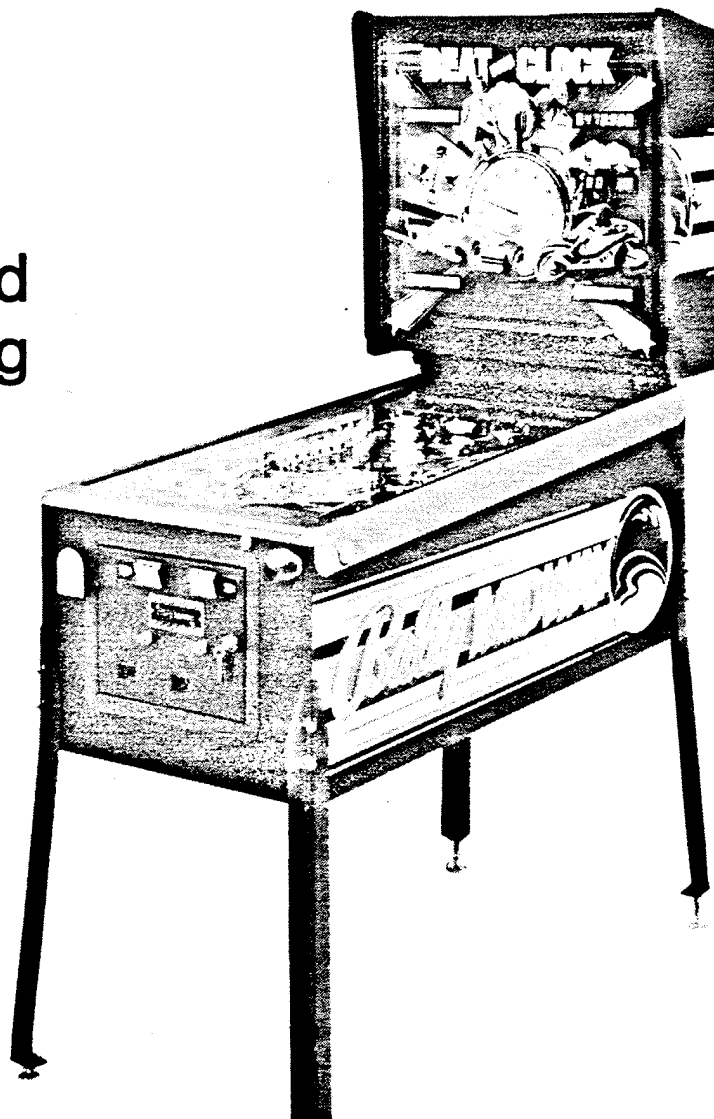


GAME No. 0C70  
Form No. 0C70-00300-000

# BEAT THE CLOCK

## Parts and Operating Manual



*Bally* **MIDWAY** MFG. CO.

10601 W. Belmont Ave. Franklin Park, Illinois 60131  
Telephone (312) 451-9200



FLIPPERSPILL.COM

**WARNING**

**THIS GAME MUST BE GROUNDED. FAILURE TO DO SO MAY RESULT IN DESTRUCTION TO ELECTRONIC COMPONENTS.**

**WARNING:** This equipment Generates, Uses and can Radiate Radio Frequency Energy and if not installed and used in accordance with the Instructions Manual, may cause interference to Radio Communications. As temporarily permitted by Regulation it has not been tested for compliance to Subpart J or Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference. Operation of this equipment in a Residential Area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

**ELECTRICAL BULLETIN:** FOR ALL APPARATUS COVERED BY THE CANADIAN STANDARDS ASSOCIATION (CSA) STANDARD C22.2 NO. 1, WHICH EMPLOYS A SUPPLY CORD TERMINATED WITH A POLARIZED 2-PRONG ATTACHMENT PLUG.

**CAUTION:** TO PREVENT ELECTRIC SHOCK DO NOT USE THIS (POLARIZED) PLUG WITH AN EXTENSION CORD, RECEPTACLE OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.

**ATTENTION:** POUR PREVENIR CHOCS ELECTRIQUES NE PAS UTILISER CETTE FICHE POLARISEE AVEC UN PROLONGATEUR. UNE PRISE DE COURANT OU UNE AUTRE SORTIE DE COURANT, SAUF SI LES LAMES PEUVENT ETRE INSEREES A FOND SANS EN LAISSER AUCUNE PARTIE A DECOUVERT.

**Bally/MIDWAY**  
T.M.

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**SECTION 1**  
**Installation and General**  
**Game Operation Instructions**



## I. INSTALLATION

### Assemble the game as follows:

Bolt legs to cabinet. Bolt back box to cabinet. Use flat washers under bolt heads. Gently feed cable connectors and ground braid through cable port in back box. Screw ground braid to braid in back box. Carefully and fully insert connectors on printed circuit assemblies.

On all games there are certain items that should be checked after shipment. These are visual inspections which may avoid time consuming service work later. Minor troubles caused by abusive handling in shipment are unavoidable. Cable connectors may be loosened, switches (especially tilt switches) may go out of adjustment. Plumb bob tilt switch should always be adjusted after game is set on location and leg levelers are adjusted.

Visual inspections before plugging in line cord:

1. Check that all cable connectors are completely seated on printed circuit assemblies.
2. Check that cables are clear of all moving parts.
3. Check for any wires that may have become disconnected.
4. Check switches for loose solder or other foreign material that may have come loose in shipment and could cause shorting of contacts.
5. Check wires on coils for proper soldering. Cold solder connections may not show up in factory inspection, but vibration in shipment may break contact.
6. Check that fuses are firmly seated and making good contact.
7. Check the transformer for any foreign material shorting across wiring lugs.
8. Check wiring of transformer to correspond to location voltage. See figure 1.

Check adjustment of the two (normally open) tilt switches:

1. Plumb bob tilt on left side of cabinet near front door.
2. Ball tilt above plumb bob tilt. Insert the smaller ball (15/16" dia.) into the ball tilt assembly, and adjust the bracket so the ball will roll free to contact the switch blade, if front of cabinet is raised.

## TRANSFORMER CONNECTION INSTRUCTIONS

**REFER TO BACK BOX WIRING DIAGRAM  
IN GAME MANUAL FOR TABLE "A"**

Figure 1.

115 VAC, 2-8, 3-6, 7-10
120 VAC, 2-8, 4-6, 7-11
220 VAC, 4-8, 7-9
240 VAC, 4-8, 7-11

**PART OF POWER TRANSFORMER MODULE  
LOCATED IN BACK BOX**

## II. GENERAL GAME OPERATION

Place ball into playfield by outhole.

Plug in line cord. Move power ON-OFF master switch at bottom right front corner of cabinet to "ON" position. The game will play a power-up tune to announce game-readiness. Drop targets are reset, scores are set to zero, alternating with the "High Score to Date", and the game is ready to play. Coin Game. The game should accept the coin and post credits\* for coins accepted (adjustable). Pressing the credit button on the cabinet will cause the outhole kicker to serve the ball to the shooter alley. A game-up tune\* is played to announce play-readiness.

One player is posted each additional time the credit button is pressed (one to four can play). The credits are reduced by one each time the credit button is pressed until the credits are reduced to zero.

Shooting the ball initiates play.

The game awards all points earned by the player. If spinner is turned and scoring when the ball hits a target, the spinner and the target scores are awarded.

When the ball enters the outhole, the player-up on the back box is advanced one position. The outhole kicker serves the ball to the shooter alley and play is resumed. This continues until each player's time units run out (adjustable). At this time 'Game Over' light is lit. A random Match\* number appears and the "Match" light is lit. If the number is the same as the last two digits in a player's score, a free game is awarded.

Scoring over 10,000,000 gives "High Score to Date" award.

At the end of the game, a "High Score to Date" is alternately flashed with all 4 player scores. If the "High Score to Date" is beat, this feature\* awards free games (adjustable, using REGISTER 15 as discussed on page 1-10).

Tilting the game results in loss of a ball and a time penalty of 15 units. The flippers, thumper bumpers, etc. go 'dead'. The purpose of the tilt penalty is to discourage the player from jostling the machine in an attempt to prolong play. Game action becomes normal after the ball kicker assembly serves the ball to the shooter alley.

Slamming the machine results in loss of the game. All feature lights go out, the game goes "dead", and a time delay occurs. The purpose of the time delay is to discourage unnecessary abuse of the machine. After the delay, the "Game Over" light lights and the power-up tune is played. The time delay occurs anytime one of the slam switches is

made to contact. There are two factory installed slam switches, one on the front door, and one on the left side of the cabinet. (Any number of slam switches could be installed by the operator, to meet his individual requirement.) The switch should be adjusted to have approximately 1/16" gap between the contacts. The weighted blade should be adjusted to attain the desired sensitivity. Decreasing the gap between contacts will make the switch more sensitive. Opening the gap will reduce sensitivity.

\* Some tunes and features can be disabled or adjusted by operator if so desired. See Standard Game Feature Options on pages 1-9 and 1-10.

**NOTE: Scoring and feature units will differ from game to game.**

### III. TAILORING & TESTING THE GAME

#### INTRODUCTION

One of the reasons for developing this new system is to provide more information to the operator. In the past, if a game was performing too liberally an operator could only guess what feature might be affecting his income. Through the process of trial and error a "good businessman" eventually found the problem and either changed score thresholds or flipped switches to get the game to perform in accordance with its location.

The new system introduces a subroutine that gives the operator more feedback on how the awards are being delivered. This subroutine allows the operator to change game features, awards and threshold settings. It also monitors specific specials awarded, game percentage and income.

All of this information is stored in memory locations or REGISTERS located in intergrated circuit U4. This memory remains intact with the game off through the use of a battery. Should erroneous information "sneak into" certain REGISTERS due to a weak battery, a flag is set telling the processor that the information stored is no longer valid. When this occurs, the processor resets these REGISTERS to factory settings, the next time the game is turned on. Also, the high score to date will flash all 5's on the 1st thru 4th player digital displays during the attract mode. In addition, the credit/coin code in REGISTER 17 goes to 01 (1 credit/1 coin for all coin chutes used).

To simplify entry to the REGISTERS and SELF-TEST functions BALLY/MIDWAY has provided a keypad that allows the operator to go directly to the function or register in question. This eliminates the tedious procedure of repeatedly pressing the Self-Test Button to look at a certain REGISTER. It also ends the aggravation of having to open the backbox just to flip switches on the MPU Board.

For example, to look at the TOTAL PLAY REGISTER in the old system, you had to press the test button 11 times! Of course this gave you time to chat with the local Repair Expert and learn how he and Ernie always "put chewin' gum on the legs to keep the game from slidin'." But occasionally, the conversation caused you to pass the REGISTER you were looking for, and you had to start over again.

With the new system, we simply hit the test button once and go to the specific REGISTER by using the keyboard.

If the REGISTER is used for Bookkeeping,(i.e. total coins chute #1) it is protected from change and may only be observed or reset to zero. No fabricated numbers may be introduced.

If the REGISTER is a game feature option (i.e. sound options) it can be changed directly from the keyboard.

#### OPERATION

The keyboard is located on the right inside wall of the game near the front door. The cable has been lengthened, so that once the keyboard is removed, it may be easily operated from outside the game.

The first step is to press the black Test Button located on the front door once. This tells the processor to do the following:

1. Check to make sure that no switches wired in parallel with the keypad are closed.
2. If any of these switches are closed the game automatically jumps to STUCK-SWITCH Test (94 is shown in the Match/Credit Display) and flashes the number of the conflicting switch in all four player displays. By referring to the STUCK-SWITCH I.D. Table on page 1-18, we can pin-point the culprit immediately. When the switch is opened up the stuck-switch test now checks all of the other switches to insure that they're open. A flashing 00 in all four player displays indicates the switches are now open. Pressing the black Test Button should cause the game to exit STUCK-SWITCH Test and go into LAMP Test. (90 in the Match/Credit display) Pressing (KEYBD/CLR) button takes the game out of Lamp Test, displays 00 in the Match/Credit Display and the game is now ready for KEYBOARD ENTRY.
3. If there were no stuck switches in parallel with the keyboard, the game enters Keypad Mode and displays 00 in the Match/Credit display. The game is now ready for KEYBOARD ENTRY.

**PLEASE NOTE:** Some of the buttons on the KEYBOARD are not used but have been provided for future expansion. They are the keys (D), (E), (F), and (\*).

#### KEYBOARD ENTRY

If you've reached this point with no problems you should find the rest of the procedure simple. Just press the number(s) of the REGISTER you want to see and press (ENTER). Use the REGISTER Table inside the game for a reference. As you press the number(s), they should appear in the Match/Credit Display. When you operate the (ENTER) button, the current information of the REGISTER will be shown in the Player #1 Display. If this REGISTER is not "protected" by the program, new information may be installed. Just press the numbers you want installed and they appear on the Player #2 Display. This allows you to compare the "old" information with the "new". Now press (ENTER) and both displays show the "new"

information. If you made a mistake, just punch in the correct number so it appears in Player #2 and press (ENTER) again. This inserts the corrected information into the REGISTER and both displays again show the new numbers.

**Example:** Let's say you want to change the maximum number of credits from 20 to 15. We look up this function in the REGISTER Table and find the feature is located in REGISTER 16. Just press buttons (1), (6), and (ENTER). The Match/Credit Display shows 16 and Player #1 should show a 20. Now press (1 and 5) (15 appears in the Player #2 Display) and (ENTER). The 15 is now also in Player #1 and therefore in the REGISTER.

Suppose you accidentally pressed (1 and 4) instead of (1 and 5) then (ENTER). The number 14 is now in the REGISTER. To correct this, simply press (1 and 5),(ENTER) and the REGISTER now shows a 15.

**NOTE:** If the number you entered is invalid, the game will make a funny noise and send you back to REGISTER 00. (the start)

### STEPPING THROUGH

Once you have looked at a REGISTER or changed it, you have three options:

**1. Press (ENTER)...** This causes the game to step to the next REGISTER. Example: If you're looking at the information in REGISTER 23 and press (ENTER), the Match/Credit display changes to 24 and the information contained in REGISTER 24 is displayed in the Player #1 position. This means we can single-step through the REGISTERS just pressing the (ENTER) key.

**2. Press (KEYBRD/CLR)...** This puts 00 back in the Match/Credit display allowing us to enter a number of a new REGISTER or FUNCTION we wish to see.

**3. Press (GAME)...** This causes the microprocessor to exit KEYBOARD ENTRY Mode and return to a gameover condition.

### TESTING

To gain entry to the standard tests we follow the same procedure we used to get to the REGISTERS. Just operate the black Test Button on the front door once. If you followed the instructions outlined under OPERATION, you're ready to proceed. If you haven't please READ THEM NOW. The KEYBOARD treats these Test Functions in the same manner.

(9), (0), (ENTER)....Turns on the LAMP Test  
Or

(9), (1), (ENTER)....Turns on the DISPLAY Test  
Or

(9), (2), (ENTER)....Turns on the SOLENOID Test  
Or

(9), (3), (ENTER)....Turns on the SOUND Test

To EXIT any of these tests do one of the following:

**Press (KEYBRD/CLR)** - Same result as step 2) above....or

**Press (ENTER)** - This steps the game to the next test....or

**Press (GAME)** - Same results as step 3) above....

The STUCK-SWITCH Test is function 94 and since the KEYBOARD is in parallel to the game switches this test may only be EXITED by operating the RED Test button on the front door.

One Quick Tip: If you don't remember how to EXIT a Test, just turn the game off and then on again. We humans can't be expected to remember everything.

### DESCRIPTION OF TESTS

**LAMPS-** (Function 90) This causes all of the switched illumination lites to flash on and off repeatedly until the test is EXITED.

**DISPLAYS-** (Function 91) When the game is placed in this test, each display will cycle from 0 thru 9 in all of its digits. While this isn't as fascinating as gazing into an open fireplace it can usually help you localize a problem to a specific display or component.

**SOLENOIDS** - (Function 92) All of the game solenoids energize in sequence as defined by the SOLENOID IDENTIFICATION TABLE on page 1-18. **PLEASE NOTE:** The flipper buttons must be held closed to allow the flippers to pull-in during this test, YOUR COOPERATION IS APPRECIATED.

**SOUND** - (Function 93) This test allows the Controller Board to talk to the Sound Board. The Sound Board doesn't talk back to the Controller Board, but it should to you. About once a second it will generate a noise (from the Programmer's top 40 favorites) almost guaranteed to drive your location crazy. So please keep the volume low if you intend to stay in this test any length of time.

**STUCK-SWITCH** - (Function 94) With this test we can pinpoint a troublesome switch quickly by looking at the Displays. If 00 is flashing in the 4 Player Displays - to the computer that means there are no stuck-switches. When a number other than 00 is flashing in these displays, just refer to the STUCK-SWITCH IDENTIFICATION TABLE on page 1-18. This table, along with its associated playfield drawing should allow you to find the switch immediately.

In addition to locating stuck-switches this test is very useful in confirming the validity of a switch. Sometimes when a serviceman is repairing a connector or soldering a bunch of wires he is pressed for time. Using this test and the Table in the book is the easiest and most accurate way of proving he's connected the wires for the '10 Point Rebound' rather than a parallel circuit to the Coin Switch.



## IV. KEYBOARD GAME ADJUSTMENTS

### TEST FUNCTIONS

FUNCTION#	TEST
90	LAMP TEST
91	DISPLAY TEST
92	SOLENOIDS TEST
93	SOUND TEST
94	STUCK SW. TEST

### REGISTER TABLE - STANDARD GAME FEATURE OPTIONS

REG. #	DESCRIPTION	VALID ENTRY
1	TOTAL PLAYS	
2	TOTAL REPLAYS	
3	COIN CHUTES #1	
4	COIN CHUTES #2	
5	COIN CHUTES #3	
6	# TIME HI SCORE BEAT	
7	GAME PERCENTAGE	
8	GAME TIME (MINUTES)	
9	SERVICE METER	
10	CREDITS	0 THRU 5
11	SPCLS AWARDED FROM PANEL	
12	THRESHOLD #1	0 thru 9999999
13	THRESHOLD #2	0 thru 9999999
14	THRESHOLD #3	0 thru 9999999
15	HI SCORE	0 thru 9999999
16	MAX CREDITS ALLOWED	1 THRU 40
17	COINS OPTION	0 THRU 99
18	COINS OPTION CHUTE #1	1 THRU 50
19	COINS OPTION CHUTE #2	1 THRU 50
20	COINS OPTION CHUTE #3	1 THRU 50
21	COINS FACTOR	1 THRU 50
22	BONUS CREDITS	0 THRU 50
23	(NOT USED)	1 THRU 5
24	SCORING THRESHOLD MODE	0 THRU 3
25	SPECIAL MODE	0 THRU 3
26	HIScore AWARD	0 THRU 3
27	SOUNDS MODE	0 THRU 3
28	GERMAN PRIZE METER	0 THRU 9999999
29	MATCH OPTION	1 = YES
30	DISPLAY CREDIT	1 = YES
31	FREE GAMES/GAMES ALLOWED	1 = UNLIMITED
32	FREE PLAY	65=FREE PLAY/ANY OTHER #=-COIN OPERATED
33	# OF SPCLS AWARDED FROM THRES. #1	
34	# OF SPCLS AWARDED FROM THRES. #2	
35	# OF SPCLS AWARDED FROM THRES. #3	

### REGISTER TABLE - UNIQUE FEATURE OPTIONS

REG. #	DESCRIPTION	VALID ENTRY
36	# OF SPCLS AWARDED FROM TOP SAUCER	
37	# OF SPCLS AWARDED FROM DROP TARGETS	
38	# OF SPCLS AWARDED FROM ROLLOVER	
39	# OF SPCLS AWARDED FROM LEFT OUTLANE	
40	# OF SPCLS AWARDED FROM RIGHT OUTLANE	
41	# OF TIME INTERVALS AWARDED	
42	(NOT USED)	
43	DT SPCL WITH (Steps by 50K)	3 = 100K
44	DT VALUES STEP WITH	1 = DTS MADE
45	MID SAUCER SPCL WITH (Steps by 10K)	7=30K
46	RECALL LEFT SAUCER BONUS	1=YES
47	ALTERNATE START ROLLOVERS	1=YES
48	CLOCK SPEED	7=SLOWEST
49	INITIAL GAME TIME UNITS (Steps by 15 Time Units)	7=3:00 (Time Units)
50	RECALL MID SAUCER VALUES	1=YES
51	ROTATE S-T-O-P LITES	1=YES
52	OUTLANE SPECIAL ON	1=WITH TRIPLE
53	ROLLOVER SPECIAL ON	1=WITH 40K
54	LEFT SAUCER AWARDS TIME UNITS	1=EVERY TIME
55	RETURN LANES ADD	1=10 UNITS
56	CLOCK STARTS AUTOMATIC	1=NO
57	POWER LINE FREQUENCY	1=60HZ (Domestic)
58	GAME OVER ATTRACT SPEECH	1=YES
59	NEW BALL ANIMATION	1=YES
60	# OF TILT WARNINGS	3=3
61	SLING SHOTS ACTIVE	1=YES
62	OPTIONS TO FACTORY SETTING	1=YES

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## A. CREDITS PER COIN ADJUSTMENT

Register tables 17, 18, 19, 20 and 21 have been reserved for setting coin/credit options. Please read the following instructions carefully so that you may take full advantage of these registers.

