PRELIMINARY OWNER/OPERATOR'S MANUAL

MIDNIGHT MARAUDER

IC 11 - Right LM398
IC 12 - Middle. Sense board
IC 13 - Left.
IC 14 - Moveable targets

Bally

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PRELIMINARY

0A12 MIDNIGHT MARAUDERS
INSTALLATION

WARNING: REMOVE SHIPPING CLAMPS ON RACK BEFORE STARTING A GAME.

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 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 following illustration.

TRANSFORMER CONNECTION INSTRUCTIONS

REFER TO POWER SUPPLY SCHEMATIC IN GAME MANUAL FOR TABLE "A"

LOCATION VOLTAGE	POWER CONNECTOR JUMPER POSITION
115VAC	2-8, 3-6, 7-10
120VAC	2-8, 4-6, 7-11
220VAC	4-8, 7-9
240VAC	4-8, 7-11

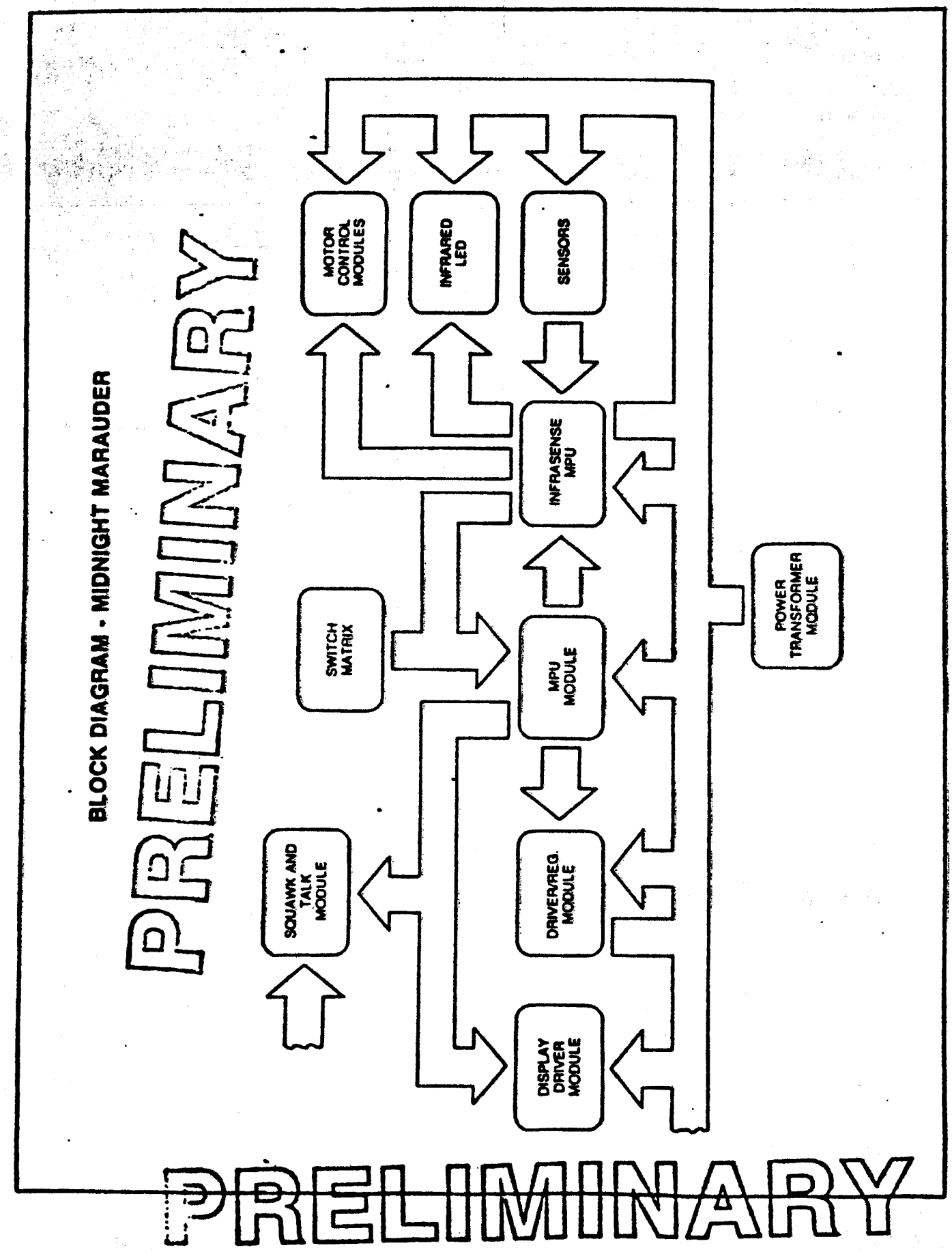
AUXILIARY TRANSFORMER CONNECTIONS

LOCATION VOLTAGE	JUMPER POSITION
115VAC	2-5
120VAC	2-6
220VAC	2-7
240VAC	2-8

NOTE: If the game is to be modified for location voltages higher than 120 volts, MAKE SURE the correct Ballast is used for the Fluorescent Lamp!

PRELIMINARY

BLOCK DIAGRAM - MIDNIGHT MARAUDER



FEATURE OPERATIONS AND SCORING

THE INVADER FEATURE:

The Invader Feature consists of twenty-four invading ships which are blue in color. The twenty-four ships are divided into three groups of eight.

The purpose of these ships is to attack and destroy your bases. They accomplish this by starting at the top of the screen and descending into your bases. It takes three ships making contact with a base to destroy it.

You destroy the ships by shooting them when lit or by shooting Tank #1 to destroy the ships above Base #1. The same holds true for Tanks #2 and #3.

The attack of the Invaders can be slowed by shooting the Command Ship. This action freezes the Invaders for about four seconds.

THE BASE FEATURE:

The Base Feature consists of three bases! Base #1, Base #2, and Base #3. When your three bases are destroyed by taking nine hits (three per base) the game ends. So----

Defend Your Bases to Survive!

You will receive new bases at 350,000 points per the factory setting. This threshold can be adjusted by changing the score in bookkeeping.

THE COMMAND SHIP FEATURE:

The Command Ship is the large ship which flys in front of the Invaders.

Shooting the Command Ship freezes the Invaders for about four seconds.

The Command Ship drops from eight when shot.

To raise the Command Ship shoot the three tanks and two marauders, so that you may freeze the Invaders again.

THE TANK FEATURE:

The Tank Feature is one of your most important weapons. The Tank Feature consists of three Tanks: Tank #1, Tank #2, and Tank #3. Shooting Tank #1 destroys the Invaders above Base #1, Tank #2 for Base #2, and Tank #3 for Base #3. You do receive the points for all the Invaders destroyed by shooting the Tanks.

THE MARAUDERS:

The two Marauder targets complete the sequence for raising the Command Ship.

THE RAPID FIRE FEATURE:

You have Rapid Fire as long as the Invaders are frozen by the Command Ship.

BOOKEEPING FUNCTIONS

The game is designed to help the operator perform certain accounting functions. The game can display the number of total plays and replays (free games). It can display the number of coins dropped down each coin chute. The bookkeeping functions are displayed on the player display after the bookkeeping location flashes 3 times.

06 -	00 to - 40	=	Current Credits
*07 -	100000 to - 99999	=	Total Plays (Plyed & Free Games)
*08 -	10000 to - 99999	=	Total Replays (Free Games)
09 -	00 to - 99999	=	Total times 'High Score to Date' is beat
*10 -	10000 to - 99999	=	Total Number of Tickets Awarded (Optional)
*11 -	10000 to - 99999	=	Coins Dropped thru Right Coin Chute
*12 -	10000 to - 99999	=	Coins Dropped thru Left Coin Chute
*13 -	00 to - 99999	=	NOT USED
*14 -	00 to - 99999	=	Number of minutes of Game Play
*15 -	00 to - 99999	=	Number of Service Credits

The game displays the first bookkeeping entry if the Self-Test button on the inside of the front door is pressed 15 times. Alternately push and release the Self-Test button at one second intervals. When the first bookkeeping function is reached it will flash 01 three times and display whats in that register location. Repeat this procedure until 06 flashes three times. Current credits will then appear on the display. Each additional press of the button after a short pause will cause the next entry to be displayed.

After the data in each bookkeeping register is recorded, it can be set to zero simply by pressing switch button S33, located on J4, the MPU module in the back box, or by pressing the left Coin Chute switch. Any or all registers can be cleared by alternating between the Self-Test button and the switch button S33 on the MPU module or left Coin Chute switch. The operator is given this option as a possible convenience and can elect to use or not use it as his needs direct.

Pressing the button 4 times causes the game to play the power-up tune and light the Game Over light. For quicker exit from bookkeeping turn game OFF, and then ON again.

Service credits are designed to allow the serviceman to test the game under actual play condidtions without disturbing the bookkeeping records that reside at identification numbers 07, 08, 11 and 12.

To obtain Service Credits, push and release the Self-Test switch until identification number 06 appears in the 'Display' window. Hold in the Trigger until the desired number of Service Credits (up to five) appears on the player score displays.

