DATA EAST

GUNS N' ROSES

'The Pinball Incident?'

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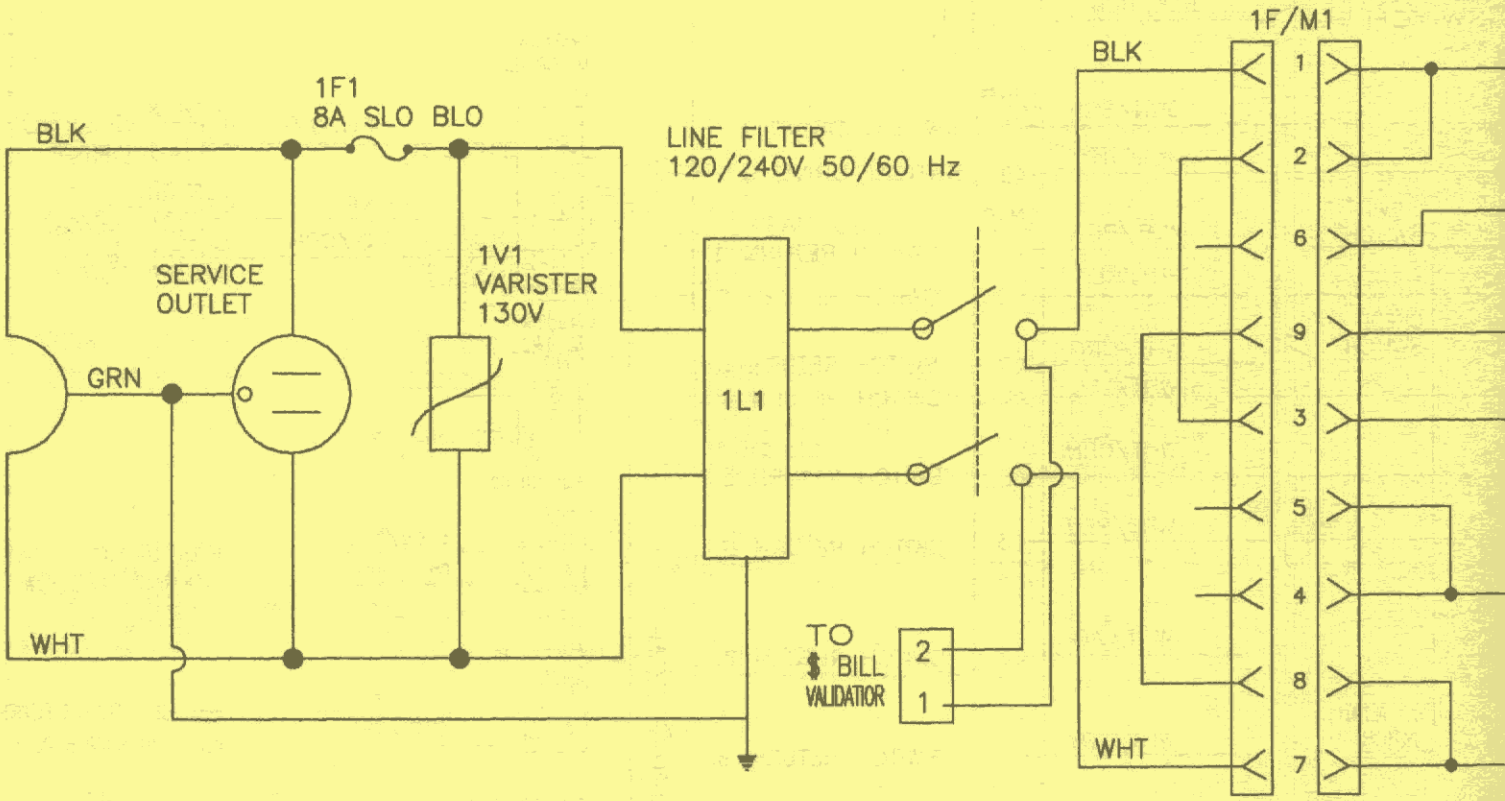
780-5029-00