### REGISTER NO. 17 - CREDITS PER COIN MENU

This register contains a menu of up to 79 preset credit/coin option settings. Each option setting is numbered. Below you will find a sample portion of the main menu.

Say, for example, you want your game to give 1 credit when 2 coins are dropped through any coin chute. First you would look at the menu to see if this setting is included. Once you find it, refer to the left column for the OPTION INDEX. The example menu below includes the setting you're looking for...1 credit for 2 coins. The number listed in the left column is the OPTION INDEX, which in this case is 36. Using the keypad, go to register no. 17 and enter the number 36 into it.

Say for example, you want your game to give 1 credit when 2 coins are dropped through any coin chute. However, this time you want to give the player a bonus credit when he pays for two. In other words, when the player inserts four coins to pay for two credits, he will receive a bonus credit for a total of three credits. First you would look at the menu to see if this setting is included. Once you find it, refer to the left column for the OPTION INDEX. The example menu below includes the setting you're looking for...1 credit for 2 coins, 3 credits for 4 coins. The number listed in the left column is the OPTION INDEX, which in this case is 37. Using the keypad, go to register #17 and enter the number 37. **When register #17 is set to any value other than zero (0), the values in registers #18, #19, #20, and #21 will be ignored.**

\*See CUSTOM CREDITS PER COIN OPTIONS for the use of the registers.

OPTION INDEX	CREDITS/COINS CHUTE #1	CREDITS/COINS CHUTE #2	CREDITS/COINS CHUTE #3	BONUS CREDIT AT
35	14 / 1 coin	14 / 1 coin	14 / 1 coin	
36	1 / 2 coins	1 / 2 coins	1 / 2 coins	
37	1 / 2 coins	1 / 2 coins	1 / 2 coins	2 credits

### CREDITS PER COINS MENU - REGISTER #17

OPTION INDEX	CREDITS/COINS CHUTE #1	CREDITS/COINS CHUTE #2	CREDITS/COINS CHUTE #3	BONUS CREDIT AT
1	1 / 1 coin	1 / 1 coin	1 / 1 coin	
2	1 / 1 coin	1 / 1 coin	1 / 1 coin	2 credits
3	1 / 1 coin	1 / 1 coin	1 / 1 coin	3 credits
4	1 / 1 coin	1 / 1 coin	1 / 1 coin	4 credits
5	1 / 1 coin	1 / 1 coin	1 / 1 coin	5 credits
6	1 / 1 coin	2 / 1 coin	2 / 1 coin	
7	1 / 1 coin	3 / 1 coin	3 / 1 coin	
8	1 / 1 coin	4 / 1 coin	4 / 1 coin	
9	1 / 1 coin	5 / 1 coin	5 / 1 coin	
10	1 / 1 coin	1 / 2 coins	1 / 2 coins	
11	1 / 1 coin	1 / 3 coins	1 / 3 coins	
12	1 / 1 coin	1 / 4 coins	1 / 4 coins	
13	1 / 1 coin	1 / 5 coins	1 / 5 coins	
14	2 / 1 coin	2 / 1 coin	2 / 1 coin	
15	2 / 1 coin	2 / 1 coin	2 / 1 coin	4 credits
16	2 / 1 coin	2 / 1 coin	2 / 1 coin	6 credits
17	2 / 1 coin	2 / 1 coin	2 / 1 coin	8 credits
18	2 / 1 coin	2 / 1 coin	2 / 1 coin	10 credits
19	2 / 1 coin	1 / 1 coin	1 / 1 coin	
20	2 / 1 coin	3 / 1 coin	3 / 1 coin	
21	2 / 1 coin	4 / 1 coin	4 / 1 coin	
22	2 / 1 coin	5 / 1 coin	5 / 1 coin	
23	2 / 1 coin	1 / 2 coins	1 / 2 coins	
24	2 / 1 coin	1 / 3 coins	1 / 3 coins	

**CREDITS PER COINS MENU - REGISTER #17 (cont'd)**

<b>OPTION INDEX</b>	<b>CREDITS/COINS CHUTE #1</b>	<b>CREDITS/COINS CHUTE #2</b>	<b>CREDITS/COINS CHUTE #3</b>	<b>BONUS CREDIT AT</b>
25	2 / 1 coin	1 / 4 coins	1 / 4 coins	
26	2 / 1 coin	1 / 5 coins	1 / 5 coins	
27	3 / 1 coin	3 / 1 coin	3 / 1 coin	
28	4 / 1 coin	4 / 1 coin	4 / 1 coin	
29	5 / 1 coin	5 / 1 coin	5 / 1 coin	
30	6 / 1 coin	6 / 1 coin	6 / 1 coin	
31	7 / 1 coin	7 / 1 coin	7 / 1 coin	
32	8 / 1 coin	8 / 1 coin	8 / 1 coin	
33	9 / 1 coin	9 / 1 coin	9 / 1 coin	
34	12 / 1 coin	12 / 1 coin	12 / 1 coin	
35	14 / 1 coin	14 / 1 coin	14 / 1 coin	
36	1 / 2 coins	1 / 2 coins	1 / 2 coins	2 credits
37	1 / 2 coins	1 / 2 coins	1 / 2 coins	3 credits
38	1 / 2 coins	1 / 2 coins	1 / 2 coins	4 credits
39	1 / 2 coins	1 / 2 coins	1 / 2 coins	5 credits
40	1 / 2 coins	1 / 2 coins	1 / 2 coins	
41	1 / 2 coins	1 / 1 coin	1 / 1 coin	
42	1 / 2 coins	2 / 1 coin	2 / 1 coin	
43	1 / 2 coins	3 / 1 coin	3 / 1 coin	
44	1 / 2 coins	4 / 1 coin	4 / 1 coin	
45	1 / 2 coins	5 / 1 coin	5 / 1 coin	
46	1 / 2 coins	1 / 3 coins	1 / 3 coins	
47	1 / 2 coins	1 / 4 coins	1 / 4 coins	
48	1 / 2 coins	1 / 5 coins	1 / 5 coins	
49	3 / 2 coins	3 / 2 coins	3 / 2 coins	6 credits
50	3 / 2 coins	3 / 2 coins	3 / 2 coins	9 credits
51	3 / 2 coins	3 / 2 coins	3 / 2 coins	12 credits
52	3 / 1 coin	3 / 1 coin	3 / 1 coin	6 credits
53	4 / 1 coin	4 / 1 coin	4 / 1 coin	8 credits
54	5 / 1 coin	5 / 1 coin	5 / 1 coin	10 credits
55	1 / 3 coins	1 / 3 coins	1 / 3 coins	2 credits
56	1 / 3 coins	1 / 3 coins	1 / 3 coins	3 credits
57	1 / 3 coins	1 / 3 coins	1 / 3 coins	4 credits
58	1 / 3 coins	1 / 3 coins	1 / 3 coins	5 credits
59	1 / 3 coins	1 / 3 coins	1 / 3 coins	
60	2 / 3 coins	2 / 3 coins	2 / 3 coins	
61	2 / 3 coins	2 / 3 coins	2 / 3 coins	4 credits
62	2 / 3 coins	2 / 3 coins	2 / 3 coins	6 credits
63	2 / 3 coins	2 / 3 coins	2 / 3 coins	8 credits
64	2 / 3 coins	2 / 3 coins	2 / 3 coins	10 credits
65	5 / 3 coins	5 / 3 coins	5 / 3 coins	
66	1 / 4 coins	1 / 4 coins	1 / 4 coins	
67	3 / 4 coins	3 / 4 coins	3 / 4 coins	
68	1 / 5 coins	1 / 5 coins	1 / 5 coins	
69	2 / 5 coins	2 / 5 coins	2 / 5 coins	
70	3 / 5 coins	3 / 5 coins	3 / 5 coins	
71	4 / 5 coins	4 / 5 coins	4 / 5 coins	
72	1 / 1 coin	0 / 1 coin	6 / 1 coin	
73	0 / 1 coin	6 / 1 coin	3 / 1 coin	
74	1 / 2 coin	3 / 1 coin	7 / 1 coin	
75	1 / 1 coin	2 / 1 coin	5 / 1 coin	
76	1 / 1 coin	3 / 1 coin	10 / 1 coin	
77	4 / 1 coin	0 / 1 coin	1 / 1 coin	
78	0 / 1 coin	1 / 2 coins	1 / 1 coin	
79	2 / 1 coin	4 / 1 coin	12 / 1 coin	

**REGISTERS #18, #19, #20, and #21 -CUSTOM CREDITS PER COIN OPTIONS**

These registers are used only when the desired credit/coin setting does not appear on the **CREDITS PER COIN MENU** (see register #17). Register #17 **MUST** be set for zero (0) in order to use these four registers. This procedure allows you to set any credit/coin combination manually. Please read the following instructions carefully. Registers #18, #19 and #20 represent the three coin chute options. Each coin chute option may be set to give a different number of credits per coin, or they may be set the same. Register #21 represents the coin factor. All four of these registers work together to deliver virtually any combination desired.

The coin chute options represent the credits awarded at each coin chute and the coin factor represents the coins. Although each coin chute option may be set differently, they must have a common denominator...the coin factor, register #21. To arrive at the common denominator, (the coin factor), you must first decide what you want each coin chute option to be. Let's say, for example, you want coin chute #1 to give 1 credit for 1 coin, coin chute #2 to give 2 credits for 1 coin and coin chute #3 to give 1 credit for 2 coins.

This is how it would look:

**COIN OPTIONS / COIN FACTOR**

COIN CHUTE OPTION #1	1 credit / 1 coin
COIN CHUTE OPTION #2	2 credit / 1 coin
COIN CHUTE OPTION #3	1 credit / 2 coin

The COIN FACTOR must be equal from one Coin Chute to another and above it is not. Therefore you must find a common denominator. In most cases, this will be the largest number. In the illustration above, the largest number under COIN FACTOR is 2 at Coin Chute #3. In order to change the COIN FACTOR in the other two coin chutes to equal 2, we must also change the COIN OPTIONS in those chutes. Since we must double the COIN FACTOR in chute #1 and #2 to equal 2, we must also double the COIN OPTIONS in those coin chutes. Whatever we do to the COIN FACTOR to make it equal to the largest number, we must also do to the COIN OPTION. For example:

<b>COIN OPTIONS / COIN FACTOR</b>	
COIN CHUTE OPTION #1	1 credit / 1 coin
<b>would become</b>	
COIN CHUTE OPTION #1	2 credit / 2 coin
<b>and</b>	
COIN CHUTE OPTION #2	2 credit / 1 coin
<b>would become</b>	
COIN CHUTE OPTION #2	4 credit / 2 coin

The finished layout would then look like this:

<b>COIN OPTIONS/COIN FACTOR</b>
Register #18 = COIN CHUTE OPTION #1 = 2 credit/ 2 coin
Register #19 = COIN CHUTE OPTION #2 = 4 credit/ 2 coin
Register #20 = COIN CHUTE OPTION #3 = 1 credit/ 2 coin
Register #21 = COMMON COIN FACTOR = 2

As you see, we now have **one** COIN FACTOR that is common to all three coin chutes...2. We now have what we need to enter the correct values into registers #18, #19, #20, and #21.

REGISTER #18 = 2
REGISTER #19 = 4
REGISTER #20 = 1
REGISTER #21 = 2

## REGISTER NO. 22 - BONUS CREDITS

This register is used in conjunction with the Custom Coin Option Register #18, #19, #20, and #21. The number entered in register #22 determines when a bonus credit will be delivered while purchasing credits.

For example, entering a '4' into register #22 will give the player an extra credit for every 4 credits purchased prior to starting the game. This allows the operator the ability to provide an incentive to the player when the Custom Coin Option Registers are used.

**PLEASE NOTE:** When register #17 is set to any number other than '0' registers #18 through #22 will be ignored.

## INCOME BOOKKEEPING REGISTERS

Specific registers have been assigned to keep track of coins dropped into the game.

REGISTER #	DISPLAYS
3	Coin Chute #1 (Left)
4	Coin Chute #2 (Center)
5	Coin Chute #3 (Right)

These registers may not be altered, but can be RESET by entering '0'.

One additional meter is provided to record the total number of Service Credits entered. This information is stored in register #9. The Service Credits feature is provided to allow the operator to test the game under normal conditions without altering the Coin Chute or setting the game on free play.

To enter Service Credits simply go to register #10 - Current Credits - and enter a number from 1 through 5. **NOTE:** This feature will not allow any credits to be entered if the Current Credits register is displaying 5 or greater. Then press the game button on the keyboard and you're ready to start playing by operating the Credit Button.

## B. STANDARD GAME FEATURE OPTIONS

### MAXIMUM CREDITS; REGISTER 16

The maximum credits accepted by the machine limits the number of games that can be accumulated by coining, by winning replays, or both. The maximum number of credits is selectable by means of setting REGISTER 16. Any number entered between '1' and '40' will set the corresponding credit limit.

### MATCH FEATURE; REGISTER 29

When the Match Feature is ON, a random number appears on the Match/Credit window and the word Match is illuminated. If the number matches the tens digit in a player's score, a free game is awarded. The Match Feature creates an incentive to play.

MATCH	REGISTER 29
ON	1
OFF	0

### CREDIT DISPLAY; REGISTER 30

CREDITS DISPLAYED	REGISTER 30
YES	1
NO	0

### HIGH SCORE FEATURE; REGISTER 24

The game is designed to award Extra Time Units or a Free game at each of the two or three score levels.

AWARD	REGISTER 24
REPLAY	ENTER '3'
EXTRA TIME UNITS	ENTER '2'
NOVELTY (POINTS)	ENTER '1'
NO AWARD	ENTER '0'

### PLAYFIELD SPECIALS FEATURE; REGISTER 25

This feature allows the operator the flexibility to award a REPLAY, EXTRA TIME UNITS, or SCORE (NOVELTY) when a special is scored.

AWARD	REGISTER 25
REPLAY	ENTER '3'
EXTRA TIME UNITS	ENTER '2'
NOVELTY (POINTS)	ENTER '1'
NO AWARD	ENTER '0'

### **HIGH SCORE TO DATE OR OVER 10,000,000 SCORE FEATURE; REGISTER 26**

The game is designed to award free games as an option if high score to date is beat or player exceeds 10,000,000 points. Each time this happens, the high score will reset to 1,999,990 as new high score to beat. This score is displayed on all 4 player score displays at the end of each game as an incentive to play.

<b>HIGH SCORE TO DATE FEATURE</b>	<b>REGISTER 26</b>
NO AWARD	ENTER '0'
ONE CREDIT	ENTER '1'
TWO CREDITS	ENTER '2'
THREE CREDITS	ENTER '3'

State and local laws may regulate the use of the above features, and they have been designed to allow for appropriate adjustment in order to conform to such requirements.

### **SOUND OPTIONS; REGISTER 27**

#### **SOUND MODE**

The game is designed to make several tones and noises to announce power-up, game-up, etc. The tones are intended to attract to the game and increase game usage.

Four options may be selected by REGISTER 28.

#### **Enter '0'**

Most switches associated chimes without feature background.

#### **Enter '1'**

Playfield switches associated chimes with background.

#### **Enter '2'**

Most scoring will have a noise effect without background.

#### **Enter '3'**

Most all scoring will have a noise effect with background.

### **NUMBER OF GAMES REPLAYS PER GAME ADJUSTMENT; REGISTER 31**

LIBERAL - ENTER '1' All replays earned will be collected.

CONSERVATIVE - ENTER '0' Only 1 replay per player per game.

### **FREE PLAY; REGISTER 42**

This feature is designed to enable the operator to set the game on FREE PLAY. Entering 65 sets the game into FREE PLAY mode. Entering any number other than 65 sets the game into the coin operated mode.

### **HIGH SCORE FEATURE ADJUSTMENTS; REGISTERS 12, 13 & 14**

The game is designed to award an extra ball (option) or a free game at each of three score levels. The recommended levels are on the score card in the game.

Any level from 0 to 9,999,999 can be set, as desired. It is also possible to reset or turn off any or all of the levels by entering '00' in the respective REGISTER.

<b>HIGH SCORE TO DATE FEATURE</b>	<b>REGISTER 26</b>
NO AWARD	ENTER '0'
ONE CREDIT	ENTER '1'
TWO CREDITS	ENTER '2'
THREE CREDITS	ENTER '3'

### **HIGH SCORE TO DATE AND 10,000,000 FEATURE; REGISTER 15**

The game is designed to award free games when 'High Score to Date' is beat or if the player exceeds 10,000,000 points.

It is recommended that the level, which will build with play, be periodically reset to the factory recommended level to encourage game play. The adjustment procedure is the same as for the High Score Feature Adjustment.

**NOTE: THE HI-SCORE REGISTERS WILL REVERT BACK TO FACTORY SETTINGS IF THE CONTROL BOARD BATTERY FAILS. ALSO, THE HI-SCORE-TO-DATE WILL FLASH ALL 5's IN ALL DISPLAYS DURING THE ATTRACT MODE.**

## C. BEAT THE CLOCK FEATURE OPERATION & SCORING

This game is based upon **playing time, not on balls** per game. (See section "6".)

### 1. TOP SAUCER FEATURE

Everytime the ball lands in the Top Saucer, the lit Saucer Value will be awarded. The Saucer Value is advanced by the Top Right Roll-over Button when the Right Lane Single Drop Target is down.

REGISTER 50 controls the Top Saucer Values:

VALUES	ENTER
In Memory	1
Reset	0

REGISTER 45 controls the Top Saucer Special:

SPECIAL AT	ENTER
30	7
40	6
50	5
60	4
70	3
80	2
90	1
100	0

REGISTER 36 indicates the total number of Specials awarded from the Top Saucer.

Reset by entering "0".

The Top Saucer also adds 10 time units when the "Adds Time Units" arrow light is flashing. The arrow light flashes **ON** when the Right Lane Single Drop Target is down. The arrow light is **OFF** when the target is up/or 10 Time Units are collected in the Top Saucer. (See section "3".)

### 2. TOP A-B-C-D ROLL-OVER LANE FEATURE

Each lane scores 5000 points and advances the Playfield Bonus. The Right Flipper Button changes the Top A-B-C-D Lane Lights.

\*REGISTER 52 controls the Outlane Specials:

Special (Left then Right)	Enter "0"
Making A-B-C-D	Lites
1st time	"Playfield Scores Double"
2nd time	"Playfield Scores Triple"
* 3rd time	One Outlane Special Arrow
* 4th time	Both Outlane Specials

Special (Left then Right) Enter "1"

Making A-B-C-D	Lites
1st time	"Playfield Scores Double"
2nd time	Triple & One Outlane Special Arrow
* 3rd time	Both Outlane Specials

REGISTER 39 indicates the total number of Specials awarded from the Left Outlane. Reset by entering "0".

REGISTER 40 indicates the total number of Specials awarded from the Right Outlane. Reset by entering "0".

### 3. RIGHT LANE SINGLE DROP TARGET AND ROLL-OVER BUTTON FEATURE:

When the ball knocks down the Drop Target, 5000 points are awarded and the Top Saucer's "Adds 10 Time Units" arrow light flashes. The Drop Target resets when the Roll-over Button switch and any Top A-B-C-D Lane or Top Saucer switch is made. The Roll-over Button scores and advances flashing Right Lane Multiplier lights and their Values. The Button also advances the Top Saucer Value. The Bonus Multiplier Values reset from ball-to ball.

REGISTER 53 controls the Roll-over Button Special:

SPECIAL ON	ENTER
with 40,000	1
after 40,000	0

REGISTER 38 indicates total number of Specials awarded from Roll-over Button feature.

Reset by entering "0".

### 4. LEFT SAUCER FEATURE:

The Saucer scores 1000 points or the Playfield Bonus times the lit Bonus Multipliers. The Saucer also adds 5 Time Units if the "Add 5 Time Units" light is **ON**.

REGISTER 46 controls the Left Saucer collect Bonus:

PLAYFIELD BONUS COLLECTED	ENTER
and recalled	1
and reset	0

REGISTER 54 controls the "Add 5 Time Units" light:

ADD 5 TIME UNITS LIGHT	ENTER
Always ON	1
Alternates ON/OFF Each time collected	0

## 5. SIDE DROP TARGET AND T-I-M-E-R FEATURE:

Knocking down each Side Drop Target or each T-I-M-E-R Target scores 3000 points. Knocking down the Drop Targets also advances the Playfield Bonus. Knocking all Drop Targets down scores the lit Value and flashes the T-I-M-E-R Target lights. Making all T-I-M-E-R Targets adds 25 Time Units on the clock and resets the Side Drop Targets.

