reinserted prior to the selection of each game. **Many operators use this feature as an incentive for players to arrive early on league night to practice.**

NOTE: The reduced prices cannot be activated during league play, even if the times overlap. If league play is selected, the prices will return to normal, and if necessary, the game will notify the players that additional credits are required to begin league play.

Set Game Clock ▪ This clock must be set correctly for modem collection to take place properly, for Top Gun maintenance, and for proper function of Happy Hour and League Training times.

Coin Slot Assignment Menu - The screen will display the factory setup for your country (U.S.A. = 1 coin/l credit). To change the preset setup, follow the screen prompts closely (see Figure 8A). It will provide the means to select # of coins per # of credits for up to three coin slots (slots one, two, and three). Slot three is used with a bill acceptor. The SELECT button is always used to increment the number, the Test button resets the number to one, and the ENTER button advances to the next screen. The game can also be set here for **Free Play**.



Figure 8A

Coin/Meter Assignments - This option is found under the Coin Slot Assignment Menu. A mechanical counter is located inside the coin door. It counts credits given in all three coin slots, from which the total amount of cash collected can be determined. The coin/meter assignment option allows the operator to assign how many coin meter clicks are registered when a coin has been dropped (to aid in counting total money collected). For most applications, this is normally set to 1 .00, which would cause the meter to count once for each coin. An electronic counter is also provided under Option 4 which counts actual coins (or bills) run through each slot.

Game Credits Setup Menu - The game credits are preset at the factory, but can be changed in the setup mode. From the Game Credits Setup Menu, standard game play, Happy Hour pricing, and League Practice pricing can be accessed for all game types (see Figure 8B).

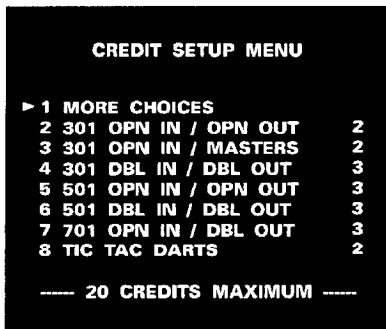


Figure 8B

- NORMAL** credits are the # of credits that each game will require during normal operation, and during league play.
- HAPPY** credits are the # of credits that each game will require during Happy Hour times.
- LEAGUE** credits are the # of credits each game requires if a team card is inserted during League Practice times.

The functions of these times are described previously under Time/Date Setup.

Cricket Spread Limit -This option prevents one player from scoring more than a given number of points over his opponent's score (regular Cricket = 200 points; Team Cricket = 400 points; Low Ball Cricket = 20 points). This helps prevent players from using Cricket for practice by not closing all the numbers and rolling over the score. The Low Ball Cricket spread limit will remain ON even when this option is deactivated.

League Password Entry -This is a safeguard for collecting league stats. If the password on the game does not match the password on the Operator Cards or modem settings, stats cannot be collected.

Write Game Setup to Card - For writing all of the test/setup mode settings to a spider writer card. See next section for more information.

Player Change Setup - Automatic player change and the remove darts delay are activated here.

E. Spider Writer Mode

Select Option 6 on the main menu. There will be a blinking spider cursor in the top left-hand corner of the screen. See the spider writer page included in this manual for details on using this feature.

F. Sounds Setup

Triple Sounds for the "01" games and Count Up - When enabled, the game will emit a sound whenever a triple 17, 18, 19, or 20 segment is hit.

Hit Sounds for Tic Tac Darts - This option will allow the game to produce a sound whenever a correct number is thrown in Tic Tac Darts. If a double is hit, it will sound twice; if a triple is hit, it will sound three times (similar to marks in Cricket).

Hat Trick Sound - The game will emit a sound whenever a hat trick is thrown.

Free Dart Sound - Causes the game to emit a sound whenever a dart is thrown at the board when no coins have been inserted.

G. Top Gun Setup

Top Gun Editing - In the Setup mode, the Top Gun players list can be edited (see Figure 8C). Names can be added or deleted as desired. The operator can also select the number of games per match that Top Gun will play (best out of 3, 5, or 7) and the length of time that a player's name will be retained on the Top Gun list if they are not challenged (1 thru 99 days).

All screen options listed in this section will be retained when the power is turned off. Turning the power off and on will always cancel any mode the game is in. Otherwise, follow these written instructions or screen instructions to change modes or exit.



Figure 8C

4.3 USING LEAGUE/TOURNAMENT PLAY MODE AND TEAM/OPERATOR CARDS

The Dartman Software Program and the Stat Card Programming Kit must be purchased to use the automatic league play features. Dartman provides faster, more efficient league management than anything else currently on the market. Contact your distributor or Arachnid, Inc. for more details.

The Galaxy will display the following statistics at the end of every game:

01 GAMES & COUNT-UP

6 DART OUT
7 DART OUT
8 DART OUT
9 DART OUT
3 IN A BED
OF TON 80'S
OF HIGH TONS
OF LOW TONS
OF HAT TRICKS
WINNER
POINTS PER DART

CRICKET

8 DART OUT (If double
bull is active)
9 DART OUT
OF WHITE HORSES
5 MARK ROUND
6 MARK ROUND
7 MARK ROUND
8 MARK ROUND
9 MARK ROUND
OF HAT TRICKS
OF WINS/ASSISTS
#OF MARKS PER ROUND

These and other statistics may be collected from league/tournament play using the methods described below.

A. League Team Cards

The team card keeps the players' names and shooting orders, and other league information for league night (see below). The Galaxy game will store other types of league information: games played, handicapping information, wins, feats and ranking information achieved by each player.

The team captain inserts the card at the start of the match, and the game does the rest. The players will no longer have to fill in score sheets. All they have to do is play darts. Select "League/Tournament Play" on the game menu, then select "Use Cards - Automatic", and follow the instructions on the screen for using the cards. After the match is over, the operator will retrieve the night's scores and feats (see Section 4.3 D).

Team cards are capable of storing the following:

1. Names of up to four team members and four substitutes
2. Nicknames for all players
3. Number of games being played

4. Type of games being played

5. Shooting order of players for up to 30 matches

6. Whether or not the double bull is active

7. Whether to follow shooting order as programmed on the card, have the winner of the last game go first, or have the loser of the last game go first.

8. Handicapping information when applicable

B. League/Tournament Play using Scoresheets

The Galaxy game also makes it possible to track feats and perform accurate Points Per Dart and Marks Per Round calculations without the use of team cards. From League/Tournament Play, select "League Play - Scoresheet". After the game type is selected, the players enter other league information into the Galaxy, such as how many players are shooting, whether they will be sharing a score, and which team shoots first - as defined by the league coordinator.

During league play, the Galaxy will keep track of each individual, and display their statistics at the end of each game, with totals displaying at the end of each set and/or match. These will include all feats listed in the beginning of Section 4.3, as well as final score, total points, and total darts/marks for each individual. The statistics may then be copied to a scoresheet for manual entry into Dartman by the league coordinator.

Another Selection in the League/Tournament Play menu is called Tournament - Scoresheet. It operates similar to League Play - Scoresheet. It is to be used for tournament play where tracking of feats and/or MPR (Marks Per Round) or PPD (Points Per Dart) information is required.

C. League Operator Cards

Another tool designed for use with the Galaxy game is the Operator Card. It can be used for the following:

1. Collecting league statistics **when team cards are used for league play**, as described in Section 4.3 A. They can also be collected via telephone lines through a master game (see Section 4.3 E).
2. Transferring Spider Writer screens and test/setup mode information. (For these uses, it is often referred to as a Spider Writer Card or Setup Card.)

D: Collecting League Data with the Operator Card

To collect automatic league data, the operator transfers the data from the game to the operator card by inserting the card into the game during the attract mode, and following the screen directions. Then he takes the card(s) back to his home office, inserts them into the stat card programmer box attached to his computer, and weekly league statistics are automatically compiled from the card information. Reports generated from the information collected on the cardscan contain such information as player feats, S.P.R.E. and/or points per dart/marks per round ranking, team statistics, etc. Reports can be customized to meet many needs. Additional user information is provided with the purchase of a League Master System.

E: Collecting League Statistics Through Phone Lines with a Modem

If a location has set up one of its games to be a "modem game" (See Section 5.2 G for details on how this is done), automatic league information can be transferred through phone lines from the other games at that location to the modem game, and then to an IBM AT (or compatible) at the league operator's location. The statistics collected from the Operator Cards, or transferred from the modem game, are then manipulated by Dartman and used to generate the desired reports. Please refer to Arachnid's Dartman manual for more information on running leagues using this software, modem installation and usage, the team/operator cards, and other league capabilities of the Galaxy Series dart games.

NOTE: The operator should use the on/off switch on the side of the game at the end of the night if modem collection is used. This way power is still available for the modem to operate during the night.

F: Using Preprogrammed Cards to Transfer SpiderWriter Screens and Test/Setup Mode Information

This feature requires the Dartman League Program, the STAT Card Programmer Kit, and an IBM PC compatible computer. The Dartman manual will provide instructions on how to program Spider Writer cards and use them with the game. The spider writer page included in this manual also contains information on using the card with the Galaxy game.

SETUP CARDS are made from spider writer cards. One card can hold 3 full spider writer screens, along with all setup information. if this is desired.

PROGRAMMING A SETUP CARD ■ Take a spider writer card to a Galaxy game. The card may have as little as one blank screen, or as much as three full screens programmed on it. Program all game setup features as desired on the dart game, then go back to the Setup Mode main menu (option 5). Insert the card into the card slot on the front of the game. Select GAME SETUP MENU, then select WRITE GAME

SETUP TO CARD. The entire game setup will be transferred to the card.