THIS CONFIGURATION FOR 11

FOR LOWER LINE VOLTAGES
OR 220 VOLT OPERATION
SEE SAMPLES BELOW



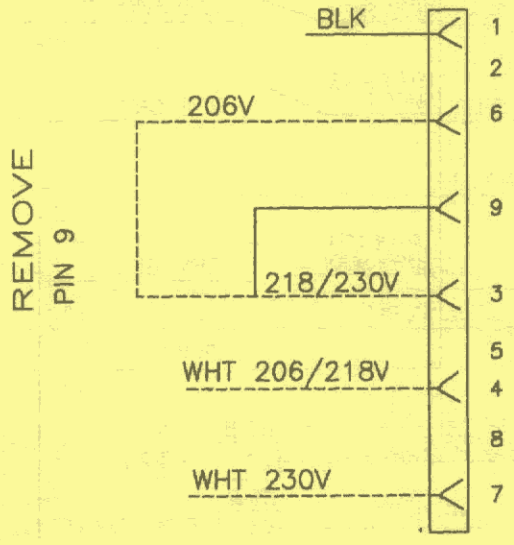
JUMPER FOR VOLTAGE VARIATIO

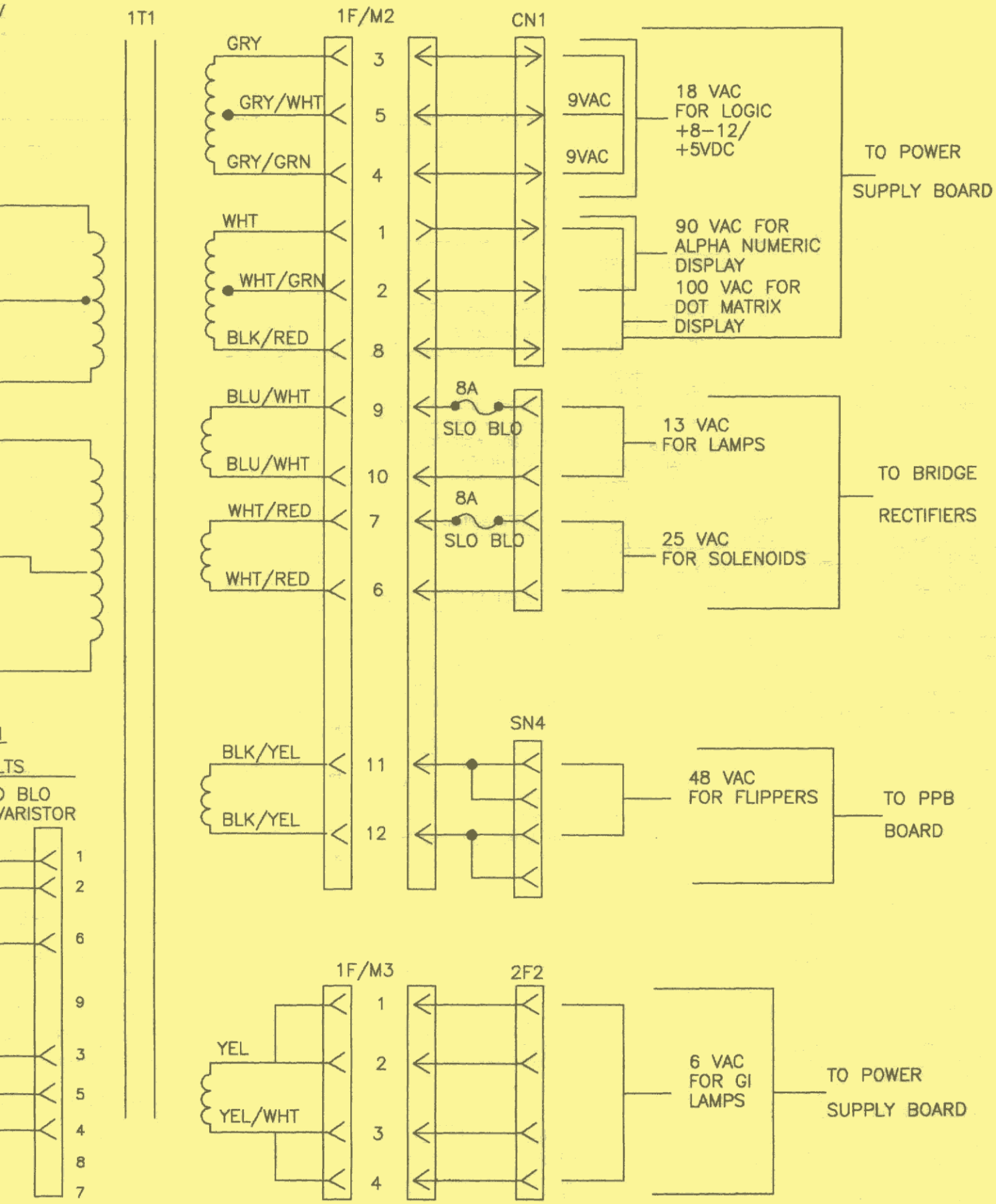
230/218/206 VOLTS

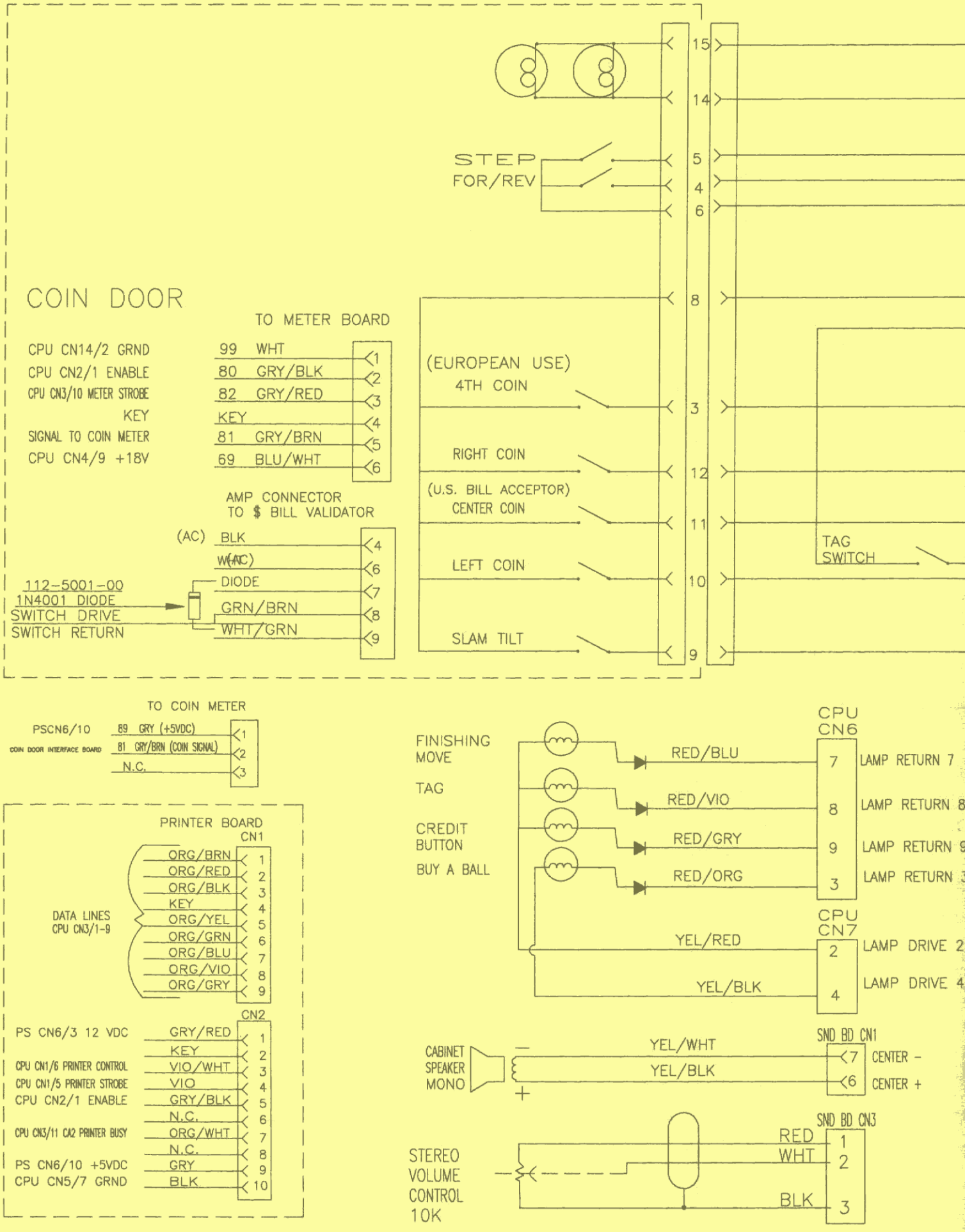
1F1= 4A SLO BLO
1V1=275V VARISTOR

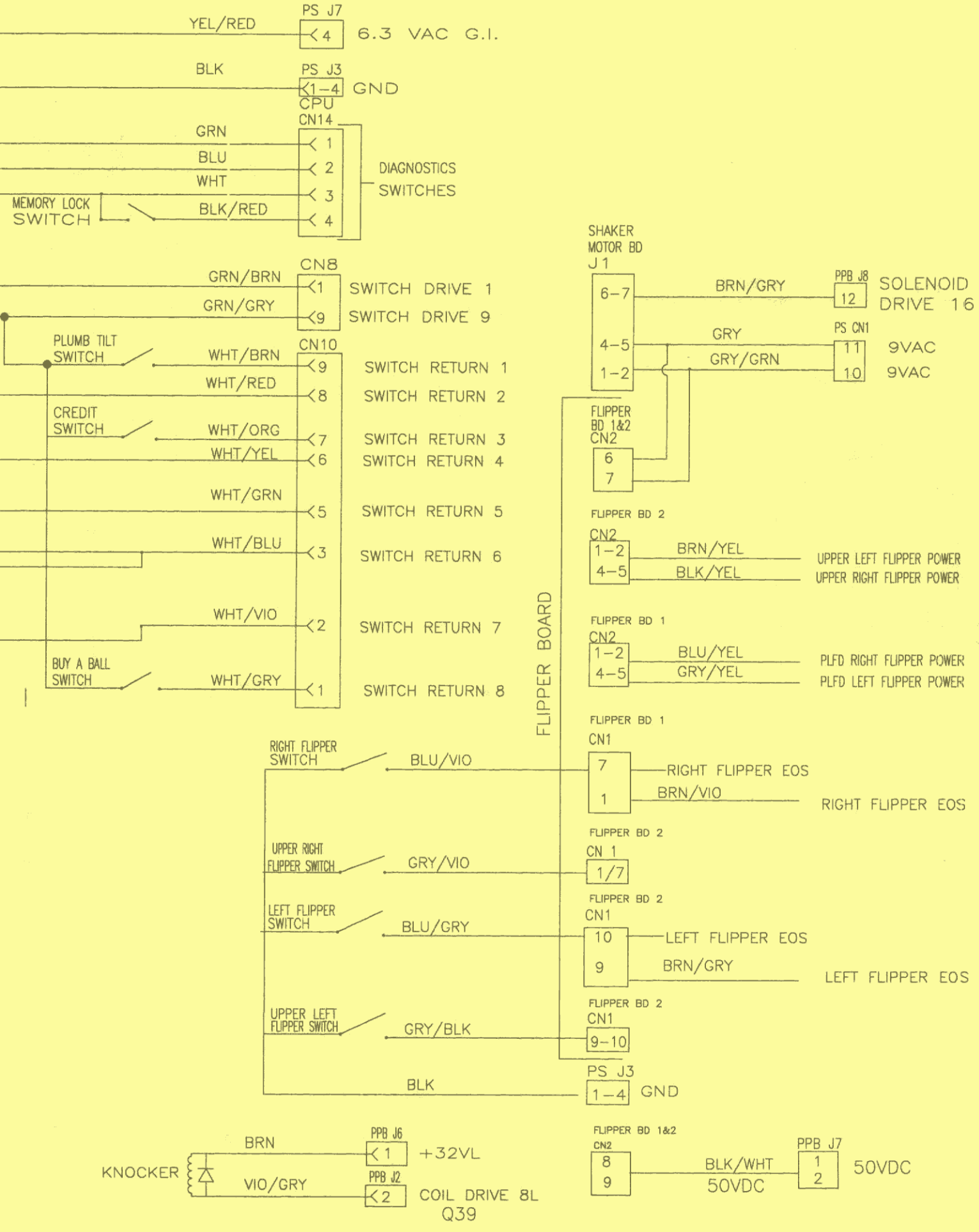
100/105 V

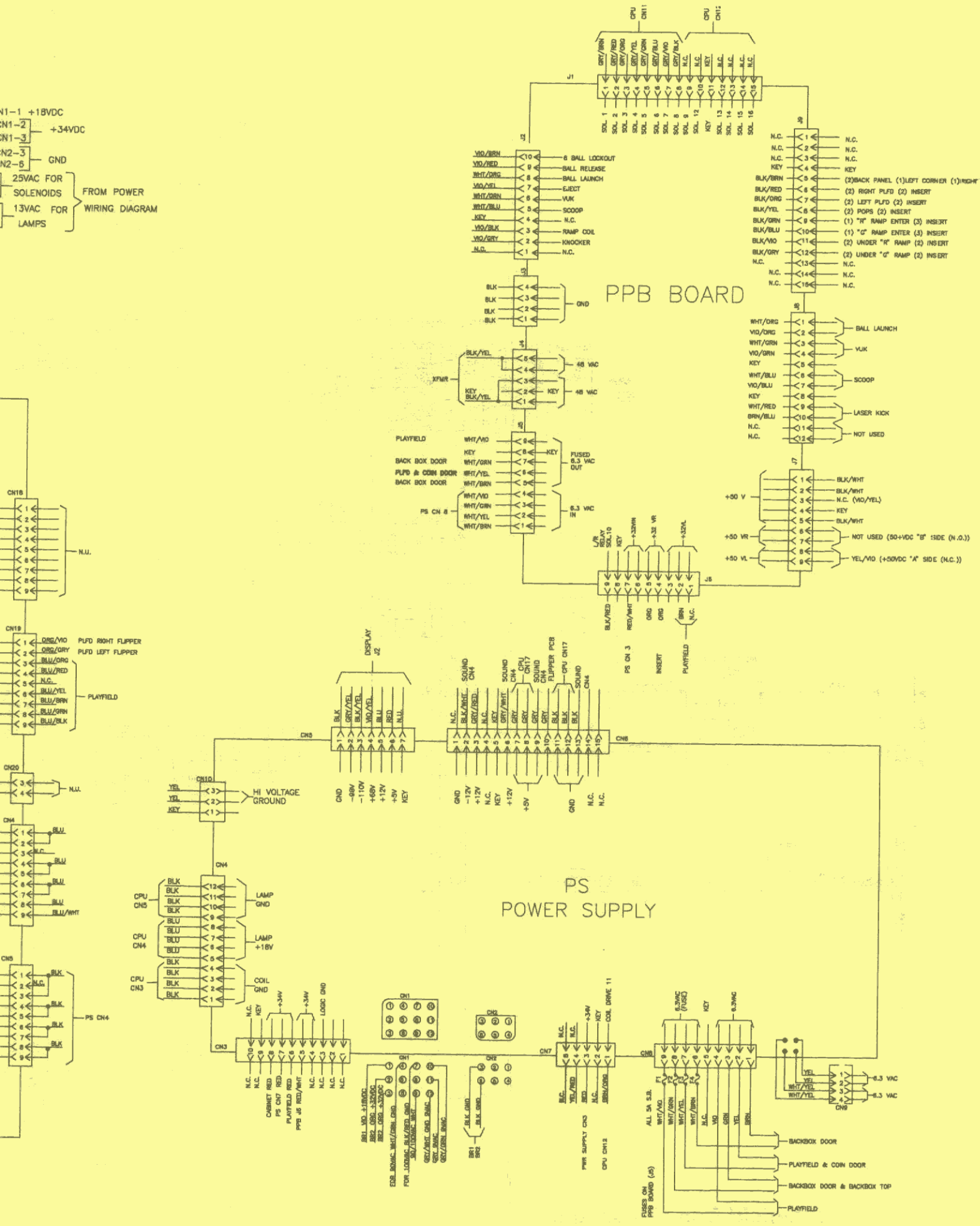
1F1= 8A SL
1V1= 130V

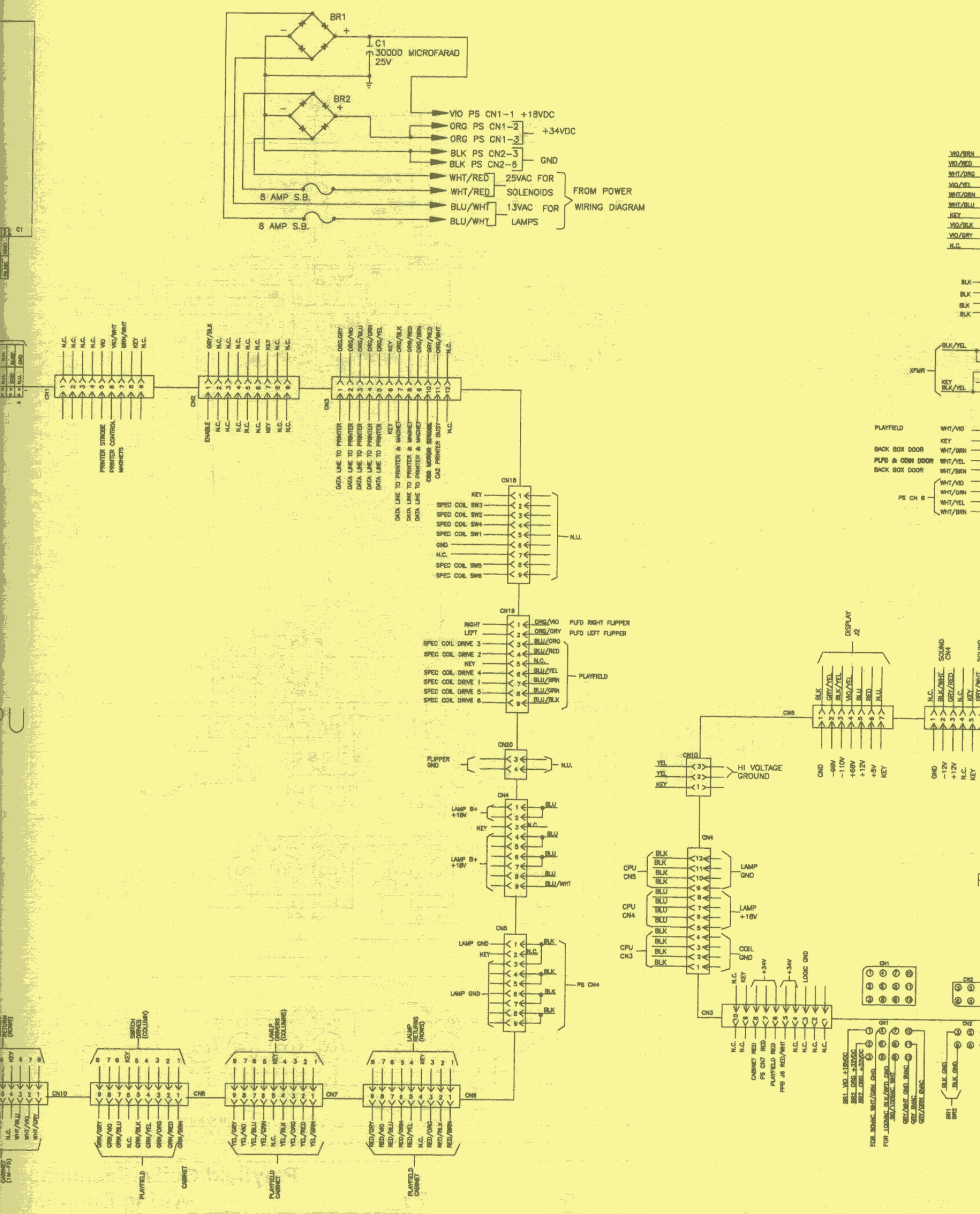


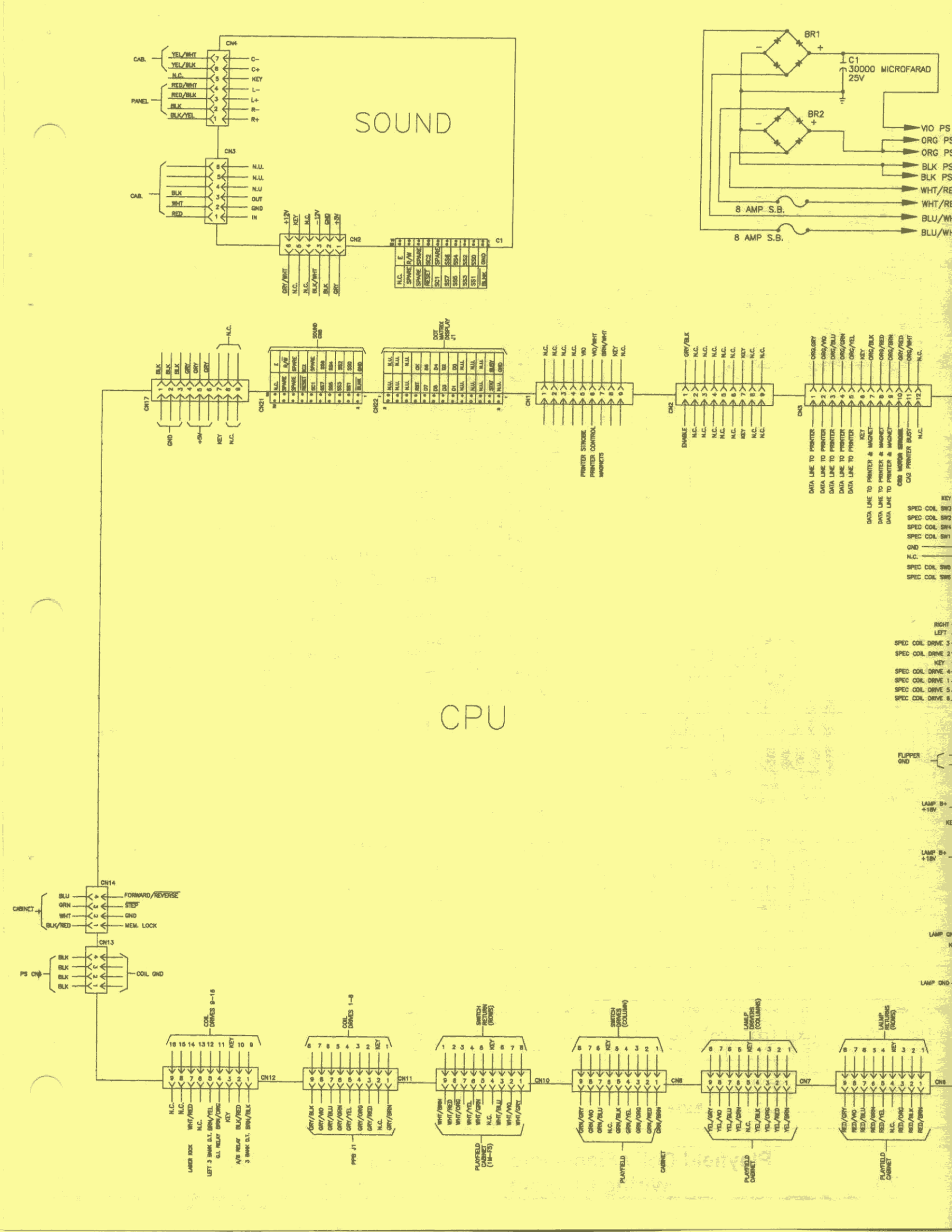

1T1
1F/M2
CN1
GRY
GRY/WHT
GRY/GRN
WHT
WHT/GRN
BLK/RED
BLU/WHT
BLU/WHT
WHT/RED
WHT/RED
3
5
4
1
2
8
9
10
7
6
9VAC
9VAC
18 VAC FOR LOGIC +8-12/ +5VDC
90 VAC FOR ALPHA NUMERIC DISPLAY
100 VAC FOR DOT MATRIX DISPLAY
