GamePlan, inc.®

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Lady Sharpshooter™

INSTALLATION AND REPAIR MANUAL

MODEL 830

02-3010 5

WARNING

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions manual, may cause interference to radio communications. 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.

INSTALLATION AND REPAIR MANUAL

INSTALLATION INDEX

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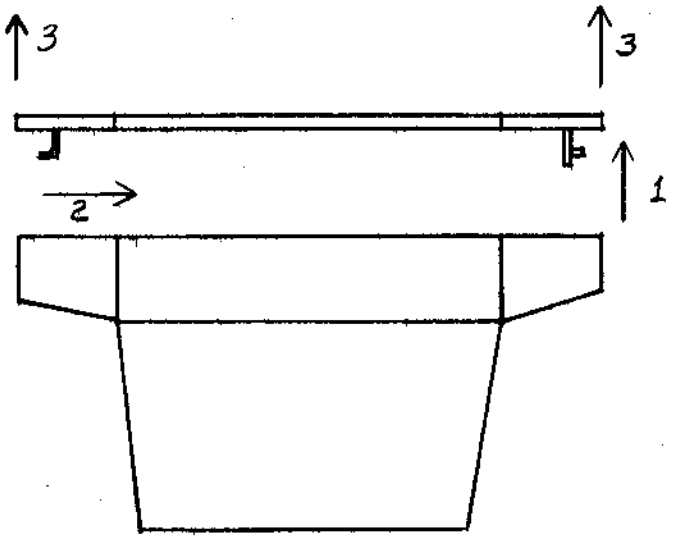
INSTALLATION

I GENERAL INSTALLATION

The game is shipped with the game ball, tilt ball and four legs inside the cash box. The keys for the door lock, top glass lock, and cash box locks are attached to the ball shooter. The following steps are necessary to make the game ready for play:

1. Attach the four legs to the bottom of the game by screwing them into their mounting brackets. Level the game by adjusting the hex nut on the legs.
2. Unlock the top glass and remove the glass by lifting the back, then sliding the top toward the back of the game and up as in figure #1. Raise the playfield by lifting on the bracket above the ball return hole and rest it on the playfield support arm.
3. Insert the tilt ball into the roll tilt assembly in the upper left corner of the cabinet. Adjust the roll tilt assembly if necessary.
4. Check the adjustment of the plumb bob tilt.
5. Check that all cable connectors are completely seated and clear of moving parts.
6. Check for any broken or disconnected wires.
7. Check the playfield for any shorts between lamp sockets, switch contacts or solenoids that may have been caused by vibration during shipment.



1. UNLOCK AND LIFT BACK OF TOPGLASS.
2. SLIDE TOPGLASS TOWARD REAR OF GAME UNTIL FRONT BRACKET IS CLEAR.
3. LIFT FRONT AND BACK UNTIL CLEAR OF GAME.

FIGURE 1. TOPGLASS REMOVAL

8. Check that fuses are firmly in place.

9. Check the power supply for any foreign material that may have fallen into it during shipment.

Lower the playfield and put the game ball in the shooter alley. Put the top glass back on and lock it. The game is now ready to be plugged in. Plug only into voltage as specified on lable on rear of game.

II GENERAL GAME OPERATION

Turn on the ON-OFF switch located at the rear of the game above the line cord. The displays should stay blank for approximately 7 seconds. During this time the MPU circuit board is exercising its self diagnostic routine. Upon successful completion of the self diagnostic routine, the game over tune will play and the displays will alternately flashes last score and high score to date.

Coin the game. The game should play the coin tune if selected and increment the credit display. Press the credit button. The start of game tune should play if selected, the credit display should decrement, the first player display should flash for player up, ball in play and number of players display should be at 1, and the ball should be served to the shooter alley if sitting in the ball return hole.

Pressing the credit button again will cause the number of players to be incremented with each depression to a maximum of two.

III. FEATURE OPERATION & SCORING

The top LADY rollover's score 5000 points when lit 3000 points when not lit and advance's bonus. Completing lady increases bonus multiplier lites spinner & bumper for 1000 points.

The left saucer lane scores designated value's advances bonus and lights a bumper for 1000 points.

Top right stand up targets score 500 points and advances bonus.

Top left rollover lane scores 5000 points and advances bonus. Making rollover lane lights lane for 10,000 points and advance bonus.

Shooter targets scores 5000 points advances bonus and lights a letter. Lit target score 25,000 points and advances bonus for each lit light. Completing S H O O T E R lights, special lane.

Power bumpers score 100 points 1000 points and advance bonus when lit.

Sharp target scores 5000 points advance bonus and lights a letter. Lit targets score 25,000 points advance bonus for each lit light. Completing S.H.A.R.P lights extra ball lane.

Special lane scores 10,000 points or special when lit.

Extra ball lane scores 5000 points or extra ball when lit.

Exceeding high score to date awards credits, if optioned, at the end of the game and the displayed high score to date is automatically updated.

Tilting the game results in loss of current ball and the flippers and all playfield features go dead. Slamming the machine results in loss of the game, and the game goes into a delay mode for approximately 15 seconds. The saucer is always active except during this delay. If a ball falls in the saucer hole during the slam delay it will be kicked out immediately after the delay.

At the end of the game, the game over tune plays and the match number shows in the ball in play / number of players display if optioned. The game goes into a game over delay for approximately 5 seconds and then begins alternately flashing last game score and high score to date on the displays.

IV. ACCOUNTING FUNCTIONS

Note: The game must be in the game over mode before entering into the accounting routine. A new accounting reset button has been added to the coin door. It provides the same function as S-33 on the MPU board.

The accounting routines are entered by pressing the test switch inside the coin door. The number of the accounting function is shown in the ball in play display and the count for that function is shown on all four players displays. Continued pressing of that test switch will cause the game to cycle through all the accounting functions. If the game is left in one of the accounting functions, it will automatically return to game over after approximately 30 seconds.

Any accounting function can be reset by pressing S33 on the MPU board or by pressing the reset switch on the coin door. While that particular accounting function is being displayed.

Replay levels and high score to date are reset to 100,000 all other accounting functions are reset to zero.

The sequence of accounting functions are as follows:

1. Coin Counter #1
2. Coin Counter #2
3. Coin Counter #3
4. Total Plays
5. Total Replays (from match, replay levels, & new high score)
*6. Replay Level #1
*7. Replay Level #2
*8. Replay Level #3
*9. High Score to Date
10. Number of times high score to date has been exceeded
11. Number of credits on game
12. Number of times level #1 exceeded
13 Number of times level #2 exceeded
14. Number of times level #3 exceeded
.....Credit Button.

*Reset to 100,000 by pressing reset switch on coin door or S-33 on MPU board, can be incremented 100,000 points for each depression of the credit button. Eliminating the 1st replay level eliminates all the replay levels because the 2nd level cannot be reached until the 1st level has been achieved, and the 3rd level cannot be reached until the 2nd level has been achieved.

V. GAME ADJUSTMENTS

A. PLAYFIELD ADJUSTMENTS

The right outlane openings are adjusted by moving the adjacent post back or forward in its slot. A smaller opening to the outlane will increase playing time and scoring.

B. VOLUME ADJUSTMENT

The volume control for the microprocessor sound unit is located on the Tilt Block assembly in the cabinet and may be accessed through the coin door. Turning the control clockwise increases volume, counter-clockwise decreases volume.

C. MPU SET UP SWITCHES

The MPU P.C. board has 32 set up switches that allow play to be customized to the location. The switches are contained in four switch packs numbered S1-8, S9-16, S17-24 and S25-32. Switch selectable options are credits per coin, tune options, maximum credits allowed, 3 or 5 balls per game option, replay of free ball award, match feature, and credits for exceeding high score.

CREDITS/COIN ADJUSTMENT

S9 through S12 select the credits per coin chute 2. Switch setting and resultant per coin as follows:

S9	S10	S11	S12	CREDITS/COIN
OFF	OFF	OFF	OFF	SAME AS COIN CHUTE # 1 SETTING
ON	OFF	OFF	OFF	1/1 COIN
OFF	ON	OFF	OFF	2/1 COIN
~~ON~~	ON	OFF	OFF	3/1 COIN
OFF	OFF	ON	OFF	4/1 COIN
ON	OFF	ON	OFF	5/1 COIN
OFF	ON	ON	OFF	6/1 COIN
ON	ON	ON	OFF	7/1 COIN
OFF	OFF	OFF	ON	8/1 COIN
ON	OFF	OFF	ON	9/1 COIN
OFF	ON	OFF	ON	10/1 COIN
ON	ON	OFF	ON	11/1 COIN
OFF	OFF	ON	ON	12/1 COIN
ON	OFF	ON	ON	13/1 COIN
OFF	ON	ON	ON	14/1 COIN
ON	ON	ON	ON	15/1 COIN

S1 through S5 select the credits per coin for chute 1. S17 through S 21 select the credits per coin for coin chute 3. Switch setting and resultant credits per coin are identical for coin chutes 1 and 3 are as follows:

CREDITS/COIN ADJUSTMENTS

COIN CHUTE	SWITCHES					CREDITS/COIN
#1———	1	2	3	4	5	
#3———	17	18	19	20	21	
OFF	OFF	OFF	OFF	OFF	OFF	3/2 COINS
ON	OFF	OFF	OFF	OFF	OFF	3/2 COINS
OFF	ON	OFF	OFF	OFF	OFF	1/1 COIN
ON	ON	OFF	OFF	OFF	OFF	1/2 COINS
OFF	OFF	ON	OFF	OFF	OFF	2/1 COIN
ON	OFF	ON	OFF	OFF	OFF	2/2 COINS
OFF	ON	ON	OFF	OFF	OFF	3/1 COIN
ON	ON	ON	OFF	OFF	OFF	3/2 COINS
OFF	OFF	OFF	ON	OFF	OFF	4/1 COIN
ON	OFF	OFF	ON	OFF	OFF	4/2 COINS
OFF	ON	OFF	ON	OFF	OFF	5/1 COIN
ON	ON	OFF	ON	OFF	OFF	5/2 COINS
OFF	OFF	ON	ON	OFF	OFF	6/1 COIN
ON	OFF	ON	ON	OFF	OFF	6/2 COINS
OFF	ON	ON	ON	OFF	OFF	7/1 COIN
ON	ON	ON	ON	OFF	OFF	7/2 COINS
OFF	OFF	OFF	OFF	ON	OFF	8/1 COIN
ON	OFF	OFF	OFF	ON	OFF	8/2 COINS
OFF	ON	OFF	OFF	ON	OFF	9/1 COIN
ON	ON	OFF	OFF	ON	OFF	9/2 COINS
OFF	OFF	ON	OFF	ON	OFF	10/1 COIN
ON	OFF	ON	OFF	ON	OFF	10/2 COINS
OFF	ON	ON	OFF	ON	OFF	11/1 COIN
ON	ON	ON	OFF	ON	OFF	11/2 COINS
OFF	OFF	OFF	ON	ON	OFF	12/1 COIN
ON	OFF	OFF	ON	ON	OFF	12/2 COINS
OFF	ON	OFF	ON	ON	OFF	13/1 COIN
ON	ON	OFF	ON	ON	OFF	13/2 COINS
OFF	OFF	ON	ON	ON	OFF	14/1 COIN
ON	OFF	ON	ON	ON	OFF	14/2 COINS
OFF	ON	ON	ON	ON	OFF	15/1 COIN
ON	ON	ON	ON	ON	OFF	15/2 COINS

BONUS SPECIAL LIGHT OPTION

SW # 6 & 7 determines when special light is turned on.

SPECIAL LITES AT	SW6	SW7
60K	ON	ON
90K	OFF	ON
120K	ON	OFF
150K	OFF	OFF

FREE PLAY OPTION

The game has provision for allowing free play.

FREE PLAY	S8
YES	ON
NO	OFF

BACKGROUND SOUND OPTION

Switch #13 selects a background sound during game play.

BACKGROUND SOUND	S13
YES	ON
NO	OFF

EXTRA BALL

S14 enables or disables the feature.

EXTRA BALL	S14
YES	ON
ON	OFF

RECALL SAUCER VALUES

Switch # 15 selects whether saucer value's are held in memory.