To use the programmed setup card in another Galaxy game, insert the card into the new game during its attract mode. After a few moments, a menu will appear. Select LOAD GAME SETUP The setup information will transfer to the new game in a few seconds.

Note: In order to load a setup card in the attract mode, the card must contain the same league password as the game being written to. If this is not the case, the card may still be used by going into the Test Mode and choosing SpiderWriter (option 6). From here, the card can transfer setup and/or spider writer screens, regardless of the password. However, if game setup is loaded, the password used on the card will transfer to the new game.

The following list describes what does and does not transfer from a Setup Card to a Galaxy game:

The card will transfer the following:

- League password
- Sound options
- X01 triple sound
- Tic Tac sound
- Hattrick sound
- Free dart sound
- Number of credits required to play each game
- Top Gun parameters
- Number of games to play
- Number of games to win
- Player I.D. option
- Number of days to forfeit players
- Cricket 200 spread limit option
- Remove Dart delay time
- Auto Player Change option and parameters
- Coins per credit settings for all coin inputs
- Mechanical coin counter assignment settings
- Bullseye options
- Modem parameters
- Number of rings to answer
- Answer times

The card will **NOT** transfer the following:

- Machine name
- Node number of machine
- Top Gun players list
- I.D. #'s of players
- All counters
- League statistics
- Time/Date
- Darthead Debug Mode on/off

PLEASE NOTE: Setup cards will not work between games which have different EPROM revisions. For consistency, make sure all your games have the same revision EPROMS (U10 on the main board).

SECTION 5 TECHNICAL DESCRIPTION

5.1 GENERAL INFORMATION

Figures 9 and 10 show the main components of the game:

- 1) Lamp/Monitor Switch
- 2) Lamp Fuse
- 3) Main PC Board
- 4) Power Supply
- 5) 12" Monitor
- 6) Smart Target Darthead Interface
- 7) Darthead Assembly

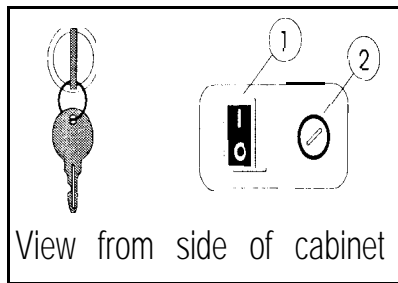


Figure 9

The Galaxy game is totally serviceable from the front. All major game components are accessed by unlocking the front panel and swinging it open. The darthead is completely exposed, and easily removable. Four thumb-nuts hold it in place, and the assembly slides out for service. The main board and power supply are easily accessible. The target lamps provide light for servicing, and are controlled by the side switch (figure 9). There is an outlet inside the cabinet (120 VAC, 4 amps max.) that is fused separately from the rest of the game. The monitor is plugged into the lower half of this outlet, which is controlled by the side switch. The top half is unswitched, and can be used as a service outlet, or for hooking up a modem. With the side switch, the operator can power down the monitor and lights without removing power from the main board. This is important for automated league play (see Section 4.3).

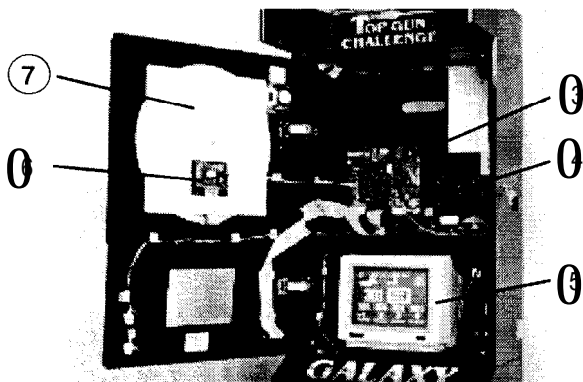


Figure 10

5.2 MAIN P.C. BOARD

The Main P.C. Board (Figure 20) is controlled by a 6809 microprocessor and associated IC's consisting of:

- TMS4464 (71 C464), 64K x 4 Dynamic Memory (2) - U6, U7
- TMS9118 Video Generator - U5
- DS1244 Battery backed up RAM with Clock - U12
- 27C020 (or 27C010) 128K EPROM - U10
- 8749 Target Scan Microprocessor - U14
- SCN2681 Dual Asynchronous Receiver/Transmitter - U20

- 74LS04 Hex Inverter - U18
- 74LS74 Dual D Flip Flop - U8
- 74LS244 Octal Buffer - U13
- 74LS245 Tri-State Bus Transceiver - U27
- 74LS541 Octal Buffer - U28, U29
- 556 Dual Timer - U3
- DS1232 MicroMonitor - U31
- 6821 Peripheral Interface Adapter(3) - U11, U15, U17
- 75176 Bus Transceiver - U24
- 1990C.JED 20V8 GAL - U16
- LM383T Audio Amplifier - U4
- ULN2003 Transistor Network(4) - U1, U2, U19, U30
- MAX4391 +12V to -12V Converter for Modem - U25
- MC1488 +5V to +/-12V RS232 Modem Driver - U23
- MC1489 +/-12V to +5V RS232 Modem Receiver - U21, U22
- MM2400 Optional Modem - U26

A: Reset Circuit

The microprocessor can be reset either by shutting the power off to the main board (switch on back) for a few seconds, and then turning the game back on; or by activating the reset switch on the main board. The reset switch retriggers the 556 timer (U3). When the switch is closed, the reset line goes low. C9 is used to prevent electrical noise from triggering a reset.

B: Low Voltage Circuit

The DS1232 MicroMonitor chip detects out-of-tolerance power supply conditions, and along with the 556 timer protects the Galaxy system from impending power failure. When VCC falls below 4.75 volts, the output pin 6 goes low and resets the Galaxy hardware. The DS1232 is located at U31 on the Rev. I (or later) main PC board, or on a daughter board at U3 on earlier revisions.

C: Player Change Select Circuits

The PLAYER CHANGE/ENTER and SELECT push buttons are located on the front panel. When the PLAYER CHANGE/ENTER button is closed, it grounds pin 3 of U11. When SELECT is closed, it grounds pin 2 of U11. When the switches are open, the inputs are held high. **NOTE:** Use only type GE658 lamps in these pushbuttons. Use of any other lamp type may cause excessive heat build-up inside the switch housing, which may keep the switch from closing completely.

D: Sound Circuit

Sound is generated through the 6821 (U17), and governed by the main program by sending out a digital sound signal when required, for each of the sounds that the game makes. The sound is output at pin 19, and is fed through the volume control potentiometer R9, accessed from the top of the PC board. U4 (LM383T) is an 8 watt audio power amplifier whose gain is controlled by the ratio of R20 and R21. The voltage for U4 is +12VDC from the power supply.

E: Interrupts

The microprocessor is interrupted by coin inputs 1, 2, & 3; the darthead; the UART (game to game communication); the 10 Hz clock; the low voltage circuit; and the reset button. The coin switches will reset the game back to the game selection screen at any time, except during the test/setup mode. The darthead affects game operation only during a game, by displaying a score or a dart hit, and is active during the darthead test portion of the test/setup mode, or when in spider writer mode. It will also trigger the free dart sound when enabled during the attract mode. The UART does not affect the game operation in a visible way, but if a game is being played during a modem collection, a short hesitation may be visible on the screen. The 10 Hz clock provides a counter for the 10 minute time-out feature. With the 10 minute time-out, any activity prior to the interrupt will reset the timer back to 10 minutes. Example: If a game is started, and then left unattended for 10 minutes, it will automatically return to its attract mode, ending the previous game and the credits used to start that game. Any extra credits will still be available for use. If the game is played within the 10 minute span, the timer starts over at 10 minutes from the time the activity was detected. In the event of a low voltage condition, the low voltage circuit will reset the Galaxy as if it were just turned on. The reset button will do the same any time it is pressed.

F: Memory

The 27C010 (or 27C020) EPROM (U10) contains the main program. The window on this IC should always be covered with our adhesive label, as EPROMs are erasable when exposed to ultraviolet light for a period of time. The RAM in this system is a DS1244 (U12) with internal lithium batteries. It contains 32K of memory. The batteries provide data retention when power is off for the popularity screen, option setups, and league statistics (see Section 4.2). The 8749 (U14) receives serial data from the smart target board, and interrupts the microprocessor. See Section 5.4 for further information on this part of the system.

G: Address Decoding

Address decoding is done with U16, a programmed GAL (GAL20V8). This IC determines whether the microprocessor is addressing memory, one of the peripheral interface adapters, or the video IC.