NOTE: If, upon accessing identification number 06, a number of credits greater than five is displayed, pressing the credit button has no effect.

Identification number 15 is reserved as a record of the number of Service Credits used.

* The 10,000 level is pre-set at the factory; can be set to zero, initially, if desired.
** If Coin Chute is not used in game, number displayed (if other than 00) on Player Score displays has no significance.

NOTE: If "Total Play" register is reset to zeros then "Total Replays" register should also be reset to zeros to maintain the game percentage value.

DIP SWITCH ADJUSTMENTS

DIP SWITCHES LOCATED ON THE AA MPU MODULE

COINS PER CREDIT LEFT COIN CHUTE (LOCK SIDE OF COIN DOOR)	SW#17	SW#18	SW#19	SW#20	SW#21	SW#22	SW#23	SW#24	SW#25	SW#26	SW#27	SW#28	SW#29	SW#30
1 COIN 1 CREDIT	OFF	OFF	OFF	OFF	OFF									
1 COIN 2 CREDITS	ON	OFF	OFF	OFF	OFF									
1 COIN 3 CREDITS	OFF	ON	OFF	OFF	OFF									
1 COIN 4 CREDITS	ON	ON	OFF	OFF	OFF									
1 COIN 5 CREDITS	OFF	OFF	ON	OFF	OFF									
1 COIN 6 CREDITS	ON	OFF	ON	OFF	OFF									
1 COIN 7 CREDITS	OFF	ON	ON	OFF	OFF									
1 COIN 8 CREDITS	ON	ON	ON	OFF	OFF									
1 COIN 9 CREDITS	OFF	OFF	OFF	ON	OFF									
1 COIN 12 CREDITS	ON	OFF	OFF	ON	OFF									
1 COIN 14 CREDITS	OFF	ON	OFF	ON	OFF									
** 2 COINS 1 CREDIT	ON	ON	OFF	ON	OFF									
** 2 COINS 2 CREDITS	OFF	OFF	ON	ON	OFF									
** 2 COINS 3 CREDITS	ON	OFF	ON	ON	OFF									
** 2 COINS 4 CREDITS	OFF	ON	ON	ON	OFF									
** 2 COINS 5 CREDITS	ON	ON	ON	ON	OFF									
** 2 COINS 6 CREDITS	OFF	OFF	OFF	OFF	ON									
** 2 COINS 7 CREDITS	ON	OFF	OFF	OFF	ON									
** 2 COINS 8 CREDITS	OFF	ON	OFF	OFF	ON									
** 2 COINS 9 CREDITS	ON	ON	OFF	OFF	ON									
** 2 COINS 12 CREDITS	OFF	OFF	ON	OFF	ON									
** 2 COINS 14 CREDITS	ON	OFF	ON	OFF	ON									
* 2 COINS 3 CREDITS	OFF	ON	ON	OFF	ON									
* 4 COINS 3 CREDITS	ON	ON	ON	OFF	ON									
* 4 COINS 3 CREDITS	OFF	OFF	OFF	ON	ON									
* 4 COINS 5 CREDITS	ON	OFF	OFF	ON	ON									
* 4 COINS 7 CREDITS	OFF	ON	OFF	ON	ON									
* 4 COINS 7 CREDITS	ON	ON	OFF	ON	ON									
* 3 COINS 1 CREDIT	OFF	OFF	ON	ON	ON									
* 4 COINS 1 CREDIT	ON	OFF	ON	ON	ON									
* 5 COINS 1 CREDIT	OFF	ON	ON	ON	ON									
* 5 COINS 2 CREDITS	ON	ON	ON	ON	ON									

FACTORY RECOMMENDED SETTINGS.

* SEE FOLLOWING TABLE FOR EXPLANATION OF HOW CREDITS ARE AWARDED FOR THESE OPTIONS.

** NO CREDITS UNTIL 2nd COIN IS DROPPED.

PRELIMINARY

DIP SWITCH ADJUSTMENTS

DIP SWITCHES LOCATED ON THE AA MPU MODULE

COINS PER CREDIT RIGHT COIN CHUTE (HINGE SIDE OF COIN DOOR)	SW#1	SW#2	SW#3	SW#4	SW#5	SW#6	SW#7	SW#8	SW#9	SW#10	SW#11	SW#12	SW#13	SW#14
# 1 COIN 1 CREDIT									OFF	OFF	OFF	OFF	OFF	
1 COIN 2 CREDITS									ON	OFF	OFF	OFF	OFF	
1 COIN 3 CREDITS									OFF	ON	OFF	OFF	OFF	
1 COIN 4 CREDITS									ON	ON	OFF	OFF	OFF	
1 COIN 5 CREDITS									OFF	OFF	ON	OFF	OFF	
1 COIN 6 CREDITS									ON	OFF	ON	OFF	OFF	
1 COIN 7 CREDITS									OFF	ON	ON	OFF	OFF	
1 COIN 8 CREDITS									ON	ON	ON	OFF	OFF	
1 COIN 9 CREDITS									OFF	OFF	OFF	ON	OFF	
1 COIN 12 CREDITS									ON	OFF	OFF	ON	OFF	
1 COIN 14 CREDITS									OFF	ON	OFF	ON	OFF	
** 2 COINS 1 CREDIT									ON	ON	OFF	ON	OFF	
** 2 COINS 2 CREDITS									OFF	OFF	ON	ON	OFF	
** 2 COINS 3 CREDITS									ON	OFF	ON	ON	OFF	
** 2 COINS 4 CREDITS									OFF	ON	ON	ON	OFF	
** 2 COINS 5 CREDITS									ON	ON	ON	ON	OFF	
** 2 COINS 6 CREDITS									OFF	OFF	OFF	OFF	ON	
** 2 COINS 7 CREDITS									ON	OFF	OFF	OFF	ON	
** 2 COINS 8 CREDITS									OFF	ON	OFF	OFF	ON	
** 2 COINS 9 CREDITS									ON	ON	OFF	OFF	ON	
** 2 COINS 12 CREDITS									OFF	OFF	ON	OFF	ON	
** 2 COINS 14 CREDITS									ON	OFF	ON	OFF	ON	
* 2 COINS 3 CREDITS									OFF	ON	ON	OFF	ON	
* 4 COINS 3 CREDITS									ON	ON	ON	OFF	ON	
* 4 COINS 3 CREDITS									OFF	OFF	OFF	ON	ON	
* 4 COINS 5 CREDITS									ON	OFF	OFF	ON	ON	
* 4 COINS 7 CREDITS									OFF	ON	OFF	ON	ON	
* 4 COINS 7 CREDITS									ON	ON	OFF	ON	ON	
* 3 COINS 1 CREDIT									OFF	OFF	ON	ON	ON	
* 4 COINS 1 CREDIT									ON	OFF	ON	ON	ON	
* 5 COINS 1 CREDIT									OFF	ON	ON	ON	ON	
* 5 COINS 2 CREDITS									ON	ON	ON	ON	ON	

FACTORY RECOMMENDED SETTINGS.

* SEE FOLLOWING TABLE FOR EXPLANATION OF HOW CREDITS ARE AWARDED FOR THESE OPTIONS.

** NO CREDITS UNTIL 2nd COIN IS DROPPED.

PRELIMINARY

1. METHODS IN WHICH CREDITS ARE AWARDED FOR THE FOLLOWING OPTIONS AS NOTED ON THE "DIP SWITCH SETTINGS TABLE" ARE AS FOLLOWS. See the Figure below.

•	2 COINS 3 CREDITS	#	4 COINS 7 CREDITS
••	4 COINS 3 CREDITS	##	3 COINS 1 CREDIT
•••	4 COINS 3 CREDITS	###	4 COINS 1 CREDIT
••••	4 COINS 5 CREDITS	####	5 COINS 1 CREDIT
•••••	4 COINS 7 CREDITS	#####	5 COINS 2 CREDITS

• 2 COINS 3 CREDITS: One credit issued when 1st coin is dropped. Two credits issued when 2nd coin is dropped.

•• 4 COINS 3 CREDITS: One credit issued when 2nd coin is dropped. One credit issued when 3rd coin is dropped. One credit issued when 4th coin is dropped.

••• 4 COINS 3 CREDITS: One credit issued when 2nd coin is dropped. Two credits issued when 4th coin is dropped.

•••• 4 COINS 5 CREDITS: One credit issued when 1st coin is dropped. One credit issued when 2nd coin is dropped. One credits issued when 3rd coin is dropped. Two credits issued when 4th coin is dropped.

••••• 4 COINS 7 CREDITS: One credit issued when 1st coin is dropped. Two credits issued when 2nd coin is dropped. One credit issued when 3rd coin is dropped. Three credits issued when 4th coin is dropped.

4 COINS 7 CREDITS: One credit issued when 1st coin is dropped. Two credits issued when 2nd coin is dropped. Two credits issued when 3rd coin is dropped. Two credits issued when 4th coin is dropped.