REGISTER 43 controls the Side Drop Target Special:

SIDE DROP TARGET SPECIAL ON WITH ENTER	
100K	3
150K	2
200K	1
250K	0

REGISTER 44 controls the Drop Target Value:

SIDE DROP TARGET VALUES	
ADVANCE WITH	ENTER
Drop Targets made	1
T-I-M-E-R made	0

REGISTER 37 indicates the number of Specials awarded from the Side Drop Target feature.

Reset by entering "0".

## 6. CLOCK FEATURE

Each player plays his ball in the proper playing sequence (i.e. 1st player, 2nd player, etc.) until his Time Units run out. Players may play as many balls as they can until their Time Units run out. When there is no time left on the clock and the ball enters the outhole, that player's game is over ("0 00" on readouts). When that happens, the remaining players continue to play their balls in the proper playing sequence.

Time remaining for each player is shown in two ways:

1. For the player-up: The Playfield clock lights and the readout flashes the score only when **a)** the clock is running (faster flash) or **b)** on a new ball (normal flash).
2. For the remaining players: each readout will alternate between player's score and the time remaining. (The time remaining light will alternate **ON** also.)

A running clock can be stopped by hitting the flashing "S-T-O-P" Targets. (See REGISTER 51 below.)

A stopped clock can be started by hitting a flashing "Start Clock" Roll-over Button. (See REGISTER 47 and 56 below.)

Making both return lanes adds Time Units. (See REGISTER 55 below.)

REGISTER 47 controls the "Start Clock" Roll-over Buttons:

START CLOCK ROLL-OVER BUTTONS ENTER	
alternate	1
both FLASHING	0

REGISTER 48 controls the clock speed.

CLOCK SPEED COUNTDOWN ENTER	
slowest	7
slower	6
slow	5
medium slow	4
medium fast	3
fast	2
faster	1
fastest	0

REGISTER 49 controls the Start-of-Game Time Units:

TIME UNITS START ENTER	
3:00	7
2:45	6
2:30	5
2:15	4
2:00	3
1:45	2
1:30	1
1:15	0

REGISTER 51 controls the "S-T-O-P" Target lights:

S-T-O-P TARGET LIGHTS ENTER	
Change on Right Flipper Button	1
Do Not Change	0

REGISTER 55 controls the Return Lanes:

MAKING BOTH RETURN LANES ADDS ENTER	
10 Time Units	1
5 Time Units	0

REGISTER 56 controls when the clock starts:

CLOCK STARTS ENTER	
When any scoring occurs	1
As above, also automatically if the ball remains in the shooter alley for an inappropriately long time (15 sec.).	0

## 7. MISCELLANEOUS:

Each Thumper Bumper scores 1000 points.  
Each Sling Shots score 30 points.

**NOTE:** There is no Outhole Bonus on this game. Appropriate Bonuses are collected in each Saucer.



REGISTER 58 controls the Game Over Attract Speech:

<b>GAME OVER ATTRACT SPEECH</b>	<b>ENTER</b>
ON	1
OFF	0

This game has been designed to attract attention in the 'Game Over' mode by saying "Beat the Clock!" approximately every 2½ minutes.

REGISTER 59 controls the clock animation between balls:

<b>ANIMATION</b>	<b>ENTER</b>
ON	1
OFF	0

REGISTER 60 controls the Tilt Warnings (per ball):

3 = 3 Tilt Warnings  
 2 = 2 Tilt Warnings  
 1 = 1 Tilt Warning  
 0 = None (immediate tilt)

REGISTER 61 controls the Sling Shots:

1 = Sling Shots active  
 0 = Sling Shots not active

REGISTER 62 controls the Default Values:

<b>SETS ALL VALES TO</b>	<b>ENTER</b>
Factory (or recommended) settings	1
No effect	0

## D. BOOKKEEPING METERS

The program in this game has been structured to provide the operator with what we believe to be a simple and efficient method of determining **how** game specials are being awarded. The following

REGISTERS display specific 'Special Award' areas so the operator can readily see how liberal or conservative a particular feature or group of features is performing:

STANDARD REGISTERS	
REGISTER #	DISPLAYS
1	Total Plays
2	Total Replays
6	Total Number of Times the Hi-Score is beaten
7	Game Percentage
8	Total Game Time (Minutes)
11	Total Specials Awarded from Playfield Only
33	Total Specials Awarded from Threshold #1
34	Total Specials Awarded from Threshold #2
35	Total Specials Awarded from Threshold #3

SPECIAL REGISTERS	
REGISTER#	DISPLAYS
36	Total Specials Awarded from the Top Saucer
37	Total Specials Awarded from the Drop Targets
38	Total Specials Awarded from Roll-Over Lanes Feature
39	Total Specials Awarded from Left Out Lane Feature
40	Total Specials Awarded from Right Out Lane Feature
41	Total Number of Extra Time Intervals Awarded

After reviewing the above **REGISTERS**, you may wish to tailor a feature or two for your location. Simply review the game's **FEATURE, OPERATION AND SCORING** section of this manual.

**NOTE:** All the above registers can not be altered - they may only be reset by entering '0'.

## V. PLAYFIELD PANEL POST ADJUSTMENTS:

Posts that control left and right outlane opening on panel can be removed to make access to outlanes easier or harder for ball to enter. See Figure II.

Easier entry will decrease playing time and scoring (conservative).

Harder entry will increase playing time and scoring (liberal).

## VI. RECOMMENDED LIBERAL & CONSERVATIVE REGISTER SETTINGS

REGISTER	FUNCTION	LIBERAL	CONSERVATIVE
43	Drop Target Special	2 (at 150K)	1 (at 200K)
44	Drop Target Values Step Up	1	1
45	Saucer Special	6 (at 40K)	5 (at 50K)
46	Recall Bonus	1	1
47	Alternate Start Roll-over Buttons	1	1
48	Clock Speed	5 (slow)	2 (fast)
49	Clock Initial Time	4 (2:15)	5 (2:30)
50	Recall Saucer Values	1	1
51	Rotate S-T-O-P	1	1
52	Outline Special	1	1
53	Roll-over Button Special	1	1
54	Alternate 5 Time Units (Saucer)	1	0
55	Return Lanes	1	0
56	Clock Starts	0	0
57	Power Frequency	1	1
58	Attract Speech	1	1
59	Animation	1	1
60	Tilt Warnings	1	1
61	Sling Shots	1	1
62	Default	0	0

### REPLAYS

Instruction Card  
Score Cards  
Playfield Specials

### LIBERAL

M051-00C70-A030  
M051-00C70-A039  
Register 25, enter "3"

### CONSERVATIVE

M051-00C70-A030  
M051-00C70-A038  
Register 25, enter "3"

Match  
High Score to Date (3 Replays)

Register 29, enter "1"  
Register 26, enter "3"

Register 29, enter "1"  
Register 26, enter "3"

### EXTRA TIME UNITS

Instruction Card  
Score Card  
  
Playfield Specials

M051-00C70-A031  
M051-00C70-A035  
w/M051-00C70-A075  
Register 25, enter "2"

Match  
High Score to Date

Register 29, enter "0"  
Register 26, enter "0"

### NOVELTY

Instruction Card  
Score Card  
Playfield Specials

M051-00C70-A032  
M051-00C70-A036  
Register 25, enter "1"

M051-00C70-A032  
M051-00C70-A036  
Register 25, enter "1"

Match  
High Score to Date

Register 29, enter "0"  
Register 26, enter "0"

Register 29, enter "0"  
Register 26, enter "0"

**\*NOTE:** In the Extra Time Units setting, Use Score Card # M051-00C70-A037.

**BEAT THE CLOCK**  
**VII. RECOMMENDED INSTRUCTIONS, SCORE CARDS**  
**& HIGH SCORE FEATURE SETTINGS**

**LIBERAL**

**REPLAYS**

Instruction Card M051-00C70-A030  
 Score Card M051-00C70-A039  
 1 Replay at 1,000,000  
 1 Replay at 2,000,000

**CONSERVATIVE**

**REPLAYS**

Instruction Card M051-00B42-A030  
 Score Card M051-00B42-A035  
 1 Replay at 2,000,000  
 1 Replay at 3,000,000

**EXTRA TIME UNITS**

Instruction Card M051-00C70-A031  
 Score Card M051-00C70-A039  
 w/M051-00C70-A075\*  
 25 Time Units at 1,900,000  
 25 Time Units at 2,500,000  
 \*(Use M051-00C70-A037 if no thresholds are used.)

**HIGH GAME TO DATE (reset periodically)**

LIBERAL ..... 3,000,000

CONSERVATIVE ..... 4,000,000

**ADDITIONAL CARDS**

**REPLAYS**

M051-00C70-A040	800,000	1,300,000
M051-00C70-A041	800,000	1,400,000
M051-00C70-A042	800,000	1,500,000
M051-00C70-A043	1,000,000	1,500,000
M051-00C70-A044	1,000,000	1,600,000
M051-00C70-A045	1,200,000	1,600,000
M051-00C70-A046	1,200,000	1,800,000
M051-00C70-A047	1,300,000	2,000,000
M051-00C70-A048	1,400,000	2,000,000
M051-00C70-A049	1,600,000	2,200,000
M051-00C70-A050	1,800,000	2,500,000
M051-00C70-A051	1,900,000	2,500,000
M051-00C70-A052	2,000,000	2,700,000
M051-00C70-A053	2,100,000	3,000,000
M051-00C70-A054	2,300,000	3,100,000
M051-00C70-A055	2,500,000	3,300,000
M051-00C70-A056	2,700,000	3,400,000
M051-00C70-A057	2,900,000	3,600,000
M051-00C70-A064	3,000,000	3,900,000
M051-00C70-A065	3,000,000	3,900,000
M051-00C70-A066	3,200,000	4,300,000
M051-00C70-A067	3,500,000	4,500,000

**EXTRA TIME UNITS**

M051-00C70-A071	900,000	1,500,000
M051-00C70-A072	1,000,000	1,600,000
M051-00C70-A073	1,200,000	1,800,000
M051-00C70-A074	1,400,000	1,900,000
M051-00C70-A075	1,900,000	2,500,000
M051-00C70-A076	2,300,000	3,100,000
M051-00C70-A077	2,700,000	3,400,000

**NOVELTY**

M051-00C70-A032  
 M051-00C70-A036

## VIII. TROUBLESHOOTING ON LOCATION

### 1A)

#### SYMPTOM:

Game does not play power-up tune when power is turned on. General illumination is present.

#### ACTION:

- A) Turn power OFF. Open back box. Locate light emitting diode (LED) on Control Board.
- B) Turn power ON. LED must flash 8X to indicate that the module is good. Correct sequence is flash-pause-flash and then six more flashes and LED goes out.
- C) If LED does not come on, or does not flash, or flashes, but less than 8X, turn off power. Check fuses. If fuses are good, replace Control Board.

**CAUTION:** Replacement Control Board must have same Part Number or incorrect operation will result! See Parts List for Control Board.

Turn power ON.

- D) If game is correct, it is now ready for play. If game is not correct, contact the Bally-Midway service department.

### 2A)

#### SYMPTOM:

Not all feature lamps light during play.

#### ACTION:

- A) With power ON, open front door. Enter '90' on keyboard. If game is correct all feature lamps flash ON and OFF.
- B) Carefully raise playfield or open back box to gain access to lamps.
- C) Replace bulbs that do not flash.
- D) If game is correct, it is now ready for play.
- E) If game is not correct, turn power OFF. Replace Control Board. Turn power ON and repeat A.
- F) If game is correct, it is now ready for play.\* If game is not correct, contact the Bally-Midway service department.

### 2B)

#### SYMPTOM:

One or some switched lamps always ON.

#### ACTION:

Repeat 2AA, AN, AE, and AF.

### 3A)

#### SYMPTOM:

Display digits improper on **one** or **several**, but less than all Display Driver Module(s). Improper: One or several segments always OFF, digits mottled or several segments or digit(s) always ON.

\*Turn power ON-OFF switch OFF and then ON.

#### ACTION:

- A) With power ON, open front door. Enter '91' on keyboard. If the game is correct, each digit on each Display Driver Module (5 used/game) displays the count 0 - 9 continuously in all 7 digit positions. Note defective Display Driver modules.
- B) Turn power OFF.

**WARNING:** High Voltage is supplied to the Display Driver Modules, from the Power Module. Wait 30 seconds for High Voltage to Bleed Off.

- C) Replace Display Driver module(s). Turn power ON. Repeat A.
- D) If game is correct, it is now ready for play.\* If game is not correct contact Bally-Midway service department.

### 3B)

#### SYMPTOM:

All displays improper (all five Display Driver Modules). Improper: Digit(s) always on or off/segment(s) always on or off, all displays.

#### ACTION:

- A) Repeat 3AA, and AB.
- B) Replace Control Board. See CAUTION NOTE, 1C. Turn power ON. Repeat A.
- C) If game is correct, it is now ready to play.\* If game is not correct, contact the Bally-Midway service department.

### 3C)

#### SYMPTOM:

One or several displays always off.

#### ACTION:

- A) Do 3AA, AB, AC, and AD.
- B) Repeat 3BB and BC, if necessary

### 4A)

#### SYMPTOM:

Solenoid(s) do(es) not pull-in during course of game.

#### ACTION:

- A) With power ON, open front door. Enter '92' on keyboard.
- B) If game was correct, each solenoid would be energized. A number is flashed on the Player Score displays as each solenoid is pulsed. Note any numbers that do not have the sound of an associated solenoid. (**NOTE:** If most of the Playfield Solenoids DO NOT operate, check the Playfield Fuse to see if it is blown. It is generally found near the Flipper Assemblies.) See Solenoid Identification Table on page 1-18.

- C) Carefully lift the playfield (or open the back box) to gain access to the solenoid. Turn power OFF. Inspect the solenoid.
- D) If a lead is broken off, repair. Repeat A & B. If game is correct, it is now ready for play.\* If solenoid wiring was correct, turn power OFF.
- E) Replace Control Board. See CAUTION NOTE.
- F) Repeat AA & AB. If game is correct, it is now ready to play.\* If game is not correct, turn power OFF.
- G) Replace Sound Module A8.
- H) Repeat AA & AB if game is correct. It is now ready to play. If game is not correct, turn power OFF.
- I) Replace Control Board. See CAUTION NOTE, 1C.
- J) Repeat A & B. If game is correct, it is now ready to play.\* If game is not correct contact the Bally-Midway service department.

- B) If the game is correct, Match/Bill in Play display would flash '94' and the Player Score displays flash '0'. If a number other than '0' appears on the Player Score displays, see SWITCH ASSEMBLY IDENTIFICATION TABLE on page 1-18.
- C) Carefully lift the playfield. Locate the switch assembly identified from the number. Visually inspect the switch assembly. If the contacts are stuck, re-gap them to 1/16". See section under SWITCH ASSEMBLY ADJUSTMENTS On page 1-20. Repeat A & B. If the game is correct, it is now ready to play.\* If game is not correct, turn power OFF.
- D) Replace Control Board. See CAUTION NOTE, 1C.
- E) Repeat A & B. If game is correct, it is now ready to play.\* If game is not correct, contact the Bally-Midway service department.

#### 4B)

##### SYMPTOM:

Solenoid(s) always energized. **NOTE:** If impulse solenoids (ball ejects, slingshots, thumper-bumpers, etc.) are energized continuously, they are subject to damage. Limit troubleshooting to one minute with power ON, followed by **five minutes with power OFF**. Repeat as necessary. Replace damaged solenoids. (**NOTE:** When troubleshooting Playfield Solenoid Circuits, be advised that a constantly energized Solenoid (i.e. Thumper-Bumper) will blow the Playfield Fuse in a few seconds. To avoid replacing the Fuse repeatedly, try to isolate the faulty Solenoid Circuit as soon as the game power switch is flipped ON.)

##### ACTION:

Do 4AA, AB, AE, & AF.

#### 5A)

##### SYMPTOM:

No sound.

##### ACTION:

- A) With power ON, open front door. Enter '93' on keyboard.
- B) Turn volume control clockwise to Max.
- C) If correct, sound will be heard. If incorrect, try seating speaker lead connector (J2) and input connector (J1).
- D) If correct, sound will be heard. If incorrect, contact the Bally-Midway service department.

#### 6A)

##### SYMPTOM:

Feature (Drop Targets, etc.) does not score.

##### ACTION:

- A) With power ON, open front door. Enter '94' on keyboard.

\*Turn power ON-OFF switch OFF and then ON.

# BEAT THE CLOCK

## IX.

### SOLENOID IDENTIFICATION TABLE

<input type="checkbox"/> SELF TEST #	SOLENOID IDENTIFICATION	<input type="checkbox"/> SELF TEST #	SOLENOID IDENTIFICATION
1	LEFT SAUCER	7	6 DROP TARGETS RESET
2	MIDDLE SAUCER	8	LEFT SLINGSHOT
3	LEFT BUMPER	9	RIGHT SLINGSHOT
4	RIGHT BUMPER	10	OUTHOLE
5	MIDDLE BUMPER	11	KNOCKER
6	SINGLE DROP TARGET RESET	12	FLIPPERS

### SWITCH ASSEMBLY IDENTIFICATION TABLE

<input type="radio"/> SWITCH SELF TEST #	DESCRIPTION	<input type="radio"/> SWITCH SELF TEST #	DESCRIPTION
1	DROP TARGET 1	25	RIGHT BUMPER
2	DROP TARGET 2	26	MIDDLE BUMPER
3	DROP TARGET 3	27	LEFT BUMPER
4	DROP TARGET 4	28	RIGHT SLINGSHOT
5	DROP TARGET 5	29	LEFT SLINGSHOT
6	CREDIT	30	RIGHT START
7	DROP TARGET 6	31	LEFT START
8	OUTHOLE	32	RIGHT ROLLOVER BUTTON
9	COIN III (RIGHT)	33	STOP "S"
10	COIN I (LEFT)	34	STOP "T"
11	COIN II (MIDDLE)	35	STOP "O"
12	LANE CHANGE	36	STOP "P"
13	LEFT RETURN LANE	37	LANE "A"
14	SLAM	38	LANE "B"
15	TILT	39	LANE "C"
16	RIGHT RETURN LANE	40	LANE "D"
17	TIMER "T"	41	NOT USED
18	TIMER "I"	42	NOT USED
19	TIMER "M"	43	NOT USED
20	TIMER "E"	44	NOT USED
21	TIMER "R"	45	SINGLE DROP TARGET
22	NOT USED	46	LEFT SAUCER
23	LEFT OUTLANE	47	MIDDLE SAUCER
24	RIGHT OUTLANE	48	NOT USED

#0C70 BEAT THE CLOCK  
 ○ INDICATES SWITCH  
 ASSEMBLY IDENTIFICATION  
 NUMBERS  
 NOTE: CABINET: 06  
 DOOR: 09, 10, 11

□ INDICATES SOLENOID  
 IDENTIFICATION NUMBERS  
 NOTE: BACKBOX: 12  
 CABINET: 11

VECTOR SHOWING FOR  
 LEFT EJECT SAUCER

VECTOR SHOWING FOR  
 CENTER EJECT SAUCER

BALL SHOULD EXIT AS  
 SHOWN

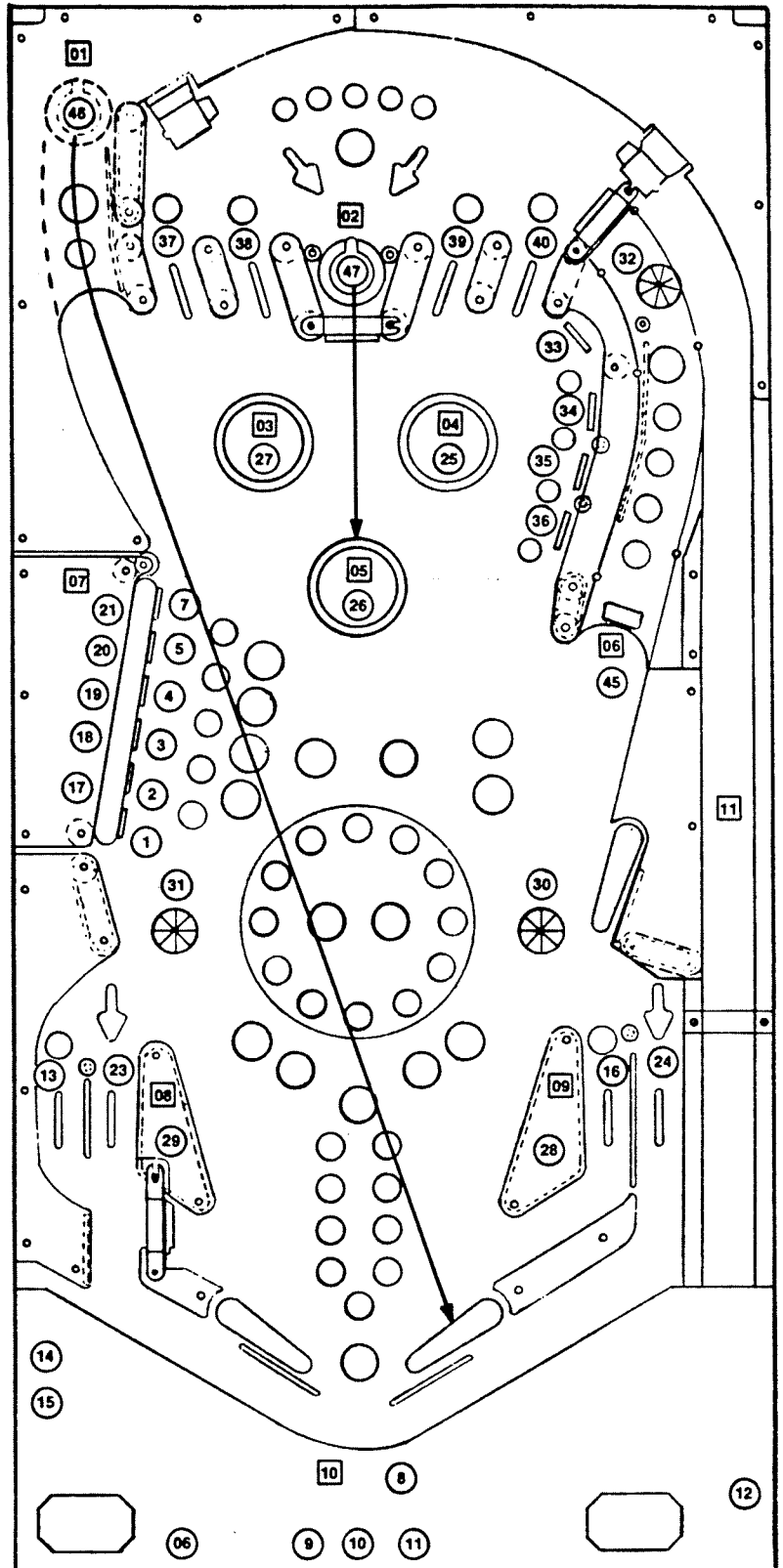


FIGURE I

## **X. ROUTINE MAINTENANCE ON LOCATION:**

After successful completion of the Self Diagnostic Test Procedure, set the game up for play. Exercise each roll-over, thumper bumper, slingshot, etc., by hand until each switch assembly on the playfield has been checked for proper operation. If actuating a switch assembly results in intermittent or no response, clean contacts by gently closing them on a clean business card or piece of paper and wiping until they wipe clean. Re-gap, if necessary, to 1/16". Do not burnish or file Gold Plated Switch Contacts.