H: Optional Modem Feature

A modem that plugs directly into the main PC board is available for use with the Galaxy. It is used in conjunction with the League Master System and Dartman for automated league management. The modem game, when connected to other Galaxy games at a given location, will be able to transfer league statistics directly to an IBM or compatible computer at

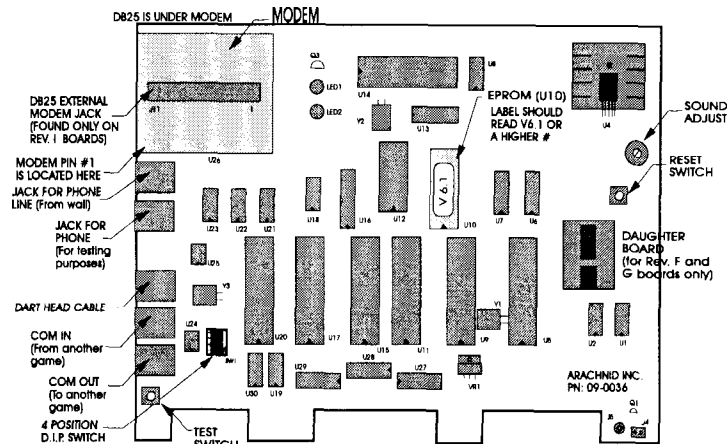


Figure 11: Main P.C. Board with modem installed

the league operator's home location. The modem is a 2400 baud, available in a kit from Arachnid. It requires a -12VDC supply, provided by U25 (MAX4391), which converts the +12V to -12V. The modem is commanded by U23 (SCN2681) through an MC1488 (RS232 driver). Modem signals are received and converted by U21 and U22, (RS232 receivers). Newer revision main boards also contain an external RS232 connector, which allows the operator to install an external 2400 baud modem. For more information consult the Dartman manual.

5.3 VIDEO AND MONITOR

The video signal is generated by a TMS9118 (U5), which also provides the clock signal for the timing circuit, from a 10.738635 MHz crystal (Y1). The TMS9118 internally divides the crystal signal by three, so that a separate crystal is not necessary to run the rest of the system. Two TMS4464's (U6, U7) provide memory for the video section. The output signal is generated on pin 36 of the TMS9118, and the output is buffered by Q1 and Q4.

There is one RCA style phono jack on the main board (see Figure 20, item 66) which is used for the internal monitor. If a second external TV or monitor is desired, this line can be split with a "Y" splitter. If a monitor is used, it must have a composite input. If a TV is used, a coaxial cable must be run from the RCA splitter to an RF modulator, or the video input of a VCR. The output of the modulator or the VCR is usually on channel 3 or 4, and should be connected appropriately to the TV. This arrangement can be useful for displaying matches at tournaments, or to create interest at locations. See the monitor manual included in the accessory kit for details on monitor operation, adjustments, and troubleshooting information.

5.4 SMART TARGET INTERFACE BOARD

Along with our new switch matrix design, we also have a new target interface PC board called the smart target interface. It contains its own 8749 microprocessor, which is used to continuously scan the darthead. Since this IC is totally dedicated to the darthead, hits should not be missed and feathering will be minimized, thus making game scoring more accurate. The static shield, a foil-backed PVC barrier, prevents static discharge from the darthead from discharging into the smart target board. When a hit is detected, the score is sent serially to the 8749 (U14) on the main board. This 8749 then interrupts the 6809 (main program IC, U9) which transfers the score to be displayed on the monitor. The smart target interface board reads the 19 conductors from the switch matrix and transfers it serially to the main board. For troubleshooting purposes it is important to know which pins on the target interface board will give a particular score. This information is listed in Table 1, and shown in Figure 13. With the game in test/setup mode (go into hardware test, then darthead test) or in game mode, pairs of pins can be shorted and opened (quickly, less than 60 ms.) with a jumper to simulate a dart hit (see Figure 12). This procedure can help determine whether a scoring problem is in the switch matrix or the game electronics.

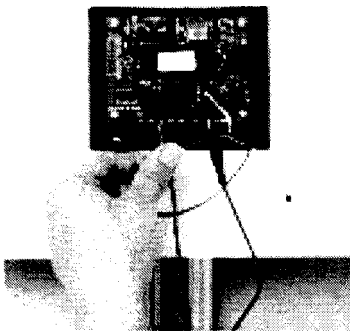


Figure 12

SWITCH MATRIX TEST CHART									
JS	=	INNER SINGLE	TO test, remove the switch matrix lead from JP8. Short two pins together and release the LED should flash and the game score as if the segment was hit.						
OS	=	OUTER SINGLE							
D	=	DOUBLE							
T	=	TRIPLE							
IB	=	INNER BULL							
OB	=	OUTER BULL							
JP8 PIN #	13	12	11	10	9	8	7	6	
1	D11	OS11	T11	IS11	D10	OS10	T10	IS10	
2	D8	OS8	T8	IS8	D15	OS15	T15	IS15	
3	D16	OS16	T16	IS16	D2	OS2	T2	IS2	
4	D7	OS7	T7	IS7	D17	OS17	T17	IS17	
5	D19	OS19	T19	IS19	D3	OS3	T3	IS3	
14	XXX	XXX	OB25	IB50	XXX	XXX	XXX	XXX	
15	D14	OS14	T14	IS14	D13	OS13	T13	IS13	
16	D9	OS9	T9	IS9	D4	OS4	T4	IS4	
17	D12	OS12	T12	IS12	D18	OS18	T18	IS18	
18	D5	OS5	T5	IS5	D6	OS6	T6	IS6	
19	D20	OS20	T20	IS20	D1	OS1	T1	IS1	

Table 1

18 16 14 12 10 8 6 4 2
19 17 15 13 11 9 7 5 3 1

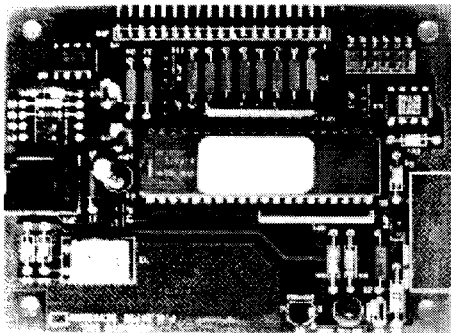


Figure 13

The score will not register until the jumper wire is removed from one of the pins. If a game has a stuck segment, it can be opened electrically by disconnecting the 19-pin ribbon. The stuck segment's score will then register, and the darthead can be checked for the cause of the problem.

5.5 TARGET ILLUMINATION

The target on a standard Galaxy cabinet (not conversion kits) is illuminated by two standard 40 watt bulbs mounted in reflecting boxes above the darthead. During the attract mode, the intensity of these bulbs can be adjusted down to discourage free play. This is done by means of a potentiometer on the dimmer PC board, mounted below the power supply chassis.

5.6 POWER SUPPLY

The Galaxy is equipped with a switching power supply. This power supply has a universal 85 VAC to 264 VAC 50/60 HZ input. The inputs connect to J1, and the outputs are on J2:

J1

- Pin 1 AC Line
- Pin 3 AC Neutral

J2

- Pin 1 +12V
- Pin 2 +5V
- Pin 3 +5V
- Pin 4 Logic Ground
- Pin 5 Logic Ground
- Pin 6 Unused

5.7 DARTHEAD

The Galaxy darthead assembly is somewhat different from Arachnid's previous assemblies. The darthead is removable from the front of the game by means of a hinged front door. A single 19-pin ribbon brings the signals to the smart target interface board, which in turn transmits the signals to the main board through a 6-conductor phone cable. Two long screws hold the darthead assembly together. It is mounted to the game by 4 screws behind the dart catcher (web).

5.8 DARTHEAD DISASSEMBLY/REASSEMBLY

To clean or replace parts in the darthead, first disconnect the modular connector from the smart target PC board. Then remove the entire assembly by removing the four thumb nuts that hold it in place, and gently pulling it off the game front. Lay the darthead face down, and remove the two screws that hold the assembly together. Now disassemble and assemble the darthead as follows (also see Figures 14 and 15):

HINT: You may wish to mark the target back, switch matrix, and yellow spider with a magic marker before disassembly to make reassembly easier.

- a) Gently lift off the wood target back.
- b) Lift off the switch matrix, and then lift off the matrix cushion to expose the segments.
- c) Check for dirt and broken tips or other foreign matter between the spider, segments, matrix and cushion, etc.
- d) Replace any worn or broken segments.

Replace the single or double bullseye at this time if desired.

- e) There is a small locating hole on the outer edge of the yellow spider. It is smaller and closer to the edge than any other hole. Position this hole at "12 o'clock" (top center).
- f) Clean the matrix cushion and set it back on the spider. There is a small "U" shaped cutout on this cushion. Position it at about "8 o'clock" on the spider. It will line up with a similar cutout on the switch matrix in the next step.
- g) Place the switch matrix with the tail at "6 o'clock" (on the bottom), lining up its "U" shaped cutout over the one on the matrix cushion. Adjust the matrix cushion if necessary.
- h) Reinstall the two screws that hold the matrix assembly to the wood back. One screw goes into the first hole directly below the "U" shaped cutout on the switch matrix. The other screw goes into the fourth hole to the right of the top locating hole. When inserted, the 2 screws should be directly across from each other (diagonally).
- i) Position the assembly on the four bolts in the game front so that the tails face down and the locating hole is on top.
- j) Double check the positioning of the darthead, then tighten the four thumb nuts to hold everything in place.

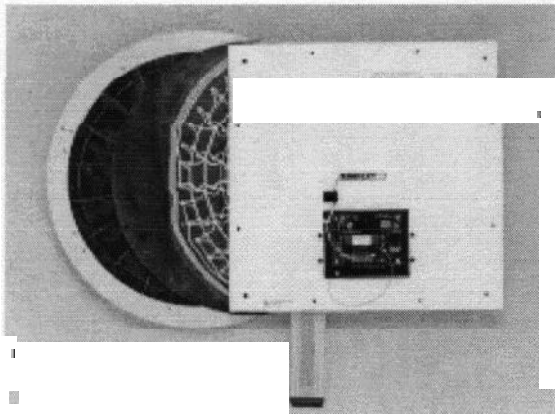
NOTE: Tighten the (2) darthead nuts and the (4) mounting nuts so they are snug, but do not over-tighten.