3 COINS 1 CREDIT: One credit issued when 3rd coin is dropped.

4 COINS 1 CREDIT: One credit issued when 4th coin is dropped.

5 COINS 1 CREDIT: One credit issued when 5th coin is dropped.

5 COINS 2 CREDITS: One credit issued when 3rd coin is dropped. One credit issued when 5th coin is dropped.

DIP SWITCH ADJUSTMENTS
GAME FEATURES

DIP SWITCHES LOCATED ON THE A4 MPU MODULE

COINS PER CREDIT RIGHT COIN CHUTE HINGE SIDE OF COIN DOOR)	SW#1	SW#2	SW#3	SW#4	SW#5	SW#6	SW#7	SW#8	SW#9	SW#10	SW#11	SW#12	SW#13	SW#14
FLASHES CREDIT LIGHT WHEN CREDITS ARE REMAINING				ON										
REDIT LIGHT STAYS ON WHEN CREDITS ARE REMAINING				OFF										
O GAME OVER ATTRACT VOICE						ON								
ME OVER ATTRACT VOICE SAYS "TRY AGAIN EARTHLING"						OFF								
IFFICULTY = LIBERAL								ON						
IFFICULTY = CONSERVATIVE								OFF						

OTE: IN THE "CONSERVATIVE" DIFFICULTY LEVEL, THE ALIENS ATTACK THE BASES AT A MUCH MORE RAPID PACE AS THE GAME PROGRESSES.

PRELIMINARY

Self-Test routines are written into the game design. They are particularly useful fo
tine maintenance. The tests are described below. The first test is automatic and oc
power-up. This test causes the MPU module A4 to examine itself for failures. Seven
of an LED indicates proper operation. The second series of self-diagnostic tests cau
MPU to 'exercise' each of the other modules in such a way as to make their faults, if
obvious.

It is recommended that these tests be used several times a week to check out the game
fore play. If faults are discovered, they may be corrected on location if the operat
a stock of replacement modules. See "Trouble Shooting on Location".

MPU Module Self-Test:

At power on, the LED on the MPU module flashes once. (Flicker-Flash). After a pause
flashes six more times then comes on and stays on. A power-up sound is played to ann
game readiness. This indicates proper MPU operating condition and successful complet
the power-up test.

Game Self-Diagnostic Tests:

1. Pressing the Self-Test button inside the door initiates the Self-Test routine.
switched lamps flash off and on continuously.

2. Pressing the Self-Test button again causes each digit on the display to cycle f
thru 9, and repeat continuously.

3. Pressing the Self-Test button again causes each solenoid to be energized one a
time, in a continuous sequence. The number appearing on the Player Score displ
the same as the number assigned to the solenoid. The sound of a solenoid pulli
a number appears indicates proper operation. The absence of sound is improper.
sound is absent, see the in Solenoid Identification Table for help.

4. Pressing the Self-Test button again causes the tank motor (Motor 0) to operate,
them left and right.

5. Pressing the Self-Test button again causes the Command Ship horizontal motor (M
to operate, moving the Ship left and right.

6. Pressing the Self-Test button again causes the Command Ship vertical motor (Mot
operate, moving the Ship up and down. To make further testing simpler you shou
this test when Command Ship is at the same level as the bases on the Lamp Sense
board. This will prevent the limit switches from appearing in the stuck switch
and expose all the sensors for the sensor test.

7. Pressing the Self-Test button again causes the game to enter Ticket Dispensor
Once in this mode the Ticket Dispensor (optional) will dispense one ticket eac
the gun trigger is pulled.

8. Pressing Self-Test button again causes the sound module to play the "Attacker
sound repeatedly.

9. Pressing the Self-Test button again causes the MPU to search each switch assem
stuck contacts. If any are found, the number of the first set encountered is
on the Player Score display. The number remains until the fault is cleared.
Switch Identification Table for help. Other numbers may follow if more stuck
are present. If there are no stuck switches, the Mirror Image display flashes

10. Pressing the Self-Test button again enters the game into sensor test. All the ships on the Lamp/Sensor board will lite. By aiming the gun at a ship, the cooresponding lamps should flicker and then go out indicating that the sensor sees the infra red beam. Additionally a sensor identifing number will be shown in the display. See the following illustration for a detailed layout of the specific Sensor/Lamp locations.

    The Sensors on the Mechanical Targets WILL NOT flash any lights, but should display an appropriate number on the display.

    To re-lite the lamps in this mode, operate the left hand coin switch.

11. Pressing the Self-Test button 19 more times causes the MPU to step thru the threshold and bookkeeping functions described previously and finally to repeat the power-up test. For more rapid exit to power-up, turn the game off, then on. The game is now ready to play.

After successful completion of the Self Diagnostic Test procedure, set the game up for play.

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. Regap, if necessary, to 1/16". Do not burnish or file Gold Plated Switch Contacts.

TROUBLESHOOTING ON LOCATION

Your game is designed to make troubleshooting easy. Several simple procedures are given below that cover the greatest percentage of game failures. They are written for an operator on location and require module replacement. Symptoms and the action to be taken are given for each type of problem.

If the problem is more complicated and is not solved by following this procedure, more detailed procedures are available from Bally/Midway.

1A) **SYMPTOM:** Game does not play power-up tune when power in turned on. General illumination is present.

ACTION:
A) Turn power OFF. Open game's Front Door Assembly by releasing the Latches on it's right side. Locate light emitting diode (LED) on MPU module A4.
B) Turn Power ON. LED must flash 7X to indicate that module A4 is good. Correct flash sequence is flicker/flash-pause-and then six more flashes and LED comes on and stays on.
C) If LED does not come on, or does not flash, or flashes, but less than 7X, turn off power. Check fuses and replace if necessary.
D) If fuses are okay replace MPU Module.

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

E) If game is correct, it is now ready for play. If game is not correct, refer to Module Replacement procedure. (See Parts List).

2A) **SYMPTOM:** Not all feature lamps light during game play.

ACTION:
A) Open front door. With power ON, press button (Self-Test switch) once. If game is correct, all feature lamps flash ON and OFF.
B) To gain access to lamps:
1. Open Back Door.
2. Remove Crater Scenery by pulling in the two "Quick Release" latches.
3. Lift playfield plastic by the edge where the 1,000 point lites are located.
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 Driver/Reg. Module A7, Turn power ON and repeat A.

CAUTION: High Voltage is supplied to the Display Driver Module A7, from the Driver/Regulator Module A3. Wait 30 seconds for High Voltage to Bleed Off.

F) If game is correct, it is now ready for play.
G) If game is not correct, turn power OFF. Replace MPU module A4. See CAUTION, 1AD. Turn power ON and repeat A.
H) If game is correct, it is now ready for play. If game is not correct, refer to Module Replacement procedure. (See Parts List).

2B) **SYMPTOM:** One or some switched lamps always ON.
ACTION: Repeat 2AA, AB, AE, and AF and if necessary AG & AH.

3A) **SYMPTOM:** Display digits improper. One or several segments always OFF, digits not lighted or several segments or digit(s) always ON.

NOTE: Since this display driver is designed to be viewed thru a mirror, looking at it directly. i.e. thru the back door - May lead you to believe the module is not operating properly.

ACTION: A) Open front door. With power ON, press button (Self-Test switch) twice. If the game is correct, each digit on the Mirror Image Display Driver Module A1 displays the count 1-9 and 0 continuously in each of the 6 digit positions. Note defect in Display Driver module.
B) Turn power OFF. See CAUTION NOTE 2AE.
C) Replace Display Driver module A1. Turn power ON. Repeat A.
D) If game is correct, it is now ready for play. If game is not correct, refer to Module Replacement procedure. (See Parts List).
E) Replace MPU module A4. See CAUTION NOTE, 1AD. Turn power ON. Repeat A.

4A) SYMPTOM: Solenoid(s) do(es) not pull-in during course of game.
ACTION: A) Open front door. With power ON, press button (Self-Test switch) three times.
B) If game was correct, each solenoid would be energized. A number is flashed on the Player Score display as each solenoid is pulsed. Note any numbers that do not have the sound of a solenoid associated. See Solenoid Identification Table.
C) Refer to 2AB 1 & 2. 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 Driver/Regulator module A3. See CAUTION NOTE 2AE.
F) Repeat AA & AB. If game is correct, it is now ready to play. If game is not correct, turn power OFF.
G) Disconnect Sound Module.
H) Repeat AA & AB. If game is correct replace sound module. If game is correct. It is now ready to play. If game is not correct, turn power OFF.
I) Replace MPU module A4. See CAUTION NOTE, 1AD.
J) Repeat A & B. If game is correct, it is now ready to play. If game is not correct, refer to Module Replacement Procedure. (See Parts List).

4B) SYMPTOM: Solenoid(s) always energized. Limit troubleshooting to one minute with power ON, followed by five minutes with power OFF. Repeat as necessary. Replace damaged solenoid. Do 4AA, AB, AE, AF, AG, AH and if necessary, AI, AJ.