	S15
YES	ON
NO	OFF

EXTRA BALL

Switch #16 selects whether the extra ball lights when saucer value reaches 100K or 150K

	SW 16
100K	ON
150K	OFF

RECALL BONUS MULTIPLIER

Switch #22 selects whether bonus multiplier is held in memory

	SW 22
YES	ON
NO	OFF

BALLS PER GAME OPTION

# BALLS PER GAME	SWITCHES	
	24	23
5	ON	ON
3	ON	OFF
2	OFF	ON
1	OFF	OFF

RECALL EXTRA BALL & SPECIAL LANE

Switch #25 selects whether this feature is held in memory

	SW 25
YES	ON
NO	OFF

MAXIMUM CREDITS

The maximum number of credits that will be accepted by the game either through the coin switch or replay award are controlled by S26 and 27. Switch settings are as follows.

MAXIMUM	SWITCHES	
CREDITS	27	26
10	OFF	OFF
20	OFF	ON
30	ON	OFF
40	ON	ON

REPLAY OR FREE BALL AWARD

The game is designed to award either a replay, free ball, 50,000 points, or no award at three selectable score levels or through specials gained during the play of the game.

AWARD	S29	S28
REPLAY	ON	ON
EXTRA BALL	ON	OFF
50,000 PTS	OFF	ON
NO AWARD	OFF	OFF

MATCH FEATURE

When the match feature is ON, a random number appears in the ball in play display at game over. A replay is awarded if the number matches the tens digit in a player's score

MATCH	S30
YES	ON
NO	OFF

CREDITS FOR EXCEEDING HIGH SCORE

The game is designed to award replays for beating the previous high score to date. The winning score becomes the new high score to date.

CREDITS	S32	S31
0	OFF	OFF
1	OFF	ON
2	ON	OFF
3	ON	ON

VI. ROUTINE MAINTENANCE ON LOCATION

The game is equipped with two separate diagnostic programs to aid in routine maintenance. The first test occurs automatically at power build up. The MPU board goes into its self-test routine, and upon successful completion plays the game over tune.

The second diagnostic program is accessed by depressing the test switch inside the front cabinet door.

NOTE: THE GAME MUST BE IN THE GAME OVER MODE.

1. Depress the test switch fifteen times to access the diagnostic routine. The score display will extinguish and all feature lamps will flash. Check for burned out lamps at this time.

2. Depress the test switch again to start the score display checkout. All digits except the units digits will count through 1-9.

3. Depress the test switch again to begin the solenoid checkout. Each solenoid will actuate individually and show its number on the score displays. Refer to table 1 of repair section for solenoid numbers.

4. Depress the test switch again to start the switch checkout. Any closed switch will show its number on the score display. Refer to table 2 of the repair section for switch numbers.

NOTE: THE BALL SHOULD NOT BE IN THE OUTHOLE DURING THIS TEST.

Depressing the test switch again puts the game back in the game over mode. The diagnostic routine should be exercised on a regular basis to ensure proper operation of the game.

REPAIR

I. INTRODUCTION

Repair of the game on location is by printed circuit board, solenoid, switch, or lamp replacement, or by cable harness repair. No special tools or equipment are required other than a standard soldering iron, hand tools and volt/ohmmeter.

Troubleshooting faults in the game is aided by the use of the two built in diagnostic routines. The first test is initiated automatically at power up as the MPU board exercises its self diagnostic routine. As each section of the MPU board is checked, the red LED located near the top of the board flashes for successful completion of each test. After six flashes, the game over tune plays to indicate correct MPU operation.

The second diagnostic program is entered by pressing the test switch inside the front cabinet door. Pressing the test switch 15 times will step through all the accounting functions and put the game into the diagnostic program. All feature lamps should flash. Pressing the test switch again causes the display to sequence from 0 through 9. Pressing the switch again causes all the solenoids to sequence. Refer to table 1 for solenoid numbers. Pressing the switch again causes closed switch to be displayed. Refer to table 2 for switch numbers. Pressing the test switch again will put the game back in the game over mode.

II. MODULE REPLACEMENT DIAGNOSTICS

SYMPTOM 1. Power up LED does not flash 6 times. General illumination lamps do not light.

	CAUSE	PROCEDURE
A.	Power Supply Incorrect	Refer To Power Supply Diagnostics.

SYMPTOM 2. Power up LED does not flash 6 times. General illumination lamps do light.

	CAUSE	PROCEDURE
A.	+5V Incorrect	Measure +5V ± .25V at TP1 of MPU board. If incorrect refer to power supply diagnostics.
B.	24VDC Incorrect	Measure 24VDC ± 6V at J1-3 of MPU Board. If incorrect refer to power supply diagnostics. If correct replace MPU Board.

SYMPTOM 3. Power up LED flashes 6 times, game over tune does not play correctly.

	CAUSE	PROCEDURE
A.	Incorrect output from MPU Board.	Replace MPU Board
B.	Faulty Sound Board	Replace Sound Board

SYMPTOM 4. One or more but less than 15 feature lamps do not light.

	CAUSE	PROCEDURE
A.	Burned Out Bulb	Replace bulb
B.	Faulty lamp driver board	Replace lamp driver board

SYMPTOM 5. More than 15 lamps do not light.

	CAUSE	PROCEDURE
A.	Faulty Lamp Driver Board	Replace Lamp Driver Board

SYMPTOM 6. One display board shows incorrect data during sequencing.

	CAUSE	PROCEDURE
A.	Faulty Display Board	Replace Display Board
B.	Faulty MPU Board Output	Replace MPU Board

SYMPTOM 7. All display boards show incorrect data during sequencing.

	CAUSE	PROCEDURE
A.	Faulty MPU Board Output	Replace MPU Board

SYMPTOM 8. One solenoid does not operate.

	CAUSE	PROCEDURE
A.	Faulty Solenoid	Replace Solenoid
B.	Faulty Solenoid Driver Board	Replace Solenoid Driver

SYMPTOM 9. More than one solenoid does not operate.

	CAUSE	PROCEDURE
A.	Faulty Solenoid Driver Board	Replace Solenoid Driver Board
B.	Faulty MPU Board Output	Replace MPU Board

SYMPTOM 10. None of the solenoids operate.

	CAUSE	PROCEDURE
A.	+24V missing at solenoids	Check +24V at solenoids

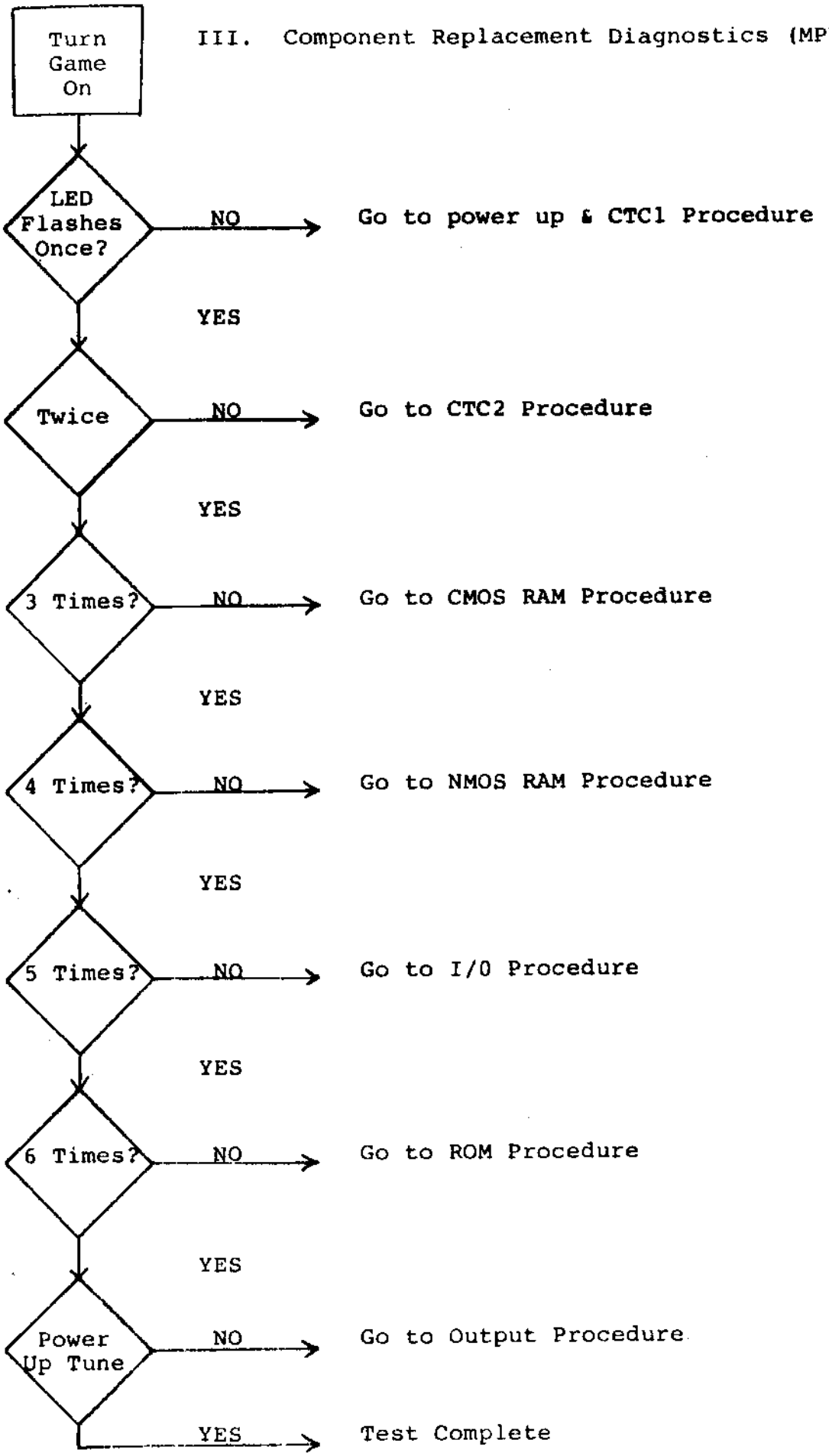
If incorrect look for broken wire between +24V at power supply and solenoids and refer to power supply diagnostics.

	CAUSE	PROCEDURE
B.	+5V missing at solenoid driver board	Check +5 at solenoid driver board. If incorrect look for broken wire between +5V at power supply and solenoid driver board.
C.	Faulty solenoid driver board	Replace solenoid driver Board

SYMPTOM 11. Switch always closed.

	CAUSE	PROCEDURE
A.	Stuck Switch	Locate switch from switch identification table and repair or replace switch.

III. Component Replacement Diagnostics (MPU Board)



A. Power Up and CTC1 Procedure

CAUSE	PROCEDURE
+5V Incorrect	Measure +5V ± .25V at TP1 of MPU board. If incorrect refer to power supply diagnostics.
+24VDC Incorrect	Measure +24VDC ± 6V at J1-3 of MPU board. If incorrect refer to power supply diagnostics.
Reset Incorrect	1. Check for positive reset pulse at pin 35 of U17. If incorrect and negative reset pulse is present at TP4, replace QC. If no negative reset pulse is present at TP4, trace back through QD, QA, QB, U5 and U3 for defect. 2. Check for negative reset pluse at pin 17 of U10 and pin 26 of U11. If one or both are incorrect and a negative reset pulse is present at TP4, look for open or shorted foil run.

	If both are incorrect and no negative reset pulse present at TP4, trace back through QD, QA, QB, U5 and U3 for defect.
Oscillator Incorrect	Check TP5 for a square wave with a period of about 400ns. If Incorrect trace back through U3 to the crystal.
LED Circuit Defective	Check for positive pulse at base of QE. If present replace QE. If operation still incorrect replace LED.
U10, U11, U17, U6, U7, U8, U12, U13, U26, U24, U25, U4, U3, or U9 defective.	Replace one at a time with known good parts until fault is cleared.

B. CTC2 PROCEDURE

CAUSE	PROCEDURE
CTC zero cross over input incorrect.	Check pin 21 or U10 for positive zero cross over pulse. If incorrect trace back through U3 and U2.
U10 Defective	Replace U10 with known good I.C.

U3 Defective	Replace U3 with a known good I.C.
U11, U6, U7, U8, U12, U13, U26 or U17 defective	Replace one at a time with known good parts until fault is cleared.

C. CMOS RAM Procedure

CAUSE	PROCEDURE
CMOS RAM Defective	Replace U6 and U7, one at a time.
CMOS Gate Defective	Replace U9.