NOTE: It is important to keep dirt and foreign material out of the area between the spider and segments, as non-scoring or improper scoring can result. On a heavily played game it is a good idea to disassemble and clean the darthead regularly, which will help prevent service calls between scheduled visits.

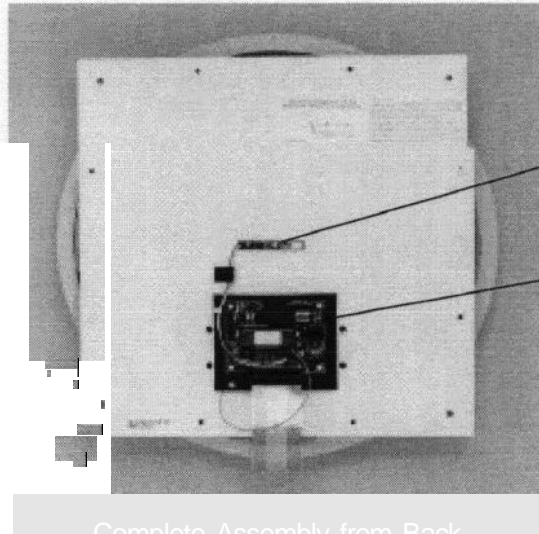
5.9 ARACHNID WEB AND MISSED DART DETECTOR

The web (or dart catcher) will snag darts that miss the target, and it now has the ability to detect when a dart has hit it by means of an impact sensitive, piezoelectric switch circuit mounted behind the darthead (see Figure 16). The connector for the switch plugs into the smart target board. It will detect a hit anywhere on the web face, and the game will record it as a dart thrown, with no score given. This will cause the PLAYER CHANGE switch to light after 3 darts are thrown, no matter where they land on the board. There is a small sensitivity adjustment pot located on the circuit board assembly. Turning it clockwise slightly will increase the missed dart detector's sensitivity, turning it counterclockwise will decrease it. Note: Though this is a single revolution pot, there are no stops when turning it.

Ideally, the missed dart detector should effectively sense darts striking anywhere on the web surface, even the aluminum house darts. However, optimum sensitivity will vary from location to location, depending on environmental circumstances. For instance, if a dart game is in very close proximity to a loudspeaker which gives off vibrations, or a dance floor, the sensitivity may have to be decreased to compensate for the interference. Adjust as needed for each location's needs.



Row of all Darthead Layers
Figure 14



Piezoelectric Missed Dart Detector
 Smart Target PCI Board

Complete Assembly from Back
Figure 16

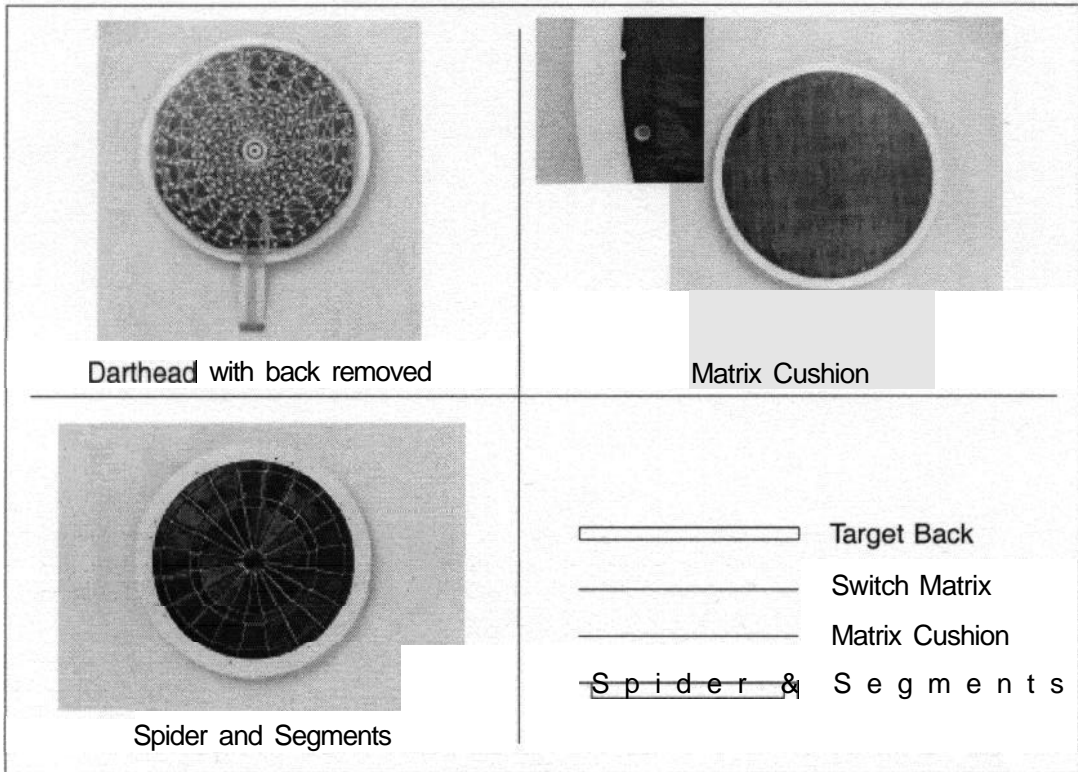


Figure 15

**SECTION 6
PARTS LISTING**

**SMART TARGET INTERFACE BOARD
24798**

FIG.#	ITEM#	PART#	DESCRIPTION
17	1	26984	IC,8749,PROGRAMMED
17	2	13653	IC,75176B, 8 PIN BUSTRANS.(2)
17	3	32547	IC,MICRO MONITOR,DS1232
17	4	12551	RESISTOR,330 OHM,1/4W
17	5	21440	RESISTOR,5.6K OHM,1/4W
17	6	23660	RESISTOR,1.8K OHM,1/4W
17	7	32555	RESISTOR,47 OHM,1/4W
17	a	26992	RESISTOR,3.3K OHM,1/4W
17	9	15887	RESISTOR NET,SIP,3.3K X 9
17	10	34777	CAPACITOR,10MFD,50V
17	11	13671	CAPACITOR,100PF,25V,MONOLYTHIC (3)
17	12	32561	CAPACITOR,.1MF,200V (3)
17	13	13673	CAPACITOR 5PF,200V,AXIAL,CERAMIC
17	14	15893	CAPACITOR,22PF,200V,AXIAL,CERAMIC
17	15	27002	CAPACITOR NET,SIP,100PF X 9, 50V
17	16	21458	CRYSTAL,4 MHZ
17	17	22588	CONNECTOR,MODULAR,6 PIN,RJ-11
17	18	24808	HEADER,19 PIN,.100 SPACING
17	19	29148	HEADER,.1 X 12 DUAL ROW
77	20	17031	LED,RED,AEG TIL 220
17	21	23842	TRANSISTOR,2N4402
17	22	21628	FERRITE,BEAD ON A LEAD (12) Z = 120 OHMS X 100MHZ

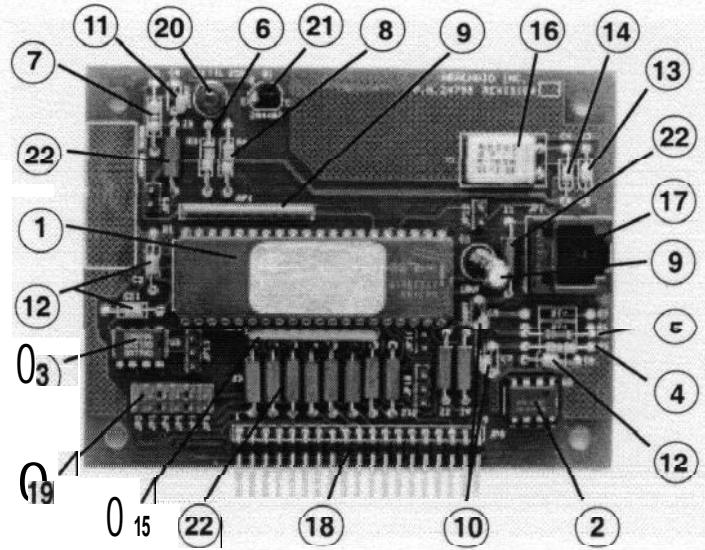


Figure 17

**COIN DOOR ASSEMBLIES
21406**

FIG.#	ITEM#	PART#	DESCRIPTION
18	1	28268	COIN DOOR, GALAXY, USA
18	2	21488	BUTTON,COIN REJECT
18	2	34811	BULB FOR SWITCH,GE658 (2)
18	3	23762	HARNESS,COIN DOOR
18	4	24818	LOCKING BAR, CASH BOX
18	4	12705	CASH BOX DIVIDER
18	4	22718	CASH BOX,PLASTIC
18	4	21608	CASH BOX LID
18	5	14935	MECHANICAL COIN COUNTER
18	N/S	18149	SWITCH, COIN MECH