5A) SYMPTOM: Motor(s) do(es) not operate during course of game.
ACTION: A) Open front door. With power ON, press button (Self-Test switch) 4, 5, or 6 time(s) to turn on each Motor individually.
B) If game is correct the tank motor will operate first, then the command ship horizontal motor, and finally the command ship vertical motor. Note any motor that does not operate.
C) Refer to 2AB 1 & 2. Turn power OFF. Inspect the motor.
D) If a lead is broken off, or a connector not seated properly on the Motor Control Board, repair or reseat connector. Repeat AA & AB. If game is correct, it is now ready for play. If game is not correct. Turn game OFF. Replace suspect Motor Control Module.
E) Repeat AA & AB. If game is not correct consult factory.

5B) SYMPTOM: No motors operate during test and no sensors score points during game play.
ACTION: A) Check fuse F2 on Driver/Reg. Module A3. If fuse is good. Turn off game.
B) If fuse is blown replace F2 with a 4 amp 3AG fuse. Repeat 5AA & AB. If game is correct, it is now ready for play. If game is not correct turn game OFF.
C) Replace Driver/Reg. Module A3. See CAUTION NOTE 2AE.
D) Repeat 5AA & AB. If game is correct, it is now ready for play. If game is not correct, turn game OFF.

E) Replace infrasense MPU.
F) Repeat 5AA & AB. If game is not correct turn game OFF and consult the factory.

6A) SYMPTOM: No Sound.
ACTION: A) Open front door. With power ON, press (Self-Test switch) 8 times.
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, refer to MOdule Replacement procedure.

7A) SYMPTOM: Trigger does not work or command ship vertical motor does not change direction.
ACTION: A) Open front door. With power ON, press (Self-Test switch) 9 times.
B) Open the back door and by hand, disengage the gear controlling up-down movement of the command shift. While holding the gear away from the spring, slide the ship forward approximately three inches and release the gear. This should lock the command ship in place and insure the limit switches are not actuated.
C) If the game is correct, the Mirror Image Display will flash "0". If a number appears on the display, See Switch Assembly Identification Table.
D) Verify switch operation by squeezing the trigger several times and by disengaging the gear and moving the command ship to its upper and lower limits. In each case an appropriate number should appear on the Mirror Image Display which coorespends to the Switch Assembly Identification Table.

8A) SYMPTOM: Target(s) do[illegible] score during game play.
ACTION: A) Open front door. With power ON, press button (Self-Test Switch) 10 times.
B) All target lites should come on and stay on.
C) Aim the gun at the suspected sensor, the corresponding lamps should go out and a number will appear in the display. See Sensor Identification Table.
To re-lite Lamps, operate Left Hand Coin Switch.
D) If the game is correct, it is now ready for play. If game is not correct turn power OFF.
E) Check connectors on Lamp/Sensor Board to insure they are properly seated. Also visually check sensors to make sure they haven't been bent out of alignment.
F) Repeat steps AA thru AC.
G) If game is correct, it is now ready to play. If game is not correct, turn power OFF.
H) Replace Lamp/Sensor Board.
I) Repeat steps AA thru AC.
J) If the game is correct, it is now ready for play. If game is not correct, turn power OFF.
K) Replace infrasense MPU.
L) Repeat steps AA thru AC.
M) If the game is correct, it is now ready to play. If game is not correct, turn power OFF and consult the factory.

9A) SYMPTOM: Game blows fuse(s) repeatedly.
ACTION: See Module Replacement Procedure. F.O. 560-3.

The following table is a guide in tracing signals from the Sensors to the inputs on the Infrasense Board.

Sensors #	Transistor #	Lamp/Sensor Connector/Pin	Infrasense Conn./Pin
1	Q1	J3-1	J3-2
2	Q2	J3-2	J3-3
3	Q3	J3-3	J3-4
4	Q4	J3-4	J3-6
5	Q5	J3-5	J3-7
6	Q6	J3-6	J3-8
7	Q7	J3-7	J3-9
8	Q8	J3-8	J3-10
9	Q9	J3-9	J3-11
10	Q10	J3-10	J3-12
11	Q11	J3-11	J3-13
12	Q12	J3-12	J3-14
13	Q13	J3-13	J3-15
14	Q14	J3-14	J3-16
15	Q15	J3-15	J3-17
16	Q16	J3-16	J3-18
17	Q17	J3-17	J3-1
18	Q18	J3-18	J4-2
19	Q19	J3-19	J4-3
20	Q20	J3-20	J4-4
21	Q21	J3-21	J4-5
22	Q22	J3-22	J4-6
23	Q23	J3-23	J4-7
24	Q24	J3-24	J4-8
25	Q25	RIGHT MARAUDER (MIRROR)	J4-11
26	Q26	LEFT MARAUDER (MIRROR)	J4-12
27	Q27	RIGHT TANK (MIRROR)	J4-13
28	Q28	CENTER TANK	J4-14
29	Q29	LEFT TANK (MIRROR)	J4-15
30	Q30	COMMAND SHIP	J4-16
31	N/U	N/U	J4-17
32	N/U	N/U	J4-18

To verify continuity of any questionable sensor, place game in target sensor test as previously described in the manual. Then clip a long jumper to the suspected transistor emitter, the appropriate number should be displayed on the mirror image display. If the number does not appear, use the table above to determine the reason for lack of continuity. If the number appears when the emitter is probed but not when the gun is aimed at the sensor either the sensor is bent out of alignment or the transistor is defective.

PRELIMINARY

Self Test #	Solenoid Identification
01	Explosion Lights (No Solenoid Sound)
02	Right Marauder
03	Left Marauder
04	Right Tank
05	Center Tank
06	Left Tank
07	Command Ship Descend

SWITCH ASSEMBLY SELF-TEST DISPLAY NUMBERS

Switch Self Test #	Description
01	Trigger
09	Coin Chute Left
10	Coin Chute Right
12	Slam
15	Lower Limit - Command Ship
16	Upper Limit - Command Ship

PART LIST
MIDNIGHT MARAUDER

MISCELLANEOUS

TRANSFORMER	M100-00109-A000
AUXILLIARY TRANSFORMER	M100-00132-A000
BULBS CM8-244	0017-00003-0519
BULBS #555	0017-00003-0484
BULBS #912	0017-00003-0525
BULB F15T8BLB (FLUORESCENT)	0017-00003-0095
STARTER	0017-00003-0412
MOTOR (2) HORIZONTAL MOTION	0040-00625-0100
MOTOR (1) VERTICAL MOTION	0040-00622-0000
FUSE (2) LAMP 3AG FLUORESCENT LAMP & AUX TRANSFORMER	0017-00003-0001

ASSEMBLY COILS

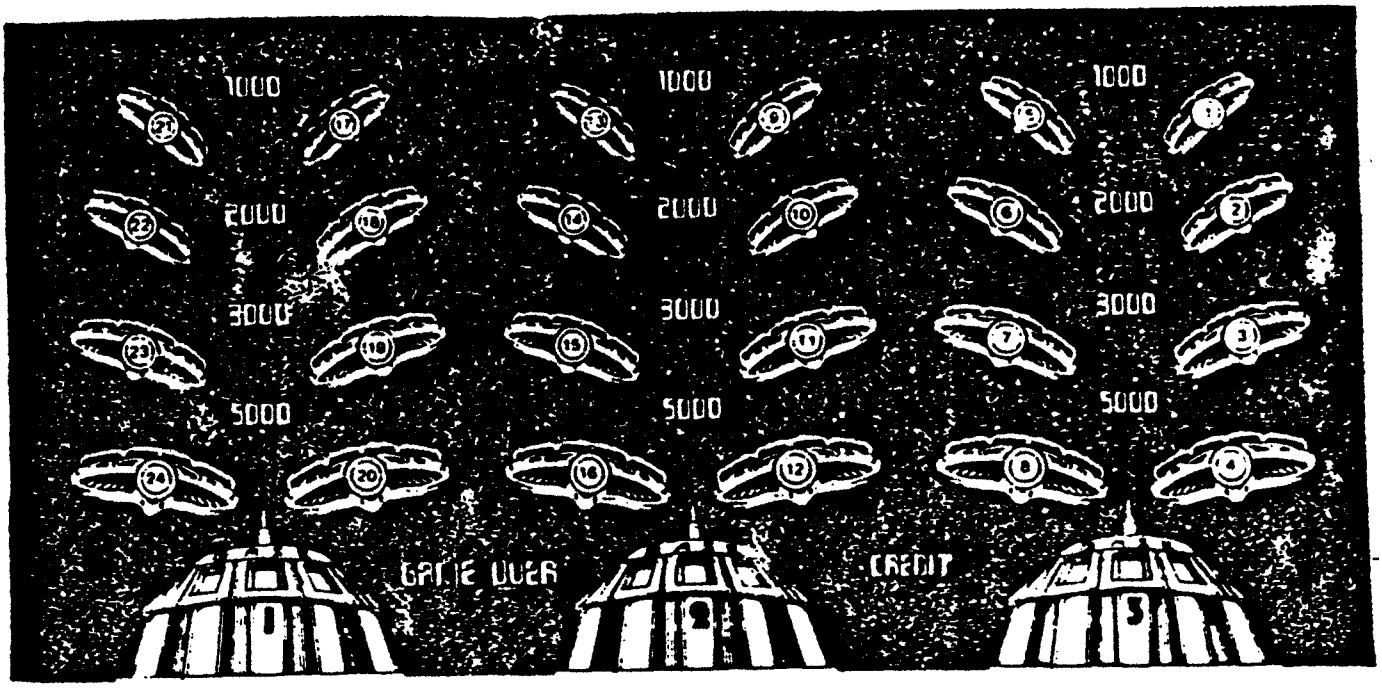
RIGHT ALIEN	AA12-00065-0000
LEFT ALIEN	AA12-00065-0000
RIGHT TANK	AA12-00065-0000
CENTER TANK	AA12-00065-0000
LEFT TANK	AA12-00065-0000
COMMAND SHIP DESCEND	AA12-00071-0000