D. NMOS RAM Procedure

CAUSE	PROCEDURE
NMOS RAM Defective	Replace U8
NMOS RAM Chip Select Defective	Replace U5 and U24, one at a Time.

E. I/0 Procedure

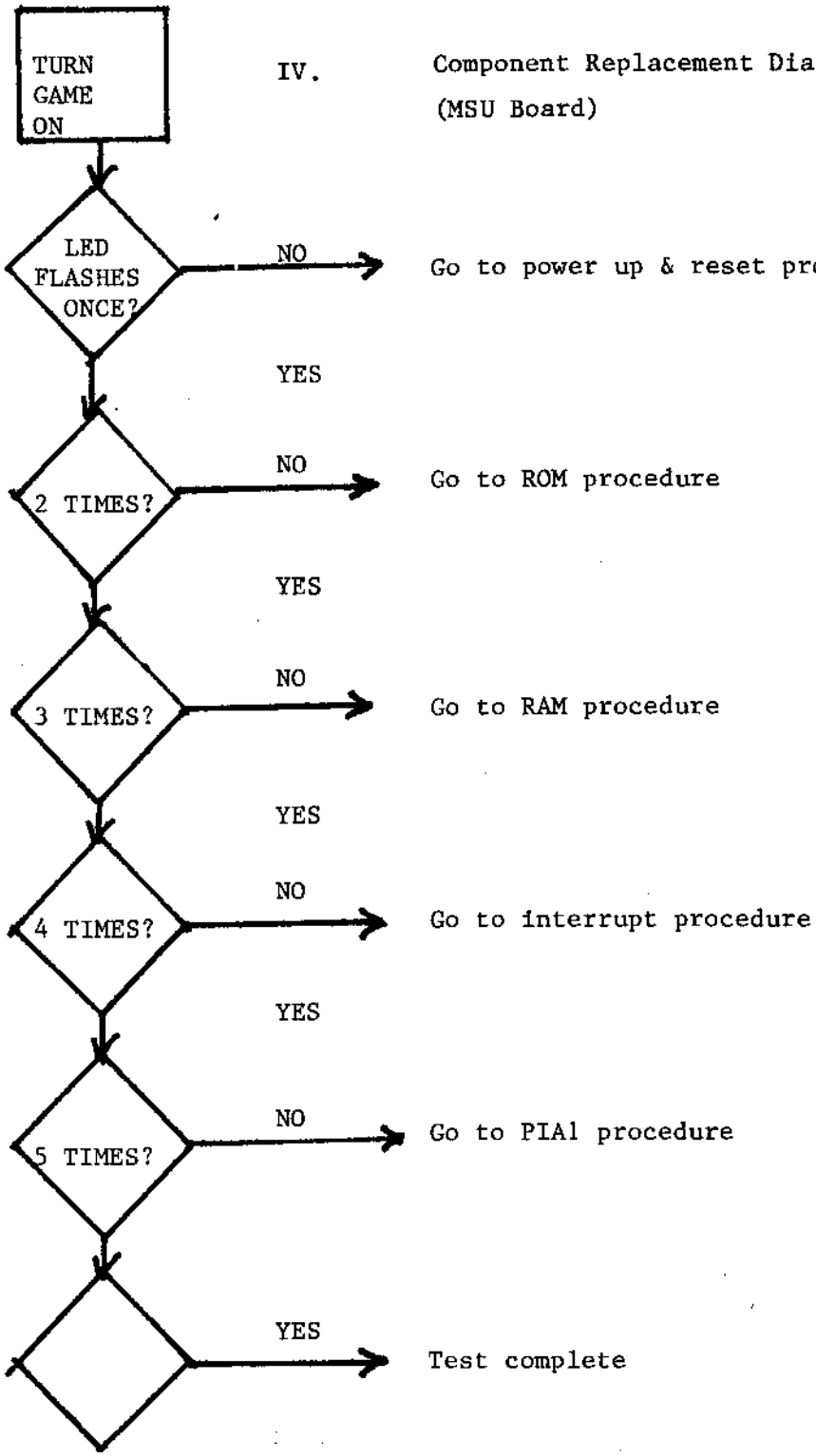
CAUSE	PROCEDURE
I/0 Defective	Replace U17
I/0 chip select gate defective	Replace U4

F. ROM Procedure

CAUSE	PROCEDURE
ROM Defective	Replace U12, U13 and U26, one at a time

G. OUTPUT PROCEDURE

CAUSE	PROCEDURE
U14, U16, U20, U21, U15, U19, U22, U18 or U23 Defective	Replace on at a time with known good parts.



IV. Component Replacement Diagnostics (MSU Board)

A. Power Up and Reset Procedure

CAUSE	PROCEDURE
±12V Incorrect	Check for ±12V ± 2V at TP4. If incorrect refer to power supply diagnostics.
±5V Incorrect	Check for ±5V ± .25V at TP3. If incorrect refer to power supply diagnostics.
LED Circuit Defective	If LED is out: Ground Pin 8 of U16. If LED does not turn on replace LED. If LED is on: Check logic level at Pin 9 of U16. If low replace U16.
Reset Incorrect	Check TP2 for negative going pulses at 10Hz Rate. If pulses present replace U6. If reset still not correct replace U9, then U7. If still incorrect check for shorted data or address lines, If no pulse at TP2 check logic level at Pin 4 of U4. If high replace U8. If low replace U4.
Clock Oscillator Incorrect	Check TP6 for 900KHz square wave. If not present replace U6. If still not correct replace crystal.

B. ROM Procedure

CAUSE	PROCEDURE
Defective ROM chip	Replace U9
Address Decoder Defective	Replace U7

C. RAM Procedure

CAUSE	PROCEDURE
Defective RAM chip	Replace U8
Address Decoder Defective	Replace U7

D. Interrupt Procedure

CAUSE	PROCEDURE
Oscillator Defective	Check for negative going pulses (400Hz Rate) at TP5. If no pulses present replace U1.
PIA1 Defective	Check for pulses at Pin 18 of U5. If present replace U5.

E. PIA1 Procedure

CAUSE	PROCEDURE
Improper Input from MPU	Unplug J1 of MSU board. If problem corrected refer to MPU diagnostics.
PIA defective	Replace U5
Address Decoder Defective	Replace U7

V. Power Supply Diagnostics

CAUTION: The power supply contains dangerous voltage levels. Use extreme caution while troubleshooting.

SYMPTOM 1. +5V incorrect, +12V incorrect

CAUSE	PROCEDURE
Defective +5V regulator	Change LM323 with known good.

SYMPTOM 2. +5V incorrect, +12V incorrect

CAUSE	PROCEDURE
Fuse Blown (+12V)	Replace fuse check 10.5 VAC input to bridge. If correct, replace bridge with known good. If +5V and +12V still do not come up, replace 11,000 MF Capacitor.
Defective Bridge	

SYMPTOM 3. +5 and +12V incorrect
+24V incorrect.

CAUSE	PROCEDURE
Fuse blown (28VAC) on power supply defective bridge.	Replace fuse check 28VAC. If correct replace bridge with known good part.
Playfield fuse blown	Replace Fuse.

SYMPTOM 4. +5, +12, +24V correct, +7V incorrect

CAUSE	PROCEDURE
Fuse Blown (8VAC)	Replace Fuse.
defective bridge	Check 8 VAC. If correct, replace bridge with known good part.

SYMPTOM 5. AC voltage incorrect on one or more, but not all secondary windings.

CAUSE	PROCEDURE
Defective Transformer Winding	Remove fuse form defective secondary. If voltage still incorrect replace transformer. If voltage comes up, disconnect all PC boards that the winding goes to, reinsert fuse and plug PC boards back until defect reappears.

SYMPTOM 6. No secondary AC voltage at transformer, primary voltage correct.

CAUSE	PROCEDURE
Defective Transformer	Replace with known good transformer.

VI. SOLENOID AND SWITCH IDENTIFICATION

A. TABLE 1.

SOLENOID IDENTIFICATION

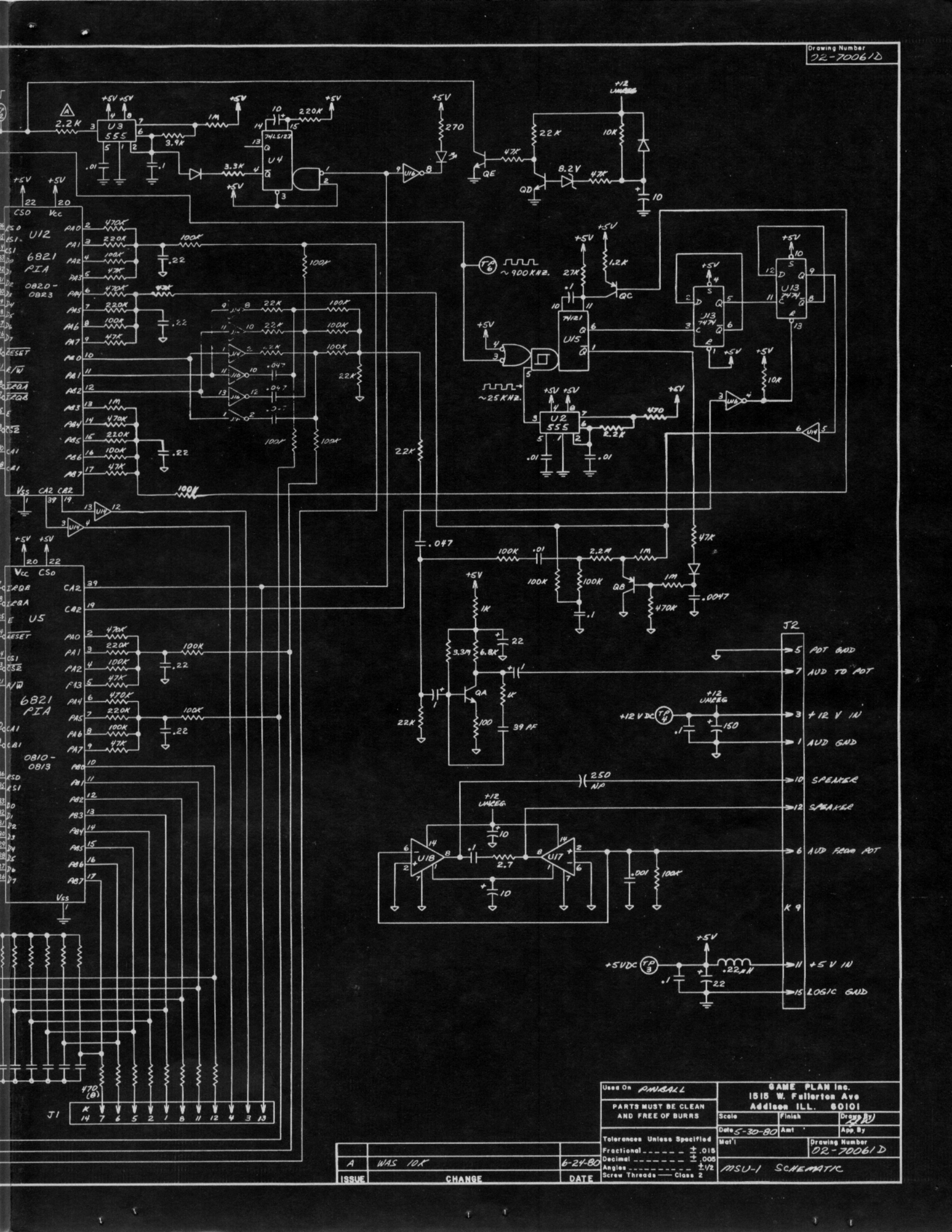
The solenoid checkout section of the diagnostic routine actuates each solenoid on the playfield. The solenoid number is shown in each display as the solenoid is being actuated. The following list identifies each solenoid by number:

01 Out hole
02 Top Bumper
03 Middle Bumper
04 Bottom Bumper
05 Saucer
06 Slingshot
07 Knocker (Optional)
08 Not Used
09 Flipper Enable
10 Feature Lamps On
11 Feature Lamp Off

B. TABLE 2

In the switch checkout section of the diagnostic routine the number of the closed switch is shown in each display. Closing any switch causes its number to be displayed. The following list identifies each switch by number.

