



HEAVY METAL



Operating Manual



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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 instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a CLASS A computing device pursuant to SUBPART J of PART 15 of FCC RULES, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever 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

Invites You To Use

**OUR TOLL FREE NUMBER FOR
SERVICE INFORMATION CONCERNING THIS GAME, OR ANY
OTHER BALLY/MIDWAY™ GAME YOU NOW HAVE ON LOCATION.**

**CALL US FOR PROMPT, COURTEOUS
ANSWERS TO YOUR PROBLEMS.**

Video or Pinball - Continental U.S. 800-323-7182

Bally
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Printed in U.S.A.

"IMPORTANT NOTICE-5 BALL"

**ALL 5 PLAYFIELD BALLS MUST BE INSERTED
IN THE OUTHOLE TROUGH.**

**GAME WILL NOT START IF THERE IS A
BALL IN SHOOTER LANE IN GAME OVER MODE.**

M051-00365-A045

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BLOCK DIAGRAM—ELECTRONIC PINBALL GAME

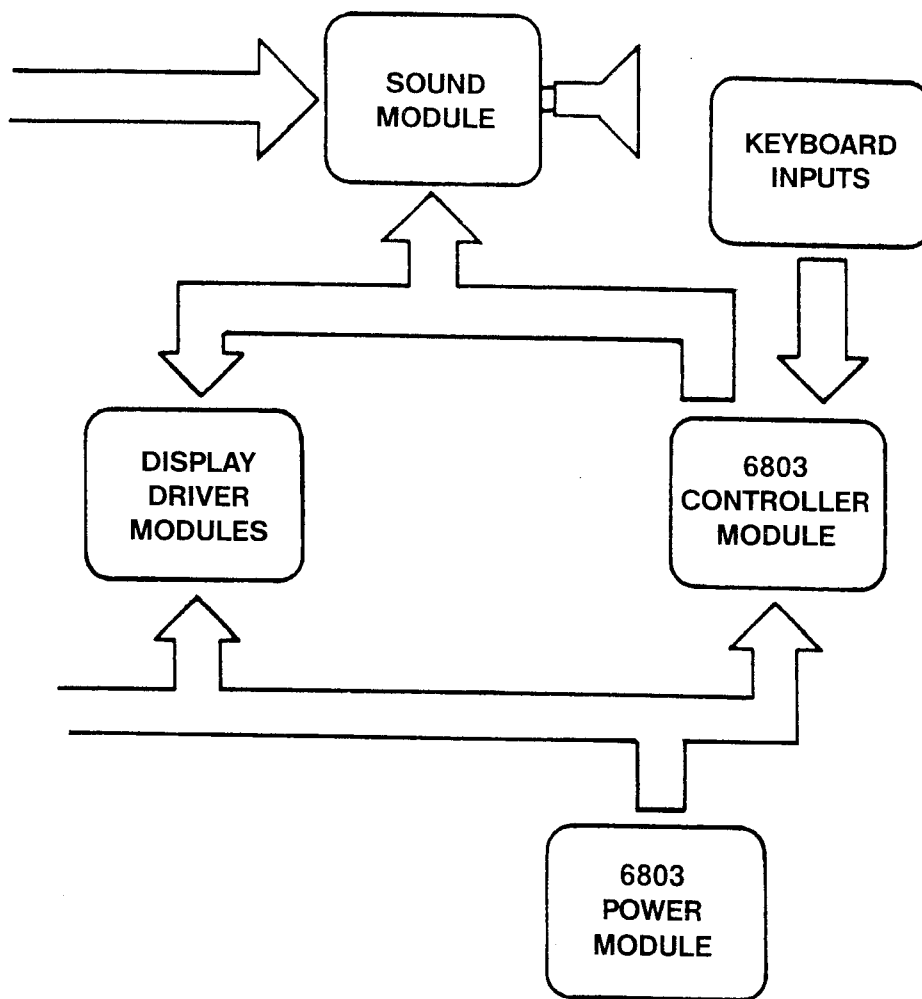


FIGURE I.

DETACHING OF PIN-GAME BACK BOX-

When the back box is in an up-right position and the 3/8" hold-down bolts are removed, the back box can be removed from the main cabinet by lifting the right corner of the back box (about 3/4") and pulling it slightly towards you. Now both hinges are disengaged and the back box can be removed.

SECTION 1

I. INSTALLATION

First, bolt legs to cabinet. Second, feed line cord between back box and cabinet then lift the back box and secure with bolts. Insert the smaller ball (15/16" dia.) into the ball tilt assembly, and adjust the bracket so the ball will roll free to the contact switch blade, if the front of the cabinet is raised.

On all games these are certain items that should be checked after shipment.

1. Check that all cable connectors are completely seated on printed circuit assemblies.
2. Check that all cables are clear of moving parts.
3. Check for wires that may have been 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 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 and adjust the plumb bob tilt on the left side of the cabinet.
8. Check wiring of the plug on the transformer to correspond to location voltage.
 - 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
9. Place ball into playfield by outhole (or balls if the game requires more than one ball).
10. Plug in line cord.

II. GENERAL GAME OPERATION

Move the ON/OFF switch at the bottom right front corner of the cabinet to "ON" position. The game will play a power-up sequence and reset the drop targets. If any switches are stuck they will be displayed at this time. After a short delay "1-4 can play" will indicate that the game is ready to play. The game should accept the coin and post the appropriate credits. Pressing the credit button on the cabinet will cause the outhole kicker to serve the ball to the shooter alley. A game-up sequence is played to announce play-readiness.

Each time the credit button is pressed it posts one player and the credits are reduced by one.

Shooting the ball initiates play.

The game awards all points earned by the player. If a 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 bonus score is added to the total score. The player-up and/or ball in play is advanced one position. The outhole kicker serves the ball to the shooter alley and play is resumed. This continues until each player has played the allowable number of balls per game. At this time a random Match number appears. If the number is the same as the last two digits in a player's score, a free game is awarded.

Extra balls won during the course of the game are played immediately after the player's regular ball enters the outhole. The player-up and/or ball in play are not advanced for extra score before the game serves the extra ball for play.

Slamming the machine results in loss of the game. This causes all feature lights to go out, the game goes "dead" and a time delay occurs. This occurs anytime either one of the slam switches make contact. This is to discourage unnecessary abuse to the game. After the delay, "1 to 4 can play" is displayed followed by the power-up sound sequence.

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.

If at the end of the game either the "High Score to Date" is beaten or if the score is over 10,000,000 free games will be awarded according to the "High Score to Date" register setting.

Tilting the game results in loss of a ball. Bonus points are not scored. 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.

NOTE: These are general instructions. Therefore, if a spinner or Drop Target is not used on your specific pinball game, please disregard any operating instructions related to these devices.

III. TAILORING & TESTING THE GAME

INTRODUCTION

We at Bally/Midway are very proud to introduce our new system which not only provides more information to the operator but it also communicates with the player thru the use of alphanumeric.

It was our aim to design a system which could be used without a manual. This will come to light the moment you press the Self-test button and the displays come to life with their messages of assistance. This allows you to change game features, awards and threshold settings and monitor specific special awards, game percent and income just by reading what is displayed. The registers are now described with useful titles such as "Book-keeping Data" or "Self-Testing."

If you've ever changed the replay thresholds on a machine and you forgot to change the replay card because you were distracted by a customer, listen to this: "It will never happen again!" For when you change this replay threshold to 2,000,000 in "Percent Options" the corresponding message; "First Replay at 2,000,000" will be displayed on Game Over.

OPERATION

The keyboard is located on the right inside wall of the game near the front door. The cable is long enough, so that once the keyboard is removed, it may be operated from outside the machine. **Note:** The keypad is mounted with a 1/4" Hex screw for shipping purposes.

1. Press the Test button located on the front door. This tells the processor to do the following;
 - A. It checks the switches wired in parallel with the keypad. If any switches are closed the game automatically jumps to Stuck Switch Test and displays a stuck switch message.
 - B. If there were no stuck switches you will be welcomed with "Bally's Testing Is Easy As ABC."
2. When appropriate heading appears on backglass display, press "Enter" on keypad once. Within each heading, there are categories which are operator selectable. When the appropriate category appears on the backglass display, press "Enter" once to access that category.
3. Set your registers with keypad.
4. Press "Enter" again to advance to next category setting. Press "CLR" to re-start Self-Test. Press "Game" to lock-in option settings.

STEPPING THROUGH

To choose a category quickly once the Test Mode has been selected just use the "A" button to step to the desired category. If you pass by the category you desired, use the "B" button to back-up to the appropriate position. Once you read the category desired, press the "ENTER" button to select that topic. The display will now show the first item in that category.

Again, use the "A" and "B" buttons to quickly step to the item you wish to look at or change. The "A" button allows you to step to the end of a category and then out to the next category. The "B" button allows you to step backwards in the same manner. **Please note:** When in the Self-Test category, the display will cycle automatically from one test to the next. Because the "A", "B", and "C" buttons are used for different functions in this category. They cannot be used to step from one test to another properly. To exit a test in this category just press the ENTER button & step to the next test.

SELF-PERCENTAGING

1. The term Self-Percentaging refers to the game's ability to automatically adjust the score level of Threshold 1 to attain a desired replay percentage, also known as the TARGET PERCENT. (see article #8)
2. Self-Percentaging also applies to extra balls, when used instead of replays.
3. Initially, a minimum of 200 games must be played before the Self-Percentaging Process goes into effect. It then monitors the current replay percentage of Threshold 1 **ONLY** and makes an adjustment, if necessary, every 50 games.
4. The Self-Percentaging Process will automatically adjust the score level of Threshold 1 **ONLY**. It makes NO adjustments to OTHER "Award" features in the game.
5. Located within the "PERCENT OPTIONS" category of your game's test mode are the following registers:
 - THRESHOLD 1
 - SELF PERCENT
 - TARGET PERCENT
 - THRESHOLD 1 PERCENT

Each of these registers are explained in detail further in this text.

6. To set or check the current score level of Threshold 1:
 - A. "Step through" your game's test mode, using the "A" or "B" button on the keypad, until you reach a category titled: "PERCENT OPTIONS."
 - B. Press the "ENTER" button to select this category.
 - C. The first register displayed will be THRESHOLD 1.

THRESHOLD 1—This register displays the current score level of the 1st Replay Threshold. Enter any value from 0 to 9,999,999 to set the desired score level.

7. To activate the Self-Percentaging Process:
 - A. "Step through" your game's test mode, using the "A" or "B" button on the keypad, until you reach a category titled "PERCENT OPTIONS."
 - B. Press the "ENTER" button to select this category.
 - C. Again, use the "A" button to "step through" until you reach a register titled: "SELF PERCENT."

SELF PERCENT—This register displays whether the Self-Percentaging Process is OFF or ON. Enter "0" to turn OFF or "1" to turn ON.

8. To adjust the desired Replay Percentage for Threshold 1:
 - A. "Step through" your game's test mode, using the "A" or "B" button on the keypad, until you reach a category titled "PERCENT OPTIONS."
 - B. Press the "ENTER" button to select this category.
 - C. Again, use the "A" button to "step through" until you reach a register titled: "TARGET PERCENT."

TARGET PERCENT—This register displays the desired percentage of replays to be awarded for reaching Threshold 1. For example, if you want Threshold 1 to award a replay in 15% of the games played, you would press keys "1," "5" and then "ENTER." This register will then display "15%" as your goal or "TARGET PERCENT."

NOTE: This register automatically defaults to a factory setting of "10%," when the "FACTORY RESET" register is enabled.

9. The TOTAL Replay Percentage will be 10% or 15% higher with the addition of Match, Special and High Score to Date credits.
10. To manually check the current replay percentage of Threshold 1 ONLY:
 - A. "Step through" your game's test mode, using the "A" or "B" button on the keypad, until you reach a category titled "PERCENT OPTIONS."
 - B. Press the "ENTER" button to select this category.
 - C. Again, use the "A" button to "step through" until you reach a register titled: "THRESHOLD 1 PERCENT."

THRESHOLD 1 PERCENT—The figure displayed in this register is the actual percentage of replays awarded for reaching Threshold 1. Progress of the Self-Percentaging Process may be monitored by comparing the current value displayed in this register with the "TARGET PERCENT."

11. The size of adjustment, made by the Self-Percentaging Process to the score level of Threshold 1, is determined by the current difference between the "TARGET PERCENT" (entered by the operator) and the actual percentage of replays awarded for reaching Threshold 1.
 - A difference of 10% or more will result in a 10% adjustment.
 - A difference equal to or greater than 5%, but less than 10%, will result in a 5% adjustment.
 - A difference less than 5% will result in a 1% adjustment.

12. To check the current score level of Threshold 1, refer to article #6.

13. When the "CLEAR BOOKKEEPING" register is enabled, the Self-Percentaging Process is reinitiated.

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IV. GAME REGISTERS & OPTIONS

BOOKKEEPING DATA

Total Coins	Number of coins thru chutes 1, 2, & 3
Game Percent	Percentage of replays
Coins Chute 1	# of coins thru chute 1
Coins Chute 2	# of coins thru chute 2
Coins Chute 3	# of coins thru chute 3
Bonus Credits	Number of Bonus Credits Given
Total Plays	Number of plays both paid and replays
Total Replays	Number of awarded games
Service Meter	Total # of service credits
Game Credits	Current game credits—Enter 0 thru 5 Added to Service Meter. <u>Not</u> added to current Game Credits.
Special Meter	Total # of Playfield Specials awarded
Clear Booking	To clear bookkeeping press "65" then "Enter"

SELF-TESTING

Single Lamp	Steps one lamp at a time, and Connector I.D. Press "A" to advance, "B" to backup, and "C" to cycle
All Lamps	All lamps light alternately, 1st "A" phase then "B"
Display	Steps thru alphanumeric character set
Solenoid	Fires one driver at a time, and Displays Driver and Connector I.D.
Single Solenoid	Fires one driver at a time. Press A for same solenoid, B for next
Sound	Plays game sounds
Game Rom I.D.	Displays your Rom or Roms I.D.
Switch Test	Displays stuck switch by description

PRESS TEST BUTTON ON DOOR TO EXIT SWITCH TEST

PERCENT DATA VALUES

Game Percent	Percentage of replays
Total Plays	Number of plays both paid and replays
Game Time	Total number of minutes
Total Replays	Total number of replays
Threshold 1	# of times the first threshold was beaten
Threshold 2	# of times the second threshold was beaten
Threshold 3	# of times the third threshold was beaten
HiScore Beaten	Total number of times the high score was beaten
X-Balls Awarded	# of extra balls awarded
Field Special	# of Specials awarded by hitting LEVEL 1 bullseye target.
Times Meltdown	# of times 5-ball multi-ball sequence was made
Times Heavy	# of times H-E-A-V-Y was completed
Times Metal	# of times M-E-T-A-L was completed
Times Jam	# of times J-A-M was completed
Times Ball Out	# of times Power Amp Shot was made
Times Loaded	# of times ball was loaded into Power Amp

PERCENT OPTIONS

Threshold 1	Enter 0 thru 9,999,999; sets award level and display
Self Percent	Enter 0 or 1; 0 disables Self-Percentaging Process, 1 enables Self-Percentaging Process
Target Percent	Enter desired percentage of replays awarded for reaching Threshold 1
Threshold 1 Percent	Displays actual percentage of replays awarded for reaching Threshold 1
Threshold 2	Enter 0 thru 9,999,999; sets award level and display
Threshold 3	Enter 0 thru 9,999,999; sets award level and display
Highest Score	Enter 0 thru 9,999,999; sets the HiScore replay level

FACTORY SETTINGS

1,500,000
1
10
Unchanged
4,500,000
00
4,999,999

BASIC OPTION VALUES

Credit Limit	Enter 1 thru 40	10
Balls per Game	Enter 1 thru 5	3
Threshold Mode	Enter 0 thru 3; 0=0, 1=Points, 2=Extra Ball, 3=Replay	3
Special Mode	Enter 0 thru 3; 0=0, 1=Points, 2=Extra Ball, 3=Replay	3
HiScore Mode	Enter 0 thru 3; 0=0, 1=1 Replay, 2=2 Replays, 3=3 Replays	3
Sound Mode	Enter 0 thru 3; 0=Chimes w/o background 2=Sounds w/o background 1=Chimes with background 3=Sounds with background	3
German Prize	German Meter	1
Match Option	Enter 0 or 1; 0 disables match, 1 enables match	0
Credit Display	Enter 0 or 1; 0=No credits displayed 1=Displayed credits	1
No Limit Replays	Enter 0 or 1; 0=Only 1 award per game 1=More than 1 per game	1
Free Play	Enter 0 or 65; 0=Coins, 65=Free Play	0
Slingshot	Enter 0 or 1; 0=No slingshots, 1=slingshots	1
Tilt Warning	Enter 0 thru 3; 0=No warning, 1=1, 2=2, 3=3	1

FEATURE OPTIONS

Reset Factory	Enter 65 for factory selected scores and features.
X-Ball Timer	Enter 0 thru 3; This entry controls length of time allowed to collect EXTRA BALL.
	<u>ENTER</u> <u>LENGTH OF TIME</u>
	0 4 seconds
	*1 8 seconds
	2 12 seconds
	3 16 seconds
Retain Balls	Enter 0 or 1*; This entry controls whether or not balls loaded in Power Amp will be held from game to game.
	<u>ENTER</u> <u>HOLD BALLS</u>
	0 Clear at end of game
	1 From game to game
Revert Values	Enter 0 thru 3; This entry controls the length of time, during single ball play, a particular Playfield Multiplier value is held before reverting to next lower value.
	<u>ENTER</u> <u>LENGTH OF TIME</u>
	0 10 seconds
	*1 15 seconds
	2 20 seconds
	3 25 seconds
	4 30 seconds
	5 35 seconds
	6 40 seconds
	7 45 seconds
Load Special	Enter 0 thru 3; This entry controls # of balls that must be loaded on Power Amp to qualify SPECIAL.
	<u>ENTER</u> <u># OF BALLS LOADED</u>
	0 5
	*1 4
	2 3
	3 2
Attract Sounds	Enter 0 or 1*; When game is over, this entry enables or disables ATTRACT SOUND mode while displaying hi-scores and instructions.
	0=No Sound 1=Sound

*Factory Setting

PRICING OPTIONS

Chute 1 Options	
XX coin for yy credit;	Coins (xx) will flash first. Enter 1 thru 99 coins. Then credits (yy) will flash. Enter 1 thru credit limit. Then coins will flash again. Either press Enter if the values are correct or repeat the data entry.
Chute 1 Bonus;	Enter 0 thru 40; 0=No Bonus Credit. 1 thru 40 sets the number of credits at which 1 Bonus Credit will be awarded.
Chute 2 Options	
XX coin for yy credit;	Coins (xx) will flash first. Enter 1 thru 99 coins. Then credits (yy) will flash. Enter 1 thru credit limit. Then coins will flash again. Either press Enter if the values are correct or repeat the data entry.
Chute 2 Bonus;	Enter 0 thru 40; 0=No Bonus Credit. 1 thru 40 sets the number of credits at which 1 Bonus Credit will be awarded.
Chute 3 Options	
XX coin for yy credit;	Coins (xx) will flash first. Enter 1 thru 99 coins. Then credits (yy) will flash. Enter 1 thru credit limit. Then coins will flash again. Either press Enter if the values are correct or repeat the data entry.
Chute 3 Bonus;	Enter 0 thru 40; 0=No Bonus Credit. 1 thru 40 sets the number of credits at which 1 Bonus Credit will be awarded.

Example:

To set Coin Chute 1 for 3 credits/2 Coins with no credits on the first coin;

Enter 02 Coin for 03 Credit Chute

Chute 1 Bonus 00

To set it for 3 Credits/2 Coins with one credit delivered on the 1st coin and 2 credits delivered on the second.

Enter 01 Coin for 01 Credit

Chute 1 Bonus 02

If all 3 Chute Options and Bonus Registers are set the same, then all Chutes will work "together."

V. RECOMMENDED 3 & 5 BALL OPTION SETTINGS

REPLAYS	3-BALL	5-BALL
Special Mode	3	3
Match Option	1	1
High Score Mode	3	3
1st replay at	1,500,000	2,500,000
2nd replay at	4,500,000	6,000,000
X-BALL		
Special Mode	2	2
Match Option	0	0
High Score Mode	0	0
1st Extra Ball at	1,500,000	2,500,000
2nd Extra Ball at	4,500,000	6,000,000
NOVELTY		
Special Mode	1	1
Match Option	0	0
High Score Mode	0	0
HIGH GAME TO DATE (reset periodically)		
3-BALL	4,999,999	5-BALL
		8,000,000

HEAVY METAL OPTION SETTINGS

FEATURE OPTIONS REGISTER	3-BALL	5-BALL
X-BALL TIMER	1	0
RETAIN BALLS	1	0
REVERT VALUES	1	0
LOAD SPECIAL	1	0
ATTRACT SOUNDS	1	1
In Basic Options:		
SLINGSHOT	1	1
TILT WARNING	1	1

VI. TROUBLESHOOTING ON LOCATION

SYMPTOM: WON'T POWER UP

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

ACTION:

- A. Check Fuses.
- B. Turn power OFF. Open back box. Locate light emitting diode (LED) on Control Board.
- C. Turn power ON. LED must flash 9X to indicate that the module is good. Correct sequence is flash-pause-flash and then seven more flashes and LED goes out.
- D. If LED does not come on or does not flash, or flashes, but less than 9X, 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.

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

SYMPTOM: LAMPS

One or some switched lamps always ON or not all feature lamps light during play.

ACTION:

- A. With power ON, open front door. Select SELF TEST-Lamp Tests with 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 Bally-Midway service department.

SYMPTOM: DISPLAYS

- I. 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.

ACTION:

- A. With power ON, open front door. Select SELF TEST-Display Test with keyboard. If the game is correct, each digit on each Display displays the count 0 through 9 and alphabet 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.

- II. All displays improper. Improper: Digit(s) always on or off/segment(s) always on or off, all displays.

ACTION:

- A. With power ON, open front door. Select SELF TEST-Display Test with keyboard. If the game is correct, each digit on each Display displays the count 0 through 9 and alphabet in all 7 digit positions. Note defective Display Driver modules.
- B. Replace Control Board. Turn power ON. Repeat A.

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

- C. If game is correct, it is now ready to play. If game is not correct, contact Bally-Midway service department.

- III. One or several displays always off.

ACTION:

- A. With power ON, open front door. Select SELF TEST-Display Test with keyboard. If the game is correct, each digit on each Display displays the count 0 through 9 and alphabet in all 7 digit positions. Note defective Display Driver modules.
- B. Turn power 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.

SYMPTOM: SOLENOIDS

- I. One or more solenoids do not pull-in during course of game.

ACTION:

- A. With power ON, open front door. Select SELF TEST-Solenoid Test with keyboard.
 - B. If game was correct, each solenoid would be energized. The Solenoid name appears with the Driver Q Number and connector jack and pin numbers. (**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.)
 - 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 A & B. 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 A & B. If game is correct it is now ready to play. If game is not correct, contact the Bally-Midway service department.
- II. Solenoid(s) are 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:

- A. With power ON, open front door. Select SELF TEST-Solenoid Test with keyboard.
- B. If game was correct, each solenoid would be energized. The Solenoid name appears with the Driver Q Number and connector jack and pin numbers. (**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.)
- 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 A & B. 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 A & B. If game is correct, it is now ready to play. If game is not correct contact the Bally-Midway service department.

SYMPTOM: NO SOUND

ACTION:

- A. With power ON, open front door. Select SELF TEST-Sound Test with the 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.

SYMPTOM: SWITCHES

Feature (Drop Targets, Stand-up, etc.) does not score.

ACTION:

- A. With power ON, open front door. Select SELF TEST-Switch Test with the keyboard.
- B. If game is correct, "All Switches Open" is displayed. Otherwise, the name of the switch(es) will be displayed with jack and pin numbers.
- C. Carefully lift the playfield. Locate the switch assembly identified from the display. Visually inspect the switch assembly. If the contacts are stuck, re-gap them to 1/16." Repeat A & B. If the game is correct, it is now ready to play. If the game is not correct, turn power OFF.
- D. Replace Control board. See CAUTION NOTE.
- 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.

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

SUBJECT: 6803 CONTROL BOARD POWER UP TEST SEQUENCE

The following is an abbreviated self-test routine for the 6803 Control Board.

- 1st Flash—(U1) Determine if the internal RAM is good. (6803)
- 2nd Flash—(U2) Checks to see if the program ROM is good (27128)
- 3rd Flash—(U3) Checks to see if the program ROM is good (27128)
- 4th Flash—(U4) Checks to see if the program ROM is good (27128)
- 5th Flash—(U8) Tests PIAO (6821)
- 6th Flash—(U7) Tests PIA1 (6821)
- 7th Flash—(U1) Checks the internal display interrupt generator (6803)
- 8th Flash—(U12 & U8) Verifies operation of the phase B switched ill. voltage.
NOTE: F5 fuse on the Power Module provides the phase B signal to the Control Board.
(U12, 14584) (U8, 6821)
- 9th Flash—(U1, U11 & U12) Verifies operation of the Phase A switched ill. voltage.
NOTE: F4 fuse on the Power Module provides the phase A signal to the Control Board.
(U1, 6803) (U11, 4011) (U12, 14584)

The following is an abbreviated self-test routine for the 6809 Sound Board.

- 1st Flash—(U7) Determine if the external ROM is good.
- 2nd Flash—(U6) Checks to see if the external RAM is good.
- 3rd Flash—(U8) Checks the PIA. (68B21)

The following is an abbreviated self-test routine for the Sounds Deluxe (68000) Board:

- 1st Flash—Determines if the ROM (U11) is good.
- 2nd Flash—Determines if the ROM (U12) is good.
- 3rd Flash—Determines if the ROM (U13) is good.
- 4th Flash—Determines if the ROM (U14) is good.
- 5th Flash—Checks to see if the RAM (U9, U10) is good.
- 6th Flash—Checks the PIA (6821) (U7).