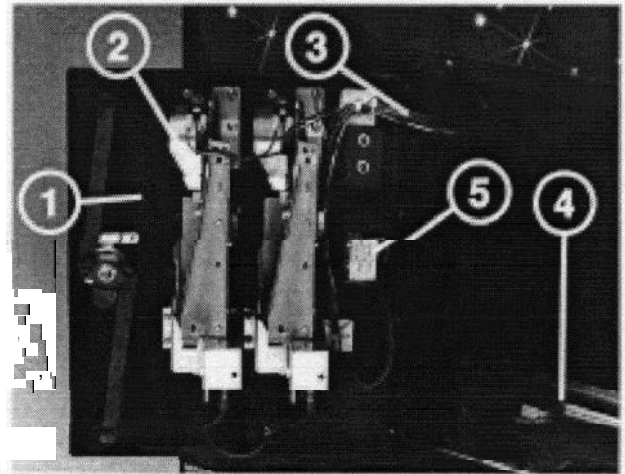


Figure 18

**STAT CARD ASSEMBLY
16957**

FIG.#	ITEM#	PART #	DESCRIPTION
19	1	29138	PC. BD,STAT CARD,COMPLETE
19	2	29210	HARNESS,STAT CARD,39"
19	N/S	29262	BEZEL,STAT CARD
19	3	28104	RESISTOR,3.9K,1/4 WATT
19	4	24770	RESISTOR,22K,1/4 WATT
19	5	16991	RESISTOR,1K,1/4 WATT
19	6	30339	CAPACITOR,.1 MFD,25V,MONO (2)
19	7	22562	CAPACITOR,10MFD,25V,TANTALUM
19	a	17001	CAPACITOR,.01 MFD,25V,MONO (3)
19	9	35896	TRANSISTOR,POWER P-FET,IRFD 9010
19	10	12567	SOCKET,STAT CARD

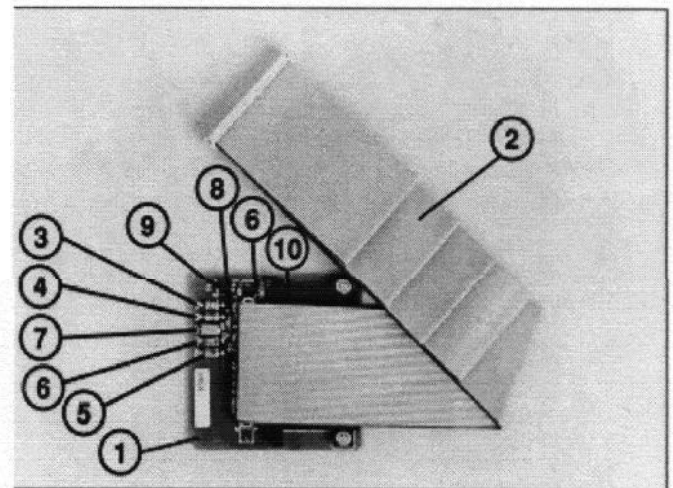


Figure 19

MAIN P.C. BOARD ASSEMBLY • 11413

FIG. #	ITEM#	PART#	DESCRIPTION
20	1	26964	IC,SN74LS04,INVERTER
20	2	29084	IC,SN74LS244
20	3	26984	IC,8749,TARGET SCAN PROGRAM
20	4	13637	IC,LM383T,AUDIO AMPLIFIER
20	5	21416	IC,MC7805,5V REG. TO-220,1 AMP
20	6	22526	IC,556,DUAL TIMER
20	7	24746	IC,6821 ,P.I A (3)
20	8	18079	IC,TMS4464 (71C464),DYNAMIC RAM,64KX4 (2)
20	9	19089	IC,TMS9118,VIDEO
20	10	23638	IC,6809,MICROPROCESSOR
20	11	34761	IC,74LS74,DUAL D,FLIP FLOP
20	12	13653	IC,75176B,8 PIN BUSTRANSCEIVER
20	13	*	IC,27C020,2MEG,EPROM,W/GAME PROGRAM
20	14	25872	IC,74LS245,TRI-STATE BUSTRANSCEIVER
20	15	13657	IC,74LS541 ,OCTAL BUFFER (2)
20	16	29104	IC.DS1244Y,BATTERY BACKED RAM W/CLOCK
20	17	30325	IC.MAX.4391 ,+/- 12V REG
20	18	23654	IC,1990C.JED,PRG,20V8GAL,PROGRAMMED
20	19	31435	IC,DS1488N,MODEM DRIVER
20	20	32545	IC,DS1489AN,MODEM RECEIVER
20	21	33655	IC,SCN2681AC1 N40,DUAL RECEIVER/TRANS
20	22	26988	RESISTOR,2 2 OHM,1/4W
20	23	29108	RESISTOR,100 OHM,1/4W (1)
20	24	34769	RESISTOR,220 OHM,1/4W
20	25	12551	RESISTOR,330 OHM,1/4W
20	26	16991	RESISTOR,1K OHM,1/4W (16)
20	27	22550	RESISTOR,10K OHM,1/4W (19)
20	28	11443	RESISTOR,680K OHM,1/4W
20	29	13663	RESISTOR,1 MEG OHM,1/4W (2)
20	30	19113	RESISTOR,10K OHM,POT
20	31	26992	RESISTOR,3.3K OHM,1/4W (4)
20	32	28102	RESISTOR,12K OHM,1/4W
20	33	34773	RESISTOR,75 OHM,1/4W
20	34	11445	RESISTOR,470 OHM,1/4W
20	35	12557	RESISTOR,750 OHM,1/4W (2)
20	36	23660	RESISTOR,18K OHM,1/4W
20	37	26990	RESISTOR,47K OHM,1/4W
20	38	30331	RESISTOR,100K OHM,1/4W
20	39	29112	RESISTOR,510K OHM,1/4W
20	40	13667	RESISTOR,75K OHM,1/4W
20	41	14777	RESISTOR,120K OHM,1/4W
20	42	19121	CAPACITOR,1MFD,25V,AXIAL, TANTALUM(2)
20	43	13669	CAPACITOR,100MFD,25V,AXIAL,ELECT.(2)
20	44	12559	CAPACITOR,47PF,25V
20	45	19119	CAPACITOR,1000MFD,25V,AXIAL,ELECT.(2)
20	46	15891	CAPACITOR,470PF,25V
20	N/S	32561	CAPACITOR, 1 UF,200V,CERAMIC,AXIAL(42)
20	48	12563	CAPACITOR,4.7MFD,25V,TANTALUM (3)
20	49	13673	CAPACITOR,5PF,200V,AXIAL,CERAMIC(3)
20	50	14783	CAPACITOR,33PF,200V,AXIAL,CERAMIC(2)
20	51	15893	CAPACITOR,22PF,200V,AXIAL,CERAMIC
20	52	17003	CAPACITOR, 22MFD,16V,AXIAL,CERAMIC
20	N/S	18113	CAPACITOR, 33MFD,100V,AXIAL,CERAMIC(2)
20	54	19123	CAPACITOR, 47MFD,16V,AXIAL,CERAMIC
20	55	22562	CAPACITOR,10MF,25V,AXIAL,TANTALUM
20	56	25892	CAPACITOR,390PF,50V (3)
20	57	27002	CAPACITOR NET,SIP,1000PF X 9. 50V(3)
20	58	21458	CRYSTAL,4 MHZ
20	59	22568	CRYSTAL,10 738635 MHZ,PAR.
20	60	24788	CRYSTAL,3.684 MHZ
20	61	33681	SWITCH,DIP,4 POSITION
20	62	11465	SWITCH,PUSH BUTTON,MOMENTARY,6MM (2)
20	N/S	33693	HEADER,POST,40 PIN,R/A,W/CLIPS
20	64	13695	CONNECTOR,1 1 PIN,R/A, 156CENTERS
20	65	32585	CONNECTOR,POST HEADER,2,.156"
20	66	15917	JACK,PHONO,P.C MOUNT
20	67	22588	CONNECTOR,MODULAR,6 PIN,RJ-11 (5)
20	68	23698	CONNECTOR,12 PIN,R/A 156CENTERS
20	69	17031	LED,RED,AEG TIL 220(2)
20	70	17173	DIODE,IN4148 (2)
20	71	22732	TRANSISTOR,2N4400
20	72	23842	TRANSISTOR,2N4402(2)
20	73	30513	TRANSISTOR NETWORK,U LN2003A (4)
20	74	21628	FERRITE,BEAD ON A LEAD,Z=120 OHMS @ 100 MHZ (4)
20	75	26070	CHOKER,680 UH
20	76	11441	RESISTOR,270 OHM,1/4W
20	77	19111	RESISTOR,4.7K OHM,1/4W
20	78	36759	CONNECTOR, DB25,FOR EXTERNAL MODEM
20	79	32547	IC,MICRO MONITOR, DS1232

*Contact Arachnid Technical Service at 1-800-435-8319 for the proper part number for your application