## **XII. SERVICE HINTS:**

The Bally playfield has an improved tuff-coat finish with excellent wearing properties. Life expectancy of the playfield as well as play appeal, can be extended by periodic cleaning.

**DO:** Bally recommends you clean your playfield with Wildcat #125 (Wildcat Chemical Co. 1349 East Seminary Drive; Fort Worth, Texas 76115; Phone 1-817/924-8321). Wildcat #125 is a combination cleaner and polish. Bally has tried and tested this product and found it to be very effective. If Wildcat #125 is not available, Bally suggests you ask your distributor to order it. Inspect and hand polish the ball in a clean cloth. A chipped ball must be replaced. It can ruin the finish on the playfield in a short period of time.

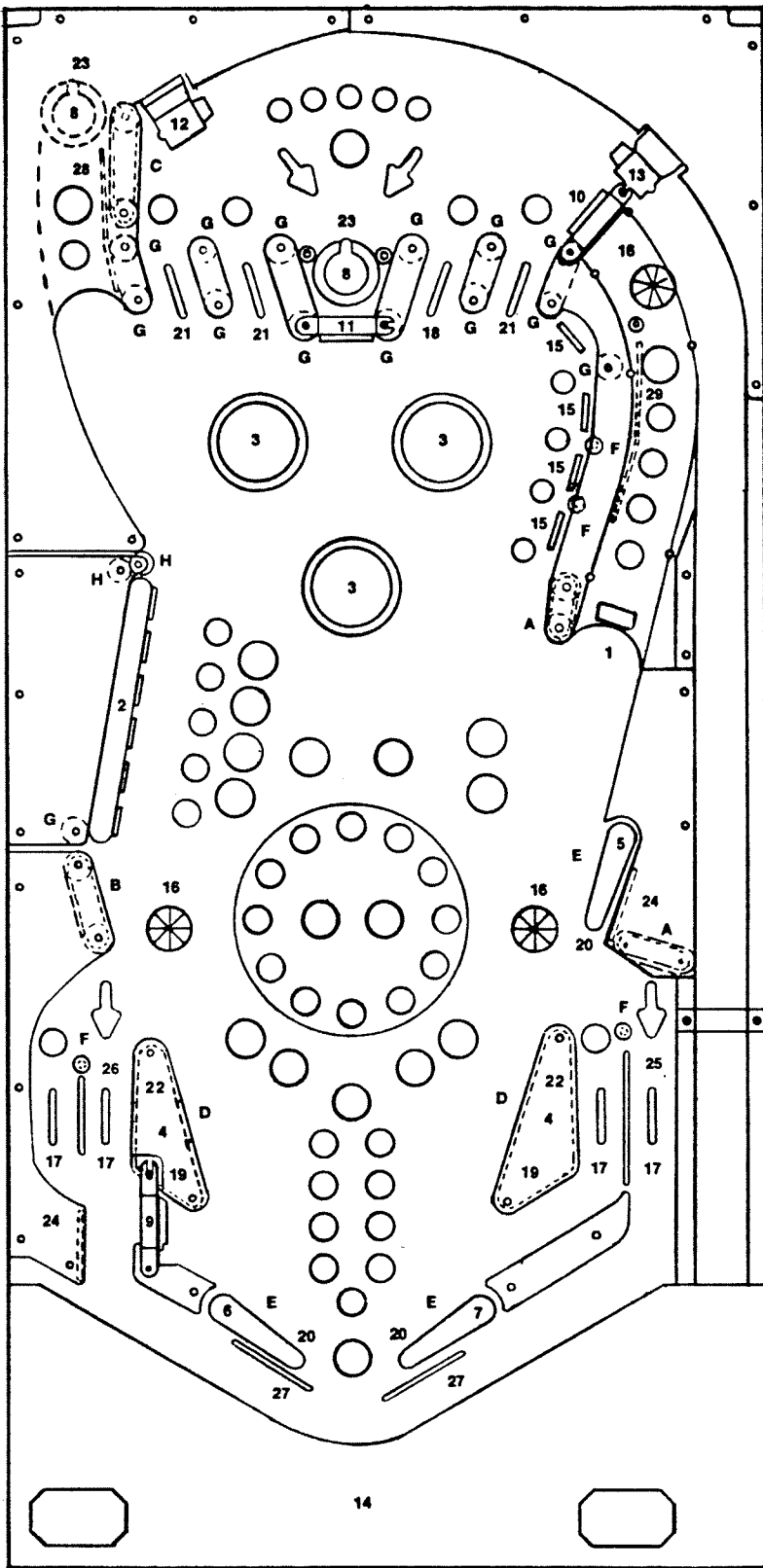
**DON'T:** Use water in large quantities, highly caustic cleaners, abrasive cleaners and cleaning pads on the playfield, or allow a wax or polish build up. Waxes yellow with age and spoil appeal.

## **XI. SWITCH ASSEMBLY ADJUSTMENTS:**

### **GENERAL:**

All switch assemblies consist of leaf springs, contacts, separators, plastic tubing and screws to hold them to the mounting surface. Before attempting to adjust a switch assembly, make sure that these screws are tight. If not, tighten screw closest to the contact end of the leaf spring first. This will prevent the assembly from being secured in such a manner that the leaf springs tend to fan out. In general, all leaf springs are adjusted for a 1/16" gap in the open position and .010" over-travel or wipe in the closed position. All contact should be in good condition. Unless otherwise instructed, they should be dry or non-lubricated. All contacts should be free of dust and dirt. Contacts, with the exception of the flipper button switch assemblies are plated to resist corrosion. Filing or burnishing breaks the finish and encourages corrosion. Clean by closing the contacts over a clean piece of paper (e.g. a lint free business card) and wiping gently until the contacts are clean. For the flipper button switch assemblies **ONLY:** Tarnish can be removed with a contact file followed by burnishing tool. Severely pitted contacts must be placed and adjusted only when they are found to be a source of game malfunction.





**OC70 BEAT THE CLOCK  
RUBBER RINGS & BUMPERS**

**RINGS**

- |    |                 |                 |
|----|-----------------|-----------------|
| A. | 0017-00041-0642 | (2) I.D. 3/4"   |
| B. | 0017-00041-0643 | (1) I.D. 1"     |
| C. | 0017-00041-0645 | (1) I.D. 2"     |
| D. | 0017-00041-0646 | (2) I.D. 2 1/2" |

**BUMPERS**

- |    |                 |                          |
|----|-----------------|--------------------------|
| E. | 0017-00041-0682 | (3) FLIPPER RED-I.D. 3"  |
| F. | 0017-00041-0633 | (4) PLASTIC POST-1"      |
| G. | 0017-00041-0637 | (14) PLASTIC POST-1 1/4" |
| H. | 0017-00041-0641 | (2) METAL POST           |

**PANEL TOP PARTS**

- |     |  |                 |
|-----|--|-----------------|
| 1.  | DROP TARGET ASSY.-<br>L.H. SINGLE            | AC70-00021-0000 |
| 2.  | DROP TARGET ASSY.-<br>6 DT & 5 ST            | AC70-00016-0000 |
| 3.  | THUMPER BUMPER ASSY.                         | A967-00053-0000 |
| 4.  | SLINGSHOT KICKER ASSY.                       | A967-00059-0000 |
| 5.  | FLIPPER ASSY.-SINGLE<br>SWITCH RT.           | AC70-00022-0100 |
| 6.  | FLIPPER ASSY.-SINGLE<br>SWITCH LT.           | AC70-00022-0200 |
| 7.  | FLIPPER ASSY.-DOUBLE<br>SWITCH RT.           | AC70-00023-0100 |
| 8.  | EJECT HOLE ASSY.                             | A360-00295-0000 |
| 9.  | WIRE GATE ASSY.                              | AC70-00027-0000 |
| 10. | WIRE GATE ASSY.                              | A360-00212-0000 |
| 11. | WIRE GATE ASSY.                              | A967-00058-0000 |
| 12. | BALL GATE ASSY.-LT.                          | A360-00022-0000 |
| 13. | BALL GATE ASSY.-RT.                          | A360-00023-0000 |
| 14. | BOTTOM ARCH ASSY.                            | AC70-00024-0000 |
| 15. | RED TARGET SWITCH<br>& BRKT. ASSY.           | AA17-00027-0000 |
| 16. | ROLLOVER BUTTON<br>SWITCH                    | AB38-00028-0000 |
| 17. | ROLLOVER WIRE SW.<br>& DIODE ASSY.           | A967-00067-0000 |
| 18. | ROLLOVER WIRE SW.,<br>DIODE & CAP ASSY.      | A360-00603-0003 |
| 19. | SLINGSHOT (10) PT.<br>SWITCH AND DIODE ASSY. | A360-00239-0000 |
| 20. | MOLDED FLIPPER<br>ASSY.-WHITE                | A967-00031-0000 |
| 21. | ROLLOVER WIRE<br>SWITCH ASSY.                | AB38-00026-0000 |
| 22. | SLINGSHOT (10) PT.<br>SWITCH ASSY.           | A360-00230-0000 |
| 23. | EJECT HOLE SWITCH<br>ASSY.                   | A365-00230-0000 |
| 24. | BALL GUIDE WIRE 2"                           | 0360-00175-5600 |
| 25. | BALL GUIDE WIRE 3-5/8"                       | 0360-00175-0106 |
| 26. | BALL GUIDE WIRE                              | 0360-00175-8400 |
| 27. | BUFFER WIRE                                  | 0360-00175-5300 |
| 28. | BALL GUIDE WIRE                              | OC70-00905-0000 |
| 29. | BALL GUIDE WIRE                              | OC70-00909-0000 |

**FIGURE II**

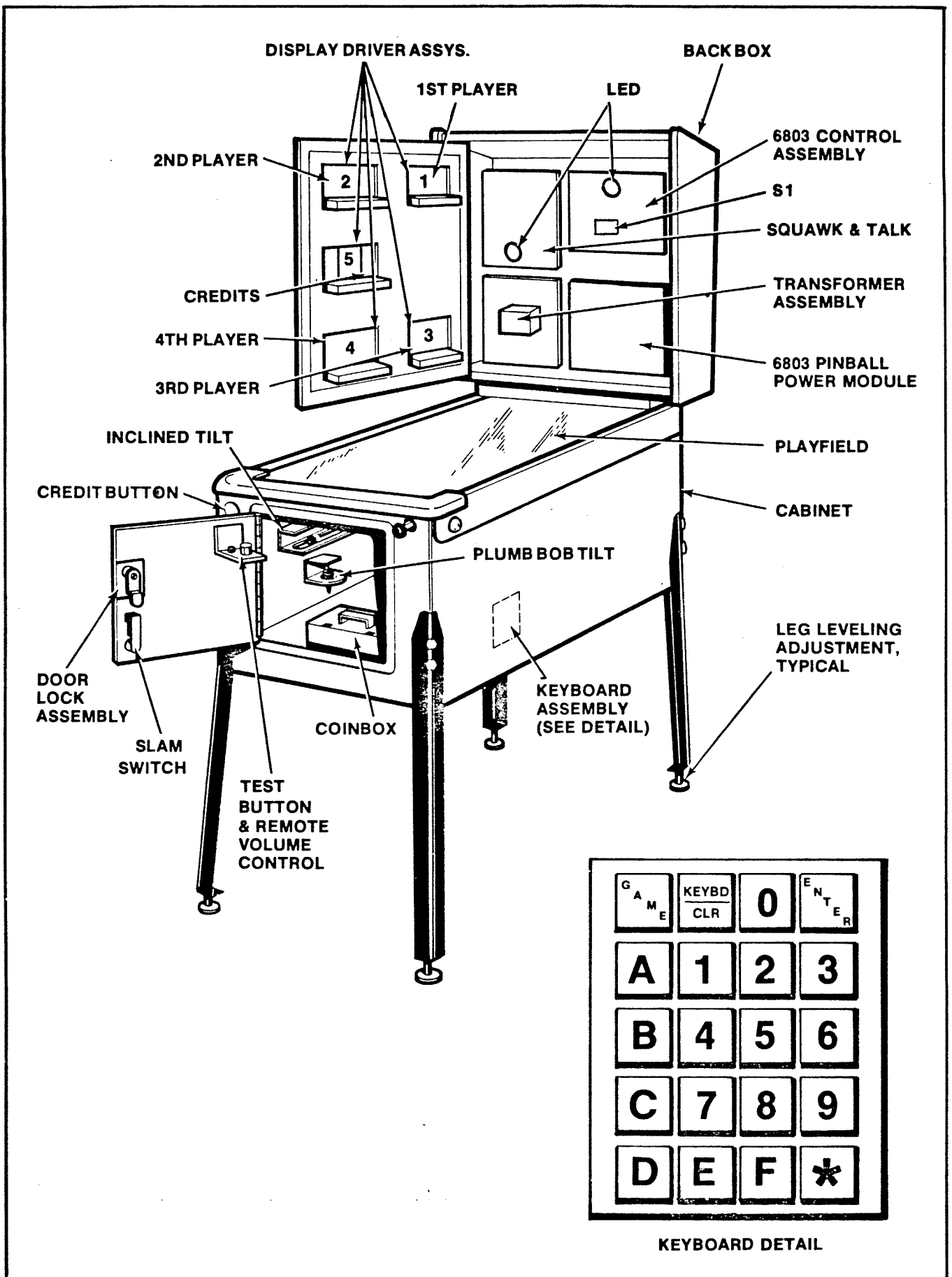


FIGURE III. ELECTRONIC PIN BALL MACHINE

### XIII. ABBREVIATED PARTS LIST BEAT THE CLOCK

MISCELLANEOUS	MIDWAY PART NUMBER	BALLY PART NUMBER
Transformer (Domestic or Export) .....	MT00-00141-0000	
Bulbs, #555 .....	0017-00003-0501	
Lamp Socket w/Diode (IN4004) .....	0017-00031-0071	
Lamp Socket w/Diode (IN4004) .....	0017-00031-0053	E-120-200
Lamp Socket w/Diode (IN4004) .....	0017-00031-0054	E-120-201
Lamp Socket w/Diode (IN4004) .....	0017-00031-0058	E-120-210
Lamp Socket w/o Diode .....	0017-00003-0103	E-133-44
Fuse, 1 Amp. 3 AG Slow Blow (Playfield Solenoid Protection) .....	0017-00003-0007	
Fuse, 3A, 3 AG Slow Blow .....	0017-00003-0008	
Fuse, 6A, 3 AG .....	A360-00086-0000	A-3080-14
Front Molding Assy. ....	A365-00074-0000	
Keypad Assy. ....	0C70-00900-0000	
Back Glass .....	A360-00280-0000	ASE-2378-5
Ball Shooter Rod & Spring Assy. (Cabinet) .....	0360-00900-0000	E-138-3
Plumb-Bob: Tilt .....	0017-00009-0019	
Keyhook: Door .....	0017-00042-0684	
Credit Pushbutton - Red/White (Cabinet) .....	0151-00804-0001	
Pushbutton - White (Cabinet) (2) .....	0365-00521-0100	
Back-Box: Generic .....	0360-00114-00XF	P-1455-1
Playfield Support .....	0017-00009-0551	M-1718-7
Allen Wrench: 1/8" .....	0017-00009-0546	M-168-26
Ball: 1-1/16" Dia. Steel .....	0017-00009-0547	M-168-50
Ball: 15/16" Dia. Steel .....		
<b>ASSEMBLY SWITCHES</b>		
Roll-over Button (3) .....	A360-00059-0000	ASW-A1-152
Saucer (2) .....	A967-00075-0000	ASW-A1-209
Credit Button (Cabinet) .....	A365-00060-0100	
Ball Return .....	0017-00005-0183	
Coin (2) (Door) .....	0017-00005-0195	
Lane Change (Cabinet) .....	A370-00078-0000	ASW-A1-56
Right Sling Shot (2) .....	A360-00069-0000	ASW-A1-47
Left Sling Shot (2) .....	A360-00069-0000	ASW-A1-47
Thumper Bumper - Make (3) .....	A967-00074-0000	ASW-A1-195
Tilt (Cabinet) .....	A360-00054-0000	ASW-A0-13
Slam (Cabinet) .....	A360-00076-0000	ASW-A2-73
Tilt (Door) .....	A090-00038-0100	
Right Lanes (Out Lane & Ball Lane) (2) .....	A360-00070-0000	ASW-A1-48
Left Lanes (Out Lane & Ball Lane) (2) .....	A360-00070-0000	ASW-A1-48
Flipper - Double Sw. - Make .....	A365-00046-0000	
Flipper - Double Sw. - Break .....	A365-00045-0000	
Flipper - Break (2) .....	A365-00045-0000	
Flipper - Make (2) (Cabinet) .....	A360-00071-0000	ASW-A1-61
Back-Up Target (Drop Target Assy.)(3) .....	A967-00076-0200	
Back-Up Target (Drop Target Assy.)(2) .....	A967-00076-0100	
Drop Target (Drop Target Assy.)(6) .....	A360-00062-0000	ASW-A1-168
Left Hand Single Drop Target .....	A360-00062-0000	ASW-A1-168
Red Target (4) .....	A360-00070-0000	ASW-A1-48
Top Roll-over Lanes (3) .....	A360-00067-0000	ASW-A1-152
Top Roll-over Lane .....	A360-00061-0000	

**XIII. ABBREVIATED PARTS LIST(cont'd)  
BEAT THE CLOCK**

<b>ASSEMBLY COILS</b>	<b>MIDWAY PART NUMBER</b>	<b>BALLY PART NUMBER</b>
Flipper (3).....	AC70-00026-0000	AQ-25-500/ 34-4500
Knocker.....	A360-00046-0000	AR-26-1200
Outhole Kicker.....	A360-00044-0000	AN-26-1200
Thumper Bumper (3).....	A360-00044-0000	AN-26-1200
Saucer.....	A360-00211-0000	A0-27-1300
Sling Shot (2).....	A967-00046-0000	A0-26-1200
Drop Target(Drop Target Assy.)(5).....	A360-00209-0000	
Left Hand Single Drop Target.....	A360-00211-0000	A027-1200

**PLAYFIELD PARTS**

See Figure II

Playfield Glass.....	0360-00921-0000	G-409
Playfield & Inserts.....	AC70-00501-00XF	
Roll-over Button - White (3).....	0017-00042-0405	C-900
Button: Roll-over Mounting - Green (2).....	0017-00042-0541	C-901-4
Button: Roll-over Mounting - Amber.....	0017-00042-0544	C-901-8
Playfield Mylar.....	0C70-00903-0000	
Screened Plastic Set.....	AC70-00011-00XF	
Post: L=1" Blue Plastic (10)(2).....	0017-00042-0586	
Post: L=1-3/16" Blue Plastic (25).....	0017-00042-0594	
Acorn Nut: Nylon (25).....	0017-00009-0302	M-1794-1
Thumper Bumper Cap & Tape Assembly (2).....	AC70-00015-0000	
Collar-Thumper Bumper - Blue (3).....	0017-00042-0567	
Thumper Bumper Locking Ring (2).....	0017-00042-0414	
Thumper Bumper Mylar Shield(3).....	0331-00903-0000	
Flipper - White (3).....	A967-00031-0000	A-3994-5