VII
OH03 HEAVY METAL



SOLENOID IDENTIFICATION TABLE

SELF TEST #	SEQUENCE
1	LEFT SAUCER
2	MIDDLE BUMPER
3	RIGHT BUMPER
4	LEFT SLINGSHOT
5	RIGHT SLINGSHOT
6	LEFT SAUCER
7	RIGHT SAUCER
8	NOT USED
9	NOT USED
10	PIN UP
11	PIN DOWN
12	BALL EJECT
13	RESERVED FOR GERMAN USE
14	OUTHOLE
15	KNOCKER
16	BACKBOX LIGHT
17	TOP LIGHT
18	FLIPPER (BACKBOX)
19	NOT USED



SWITCH ASSEMBLY IDENTIFICATION TABLE

SELF TEST #	SEQUENCE
1	LEFT SAUCER
2	RIGHT SAUCER
3	LOAD CHAMBER
4	EJECT CHAMBER
5	CABINET LEFT
6	CREDIT
7	CABINET RIGHT
8	OUTHOLE
9	COINS RIGHT
10	COINS LEFT
11	COINS MIDDLE
12	LEFT RETURN LANE
13	RIGHT RETURN LANE
14	SLAM
15	TILT
16	NOT USED
17	LEFT BUMPER
18	MIDDLE BUMPER
19	RIGHT BUMPER
20	LEFT SLINGSHOT
21	RIGHT SLINGSHOT
22	TOP LANE "J"
23	TOP LANE "A"
24	TOP LANE "M"
25	LEFT OUTLANE
26	RIGHT OUTLANE
27	TOP 25K LANE
28	TOP 50K LANE
29	LEFT ROLLOVER
30	RIGHT ROLLOVER
31	LEFT 25K TARGET
32	RIGHT 25K TARGET
33	CENTER TARGET
34	"METAL" TARGET
35	"HEAVY" TARGET
36	LEFT OUTHOLE-1
37	OUTHOLE-2
38	OUTHOLE-3
39	OUTHOLE-4
40	RIGHT OUTHOLE-5

*NOTE: SEQUENCE NUMBERS SHOWN HERE ARE USED AS AN AID IN LOCATING FAULTY SOLENOID OR SWITCH USING DRAWING SHOWN.

VECTOR SHOWING FOR EACH EJECT SAUCER. BALL SHOULD EXIT AS SHOWN.

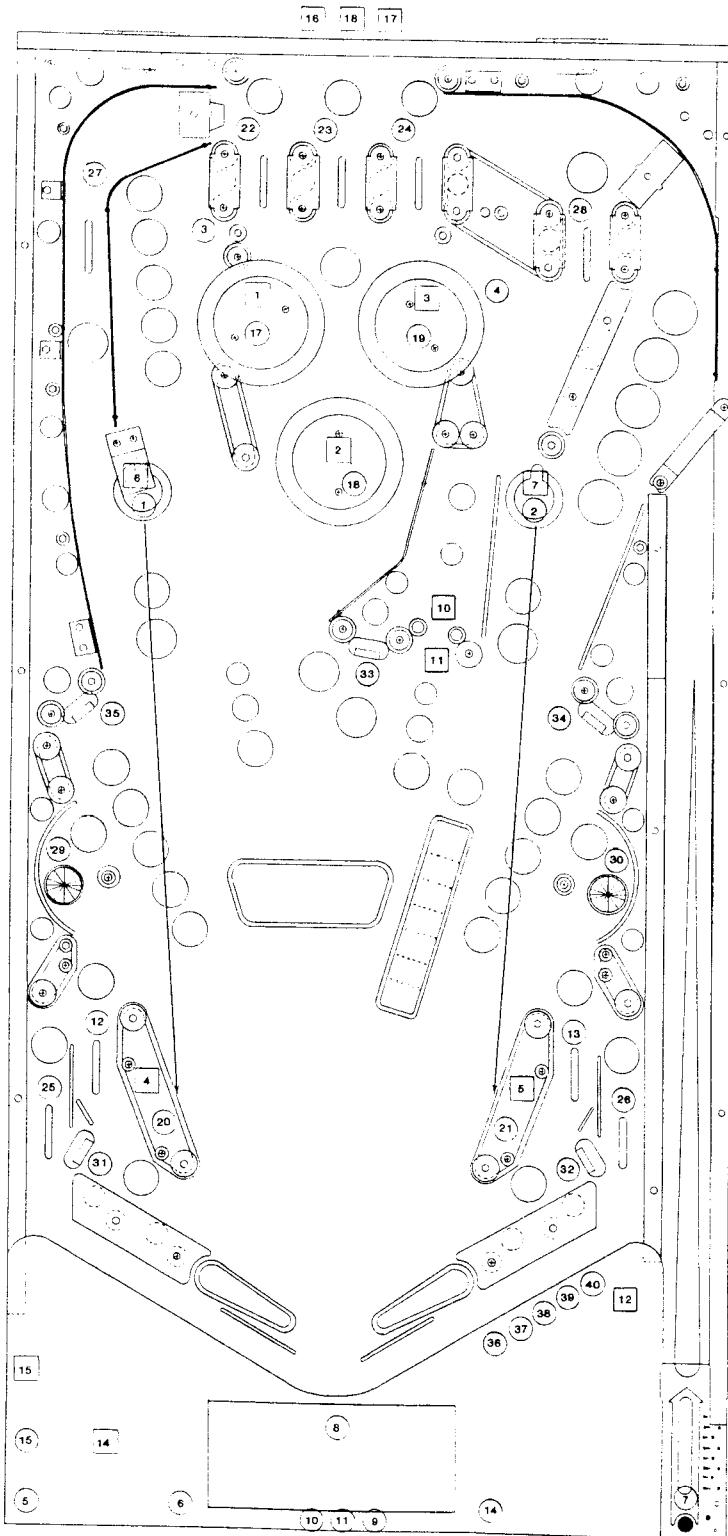


FIGURE II a

VIII. 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.

IX. 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 contacts 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.

X. 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
OH03 HEAVY METAL
PANEL TOP PARTS

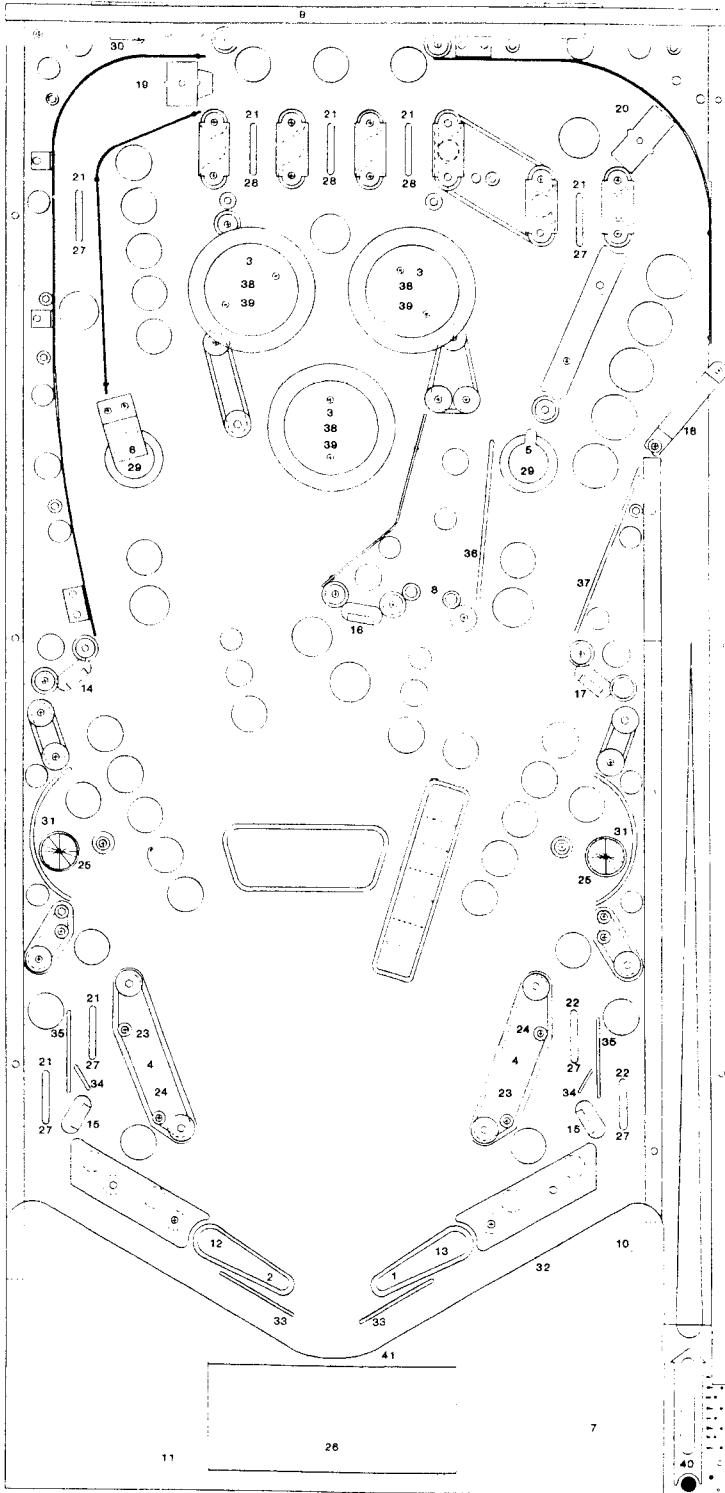


FIGURE # b

- | | |
|--|-----------------|
| 1. FLIPPER ASSY. SINGLE SW/RT. | AC70-00022-0100 |
| 2. FLIPPER ASSY. SINGLE SW/LT. | AC70-00022-0200 |
| 3. THUMPER BUMPER | A967-00053-0100 |
| 4. SLINGSHOT KICKER ASSY. | A967-00059-0000 |
| 5. EJECT HOLE ASSY.: RIGHT | A365-00341-0100 |
| 6. EJECT HOLE ASSY.: LEFT | A365-00342-0100 |
| 7. KICKER ASSY.: MULTI-BALL | AH01-00027-0000 |
| 8. BALL STOP & COIL ASSY. | AH03-00028-0000 |
| 9. BACKBOARD ASSY. | AH03-00009-0000 |
| 10. SWITCH-TO-TROUGH COVER ASSY. | A365-00339-0500 |
| 11. TOP MOUNTED KICKER ASSY. | A360-00234-0000 |
| 12. MOLDED FLIPPER W/CAP ASSY.:
(BLACK) LEFT | A365-00312-0300 |
| 13. MOLDED FLIPPER W/CAP ASSY.:
(BLACK) RIGHT | A365-00312-0400 |
| 14. TARGET W/SWITCH & BRKT.:
BLUE LUG-RT. | A365-R0300-F002 |
| 15. TARGET W/SWITCH & BRKT.:
YELLOW LUG-RT. | A365-R0300-F003 |
| 16. TARGET W/SWITCH & BRKT.:
WHITE LUG-RT. | A365-R0300-F005 |
| 17. TARGET W/SWITCH & BRKT.:
ORANGE LUG-RT. | A365-R0300-F007 |
| 18. GATE BRKT. & WIRE-FORM ASSY. | AA40-00034-0000 |
| 19. BALL-GATE & HOLD DOWN ASSY. | AH03-00031-0000 |
| 20. BALL-GATE & BRKT. ASSY.: RT. | A365-00337-0000 |
| 21. BRKT. & WIRE-FORM ASSY.:
ROLLOVER LT. | A331-00042-0000 |
| 22. BRKT. WIRE-FORM ASSY.:
ROLLOVER RT. | A360-00216-0000 |
| 23. SWITCH W/BRKT. & PLATE ASSY.:
SLINGSHOT | A360-00230-0000 |
| 24. SWITCH W/BRKT. & DIODE ASSY.:
SLINGSHOT | A360-00239-0000 |
| 25. SWITCH W/DIODE & CAP ASSY. | A360-00603-0002 |
| 26. SWITCH W/DIODE & PLATE ASSY. | A365-00034-0000 |
| 27. SWITCH W/DIODE & PLATE ASSY. | A365-00035-0000 |
| 28. SWITCH W/DIODE, PLATE & CAP | A365-00035-0100 |
| 29. SWITCH W/DIODE & PLATE ASSY. | A365-00036-0000 |
| 30. LIGHT DOME: PLASTIC, AMBER | 0017-00042-0748 |
| 31. WIRE-FORM: | OH03-00102-0000 |
| 32. BOTTOM ARCH EXTENSION | 0370-00918-1000 |
| 33. WIRE-FORM: BALL GUIDE | 0360-00175-5300 |
| 34. WIRE-FORM: BALL GUIDE | 0365-00151-0750 |
| 35. WIRE-FORM: BALL GUIDE | 0365-00151-2250 |
| 36. WIRE-FORM: BALL GUIDE | 0365-00151-4500 |
| 37. WIRE-FORM: BALL GUIDE | 0365-00151-5000 |
| 38. CAP: THUMPER BUMPER, RED | 0017-00042-0518 |
| 39. COLLAR: THUMPER BUMPER, RED | 0017-00042-0566 |
| 40. SHOOTER GAUGE | OH03-00100-00XF |
| 41. BUTYRATE: SCREENED
BOTTOM ARCH | OH03-00901-00XF |

**XII
OH03 HEAVY METAL**

RAMP PARTS

- | | | |
|----|-------------------------------------|-----------------|
| 1. | RAMP ASSY.: PLASTIC
(NOT SHOWN) | AH03-00018-0000 |
| 2. | BALL-TRAP RAMP ASSY.
(NOT SHOWN) | A365-00336-0000 |

RUBBER RINGS

- | | | |
|----|-------------------|-----------------|
| A. | RING: | 0017-00041-0633 |
| B. | RING: 5/16" | 0017-00041-0637 |
| C. | RING: 23" | 0017-00041-0641 |
| D. | RING: 1" | 0017-00041-0643 |
| E. | RING: 1-1/2" | 0017-00041-0644 |
| F. | RING: 2-1/2" | 0017-00041-0646 |
| G. | RING: 3" (YELLOW) | 0017-00041-0653 |

POST

- | | | |
|----|--|-----------------|
| J. | POST: (RED) PLASTIC 1" | 0017-00042-0588 |
| K. | POST: (RED) PLASTIC
1-3/16" | 0017-00042-0596 |
| L. | POST: NICKEL
(NO THREADS) 1-3/16" | 0360-00733-00XF |
| M. | POST: METAL-MINI
(W/THREADS FOR
10-32 NUT) | 0365-00700-00XF |

RUBBER BUMPER FOR

- | | | |
|---------|-----------------------|-----------------|
| M. | - POST: METAL-MINI | 0017-00041-0633 |
| J. & K. | - POST: (RED) PLASTIC | 0017-00041-0637 |
| L. | - POST: NICKEL | 0017-00041-0643 |

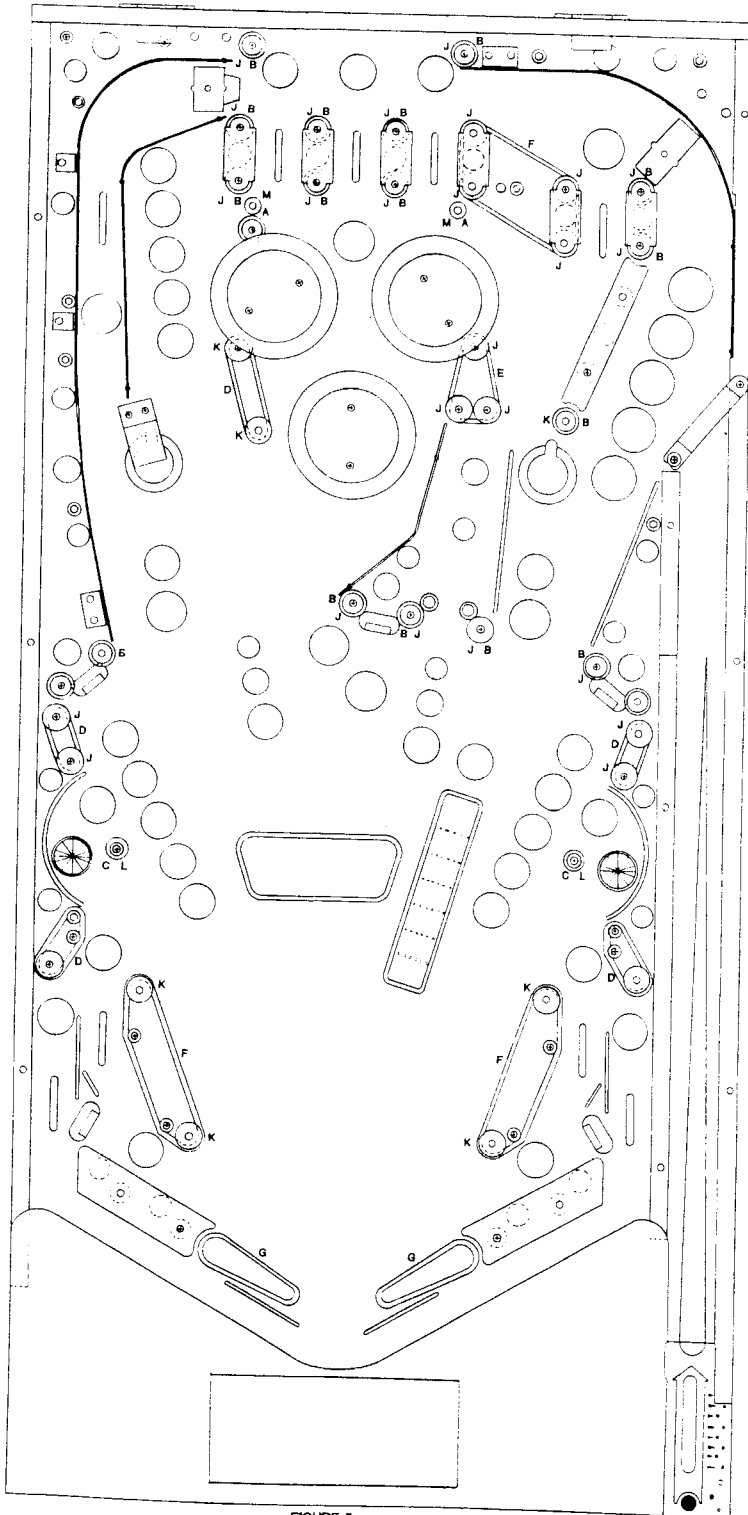


FIGURE II c

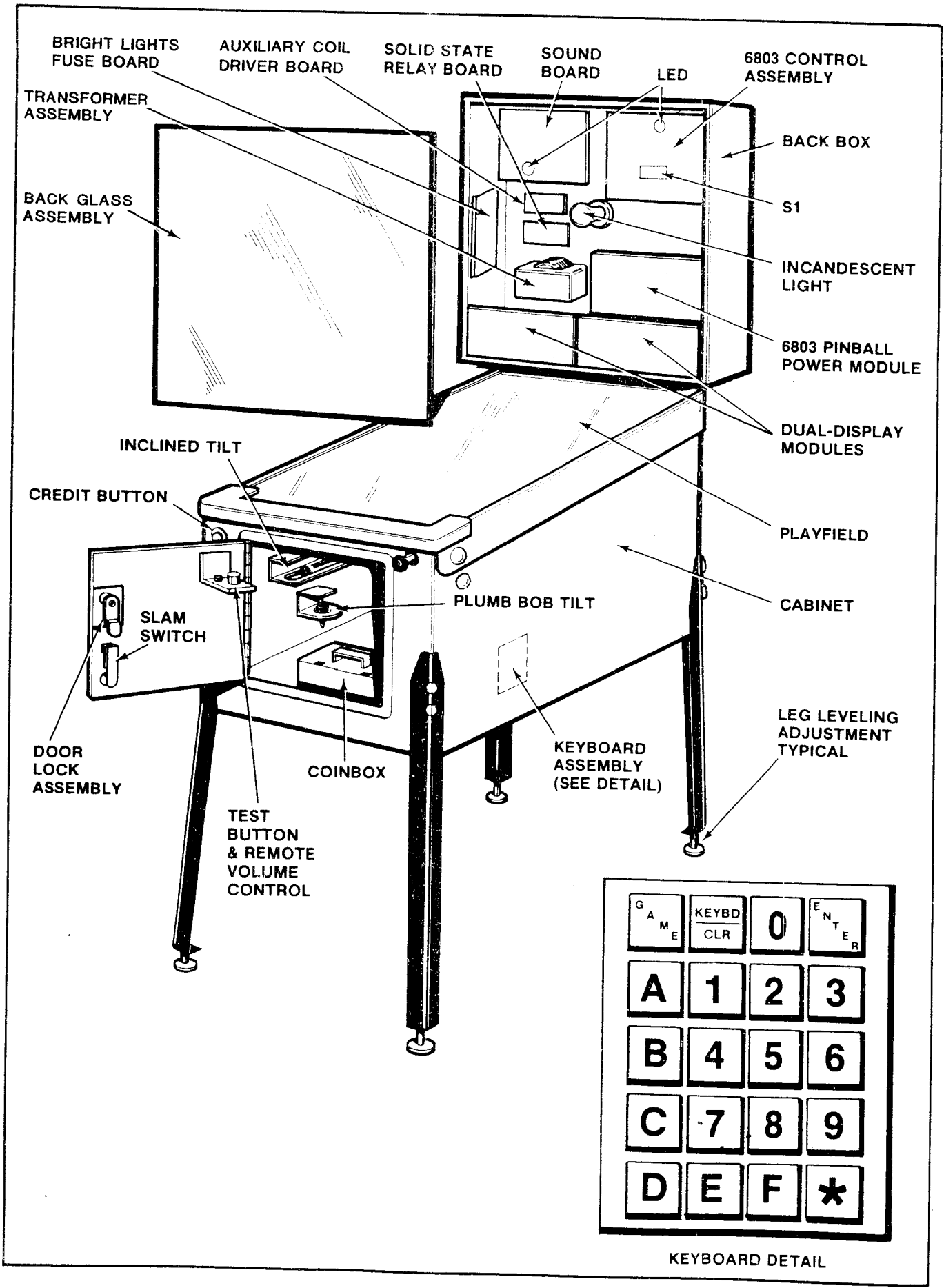


FIGURE III. ELECTRONIC PIN BALL MACHINE

HEAVY METAL FEATURE OPERATION AND SCORING

1. SHOOTER LANE SKILL SHOT FEATURE

Making the upper right most lane's rollover switch awards 50,000 points when the 50k light is lit and can be made with a skill shot off of the plunger. The ball landing in the right saucer produces a MELTDOWN (MULTI-BALL PLAY) if there are 4 balls in the POWER AMP at the beginning of a new ball. The unlit 50k light awards 10,000 points.

2. J-A-M LANES FEATURE

The top 3 lanes spell J-A-M. Everytime J-A-M is completed, the BONUS MULTIPLIER advances one value until a maximum value of 6X is reached. Making each letter in J-A-M awards 5,000 points when unlit and 1,000 points when lit. Completing J-A-M awards an extra 15,000 points.

When "J" is lit by making the letter, its corresponding left Thumper Bumper is lit. When the lit "J" is made again, the left Thumper Bumper flashes. The same holds true for "A" and its corresponding center Thumper Bumper, and for "M" and its corresponding right Thumper Bumper.

Each time any one of the 3 Thumper Bumpers is hit, the "light status" of each will rotate to the next Thumper Bumper in a counter-clockwise direction.

Hitting each Thumper Bumper awards 100 points when unlit, 1,000 points when lit and 3,000 points when flashing.

3. POWER AMP FEATURE

The POWER AMP is a multi-functioned ball storage device!

- A.) When the ball chamber of the POWER AMP is empty, a ball can be shot through the POWER AMP, which advances the PLAYFIELD MULTIPLIER.
- B.) When balls are loaded into the POWER AMP by means of the POWER BOOSTER RAMP, the balls are stored until all 5 balls are loaded. Each ball loaded scores 20,000 points if the 100k light under POWER BOOSTER ramp is unlit. Each ball loaded scores 100,000 points if the 100k light is lit.
- C.) When balls are stored in the POWER AMP, a direct shot at the POWER AMP, hitting the lowest ball stored, will knock out one ball for multiball play and advances the PLAYFIELD MULTIPLIER. Each ball knocked out scores 25,000 points times the PLAYFIELD MULTIPLIER value.
- D.) If all 5 balls are loaded, this is the condition for a MELTDOWN, releasing 5 balls all at once and advancing the PLAYFIELD MULTIPLIER to 5X. One more shot into the ramp will advance the PLAYFIELD MULTIPLIER to 10X.
- E.) Another way to release all balls stored in the POWER AMP, before loading all 5 balls, is to first achieve 2 ball play by knocking out one ball, then reloading one ball into the POWER AMP during MULTI-BALL PLAY.

*During SINGLE BALL PLAY, the PLAYFIELD MULTIPLIER value (2X or higher) is held for a designated amount of time, then reverts back to the next lower value. The time length of this timer is adjustable through the following register:

<u>REGISTER</u>	<u>SETTING</u>	<u>FUNCTION</u>
REVERT VALUES	0	10 seconds
REVERT VALUES	1	15 seconds
REVERT VALUES	2	20 seconds
REVERT VALUES	3	25 seconds
REVERT VALUES	4	30 seconds
REVERT VALUES	5	35 seconds
REVERT VALUES	6	40 seconds
REVERT VALUES	7	45 seconds

*The balls stored in the POWER AMP can be held over from game to game through the following settings:

<u>REGISTER</u>	<u>SETTING</u>	<u>FUNCTION</u>
RETAIN BALLS	0	DO NOT hold balls in POWER AMP from game to game.
RETAIN BALLS	1	DO hold balls in POWER AMP from game to game.

4. HOLD BONUS FEATURE

Loading one ball into the POWER AMP qualifies the HOLD BONUS. When the ball lands in the left saucer, the flashing HOLD BONUS light goes off and the GUITAR BONUS HELD light turns on. Whatever GUITAR BONUS points are accumulated during this ball will be carried over to the next ball.

5. PLAYFIELD SPECIAL FEATURE

Loading a designated number of balls into the POWER AMP in one turn qualifies the PLAYFIELD SPECIAL. The LEVEL 1 bullseye will then score the PLAYFIELD SPECIAL.

*The designated number of balls required to qualify the PLAYFIELD SPECIAL is adjustable through the following settings:

<u>REGISTER</u>	<u>SETTING</u>	<u>FUNCTION</u>
LOAD SPECIAL	0	5 balls required to qualify SPECIAL.
LOAD SPECIAL	1	4 balls required to qualify SPECIAL.
LOAD SPECIAL	2	3 balls required to qualify SPECIAL.
LOAD SPECIAL	3	2 balls required to qualify SPECIAL.