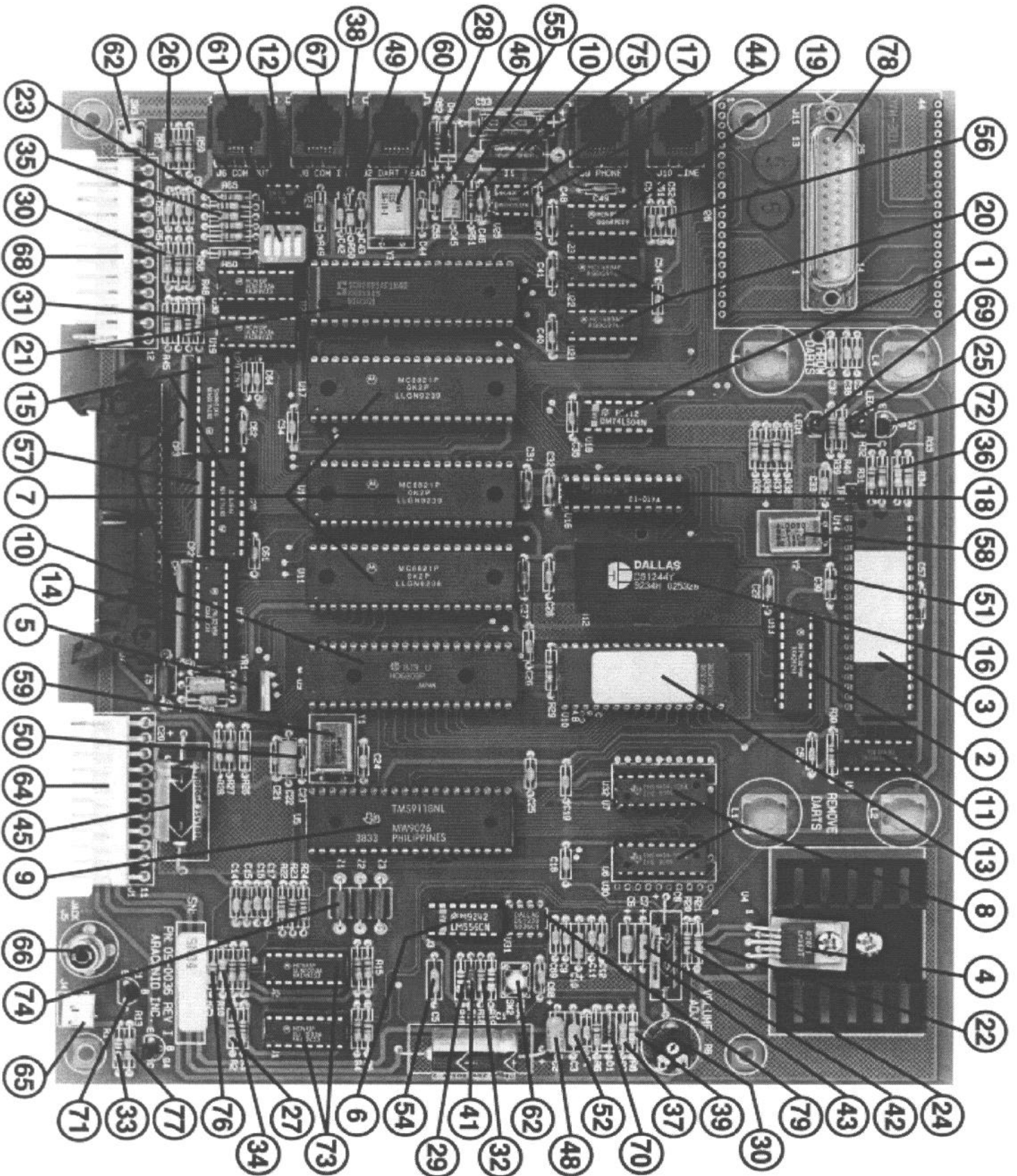


Figure 20: Main P.C. Board

MAIN CABINET ASSEMBLY

FIG. %	ITEM #	PART #	DESCRIPTION
21	1	39832	LOWER DECAL, TOWERS
21	2	39772	CABINET, LOWER, EMPTY
21	3	39784	CABINET, UPPER, EMPTY
21	4	21768	FRONT CABINET DOOR, W/BACKET
21	5	40021	TOP DECAL
21	6	39310	DECAL, SCORING, USA
21	N/S	22684	COMPETITOR STRIP
21	8A	39309	DECAL, INSTRUCTIONS, USA
21	8B	26004	DECAL, ENTER/SELECT BUTTONS, USA
21	aC	39308	DECAL, ARACHNID LOGO, USA
21	8D	39831	DECAL, ANGLE, GALAXY
21	9	12397	ARACHNID WEB ASSEMBLY
22	10	32565	SOCKET, LAMP, MEDIUM BASE (2)
22	11	37024	LAMP, 120V, 40WATT, STANDARD BULB (2)
22	12	39802 & 39803	LEFT & RIGHT REFLECTORS FOR LAMPS
23	13	31483	LOCK, WITHOUT CAM (2)
23	13	31491	CAMS FOR LOCKS (2)
23	13	37664	LOCK W/CAM HARDWARE
23	14	21462	SWITCH, ON/OFF ROCKER FOR LAMPS
23	15	19167	FUSE HOLDER, CHASSIS MOUNT
23	15	39619	FUSE, 2.0AMP, 250V FAST BLOW
24	16	21484	SPEAKER
25	17	38458	MAIN HARNESS, GALAXY, SW PWR SUPPLY
25	18	13763	VIDEO HARNESS
25	19	33761	CABLE, PHONE (TI) 30"
25	20	19127	RECEPTACLE, CASED, 3 PRONG
25	21	22610	HINGE, FRONT PANEL, 160 DEG. SWING (2)
25	22	39078	MONITOR, 12" COMPLETE
26	23	19131	SWITCH, ILLUMINATED W/O BULB (2)
26	24	34811	BULB, GE658 (2)
N/S	N/S	34809	RCA SPLITTER 2T0 1 (FOR 2 MONITORS)
21	25 & 26	39744	MODULAR SHROUD
21	27 & 28	36176 & 36175	LEFT & RIGHT LIGHT SHROUD DECALS
21	29 & 30	31565 & 30455	LEFT & RIGHT UNDER SHROUD DECALS
21	31	39272 (35803GS)	MONITOR BEZEL, PLASTIC W/DECALS

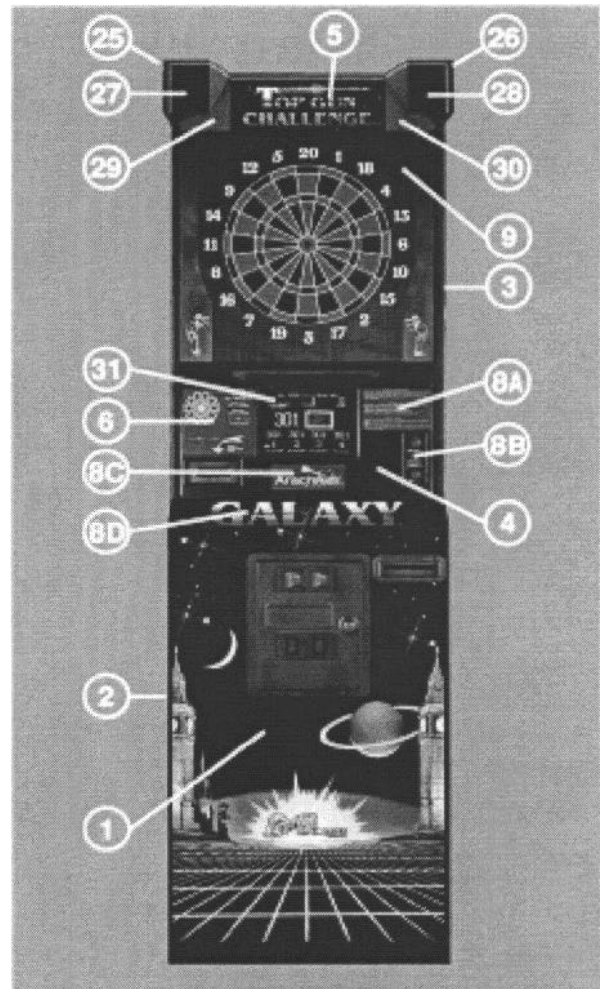


Figure 21

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 PARENTHESSES. THIS NUMBER IS THE QUANTITY USED IN THAT ASSEMBLY.