TO POWER SUPPLY BOARD
8A
SLO BLO
8A
SLO BLO
13 VAC FOR LAMPS
25 VAC FOR SOLENOIDS
TO BRIDGE RECTIFIERS
SN4
BLK/YEL
BLK/YEL
11
12
48 VAC FOR FLIPPERS
TO PPB BOARD
1F/M3
2F2
YEL
YEL/WHT
1
2
3
4
6 VAC FOR GI LAMPS
TO POWER SUPPLY BOARD
LTS
BLO
VARISTOR
1
2
6
9
3
5
4
8
7

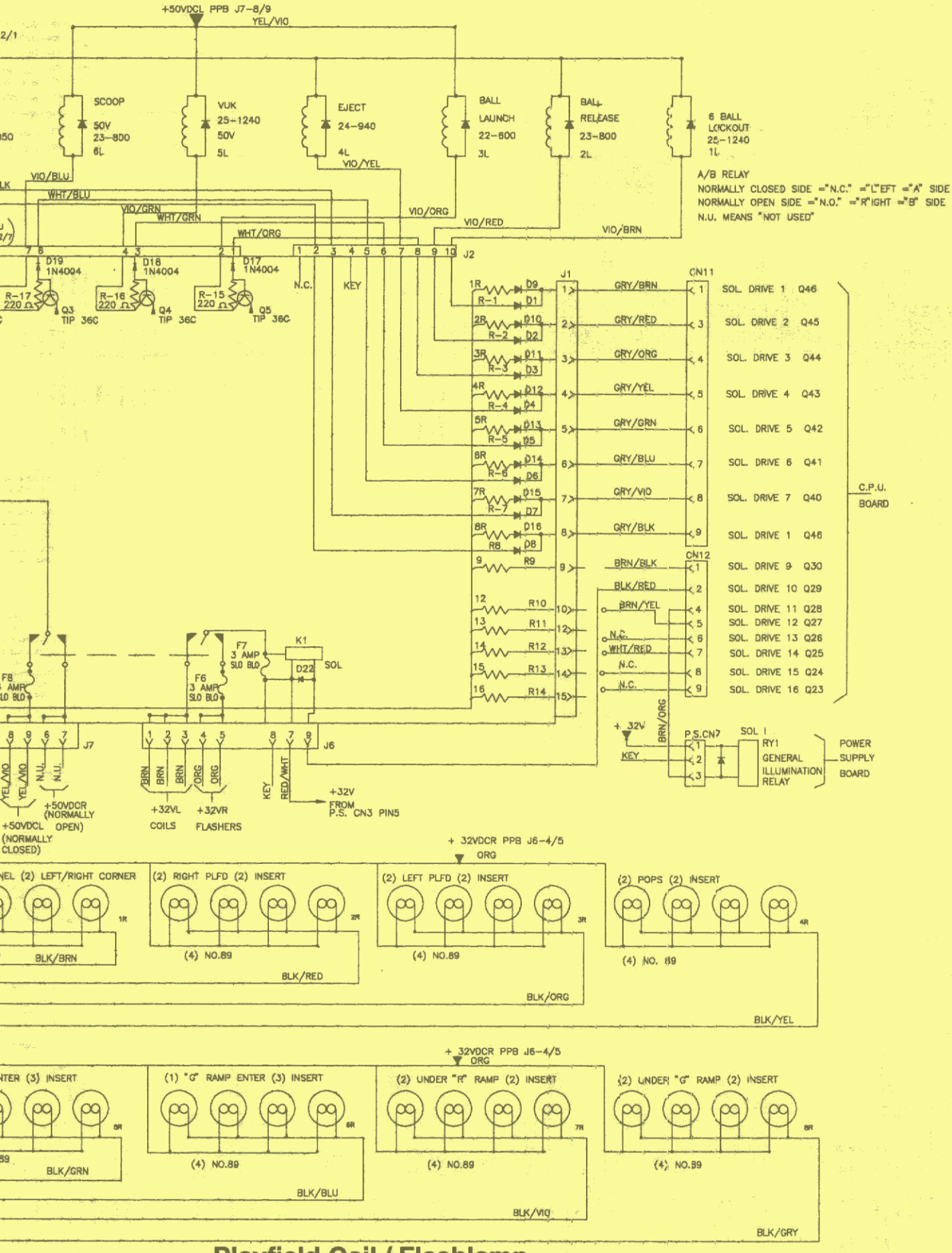

COIN DOOR
TO METER BOARD
CPU CN14/2 GRND
CPU CN2/1 ENABLE
CPU CN3/10 METER STROBE
KEY
SIGNAL TO COIN METER
CPU CN4/9 +18V
99 WHT
80 GRY/BLK
82 GRY/RED
KEY
81 GRY/BRN
69 BLU/WHT
AMP CONNECTOR
TO $ BILL VALIDATOR
(AC) BLK
W(AC)
DIODE
GRN/BRN
WHT/GRN
112-5001-00
1N4001 DIODE
SWITCH DRIVE
SWITCH RETURN
STEP
FOR/REV
(EUROPEAN USE)
4TH COIN
RIGHT COIN
(U.S. BILL ACCEPTOR)
CENTER COIN
LEFT COIN
SLAM TILT
TAG
SWITCH