6. LEVELS 1 THROUGH 5 FEATURE

Each level indicator under the clear POWER BOOSTER RAMP is color keyed with a target area on the playfield. The level number (1 thru 5) corresponds to the number of balls stored in the POWER AMP. Hitting the level target, which corresponds to the flashing level indicator, lights the 100k ramp value on the POWER BOOSTER. Hitting each LEVEL 1 bullseye target awards 2,000 points. Hitting LEVEL 2 or LEVEL 3 bullseye targets involves values ranging from 2,000 points to 10,000 points (see H-E-A-V-Y M-E-T-A-L- FEATURE for scoring information). Landing in the LEVEL 4 saucer awards 10,000 points. LEVEL 5 consists of JAM lanes (see JAM LANES FEATURE for scoring information).

7. MULTI-BALL PLAY FEATURE

During MULTI-BALL PLAY, the PLAYFIELD MULTIPLIER has advanced one step for each multi-ball in play. A shot into the POWER BOOSTER RAMP during MULTI-BALL PLAY is always worth 100k multiplied by the PLAYFIELD MULTIPLIER.

8. COLLECT BONUS FEATURE

Spelling H-E-A-V-Y qualifies the left COLLECT BONUS. Spelling M-E-T-A-L qualifies the right COLLECT BONUS. The left or right saucer collects the left or right COLLECT BONUS, respectively.

9. H-E-A-V-Y M-E-T-A-L FEATURE

Each hit on the LEVEL 2 bullseye target spots a letter in H-E-A-V-Y. "H" awards 2,000 points, "E" awards 4,000 points, "A" awards 6,000 points, "V" awards 8,000 points and "Y" awards 10,000 points. Each hit on the LEVEL 3 bullseye target spots a letter in M-E-T-A-L. "M" awards 2,000 points, "E" awards 4,000 points, "T" awards 6,000 points, "A" awards 8,000 points and "L" awards 10,000 points. Spelling H-E-A-V-Y or M-E-T-A-L lights EXTRA BALL on a timer. Hitting the LEVEL 1 bullseye, before the time limit expires, scores an EXTRA BALL.

*The time length of the EXTRA BALL TIMER is adjustable through the following settings:

<u>REGISTER</u>	<u>SETTING</u>	<u>FUNCTION</u>
X-BALL TIMER	0	Length of time is 4 seconds.
X-BALL TIMER	1	Length of time is 8 seconds.
X-BALL TIMER	2	Length of time is 12 seconds.
X-BALL TIMER	3	Length of time is 16 seconds.

10. GUITAR BONUS FEATURE

The GUITAR BONUS lights are numbered in thousands ("1", "2", "4", "8", "16", "32", "64" and "128k"). The GUITAR BONUS value increases with any switch made (except for the SLING SHOTS and THUMPER BUMPERS) until all of its lights are lit. The bonus is collected when the ball drains.

11. BULLSEYE TARGET RETURN LANES FEATURE

Hitting the bullseye target, located in the left return lane, scores 25,000 points when its 25k light is lit and 5,000 points when its 25k light is unlit.

Hitting the bullseye target, located in the right return lane, scores 25,000 points when its 25k light is lit and 5,000 points when its 25k light is unlit.

12. UPPER LEFT 25K LANE FEATURE

Making the upper left most lane's rollover switch awards 25,000 points when its 25k light is lit and 5,000 points when its 25k is unlit.

13. LEFT SIDE & RIGHT SIDE SCOOPS FEATURE

Making the rollover button of the left side scoop, lights the 50k light of the right side scoop for a brief period of time and also lights the 10k light of the left return lane and the 25k light of the left return lane target.

Making the rollover button of the right side scoop, lights the 50k light of the left side scoop for a brief period of time and also lights the 10k light of the right return lane and the 25k lights of the right return lane target.

Making each side scoop awards 50,000 points when its 50k light is lit and 2,000 points when its 50k light is unlit.

Making each return lane awards 10,000 points with its 10k light lit and 2,000 points with its 10k light unlit.

14. MISCELLANEOUS FEATURES

Each OUTLANE awards 50,000 points.

Each SLING SHOT awards 30 points.

*REGISTER "ATTRACT SOUNDS" enables or disables, after the game is over, the ATTRACT SOUNDS mode while displaying Hi-Score or Instructions.

<u>REGISTER</u>	<u>SETTING</u>	<u>FUNCTION</u>
ATTRACT SOUNDS	0	Does not enable ATTRACT SOUND mode.
ATTRACT SOUNDS	1	Enables ATTRACT SOUND mode.

SECTION 2
**Component Layouts,
Schematics & Wiring Diagrams**

6803 PINBALL POWER MODULE
AQR4-91785-0000
M051-00C53-0001

DESIGNATION LIST

DESIGNATION

DESCRIPTION

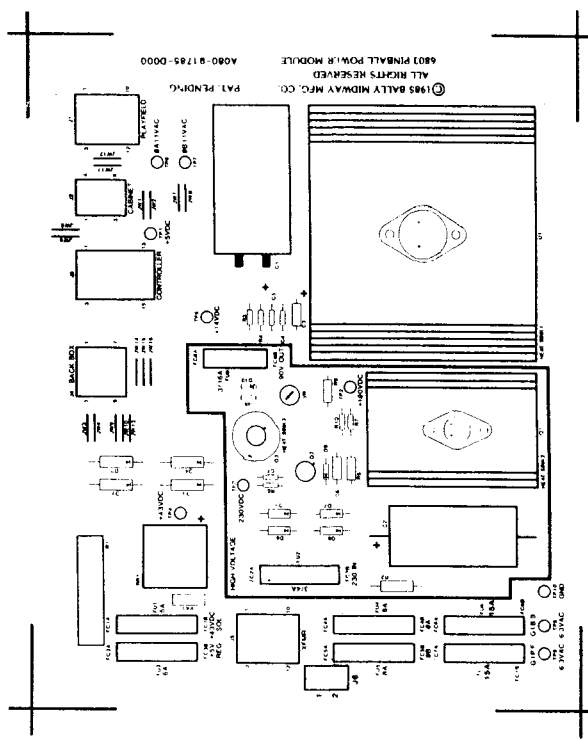
C1	11,000uf 20V ELEC.
P/O C1	TY-WRAP
P/O C1	SOLDER LUG
P/O C1	WIRE 20AWG
C2	160uf 350V ELEC.
P/O C2	TY-WRAP
C3	2uf 25V ELEC.
C4, C5	.1uf 25V CER.
C6, C7	.01uf 500V CER.
R1	600 OHM 10W
R2	100K 1W 5%
R3	2.2 OHM 1/4W 5%
R4	100 OHM 1/2W 5%
R5	22K 1/2W 5%
R6	100K 1/4W 5%
R7	390 OHM 1/4W 5%
R8	1.2K 1/4W 5%
R9	82K 1/2W 5%
R10	0 - .25K 1/4W POT.
VRI	MR751
D1 - D4	IN4004
D5 - D9	IN4004
D10	IN5275A ZENER
RR1	KRPG-35-02-W
P/O RRI	BRIDGE SPACER
01	2N3584
P/O 01	SHIELD
P/O 01	HEX SPACER
P/O 01	6-32 X 5 SCREW
P/O 01	6-32 X 12 SCREW
P/O 01	LOCKWASHER EXT.
P/O 01	LOCKWASHER INT.
P/O 01	FLAT WASHER
P/O 01	6-32 HEX NUT
P/O 01	LAPEL - CAUTION HIGH VOLT.
P/O 01	HEATSINK 2
P/O 01	INSULATOR T0-66
Q2, Q3	2N3440
P/O 02, 3	INSULATOR T0-5
P/O 03	HEATSINK 3
U1	78H05C REG.
P/O U1	6-32 X 12 SCREW
P/O U1	6-32 HEX NUT
P/O U1	LOCKWASHER EXT.
P/O U1	FLAT WASHER
P/O U1	HEATSINK 1
P/O U1	INSULATOR T0-3
VAI	VARIATOR

DESIGNATION

DESCRIPTION

JW1 - JW16	ZERO OHM RES. JUMPER
TP1 - TP10	TEST POINTS
F1*	5 AMP 3AG FUSE
F2	3/4 AMP 3AG FUSE
F3	6 AMP 3AG FUSE
F4, F5	8 AMP 3AG FUSE
F6, F7	15 AMP 3AG FUSE
F8	3/16 AMP 8AG FUSE
FC1A - FC3B, FC8A	FUSE CLIPS
FC8R	FUSE CLIPS
FC4A - FC7B	12 PIN M-N-L CONN. FE
J1	6 PIN M-N-L CONN. MA
J2	15 PIN M-N-L CONN. MA
J3	9 PIN M-N-L CONN. MA
J4	12 PIN M-N-L CONN. MA
J5	2 PIN M-N-L CONN. MA
J6	P.C. BOARD
6803 POWER MODULE	
4-23-86 REV. 1.0 FIXED R2, R6	

* TWO FLIPPER GAMES ONLY - SEE SCHEMATIC



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DATE	1/14/78
BY	CL
APPROVED	ASST. DRAWING
TITLE	6803 PINBALL POWER MODULE
REVISED	M051-00C53-0001
REVISIONS	

MIDWAY MFG. CO.
6803 PINBALL POWER MODULE
AQR4-91785-0000

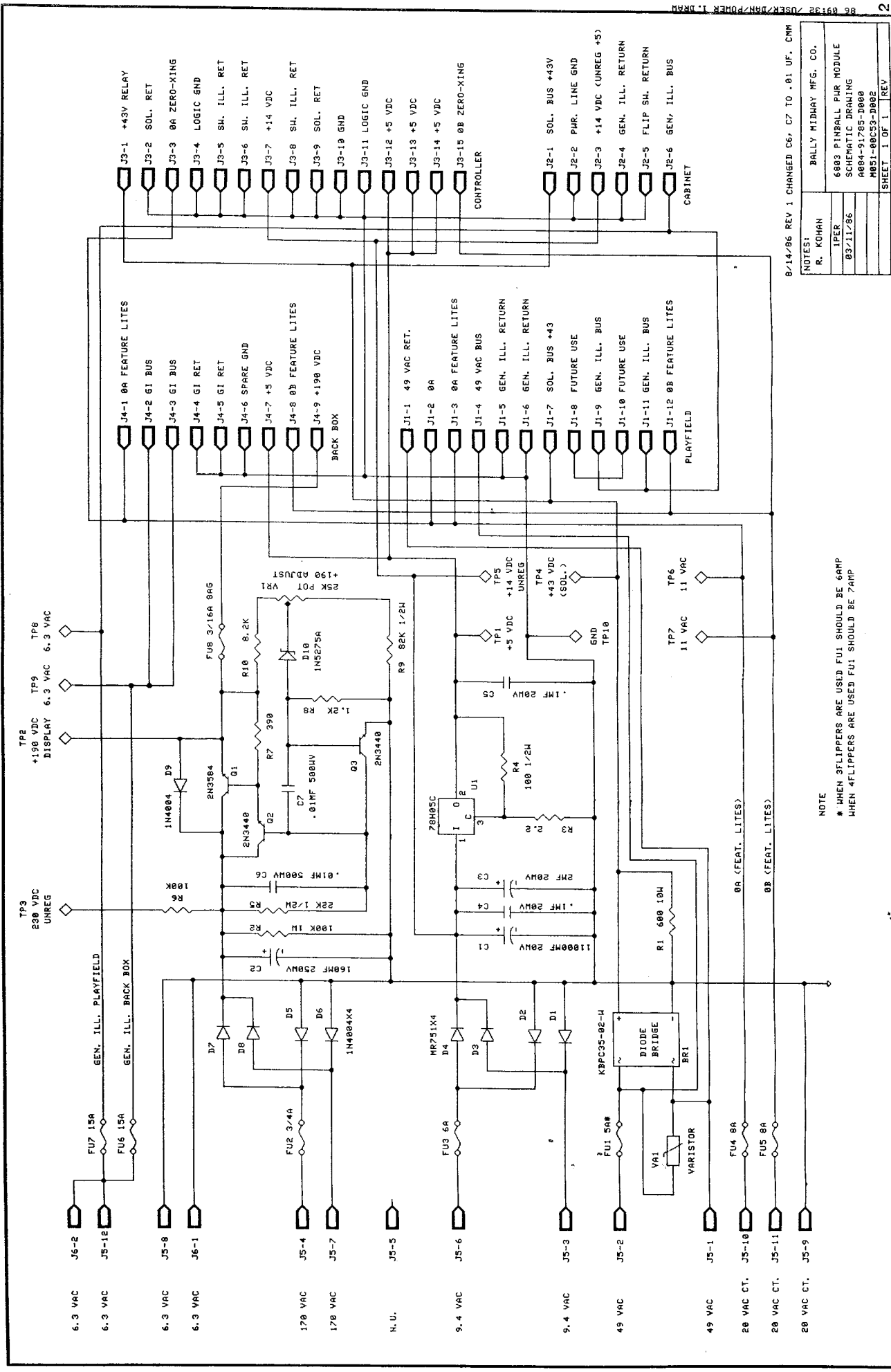
CROSS REFERENCE LIST

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	R1	0360-00804-0004
MR 751	4	VR1	103E-00003-0016
1N4004	5	D1-D4	103E-00003-0005
1N5275	1	D5-D9	103E-00001-0027
KRPO-35-02-W	1	D10	103E-00005-0005
2N3440	2	RR1	104E-00003-0002
2N3584	1	O1	104E-00005-0002
78H05C REG	1	U1	0360-00803-0021
VARIABLE METAL OXIDE 60V	1	VAI	115E-00001-0002
TY-WRAP	4	P/O C1, C2	0017-00042-0048
ZERO OHM RES. JUMPER	16	JW1-JW16	117E-00001-0001
TEST POINTS	10	TP1-TP10	0017-00007-0131
SOLDER LUG	2	P/O C1	0017-00021-0257
JUMPER WIRE 20AWG	2	P/O C1	0017-00033-0448
INSULATOR T0-3	1	P/O U1	0017-00042-0119
INSULATOR T0-5	2	P/O U1	0017-00042-0151
INSULATOR T0-66	1	P/O O1	0017-00042-0158
HEX SPACER	2	P/O O1	0017-00042-0248
SHIELD	1	P/O O1	0365-00952-0000
HEATSINK 1	1	P/O U1	112E-00001-0003
HEATSINK 2	1	P/O U1	112E-00001-0002
HEATSINK 3	1	P/O O3	112E-00001-0004
RRIDGE SPACER	1	P/O RR1	118E-00001-0001
6-32 X 12 SCREW	4	P/O O1, U1	0017-00101-0132
6-32 X 5 SCREW	2	P/O O1	0017-00101-0555
6-32 HEX NUT	4	P/O O1, U1	0017-00103-0005
LOCKWASHER INT.	4	P/O O1, U1	0017-00104-0008
LOCKWASHER EXT.	4	P/O O1, U1	0017-00104-0009
FLAT WASHER	4	P/O O1, U1	0017-00104-0106
FUSE CLIP	8	FC1A-FC3B,	0017-00071-0033
		FC8A, FC8R	
		FC4A-FC7A	
FUSE CLIP	8	FC4A-FC7A	0017-00071-0034
3/16 AMP 8AG 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

CROSS REFERENCE LIST

DESCRIPTION	QTY.	DESIGNATION NO.	PART NOS.
8 AMP 3AG FUSE	2	F4, F5	0017-00003-0387
15 AMP 3AG FUSE	2	F6, F7	0017-00003-0011
12 PIN M-N-L CONN., FEMALE	1	J1	0017-00021-0532
6 PIN M-N-L CONN., MALE	1	J2	0017-00021-0424
15 PIN M-N-L CONN., MALE	1	J3	0017-00021-0434
9 PIN M-N-L CONN., MALE	1	J4	0017-00021-0425
12 PIN M-N-L CONN., MALE	1	J5	0017-00021-0426
2 PIN M-N-L CONN., MALE	1	J6	0017-00021-0488
6803 POWER MODULE P.C.B.	1		A080-91785-D000

* TWO FLIPPER GAMES ONLY - SEE SCHEMATIC



8/14/86 REV 1 CHANGED C6, C7 TO .01 UF. CMW

NOTES:	BALLY MIDWAY MFG. CO.
R. KOHAN	6803 PINBALL PWR MODULE
1PER	SCHEMATIC DRAWING
03/21/86	A084-91785-0000
	M051-00C53-0000
	SHEET 1 OF 1 REV

NOTE
 * WHEN 3FLIPPERS ARE USED FU1 SHOULD BE 6AMP
 WHEN 4FLIPPERS ARE USED FU1 SHOULD BE 7AMP

DESIGNATION LIST

DESCRIPTION

CP1,CP2	.1 UF AX CER
CP3-CP13	.01 UF AX CER
C1	.1 UF AX CER
C2	10 UF RD TANT
C3-C5	NOT INSERTED
C6	470 PF AX CER
C7-C10	100 PF AX CER
C11	.01 UF AX CER
C12	47 UF AX ELEC
C13	470 PF AX CER
C14	1 UF AX TANT
C15	.01 UF AX CER
C16	68 PF AX CER
C17	.1 UF AX TANT
C18	.001 UF AX CER
C19	82 PF AX CER
C20	10 UF AX TANT
C21	1 UF AX TANT
C22	.05 UF RD CER
C23	470 UF AX ELEC
C24	1000 UF AX ELEC
C25	.1 UF AX CER
C26,C27	.22 UF AX CER
C28-C30	.1 UF AX CER
C31	4700 UF AX ELEC
C32	.01 UF AX CER
C33,C34	4.7 UF RD TANT
C35	.01 UF AX CER
C36	NOT INSERTED
C37	10 UF AX TANT
C38	.01 UF AX CER
C39	.1 UF AX CER
D1	NOT INSERTED
D2	VR330
D3,D4	1N4004
D5-D8	NOT INSERTED
D9,D10	1N4004
FB1-FR3	FERRITE READ
HS U15	HEATSINK T0-220
HS U17	HEATSINK T0-220
ICS U3	64 PIN I.C. SOCKET
ICS U4	20 PIN I.C. SOCKET
ICS U7	40 PIN I.C. SOCKET
ICS U8	16 PIN I.C. SOCKET
ICS U9-U14	28 PIN I.C. SOCKET

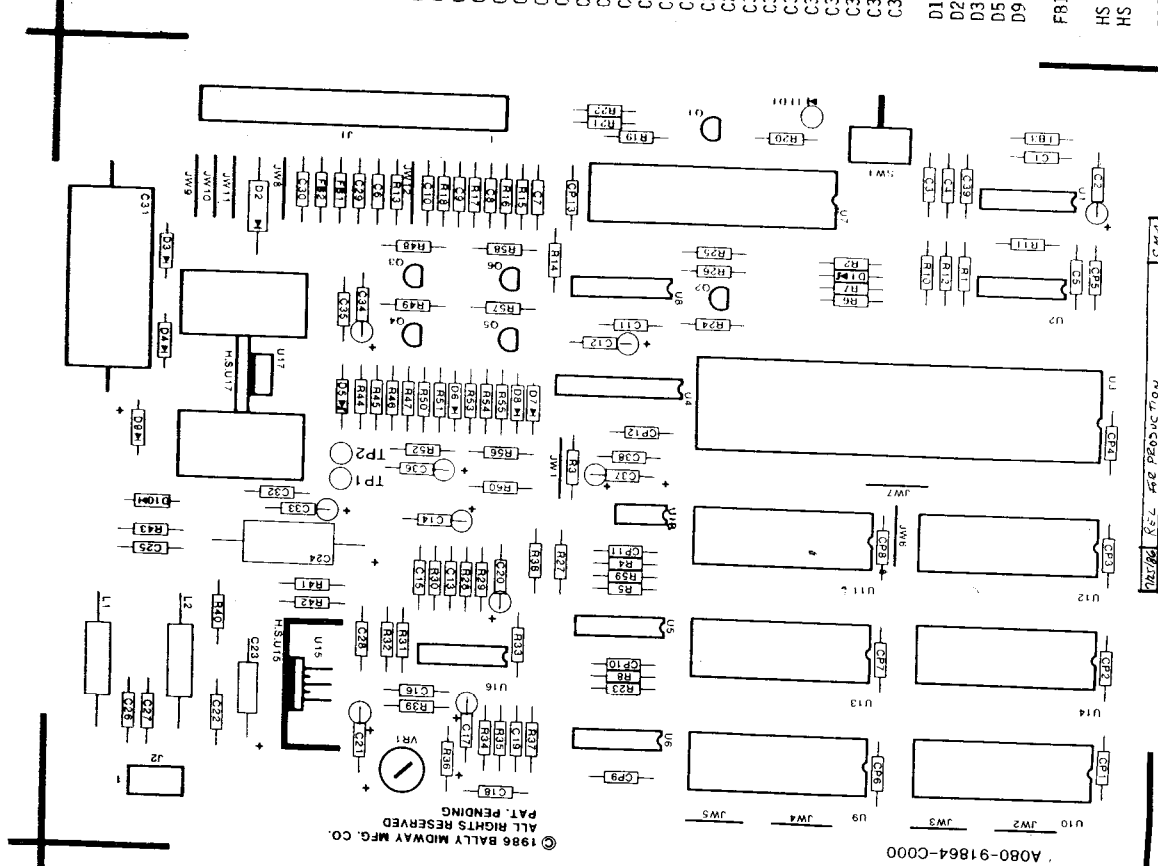
DESIGNATION

INS U15, INS U17
J1,J2
JW1-JW12
L1,L2
LED 1
MH U15
MH U15
MH U15
MH U17
MH U17
MH U17
Q1,Q2
Q3-Q6
R1-R8
R9
R10-R12
R13
R14
R15-R18
R19
R20
R21-R23
R24
R25
R26
R27
R28
R29
R30
R31
R32
R33
R34
R35
R36
R37
R38
R39
R40
R41
R42

DESIGNATION LIST

DESCRIPTION

INS U15, INS U17	SIL PAD THERMAL WASHER
J1,J2	AUTO INSERT PIN TIN .045 SO.
JW1-JW12	JUMPER WIRE
L1,L2	10 UH INDUCTOR
LED 1	GREEN LED
MH U15	SCREW, 6-32
MH U15	NUT, 6-32
MH U15	WASHER, #6 STAR
MH U17	SCREW, 4-40
MH U17	NUT, 4-40
MH U17	WASHER, #4 STAR
Q1,Q2	2N5305
Q3-Q6	NOT INSERTED
R1-R8	4.7K OHM 1/4W CRBN
R9	NOT USED
R10-R12	NOT INSERTED
R13	10K OHM 1/4W CRBN
R14	100K OHM 1/4W CRBN
R15-R18	10K OHM 1/4W CRBN
R19	47K OHM 1/4W CRBN
R20	100 OHM 1/4W CRBN
R21-R23	4.7K OHM 1/4W CRBN
R24	2.7K OHM 1/4W CRBN
R25	180 OHM 1/4W CRBN
R26	68 OHM 1/4W CRBN
R27	62K OHM 1/4W CRBN
R28	120K OHM 1/4W CRBN
R29	75K OHM 1/4W CRBN
R30	33K OHM 1/4W CRBN
R31	18K OHM 1/4W CRBN
R32	33K OHM 1/4W CRBN
R33	47K OHM 1/4W CRBN
R34	150K OHM 1/4W CRBN
R35	82K OHM 1/4W CRBN
R36	150K OHM 1/4W CRBN
R37	200K OHM 1/4W CRBN
R38	1K OHM 1/4W CRBN
R39	33K OHM 1/4W CRBN
R40	430 OHM 1/4W CRBN
R41	220 OHM 1/4W CRBN
R42	2.2 OHM 1/4W CRBN



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REVISIONS
C.M.T.

USED ON P.C.B.D.
NO. REV'D

REVISIONS
FRANKLIN PK. ILL.

Bally / MIDWAY MFG. CO.