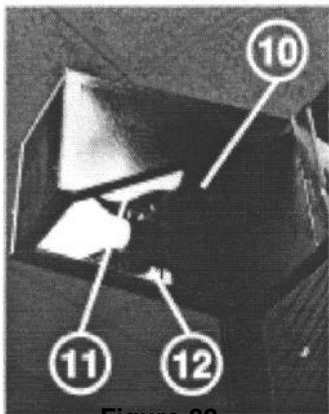


Figure 22

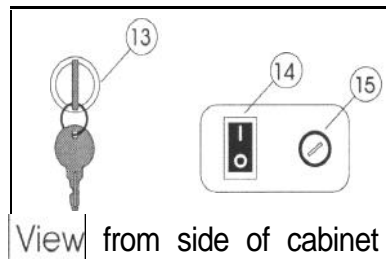


Figure 23

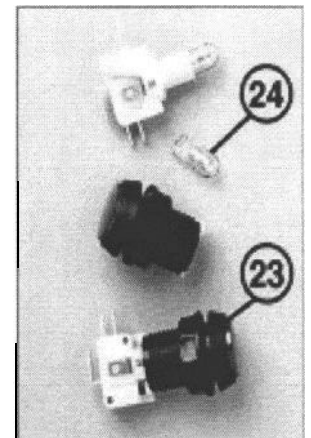


Figure 26

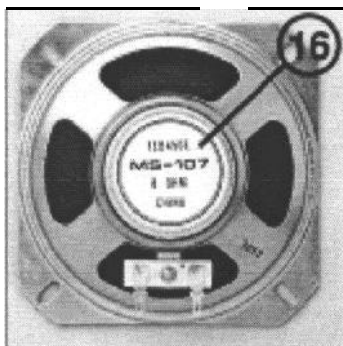


Figure 24

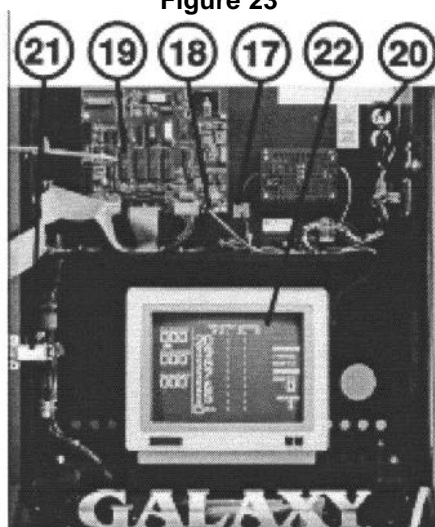


Figure 25

POWER SUPPLY ASSEMBLY

37046

FIG.#	ITEM#	PART#	DESCRIPTION
27	1	14843	SCREW,6-32 X 1/4",RHPZN,SEM,W/STAR"
27/29	2	38463	SOCKET,POWER INLET,IEC1
27/29	3	19167	FUSE,HOLDER,CHASSIS MNT,SLOTTED CAP
27/29	3	37003	FUSE,4 AMP,250V SLOW BLOW FOR SERVICE OUTLET"
28	4	36994	POWER SUPPLY BOARD,85-264VAC,+5 & +12,25W,SWG"
28	5	37002	GROMMET,ROUND,VINYL,,5 HOLE X 1 1/16" OD X 1/16"
28	6	38239	PCB,ASMBY,DIMMER,120V1
28	7	38093	PLUG,DIMMER ADJ. POT"
28	8	38087	SCREW,#6 x 3/4"
28	9	37009	SPACER,6-32 X 1-3/8,MALE FEMALE,ALUM,STANDOFF"
28	10	15951	NUT,6-32 X 15/16,HEX,ZN1
27	11	36228	COVER,PWR SPLY,SHIELD,FOR DIMMER"
27	12	38309	CHASSIS,PWR SPLY,SHIELD BASE,W/DIMMER1
28	13	38088	SCREW,6-32 X 3/4,FHP1
27	14	36458	MAIN HARNESS FOR GALAXY,SWITCHING POWER SUPPLY WITH DIMMER
27/29	15	21462	SWITCH,ROCKER,ON/OFF,DP,SP,3A@250VAC1

MODEMS & ACCESSORIES (Not Shown)

PART#	DESCRIPTION
24614	INTERNAL MODEM KIT FOR GALAXY GAME
37389	MODEM KIT WITH CABLE FOR GALAXY
37388	MODEM KIT WITH CABLE & ADAPTER PC BOARD FOR GALAXY MAIN BOARDS PRIOR TO REVISION I
37201	3 FOOT CABLE,EXTERNAL MODEM,DB251
37150	ADAPTER BOARD FOR EXTERNAL MODEM, NEEDED WITH GALAXY MAIN BOARDS PRIOR TO REVISION I

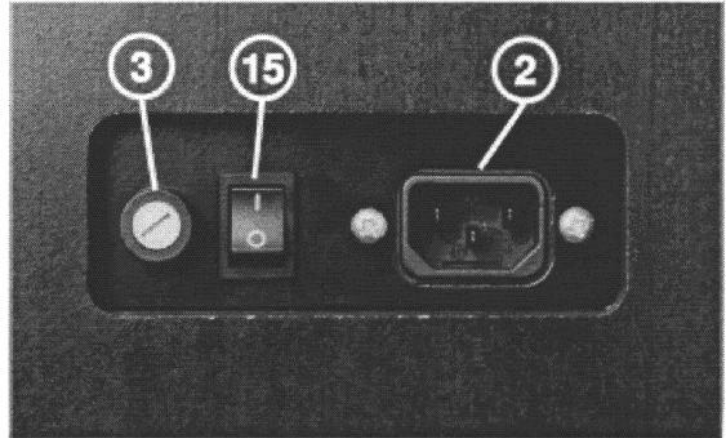


Figure 29

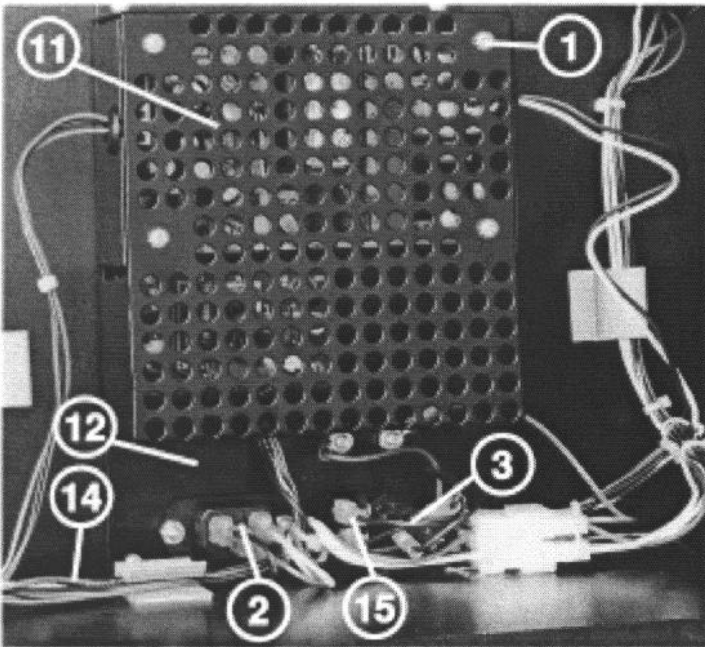


Figure 27

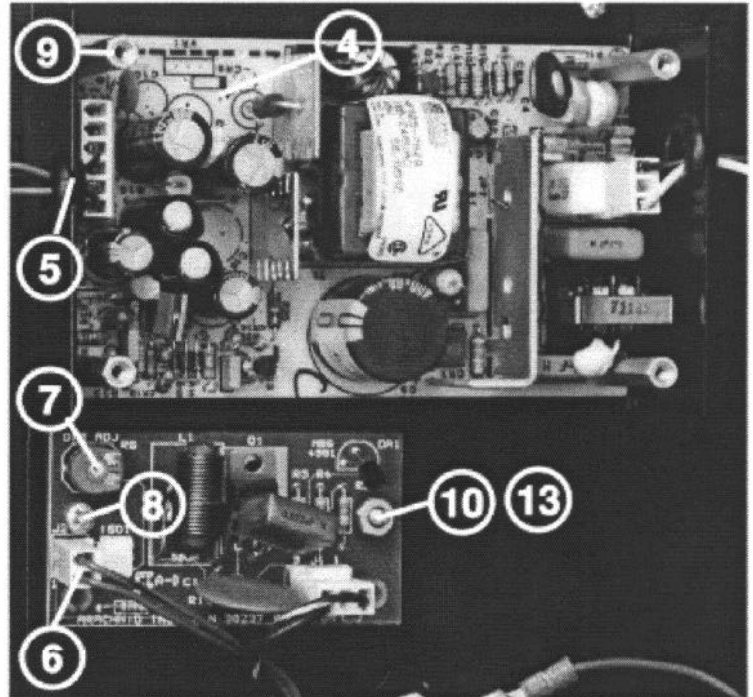


Figure 28

DARTHEAD SEGMENTS

FIG.#	ITEM#	PART#	DESCRIPTION
30	1	16069	A-SEGMENT,RED,DOUBLE
30	1	19079	A-SEGMENT,BLACK,DOUBLE
30	2	21408	C-SEGMENT,RED,SINGLE
30	2	22518	C-SEGMENT,BLACK,SINGLE
30	3	23628	D-SEGMENT,RED,TRIPLE
30	3	24738	D-SEGMENT,BLACK,TRIPLE
30	4	25848	E-SEGMENT,RED,PIE SINGLE
30	4	26958	E-SEGMENT,BLACK,PIE SINGLE
NOT SHOWN		28068	B-SEGMENT,RED BULLSEYE (SINGLE)
30	5 & 6	36971	B-SEGMENT,DOUBLE BULL ASSEMBLY,INNER & OUTER,WITH SPRING

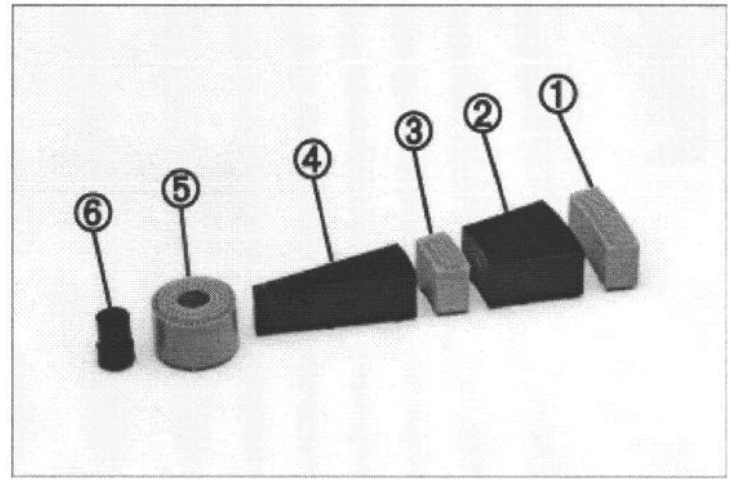


Figure 30

DARTHEAD ASSEMBLY

FIG.#	ITEM#	PART#	DESCRIPTION
31	1	29268	SPIDER W/O SEGMENTS
31	1	14617	SPIDER WITH SEGMENTS
31	2	28258	DAMPER,PLASTIC,SUP SPIDER
31	3	12575	SWITCH MATRIX,SUP SPIDER
31	4	19273	TARGET BACK,SUPER SPIDER
32	5	27944	COMPLETE SINGLE & DOUBLE BULL
DARTHEAD			
32	6	39168	MISSED DART DETECTOR ASSY
32	7	24798	TARGET INTERFACE,GALAXY
32	8	36601	STATIC SHIELD