**MODULES**

6803 Pinball Power Module w/Fuses.....	A084-91785-AC70	
Squawk & Talk.....	B084-91625-AC70	AS-2518-61
6-Digit Display Driver (1 used).....	B084-91491-A000	AS-2518-21
7-Digit Display Driver (4 used).....	B084-91617-A000	AS-2518-58
6803 Pinball Control Module.....	B084-91786-AC70	

**MODULE COMPONENTS**

SEE MODULE PARTS LIST

**SECTION 3**  
**Component Layouts,**  
**Schematics & Wiring Diagrams**



6803 PINBALL POWER MODULE  
A084-91785-C000  
M051-00C53-C001

DESIGNATION LIST

DESIGNATION

C1 P/O C1  
P/O C1  
P/O C1  
C2 P/O C2  
C3 C3  
C4, C5  
C6, C7  
R1  
R2  
R3  
R4  
R5  
R6  
R7  
R8  
R9  
R10  
VR1  
D1 - D4  
D5 - D9  
D10  
BR1  
P/O BR1  
O1  
P/O Q1  
P/O Q1  
P/O Q1  
P/O Q1  
P/O Q1  
P/O Q1  
P/O Q1  
P/O Q1  
P/O Q1  
P/O Q1  
P/O Q2, Q3  
P/O Q2, Q3  
P/O Q3  
U1  
P/O U1  
P/O U1  
P/O U1  
P/O U1  
P/O U1  
VA1

DESIGNATION LIST

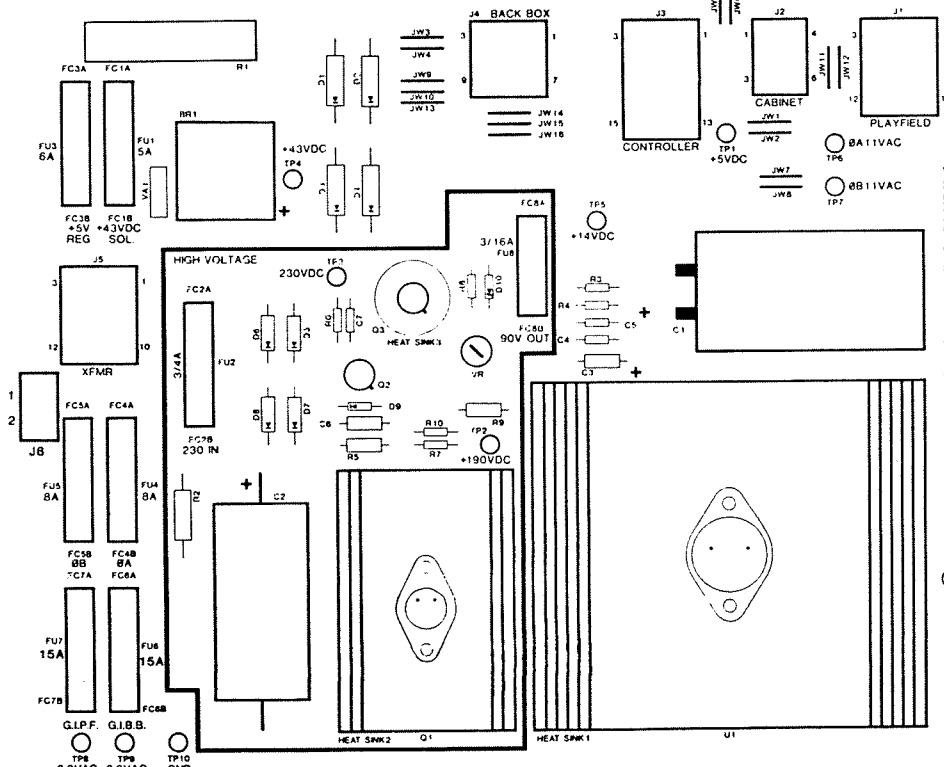
DESIGNATION

JW1 - JW16  
F1\*  
F2  
F3  
F4, F5  
F6, F7  
F8  
FC1A - FC3B, FC8A,  
FC8B  
FC4A - FC7B  
J1  
J2  
J3  
J4  
J5  
J6  
6803 POWER MOD.

DESCRIPTION

11,000uF 20V ELEC.  
TY-WRAP  
SOLDER LUG  
WIRE 20AWG  
160uF 350V ELEC.  
TY-WRAP  
2uF 25V ELEC.  
.1uF 25V CER.  
.01uF 500V CER.  
600 OHM 10W  
100K 1/4W 5%  
2.2 OHM 1/4W 5%  
100 OHM 1/2W 5%  
22K 1/2W 5%  
100K 1W 5%  
390 OHM 1/4W 5%  
1.2K 1/4W 5%  
8.2K 1/4W 5%  
0 - 25K 1/4W POT.  
MR751  
1M4004  
1N5275A ZENER  
KBFC-35-02-W  
BRIDGE SPACER  
2N3584  
SHIELD  
HEX SPACER  
6-32 X 5 SCREW  
6-32 X 12 SCREW  
LOCKWASHER EXT.  
LOCKWASHER INT.  
FLAT WASHER  
6-32 HEX NUT  
LABEL - CAUTION HIGH VOLT.  
HEATSINK 2  
INSULATOR TO-66  
2N3440  
INSULATOR TO-5  
HEATSINK 3  
78H05C REG.  
6-32 X 12 SCREW  
6-32 HEX NUT  
LOCKWASHER EXT.  
FLAT WASHER  
HEATSINK 1  
INSULATOR TO-5  
VARISTOR

\* TWO FLIPPER GAMES ONLY - SEE SCHEMATIC



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6803 PINBALL POWER MODULE  
A080-91785-C000

6803 PINBALL POWER MODULE  
A084-91785-C000  
M051-00C53-C001

CROSS REFERENCE LIST		CROSS REFERENCE LIST	
DESCRIPTION	QTY.	DESIGNATION NO.	PART NOS.
.01UF 500V CER.	2	C6,C7	0360-00800-0013
.1UF 25V CER.	2	C4,C5	0360-00800-0026
2UF 25V ELEC.	1	C3	0360-00800-0019
160UF 350V ELEC.	1	C2	0360-00800-0020
11,000UF 20V ELEC.	1	C1	0360-00800-0024
2-2 OHM 1/4W 5%	1	R3	100E-00005-0003
100 OHM 1/2W 5%	1	R4	100E-00006-0021
390 OHM 1/4W 5%	1	R7	100E-00005-0049
600 OHM 10W 10%	1	R1	100E-00002-0049
1.2K 1/4W 5%	1	R8	100E-00005-0063
8.2K 1/4W 5%	1	R10	100E-00005-0086
22K 1/2W 5%	1	R5	100E-00006-0065
82K 1/2W 5%	1	R9	100E-00006-0072
100K 1/4W 5%	1	R6	100E-00005-0115
100K 1W 5%	1	R2	100E-00007-0037
0-25K 1/4W POT	1	VR1	0360-00804-0004
MR 751	4	D1-D4	103E-00003-0016
1N4004	5	D5-D9	103E-00001-0027
1N5275	1	D10	103E-00003-0005
K8PC-35-02-W	2	RR1	104E-00003-0002
2N3440	1	O2,O3	104E-00005-0002
2N3584	1	O1	0360-00803-0021
78H05C REG	1	U1	115E-00001-0002
VARISTOR METAL OXIDE 60V	4	VA1	0017-00042-0048
TY-WRAP	16	P/O C1,C2	117E-00001-0001
ZERO OHM RES. JUMPER	10	JW1-JW16	0017-00007-0131
TEST POINTS	2	TP1-TP10	0017-00021-0257
SOLDER LUG	2	P/O C1	0017-00033-0448
JUMPER WIRE 20AWG	1	P/O U1	0017-00042-0119
INSULATOR T0-3	2	P/O U1	0017-00042-0151
INSULATOR T0-5	1	P/O O1	0017-00042-0158
INSULATOR T0-66	2	P/O O1	0017-00042-0248
HEX SPACER	1	P/O O1	0365-00952-0000
SHIELD	1	P/O U1	112E-00001-0003
HEATSINK 1	1	P/O O1	112E-00001-0002
HEATSINK 2	1	P/O O3	112E-00001-0004
HEATSINK 3	1	P/O BR1	118E-00001-0001
BRIDGE SPACER	4	P/O O1,U1	0017-00101-0132
6-32 X 12 SCREW	2	P/O O1	0017-00101-0555
6-32 X 5 SCREW	4	P/O O1,U1	0017-00103-0005
6-32 HEX NUT	4	P/O O1,	0017-00104-0008
LOCKWASHER INT.	4	P/O O1,U1	0017-00104-0009
LOCKWASHER EXT.	4	P/O O1,U1	0017-00104-0106
FLAT WASHER	8	FC1A-FC3B,	0017-00071-0033
FUSE CLIP	8	FC8A,FC8B,	0017-00071-0034
FUSE CLIP	1	FC4A-FC7A	0017-00071-0034
3/16 AMP 3AG FUSE	1	F8	0017-00003-0206
3/4 AMP 3AG FUSE	1	F2	0017-00003-0010
5 AMP 3AG FUSE	1	F1*	0017-00003-0175
6 AMP 3AG FUSE	1	F3	0017-00003-0008

\* TWO FLIPPER GAMES ONLY - SEE SCHEMATIC

DESCRIPTION  
8 AMP 3AG FUSE  
15 AMP 3AG FUSE  
12 PIN M-N-L CONN. FEMALE  
6 PIN M-N-L CONN. MALE  
15 PIN M-N-L CONN. MALE  
9 PIN M-N-L CONN. MALE  
12 PIN M-N-L CONN. MALE

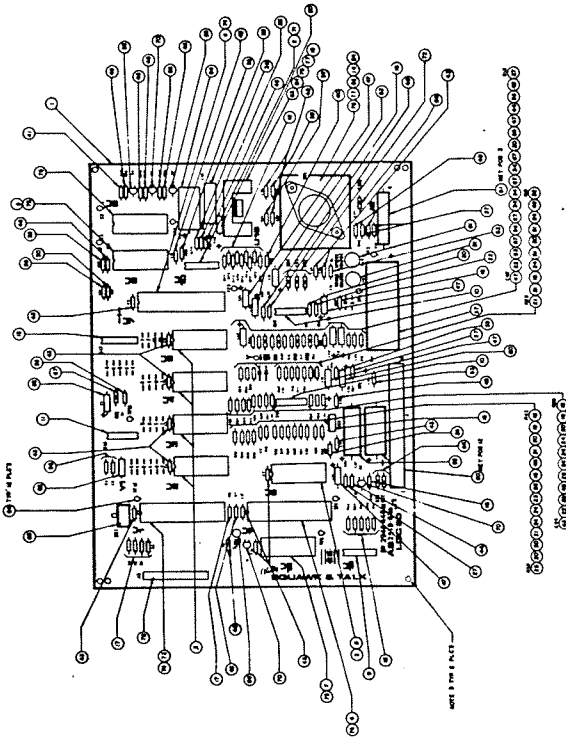
QTY.  
2  
2  
1  
1  
1  
1  
1

DESIGNATION NO.  
F4,F5  
F6,F7  
J1  
J2  
J3  
J4  
J5  
J6

PART NOS.  
0017-00003-0387  
0017-00003-0011  
0017-00021-0532  
0017-00021-0424  
0017-00021-0434  
0017-00021-0425  
0017-00021-0426  
0017-00021-0488