ASSEMBLY DRAWING
SOUNDS DELUXE P.C.B.D.
A084-91864-C000

PART NO.
M051-00114-C153

SOUNDS DELUXE
A084-91864-C000
M051-00114-C154

Rev. 4

DESIGNATION LIST

DESIGNATION	DESCRIPTION	CROSS REFERENCE	QTY.	DESIGNATION	PART NUMBER
R43	1 OHM 1/4W CRBN	68 PF AX CER 5%	1	C16	0360-00800-0028
R44-R58	NOT INSERTED	82 PF AX CER 5%	1	C19	0E47-00800-0002
R59	4.7K OHM 1/4W CRBN	100 PF AX CER	4	C7-C10	0360-00800-0046
R60	10K OHM 1/4W CRBN	470 PF AX CER 10%	2	C6,C13	0307-00800-0008
SW1	PC MTG. SWITCH	.001 UF AX CER 10%	1	C18	0E47-00800-0003
TP1, TP2	TEST POINT	.01 UF AX CER 10%	1	C15	0E47-00800-0001
U1	16 MHZ COSC	.01 UF AX CER	15	CP3-CP13,C11,C32	0360-00800-0005
U2	74LS74	.05 UF RD CER	1	C35,C38	0360-00800-0006
U3	MC6800Q68 CPU	.1 UF AX CER	8	C22	0360-00800-0058
U4	PAL16L8A-2 SDOORO	.22 UF AX CER	2	CP1,CP2,C1,C25, C28-C30,C39	0360-00800-0057
U5	74LS05	1 UF AX TANT	3	C26,C27	0986-00800-1400
U6	74F32	4.7 UF RD TANT	2	C14,C17,C21	0360-00800-0008
U7	MC6821	10 UF AX TANT	3	C33,C34	0986-00800-0700
U8	AD7533 DAC	47 UF AX ELEC	1	C2,C20,C37	0360-00800-0042
U9,U10	RAM 2K X 8	470 UF AX ELEC	1	C23	0360-00800-0021
U11-U14	ROM/EPROM	1000 UF AX ELEC	1	C24	0360-00800-0044
U15	TDA2002	4700 UF AX ELEC	1	C31	0360-00800-0023
U16	LM3900	1 OHM 1/4W CRBN	1	R43	100E-00005-0002
U17	MC7805 REG.	2.2 OHM 1/4W CRBN	1	R42	100E-00005-0003
U18	TL7705	68 OHM 1/4W CRBN	1	R26	100E-00005-0029
VR1	10K POT.	100 OHM 1/4W CRBN	1	R20	100E-00005-0033
		180 OHM 1/4W CRBN	1	R25	100E-00005-0039
		220 OHM 1/4W CRBN	1	R41	100E-00005-0041
		430 OHM 1/4W CRBN	1	R40	100E-00005-0050
		1K OHM 1/4W CRBN	1	R38	100E-00005-0061
		2.7K OHM 1/4W CRBN	1	R24	100E-00005-0071
		4.7K OHM 1/4W CRBN	12	R1-R8, R21-R23, R59	100E-00005-0079
		10K OHM 1/4W CRBN	6	R13,R15-R18,R60	100E-00005-0088
		18K OHM 1/4W CRBN	1	R31	100E-00005-0093
		33K OHM 1/4W CRBN	3	R30,R32,R39	100E-00005-0100
		47K OHM 1/4W CRBN	2	R19,R33	100E-00005-0104
		62K OHM 1/4W CRBN	1	R27	100E-00005-0107
		82K OHM 1/4W CRBN	1	R29	100E-00005-0110
		100K OHM 1/4W CRBN	1	R35	100E-00005-0112
		120K OHM 1/4W CRBN	1	R14	100E-00005-0115
		150K OHM 1/4W CRBN	2	R28	100E-00005-0118
		200K OHM 1/4W CRBN	1	R34,R36	100E-00005-0120
				R37	100E-00005-0123
		10K POT	1	VP1	0360-00804-0024
		1M4004	4	D3,D4,D9,D10	103E-00003-0005
		VR330	1	D2	0360-00801-0007

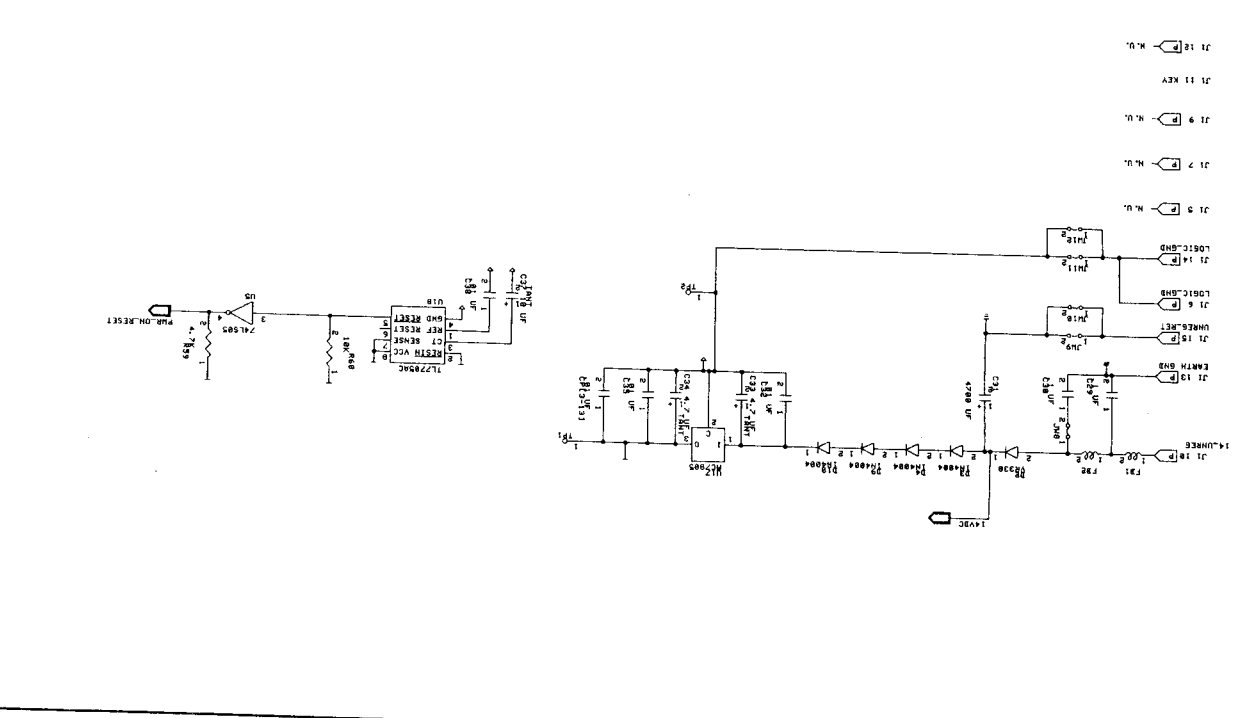
SOUNDS DELUXE
A084-91864-C000
M051-00114-C154

CROSS REFERENCE

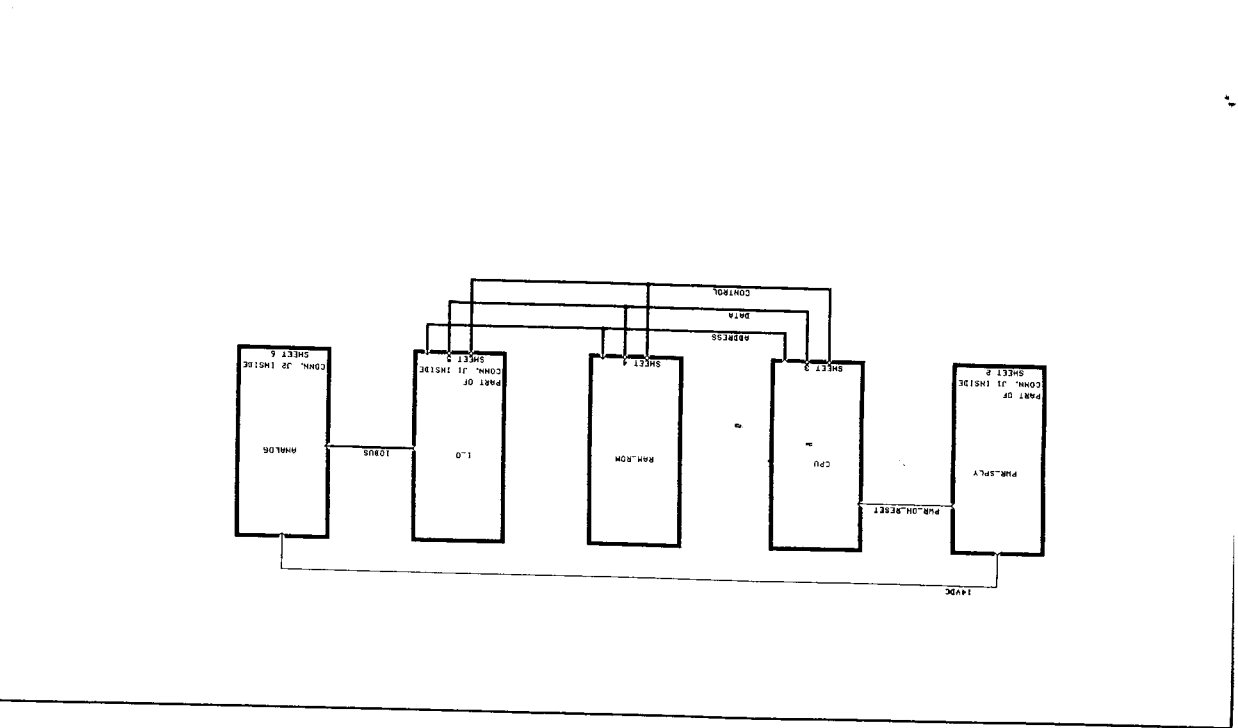
DESCRIPTION	QTY.	DESIGNATION	PART NUMBER
215305	2	Q1,Q2	0360-00802-0012
74F32	1	U6	0304-00803-0059
74LS05	1	U5	0E47-00803-0002
74LS74	1	U2	0304-00803-0058
AD7533 DAC	1	U8	0304-00803-0055
16 MHZ COSC	1	U1	0304-00804-0008
LM3900	1	U16	0360-00803-0002
MC6821	1	U7	0304-00803-0054
MC68000 G8 CPU	1	U3	0360-00803-0050
MC7805 REG	1	U17	0E47-00803-0001
PAL16L8A-2 SDOOR0	1	U4	0E47-00803-0003
RAM 2K X 8	2	U9,U10	0360-00803-0009
TDA2002	1	U15	0066-447RX-XXCX
TL7705AC	1	U18	SEE ROM/EPPROM SHEET
ROM/EPPROM	4	U11-U14	
FERRITE BEAD	3	FR1-FB3	0316-00804-0002
10 UH INDUCTOR	2	L1,L2	0360-00804-0031
16 PIN I.C. SOCKET	1	ICS U8	110E-00001-0003
20 PIN I.C. SOCKET	1	ICS U4	110E-00001-0005
28 PIN I.C. SOCKET	6	ICS U9-ICS U14	110E-00001-0010
40 PIN I.C. SOCKET	1	ICS U7	110E-00001-0011
64 PIN I.C. SOCKET	1	ICS U3	110E-00001-0016
HEATSINK TO-220	1	HS U15	112E-00001-0011
HEATSINK TO-220	1	HS U17	0E47-00804-0001
SIL PAD THERMAL WASHER # 2	2	INS U15, INS U17	0017-00042-0319
SCREW, 6-32	1	MH U15	0017-00101-0339
NUT, 6-32	1	MH U15	0017-00103-0005
WASHER, #6 STAR	1	MH U15	0017-00104-0009
SCREW, 4-40	1	MH U17	0017-00101-0731
NUT, 4-40	1	MH U17	0017-00103-0002
WASHER, #4 STAR	1	MH U17	0017-00104-0071
AUTO INSERT PIN	16	J1,J2	0304-00804-0010
TIN .045 SQ.			
JUMPER WIPE	12	JW1-JW12	117E-00001-0003
GREEN LED	1	LED 1	119E-00001-0001
TEST POINT	2	TP1,TP2	0017-00007-0131
PC MTG. SWITCH	1	SW1	0986-00804-3100
PC BOARD	1	--	A080-91864-C000

8/01/86 Rev. 1 - Changed Filter Values, C13,C15,C16,C18,C19,P39 CMM
8/05/86 Rev. 2 - Removed D1 CMM.
8/11/86 Rev. 3 - Added CP11-CP13 CMM.
8/15/86 Rev. 4 - Added ICS U13, ICS U14. Fixed Desig. list U5, U6.
Corrected qty. of Ferrite Bead.

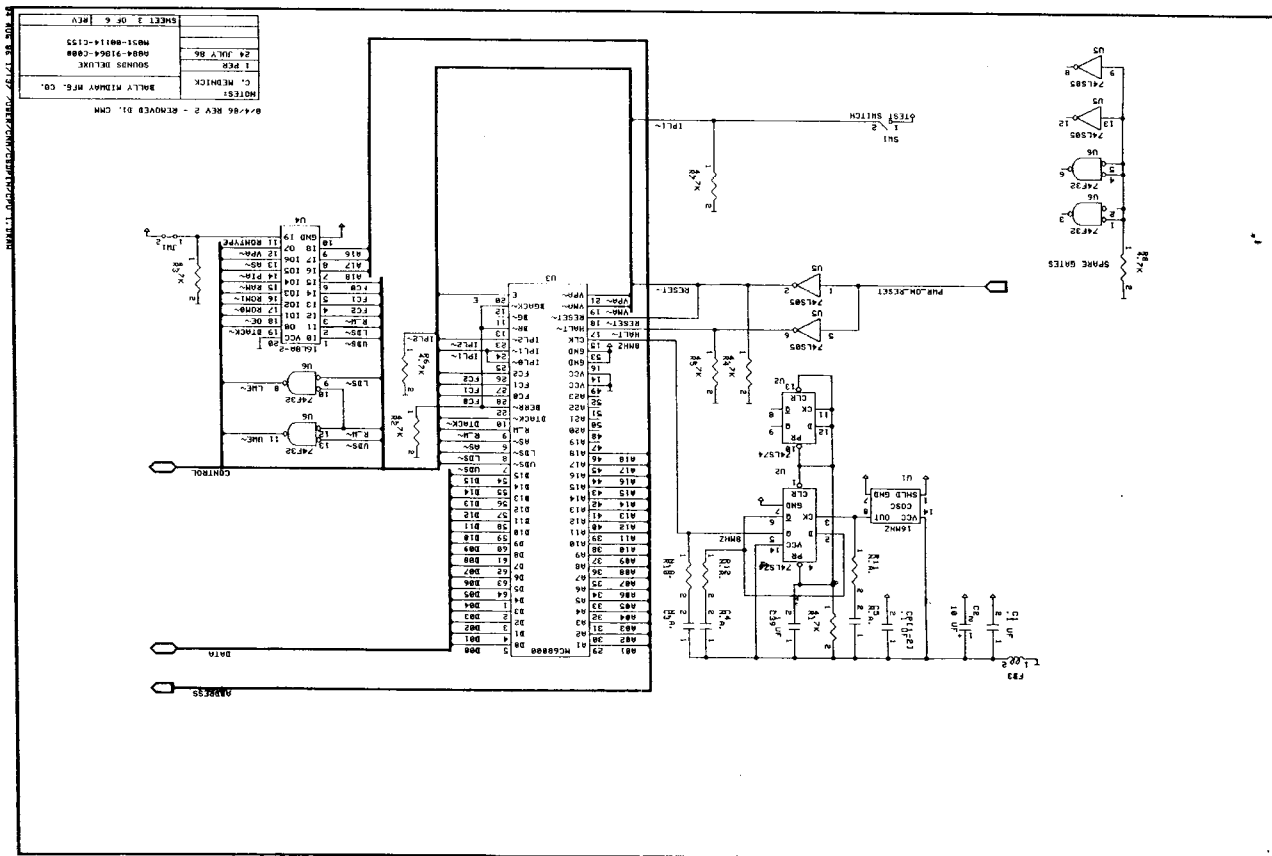
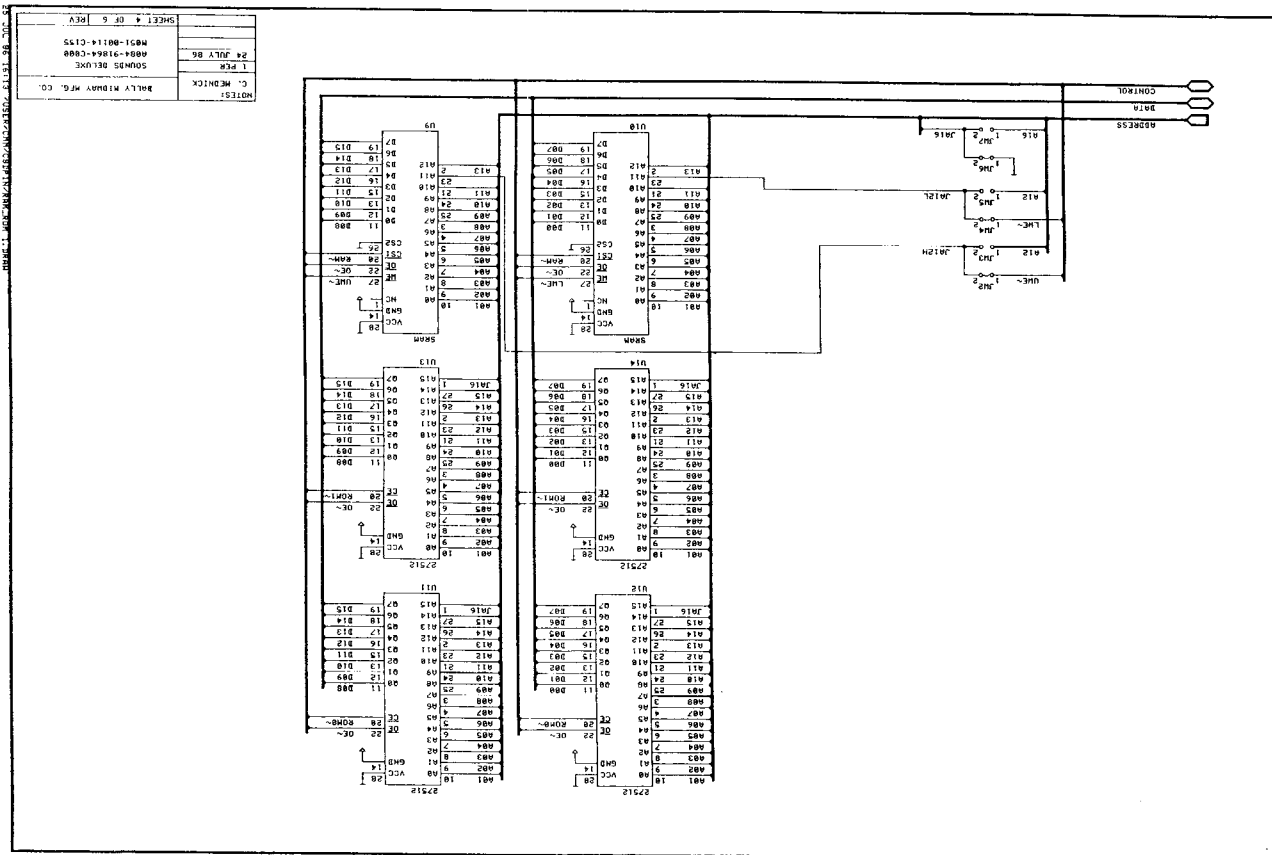
SHEET 2 OF 6 REV	
24 JULY 86	M82-9814-C135
1 PER	SOMMS BELLYK
C. MENNICK	BALLY MIDDAY MFG. CO.
NOTES: 8/11/86 REV 3 - Added CP11-CP13, CM	

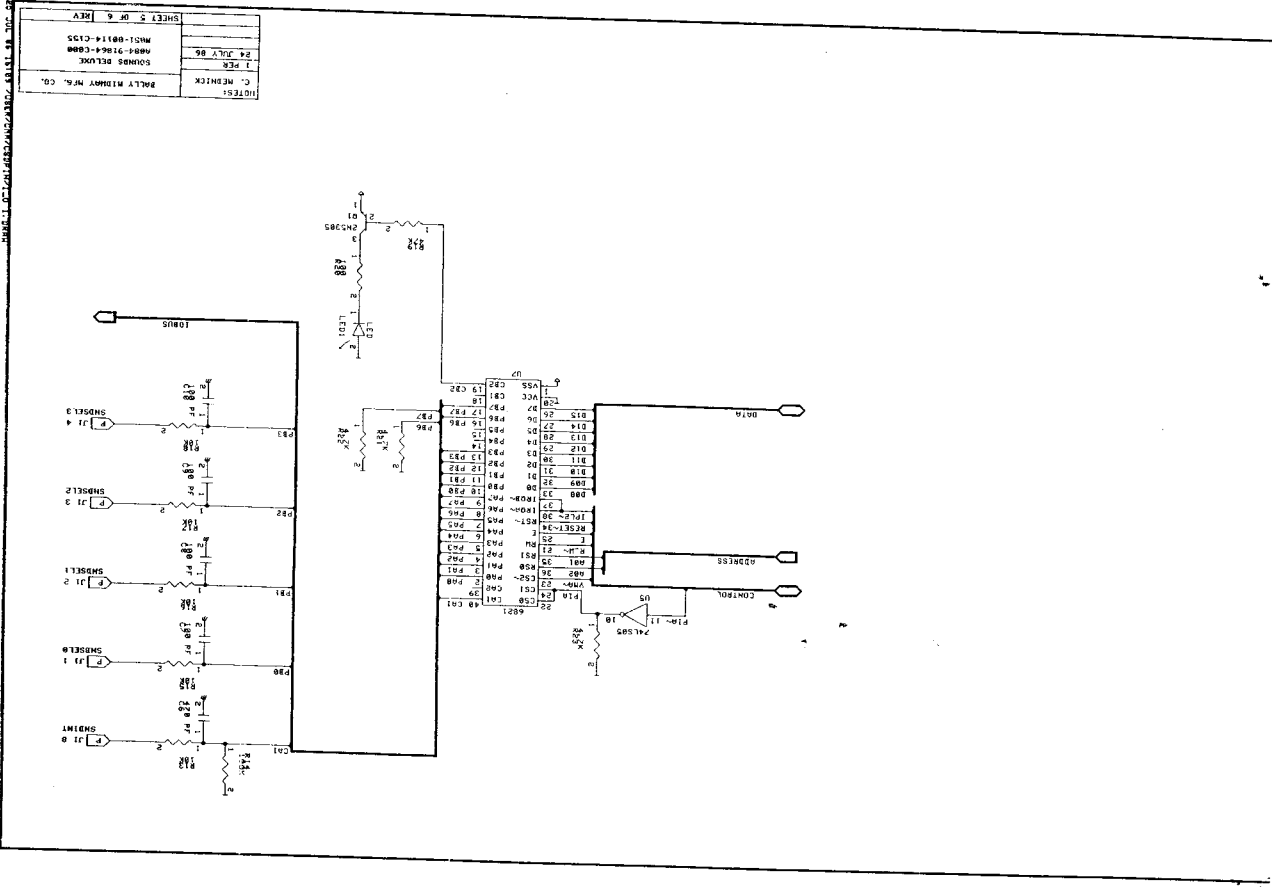
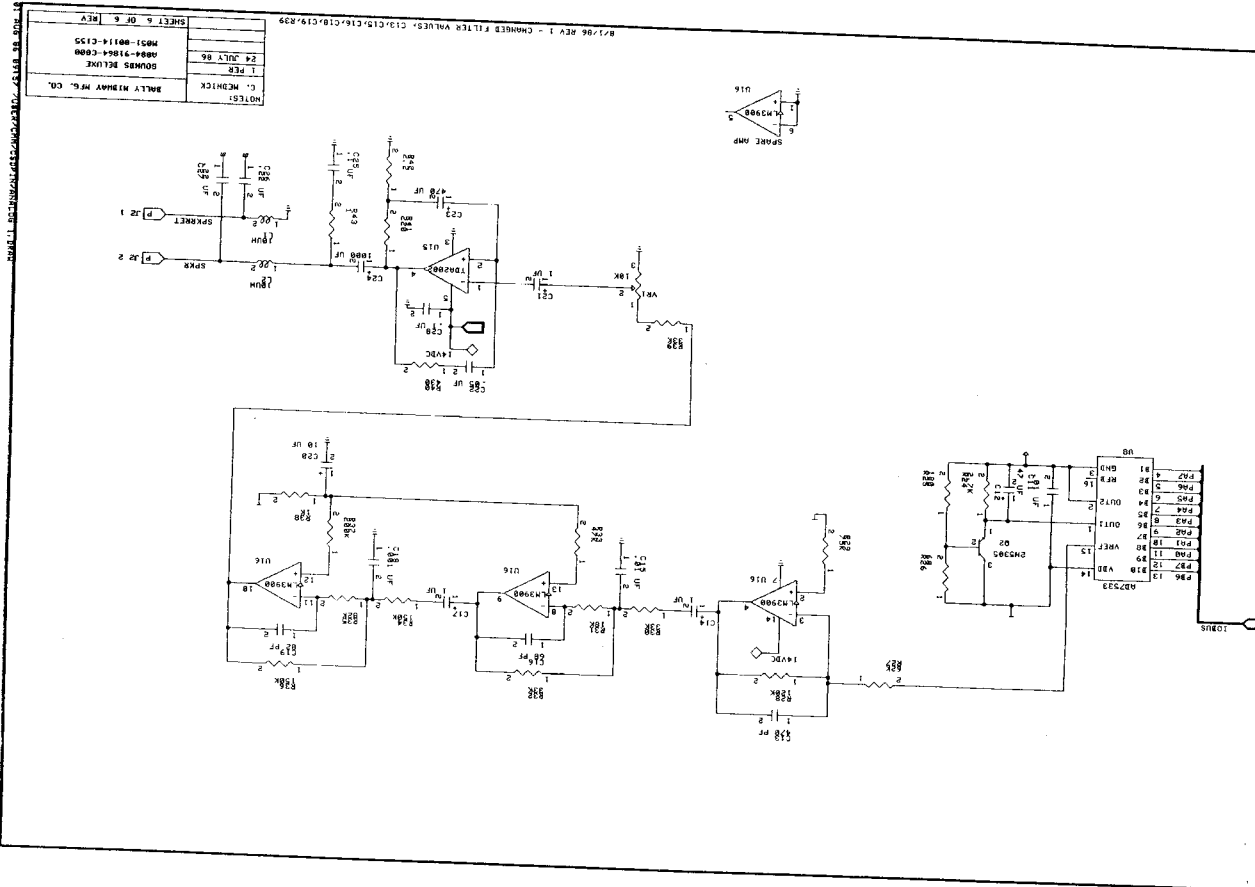


SHEET 1 OF 6 REV	
24 JULY 86	M82-9814-C135
1 PER	SOMMS BELLYK
C. MENNICK	BALLY MIDDAY MFG. CO.
NOTES: 8/11/86 REV 3 - Changed page 2, CM 8/4/86 REV 2 - Changed page 3, CM 8/1/86 REV 1 - Changed page 6	



LAST USER: C91-CP13-R191-F33-J2-M12-L2-R68-SU1-T82-LED1-V81
 NOT INSTALLED: C3-C5-C6-B1-B5-B8-B9-05-R18-M12-K4-K6-M08
 NOT USED: 69

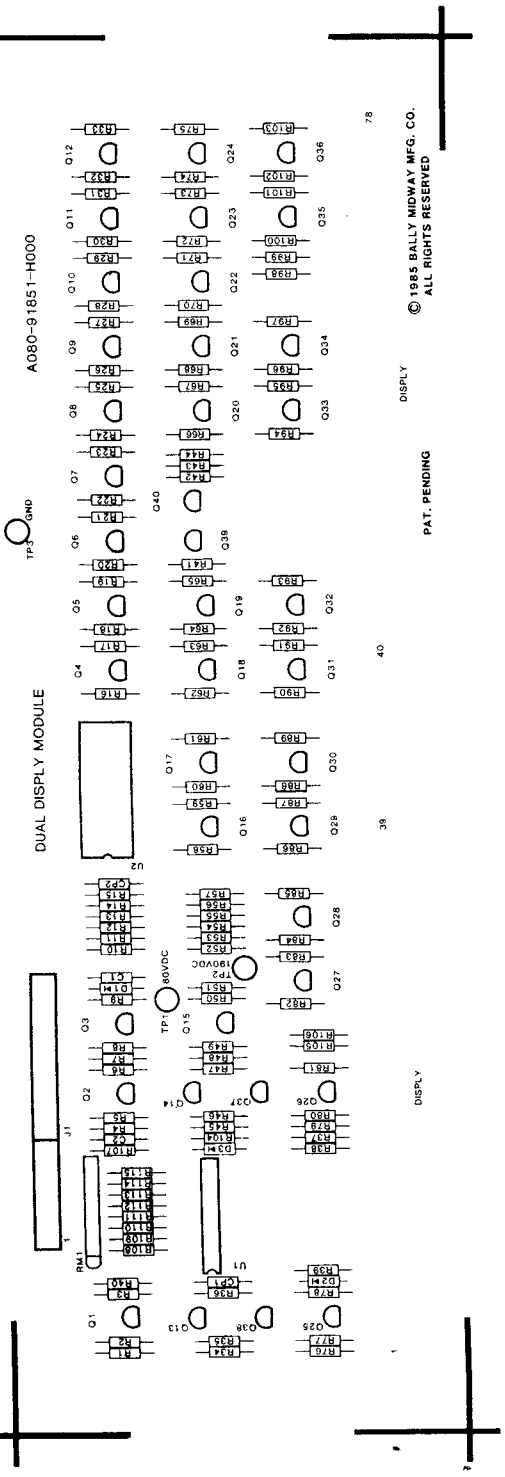




A080-91851-H000

DUAL DISPLAY MODULE

DUAL DISPLAY MODULE



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PAT. PENDING

40

39

DISPLY

THIS DWG IS CONFIDENTIAL & PROPERTY OF BALLY/MIDWAY MFG. CO.