TO COIN METER
PSCN6/10
COIN DOOR INTERFACE BOARD
69 GRY (+5VDC)
81 GRY/BRN (COIN SIGNAL)
N.C.
PRINTER BOARD
CN1
DATA LINES
CPU CN3/1-9
ORG/BRN
ORG/RED
ORG/BLK
KEY
ORG/YEL
ORG/GRN
ORG/BLU
ORG/VIO
ORG/GRY
CN2
PS CN6/3 12 VDC
CPU CN1/6 PRINTER CONTROL
CPU CN1/5 PRINTER STROBE
CPU CN2/1 ENABLE
CPU CN3/11 CA2 PRINTER BUSY
PS CN6/10 +5VDC
CPU CN5/7 GRND
GRY/RED
KEY
VIO/WHT
VIO
GRY/BLK
N.C.
ORG/WHT
N.C.
GRY
BLK
FINISHING
MOVE
TAG
CREDIT
BUTTON
BUY A BALL
CPU
CN6
RED/BLU
RED/VIO
RED/GRY
RED/ORG
LAMP RETURN 7
LAMP RETURN 8
LAMP RETURN 9
LAMP RETURN
CPU
CN7
YEL/RED
YEL/BLK
LAMP DRIVE 2
LAMP DRIVE 4
CABINET
SPEAKER
MONO
YEL/WHT
YEL/BLK
SND BD CN1
CENTER -
CENTER +
STEREO
VOLUME
CONTROL
10K
SND BD CN3
RED
WHT
BLK