SWITCH FUNCTION	
None Closed	00
Accounting Reset	01
Credit Button	02
Slam Switch	03
10 Point Rebound	04
Coin Chute 2	05
Coin Chute 3	06
Coin Chute 1	07
Tilt Switch	08
Special Lane	09
Ex Ball Lane	10
Out Hole	11
Sharp Target	12
L Lane	13
A Lane	14
D Lane	15
Y Lane	16
Top Bumper	17
Middle Bumper	18
Bottom Bumper	19
Left Slingshot	20
Shooter Target	21
Top Left Rollover Lane	22
Top Right "500" Target	23
Bottom Right "500" Target	24
Spinner	25
Diagnostic and Accounting	26
Lane Change	27
Saucer	28
Not Used	29
Not Used	30
Accounting Reset	31



A	WAS 10K	6-24-80	
ISSUE	CHANGE	DATE	

Uses On PINBALL

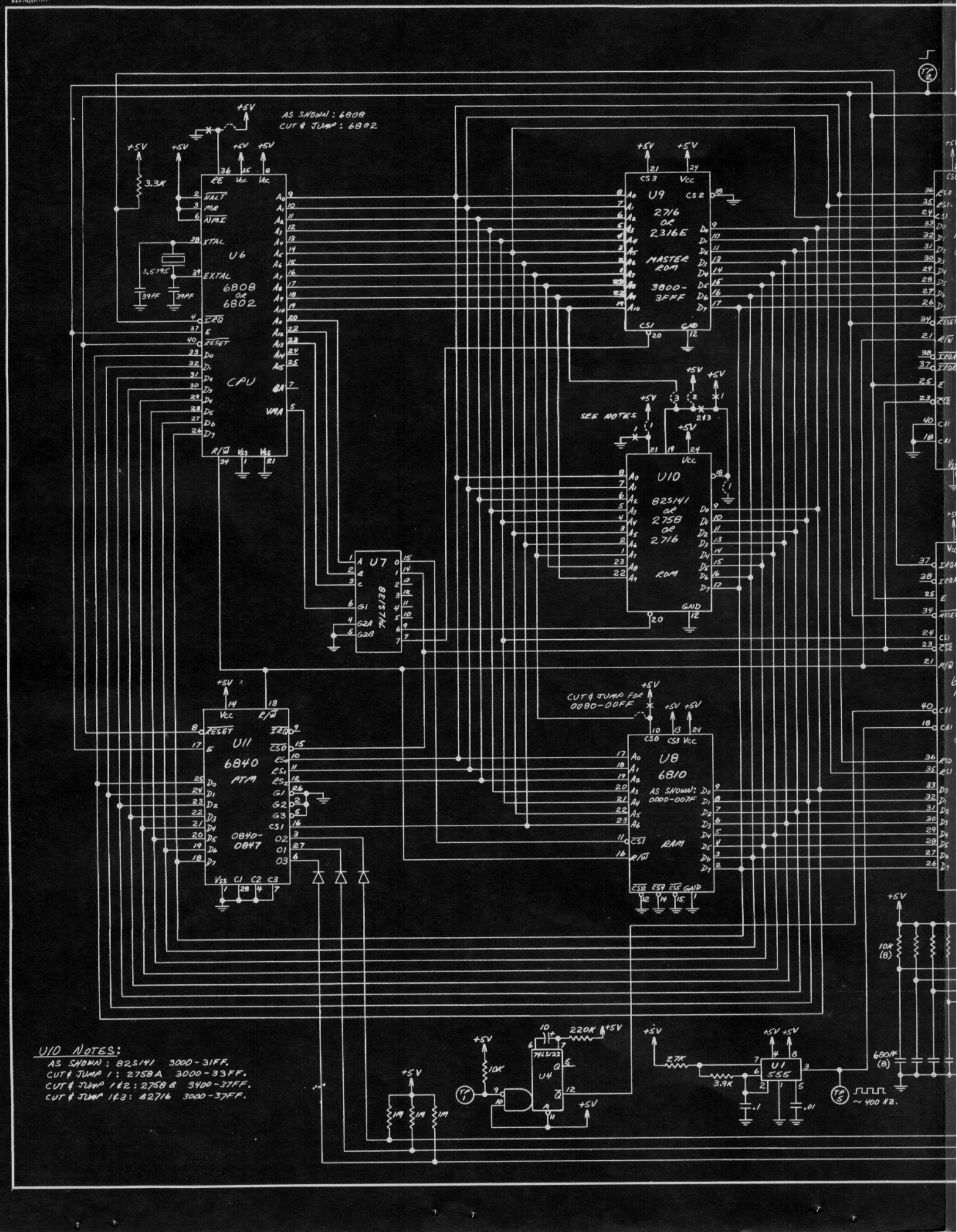
PARTS MUST BE CLEAN AND FREE OF BURRS

Tolerances Unless Specified
Fractional ..... ±.015
Decimal ..... ±.005
Angles ..... ±1/2
Screw Threads — Class 2

GAME PLAN Inc.
1515 W. Fullerton Ave
Addison ILL. 60101

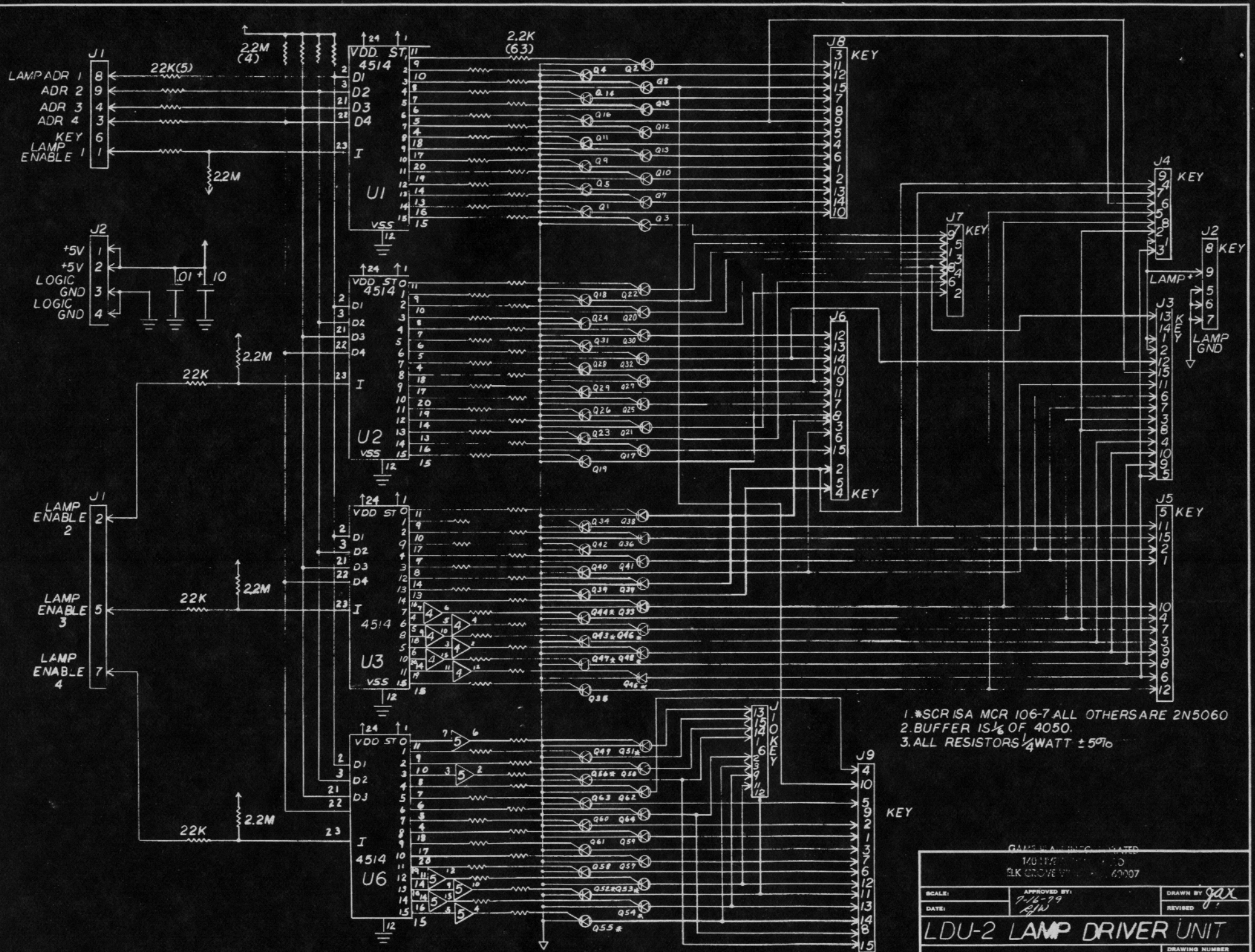
Scale	Finish	Drawn By
Date 5-30-80	Amt	App. By
Mat'l		Drawing Number 02-7006 1D

MSU-1 SCHEMATIC



U10 NOTES:

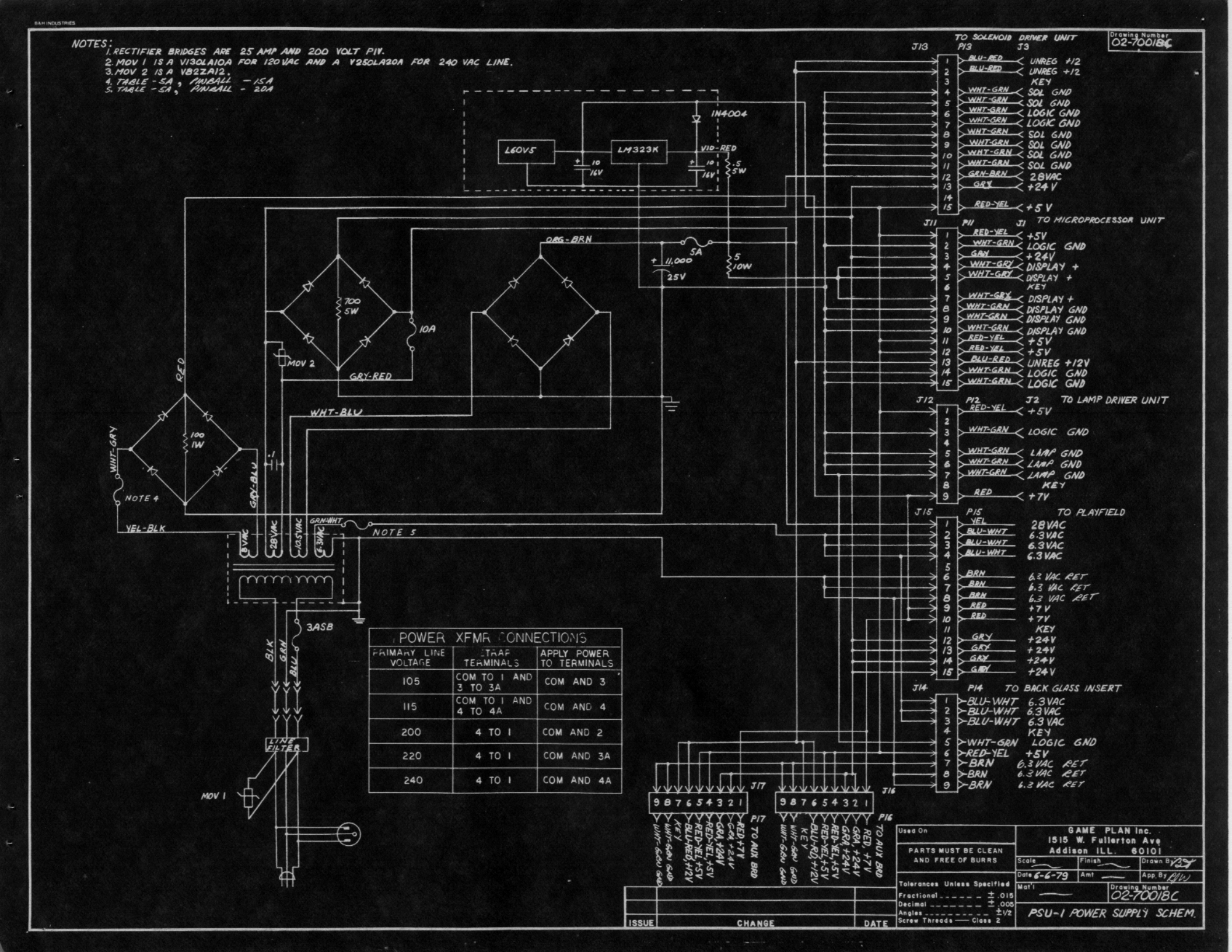
AS SHOWN: 8255/41 3000-31FF.
CUT & JUMP 1: 2758A 3000-33FF.
CUT & JUMP 1&2: 2758 & 3400-37FF.
CUT & JUMP 1&3: 82716 3000-37FF.