REL. FOR PRODUCTION	5/15/87
REVISIONS	
PART NO.	M.O. 5.1-0-0-3-6.5-H.O. 3-3

Bally/Midway Mfg. Co.
FRANKLIN PARK, IL 60131
ASSEMBLY DRAWING
DUAL DISPLAY MODULE
A084-91851-H000

FIRST USED ON	PIN BALL	SCALE	FULL
DATE	5/15/87		
DRAWN	JBB	MATL	
MECH/CHK		FINISH	
ELEC/CHK	JBB		

DIM. TOLERANCES
UNLESS OTHERWISE SPEC.
CONCENTRICITY T.I.R. .002
ANGULAR .005
DECIMAL .005
HOLE DIA. +.002 - .000
ANGLE ± 1/2°
DO NOT SCALE DWG.

DUAL DISPLAY MODULE
A084-91851-H000
M051-00365-H042 (Page 3 of 5) REV. 1

DUAL DISPLAY MODULE
A084-91851-H000
M051-00365-H042 (Page 2 of 5) REV. 1

DUAL DISPLAY MODULE
A084-91851-H000
M051-00365-H042 (Page 1 of 5) REV. 1

DESIGNATION LIST

DESIGNATION NO.	DESCRIPTION
C1	.01UF 500V CER.
C2	.01UF 50V AX. CER.
CP1, CP2	1M110ZS10 110V ZENER DIODE
D1	1M4148 DIODE
D2, D3	MPS-A-42 NPN XSTR
Q1 - Q4	2N5401 PNP XSTR
Q5	MPS-A-42
Q6	2N5401
Q7	MPS-A-42
Q8	2N5401
Q9	MPS-A-42
Q10 - Q21	MPS-A-42
Q22 - Q24	MPS-A-42
Q25	MPS-A-42
Q26	MPS-A-42
Q27	MPS-A-42
Q28	MPS-A-42
Q29 - Q35	MPS-A-42
Q36 - Q40	MPS-A-42
U1	74HC373 CMOS OCTAL LATCH
U2	14514 1-16 DECODER
U3	14 DIGIT, 9 SEGMENT GAS DISCHARGE DISPLAY
J1	-025 SOG. PINS
J2	TEST LOOPS
J3	POWER TAPE
J4	DISPLAY
J5	DISPLAY MTG. CLIPS
J6	SCREWS
J7	DUAL DISPLAY MODULE P.C.B.

DESIGNATION LIST

DESIGNATION NO.	DESCRIPTION
R59	100K 1/4W 1% METAL FILM
R60	100K 1/4W 1% METAL FILM
R61	9.1K 1/4W 5% CARBON
R62	9.1K 1/4W 5% CARBON
R63	100K 1/4W 5% CARBON
R64	100K 1/4W 5% METAL FILM
R65	100K 1/4W 5% METAL FILM
R66	100K 1/4W 5% METAL FILM
R67	100K 1/4W 5% METAL FILM
R68	100K 1/4W 5% METAL FILM
R69	100K 1/4W 5% METAL FILM
R70	100K 1/4W 5% METAL FILM
R71	100K 1/4W 5% CARBON
R72	2.2K 1/4W 5% CARBON
R73	300K 1/4W 5% CARBON
R74	300K 1/4W 5% CARBON
R75	300K 1/4W 5% CARBON
R76	1.5K 1/4W 5% CARBON
R77	820 OHM 1/4W 5% CARBON
R78	300K 1/4W 5% CARBON
R79	1.5K 1/4W 5% CARBON
R80	820 OHM 1/4W 5% CARBON
R81	300K 1/4W 5% CARBON
R82	300K 1/4W 5% CARBON
R83	100K 1/4W 5% METAL FILM
R84	100K 1/4W 5% METAL FILM
R85	9.1K 1/4W 5% CARBON
R86	300K 1/4W 5% CARBON
R87	2.2K 1/4W 5% CARBON
R88	2.2K 1/4W 5% CARBON
R89	300K 1/4W 5% CARBON
R90	300K 1/4W 5% CARBON
R91	2.2K 1/4W 5% CARBON
R92	2.2K 1/4W 5% CARBON
R93	300K 1/4W 5% CARBON
R94	2.2K 1/4W 5% CARBON
R95	300K 1/4W 5% CARBON
R96	2.2K 1/4W 5% CARBON
R97	300K 1/4W 5% CARBON
R98	2.2K 1/4W 5% CARBON
R99	10M 1/4W 5% CARBON
R100	1M 1/4W 5% CARBON
R101	300K 1/4W 5% CARBON
R102	2.2K 1/4W 5% CARBON
R103	100K 1/4W 1% METAL FILM
R104	9.1K 1/4W 5% CARBON
R105	150K 1/4W 5% CARBON
R106	10M 1/4W 5% CARBON
R107	1M 1/4W 5% CARBON
R108-R115	10K 1/4W 5% CARBON
RMI	100K 10 PIN SIP

DESIGNATION LIST

DESIGNATION NO.	DESCRIPTION
R1	1.5K 1/4W 5% CARBON
R2	820 OHM 1/4W 5% CARBON
R3	300K 1/4W 5% CARBON
R4	1.5K 1/4W 5% CARBON
R5	510 OHM 1/4W 5% CARBON
R6	300K 1/4W 5% CARBON
R7	1.5K 1/4W 5% CARBON
R8	820 OHM 1/4W 5% CARBON
R9	300K 1/4W 5% CARBON
R10 - R15	300K 1/4W 5% CARBON
R16	1.5K 1/4W 5% CARBON
R17	10K 1/4W 5% METAL FILM
R18	2.2K 1/4W 5% CARBON
R19	300K 1/4W 5% CARBON
R20	9.1K 1/4W 5% CARBON
R21	100K 1/4W 1% METAL FILM
R22	2.2K 1/4W 5% CARBON
R23	300K 1/4W 5% CARBON
R24	9.1K 1/4W 5% CARBON
R25	100K 1/4W 1% METAL FILM
R26	2.2K 1/4W 5% CARBON
R27	300K 1/4W 5% CARBON
R28	9.1K 1/4W 5% CARBON
R29	100K 1/4W 1% METAL FILM
R30	9.1K 1/4W 5% CARBON
R31	100K 1/4W 1% METAL FILM
R32	9.1K 1/4W 5% CARBON
R33	100K 1/4W 1% METAL FILM
R34	1.5K 1/4W 5% CARBON
R35	820 OHM 1/4W 5% CARBON
R36	300K 1/4W 5% CARBON
R37	1.5K 1/4W 5% CARBON
R38	300K 1/4W 5% CARBON
R39	1K 1/4W 5% CARBON
R40	100K 1/4W 5% CARBON
R41	100K 1/4W 5% CARBON
R42	1K 1/4W 5% CARBON
R43	1.5K 1/4W 5% CARBON
R44	300K 1/4W 5% CARBON
R45	1.5K 1/4W 5% CARBON
R46	820 OHM 1/4W 5% CARBON
R47	300K 1/4W 5% CARBON
R48	1.5K 1/4W 5% CARBON
R49	820 OHM 1/4W 5% CARBON
R50	100K 1/4W 5% CARBON
R51	100K 1/4W 1% METAL FILM
R52	2.2M 1/4W 5% CARBON
R53	9.1K 1/4W 5% CARBON

DESIGNATION LIST

DESIGNATION NO.	DESCRIPTION
R59	100K 1/4W 1% METAL FILM
R60	100K 1/4W 1% METAL FILM
R61	9.1K 1/4W 5% CARBON
R62	9.1K 1/4W 5% CARBON
R63	100K 1/4W 5% CARBON
R64	100K 1/4W 5% METAL FILM
R65	100K 1/4W 5% METAL FILM
R66	100K 1/4W 5% METAL FILM
R67	100K 1/4W 5% METAL FILM
R68	100K 1/4W 5% METAL FILM
R69	100K 1/4W 5% METAL FILM
R70	100K 1/4W 5% METAL FILM
R71	100K 1/4W 5% CARBON
R72	2.2K 1/4W 5% CARBON
R73	300K 1/4W 5% CARBON
R74	300K 1/4W 5% CARBON
R75	300K 1/4W 5% CARBON
R76	1.5K 1/4W 5% CARBON
R77	820 OHM 1/4W 5% CARBON
R78	300K 1/4W 5% CARBON
R79	1.5K 1/4W 5% CARBON
R80	820 OHM 1/4W 5% CARBON
R81	300K 1/4W 5% CARBON
R82	300K 1/4W 5% CARBON
R83	100K 1/4W 5% METAL FILM
R84	100K 1/4W 5% METAL FILM
R85	9.1K 1/4W 5% CARBON
R86	300K 1/4W 5% CARBON
R87	2.2K 1/4W 5% CARBON
R88	2.2K 1/4W 5% CARBON
R89	300K 1/4W 5% CARBON
R90	300K 1/4W 5% CARBON
R91	2.2K 1/4W 5% CARBON
R92	2.2K 1/4W 5% CARBON
R93	300K 1/4W 5% CARBON
R94	2.2K 1/4W 5% CARBON
R95	300K 1/4W 5% CARBON
R96	2.2K 1/4W 5% CARBON
R97	300K 1/4W 5% CARBON
R98	2.2K 1/4W 5% CARBON
R99	10M 1/4W 5% CARBON
R100	1M 1/4W 5% CARBON
R101	300K 1/4W 5% CARBON
R102	2.2K 1/4W 5% CARBON
R103	100K 1/4W 1% METAL FILM
R104	9.1K 1/4W 5% CARBON
R105	150K 1/4W 5% CARBON
R106	10M 1/4W 5% CARBON
R107	1M 1/4W 5% CARBON
R108-R115	10K 1/4W 5% CARBON
RMI	100K 10 PIN SIP

DUAL DISPLAY MODULE
A084-91851-H000
M051-00365-H042 (Page 5 of 5) REV. 1

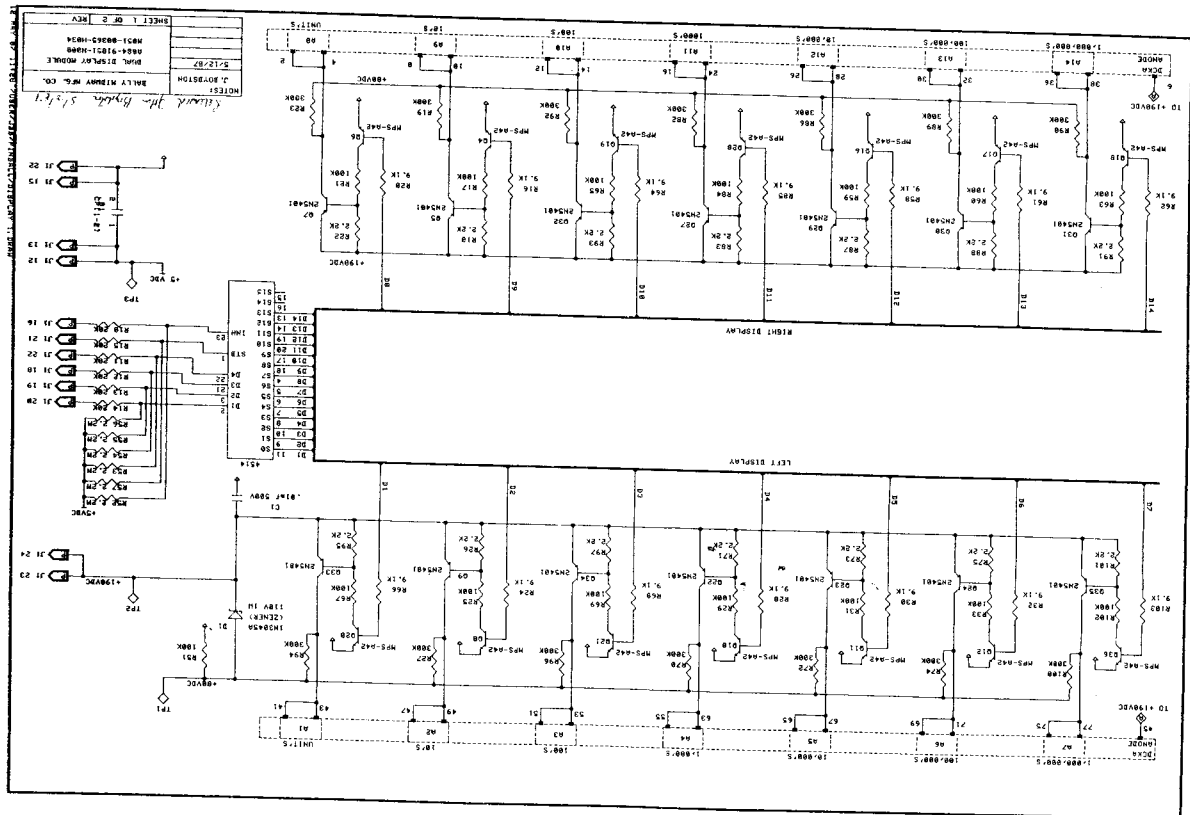
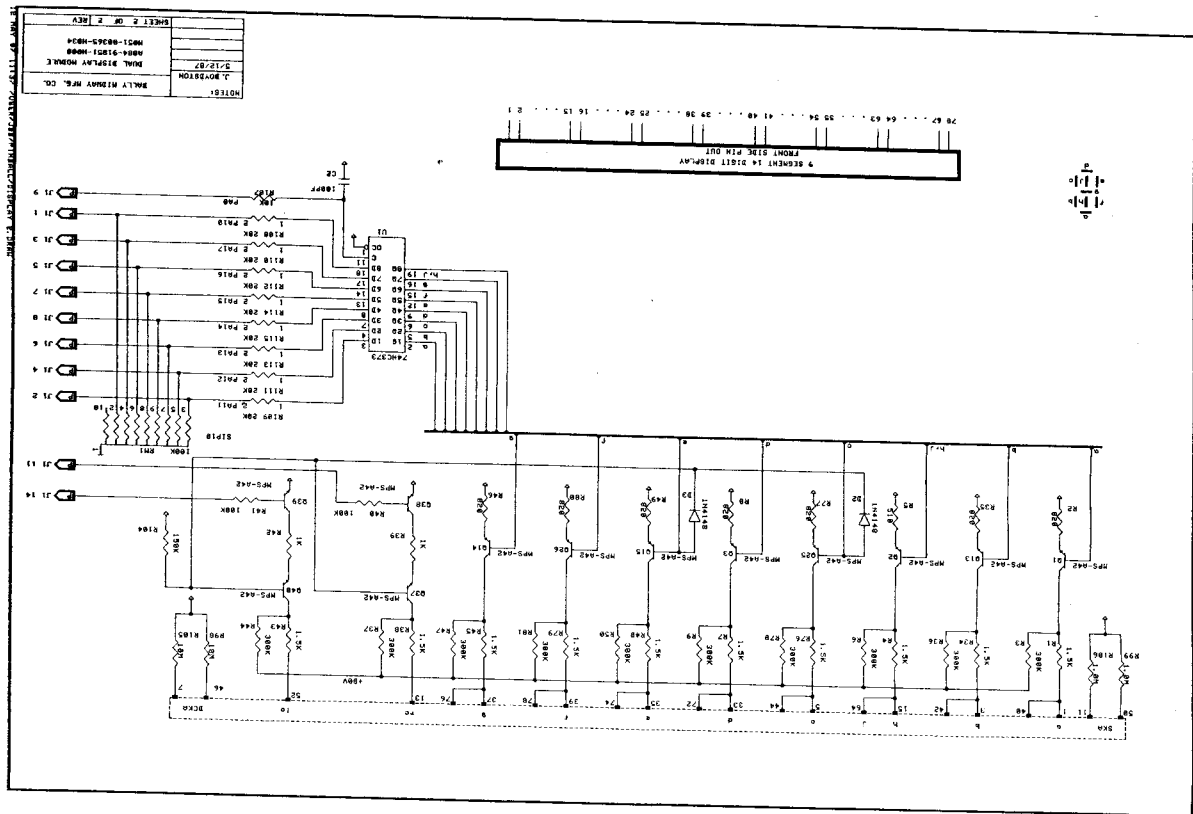
DUAL DISPLAY MODULE
A084-91851-H000
M051-00365-H042 (Page 4 of 5) REV. 1

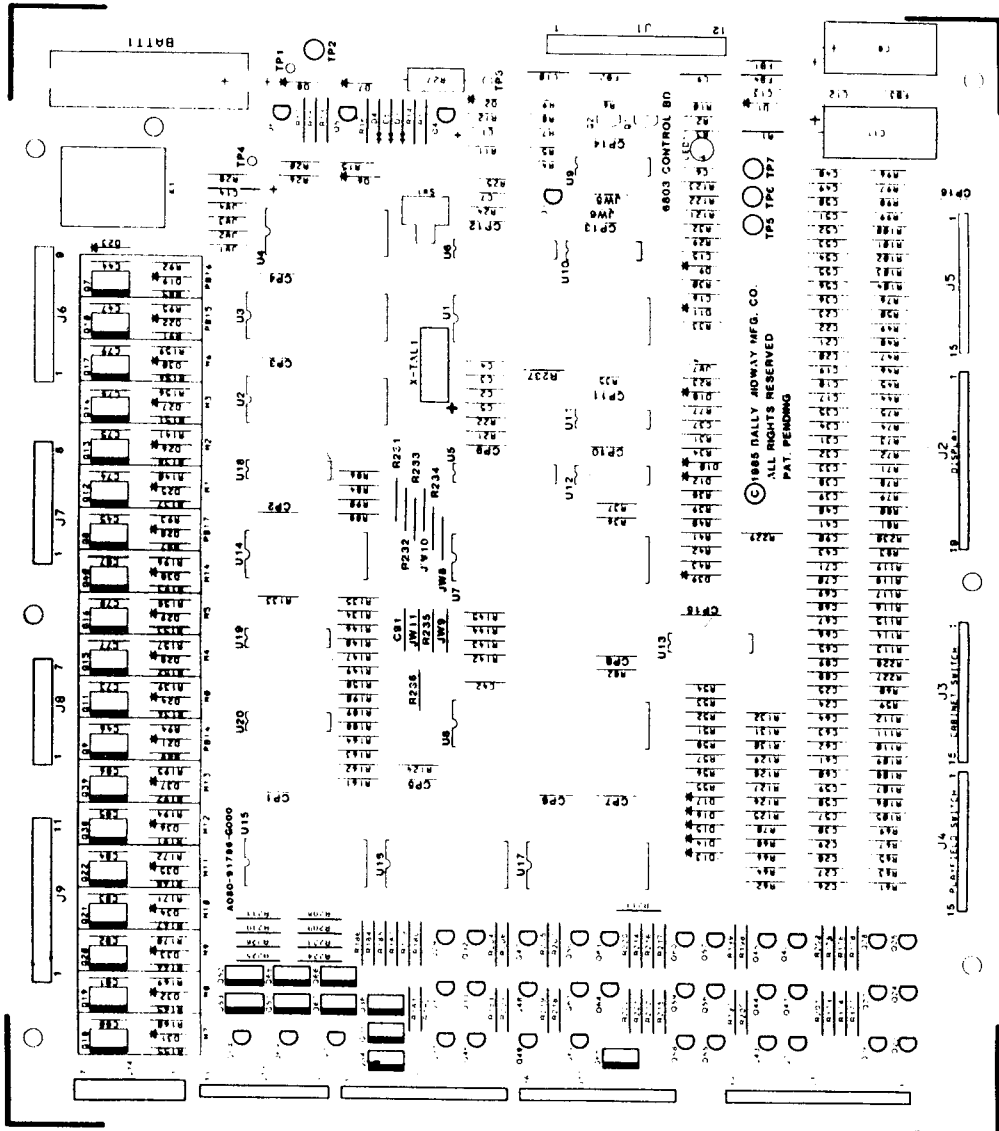
CROSS REFERENCE LIST

CROSS REFERENCE LIST

DESCRIPTION	QTY.	DESIGNATION NO.	PART NOS.
510 OHM 1/4W 5% CARBON	1	R5	100E-00005-0053
820 OHM 1/4W 5% CARBON	7	R2, R8, R35, R46	100E-00005-0058
1K 1/4W 5% CARBON	2	R49, R77, R80	
1.5K 1/4W 5% CARBON	10	R39, R42	100E-00005-0061
2.2K 1/4W 5% CARBON	14	R1, R4, R7, R34, R38	100E-00005-0065
		R43, R45, R48	
		R76, R79	
		R18, R22, R26, R71	100E-00005-0069
		R73, R75, R83, R87	
		R88, R91, R93, R95	
		R97, R101	
9.1K 1/4W 5% CARBON	14	R16, R20, R24, R28	100E-00005-0087
		R30, R32, R58, R61	
		R82, R84, R66, R68	
		R85, R103	
10K 1/4W 5% CARBON	1	R107	100E-00005-0088
20K 1/4W 5% CARBON	14	R10-R15, R108-R115	100E-00005-0095
100K 1/4W 5% CARBON	12	R40, R41	100E-00005-0115
100K 1/4W 5% CARBON	15	R17, R21, R25, R29	100E-00001-0046
100K 1/4W 1% METAL FILM		R31, R33, R51, R59	
		R60, R83, R65, R67	
		R69, R84, R102	
150K 1/4W 5% CARBON	1	R106, R9, R19, R23	100E-00005-0120
300K 1/4W 5% CARBON	24	R27, R36, R37, R44	100E-00005-0127
		R47, R50, R70, R72	
		R74, R78, R81, R82	
		R86, R89, R90, R92	
		R94, R96, R100	
		R99, R106	100E-00005-0140
		R52, R57	100E-00005-0147
1.0M OHM 1/4W 5% CARBON	2	RM1	102E-00004-0045
2.2M OHM 1/4W 5% CARBON	6	R98, R105	100E-00005-0162
100K 10 PIN SIP	1	C2	0639-00800-0003
10.0M OHM 1/4W 5% CARBON	2	CP1, CP2	0360-00800-0005
100PF AX. CER.	1	C1	0360-00800-0013
.01UF 500V	2	D2, D3	103E-00002-0005
1N4148	2	D1	103E-00001-0028
1M110ZS10 110V ZENER DIODE	1	D4	0360-00802-0006
2N5401 PNP XSTR	14	Q1, Q2, Q29, Q30	
		Q31, Q32, Q33, Q34	
		Q35	
MPS-A-42 NPN XSTR	26	Q1-Q4, Q6, Q8, Q10-Q21, Q25, Q26, Q28	0360-00802-0007
		Q36-Q40	
14514 1-16 DECODER	1	U1	0360-00803-0013
74HC373 OCTAL LATCH	1	U2	0365-00803-0015
.02550. PINS	23	J1	0304-00804-0009
14 DIGIT 9 SEGMENT			
GAS DISCHARGE DISPLAY	1	DISPLAY 1	119E-00002-0006
TEST LOOPS	3	TP1 - TP3	0017-00007-0131

5/20/87 REV. 1 - CORRECTION TO DISPLAY MTG. PROCEDURE PART NO. 985





THIS DWG. IS CONFIDENTIAL & PROPERTY OF MIDWAY MFG. CO.