MODULES

[illegible]OR IMAGE DISPLAY	A084-91719-B000
INFRASENSE MPU	A084-91681-DA12
DRIVER/REGULATOR	A084-91678-EA12
MOTOR CONTROL	A084-91682-GA12
SQUAWK & TALK	A084-91625-AA12
MPU	A084-91494-AA12
LAMP/SENSOR	A084-91697-CA12
TARGET SENSOR	A084-91707-BA12
POWER MODULE	A084-91492-A000
TRANSFORMER & RECTIFIER ASSEMBLY	AA12-00037-0000

PRELIMINARY

SENSOR IDENTIFICATION TABLE (MIRROR IMAGE)



SENSOR #	DESCRIPTION
25	RIGHT ALIEN
26	LEFT ALIEN
27	RIGHT TANK
28	CENTER TANK
29	LEFT TANK
30	COMMAND SHIP

PRELIMINARY

Bally MIDWAY MFG. CO.

May 15, 1984

SERVICE BULLETIN

GAME: MIDNIGHT MARAUDERS

SUBJECT: P.C. BOARD INTERCHANGEABILITY

The following P.C. Boards have been used before in Bally Midway Pinball Games.

P.C. BOARD	INTERCHANGEABLE WITH
1. MPU Module	Any Bally Midway Pinball Game to date. (Except Program IC's and Jumper Combinations.)
2. Squawk & Talk Module	Any Bally Midway Pinball Game to date that uses the Squawk and Talk Module. (Except Program IC's and Jumper Combinations.)
3. Rectifier/Power Supply Module	Gold Ball and Grand Slam

Attached is a preliminary parts list for Midnight Marauders.

Pete Gustafson
Field Service Technician

PG/dd

attach.

10601 W. Belmont Ave. • Franklin Park, Illinois 60131 • Telephone (312) 451-9200 • Telex: 72-1596

PRELIMINARY PARTS LIST

MIDNIGHT MARAUDERS

MISCELLANEOUS

Transformer	MT00-00109-A000
Auxiliary Transformer	MT00-00132-A000
Bulbs CM8-244 or 86	0017-00003-0519
Bulbs #555	0017-00003-0484
Bulbs #912	0017-00003-0525
Bulb F15T8BLB (Fluorescent)	0017-00003-0095
Starter	0017-00003-0412
Motor (2) Horizontal Motion	0040-00625-0100
Motor (1) Vertical Motion	0040-00622-0000
Fuse (2) Lamp 3AG Fluorescent Lamp and Auxiliary Transformer	0017-00003-0001

ASSEMBLY COILS

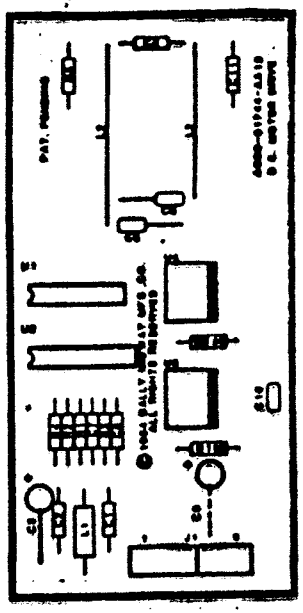
Right Alien	AA12-00065-0000
Left Alien	AA12-00065-0000
Right Tank	AA12-00065-0000
Center Tank	AA12-00065-0000
Left Tank	AA12-00065-0000
Command Ship Descend	AA12-00071-0000

MODULES

Mirror Image Display	A084-91713-B000
Infrasense MPU	A084-91681-DA12
Driver/Regulator	A084-91678-EA12
Motor Control	A084-91682-GA12
Squawk & Talk	A084-91625-AA12
MPU	A084-91494-AA12
Lamp/Sensor	A084-91697-CA12
Target Sensor	A084-91707-BA12
Power Module	A084-91492-A000
Transformer & Rectifier Assembly	AA12-00037-0000
Trigger LED (In Gun Assembly)	A084-91708-AA12

DESIGNATION LIST

DESIGNATION NO.	DESCRIPTION
C1	820 PF 50V
C2	.1 UF 25V
C3	4.7 UF 35V TANT
C4	.47 MF 100V CER
C5,C6	.0047 UF 100V MYLAR
C7	470 PF 50V
C8	470 PF 50V
C9	4.7 UF 35V TANT
C10	.47 UF 100V CER
C11	330 PF CER
R1	10K
R2	100K
R3	10K
R4	100K
R5	1K
L1	10 UH
L2	3.75 MH DUAL LINE CHOKE
D1,D2	1N4004
U1	74LS00
U2	4049
U3,U4	UDN 2949Z
J1	.025 SQ. PIN
A080-91744-AA12	P.C.B.



CROSS REFERENCE LIST

DESCRIPTION	QTY	DESIGNATION NO.	PART NUMBER
330 PF CER	1	C11	0171-056N6-JXXX
470 PF 50V	1	C7,C8	0360-00800-0002
820 PF 50V	1	C1	0360-00800-0004
.0047 UF 100V MYLAR	2	C5,C6	0A12-00800-0003
.1 UF 25V	1	C2	0360-00800-0014
.47 UF 100V CER	2	C4,C10	0171-153N6-0KJX
4.7 UF 35V TANT	1	C3,C9	0945-00800-0800
1K 1/4W	1	R5	100E-00005-0061
10K 1/4W	2	R1,R3	100E-00005-0088
100K 1/4W	2	R2,R4	100E-00005-0115
10 UH CHOKE	1	L1	0986-00804-3300
3.75 MH DUAL LINE CHOKE	1	L2	0067-029XX-XXXX
1N4004	2	D1,D2	103E-00003-0005
74LS00	1	U1	0A12-00803-0017
4049	1	U2	0A12-00803-0018
.025 SQ. PIN	7	J1	0304-00804-0009
UDN 2949Z	2	U3,U4	0A12-00803-0009
P.C.B.			A080-91744-AA12

PROJECT ENG' M STEINMETZ

DIM. TOLERANCES UNLESS OTHERWISE SPEC.
CONCENTRICITY T.I.R. .005
FRACTIONAL ..... ± 1/64
DECIMAL ..... ± .005
HOLE DIA. .... +.003 −.000
ANGLE ..... ± 1/2°
DO NOT SCALE DWG.

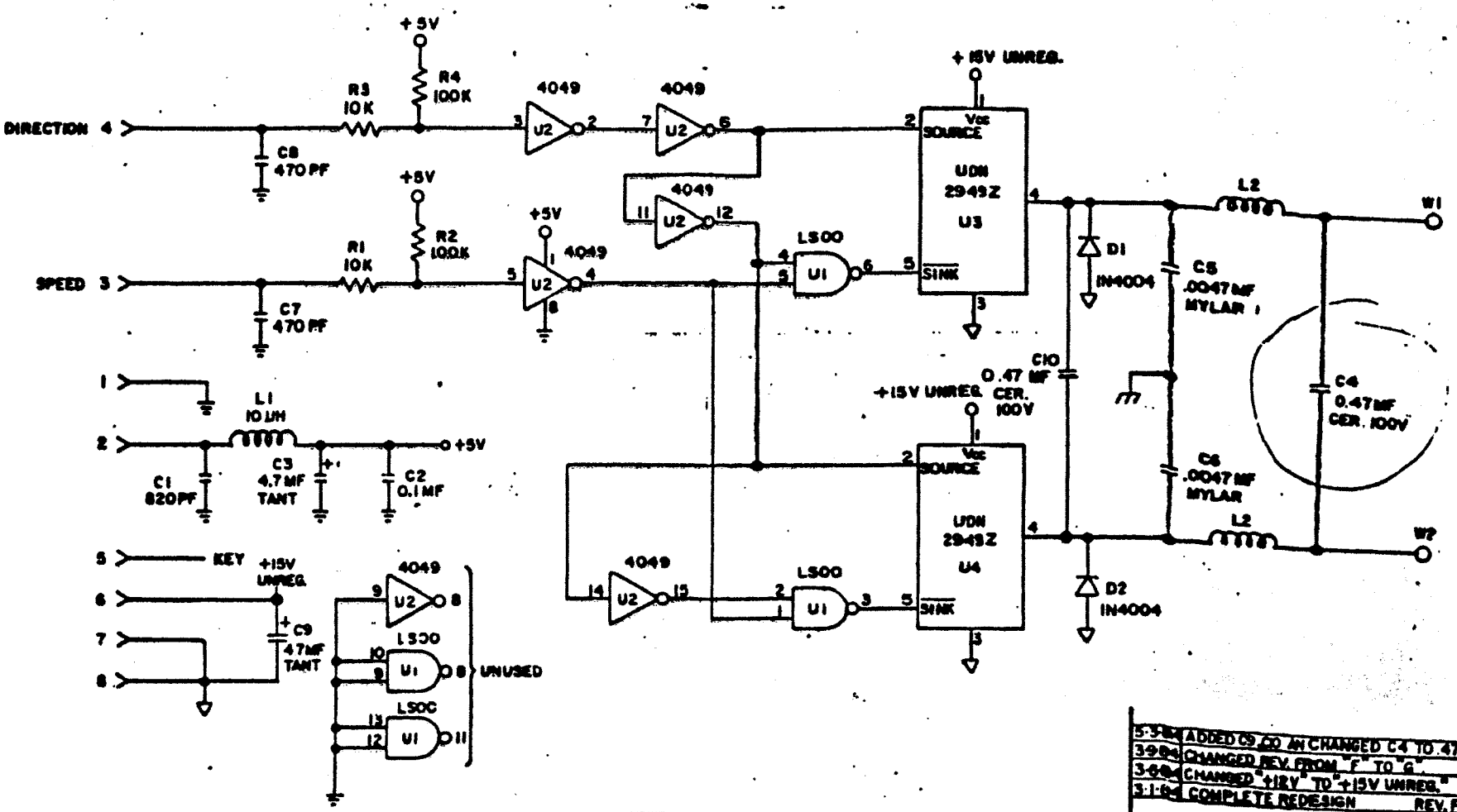
PRINT NAME MIDNIGHT MARAUDER
DATE 5/10/84
SCALE —H