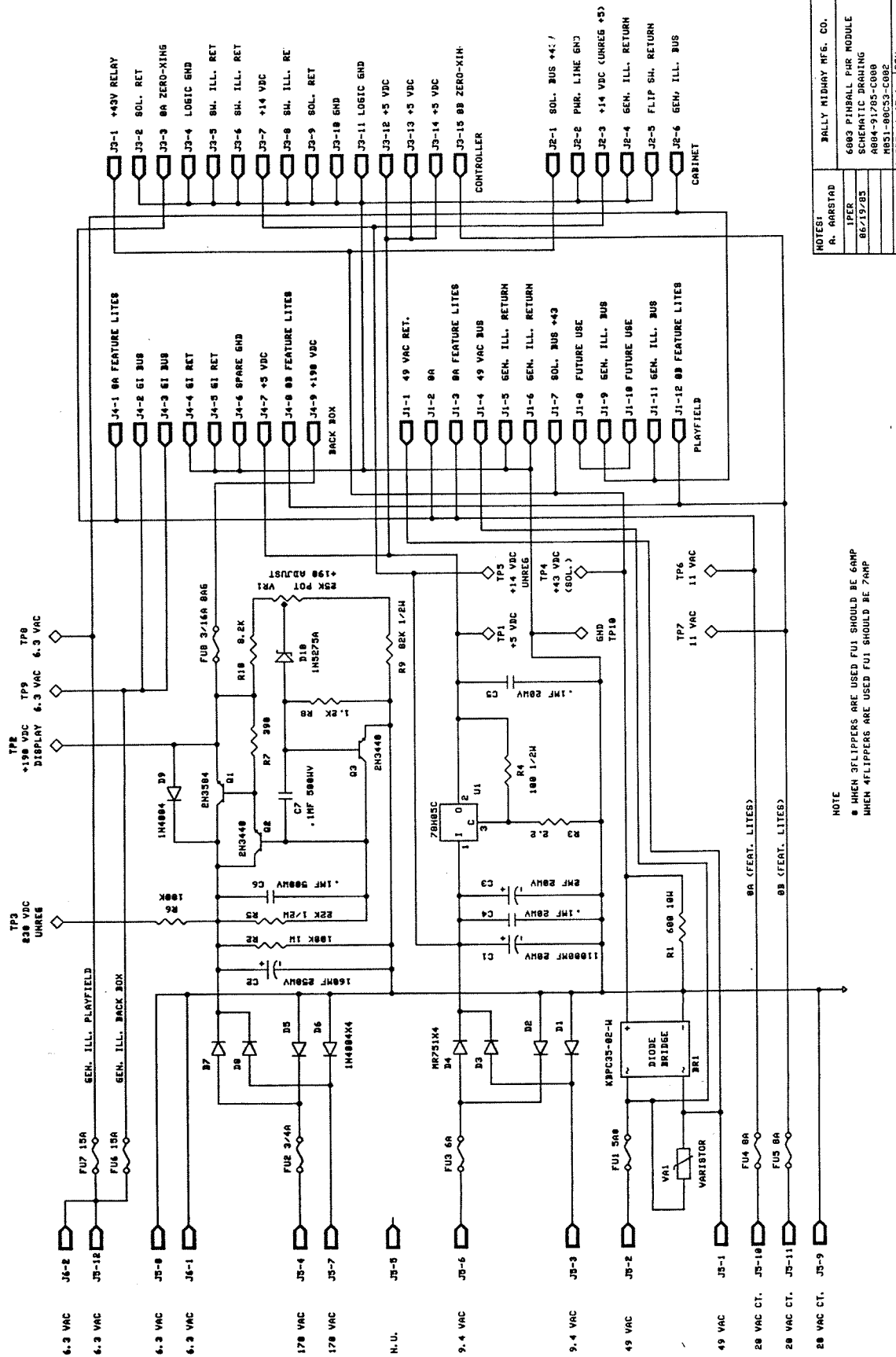


**SQUAWK & TALK MODULE  
AS 2518-61A**



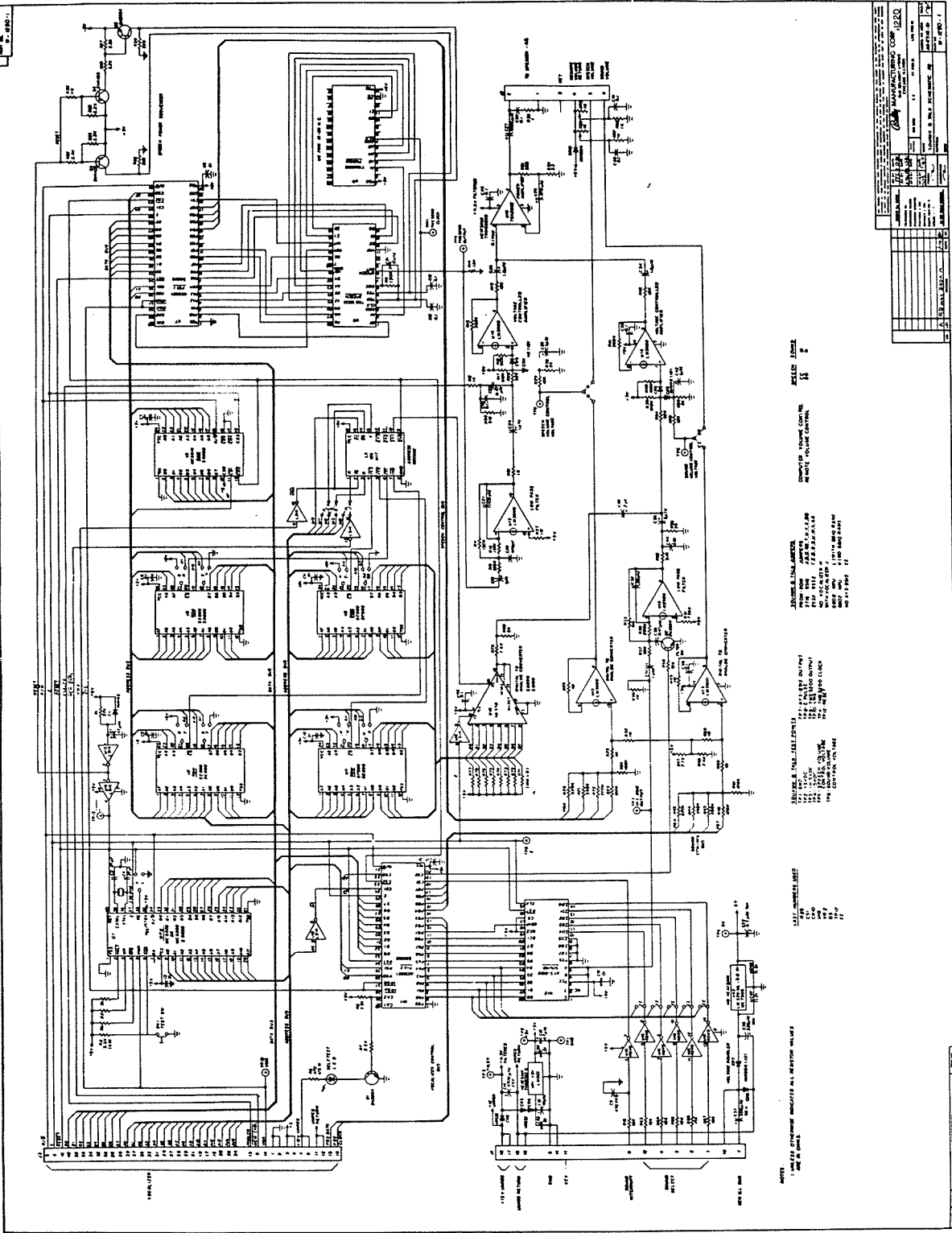
**SQUAWK & TALK MODULE  
AS 2518-61A  
COMPONENTS PARTS LIST**

ITEM	QTY.	REFERENCE DESIGNATION	DESCRIPTION	BALLY PART #
26	1	R37	Resistor, 1/4W, 5%, 30K	E-105-245
27	1	R1	Resistor, 1/4W, 5%, 1K	E-105-230
28	1	R2	Resistor, 1/4W, 5%, 750K	E-105-344
29	2	R3	Resistor, 1/4W, 5%, 9.1K	E-105-228
30	2	R16	Resistor, 1/4W, 5%, 130K	E-105-203
31	1	R11	Resistor, 1/4W, 5%, 150K	E-105-248
32	1	R15	Resistor, 1/4W, 5%, 220K	E-105-161
33	1	R14	Resistor, 1/4W, 5%, 1.8K	E-105-346
34	4	R17, 18, 39, 40	Resistor, 1/4W, 5%, 27K	E-105-243
35	1	R1	Resistor, 1/4W, 5%, 510 Ω	E-105-311
36	1	R68	Resistor, 1/4W, 5%, 2.2 Ω	E-105-211
37	3	R34	Resistor, 1/4W, 5%, 220 Ω	E-105-303
38	3	R31, 88, 89	Resistor, 1/4W, 5%, 7.5K	E-105-345
39	1	R79	Resistor, 1/4W, 5%, 1 Ω	E-105-196
40	1	R35	Resistor, 1/4W, 5%, 11K	E-105-190
41	1	R83	Resistor, 1/4W, 5%, 8.2K	E-105-196
42	4	R7	Resistor, 1/4W, 5%, 1.1K	E-105-263
43	14	C2, 5-8, 10, 11, 17, 18, 44, 47-50	Capacitor, Ceramic, 0.1μF, 25V	E-586-121
44	43	C23, 35	Capacitor, Ceramic, 47μF, 16V	E-586-120
45	4	R84-87	Resistor, 1/4W, 5%, 2.2K	E-105-237
46	4	R8	Resistor, 1/4W, 5%, 2.2K	E-105-342
47	7	C19, 24, 25, 28, 31, 34, 42, 44, 45, 46	Capacitor, Electrolytic, 1μF, 25V	E-586-90
48	10	C12, 13, 26, 30, 33, 38, 40, 41	Capacitor, Ceramic, 1μF, 25V	E-586-89
49	2	C32	Capacitor, Ceramic, 470pF, 50V	E-586-83
50	1	C32	Capacitor, Ceramic, 68pF	E-586-120
51	1	C21	Capacitor, Ceramic, 100pF	E-586-68
52	1	C15	Capacitor, Electrolytic, 10μF, 16V	E-586-135
53	2	C16, 22	Capacitor, Tantalum, 4.7μF, 25V	E-586-73
54	2	C29	Capacitor, Electrolytic, 1000μF, 16V	E-586-136
55	2	C34	Capacitor, Electrolytic, 470μF, 8V	E-586-124
56	2	C14	Capacitor, Ceramic, 27pF	E-586-121
57	2	C37, 38	Capacitor, Electrolytic, 4700μF, 25V	E-586-122
58	1	C51	Capacitor, Electrolytic, 330μF, 50V	E-586-147
59	1	J1	Capacitor, Monolithic, 10pF	E-586-150
60	1	J2	18 Pin Water Connector (156)	E-736-18
61	1	J2	Heatsink, 6053B	E-736-6
62	1	J2	Heatsink, 6030B	E-682-11
63	1	J2	Test Points	E-682-8
64	12	SW, 1	PC.B. Switch	P-5389
65	3	CR7, 8, 10	Diode (IN4004)	E-658-1
66	3	CR1, 5, 6, 9, 11	Diode (IN4148)	E-587-15
67	5	Y1	Crystal, 3.579	E-744-5
68	1	LED1	LED	E-679
69	1	LED1	Transistor, 2N3004	E-585-31
70	3	Q1-2, 5	Socket I.C., 16 Pin	E-712-16
71	1	U1	Socket I.C., 40 Pin	E-712-40
72	3	CR2-4	Socket I.C., 28 Pin	E-712-28
73	1	U1	Microprocessor	E-620-125 or 128
74	3	U1	Used with U1, 7, 11	E-712-1
75	3	U1	Used with U6, 8, 12	E-712-28
76	3	U1	Used with U18, VR1	LSPPR-00632-1106
77	3	U1	Used with U18, VR1	N-00632-2112
78	2	J3	Header, 20 Pin	E-766-20
80	2	C36, 43	Capacitor, 2μF, 16V	E-586-63
81	2	R69, 70	Resistor, 1/4W, 5%, 1K	E-586-148
82	2	C1	Capacitor, Electrolytic, 47μF	E-105-341
83	2	R28, 54	Resistor, 82K	M-1834
84	AR	U1	Thermal Compound	E-585-23
85	2	Q3, 4	Transistor, 2N4403	E-105-312
86	2	R82, 48	Resistor, 1/4W, 5%, 2.4K	E-105-312
			JUMPERS—SEE NOTES	
1	1	PWB	M-645-577b	
2	1	U10	AD 586 DAC	P-2948-446b
3	5	Used with U2 thru U6	24 Pin I.C. Socket	E-620-171
4	2	U7, U11	6821 P.I.A.	E-712
5	1	U8	Tms 5200 Speech	E-620-29
7	1	U12	AY3-8912 Sound	E-620-166
8	1	U6	6810 RAM (SEE NOTE 1)	E-620-30
9	1	U16	4049 Hex Inverter	E-620-33
10	2	U13, U14	LM 3900	E-620-126
11	1	U15	74LS155	E-620-169
12	1	U17	74LS155	E-620-168
13	1	U18	TDA 2002 Power Amp	E-620-127
14	1	VR1	LM323, 5V Regulator	E-710
15	1	VR2	7905, -5V Regulator	E-620-165
16	19	R10, 19, 29, 42, 50, 63-67, 71-78, 55	Resistor, 1/4W, 10K	E-105-185
17	5	R2-5, 8	Resistor, 1/4W, 5%, 3.3K	E-105-238
18	2	R20, 43	Resistor, 1/4W, 5%, 820K	E-105-343
19	2	R21, 44	Resistor, 1/4W, 5%, 390K	E-105-310
20	5	R13, 22, 38, 41, 45	Resistor, 1/4W, 5%, 200K	E-105-225
21	4	R23, 24, 46, 61	Resistor, 1/4W, 5%, 100K	E-105-226
22	4	R30, 53, 56, 80	Resistor, 1/4W, 5%, 2K	E-105-237
23	1	R47	Resistor, 1/4W, 5%, 2.7K	E-105-151
24	7	R25, 26, 27, 32, 49, 59, 80	Resistor, 1/4W, 5%, 1m	E-105-285
25	1	R33	Resistor, 1/4W, 5%, 91K	E-105-313



NOTES:	BALLY MIDWAY MFG. CO.
A. ARABTAD	6803 PINBALL PAR MODULE
IPER	SCHEMATIC DRAWING
06/19/85	AB84-91785-C088
	M851-80C53-C082
	SHEET 1 OF 1 RPV

NOTE  
 \* WHEN 3FLIPPERS ARE USED FUI SHOULD BE 6AMP  
 WHEN 4FLIPPERS ARE USED FUI SHOULD BE 7AMP



NAME: T. J. JENSEN  
 TITLE: SENIOR DESIGNER  
 PROJECT: COMPUTER VOLUME CONTROL  
 DATE: 11/15/62  
 DRAWN BY: T. J. JENSEN  
 CHECKED BY: J. W. BROWN  
 APPROVED BY: J. W. BROWN

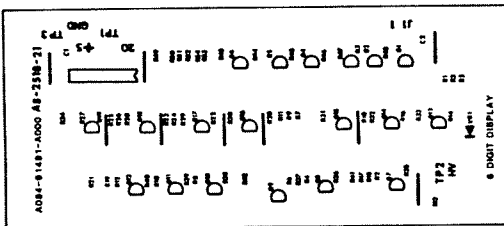
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 IC99 - 74100  
 IC100 - 74100

REV.	DATE	DESCRIPTION
1	11/15/62	INITIAL DESIGN
2	11/15/62	REVISIONS
3	11/15/62	REVISIONS
4	11/15/62	REVISIONS
5	11/15/62	REVISIONS
6	11/15/62	REVISIONS
7	11/15/62	REVISIONS
8	11/15/62	REVISIONS
9	11/15/62	REVISIONS
10	11/15/62	REVISIONS

NO.	DESCRIPTION	QTY.	UNIT PRICE	TOTAL PRICE
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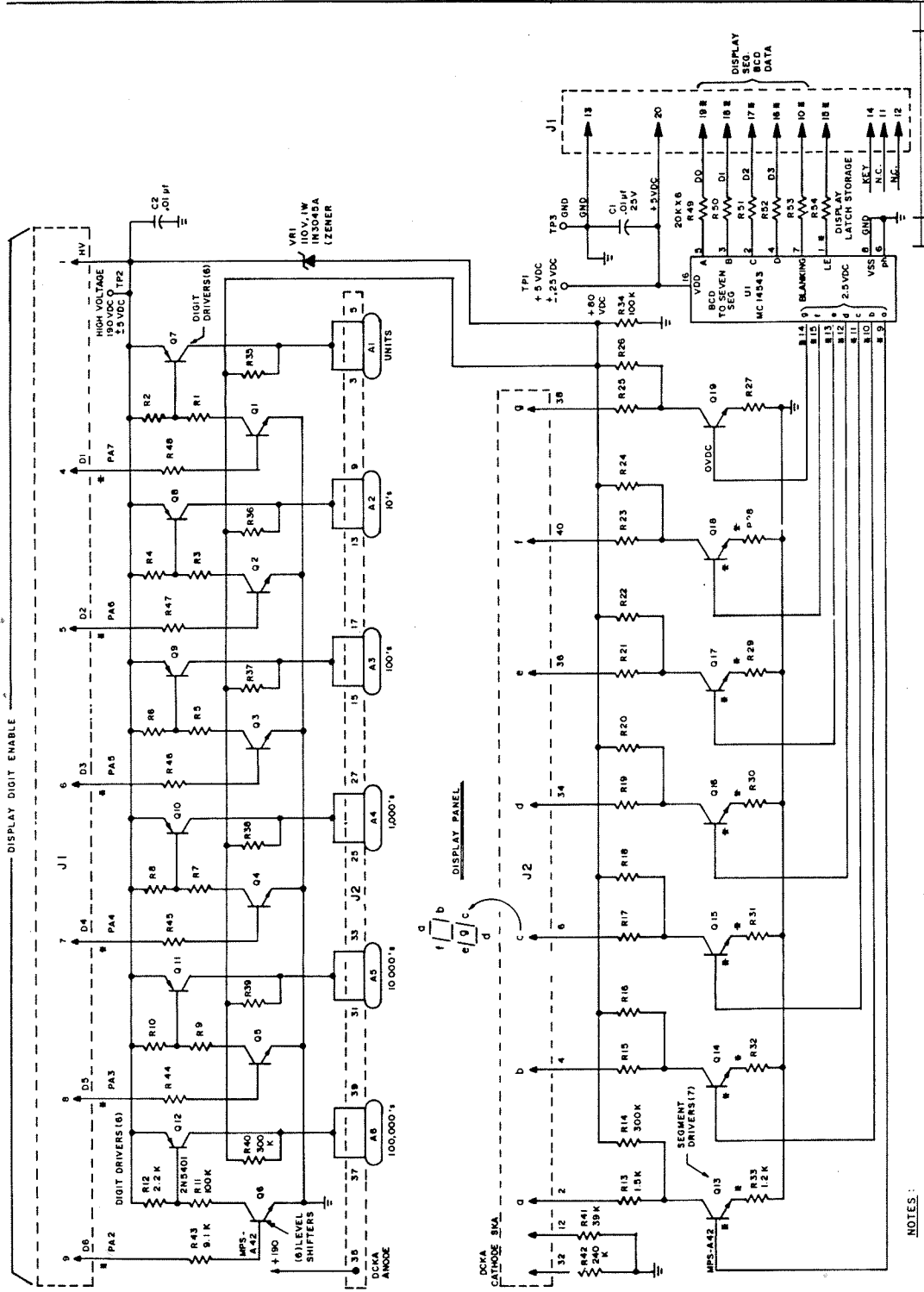
**CROSS REF. LIST**

DESCRIPTION	QTY.	DESIGNATION NO.	PART NUMBER
.01 HF 25V	1	C1	0360-00800-0005
.01 HF 500V	1	C2	0360-00800-0013
1.2K 1/4W 5%	7	R27-R33	100E-00005-0001
1.5K 1/4W 5%	7	R31, R32, R25	100E-00005-0005
2.2K 1/4W 5%	6	R2, R4, R6, R8, R10	100E-00005-0009
9.1K 1/4W 5%	6	R43-R48	100E-00005-0022
20K 1/4W 5%	6	R49-R54	100E-00005-0027
39K 1/4W 5%	7	R1, R3, R5, R7, R9	100E-00005-0032
METAL FILM	7	R11, R13	100E-00005-0037
240K 1/4W 5%	1	R42	100E-00005-0052
300K 1/4W 5%	1	R14, R16, R18, R20, R22, R24, R26, R28, R30	100E-00005-0057
IN3045A	1	VH1	115E-00001-0028
2N5401	6	07-012	100E-00002-0007
MPS-A42	1	Q1-Q6 Q13-Q20	100E-00002-0014
MCL1543	1	DS1	01A0-00004-0018
DSI MTC. KDM	1	DS1	01A0-00004-0018
TACT-SCREEN RPLCNMT	4	DS1MH	0093-00900-0000
DISPLAY MTC. TOP	1	DS1MH	0017-00042-0135
DISPLAY MTC. BOTTOM	1	DS1MH	0017-00042-0135
TAPE	1	DS1MH	0017-00042-0135
BUMPER	1	0017-00041-0598	0017-00041-0598
.045 SQ. PIN	1	J1	0304-00804-0010
TEST POINTS	3	TP1-TP3	0017-00007-0131
JUMPER TIN 22 ANG	9		117E-00001-0001
6 DIGIT DISPLAY PCB.	1		A080-91491-A000



DESCRIPTION	QTY.	DESIGNATION NO.	PART NUMBER
TACT-SCREEN RPLCNMT	4	DS1MH	0093-00900-0000
DISPLAY MTC. TOP	1	DS1MH	0017-00042-0135
DISPLAY MTC. BOTTOM	1	DS1MH	0017-00042-0135
PRESSURE SENSITIVE TAPE	1	DS1MH	0017-00042-0135
BUMPER	1	0017-00041-0598	0017-00041-0598
.045 SQ. PIN	1	J1	0304-00804-0010
TEST POINTS	3	TP1-TP3	0017-00007-0131
JUMPER TIN 22 ANG	9		117E-00001-0001
6 DIGIT DISPLAY PCB.	1		A080-91491-A000
100K OHM 1/4W 5%			
1.2K OHM 1/4W 5%			
1.5K OHM 1/4W 5%			
2.2K OHM 1/4W 5%			
9.1K OHM 1/4W 5%			
20K OHM 1/4W 5%			
39K OHM 1/4W 5%			
240K OHM 1/4W 5%			
300K OHM 1/4W 5%			
IN3045A			
2N5401			
MPS-A42			
MCL1543			
DSI			
DS1MH			
6 DIGIT DISPLAY PANEL			

PROJECT ENG. A. AARSTAD		REVISED	
DO NOT SCALE		USED ON	
DIM TOLERANCES UNLESS SPECIFIED		NO RECD. 1 PER	
DATE BAK		FULL	
DATE 11/14/84		ASSEMBLY DWG. SIX DIGIT DISPLAY	
DATE 11/14/84		A080-91491-A000	
PART NO. MOSI - 00114 - A028		MIDWAY MFG. CO.	
FRANKLIN, ILL.			



REVISIONS

REVISED BY	DATE	DESCRIPTION

PROJECT ENG. D. MACDONALD  
 DRAWN BY: J. J. JONES  
 CHECKED BY: J. J. JONES  
 DATE: 5/17/63

USED ON: PINBALL  
 NO. REQS: 1 PER FULL  
 SIX DIGIT DISPLAY BOARD  
 SEMI-MATIC 'A1'  
 A084-91491-A000

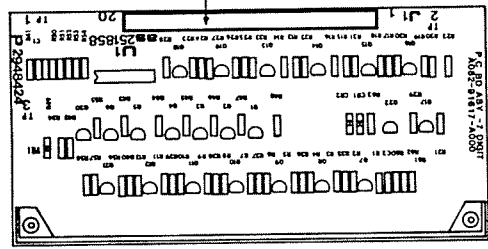
MIDWAY MFG. CO.  
 FRANKLIN, ILL.

PART NO. MOSI-00114 -A029

- NOTES:
- 1) UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE  $\pm 5\%$ , 1/4 W.
  - 2) PREFIX ALL REFERENCE DESIG. WITH ASSY REF. DESIG. "A1"
  - 3) \* INDICATES "AID" TEST POINT.

**CROSS REFERENCE LIST**

DESIGNATION NO.	DESCRIPTION	DESIGNATION NO.	DESCRIPTION	QTY	DESIGNATION NO.	BALLY'S PART NOS.	MIDWAY'S PART NOS.
C1	.01 WF 25V	CR1, CR2	1K4148	1	C1	E-586-85	0360-0080-0011
C2	.01 WF 500V	VR1	1M3045A/10V ZENER	1	C2	E-586-85	0360-0080-0011
R1	100K OHM 1/4W 5%	Q1-Q6	RFS-442	7	R27-R33	E-105-222	100E-00005-0083
R2	2.2K OHM 1/4W 5%	Q7-Q12	2N5401	9	R31, R23, R25, R60	E-105-229	100E-00005-0083
R3	2.2K OHM 1/4W 5%	Q13-Q20	RFS-442	7	R6, R4, R6, R8, R10	E-105-287	100E-00005-0083
R4	2.2K OHM 1/4W 5%	Q21	2N5401	7	R12, R57	E-105-228	100E-00005-0083
R5	100K OHM 1/4W 5%	Q22	RFS-442	6	R43-R48, R55	E-105-228	100E-00005-0083
R6	2.2K OHM 1/4W 5%	UI	MC14843	8	R49-R54	E-105-231	100E-00005-0083
R7	100K OHM 1/4W 5%	DS1	DISPLAY ASSY	1	R1, R2, R5, R7, R9, R11, R34, R56	E-105-331	100E-00001-0011
R8	2.2K OHM 1/4W 5%	J1	10 PIN WATER KR-106 (2)	1	R63	E-105-248	100E-00001-0011
R9	2.2K OHM 1/4W 5%	TP1-TP3	TEST LOOPS	15	R42	E-105-227	100E-00001-0011
R10	2.2K OHM 1/4W 5%		7 DIGIT DISPLAY PCB	1	R22, R24, R26, R33-R40, R55, R62	E-105-227	100E-00001-0011
R11	100K OHM 1/4W 5%		BUMPER	1	VR1	E-598-7	103E-00001-0028
R12	2.2K OHM 1/4W 5%			2	CR1, CR2	103E-00002-0005	103E-00002-0005
R13	1.5K OHM 1/4W 5%			7	Q7-Q12, Q21	E-585-32	0360-00802-0006
R14	300K OHM 1/4W 5%			15	R1-R6, R13-Q20, R22	E-585-33	0360-00802-0007
R15	1.5K OHM 1/4W 5%			1	UI	E-620-38	0360-00803-0014
R16	300K OHM 1/4W 5%			1	DS1	E-680-7	0360-00804-0022
R17	1.5K OHM 1/4W 5%			2		0095-00950-0000	0095-00950-0000
R18	300K OHM 1/4W 5%			2		0017-00032-0155	0017-00032-0155
R19	1.5K OHM 1/4W 5%			1		P-2399-1	0017-00032-0156
R20	1.5K OHM 1/4W 5%			1			0017-00031-0095
R21	1.5K OHM 1/4W 5%			1			0017-00031-0095
R22	300K OHM 1/4W 5%			1			0017-00031-0095
R23	1.5K OHM 1/4W 5%			1			0017-00031-0095
R24	300K OHM 1/4W 5%			1			0017-00031-0095
R25	1.5K OHM 1/4W 5%			1			0017-00031-0095
R26	300K OHM 1/4W 5%			1			0017-00031-0095
R27	1.5K OHM 1/4W 5%			1			0017-00031-0095
R28	300K OHM 1/4W 5%			1			0017-00031-0095
R29	1.5K OHM 1/4W 5%			1			0017-00031-0095
R30	300K OHM 1/4W 5%			1			0017-00031-0095
R31	1.5K OHM 1/4W 5%			1			0017-00031-0095
R32	300K OHM 1/4W 5%			1			0017-00031-0095
R33	1.5K OHM 1/4W 5%			1			0017-00031-0095
R34	300K OHM 1/4W 5%			1			0017-00031-0095
R35	1.5K OHM 1/4W 5%			1			0017-00031-0095
R36	300K OHM 1/4W 5%			1			0017-00031-0095
R37	1.5K OHM 1/4W 5%			1			0017-00031-0095
R38	300K OHM 1/4W 5%			1			0017-00031-0095
R39	1.5K OHM 1/4W 5%			1			0017-00031-0095
R40	300K OHM 1/4W 5%			1			0017-00031-0095
R41	1.5K OHM 1/4W 5%			1			0017-00031-0095
R42	300K OHM 1/4W 5%			1			0017-00031-0095
R43	1.5K OHM 1/4W 5%			1			0017-00031-0095
R44	300K OHM 1/4W 5%			1			0017-00031-0095
R45	1.5K OHM 1/4W 5%			1			0017-00031-0095
R46	300K OHM 1/4W 5%			1			0017-00031-0095
R47	1.5K OHM 1/4W 5%			1			0017-00031-0095
R48	300K OHM 1/4W 5%			1			0017-00031-0095
R49	1.5K OHM 1/4W 5%			1			0017-00031-0095
R50	300K OHM 1/4W 5%			1			0017-00031-0095
R51	1.5K OHM 1/4W 5%			1			0017-00031-0095
R52	300K OHM 1/4W 5%			1			0017-00031-0095
R53	1.5K OHM 1/4W 5%			1			0017-00031-0095
R54	300K OHM 1/4W 5%			1			0017-00031-0095
R55	1.5K OHM 1/4W 5%			1			0017-00031-0095
R56	300K OHM 1/4W 5%			1			0017-00031-0095
R57	1.5K OHM 1/4W 5%			1			0017-00031-0095
R58	300K OHM 1/4W 5%			1			0017-00031-0095
R59	1.5K OHM 1/4W 5%			1			0017-00031-0095
R60	300K OHM 1/4W 5%			1			0017-00031-0095
R61	1.5K OHM 1/4W 5%			1			0017-00031-0095
R62	300K OHM 1/4W 5%			1			0017-00031-0095
R63	1.5K OHM 1/4W 5%			1			0017-00031-0095