MIDWAY MFG. CO. FRANKLIN P.C.I.L. 68131 A BALLY CO.	
DWG. TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONAL $\pm .004$ DECIMAL $\pm .005$ ANGLES $\pm .002$ DO NOT SCALE DWG.	DATE: 04/08/86 PART: 6803 CONTROL BD. REVISIONS: A084 - 91786 - G000
THIS DWG. IS CONFIDENTIAL & PROPERTY OF MIDWAY MFG. CO.	PART NO: MO.5-1-000C.5.3 - G-0-0.3

6803 CONTROL BOARD
A084-91786-G000
M051-00C53-6003

CROSS REFERENCE LIST

CROSS REFERENCE LIST

DESCRIPTION	QTY.	DESIGNATION NO.	PART NOS.	DESCRIPTION	QTY.	DESIGNATION NO.	PART NOS.
27pf 50V CER.	2	C2, C3	0360-00800-0052	7.5 1/4W 5%	1	R5	100E-00005-0085
47pf 50V CER.	1	C7	0360-00800-0027	9.1 1/4W 5%	1	R4	100E-00005-0087
390pf 50V CER.	25	C24-C30, C57-C71	0360-00800-0001	10K 1/4W 5%	4	R12, R13, R30, R33	100E-00005-0088
470pf 1KV CER.	27	C88-C90	0307-00800-0008	15K 1/4W 5%	2	R31, R34	100E-00005-0092
.002uf 1KV CER.	19	C17-C23, C31-C36, C91	0360-00800-0012	39K 1/4W 5%	1	R10, R11	100E-00005-0102
.003uf 1KV CER.	1	C38-C41, C48-C56, C91	0360-00800-0025	47K 1/4W 5%	2	R62, R64, R66, R68	100E-00005-0104
.01uf 50V CER.	24	C44-C47, C73-C87	0365-00800-0014	56K 1/4W 5%	14	R70, R125-R132, R229	100E-00005-0106
.05uf 16V CER.	1	C6, C9, C10, C12, C13	0360-00800-0006	62K 1/4W 5%	1	R15	100E-00005-0107
.1uf 50V CER.	1	C15, C16, C42, CP1-CP16	0360-00800-0025	82K 1/4W 5%	1	R14	100E-00005-0112
4.7uf 25V TANT	2	C4	0360-00800-0058	100K 1/4W 5%	2	R26, R237	100E-00005-0115
6.8uf 25V TANT	1	C5, C14	0360-00800-0008	270K 1/4W 5%	1	R77	100E-00005-0126
470uf 16V ELEC	1	C1	0360-00800-0048	82 OHM 1W 10%	1	R27	100E-00007-0014
470uf 25V ELEC	1	C8	0360-00800-0022	IN958R ZENER	1	D1	103E-00001-0002
82 OHM 1/4W 5%	1	C11	0360-00800-0024	IN4004	20	D19-D38	103E-00003-0005
100 OHM 1/4W 5%	1	R9	100E-00005-0031	IN4148	13	D3, D6, D9-D18, D39	103E-00002-0005
110 OHM 1/4W 5%	1	R8	100E-00005-0033	IN4606	5	D2, D4, D5, D7, D8	103E-00002-0006
120 OHM 1/4W 5%	21	R24, R85, R87, R89	100E-00005-0034	2N3904	3	Q2, Q4, Q6	104E-00001-0006
		R91, P121, R136-R138,	100E-00005-0035	2N4403	2	Q3, Q5	104E-00002-0006
		R151-R155, R165-R168,		2N5060	35	Q23-Q33, Q37, Q41-Q50,	104E-00015-0001
		R191-R193		2N5305	1	Q54-Q64, Q69, Q70	104E-00007-0003
270 OHM 1/4W 5%	1	R28	100E-00005-0044	MCR106-1	10	O1	0360-00802-0009
330 OHM 1/4W 5%	23	R92-R95, R139-R141,	100E-00005-0047	SE9302	19	O34-Q36, Q51-Q53	0360-00802-0008
		R156-R160, R169-R172,		4011	1	O65-Q68	0360-00803-0010
		R194-R196, R231-R234,		4514R	3	O7-Q22, Q38-Q40	0360-00803-0005
		R96-R104		4584	1	U11	0360-00803-0013
470 OHM 1/4W 5%	9	R1	100E-00005-0051	6116 RAM	1	U15-U17	0066-0908X-XXDX
560 OHM 1/4W 5%	1	R2	100E-00005-0054	6803 MPU	1	U4	0365-00803-0013
680 OHM 1/4W 5%	1	R25	100E-00005-0055	6821 P1A	2	U7, U8	0360-00803-0017
750 OHM 1/4W 5%	1	R19	100E-00005-0057	74LS04	1	U10	0A15-00803-0010
910 OHM 1/4W 5%	1	R18	100E-00005-0059	74LS154	1	U9	0A89-00803-0007
1K 1/4W 5%	3	R3, R29, R32	100E-00005-0061	75LS154	1	U14	0360-00803-0024
1.2K 1/4W 5%	60	R44-R50, R59-R61, R63,	100E-00005-0063	74HCT245	1	U5	0365-00803-0014
		R65, R67, R69, R71-R76,		74LS373	1	U6	0A89-00803-0006
		R78-R82, R105-R119, R122		CA3081	3	U18-U20	0360-00803-0007
		R133-R135, R146-R150,		3.580 MHZ CRYSTAL	1	XTAL-1	109E-00001-0003
		R161-R164, R188-R190,		LED GREEN	1	LED 1	0017-00007-0131
		R27, R228, R230, R235		TEST POINTS	7	TP1-TP7	0017-00007-0131
1.5K 1/4W 5%	1	R20	100E-00005-0065	SWITCH P.R.	1	SW1	0017-00032-0038
2K 1/4W 5%	46	R123, R173-R187	100E-00005-0068	BATTERY 3.6V	1	BATT-1	0017-00003-0172
2.7K 1/4W 5%	2	R197-R226	100E-00005-0071	ZERO OHM RES. JUMPER	5	JW2, JW4, JW6, JW8, JW10	117E-00001-0001
3K 1/4W 5%	1	R2, R6	100E-00005-0073	RELAY 4RVDG	1	K1	114F-00001-0011
3.3K 1/4W 5%	18	R17	100E-00005-0074	40 PIN I.C. SOCKET	3	XU1, XU7, XUR	110E-00001-0011
		R21-R23, P35, R51-R58,		28 PIN I.C. SOCKET	2	XU2, XU3	110E-00001-0010
		R124, R142-R145, R235		24 PIN I.C. SOCKET	1	XU4	110E-00001-0007
3.9K 1/4W 5%	4	R84, R86, R88, R90	100E-00005-0077	FERRITE BEAD	4	FR1-FR4	0316-00804-0002
4.7K 1/4W 5%	8	R36-R43	100E-00005-0079				
5.6 1/4W 5%	1	R16	100E-00005-0082				

6803 CONTROL BOARD
A084-91786-G000
M051-00C53-G003

DESIGNATION LIST

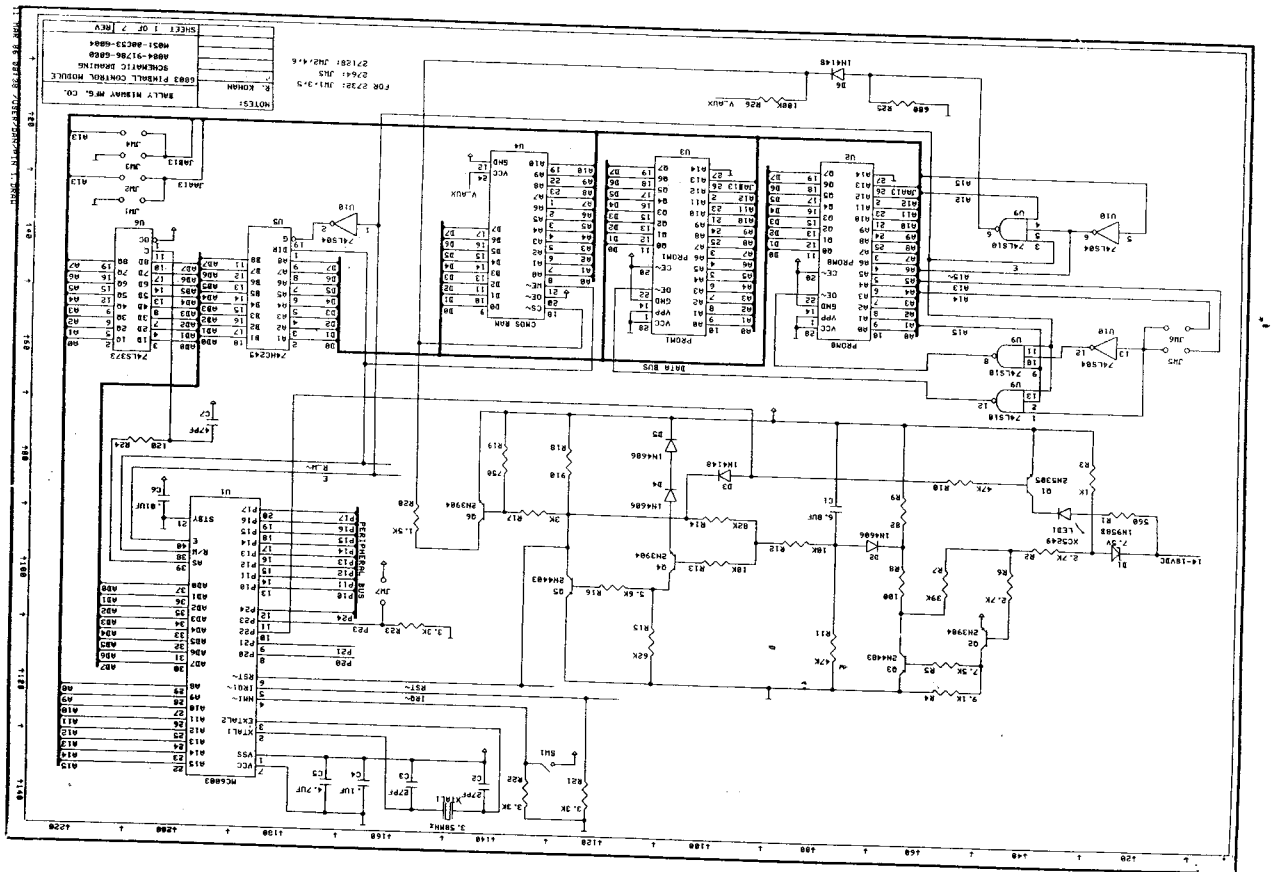
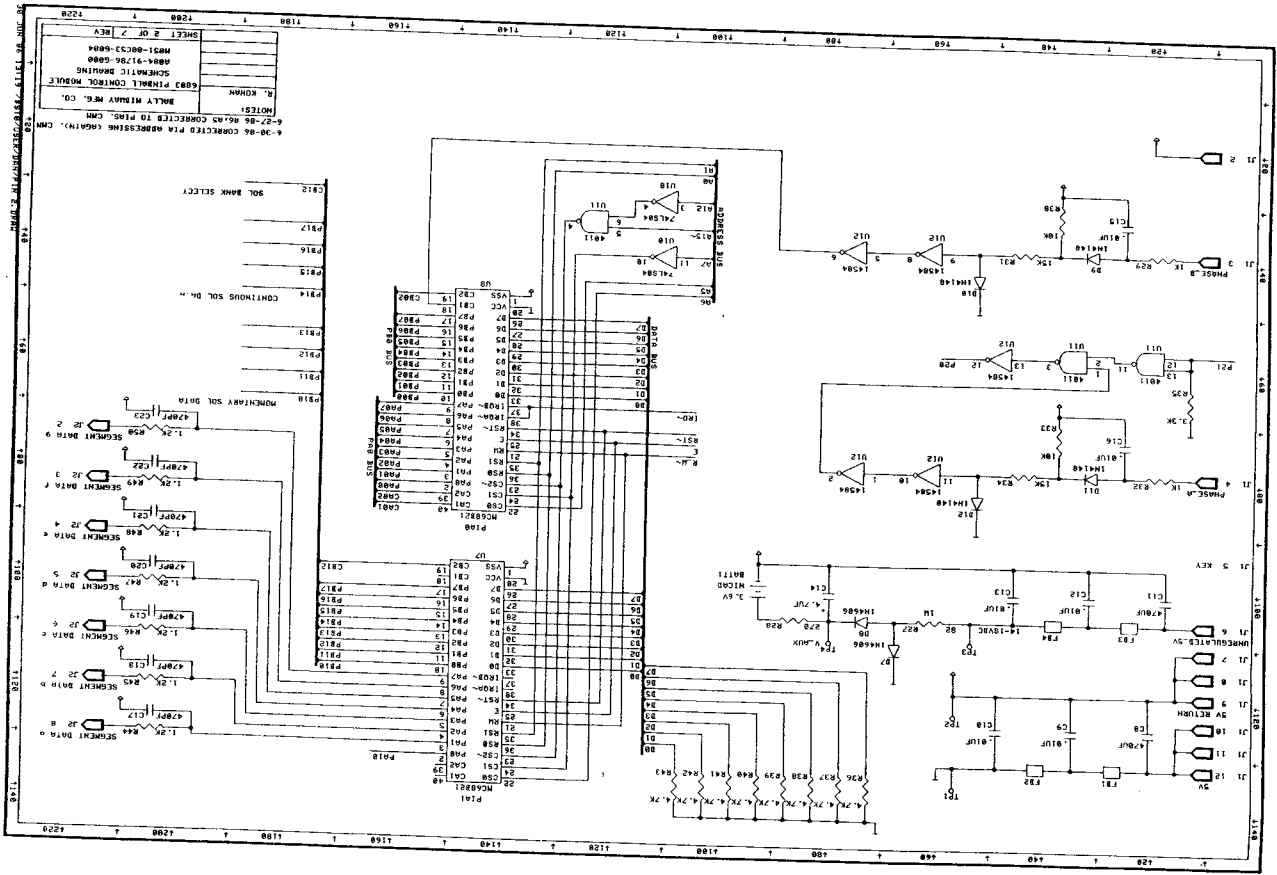
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C1	6.0UF 25V TANT.	R28	270 OHM 1/4W 5%	R165 - R168	120 OHM 1/4W 5%	U15 - U17	3.580 MHZ CRYSTAL
C2, C3	27PF 50V CER.	R29	1K 1/4W 5%	R169 - R172	330 OHM 1/4W 5%	XTAL-1	LED GREEN
C4	.1UF 50V CER.	R30	10K 1/4W 5%	R173 - R187	2K 1/4W 5%	LED 1	TEST POINTS
C5	4.7UF 25V TANT.	R31	15K 1/4W 5%	R188 - R190	1.2K 1/4W 5%	TP1 - TP7	SWITCH P.P.R.
C6	.01UF 50V CER.	R32	1K 1/4W 5%	R191 - R193	120 OHM 1/4W 5%	SW1	BATTERY 3.6V
C7	47PF 50V CER.	R33	10K 1/4W 5%	R194 - R196	330 OHM 1/4W 5%	RATT-1	ZERO OHM RES. JUMPER
C8	470UF 16V ELEC.	R34	15K 1/4W 5%	R197 - R226	2K 1/4W 5%	JW2	ZERO OHM RES. JUMPER
C9, C10	.01UF 50V CER.	R35	3.3K 1/4W 5%	R227, R228	1.2K 1/4W 5%	JW4	ZERO OHM RES. JUMPER
C11	470UF 25V ELEC.	R36 - R43	4.7K 1/4W 5%	R230	56K 1/4W 5%	JW6	ZERO OHM RES. JUMPER
C12, C13	.01UF 50V CER.	R44 - R50	1.2K 1/4W 5%	R231 - R234	1.2K 1/4W 5%	JW8	ZERO OHM RES. JUMPER
C14	4.7UF 25V TANT.	R51 - R58	3.3K 1/4W 5%	R235	330 OHM 1/4W 5%	JW10	ZERO OHM RES. JUMPER
C15, C16	.01UF 50V CER.	R59 - R61	1.2K 1/4W 5%	R236	3.3K 1/4W 5%	K1	ZERO OHM RES. JUMPER
C17 - C23	470PF 1KV CER.	R62	56K 1/4W 5%	R237	100K OHM 1/4W 5%	XU1, XU7, XU8	RELAY 48V DC
C24 - C30	390PF 50V CER.	R63	56K 1/4W 5%	D1	1N958B	XU2, XU3	40 PIN IC SOCKET
C31 - C36	470PF 1KV CER.	R64	56K 1/4W 5%	D2	1N4606	XU4	28 PIN IC SOCKET
C37	.05UF 16V CER.	R65	1.2K 1/4W 5%	D3	1N4148	FBI - FR4	24 PIN IC SOCKET
C38 - C41	470PF 1KV CER.	R66	56K 1/4W 5%	D4, D5	1N4606	J1	FERRITE READ
C42	.01UF 50V CER.	R67	1.2K 1/4W 5%	D6	1N4148	J2	11 - .045 SO. PINS
C43	.003UF 1KV CER.	R68	56K 1/4W 5%	D7, D8	1N4506	J3	18 - .025 SO. PINS
C44 - C47	.002UF 1KV CER.	R69	1.2K 1/4W 5%	D9 - D18	1N4506	J4	14 - .025 SO. PINS
C48 - C56	470PF 1KV CER.	R70	56K 1/4W 5%	D19 - D38	1N4148	J5	14 - .025 SO. PINS
C57 - C71	390PF 50V CER.	R71 - R76	1.2K 1/4W 5%	D39	1N4004	J6	14 - .025 SO. PINS
C73 - C87	.002 1KV CER.	R77	270K 1/4W 5%	D1	1N4148	J7	8 - .045 SO. PINS
C88 - C90	.002 1KV CER.	R78 - R82	1.2K 1/4W 5%	D2	2N5305	J8	7 - .045 SO. PINS
C91	390PF 50V CER.	R83	110 OHM 1/4W 5%	D3	2N5904	J9	6 - .045 SO. PINS
CP1 - CP16	.01 50V CER.	R84	560 OHM 1/4W 5%	D4	2N4403	J10	10 - .045 SO. PINS
R1	560 OHM 1/4W 5%	R85	2.7K 1/4W 5%	D5	2N3904	J11	18 - .025 SO. PINS
R2	2.7K 1/4W 5%	R86	1K 1/4W 5%	D6	2N4403	J12	17 - .025 SO. PINS
R3	1K 1/4W 5%	R87	9.1K 1/4W 5%	D7	2N4403	J13	16 - .025 SO. PINS
R4	9.1K 1/4W 5%	R88	7.5K 1/4W 5%	D8	2N3904	J14	5 - .045 SO. PINS
R5	7.5K 1/4W 5%	R89	2.7K 1/4W 5%	D9	2N5060	P/O RATT-1	TY-WRAP
R6	2.7K 1/4W 5%	R90	39K 1/4W 5%	D10	MCR 106-1	6803 CONTROL RD.	P.C. BOARD
R7	39K 1/4W 5%	R91	100 OHM 1/4W 5%	D11	SE9302		
R8	100 OHM 1/4W 5%	R92 - R95	82 OHM 1/4W 5%	D12	2N5060		
R9	82 OHM 1/4W 5%	R96 - R104	470 OHM 1/4W 5%	D13	MCR 106-1		
R10, R11	47K 1/4W 5%	R105 - R119	1.2K 1/4W 5%	D14	2N5060		
R12, R13	10K 1/4W 5%	R120	120 OHM 1/4W 5%	D15	MCR 106-1		
R14	82K 1/4W 5%	R121	120 OHM 1/4W 5%	D16	2N5060		
R15	62K 1/4W 5%	R122	2K 1/4W 5%	D17	MCR 106-1		
R16	5.6K 1/4W 5%	R123	3.3K 1/4W 5%	D18	2N5060		
R17	3K 1/4W 5%	R124	56K 1/4W 5%	D19	6803		
R18	910 OHM 1/4W 5%	R125 - R132	1.2K 1/4W 5%	D20	6116 RAM		
R19	750 OHM 1/4W 5%	R133 - R135	120 OHM 1/4W 5%	D21	74HCT245		
R20	1.5K 1/4W 5%	R136 - R138	330 OHM 1/4W 5%	D22	74LS373		
R21	3.3K 1/4W 5%	R139 - R141	3.3K 1/4W 5%	D23	6821		
R22	120 OHM 1/4W 5%	R142 - R145	1.2K 1/4W 5%	D24	74LS10		
R23	680 OHM 1/4W 5%	R146 - R150	330 OHM 1/4W 5%	D25	74LS04		
R24	100K 1/4W 5%	R151 - R155	1.2K 1/4W 5%	D26	4011		
R25	82 OHM 1W 10%	R156 - R160	1.2K OHM 1/4W 5%	D27	4584		
R26		R161 - R164	1.2K OHM 1/4W 5%	D28	4502		
R27				D29	74LS154		

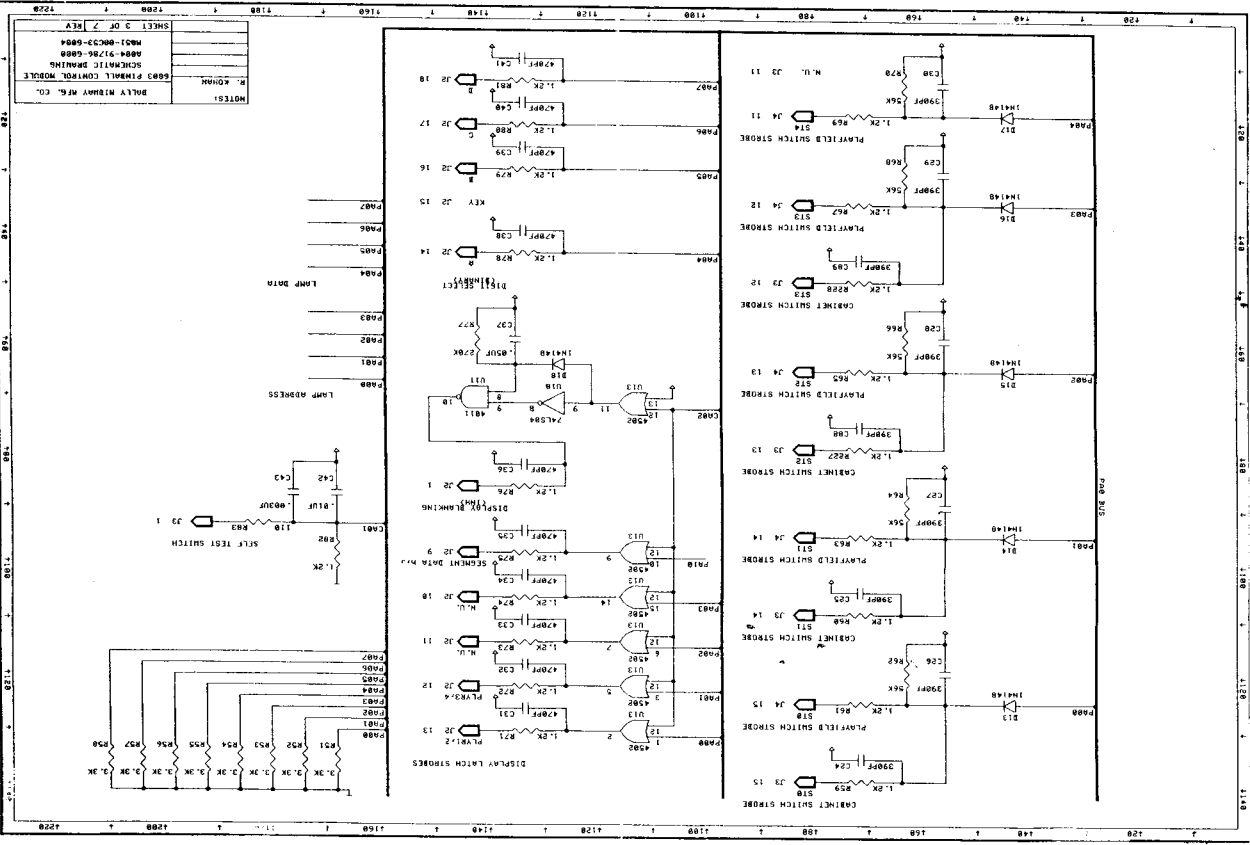
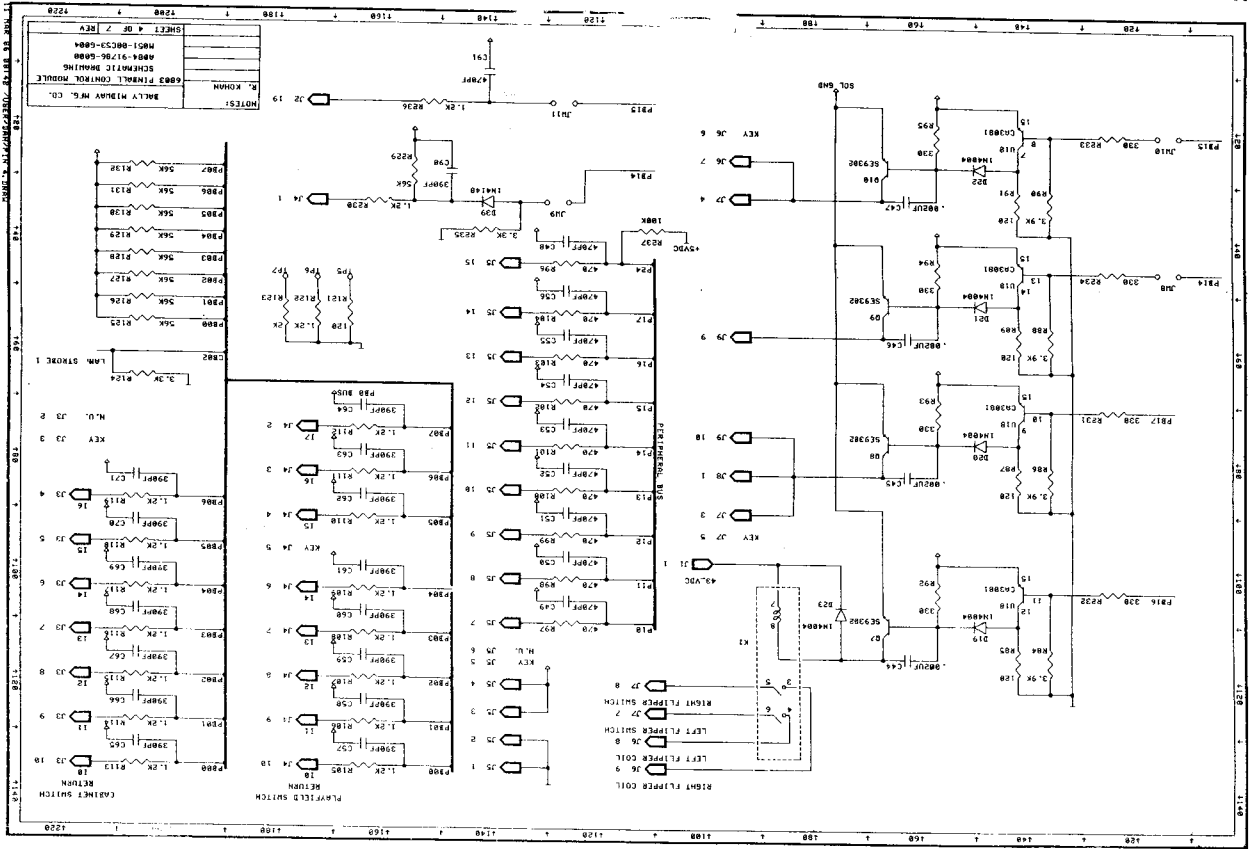
6803 CONTROL BOARD
 A084-91786-6000
 M051-000653-6003