PS J7
YEL/RED
4
6.3 VAC G.I.
BLK
PS J3
1-4
GND
CPU
CN14
GRN
1
BLU
2
WHT
3
DIAGNOSTICS
SWITCHES
MEMORY LOCK
SWITCH
BLK/RED
4
CN8
GRN/BRN
1
SWITCH DRIVE 1
GRN/GRY
9
SWITCH DRIVE 9
PLUMB TILT
SWITCH
CN10
WHT/BRN
9
SWITCH RETURN 1
WHT/RED
8
SWITCH RETURN 2
CREDIT
SWITCH
WHT/ORG
7
SWITCH RETURN 3
WHT/YEL
6
SWITCH RETURN 4
WHT/GRN
5
SWITCH RETURN 5
WHT/BLU
3
SWITCH RETURN 6
WHT/VIO
2
SWITCH RETURN 7
BUY A BALL
SWITCH
WHT/GRY
1
SWITCH RETURN 8
SHAKER
MOTOR BD
J1
6-7
BRN/GRY
PPB J8
12
SOLENOID
DRIVE 16
4-5
GRY
PS CN1
11
9VAC
1-2
GRY/GRN
10
9VAC
FLIPPER
BD 1&2
CN2
6
7
FLIPPER BD 2
CN2
1-2
BRN/YEL
UPPER LEFT FLIPPER POWER
4-5
BLK/YEL
UPPER RIGHT FLIPPER POWER
FLIPPER BD 1
CN2
1-2
BLU/YEL
PLFD RIGHT FLIPPER POWER
4-5
GRY/YEL
PLFD LEFT FLIPPER POWER
FLIPPER BOARD
FLIPPER BD 1
CN1
RIGHT FLIPPER
SWITCH
BLU/VIO
7
RIGHT FLIPPER EOS
1
BRN/VIO
RIGHT FLIPPER EOS
FLIPPER BD 2
CN 1
UPPER RIGHT
FLIPPER SWITCH
GRY/VIO
1/7
FLIPPER BD 2
CN1
LEFT FLIPPER
SWITCH
BLU/GRY
10
LEFT FLIPPER EOS
9
BRN/GRY
LEFT FLIPPER EOS
FLIPPER BD 2
CN1
UPPER LEFT
FLIPPER SWITCH
GRY/BLK
9-10
PS J3
BLK
1-4
GND
KNOCKER
BRN
PPB J6
1
+32VL
VIO/GRY
PPB J2
2
COIL DRIVE 8L
Q39
FLIPPER BD 1&2
CN2
8
9
BLK/WHT
50VDC
PPB J7
1
2
50VDC


PPB BOARD
PS
POWER SUPPLY
FROM POWER WIRING DIAGRAM
+18VDC
+34VDC
GND
25VAC FOR SOLENOIDS
13VAC FOR LAMPS
BALL LAUNCH
VUK
SCOOP
LASER KICK
NOT USED
6 BALL LOCKOUT
BALL RELEASE
BALL LAUNCH
EJECT
VUK
SCOOP
N.C.
RAMP COIL
KNOCKER
N.C.
(2) RIGHT PLFD (2) INSERT
(2) LEFT PLFD (2) INSERT
(2) POPS (2) INSERT
(1) "R" RAMP ENTER (3) INSERT
(1) "G" RAMP ENTER (3) INSERT
(2) UNDER "R" RAMP (2) INSERT
(2) UNDER "G" RAMP (2) INSERT
PLFD RIGHT FLIPPER
PLFD LEFT FLIPPER
PLAYFIELD
HI VOLTAGE GROUND
LAMP GND
LAMP +18V
COIL GND
BACKBOX DOOR
PLAYFIELD & COIN DOOR
BACKBOX DOOR & BACKBOX TOP
PLAYFIELD

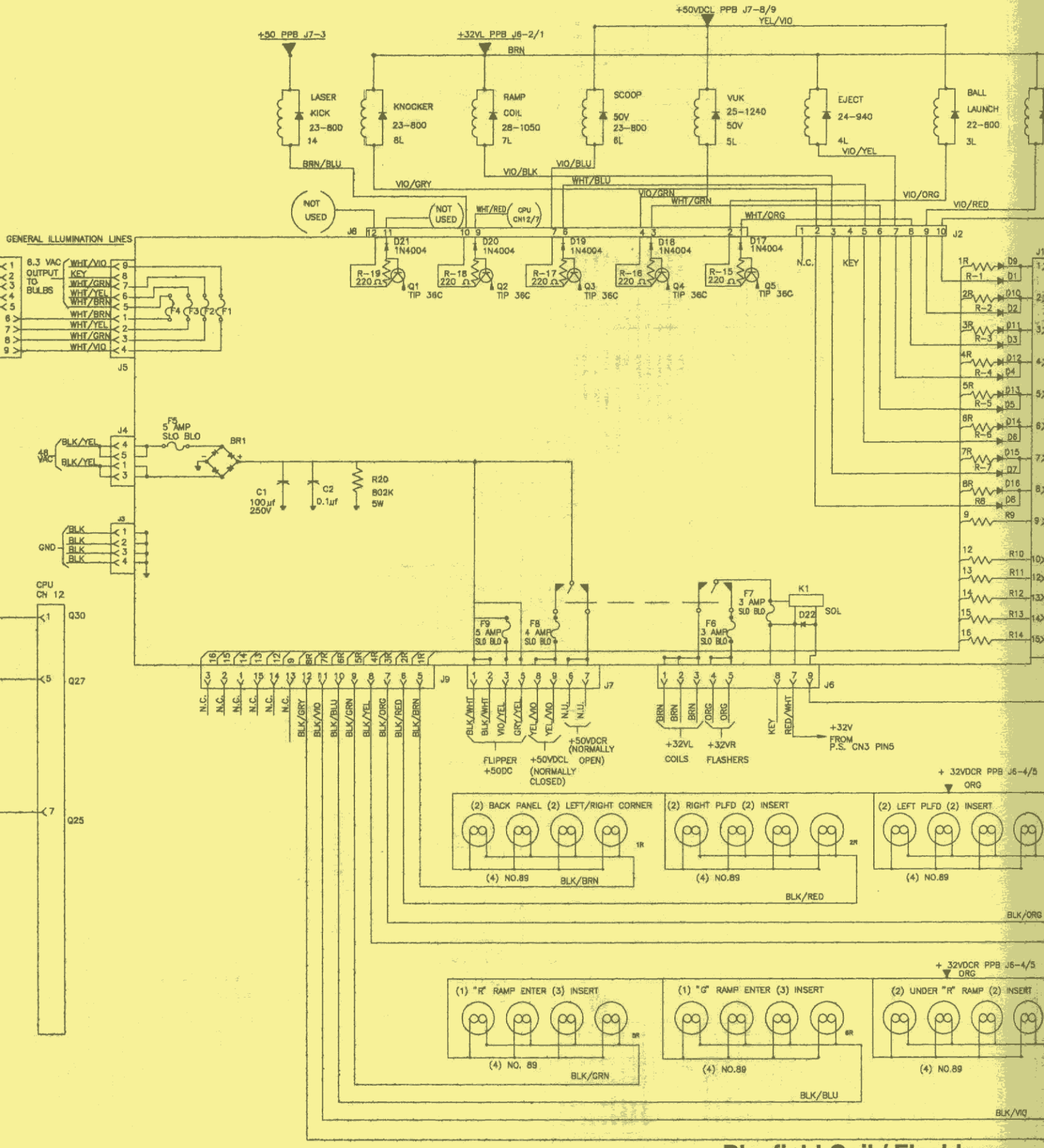

BR1
C1
30000 MICROFARAD
25V
BR2
VIO PS CN1-1 +18VDC
ORG PS CN1-2
ORG PS CN1-3
+34VDC
BLK PS CN2-3
BLK PS CN2-6
GND
WHT/RED
WHT/RED
25VAC FOR SOLENOIDS
BLU/WHT
BLU/WHT
13VAC FOR LAMPS
FROM POWER WIRING DIAGRAM
8 AMP S.B.
8 AMP S.B.
CN1
CN2
CN3
CN18
CN19
CN20
CN4
CN5
CN6
CN7
CN8
CN10
HI VOLTAGE GROUND
DISPLAY J2
SOUND CN4
PLAYFIELD
PS CN4
LAMP GND
LAMP +18V
COIL GND
XFMR
BACK BOX DOOR
PLFD RIGHT FLIPPER
PLFD LEFT FLIPPER