B&M INDUSTRIES

NOTES:
1. RECTIFIER BRIDGES ARE 25 AMP AND 200 VOLT PIV.
2. MOV 1 IS A V130LA10A FOR 120 VAC AND A V250LA20A FOR 240 VAC LINE.
3. MOV 2 IS A VB2ZA12.
4. TABLE - 5A, PINBALL - 15A
5. TABLE - 5A, PINBALL - 20A

Drawing Number 02-7001BC



POWER XFMR CONNECTIONS		
PRIMARY LINE VOLTAGE	STRAP TERMINALS	APPLY POWER TO TERMINALS
105	COM TO 1 AND 3 TO 3A	COM AND 3
115	COM TO 1 AND 4 TO 4A	COM AND 4
200	4 TO 1	COM AND 2
220	4 TO 1	COM AND 3A
240	4 TO 1	COM AND 4A

ISSUE	CHANGE	DATE

Used On

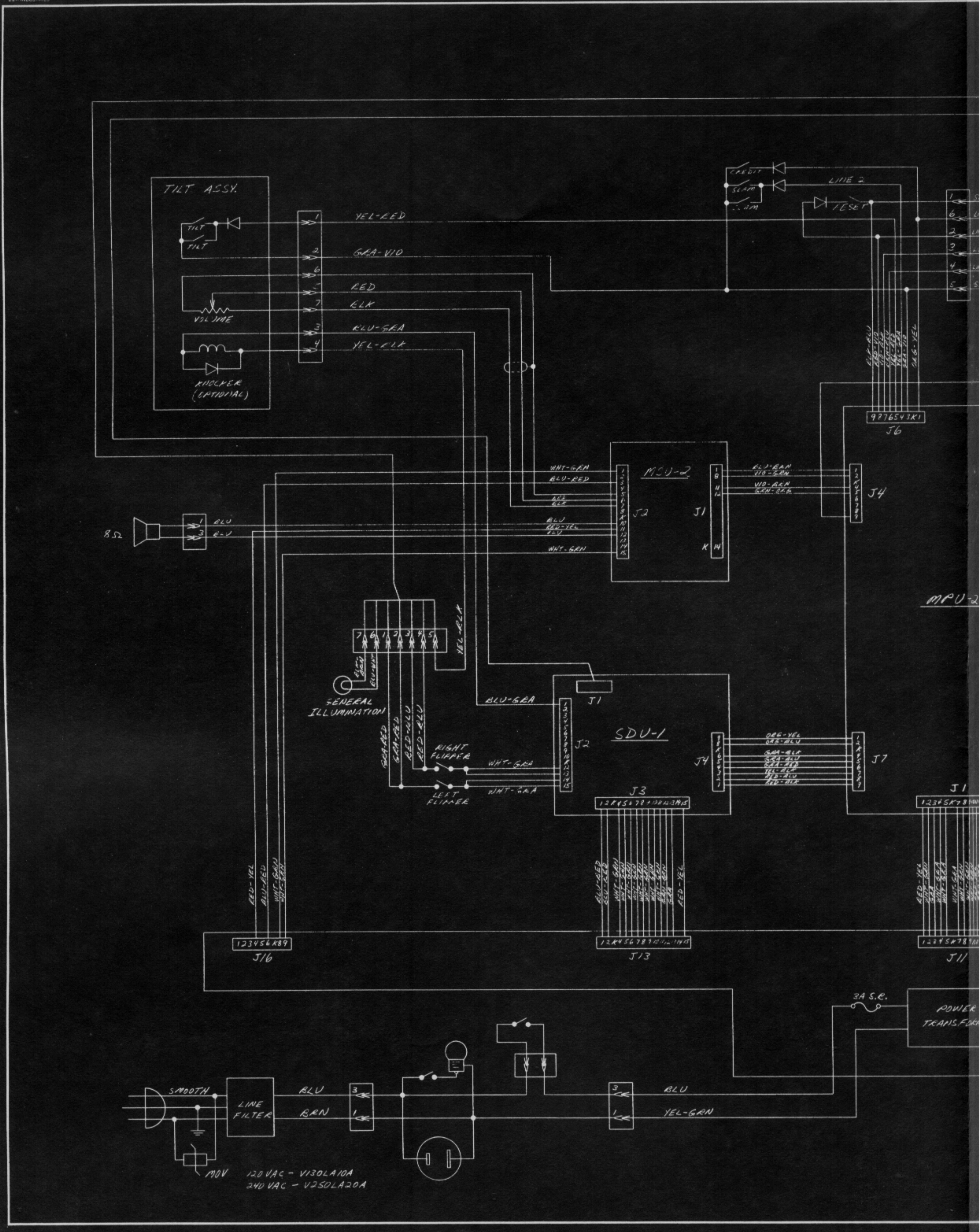
PARTS MUST BE CLEAN AND FREE OF BURRS

Tolerances Unless Specified
Fractional ± .015
Decimal ± .005
Angles ± 1/2
Screw Threads — Class 2

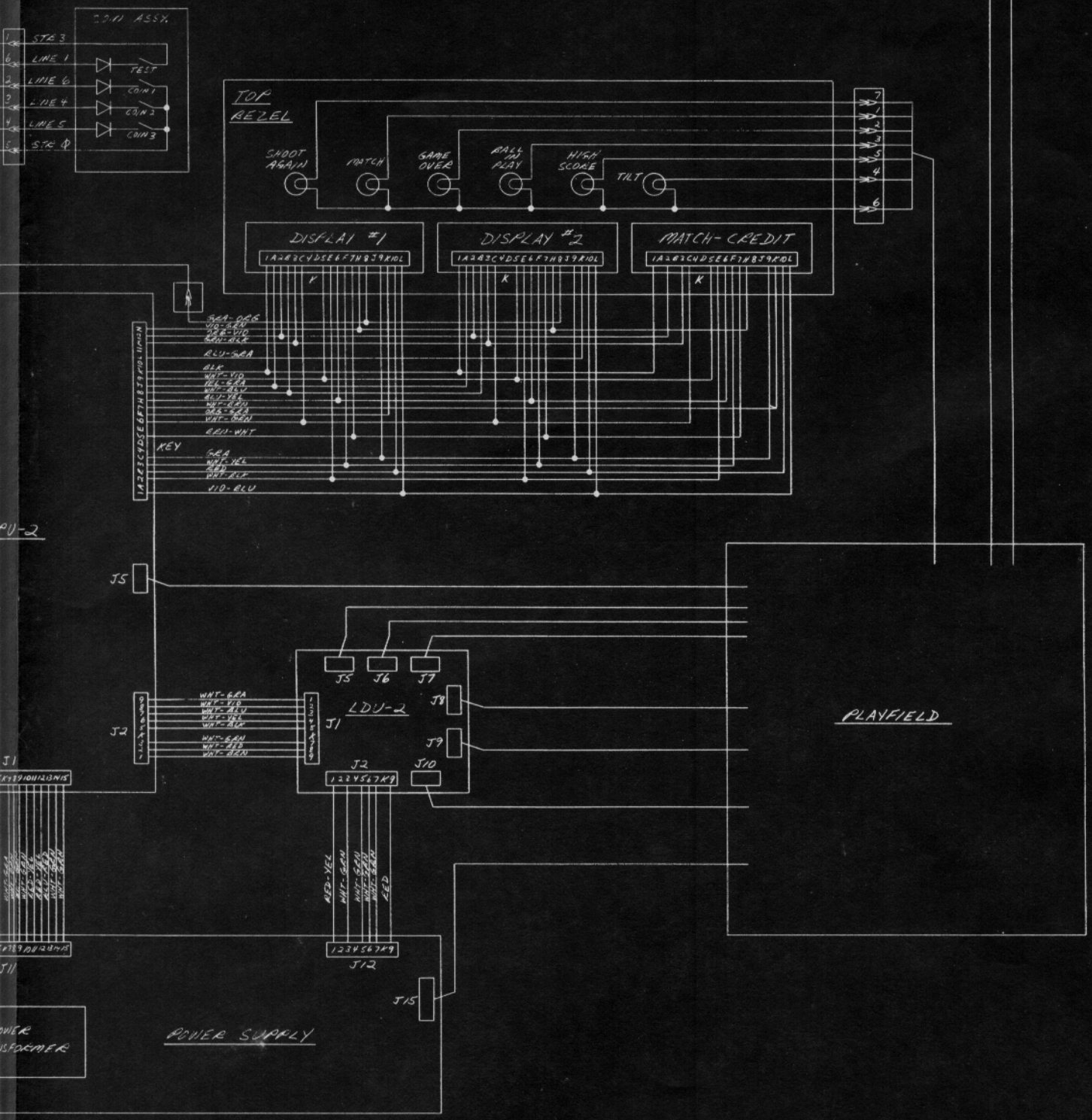
GAME PLAN Inc.
1515 W. Fullerton Ave
Addison ILL. 60101

Scale — Finish — Drawn By JS
Date 6-6-79 Amt — App. By [illegible]
Mat'l — Drawing Number 02-7001BC

PSU-1 POWER SUPPLY SCHEM.

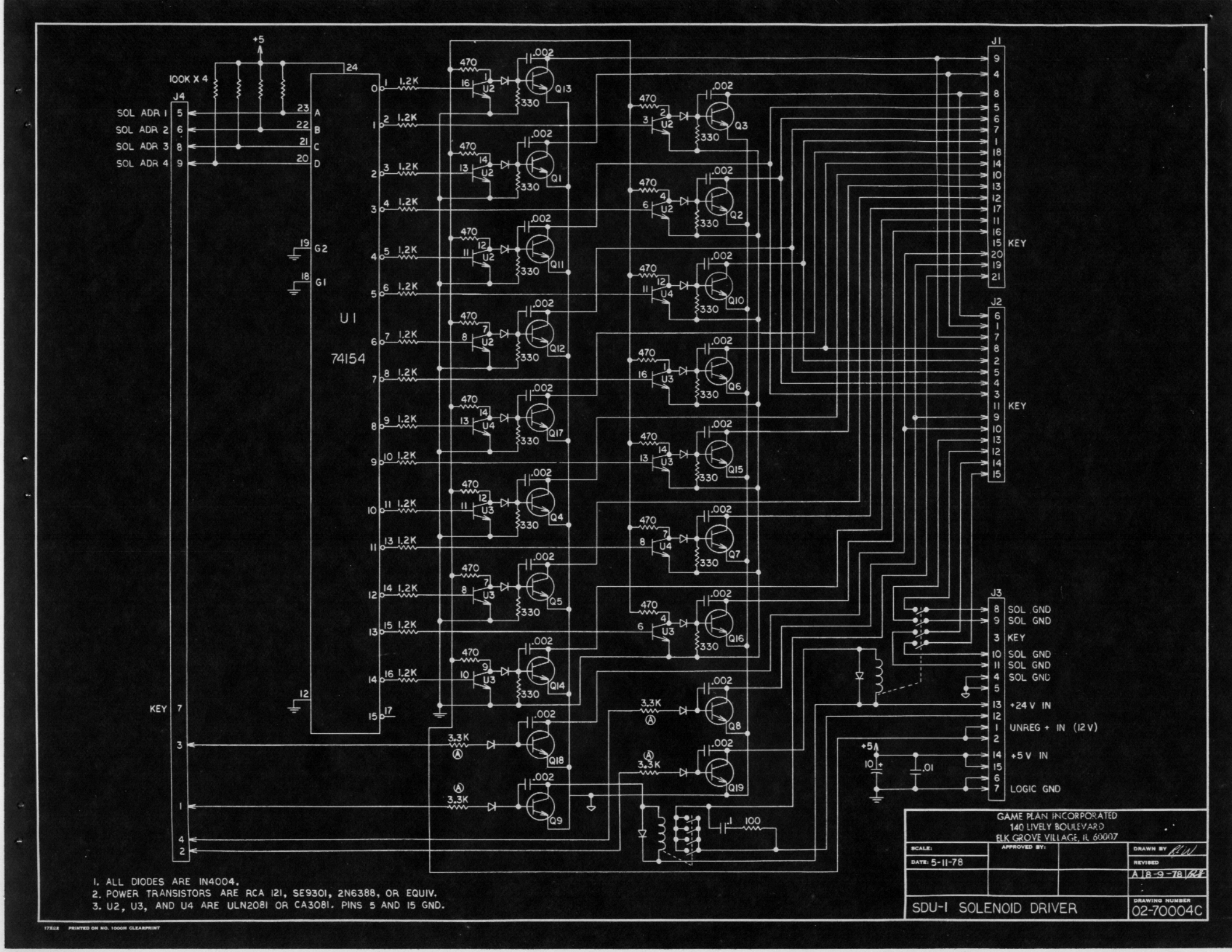

TILT ASSY.
TILT
VOLUME
KNOCKER (OPTIONAL)
YEL-RED
GRA-VIO
RED
BLK
BLU-GRA
YEL-BLK
CREDIT
SLAM
RESET
LINE 2
J6
MSU-2
J2
J1
J4
WHT-GRN
BLU-RED
8Ω
BLU
GENERAL ILLUMINATION
RIGHT FLIPPER
LEFT FLIPPER
WHT-GRA
SDU-1
J3
J7
MPU-2
J16
J13
J11
3A S.R.
POWER TRANSFORMER
SMOOTH
LINE FILTER
BRN
YEL-GRN
MOV
120 VAC - V130LA10A
240 VAC - V250LA20A