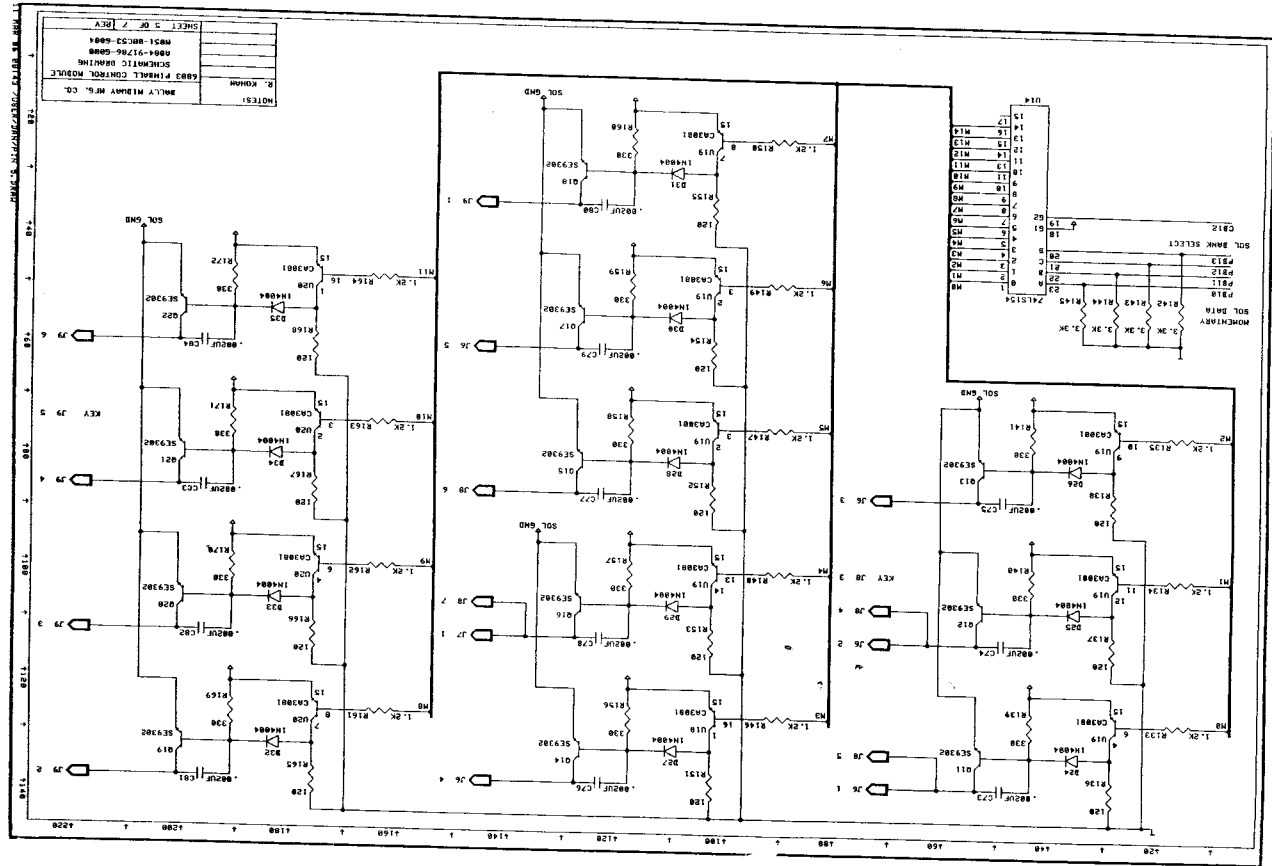
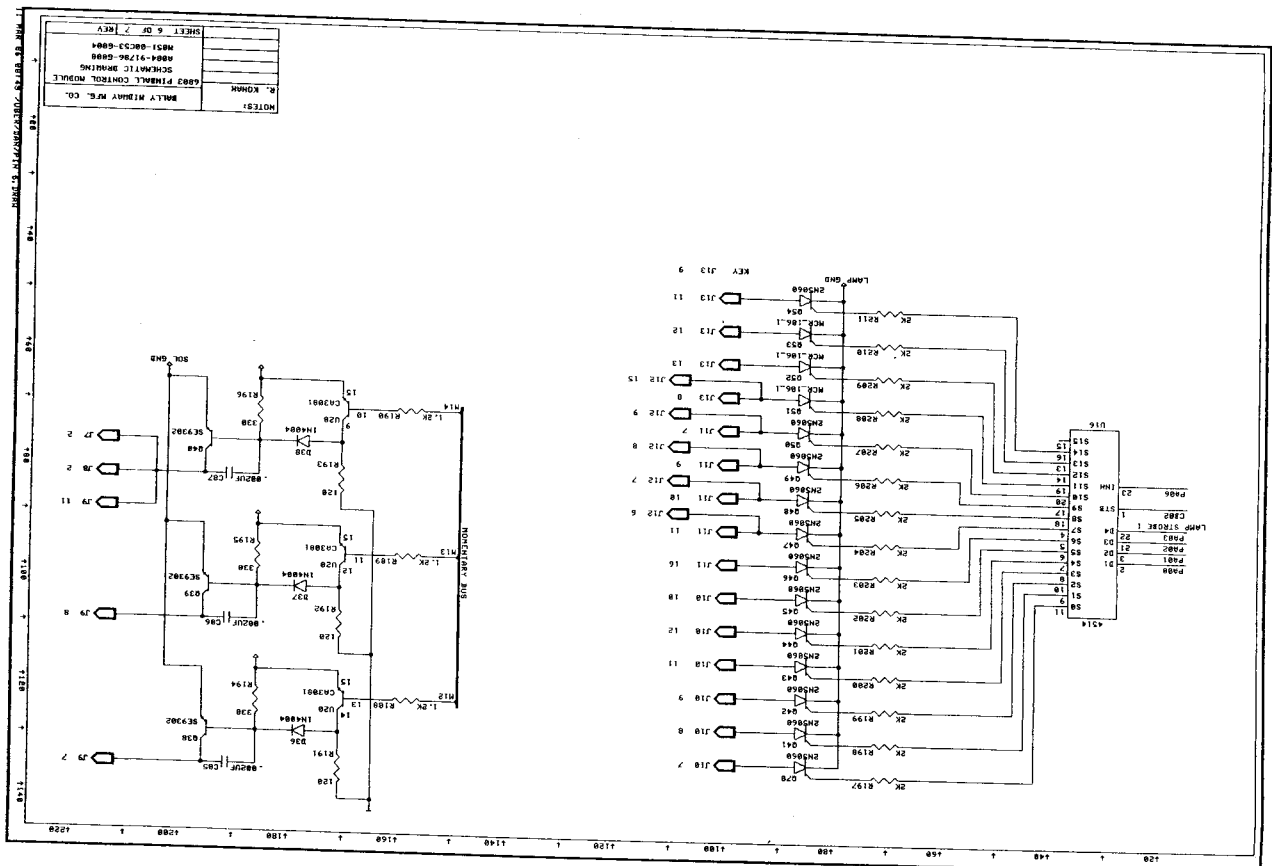
CROSS REFERENCE LIST

<u>DESCRIPTION</u>	<u>QTY.</u>	<u>DESIGNATION NO.</u>	<u>PART NOS.</u>
.025 SO. PINS	123	J2, J3, J4, J5, J10, J11, J12, J13	0304-00804-0009
.045 SO. PINS	47	J1, J6, J7, J8, J9, J14	0304-00804-0010
TY-WRAP	1	P/O BATT-1	0017-00042-0622
P.C. BOARD	1	6803 CONTROL BOARD	A080-91786-6000

4-23-86 REV. 1.0 Fixed Part Number for 470PF Cap.







HEAVY METAL LAMP & SOLENOID DRIVER LOCATIONS LISTING
M051-00H03-A012

LAMP DRIVER LOCATIONS

DRIVER	CONNECTOR	PIN	PHASE	WIRE	DESCRIPTION
Q42	J10	9	B	26	BONUS 12BK
Q41	J10	8	B	25	BONUS 16K
Q23	J10	1	B	12	BONUS 1K
Q70	J10	7	B	24	BONUS 2K
Q57	J10	18	A	43	BONUS 2X
Q56	J10	17	B	41	BONUS 32K
Q26	J10	4	A	15	BONUS 3X
Q95	J10	16	B	38	BONUS 4K
Q43	J10	31	A	31	BONUS 4X
Q58	J10	19	A	45	BONUS 5X
Q25	J10	5	B	14	BONUS 64K
Q27	J10	2	A	18	BONUS 6X
Q24	J10	3	B	13	BONUS 8K
Q25	J10	3	A	14	BONUS HELD
Q30	J11	12	A	72	BOOSTER 1 BOTTOM
Q47	J11	11	A	71	BOOSTER 2 MIDDLE
Q62	J11	4	A	61	BOOSTER 3 TOP
Q64	J13	1	C	81	BRIGHT ATM SHASHER
Q67	J13	5	C	86	BRIGHT BACK LEFT
Q67	J13	5	D	86	BRIGHT BUMPERS
Q36	J13	3	D	84	BRIGHT DRUM HEAVY
Q51	J13	2	D	83	BRIGHT DRUM METAL
Q52	J13	13	C	93	BRIGHT LEVEL 1
Q51	J13	8	C	92	BRIGHT LEVEL 2
Q66	J13	6	C	97	BRIGHT LEVEL 3
Q36	J13	3	D	84	BRIGHT LEVEL 4
Q65	J11	1	D	48	BRIGHT MELTDOWN
Q34	J13	1	D	81	BRIGHT MELTDOWN 2
Q51	J13	8	D	93	BRIGHT MELTDOWN 3
Q66	J13	6	D	87	BRIGHT MELTDOWN 4
Q65	J11	1	C	48	BRIGHT TARGET BACK
Q35	J13	2	C	83	BRIGHT TARGET BACK RIGHT
Q52	J13	13	C	97	BRIGHT TOP 25K
Q33	J11	15	B	75	EXTRA BALL
Q37	J13	4	A	85	HEAVY "A"
Q68	J13	10	A	94	HEAVY "E"
Q53	J13	12	A	96	HEAVY "H"
Q54	J13	11	A	95	HEAVY "V"
Q69	J13	7	A	91	HEAVY "Y"
Q47	J11	11	B	71	JAM "A"
Q30	J11	12	B	72	JAM "J"
Q62	J11	4	B	61	JAM "M"
Q31	J11	13	B	73	LEFT 25K TARGET
Q45	J10	10	B	28	LEFT BUMPER
Q63	J11	3	A	59	LEFT COLLECT BONUS
Q23	J10	1	A	12	LEFT OUTLANE

LAMP DRIVER LOCATIONS

DRIVER	CONNECTOR	PIN	PHASE	WIRE	DESCRIPTION
Q55	J10	16	A	38	LEFT RETURN
Q41	J10	8	A	25	LEFT ROLL OVER
Q31	J11	13	B	73	LEVEL 1
Q48	J11	10	B	80	LEVEL 2
Q63	J11	3	B	24	LEVEL 3
Q32	J11	3	B	24	LEVEL 4
Q49	J11	14	B	67	LEVEL 5
Q28	J10	6	B	41	MELTDOWN
Q54	J13	11	B	54	METAL "A"
Q68	J13	10	B	94	METAL "E"
Q69	J13	7	B	61	METAL "H"
Q53	J13	12	B	96	METAL "M"
Q37	J13	4	B	85	METAL "T"
Q60	J10	13	B	36	MIDDLE BUMPER
Q44	J10	12	A	32	POWER AMP 1 BOTTOM
Q59	J10	14	A	37	POWER AMP 2 MIDDLE
Q28	J10	6	A	21	POWER AMP 3 TOP
Q64	J11	2	B	58	QUALIFY HOLD BONUS
Q59	J10	14	B	37	RAMP 100K
Q48	J11	10	A	60	RIGHT 25K TARGET
Q29	J11	8	B	64	RIGHT BUMPER
Q70	J10	7	A	24	RIGHT COLLECT BONUS
Q24	J10	2	A	13	RIGHT OUTLANE
Q56	J10	17	A	41	RIGHT ROLL OVER
Q42	J10	9	A	26	ROCK AGAIN
Q57	J10	16	B	43	SN DRUM 1 LEFT
Q26	J10	4	B	15	SN DRUM 2 MIDDLE
Q53	J10	11	B	31	SN DRUM 3 RIGHT
Q33	J11	7	B	63	SPECIAL
Q50	J12	11	A	75	SPECIAL
Q51	J12	9	A	63	TOP BOX LEFT
Q51	J12	10	A	63	TOP BOX MIDDLE
Q49	J11	9	B	62	TOP BOX RIGHT
Q64	J11	2	A	58	TOP LANE 25K
Q61	J11	6	A	62	TOP LANE 50K
Q45	J10	10	A	26	VALUE 10X
Q60	J10	13	A	26	VALUE 2X
Q29	J11	8	A	26	VALUE 3X
Q46	J11	16	A	28	VALUE 4X
Q46	J11	16	A	78	VALUE 5X

SOLENOID DRIVER LOCATIONS

TRANSISTOR	CONNECTOR	PIN	WIRE	DESCRIPTION
Q9	J9	9	511	BACK BOX LIGHT
Q22	J9	6	56	BALL EJECT
Q8	J7	3	24	G-I. OFF
Q40	J9	11	59	KNOCKER
Q7	J6	8	90	LEFT FLIPPER (THROUGH RELAY K1)
Q11	J6	1	31	LEFT BUMPER
Q15	J6	6	25	LEFT SAUCER
Q14	J6	4	35	LEFT SLINGSHOT
Q21	J6	2	32	MIDDLE BUMPER
Q39	J6	8	58	OUTHOLE
Q20	J9	3	53	PIN DOWN
Q38	J9	7	57	PIN UP
Q35	J9	7	57	RESERVED FOR GERMAN USE
Q13	J6	9	95	RIGHT FLIPPER (THROUGH RELAY K1)
Q17	J6	3	34	RIGHT BUMPER
Q16	J6	5	36	RIGHT SAUCER
Q16	J6	7	27	RIGHT SLINGSHOT
Q10	J6	7	311	TOP BOX LIGHT

WIRE COLOR CODE	
1-RED	6-BROWN
2-BLUE	7-ORANGE
3-YELLOW	8-BLACK
4-GREEN	9-GRAY
5-WHITE	0-NO TRACE
J-JUMPER	11-VIOLET
1-FIRST NUMBER-BODY COLOR	
2-SECOND NUMBER-TRACER COLOR	
EXAMPLE: 50-WHITE	
51-WHITE/RED	

18-21

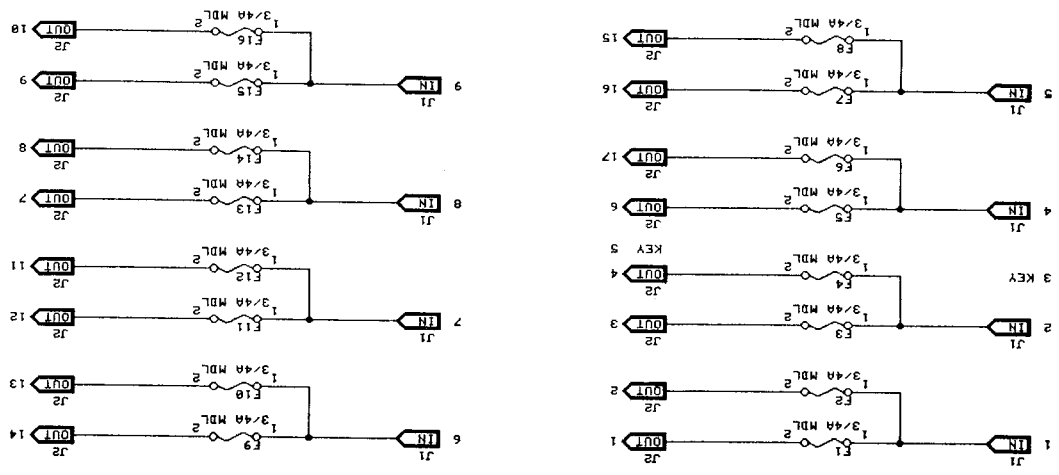
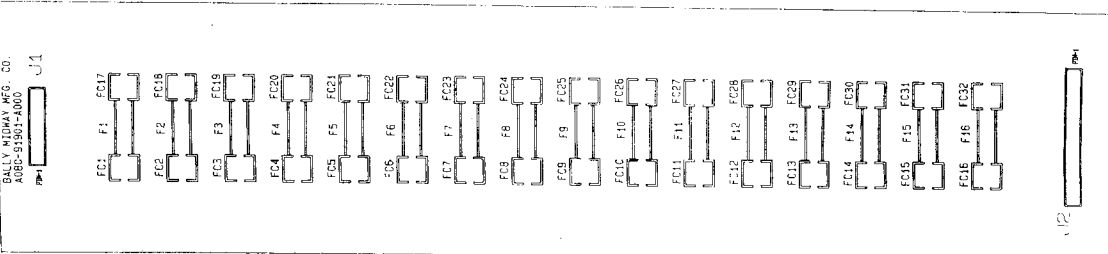
MURPHY ELECTRONICS COMPANY

NOTES:	6/23/87 REV 1 Fuse Value Chg. 988
BALLY MIDWAY MFG. CO.	D. STERN
BRIGHT LIGHTS FUSE PCB	3-15-87
M051-00114-A212	6/23/87 988
SHEET 1 OF 1	REV

CROSS REFERENCE/DESIGNATION LIST
FOR BRIGHT LIGHTS FUSE BOARD
M051-00114-A212

QTY	DESCRIPTION	PART NO	DESIGNATION
8	AUTO INSERT PINS	Z384-00884-00889	J1
16	AUTO INSERT PINS	Z077-00871-00874	F1-F16 (2 USED PER DESIGNATION)
1	RAW PCB BOARD	A088-01581-A0888	

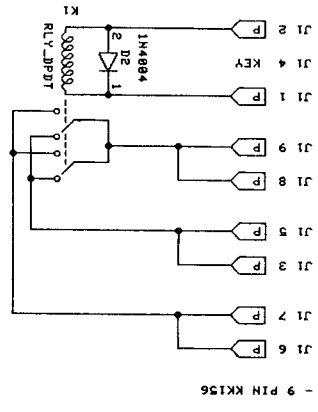
REF:
LAYOUT/ASSEMBLY DRAWING M051-00114-A212
SCHEMATIC DRAWING M051-00114-A212



M051-00114-A214

NOTES:	C. MEDNICK	6/4/87
AUX COIL DRIVER		
A080-91902-A000		
M051-00114-A214		
SHEET 1 OF 1 REV		

NOT INSERTED C1,D1,R1

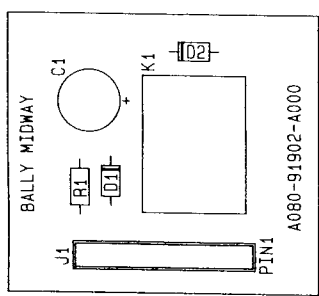


AUX COIL DRIVE
A080-91902-A000
M051-00114-A214

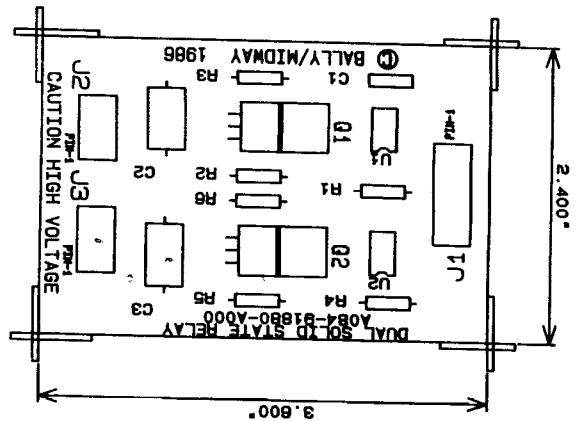
CROSS REFERENCE LIST

DESCRIPTION	QTY.	DESIGNATION NO.	PART NO.
1N4004 DIODE .045 SQ. PIN RELAY	1 3 1	D2 J1 K1	103E-00003-0005 0304-00804-0010 114E-00001-0011
NOT INSERTED	3	C1,D1,R1	
AUX COIL DRIVER PCB	1		A080-91902-A000

6/4/87 - Released for Production. CMW



<i>BALLY MIDWAY MFG. CO.</i>		
PROJECT ENG:	D.B.S.	ASSEMBLY DRAWING
C. MEDNICK	05/28/87	AUX. COIL DRIVER BD.
		M051-00114-A213

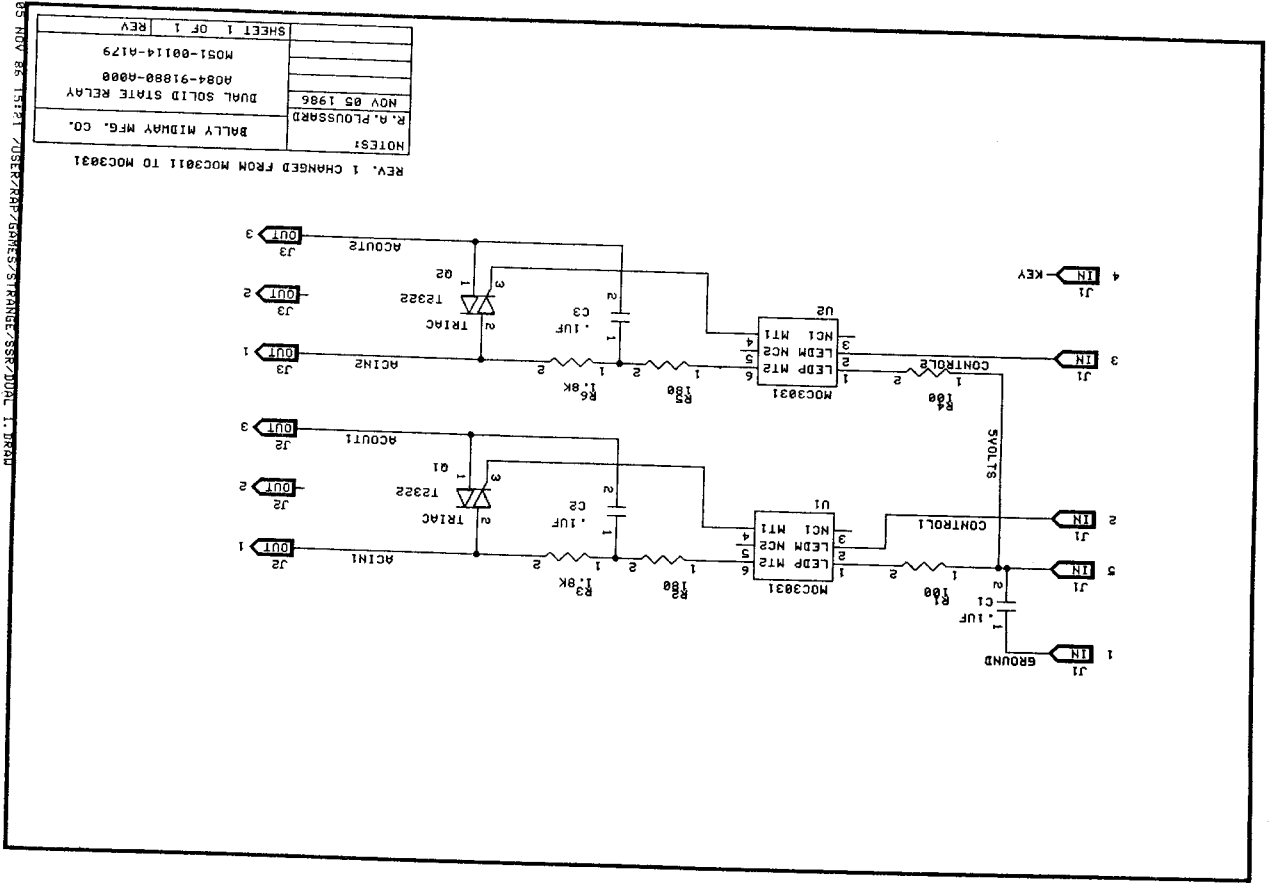


FR-400		J.S.		ASSEMBLY DRAWING	
10/21/86		DUAL SS-RELAY PC		A084-91880-A000	
.062"		BALLY MIDWAY MFG. CO.		M051-00114-A177	

REV. 1 CHANGED U1 AND U2 FROM MOC3011 TO MOC3031

DESCRIPTION	QTY	DESIGNATION	PART NUMBER
BLANK P.C.B.	1	C1	A084-91880-A000
.1MFD CAP	2	C2, C3	0C35-20800-0005
100 OHM RES.	2	R1, R4	100E-00005-0033
100 OHM RES.	2	R2, R5	100E-00005-0039
1.8K OHM RES.	2	R3, R6	100E-00005-0057
OPTO-COUPLER	2	U1, U2	100E-00016-0015
.045 PINS	6	U1, U2, J3	120E-00002-0010
SPACER	4	J1, J2, J3	0304-00004-0010
			0017-00042-0020

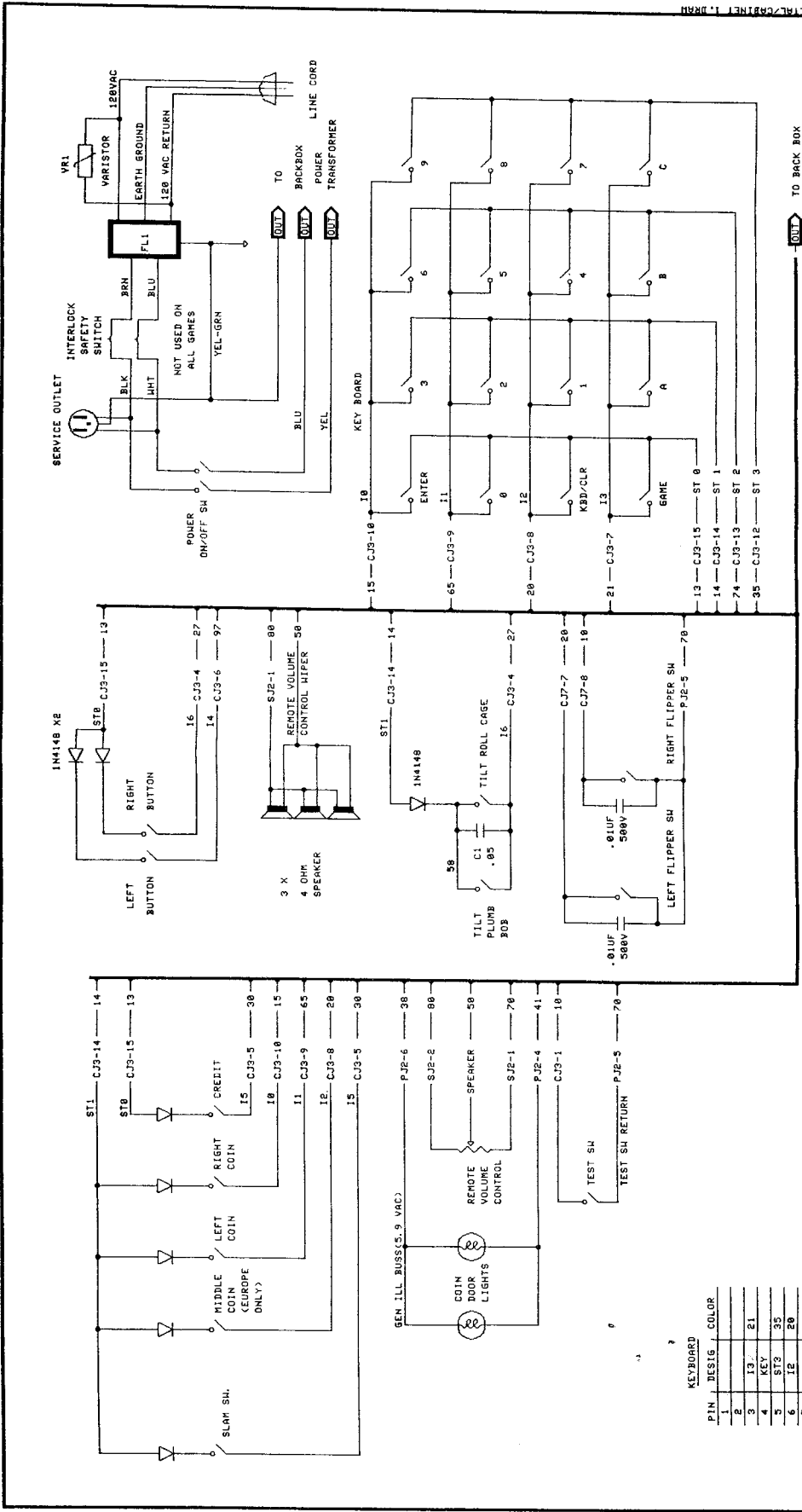
DUAL SOLID STATE RELAY BOARD
 CROSS REFERENCE DESIGNATION LIST
 A084-91880-A000
 M051-00114-A178



REV. 1 CHANGED FROM MOC3011 TO MOC3031

NOTES:	
BALLY MIDWAY MFG. CO.	NOV 05 1986
DUAL SOLID STATE RELAY	M051-00114-A179
A084-91880-A000	SHEET 1 OF 1 REV

NOV 05 1986 J.S. / R.A.P. / G.M.S. / S.P.R. / D.J.L. / I. / D.R.