Bally/MIDWAY Mfg. CO.
FRANKLIN PARK, IL 60131

D.C. MOTOR DRIVE
ASSEMBLY DRWG.
A080-91744-AA12

REVISIONS

PART NO. 00-0-8-1-0-0-A-1-2-A-0-3-0



5-3-84	ADDED C9,C10 & CHANGED C4 TO .47MF
3-9-84	CHANGED REV. FROM "F" TO "G"
3-6-84	CHANGED "+12V" TO "+15V UNREG."
3-1-84	COMPLETE REDESIGN REV. F

REVISIONS

PROJECT ENG: M. STEINMETZ

USED ON MIDNT MARAUDER

DO NOT SCALE DRAWING

FULL

NO. REQD 1 PER

UNLESS TOLERANCES UNLESS SPECIFIED

RLW

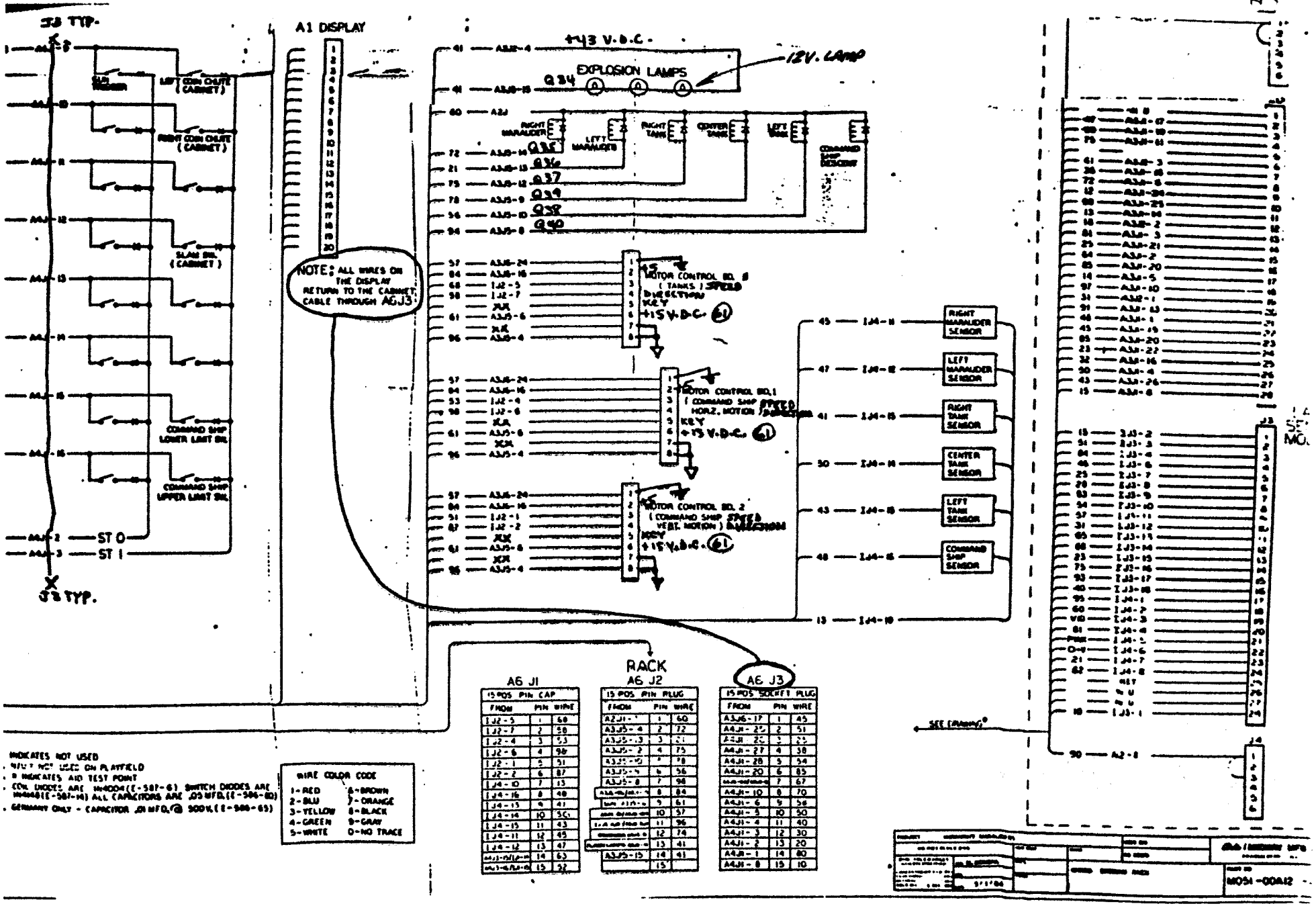
M.A.S.