SOUND
CPU
CN4
CN3
CN2
CN1
CN17
CN21
CN22
CN14
CN13
CN12
CN11
CN10
CN8
CN7
CN6
C1
BR1
BR2
C1
30000 MICROFARAD
25V
8 AMP S.B.
8 AMP S.B.
CAB.
PANEL
CABINET
PS ON
YEL/WHT
YEL/BLK
N.C.
RED/WHT
RED/BLK
BLK
BLK/YEL
C-
C+
KEY
L-
L+
R-
R+
N.U.
OUT
GND
IN
+12V
-12V
+5V
GRY/WHT
BLK/WHT
BLU
GRN
WHT
BLK/RED
FORWARD/REVERSE
STEP
MEM. LOCK
COIL GND
COIL DRIVES 9-16
COIL DRIVES 1-8
SWITCH RETURN (ROWS)
SWITCH DRIVES (COLUMN)
LAMP DRIVES (COLUMNS)
LAMP RETURNS (ROWS)
PRINTER STROBE
PRINTER CONTROL
MAGNETS
ENABLE
DATA LINE TO PRINTER
DATA LINE TO PRINTER & MAGNET
PRINTER BUSY
PLAYFIELD
CABINET
PLAYFIELD CABINET
FLIPPER GND
LAMP B+ +18V
LAMP GND

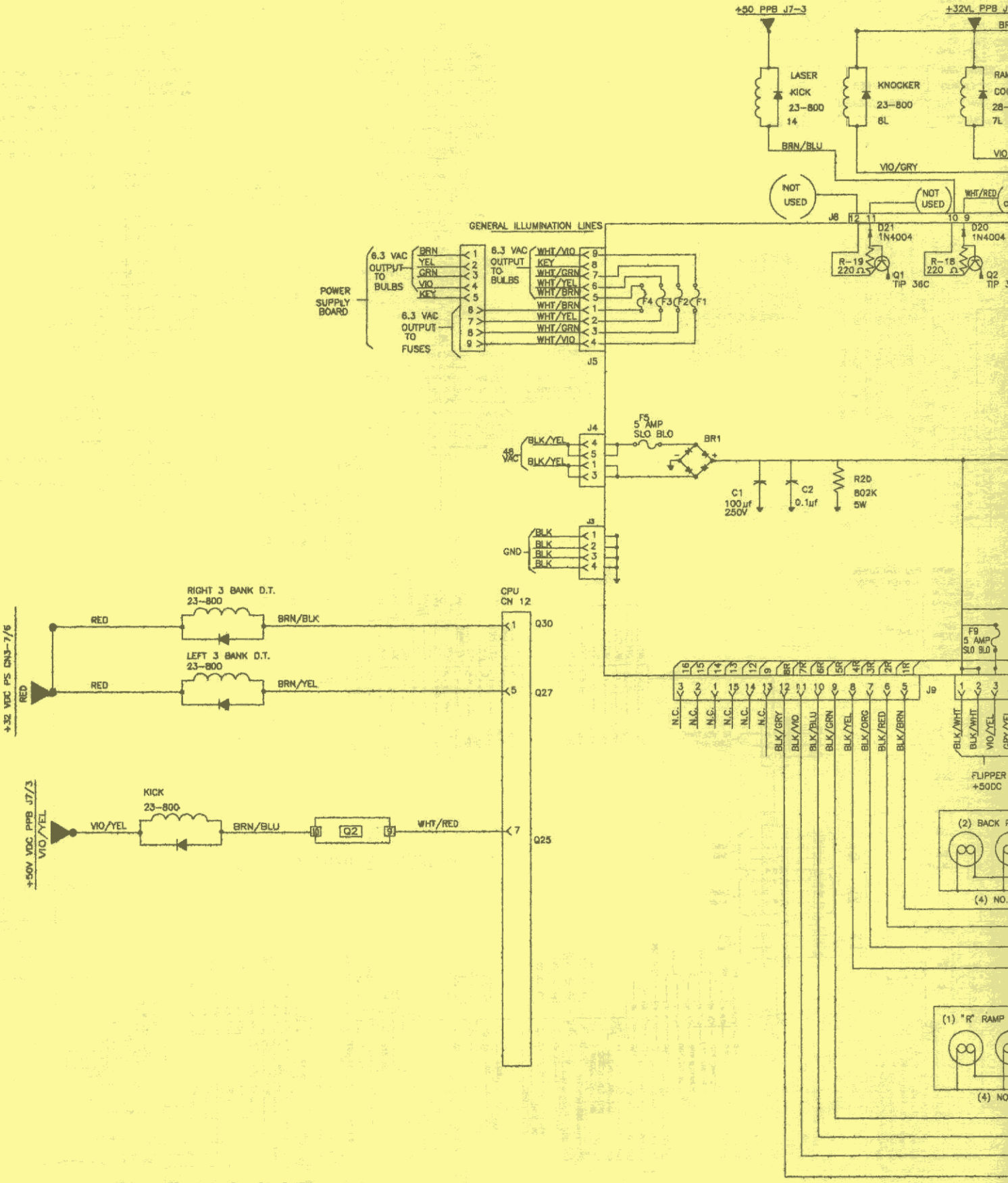


Playfield Coil / Flashlamp Wiring Diagram

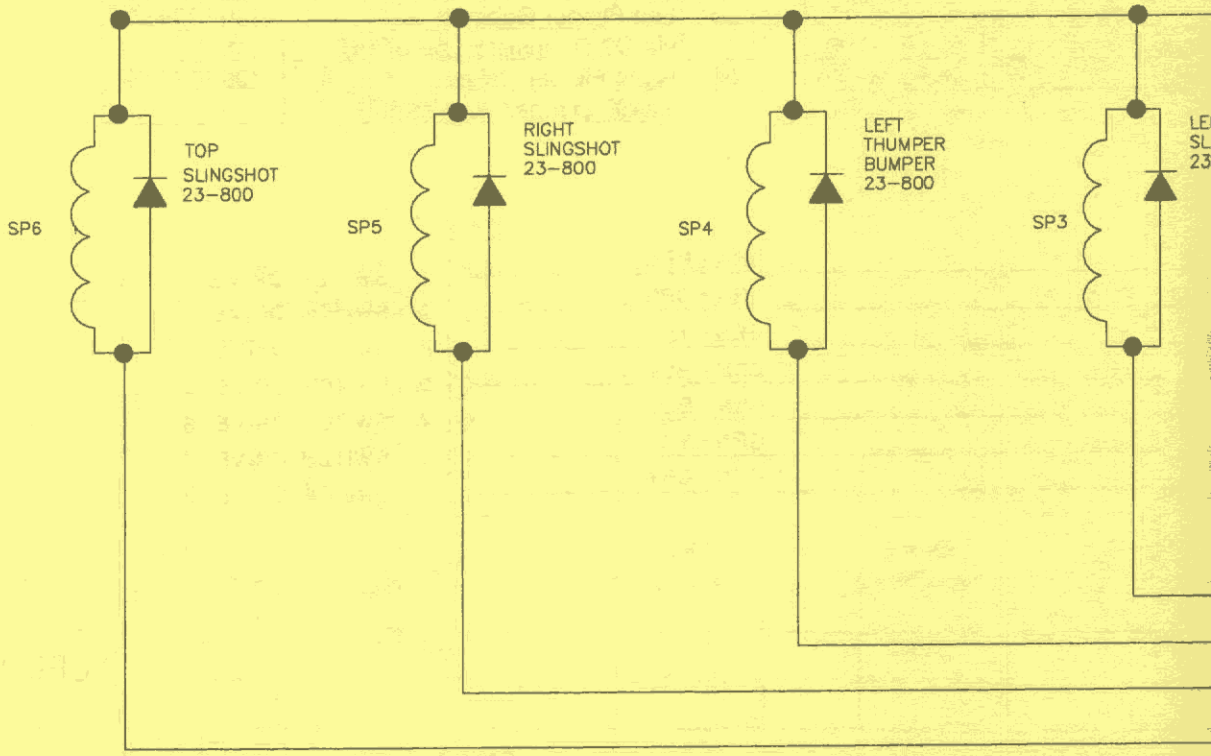
DWN	GAME:
Phillie	GUNS'N'ROSES
DATE	Data East Pinball Inc.
06-14-94	1990 Lake View Avenue Park, IL 60160