COLOR CODE

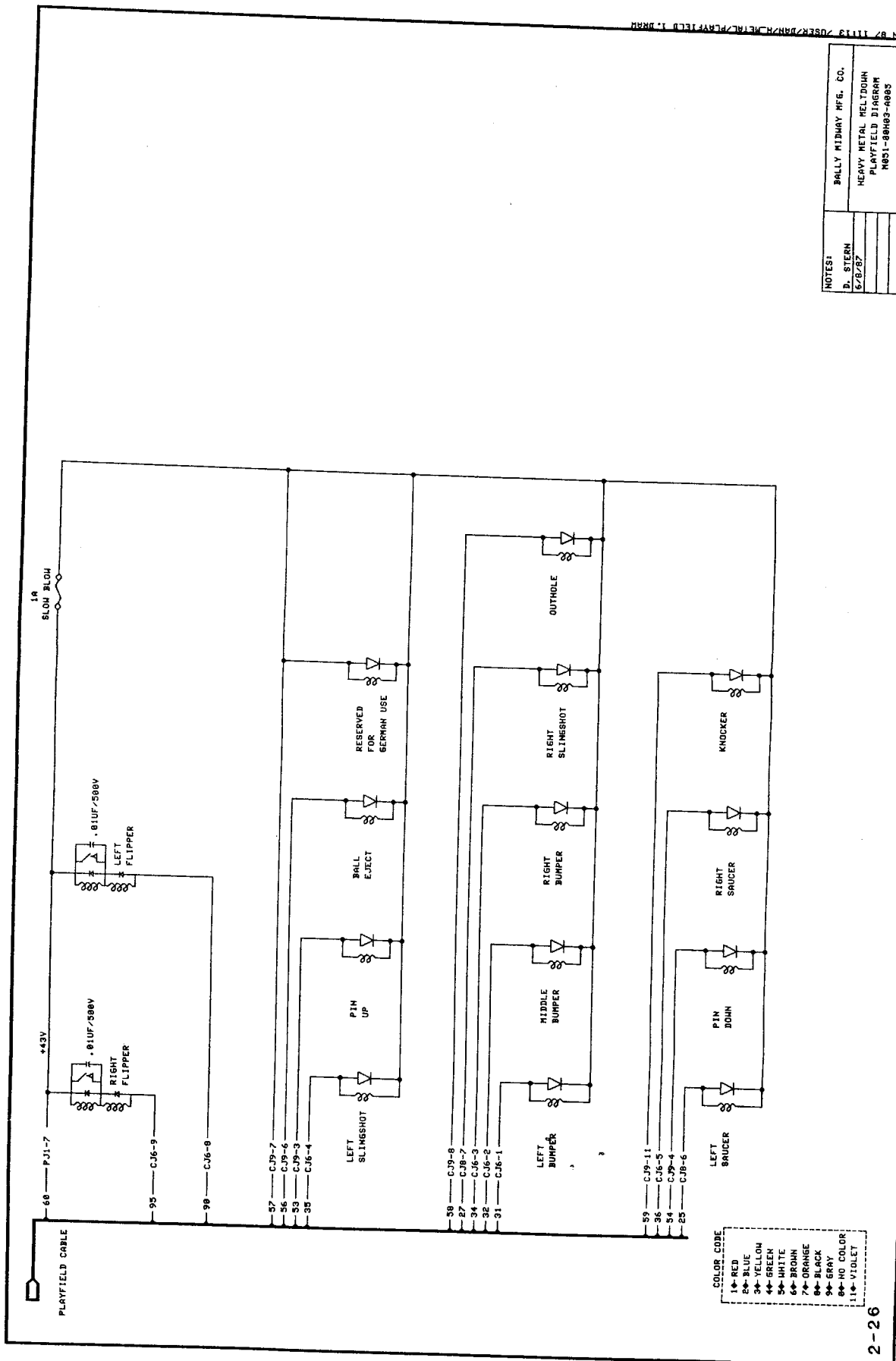
1=RED	7=ORANGE
2=BLUE	8=BLACK
3=YELLOW	9=GRAY
4=GREEN	10=NO TRACE
5=WHITE	11=VIOLET
6=BRN	

NOTES:

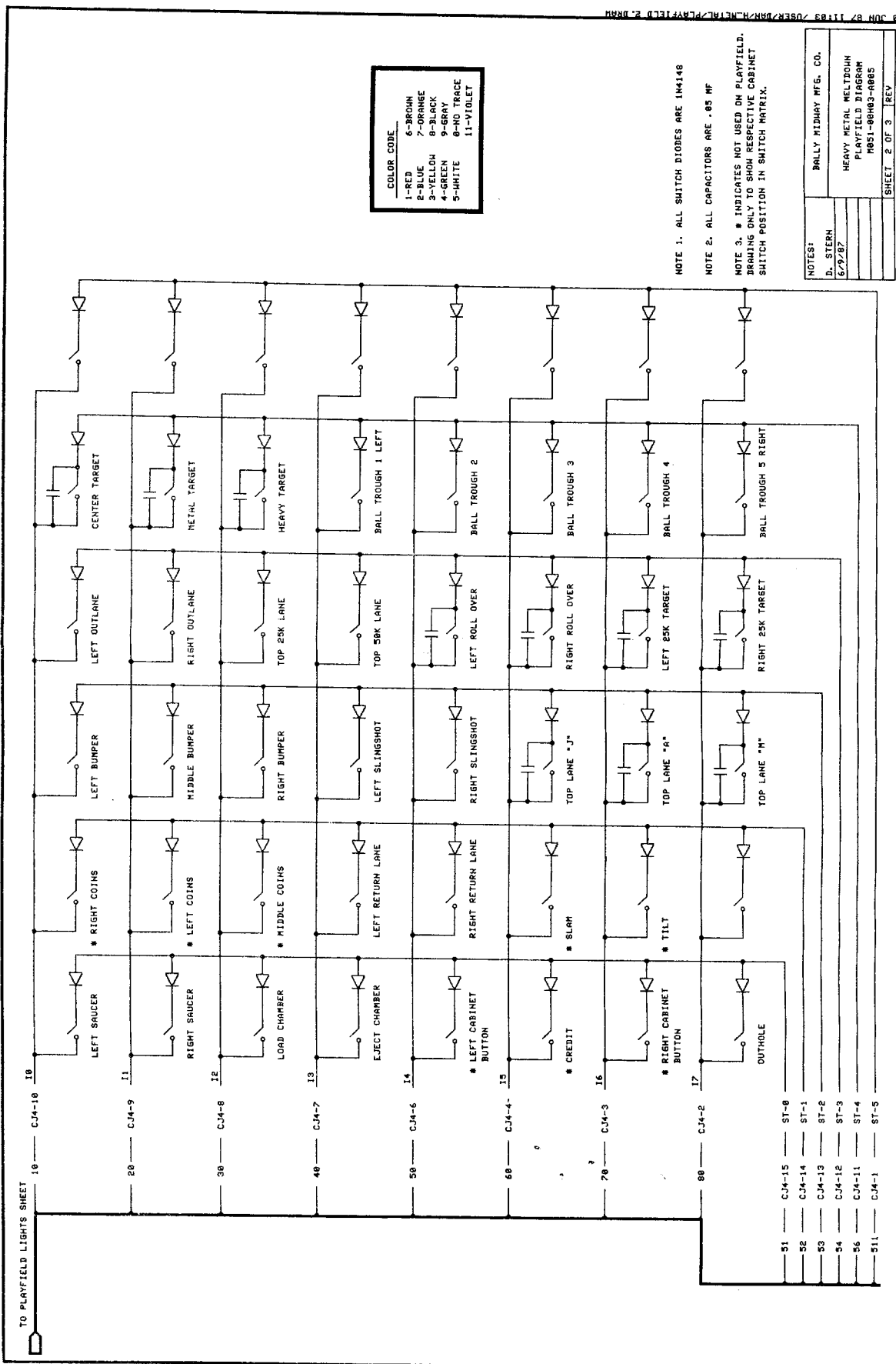
D. STERN
6/9/87
BALLY MIDWAY MFG. CO.
HEAVY METAL MELTDOWN
CABINET DIAGRAM
MS1-00H83-8803
SHEET 1 OF 1
REV

KEYBOARD

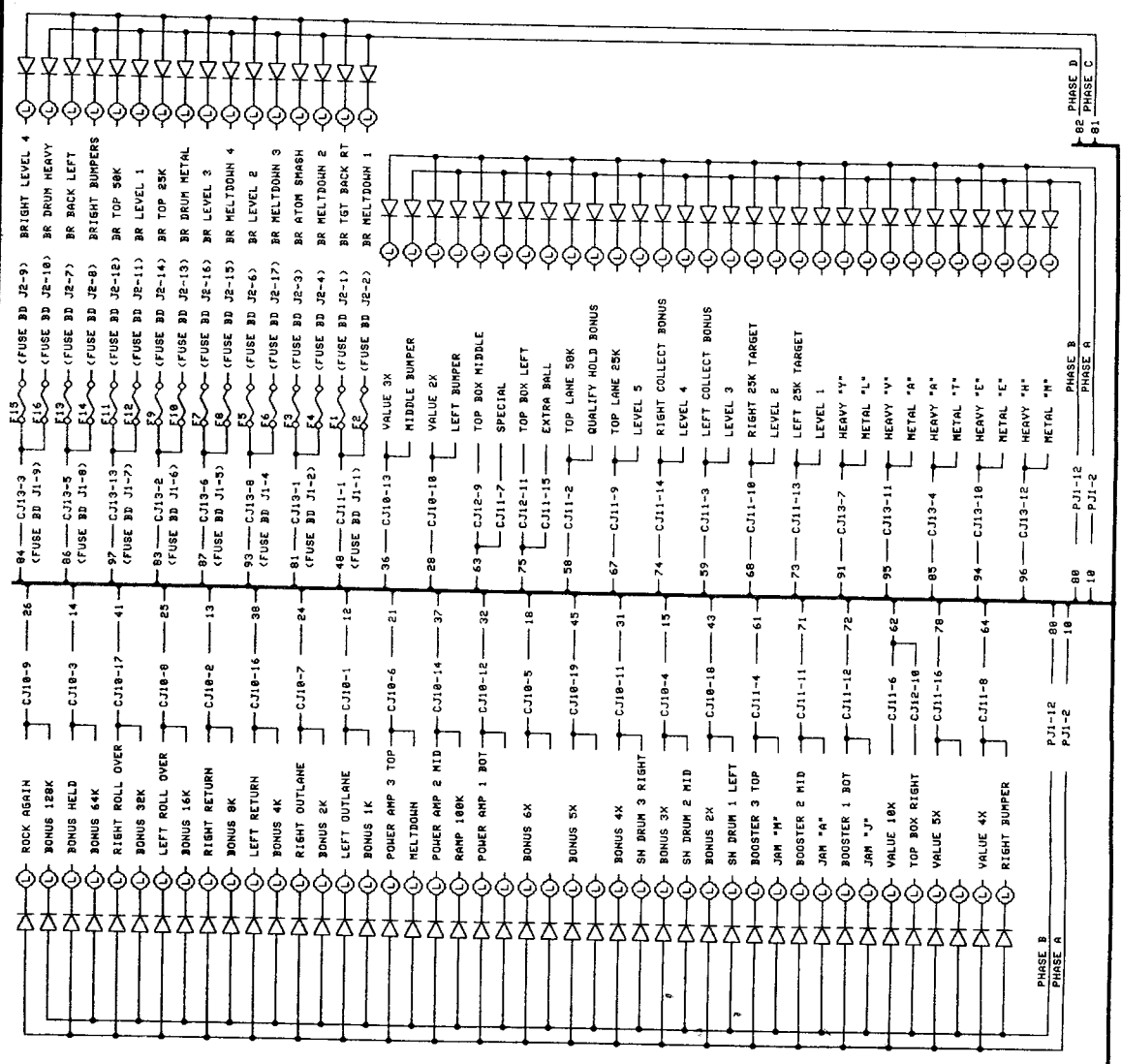
PIN	POS	KEY	COLOR
1			
2	13	21	
3	KEY		
4	ST3	35	
5	12	20	
6	ST2	74	
7	10	65	
8	11	ST1	14
9	12	18	15
10	13	15	
11	ST8	13	
12			
13			
14			
15			



29 JUN 57 1113 ZSERK/2R4H/METAL/PLAYFIELD 1.MR4H



8 JUN 87 11:03 USER: DAN R. METAL/PLAYFIELD 2.DRAW



COLOR CODE

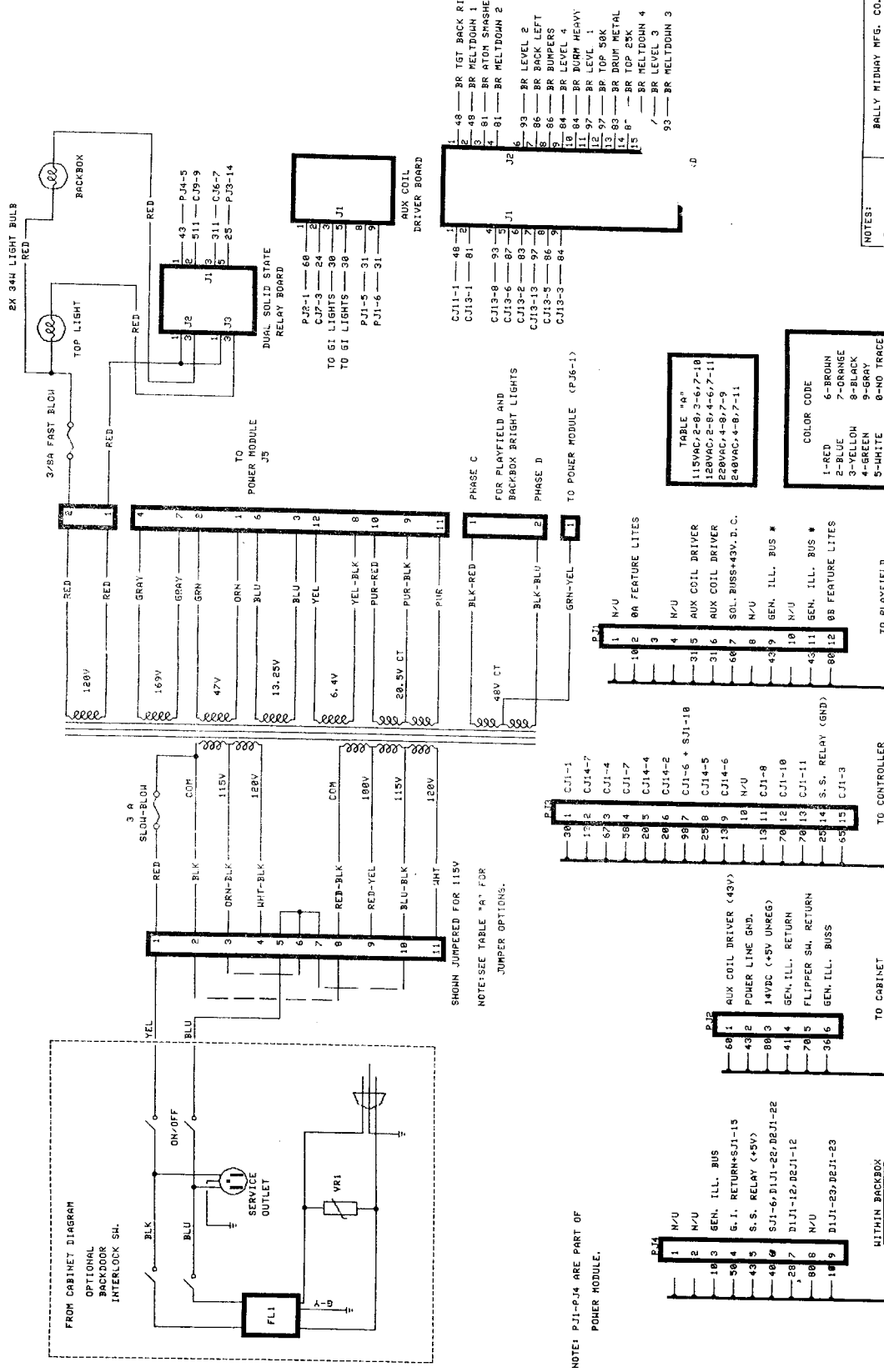
1	RED
2	BLUE
3	YELLOW
4	GREEN
5	WHITE
6	BROWN
7	ORANGE
8	BLACK
9	GRAY
10	NO COLOR
11	VIOLET

NOTE: DIODES ARE 1M4884
FUSES ARE 9/18 MTL AND
LOCATED IN THE BACKBOX

NOTES:

D. STERN
6/9/87
BALLY MIDWAY MFG. CO.
HEAVY METAL MELTDOWN
PLAYFIELD DIAGRAM
MS1-88H83-8885

SHEET 3 OF 3 REV

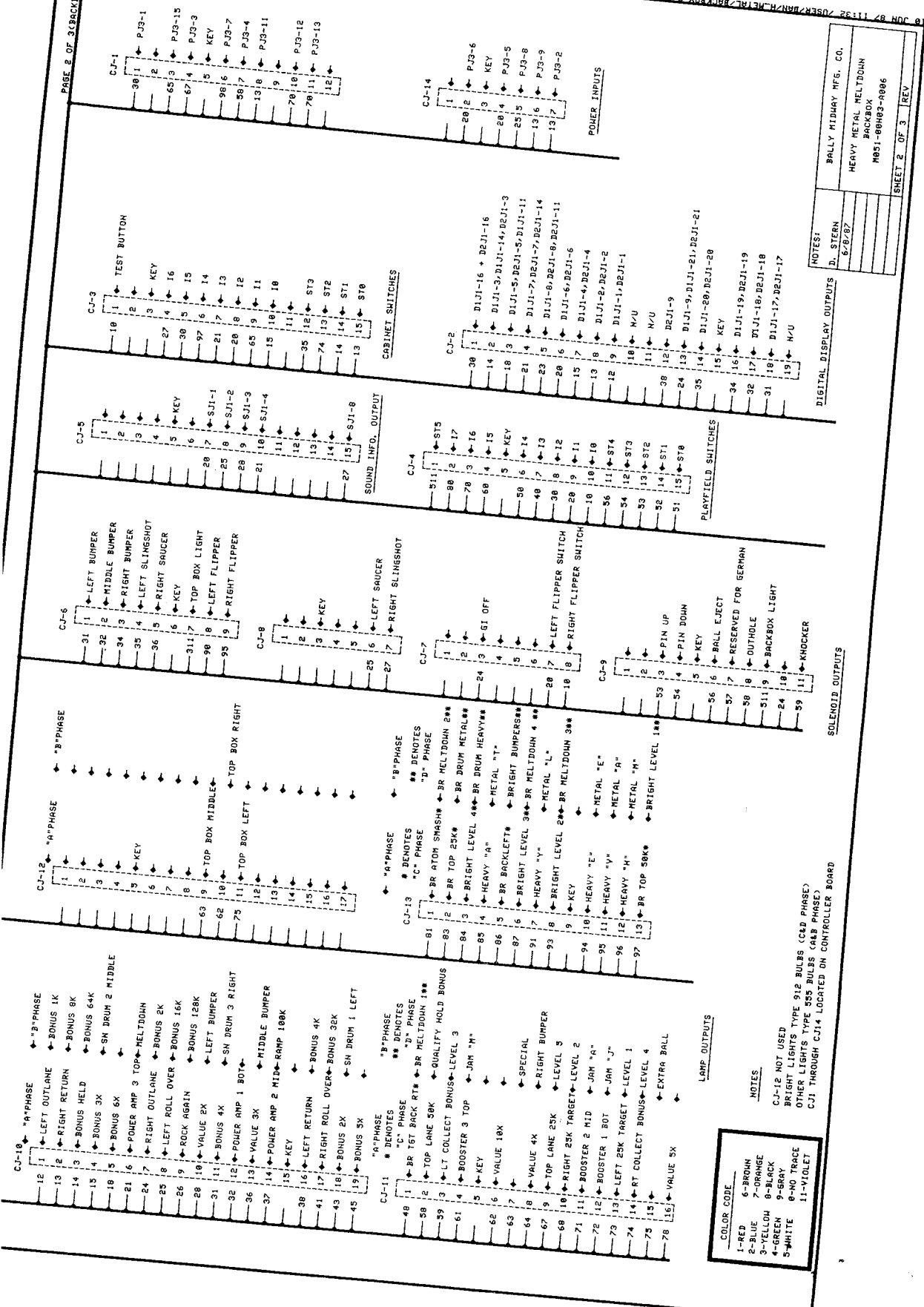


* = 32 61 LAMPS

NOTES:

D. STEIN	6/2/87
BALLY MIDWAY MFG. CO.	
HEAVY METAL MELTDOWN	
BACKBOX	
M851-0H03-8806	
SHEET 1 OF 3	REV.

18 JUN 87 11:26 / USER:DRM/H/META/BACKBOX 1.DRAW



COLOR CODE	
1-RED	6-BROWN
2-BLUE	7-ORANGE
3-YELLOW	8-BLACK
4-GREEN	9-BRAY
5-WHITE	10-NO TRACE
	11-VIOLET

NOTES
 CJ-12 NOT USED
 BRIGHT LIGHTS TYPE 912 BULBS (C&D PHASE)
 OTHER LIGHTS TYPE 555 BULBS (A&B PHASE)
 CJ1 THROUGH CJ14 LOCATED ON CONTROLLER BOARD

NOTES:
 D. STERN
 6/28/87
 BALLY MIDWAY MFG. CO.
 HEAVY METAL MELTDOWN
 BACKBOX
 M051-08003-0886
 SHEET 2 OF 3 REV

DISPLAYS-D

PLVR 1&2

DIJ1

12	CJR-9	1
13	CJR-8	2
14	CJR-2	3
15	CJR-7	4
18	CJR-3	5
20	CJR-6	6
21	CJR-4	7
23	CJR-5	8
24	CJR-13	9
KEY	KEY	10
18	CJR-3	11
28	PJA-7	12
N/U	N/U	13
14	CJR-2	14
N/U	N/U	15
38	CJR-1	16
31	CJR-18	17
32	CJR-17	18
34	CJR-16	19
35	CJR-14	20
24	CJR-13	21
48	PJA-6	22
18	PJA-9	23
N/U	N/U	24

PLVR 3&4

DIJ2

12	CJR-9	1
13	CJR-8	2
14	CJR-2	3
15	CJR-7	4
18	CJR-3	5
20	CJR-6	6
21	CJR-4	7
23	CJR-5	8
38	CJR-12	9
KEY	KEY	10
23	CJR-5	11
28	PJA-7	12
N/U	N/U	13
21	CJR-4	14
N/U	N/U	15
38	CJR-1	16
31	CJR-18	17
32	CJR-17	18
34	CJR-16	19
35	CJR-14	20
24	CJR-13	21
48	PJA-6	22
18	PJA-9	23
N/U	N/U	24

SOUND MODULE

SJ1

28	CJS-7	1
25	CJS-8	2
28	CJS-9	3
21	CJS-10	4
5		5
48	PJA-6	6
7		7
27	CJS-15	8
9		9
98	PJS-7	10
11	KEY	11
12		12
13		13
14		14
58	PJA-4	15

SJ2



PAGE 3 OF 3(BACKBOX)

COLOR CODE	
1 - RED	6 - BROWN
2 - BLUE	7 - ORANGE
3 - YELLOW	8 - BLACK
4 - GREEN	9 - GRAY
5 - WHITE	10 - NO TRACE
	11 - VOID

NOTES:	BALLY MIDWAY MFG. CO.
D. STERN	HEAVY METAL MELTDOWN
3/30/87	BACKBOX
	M851-00493-A886
	SHEET 3 OF 3 REV

BALLY/MIDWAY'S HEAVY METAL
#H03
ROM/EPROM PART NUMBERS

UNPROGRAMMED CONTROL BOARD A084-91786-G000
PROGRAMMED CONTROL BOARD A084-91786-AH03

POS.	MIDWAY PART NUMBER
U2	H03A-12601-0000
U3	H03A-12602-0000

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

UNPROGRAMMED SOUNDS DELUXE A084-91864-C000
PROGRAMMED SOUNDS DELUXE A084-91864-AH03

POS.	MIDWAY PART NUMBER
U11	H03A-12603-0000
U12	H03A-12604-0000

JUMPERS	IN	OUT
JW1	X	
JW2	X	
JW3		X
JW4	X	
JW5		X
JW6		X
JW7	X	
JW8	X	

M051-00H03-A008	REVISIONS
7/14/87	RELEASE FOR PRODUCTION