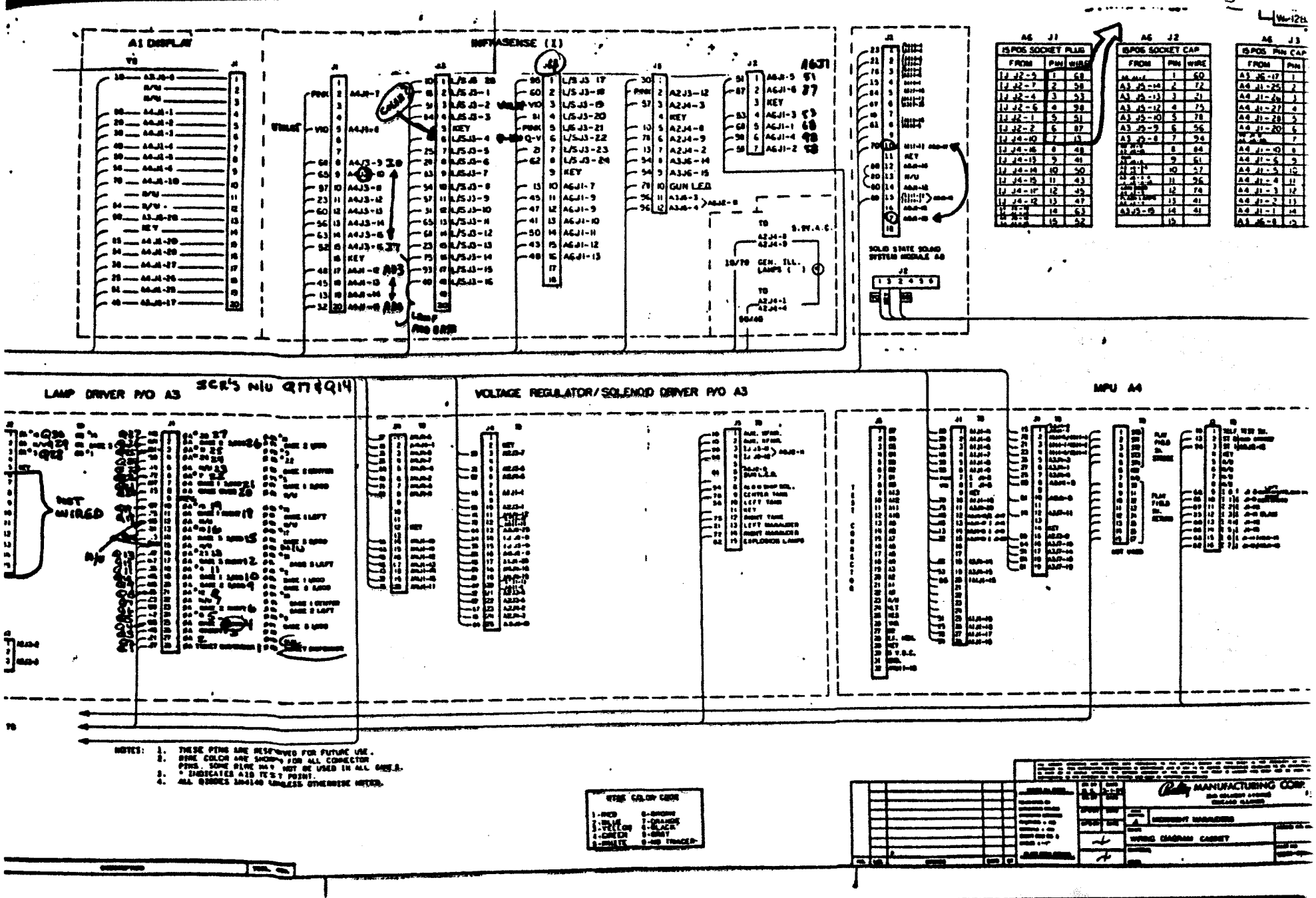
05/07/84

SCHEMATIC DWG.
MOTOR CONTROL
A080-91892-HA12

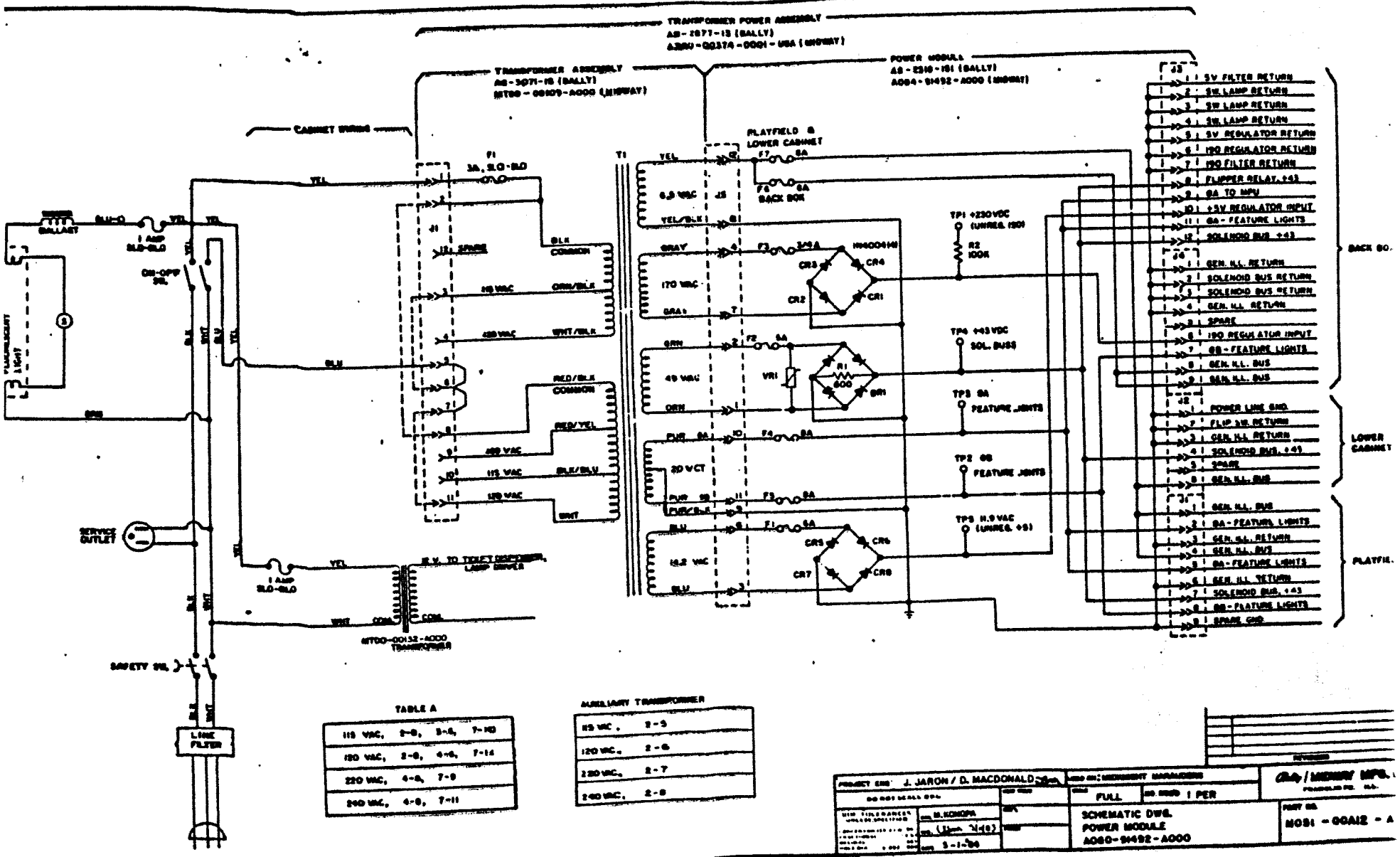
Bally / MIDWAY MFG. CO.
FRANKLIN PK ILL

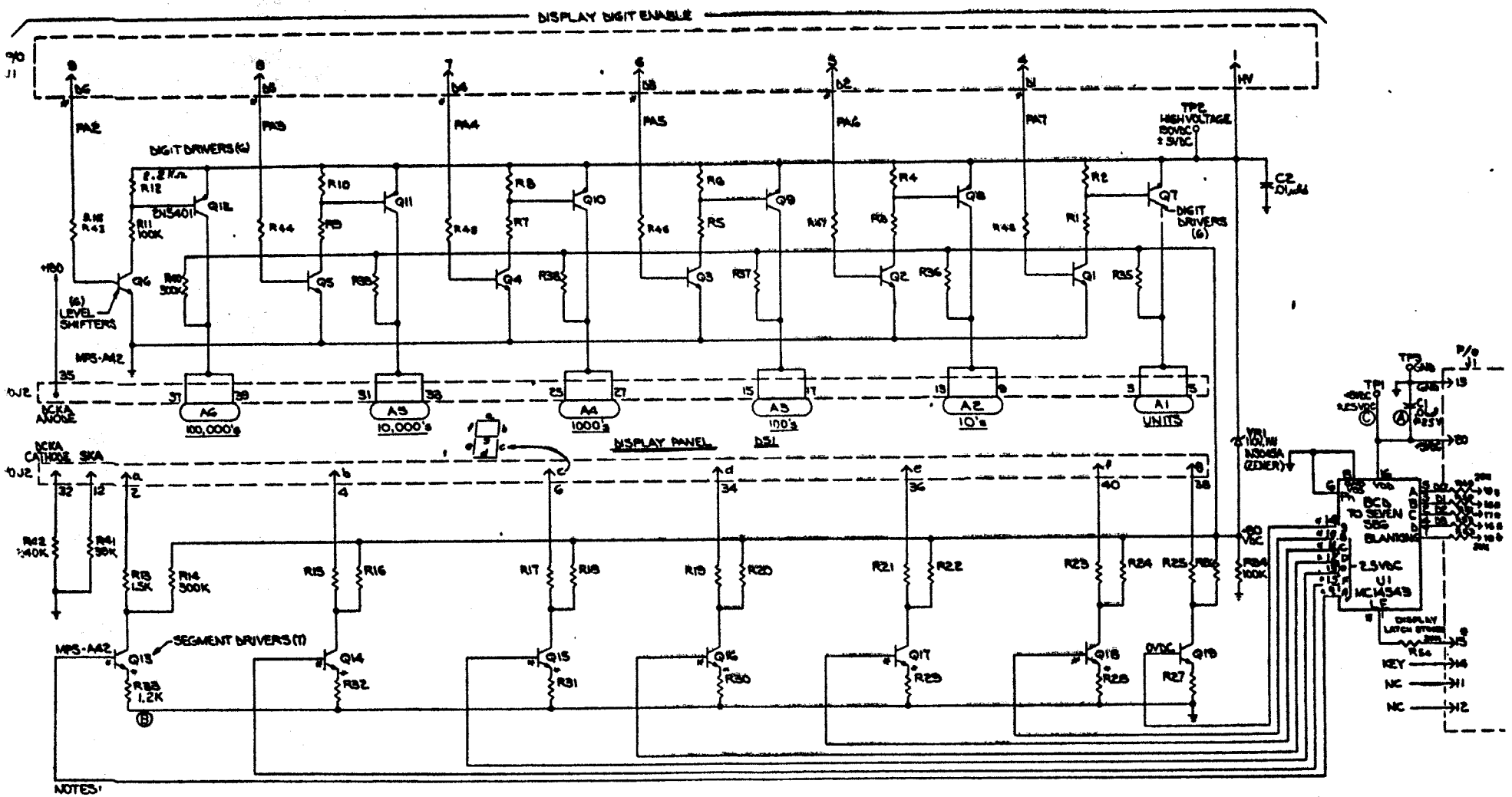
PART NO.
MOBI — 00A12 — H013

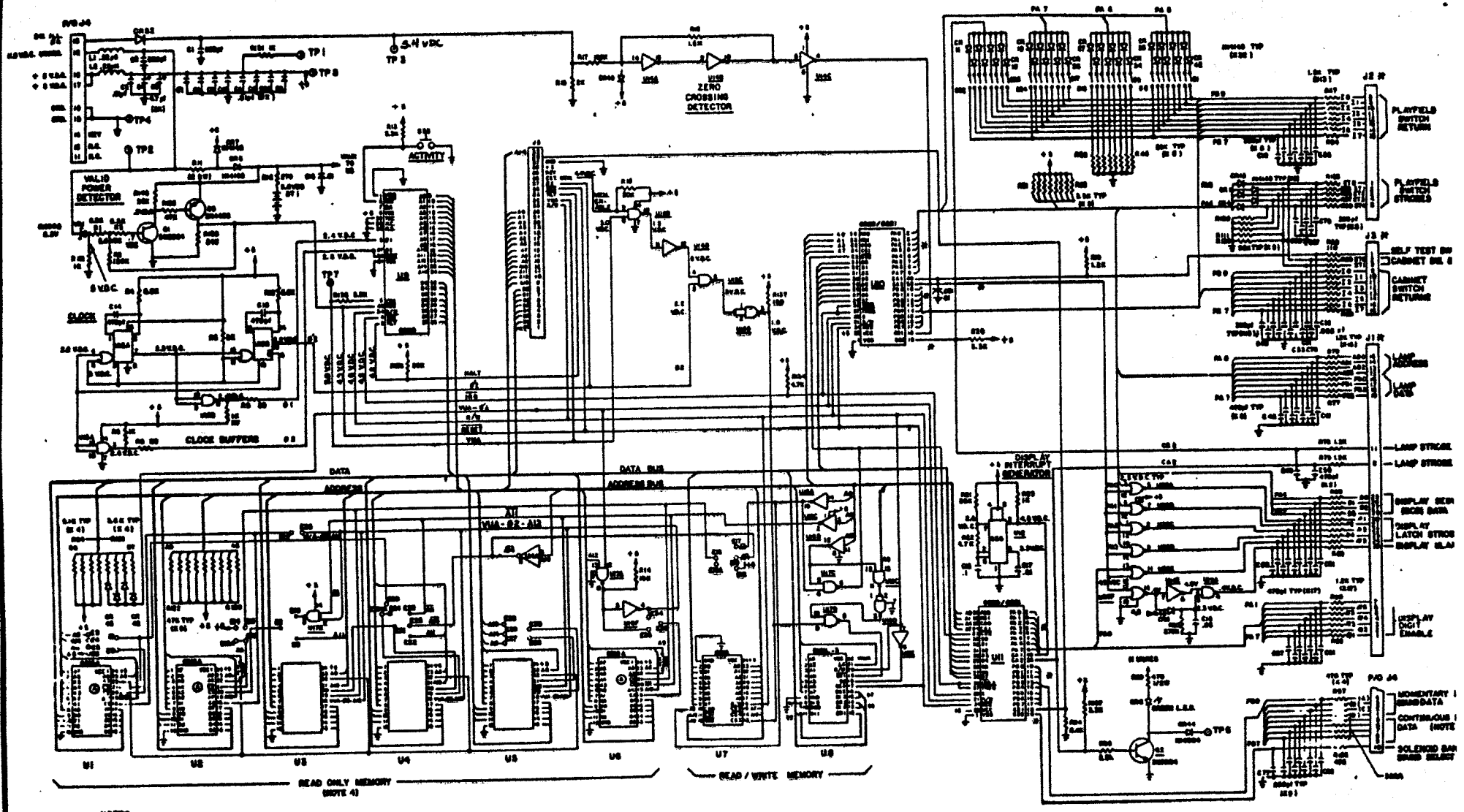

A1 DISPLAY
+43 V.D.C.
12V. LAMP
EXPLOSION LAMPS
Q34
NOTE: ALL WIRES ON THE DISPLAY RETURN TO THE CABINET CABLE THROUGH AGJ3
MOTOR CONTROL BD. 0
MOTOR CONTROL BD. 1
MOTOR CONTROL BD. 2
RIGHT MARAUDER SENSOR
LEFT MARAUDER SENSOR
RIGHT TANK SENSOR
CENTER TANK SENSOR
LEFT TANK SENSOR
COMMAND SHIP SENSOR
ST 0
ST 1
RACK
A6 J1
A6 J2
A6 J3
WIRE COLOR CODE
1-RED
2-BLU
3-YELLOW
4-GREEN
5-WHITE
6-BROWN
7-ORANGE
8-BLACK
9-GRAY
0-NO TRACE



NOTES:
1. THESE PINS ARE RESERVED FOR FUTURE USE.
2. WIRE COLOR ARE SHOWN FOR ALL CONNECTOR PINS. SOME WIRE MAY NOT BE USED IN ALL GAMES.
3. * INDICATES A1B TEST POINT.
4. ALL DIODES 1N4148 UNLESS OTHERWISE NOTED.


TRANSFORMER POWER ASSEMBLY
A8-2877-1S (BALLY)
A30U-00374-0001-USA (MIDWAY)
TRANSFORMER ASSEMBLY
A8-3071-1S (BALLY)
A1T00-00109-A000 (MIDWAY)
POWER MODULE
A8-2510-1S1 (BALLY)
A080-91492-A000 (MIDWAY)
CABINET WIRING
PLAYFIELD & LOWER CABINET
BACK BOX
LOWER CABINET
PLAYFIELD
F1 3A, SLO-BLO
T1
J1
J2
J3
J4
J5
J6
J7
J8
J9
J10
J11
J12
SPARE
COMMON
115 VAC
230 VAC
6.3 VAC
170 VAC
49 VAC
20 VCT
16.2 VAC
VR1
R1 500
R2 100R
TP1 +230 VDC (UNREG. +50)
TP4 +43 VDC SOL. BUSS
TP3 8A FEATURE LIGHTS
TP2 6B FEATURE LIGHTS
TP5 11.9 VAC (UNREG. +5)
5V FILTER RETURN
SW. LAMP RETURN
5V REGULATOR RETURN
+20 REGULATOR RETURN
+20 FILTER RETURN
FLIPPER RELAY, +43
8A TO MPU