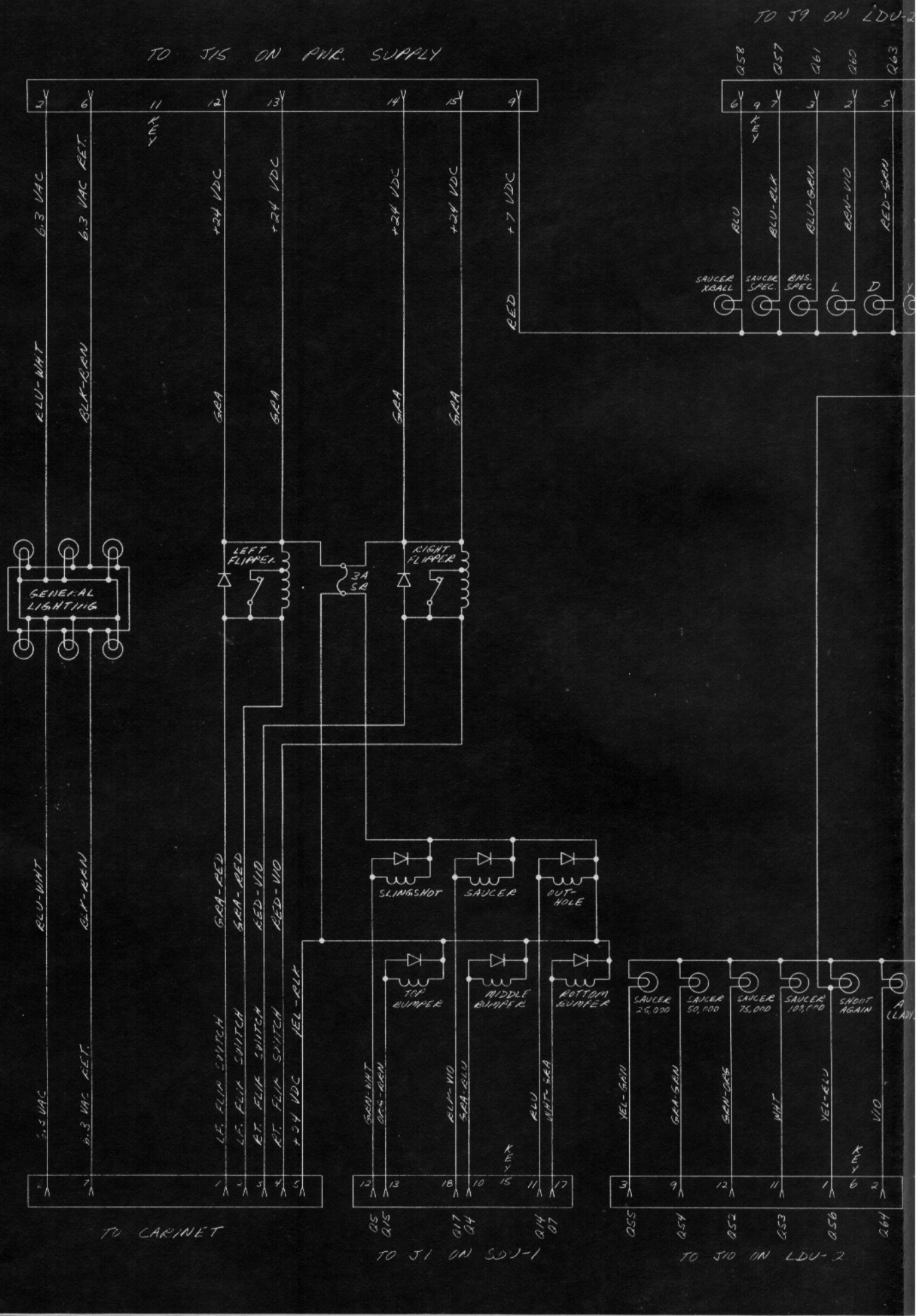
Drawing Number
02-7013SD



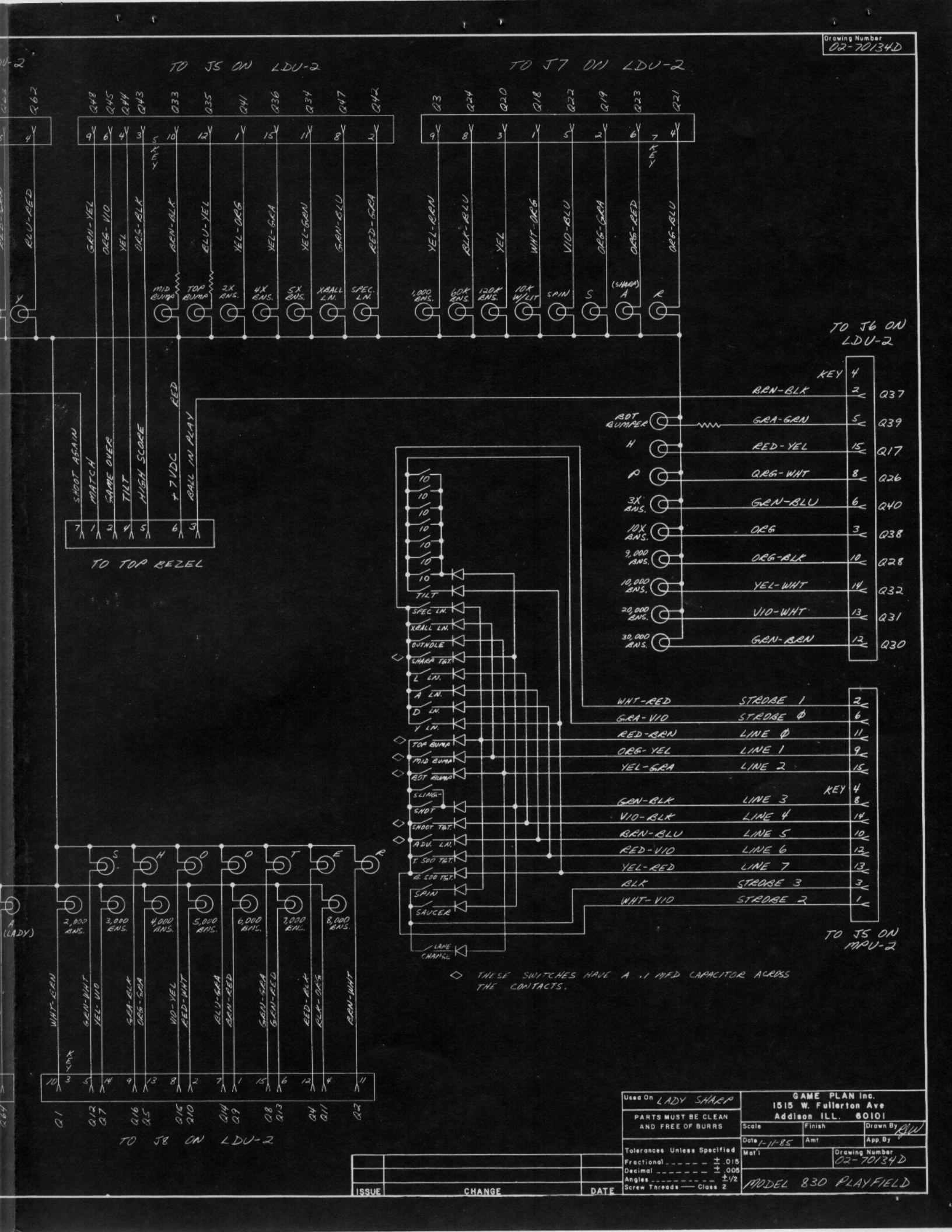
Used On COCKTAIL PINS	GAME PLAN Inc. 1515 W. Fullerton Ave Addison ILL. 60101		
PARTS MUST BE CLEAN AND FREE OF BURRS	Scale	Finish	Drawn By RJW
Tolerances Unless Specified	Date 1-21-85	Amt	App. By
Fractional ± .015	Mat'l	Drawing Number 02-7013SD	
Decimal ± .005			
Angles ± 1/2			
Screw Threads — Class 2	CABINET WIRING		

ISSUE	CHANGE	DATE




TO J9 ON LDU-2
TO J15 ON PWR. SUPPLY
Q58
Q57
Q61
Q62
Q63
KEY
BLU
BLU-BLK
BLU-GRN
BRN-VIO
RED-GRN
SAUCER XBALL
SAUCER SPEC.
BNS. SPEC.
L
D
RED
6.3 VAC
6.3 VAC RET.
+24 VDC
+7 VDC
BLU-WHT
BLK-GRN
GRA
GENERAL LIGHTING
LEFT FLIPPER
RIGHT FLIPPER
3A SB
GRA-RED
RED-VIO
LF. FLIP SWITCH
RT. FLIP SWITCH
+5 V VDC
YEL-BLK
SLINGSHOT
SAUCER
OUT-HOLE
TOP BUMPER
MIDDLE BUMPER
BOTTOM BUMPER
GRN-WHT
BLK-GRN
BLK-VIO
GRA-BLU
BLU
WHT-GRA
SAUCER 25,000
SAUCER 50,000
SAUCER 75,000
SAUCER 100,000
SHOOT AGAIN
YEL-GRN
GRA-GRN
GRN-BRN
WHT
YEL-BLU
VIO
TO CABINET
TO J1 ON SDJ-1
TO J10 IN LDU-2

Drawing Number
02-70134D



◇ THESE SWITCHES HAVE A .1 MFD CAPACITOR ACROSS THE CONTACTS.