**REVISIONS**

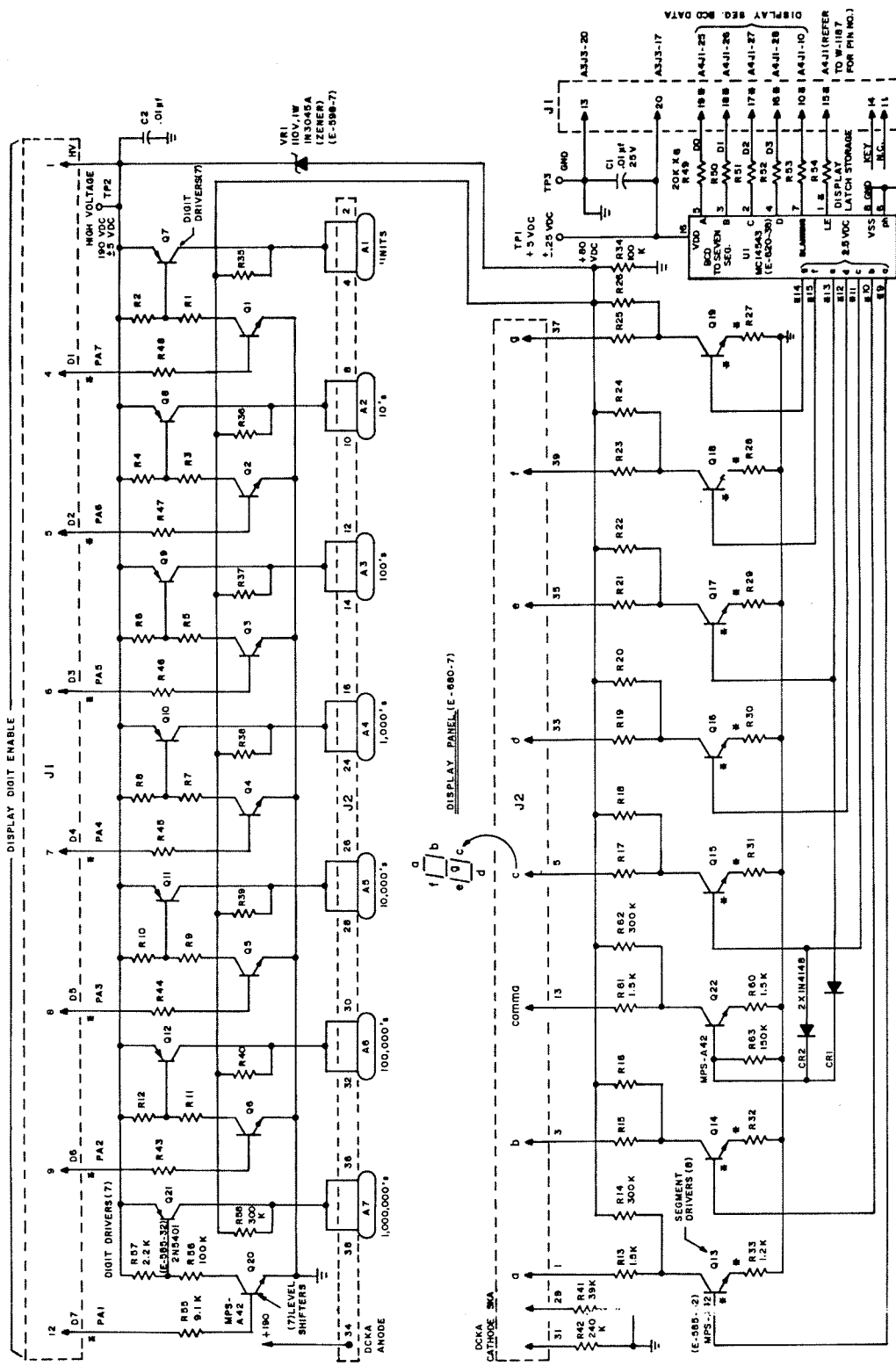
NO.	DESCRIPTION	DATE	BY	CHKD.

PROJECT ENG: D. MACDONALD  
 USED ON: FULL I PER  
 NO REQ I PER  
 SEVEN DIGIT DISPLAY ASSY DWG.  
 A082-91617-A000

PART NO: M051-00114 - A056

FRANKLIN, ILL.

DATE: 12 09 83



PROJECT ENG: D. MACDONALD  
 DO NOT CALL ORG  
 DATE: 5/13/83  
 DRAWN BY: [Signature]

USED ON: PINBALL  
 NO REQ: 1 PER  
 FULL

SEVEN DIGIT DISPLAY BOARD  
 SOLE SOURCE  
 A084-91617-A000

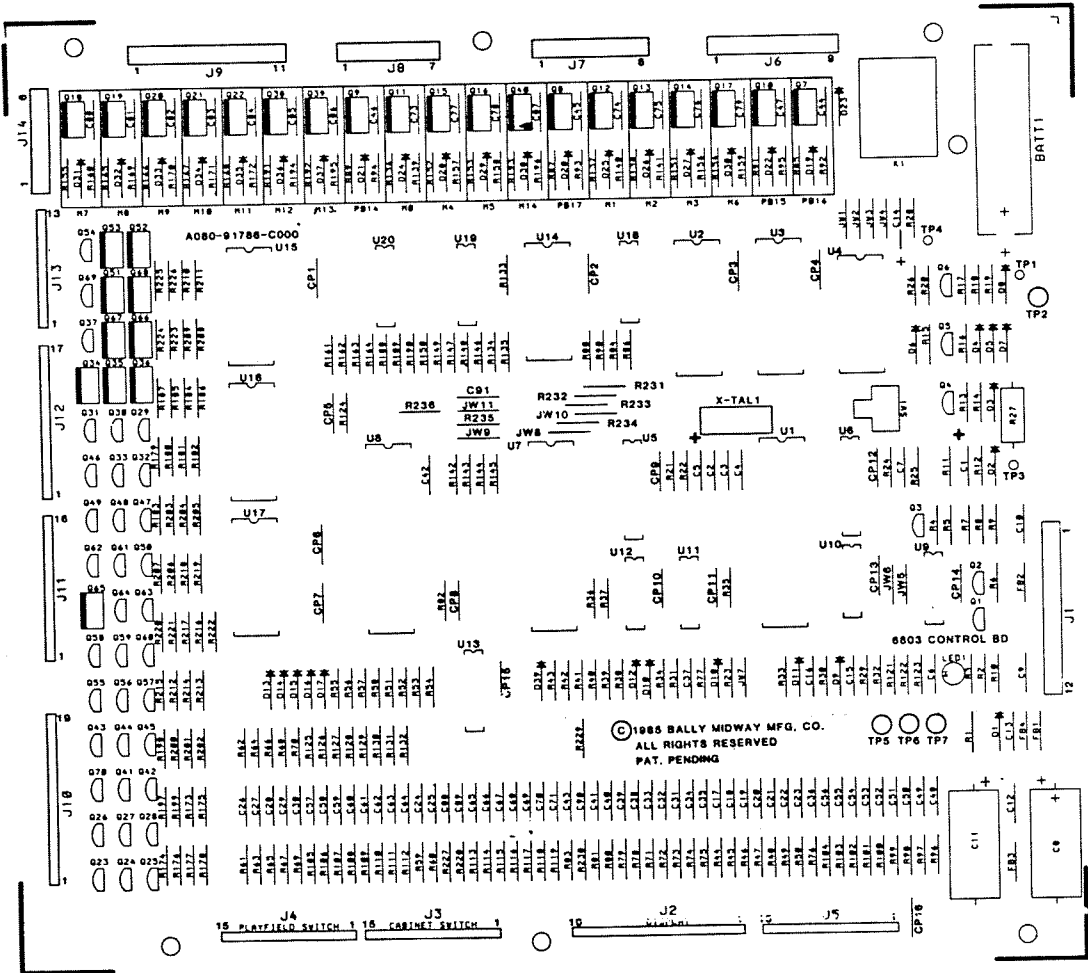
PART NO: M051-00114-A037

Midway Mfg. Co.  
 FRANKLIN, ILL.

- NOTES:
- 1) UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE  $\pm 5\%$ , 1/4 W.
  - 2) PREFIX ALL REFERENCE DESIG. WITH ASSY. REF. DESIG. "A1".
  - 3) \* INDICATES "AID" TEST POINT.

**DESIGNATION LIST**

DESIGNATION	DESCRIPTION
C1	6.8UF 25V TANT.
C2,C3	27PF 50V CER.
C4	4.7UF 50V CER.
C5	4.7UF 25V TANT.
C6	.01UF 50V CER.
C7	47PF 50V CER.
C8	470UF 16V ELEC.
C9,C10	.01UF 50V CER.
C11	470UF 25V ELEC.
C12,C13	.01UF 50V CER.
C14	4.7UF 25V TANT.
C15,C16	.01UF 50V CER.
C17 - C23	470PF 1KV CER.
C24 - C30	390PF 50V CER.
C31 - C36	470PF 1KV CER.
C37	.05UF 16V CER.
C38 - C41	470PF 1KV CER.
C42	.01UF 50V CER.
C43	.005UF 1KV CER.
C44 - C47	.002UF 1KV CER.
C48 - C56	470PF 1KV CER.
C57 - C71	390PF 50V CER.
C75 - C87	.002 1KV CER.
C88 - C90	390PF 50V CER.
C91	470PF 1KV CER.
CP1 - CP16	.01 50V CER.
R1	560 OHM 1/4W 5%
R2	2.7K 1/4W 5%
R3	1K 1/4W 5%
R4	9.1K 1/4W 5%
R5	7.5K 1/4W 5%
R6	2.7K 1/4W 5%
R7	39K 1/4W 5%
R8	100 OHM 1/4W 5%
R9	82 OHM 1/4W 5%
R10,R11	47K 1/4W 5%
R12,R13	10K 1/4W 5%
R14	82K 1/4W 5%
R15	62K 1/4W 5%
R16	5.6K 1/4W 5%
R17	3K 1/4W 5%
R18	910 OHM 1/4W 5%
R19	750 OHM 1/4W 5%
R20	1.5K 1/4W 5%
R21 - R23	3.3K 1/4W 5%
R24	120 OHM 1/4W 5%
R25	680 OHM 1/4W 5%
R26	100K 1/4W 5%
R27	82 OHM 1W 10%





DESIGNATION LIST

DESIGNATION	DESCRIPTION
R28	270 OHM 1/4W 5%
R29	1K 1/4W 5%
R30	10K 1/4W 5%
R31	15K 1/4W 5%
R32	1K 1/4W 5%
R33	10K 1/4W 5%
R34	15K 1/4W 5%
R35	3.3K 1/4W 5%
R36	4.7K 1/4W 5%
R44	1.2K 1/4W 5%
R51	3.3K 1/4W 5%
R59	1.2K 1/4W 5%
R62	56K 1/4W 5%
R63	1.2K 1/4W 5%
R64	56K 1/4W 5%
R65	1.2K 1/4W 5%
R66	56K 1/4W 5%
R67	1.2K 1/4W 5%
R68	56K 1/4W 5%
R69	1.2K 1/4W 5%
R70	56K 1/4W 5%
R71	1.2K 1/4W 5%
R77	270K 1/4W 5%
R78	1.2K 1/4W 5%
R83	110 OHM 1/4W 5%
R84	3.9K 1/4W 5%
R85	120 OHM 1/4W 5%
R86	3.9K 1/4W 5%
R87	120 OHM 1/4W 5%
R88	3.9K 1/4W 5%
R89	120 OHM 1/4W 5%
R90	3.9K 1/4W 5%
R91	120 OHM 1/4W 5%
R92	330 OHM 1/4W 5%
R96	470 OHM 1/4W 5%
R105	1.2K 1/4W 5%
R121	120 OHM 1/4W 5%
R122	1.2K 1/4W 5%
R123	2K 1/4W 5%
R124	3.3K 1/4W 5%
R125	56K 1/4W 5%
R133	1.2K 1/4W 5%
R135	120 OHM 1/4W 5%
R136	330 OHM 1/4W 5%
R139	1.2K 1/4W 5%
R142	3.3K 1/4W 5%
R145	1.2K 1/4W 5%
R150	120 OHM 1/4W 5%
R151	330 OHM 1/4W 5%
R156	1.2K 1/4W 5%
R161	1.2K OHM 1/4W 5%

DESIGNATION LIST

DESIGNATION	DESCRIPTION
R165	120 OHM 1/4W 5%
R169	330 OHM 1/4W 5%
R173	2K 1/4W 5%
R188	1.2K 1/4W 5%
R191	120 OHM 1/4W 5%
R194	330 OHM 1/4W 5%
R197	2K 1/4W 5%
R227,R228	1.2K 1/4W 5%
R229	56K 1/4W 5%
R230	1.2K 1/4W 5%
R231	330 OHM 1/4W 5%
R235	3.3K 1/4W 5%
R236	1.2K 1/4W 5%
D1	1N958B
D2	1N4606
D3	1N4148
D4,D5	1N4606
D6	1N4148
D7,D8	1N4606
D9	1N4148
D19	1N4004
D39	1N4148
O1	2N5305
O2	2N3904
O3	2N4403
O4	2N3904
O5	2N4403
O6	2N3904
O7	07 - 022
O23	023 - 033
O34	034 - 036
O37	MCR 106-1
O38	2N5060
O41	SE9302
O41	2N5060
O51	MCR 106-1
O54	2N5060
O65	MCR 106-1
O69,O70	2N5060
U1	6803
U4	6116 RAM
U5	74HCT245
U6	74LS373
U7,U8	6821
U9	74LS10
U10	74LS04
U11	4011
U12	4584
U13	4502
U14	74LS154

CROSS REFERENCE LIST

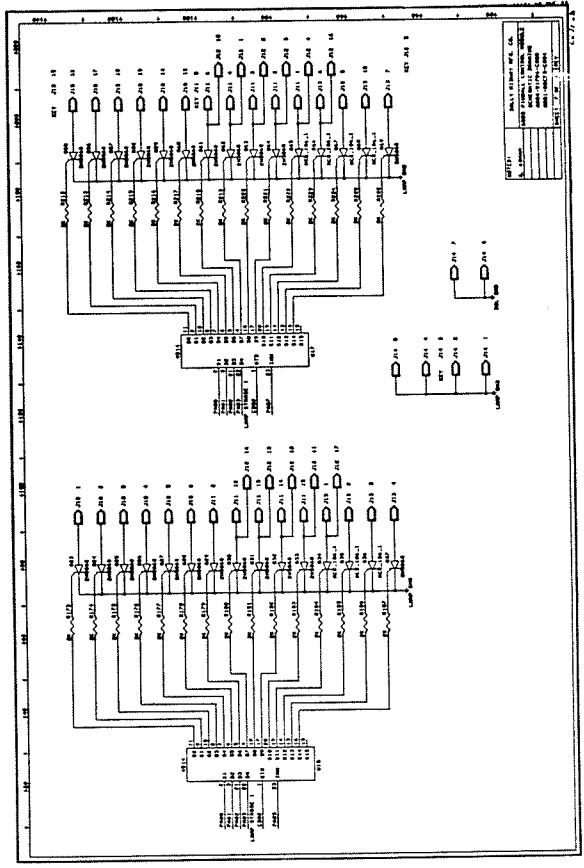
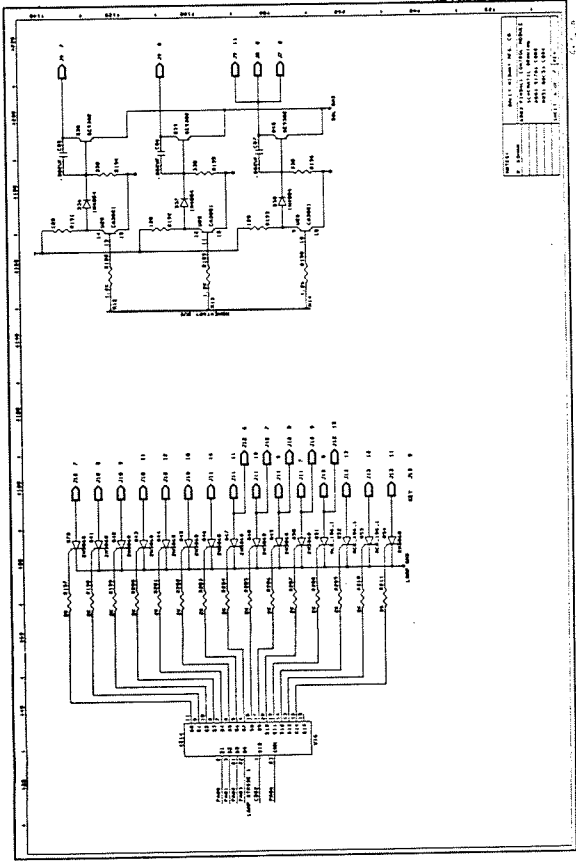
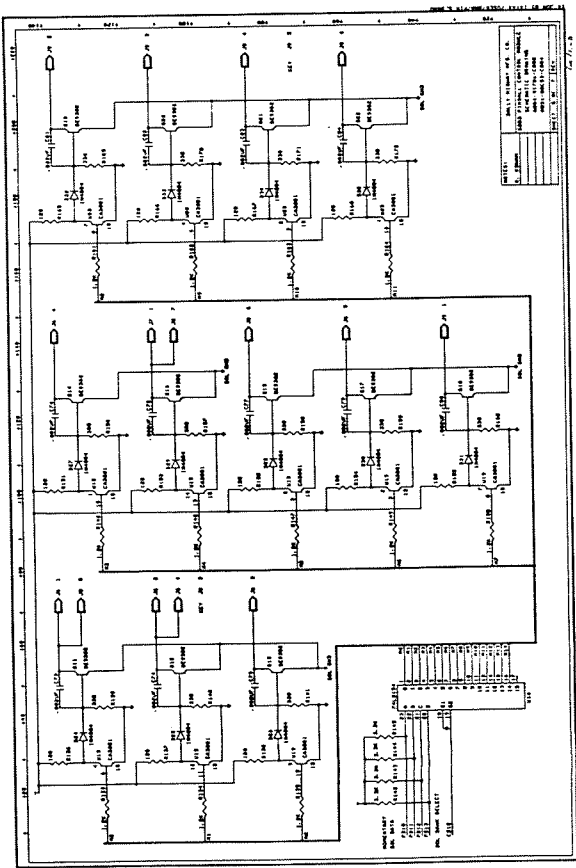
DESIGNATION LIST

DESIGNATION	DESCRIPTION	QTY.	DESCRIPTION NO.	PART NOS.
U15 - U17	4514B	2	C2, C3	0360-00800-0052
U18 - U20	CA3081	1	C7	0360-00800-0027
XTAL-1	3.580 MHZ CRYSTAL	25	C24-C30, C57-C71	0360-00800-0001
LED 1	LED GREEN		C88-C90	0360-00800-0003
TP1 - TP7	TEST POINTS	27	C17-C23, C31-C36, C91	0360-00800-0012
SW1	RELAY P.B.	19	C43-C47, C73-C87	0360-00800-0014
BATT-1	BATTERY 3.6V	1	C6, C9, C10, C12, C13	0360-00800-0006
JW2	ZERO OHM RES. JUMPER	1	C15, C16, C42, CP1-CP16	0360-00800-0058
JW4	ZERO OHM RES. JUMPER	1	C4	0360-00800-0008
JW6	ZERO OHM RES. JUMPER	2	C5, C14	0360-00800-0048
JW8	ZERO OHM RES. JUMPER	1	C8	0360-00800-0022
JW10	ZERO OHM RES. JUMPER	1	C11	0360-00800-0024
K1	RELAY 48V DC	1	R9	100E-00005-0031
XU1, XU7, XU8	40 PIN IC SOCKET	1	R8	100E-00005-0033
XU2, XU3	28 PIN IC SOCKET	1	R83	100E-00005-0034
XU4	24 PIN IC SOCKET	1	R24, R85, R87, R89,	
FBI - FRA	FERRITE BEAD	1	R91, R121, R136-R138,	
J1	11 - .045 SO. PINS	1	R151-R155, R165-R168,	
J2	18 - .025 SO. PINS	21	R191-R193	100E-00005-0044
J3	14 - .025 SO. PINS		R28	100E-00005-0047
J4	14 - .025 SO. PINS		R92-R95, R139-R141,	
J5	6 - .045 SO. PINS		R156-R160, R169-R172,	
J6	7 - .045 SO. PINS		R194-R196, R231-R234	
J7	6 - .045 SO. PINS		R96-R104	100E-00005-0051
J8	10 - .045 SO. PINS		R1	100E-00005-0054
J9	18 - .025 SO. PINS	9	R1	100E-00005-0056
J10	17 - .025 SO. PINS	1	R25	100E-00005-0057
J11	16 - .025 SO. PINS	1	R19	100E-00005-0059
J12	12 - .025 SO. PINS	1	R18	100E-00005-0061
J13	5 - .045 SO. PINS	3	R3, R29, R32	100E-00005-0063
P/O BATT-1	TY-WRAP	60	R44-R50, R59-R61, R63,	
6803 CONTROL BD.	P.C. BOARD		R65, R67, R69, R71-R76	
			R78-R82, R105-R119, R122	
			R133-R135, R146-R150,	
			R161-R164, R188-R190,	
			R227, R228, R230, R236	
			R20	100E-00005-0065
			R123, R173-R187	100E-00005-0068
			R197-R226	
			R2, R6	100E-00005-0071
			R17	100E-00005-0073
			R21-R23, R35, R51-R58,	
			R124, R142-R145, R235	100E-00005-0074
			R84, R86, R88, R90	
			R36-R43	100E-00005-0077
			R16	100E-00005-0082
				100E-00005-0082