+5V REGULATOR INPUT
6A - FEATURE LIGHTS
SOLENOID BUS +43
GEN. ILL. RETURN
SOLENOID BUS RETURN
+20 REGULATION INPUT
6B - FEATURE LIGHTS
GEN. ILL. BUS
POWER LINE GND.
FLIP 5V RETURN
SERVICE OUTLET
ON-OFF SW.
SAFETY SW.
LINE FILTER
1 AMP SLO-BLO
A1T00-00132-A000 TRANSFORMER
TABLE A
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
AUXILIARY TRANSFORMER
115 VAC. 2-5
120 VAC. 2-6
220 VAC. 2-7
240 VAC. 2-8
PROJECT ENG: J. JARON / D. MACDONALD
DO NOT SCALE DWG.
M. KONOPA
5-1-84
FULL
1 PER
SCHEMATIC DWG.
POWER MODULE
A080-91492-A000
MOSI - 00A12 - A


DISPLAY DIGIT ENABLE
DIGIT DRIVERS (6)
2N5401
LEVEL SHIFTERS
SEGMENT DRIVERS (7)
TP2 HIGH VOLTAGE 190VDC ± 5VDC
C2 .01μF
DIGIT DRIVERS (6)
MPS-A42
A6 100,000's
A5 10,000's
A4 1000's
A3 100's
A2 10's
A1 UNITS
DISPLAY PANEL DS1
VR1 100,W IN5245A (ZENER)
BCD TO SEVEN SEG BLANKING
2.5VDC
U1 MC14543 LF
DISPLAY LATCH STROBE
KEY
NC
NC
TP3
TP1
P/O J1
J2
NOTES:
1. UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE ±5%, ¼W.
2. PREFIX ALL REFERENCE DESIG. WITH ASSEMBLY REFERENCE DESIG. "A1"
3. ® INDICATES 'A1B' TEST POINT.
MANUFACTURING CORP.
6 DIGIT DISPLAY BOARD SCHEMATIC
MIRROR IMAGE
W-118



NOTES

1. ※ INDICATES "A40" TEST POINT.
2. REMOVE A344 BEFORE USING AS A40 TEST POINT, MAY BE USED FOR 6TH AND 7TH DISPLAYS
3. PREFIX ALL REFERENCE DESIGNATIONS WITH "A4"
4. EXACT CHIP COMPLEMENT USED IN SOCKETS U1 THRU U6 CAN VARY FOR DIFFERENT GAMES AND PRODUCTION LOTS. TABLES OF MEMORY CHIPS AND CORRESPONDING JUMPERS FOR DIFFERENT GAMES AVAILABLE FROM BALLY FIELD SERVICE DEPARTMENT.

Bally MANUFACTURING CO

M P.U. CONTRO. BOARD

W-1