ISSUE	CHANGE	DATE

Used On LADY SHARP

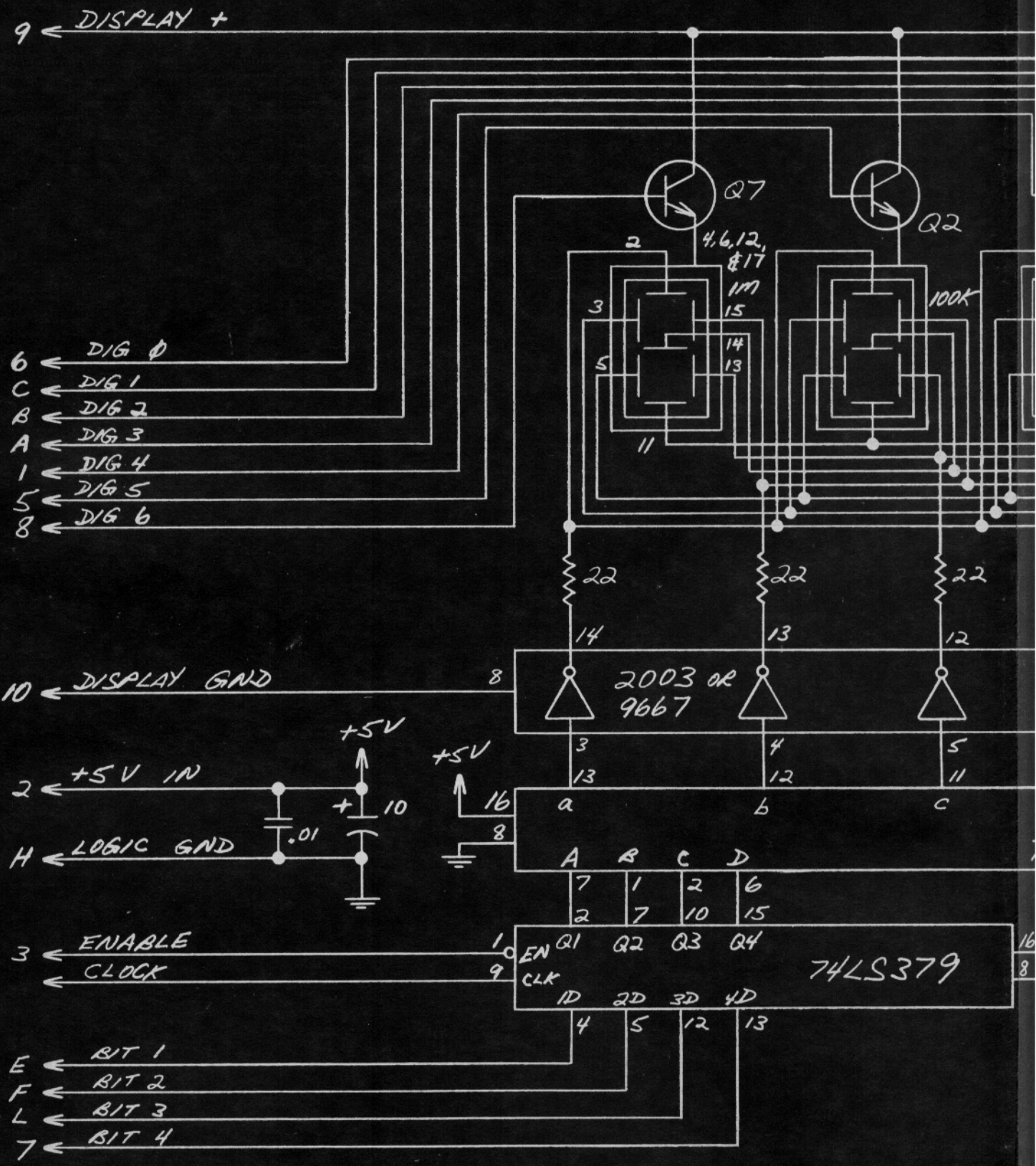
PARTS MUST BE CLEAN AND FREE OF BURRS

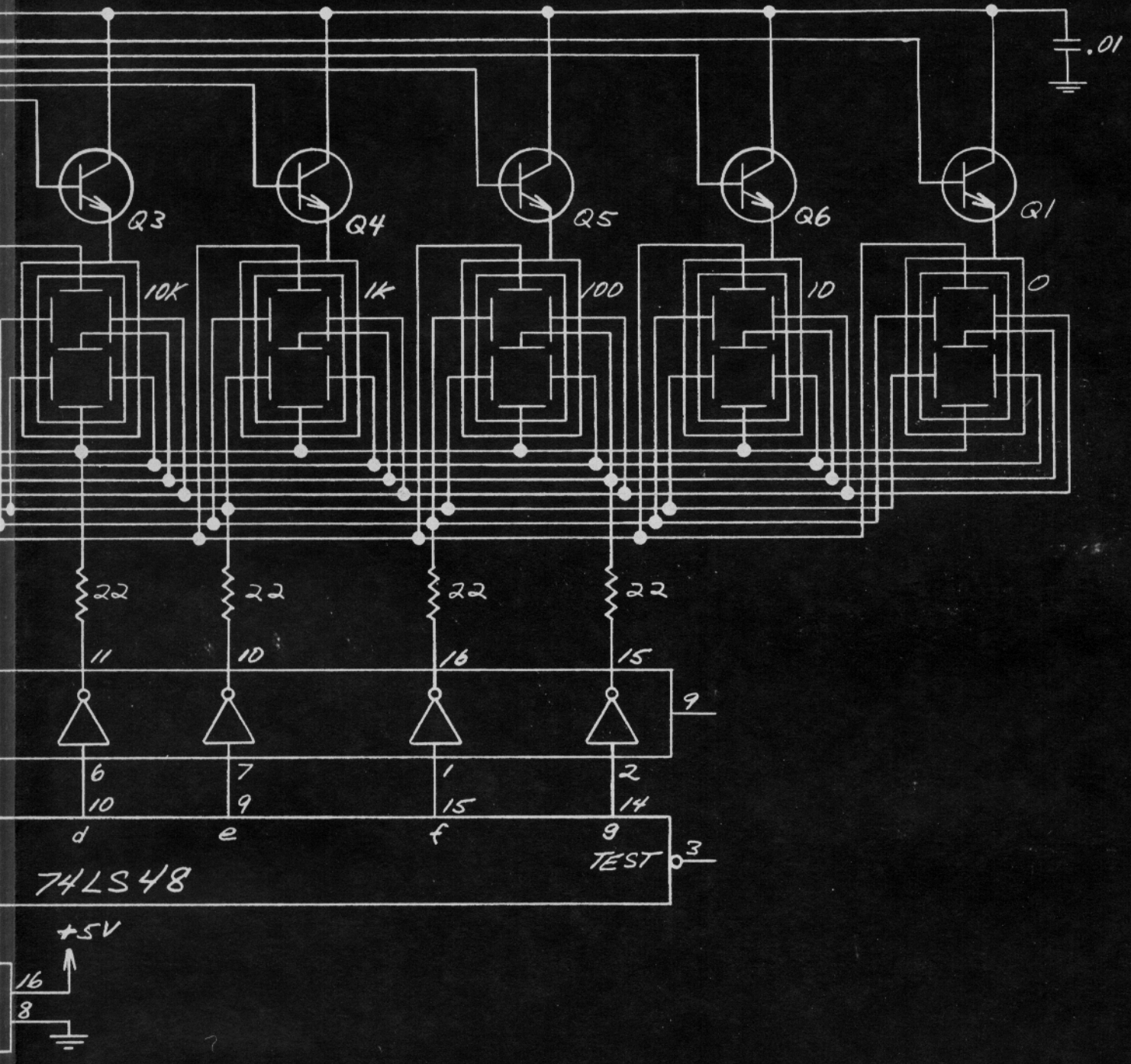
Tolerances Unless Specified
Fractional ..... ±.015
Decimal ..... ±.005
Angles ..... ±1/2
Screw Threads — Class 2

GAME PLAN Inc.
1515 W. Fullerton Ave
Addison ILL. 60101

Scale	Finish	Drawn By
Date 1-11-85	Amt	App. By
Mat'l		Drawing Number 02-70134D

MODEL 830 PLAYFIELD


9 DISPLAY +
Q7
Q2
4,6,12, & 17
1M
100K
2
3
5
15
14
13
11
6 DIG Ø
C DIG 1
B DIG 2
A DIG 3
1 DIG 4
5 DIG 5
8 DIG 6
22
22
22
14
13
12
10 DISPLAY GND
8
2003 OR 9667
+5V
+5V
2 +5V IN
H LOGIC GND
.01
10
16
8
3
4
5
13
12
11
a
b
c
A B C D
7 1 2 6
2 7 10 15
3 ENABLE
CLOCK
1
9
EN
CLK
Q1 Q2 Q3 Q4
74LS379
1D 2D 3D 4D
4 5 12 13
E BIT 1
F BIT 2
L BIT 3
7 BIT 4
ISSUE
CHANGE