CROSS REFERENCE LIST

DESCRIPTION	QTY.	DESIGNATION NO.	PART NOS.	DESCRIPTION	QTY.	DESIGNATION NO.	PART NOS.
7.5 1/4W 5%	1	R5	100E-00005-0085	.025 SQ. PINS	123	J2, J3, J4, J5, J10,	0304-00804-0009
9.1 1/4W 5%	1	R4	100E-00005-0087	.045 SQ. PINS	47	J11, J12, J13	0304-00804-0010
10K 1/4W 5%	4	R12, R13, R30, R33	100E-00005-0088	TY-WRAP	1	J1, J6, J7, J8, J9, J14	0017-000/2-0622
15K 1/4W 5%	2	R31, R34	100E-00005-0092	P.C. BOARD	1	P/O BATT-1	A080-91786-C000
39K 1/4W 5%	1	R7	100E-00005-0102				
47K 1/4W 5%	2	R10, R11	100E-00005-0104				
56K 1/4W 5%	14	R62, R64, R66, R68	100E-00005-0106				
		R70, R125-R132, R229					
62K 1/4W 5%	1	R15	100E-00005-0107				
82K 1/4W 5%	1	R14	100E-00005-0112				
100K 1/4W 5%	1	R26	100E-00005-0115				
270K 1/4W 5%	1	R77	100E-00005-0126				
82 OHM 1W 10%	1	R27	100E-00007-0014				
1N958B ZENER	1	D1	103E-00001-0002				
1N4004	20	D19-D38	103E-00003-0005				
1N4148	13	D3, D6, D9-D18, D39	103E-00002-0005				
1N4606	5	D2, D4, D5, D7, D8	103E-00002-0006				
2N3904	3	Q2, Q4, Q6	104E-00001-0006				
2N4403	2	Q2, Q5	104E-00002-0006				
2N5060	35	Q23-Q33, Q37, Q41-Q50,	104E-00015-0001				
		Q54-Q64, Q69, Q70					
2N5305	1	Q1	104E-00007-0003				
MCR108-1	10	Q34-Q36, Q51-Q53	0360-00802-0009				
SE9302	19	Q7-Q22, Q38-Q40	0360-00802-0008				
4011	1	U11	0360-00803-0010				
4502	1	U13	0360-00803-0005				
4514B	3	U15-U17	0360-00803-0013				
4584	1	U12	0066-0908X-XXDX				
6116 RAM	1	U4	0365-00803-0013				
6803 MPU	1	U1	0360-00803-0048				
6821 PIA	2	U7, U8	0360-00803-0017				
74LS04	1	U10	0A15-00803-0010				
74LS10	1	U9	0A89-00803-0007				
75LS154	1	U14	0360-00803-0024				
74HCT245	1	U5	0365-00803-0014				
74LS373	1	U6	0A89-00803-0006				
CA3081	3	U18-U20	0360-00803-0007				
3.580 MHZ CRYSTAL	1	XTAL-1	109E-00001-0003				
LED GREEN	1	LED 1	0017-00007-0131				
TEST POINTS	7	TP1-TP7	0017-00007-0131				
SWITCH P.B.	1	SW1	0017-00032-0038				
BATTERY 3.6V	1	BATT-1	0017-00003-0172				
ZERO OHM RES. JUMPER	5	JW2, JW4, JW6, JW8,	117E-00001-0001				
		JW10					
RELAY 48VDC	1	K1	114E-00001-0011				
28 PIN I.C. SOCKET	2	XU2, XU3, XU8	110E-88881-8816				
24 PIN I.C. SOCKET	1	XU4	110E-00001-0007				
FERRITE BEAD	4	FB1-FB4	0316-00804-0002				





BEAT THE CLOCK LAMP DRIVER LOCATIONS

SCR	CONNECTOR PIN	LAMP	PHASE	WIRE CODE
032	J12-11	ADD .85/SEC	"B"	98
033	J18-18	BONUS .85K	"A"	58
034	J18-4	BONUS 18K	"A"	41
035	J18-11	BONUS 28K	"A"	58
036	J18-19	BONUS 28K	"A"	18
037	J18-12	BONUS 38K	"A"	68
038	J18-14	BONUS 38K	"A"	34
039	J18-6	BONUS 48K	"A"	36
040	J18-19	BONUS 58K	"A"	57
041	J18-13	BONUS 58K	"A"	51
042	J18-13	BONUS 188K	"A"	67
043	J11-16	BONUS 208K	"A"	63
044	J11-11	CLOCK RUNNING	"A"	03
045	J11-4	CLOCK STOPPED	"A"	13
046	J12-9	CREDIT BONUS	"A"	61
047	J12-9	CREDIT BONUS	"A"	61
048	J18-17	DOUBLE SCORE	"A"	45
049	J18-17	DOUBLE SCORE	"A"	12
050	J18-17	DOUBLE SCORE	"A"	62
051	J18-17	DROP TARGETS 88K	"B"	52
052	J18-3	DROP TARGETS 188K	"B"	92
053	J18-3	DROP TARGETS 188K	"B"	92
054	J18-3	DROP TARGETS 188K	"B"	92
055	J18-17	CAME OVER'S SPCL.	"A"	35
056	J12-4	HIGH SCORE	"A"	97
057	J12-4	HIGH SCORE	"A"	15
058	J13-1	LANE "A"	"B"	34
059	J13-1	LANE "B"	"B"	14
060	J13-8	LANE "C"	"B"	14
061	J13-6	LEFT OUTLANE	"B"	38
062	J13-6	LEFT RETURN LANE	"B"	73
063	J12-12	LEFT START	"A"	01
064	J18-16	MATCH	"A"	01
065	J18-1	N/U	"A"	62
066	J18-9	N/U	"A"	56
067	J18-9	N/U	"A"	67
068	J11-8	N/U	"B"	51
069	J12-13	N/U	"B"	51
070	J13-2	N/U	"B"	53
071	J18-18	N/U	"B"	53
072	J12-15	N/U	"B"	52
073	J12-15	N/U	"B"	52
074	J18-13	N/U	"B"	51
075	J13-3	RIGHT RETURN LANE	"A"	92
076	J13-12	RIGHT LANE 2X	"B"	57
077	J13-18	RIGHT LANE 5X	"B"	72
078	J13-18	RIGHT LANE 8X	"B"	72
079	J13-18	RIGHT LANE 48K	"B"	54
080	J13-7	RIGHT LANE SPCL.	"B"	54
081	J12-3	RIGHT OUTLANE	"B"	23
082	J12-2	RIGHT START	"B"	58
083	J18-19	SAUCER 28K	"B"	41
084	J18-11	SAUCER 38K	"B"	18
085	J18-19	SAUCER 48K	"B"	43
086	J18-5	SAUCER 48K	"B"	18
087	J18-5	SAUCER 58K	"B"	59
088	J18-5	SAUCER 188K	"B"	21
089	J18-4	SAUCER 188K	"B"	21
090	J18-16	SAUCER SPCL.	"B"	36
091	J18-16	STOP "O"	"B"	71
092	J18-12	STOP "P"	"B"	45
093	J18-1	STOP "S"	"B"	61
094	J18-7	STOP "T"	"B"	56
095	J18-7	STOP "T"	"B"	35
096	J12-16	TIME #1	"A"	12
097	J12-16	TIME #2	"A"	45
098	J15-14	TIME #3	"B"	33
099	J15-6	TIME #4	"B"	63
100	J18-1	TIME #5	"A"	52
101	J11-13	TIME #5	"A"	25
102	J11-3	TIME 18	"A"	73
103	J11-3	TIME 18	"A"	73
104	J11-15	TIME 15	"A"	73

BEAT THE CLOCK LAMP DRIVER LOCATIONS

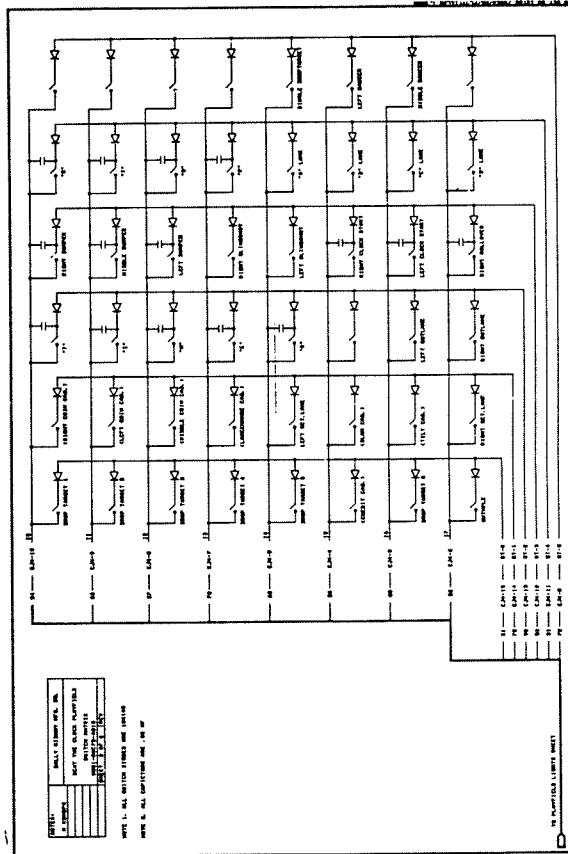
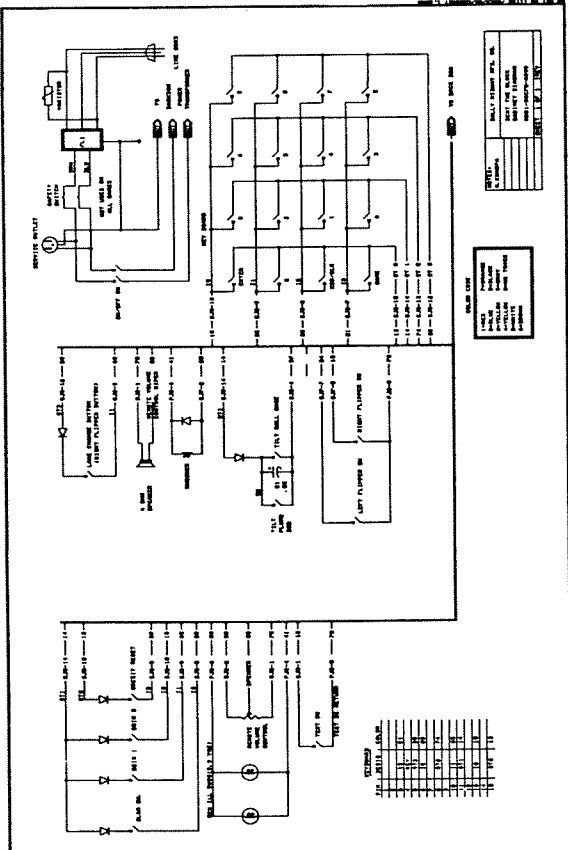
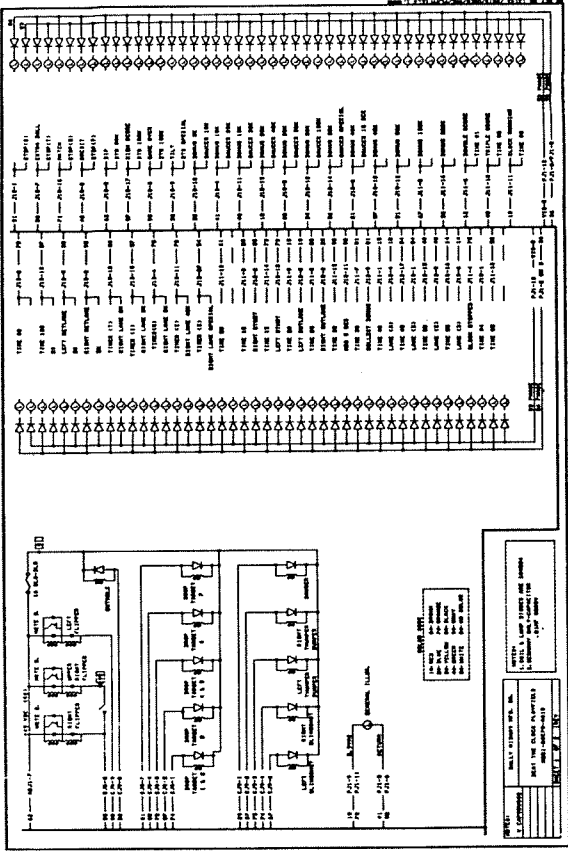
SCR	CONNECTOR PIN	LAMP	PHASE	WIRE CODE
049	J11-9	TIME 28	"A"	18
050	J11-9	TIME 28	"A"	23
051	J11-7	TIME 35	"A"	58
052	J11-7	TIME 35	"A"	91
053	J12-17	TIME 48	"A"	13
054	J12-15	TIME 55	"A"	48
055	J12-15	TIME 55	"A"	14
056	J12-15	TIME 55	"A"	78
057	J13-3	TIME 128	"A"	57
058	J13-11	TIMER "E"	"A"	57
059	J13-18	TIMER "A"	"A"	78
060	J13-4	TIMER "H"	"A"	78
061	J13-4	TIMER "R"	"A"	54
062	J13-12	TIMER "T"	"A"	88
063	J13-13	TRIPLE SCORE	"A"	45
064	J13-5	2X	"B"	58
065	J13-5	3X	"B"	58
066	J13-5	5X	"B"	58

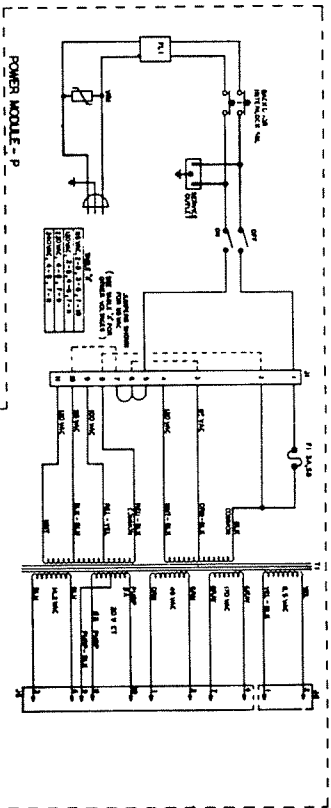
BEAT THE CLOCK SOLENOID DRIVER LOCATIONS

TRANSISTOR	CONNECTOR/PIN	COIL	WIRE CODE
Q78	J7-2	KNOCKER	89
Q79	J7-2	LEFT BUMPER	76
Q80	J8-3	LEFT SAUCER	29
Q81	J8-7	LEFT SLINGSHOT	81
Q82	J6-2	MIDDLE BUMPER	87
Q83	J9-8	OUTHOLE BUMPER	76
Q84	J6-1	RIGHT BUMPER	87
Q85	J3-2	RIGHT SAUCER	87
Q86	J9-3	RIGHT SLINGSHOT	96
Q87	J9-3	SINGLE DROPTARGET RESET	76
Q88	J9-4	1-6 DROPTARGET RESET	74

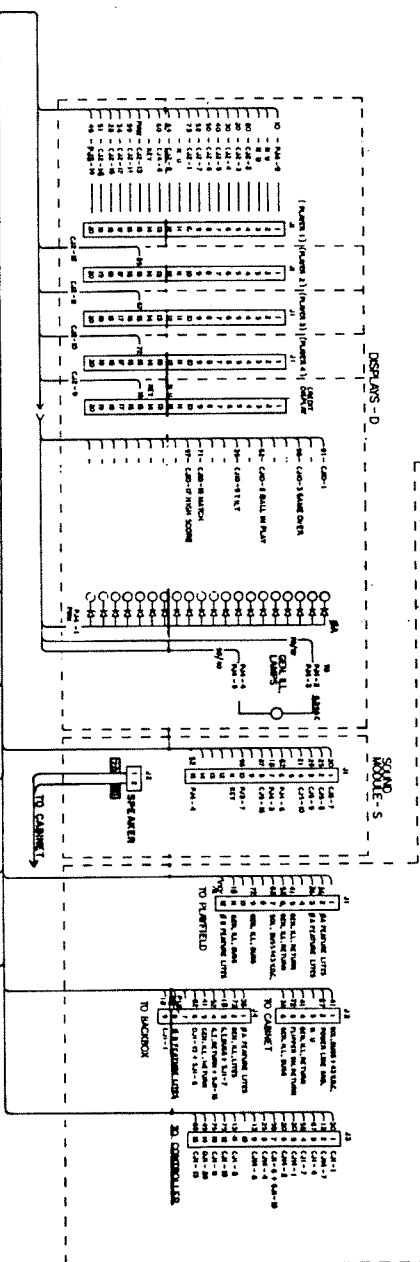
WIRE COLOR CODE

1-RED -R-	6-BROWN -BR-
2-BLUE -BLU-	7-ORANGE -O-
3-YELLOW -Y-	8-GRAY -G-
4-RED -R-	9-GRAY -G-
5-WHITE -W-	8-NO TRACER
1-FIRST NUMBER-BODY COLOR	
2-SECOND NUMBER-TRACER COLOR	
EXAMPLE: 58 - WHITE-RED	



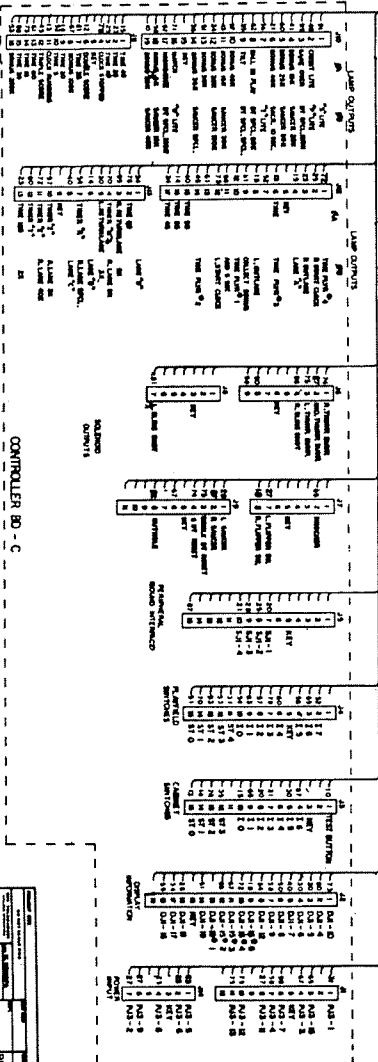


POWER MODULE - P



SPEAKERS - D

SOUND MODULE - S



CONTROLLER BD - C

WIRE GAUGE	COLOR	TO
14	RED	115V 1/2 AMP
14	BLACK	115V 20 AMP
14	WHITE	115V 1/2 AMP
14	GREEN	115V 20 AMP
14	BROWN	115V 1/2 AMP
14	PURPLE	115V 20 AMP

REAR THE CLOCK	
DATE	TIME
BY	NO.
MKS-00C70-100	



**BALLY/MIDWAY'S BEAT THE CLOCK PIN**

**#C70**

**ROM/EPROM PART NUMBERS**

UNPROGRAMMED CONTROL BOARD A084-91786-C000

PROGRAMMED CONTROL BOARD A084-91786-AC70

POS.	MIDWAY PART NUMBER
U3	0C70-00803-0005

JUMPERS	IN	OUT
JW1		**
JW2	**	
JW3		**
JW4	**	
JW5		**
JW6	**	
JW7		**
JW8	**	
JW9		**
JW10	**	
JW11		**

UNPROGRAMMED SQUAWK & TALK A084-91625-A000

PROGRAMMED SQUAWK & TALK A084-91625-AC70

POS.	MIDWAY PART NUMBER
U3	0C70-00803-0002
U4	0C70-00803-0003
U5	0C70-00803-0004
U2	0C70-00803-0001

JUMPERS	IN	OUT
A		**
R		**
C	**	
D	**	
E	**	
F		**
G	**	
H	**	
J		**
K		**
L	**	
M		**
N	**	
P		**
O	**	
R		**
S	**	
T		**
U	**	
V		**
W	**	
X		**
Y	**	
Z		**
AA	**	
BB		**
CC		**
DD	**	
EE		**
FF	**	

M051-00C70-R009	REVISIONS
11-07-85	RELEASE FOR PRODUCTION