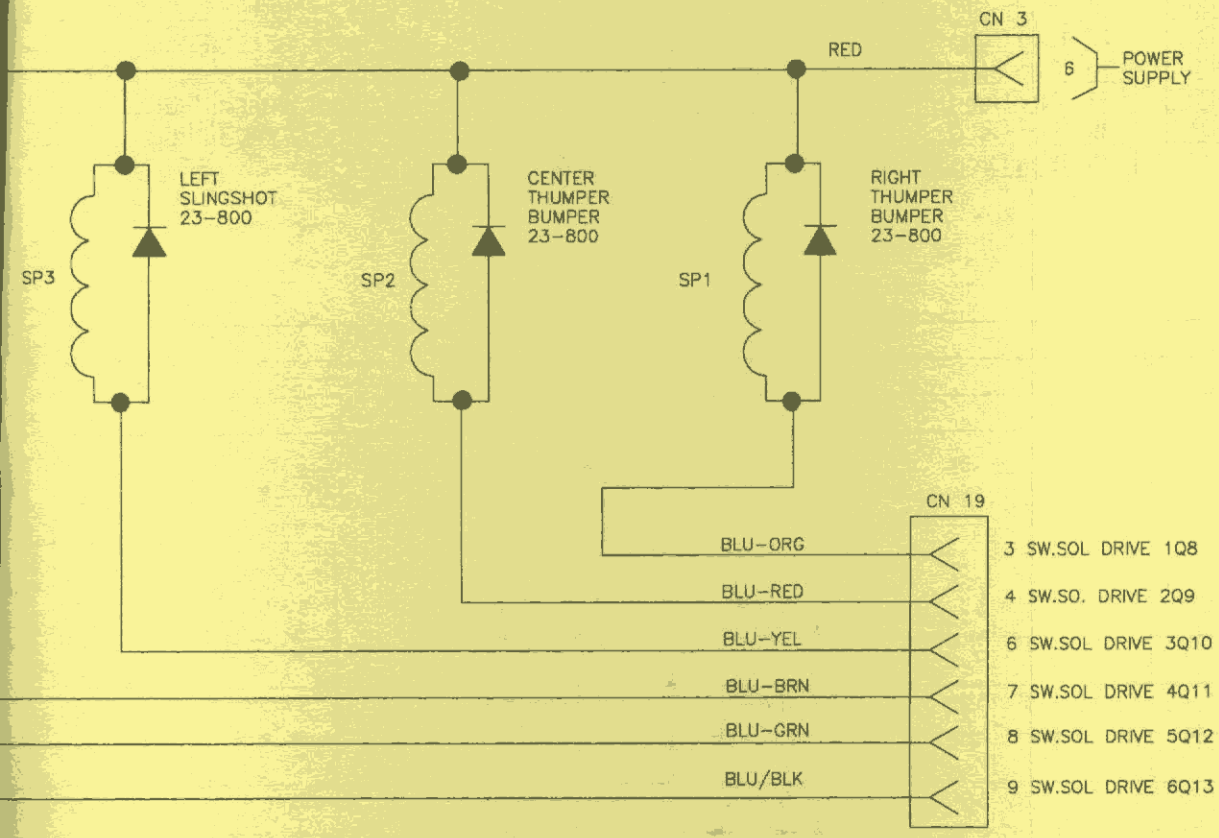


Playfield Coil / Flashlamp Wiring Diagram



Playfield Coil / Flashlamp Wiring Diagram


SP6
TOP
SLINGSHOT
23-800
SP5
RIGHT
SLINGSHOT
23-800
SP4
LEFT
THUMPER
BUMPER
23-800
SP3

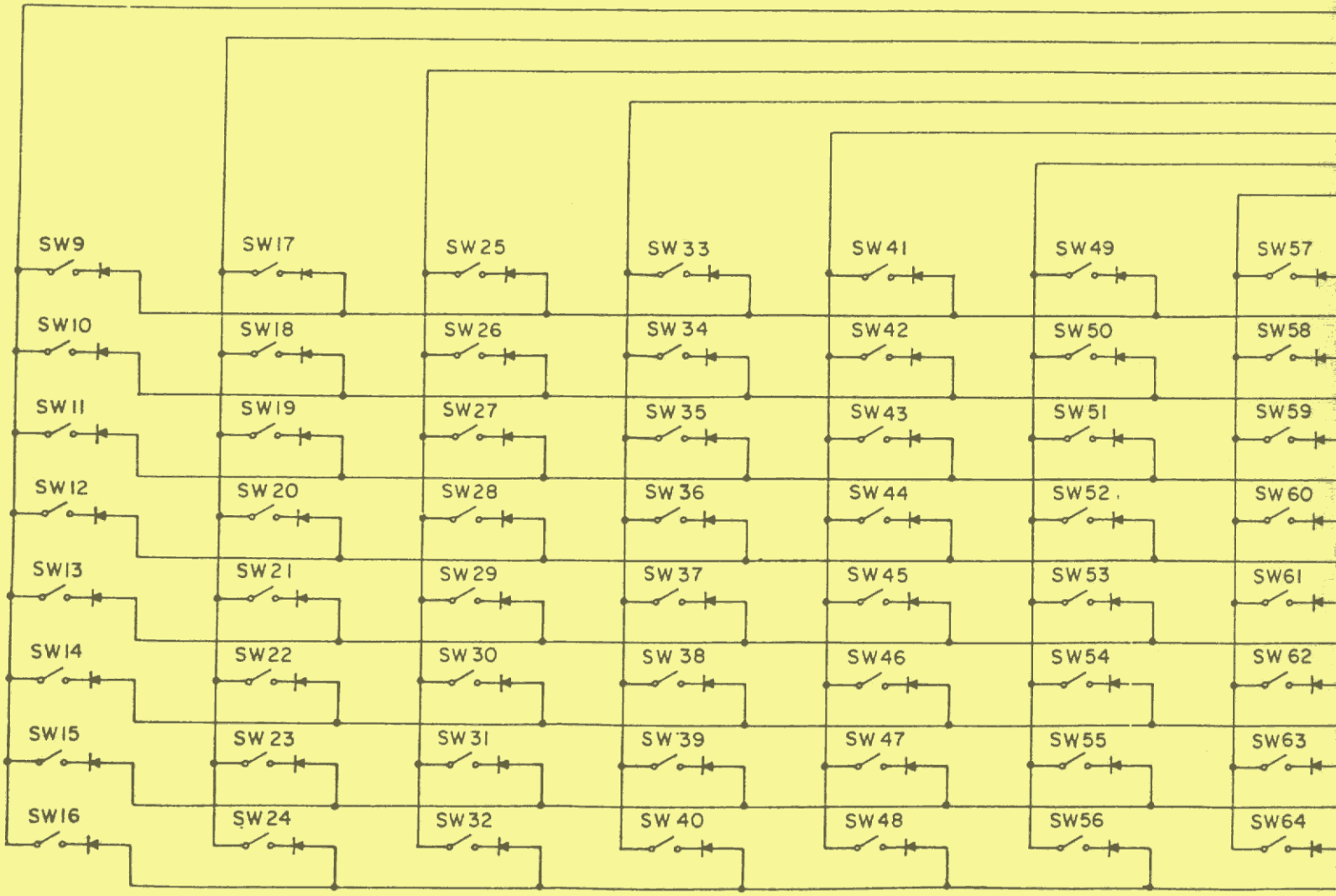


Playfield Special Coil Diagram

Switch Matrix No. & Description		Part No.
01*	Plumb Tilt	See Cabinet
02*	4th Coin (On Coin Door)	---
03*	Credit Button (Left of Coin Door)	500-5097-02
04*	Right Coin (On Coin Door)	180-5024-00
05*	Center Coin (On Coin Door)	180-5024-00
06*	Left Coin (On Coin Door)	180-5024-00
07*	Slam Tilt	180-5022-00
08*	Extra Ball Button (Under 03)	180-5073-00
09	#1 (Left) Ball Trough	180-5119-00
10	#2 Ball Trough	180-5119-00
11	#3 Ball Trough	180-5119-00
12	#4 Ball Trough	180-5119-00
13	#5 Ball Trough	180-5119-00
14	#6 Ball Trough	180-5119-00
15	#7 (Right) Ball Trough	180-5118-00
16	Shooter Lane	180-5100-01

Switch Matrix No. & Description		Part No.
17	Captive Stand-Up "D" of DUFF	515-5470-08
18	Captive Stand-Up "U" of DUFF	515-5470-08
19	Captive Stand-Up "F" of DUFF	515-5470-08
20	Captive Stand-Up "F" of DUFF	515-5470-08
21	Top Lane Left "J" of JAM	500-5707-00
22	Top Lane Middle "A" of JAM	500-5707-00
23	Top Lane Right "M" of JAM	500-5707-00
24	Left Shooter Lane	180-5700-00
25	Left Turbo Bumper	180-5015-01
26	Bottom Turbo Bumper	180-5015-01
27	Right Turbo Bumper	180-5015-01
28	Right Slingshot	180-5054-00
29	Left Slingshot	180-5054-00
30	Top Slingshot	180-5054-00
31	Not Used	— - — - —
32	Not Used	— - — - —
33	Left Drop Target Bottom	180-5092-01