NGE	DATE

Used On PINBALL

PARTS MUST BE CLEAN AND FREE OF BURRS

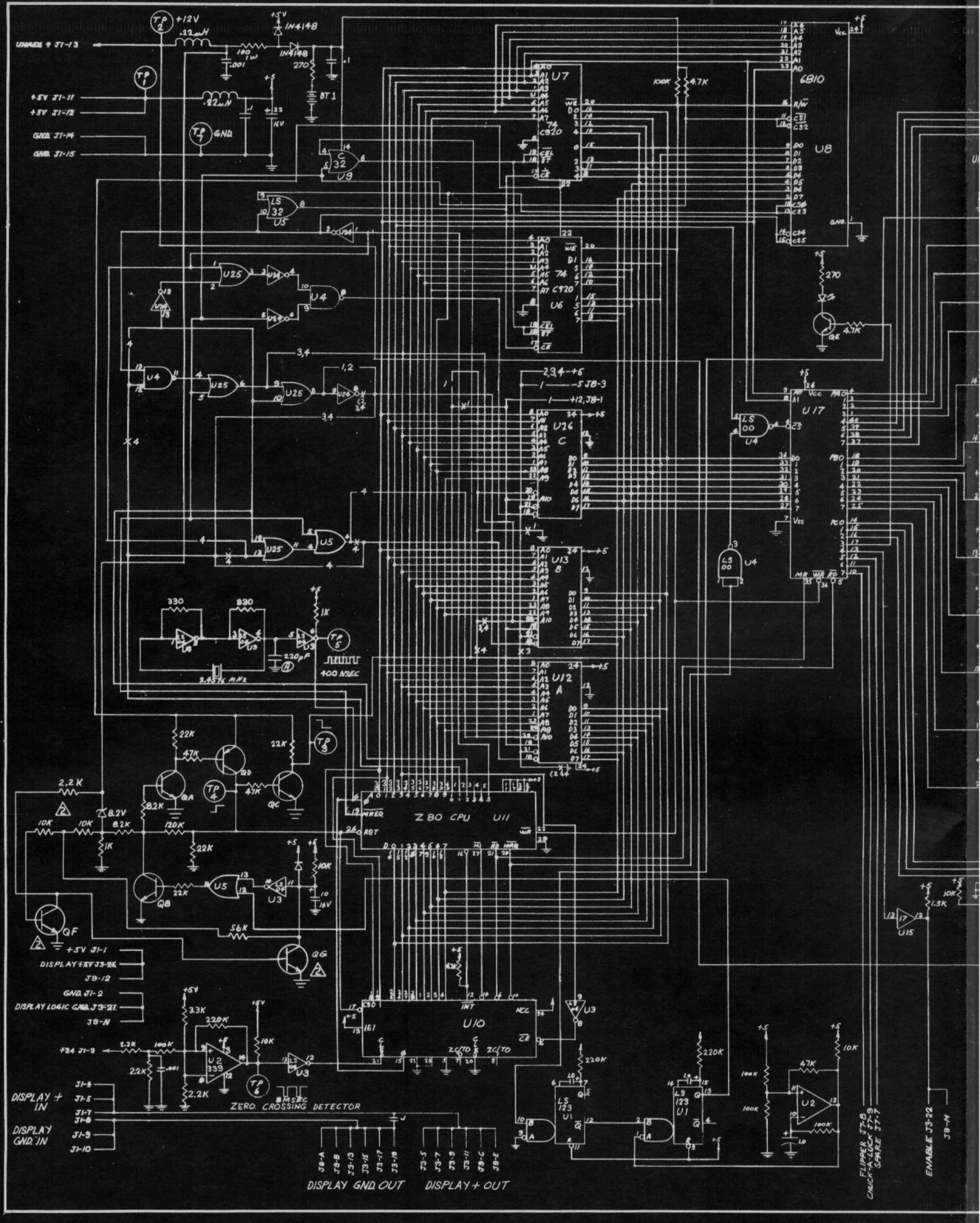
Tolerances Unless Specified

Fractional ± .015
Decimal ± .005
Angles ±1/2
Screw Threads — Class 2

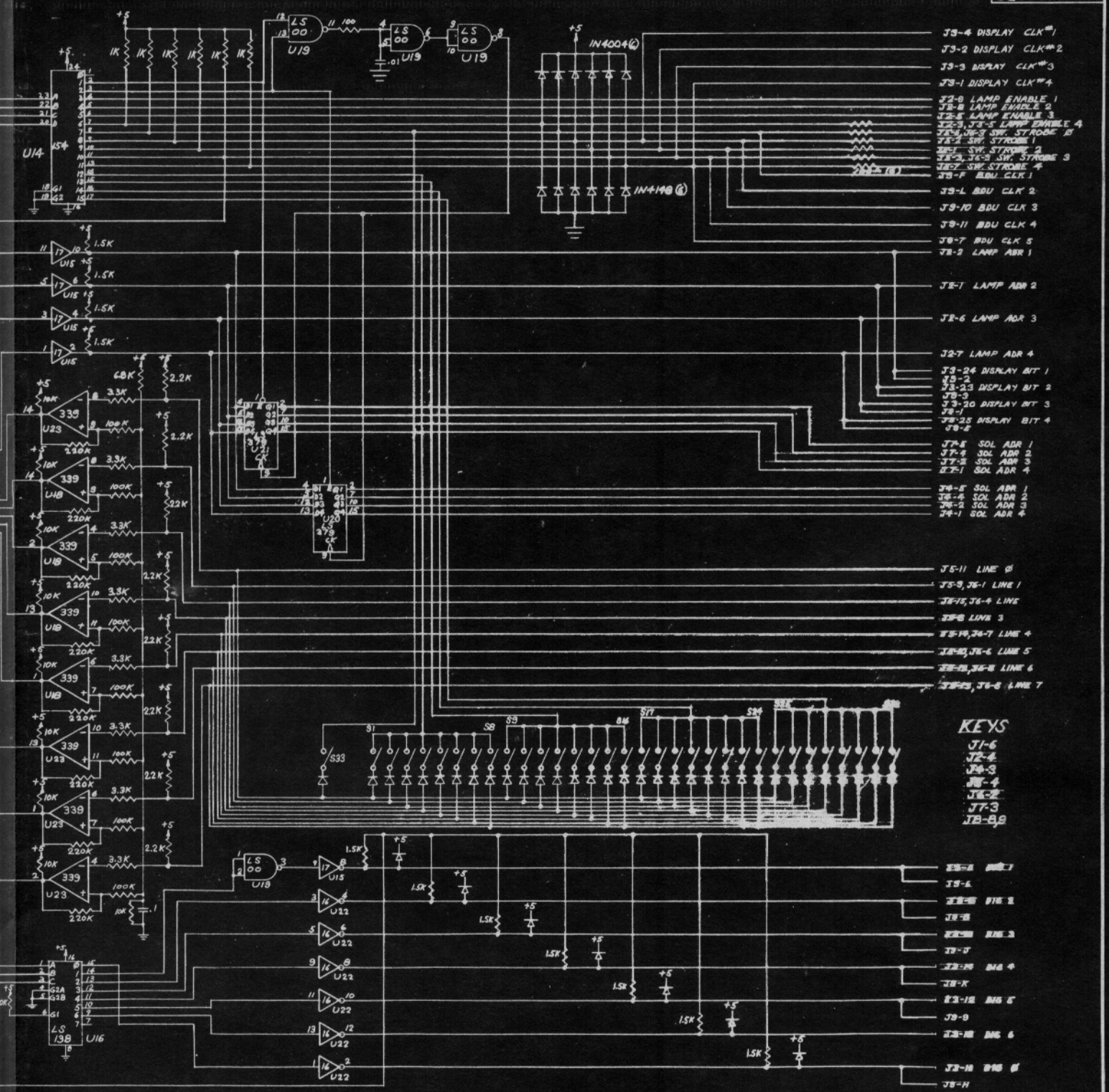
GAME PLAN Inc.
1515 W. Fullerton Ave
Addison ILL. 60101

Scale	Finish	Drawn By EJW
Date 4-7-81	Amt	App. By
Mat'l		Drawing Number 02-700898

BDU-2 DISPLAY UNIT


+12V
.22mH
IN4148
100 1W
.001
270
BT1
+5V J1-11
+5V J1-12
GND J1-14
GND J1-15
GND
1KV
U7
74 C920
6810
U8
100K
4.7K
U9
LS 32
U5
U25
U4
U26
C
U6
2,3,4-+5
-5 J8-3
+12, J8-1
U17
LS 00
U13
B
U12
A
330
1K
220pF
2.455 MHz
400 NSEC
22K
47K
2.2K
8.2V
10K
120K
Q8
Q9
QA
QB
QC
QF
QG
56K
Z80 CPU U11
MREQ
RST
U10
INT
NMI
IEI
IEO
ZC/TO
U3
U2
333
3.3K
220K
.001
ZERO CROSSING DETECTOR
.8MSEC
LS 123
U1
U15
1.5K
+5V J1-1
DISPLAY +5V J3-25
J8-12
GND J1-2
DISPLAY LOGIC GND J3-27
J8-N
F24 J1-9
DISPLAY + IN
DISPLAY GND IN
J1-4
J1-5
J1-7
J1-8
J1-9
J1-10
J3-A
J3-8
J3-13
J3-15
J3-17
J3-18
J3-5
J3-7
J3-9
J3-11
J3-C
J3-E
DISPLAY GND OUT
DISPLAY + OUT
FLIPPER J7-8
CHUCK LOCK J7-9
SPARE J7-7
ENABLE J3-22
J9-M

Drawing Number 02-700017 D



CUT & STRAP 4	CUT & STRAP 3	CUT & STRAP 2	CUT & STRAP 1	AS SHOWN
TMS 2532 OR (A) 0000-0FFF 2332 TMS 2532 OR (B) 1000-1FFF 2332	2316E (A) 0000-07FF TMS 2532 OR (B) 0800-17FF 2332	B2716 (A) 0000-07FF B2716 (B) 0800-0FFF B2716 (C) 1000-17FF	TMS 2716 (A) 0000-07FF TMS 2716 (B) 0800-0FFF TMS 2716 (C) 1000-17FF	2316E (A) 0000-07FF 2316E (B) 0800-0FFF 2316E (C) 1000-17FF RAM 8C00-8CFF 6810 8D00-8D7F 8255 A 04 B 05 C 06 CONT. 07 CTC CH.1 08 CH.2 09 CH.3 0A CH.4 0B

REVISION	DATE	CHANGE	BY

ISSUE	CHANGE	DATE
2	ADDED RESET PARTS	10-28-79
A	220pF RELOCATED, U3 PIN 1 TO PIN 4	7-7-79

Used On

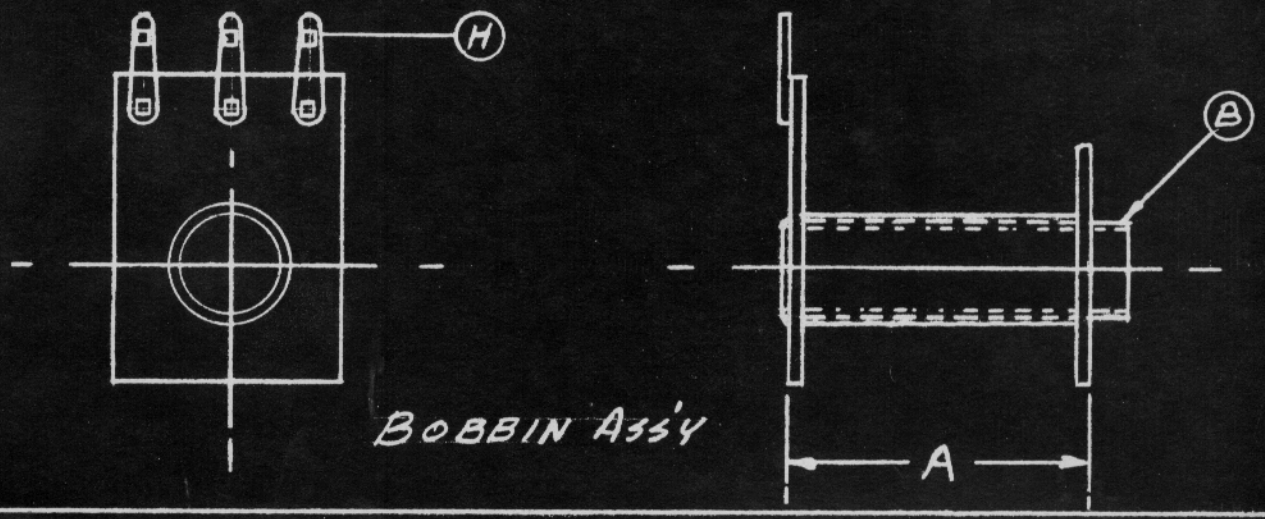
PARTS MUST BE CLEAN AND FREE OF BURRS

Tolerances Unless Specified
Fractional ± .015
Decimal ± .005
Angles ± 1/2
Screw Threads — Class 2

GAME PLAN Inc.
1515 W. Fullerton Ave
Addison ILL. 60101

Scale | Finish | Drawn By
Date 5-10-79 | Amt | App. By
Mat'l | Drawing Number 02-700017 D

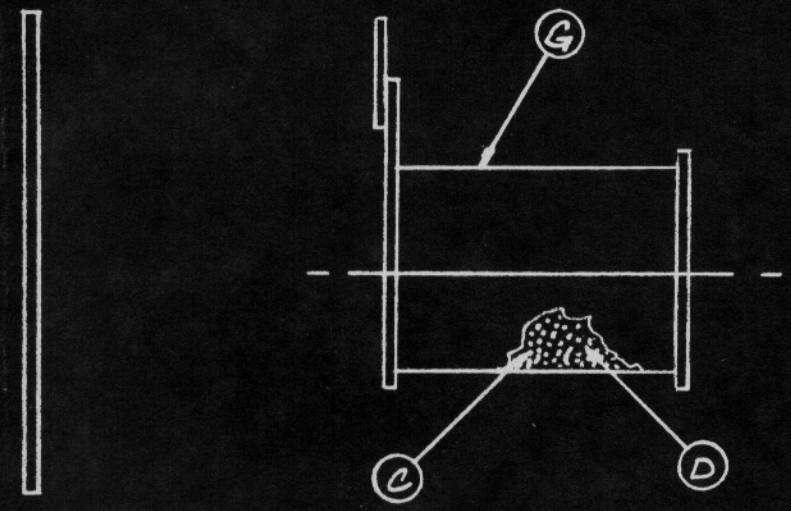
MPU-2 SCHEMATIC

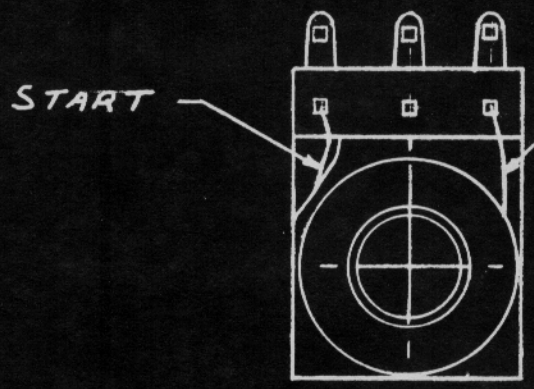


BOBBIN ASS'Y

	A	B	C	D
COIL NUMBER	BOBBIN	TUBE	WIRE GAGE-TYPE	NUMBER TURNS
21-50001B	03-40002N 1.562	03-40008N 1.686	No. 24 MAGNET	850
21-50002B	03-40002N 1.562	03-40008N 1.686	No. 25 No. 27	400 1000
21-50003B	03-40002N 1.562	03-40008N 1.686	No. 25	1050
21-50004B	03-40002N 1.562	03-40027N	No. 29	2000
21-50005B	03-40002N 1.562	03-40008N 1.686	No. 27	1400
21-50006B	"	"	No. 28	1800
21-50007B	03-40037B	03-40038A	No. 24	1000
(A) 21-50008B	03-40002N	04-20022	No-22 No-30	375 800
21-50009B	03-40037B	03-40038A	No-23	1100
21-50010B	03-40037B	03-40038A	No-25	1800

(A)	04-20022 WAS 03-40008A	
ISSUE	CHANGE	DATE





SOLENOID ASS'Y

E	F	G	H
BER NS	RESISTANCE	DESIGN VOLTAGE	COIL WRAPPER	LUG NUMBER
	4.75 Ω	24 V.D.C.		
	2.8 Ω 13.4 Ω	24 V.D.C.		
	7.45 Ω	24 V.D.C.		
	33.8 Ω	24 V.D.C		
	15.4 Ω	24 V.D.C		
	25.8 Ω	24 V.D.C.		
	8 Ω	24 V.D.C.		
	1.2 Ω 21.5 Ω	24 V.D.C. 24 V.D.C.		
	6.2 Ω	24 V.D.C.		
	16.5 Ω	24 V.D.C.	EXP.	

GAME PLAN INCORPORATED
140 LIVELY BOULEVARD
ELK GROVE VILLAGE, IL 60007

SCALE: ———	APPROVED BY: WM 11-3-77	REV. 1	DRAWN BY ED-C
DATE: 11-3-77			REVISED 4-25-78
MAT'L - AS NOTED	FINISH ———	AMT - AS REQ'D	USED ON GENERAL
SOLENOIDS			DRAWING NUMBER 21-50001B THRU →