PIEZOELECTRIC MISSED DART DETECTOR ASSEMBLY 39169

FIG.#	ITEM#	PART#	DESCRIPTION
33	2	39127	PCB ASSEMBLY,PIEZO MDD
33		39479	SCREW,#4X1/2
33	3	39167	HARNESS, MDD

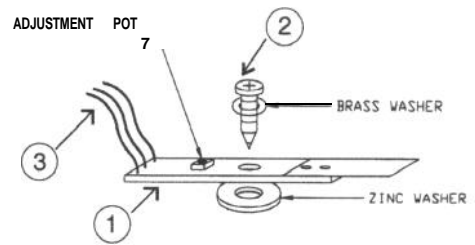


Figure 33

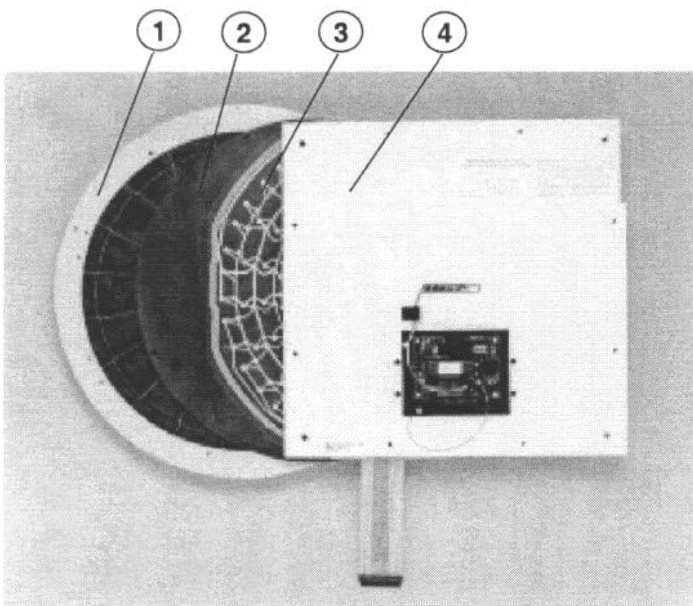


Figure 31

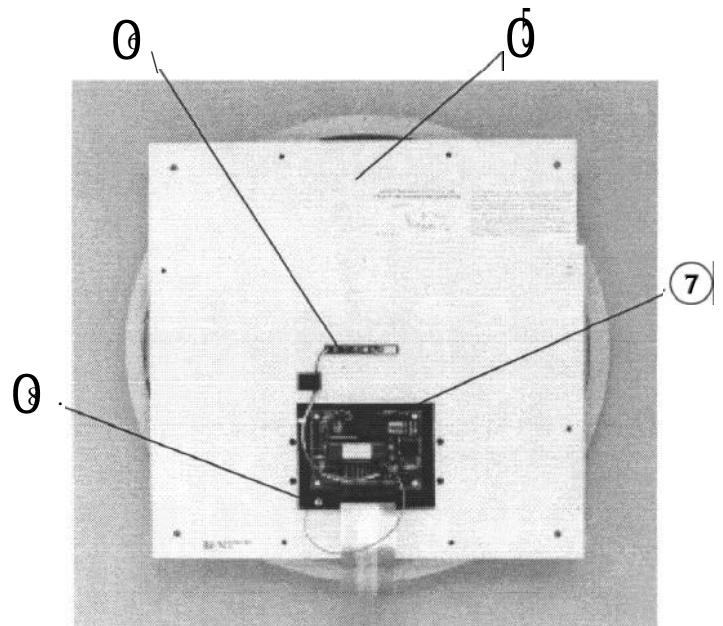


Figure 32

SECTION 7 • TROUBLESHOOTING GUIDE

WARNING!!! UNPLUG POWER TO GAME BEFORE WORKING ON MACHINE

PROBLEM	PROBABLE CAUSE	PROCEDURE
Nothing lit on game	A. Blown power supply fuse	A. Remove chassis cover. Replace fuse PS board (2 Amp, 5mm)
	B. No power at outlet	B. Check Main breaker in building
	C. Game not turned on	C. Turn on switch located on back of supply (behind game), as well as the side switch
Player change and/or game select switches not functioning	A. Defective U11 (6821)	A. Replace U1 1
	B. Broken connection from PC. board to switches	B. Check and repair wire harness
Coin switch(es) not functioning	A. If both are not working, may be a defective ground to coin switches	A. Repair ground. NOTE - system ground is floating (not connected to power return supply)
	B. If one switch isn't working, check U11 or U17 (6821 's)	B. Swap U11 with U17. If problem changes, one of the IC's are defective
	C. If just one switch isn't working, check U1 or U2	C. Swap U1 or U2 with U19. If problem changes, replace the defective ULN2003
	D. Intermittent operation of coin slot	D. Check trip switch wire on coin switch. Make sure it is centered and not rubbing against the metal edge of the slot. It is also possible that bending the wire up slightly will cause the switch to be closed a little longer
Target lamps won't light at all	A. Bulb burned out	A. Replace bulb(s) - standard 40 watt
	B. If coin lights are lit but monitor doesn't come up, the fuse on the side of the game is blown, or side switch is turned off	B. Make sure the side switch is turned on. If it is, check fuse mounted next to it, and replace with a 2Amp, 250V slow blow (if blown)"
	C. Potentiometer turned way down	C. Adjust potentiometer
	D. Defective MOC3040	D. Replace MOC3040 on dimmer board

SECTION 7 - TROUBLESHOOTING GUIDE

WARNING!!! UNPLUG POWER TO GAME BEFORE WORKING ON MACHINE

PROBLEM	PROBABLE CAUSE	PROCEDURE
Sound problems	A. Amplifier faulty (U4, LM383T) on Main Board	A. Check input (pin 1) with an oscilloscope to see if square waves are coming in during a sound (make sure volume is turned up). If no square wave is present, see "C" below. If square waves are present at pin 1 but not at pin 4, replace U 17
	B. Defective P.I.A. U17 (6821)	B. If no square wave is present on pin 19 of U17 (during the time sound is supposed to be present), replace U17
	C. Sound sticks on and game must be shut off to stop it	C. Replace capacitor C2 on the Main Board
No score	A. A piece of foreign material or broken tips in darthead holding a switch in the matrix closed (game won't score until switch in the matrix is open)	A. Try to remove the foreign material with a pliers or tweezers. If material can't be removed, clean darthead assembly by taking it apart, removing any broken pieces, cleaning it thoroughly, and reassembling. Be sure to line layers up properly before reinstalling
Select or Player Change lamps not functioning	A. Lamp burned out	A. Replace with GE658 (do not use a GE1 94 or GE1 61 lamp)
	B. Driver for lamp is defective	B. Replace U19 (ULN2003)
	C. P.I.A. (6821) is defective	C. Replace P.I.A. (U11)
	D. No +12V output on power	D. Replace power supply
Garbage on Top Gun list, Spider Writer screens, or popularity screens	A. Service person has touched Main Board or wiring going to Main Board while charged with static, or static has entered in some other way	A. Clear the screens with garbage according to Test/Setup Mode instructions. Service person should touch the front of the coin door to discharge static before touching electronics in the game
	B. Battery in DS1244 static RAM is defective	B. Batteries inside device are not replaceable. Replace static RAM (IC U12)
	C. Game not properly grounded	C. The 3 prong plug on game and wall outlet must be properly grounded

SECTION 7 • TROUBLESHOOTING GUIDE

WARNING!!! UNPLUG POWER TO GAME BEFORE WORKING ON MACHINE

PROBLEM	PROBABLE CAUSE	PROCEDURE
No video display	A. No 11 OVAC to monitor	A. Check on/off switch on the side of the game. Check the fuse next to the switch (2A, 250V slow blow). NOTE: The target lamps will also not work if this is blown. Check switch on front of monitor. Disassemble monitor, then check the fuse on front of monitor board and replace if needed (3/4A, 250V, SB)
	B. Transistor Q1 (or TMS9118) defective on Main PC. Board	B. With an oscilloscope, check the output of the TMS9118(U5) for approximately 1 to 1 1/2V P-P video signal. Then check for same at the center connector of the video jack. If not present at the jack, replace Q1 (2N4400). Q1 is used as a buffer for the TMS9118 for protection against accidental shorting. If signal is not present at TMS9118(U5) output, replace it instead of Q1
Garbage on display	A. Video Memory(s) defective	A. Replace U6 and/or U7, (TMS4464 or 71 C464)
	B. Video chip defective	B. Replace U5, TMS9118
	C. Static RAM chip defective	C. Replace U12, DS1244
Skipping darts or free dart sound going off randomly	A. Sensitivity on Missed Dart Detector is set too high	A. Adjust sensitivity of MDD slightly using small adjustment pot on the MDD board.
	B. Defective Missed Dart Detector	B. Replace Piezoelectric MDD
	C. 4.0 Mhz crystal on the Smart Target board is loose or broken	C. Check legs of crystal for breaks or weakness and make sure it is securely GLUED DOWN to the Smart Target board. Repair or replace as necessary.

NOTES



PLAY DARTS!

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

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