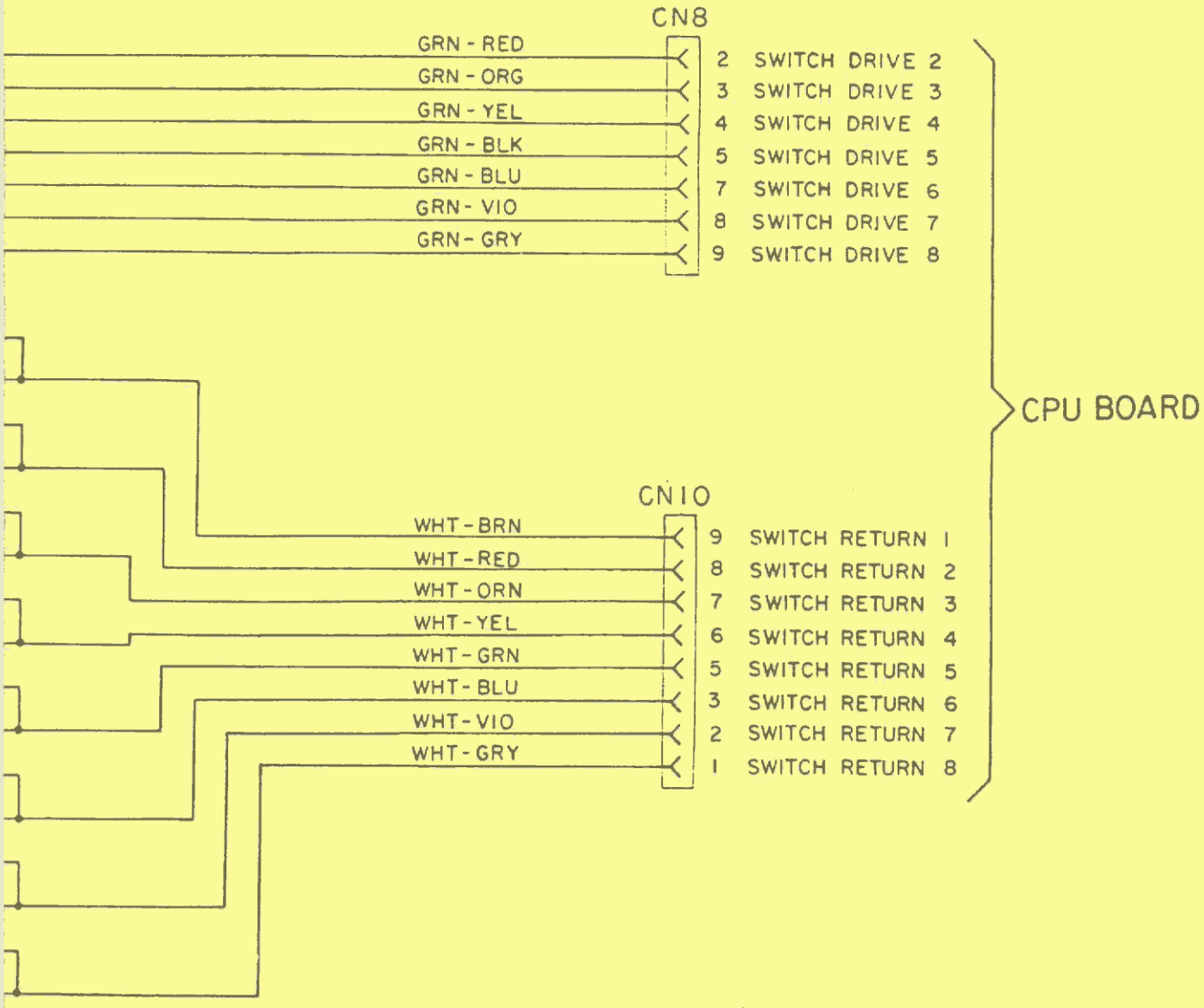
Switch Matrix	
34	Left Drop Ta
35	Right Drop T
36	Right Drop T
37	Eject
38	Center Scoo
39	VUK
40	Funnel Snak
41	Not Used
42	Not Used
43	Not Used
44	Not Used
45	Not Used
46	Not Used
47	Not Used
48	Inner Orbit B
49	" R " Ramp E



72 Playfield Switch Wiring Diagram

lo. & Description	Part No.
get Middle	180-5092-01
arget Middle	180-5092-01
arget Bottom	180-5092-01
	180-5027-01
	180-5057-00
	180-5116-00
e Pit	515-6073-00
	— - — - —
	— - — - —
	— - — - —
	— - — - —
	— - — - —
	— - — - —
	— - — - —
ottom	500-5706-00
nter	180-5090-00

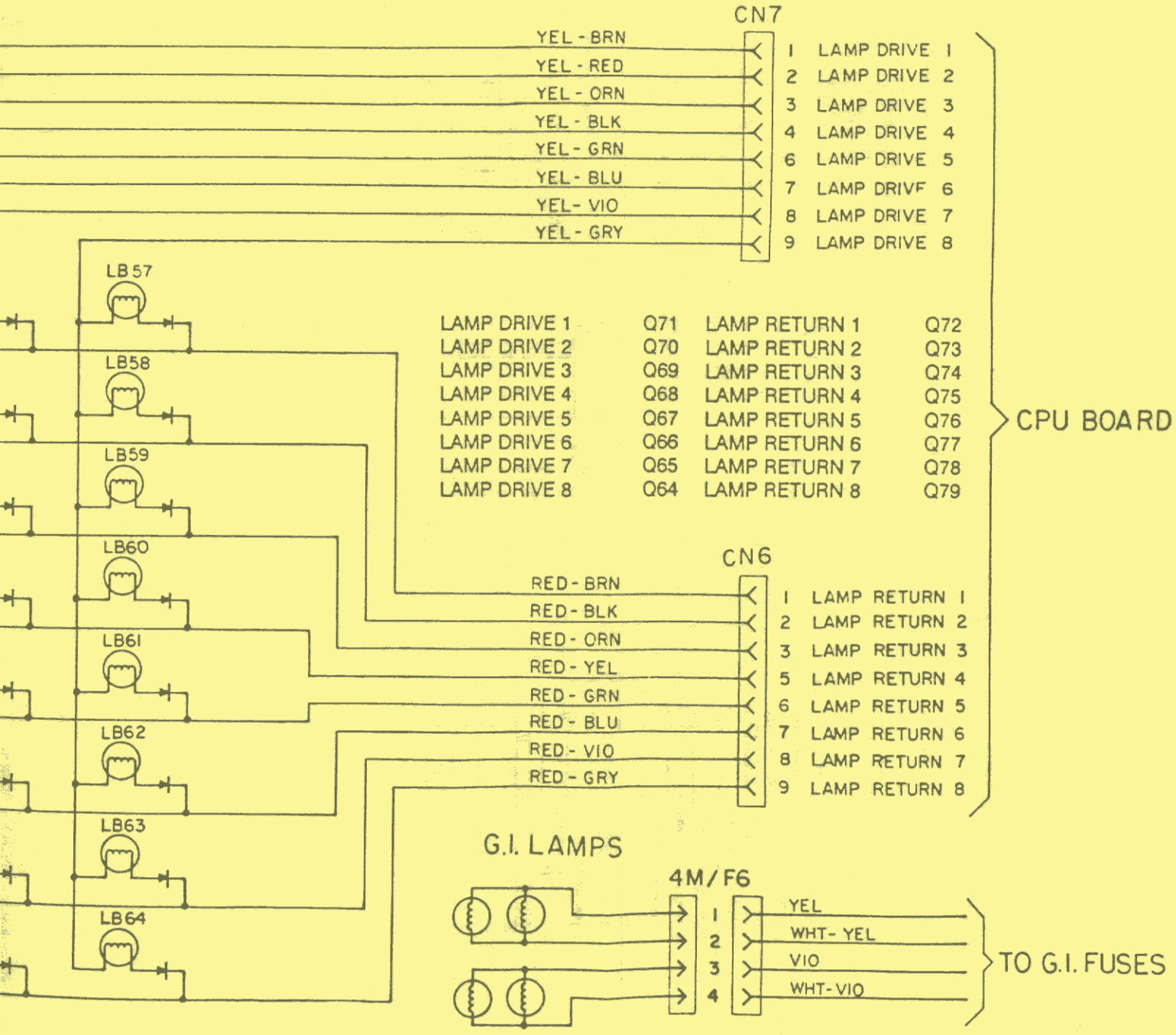
Switch Matrix No. & Description		Part No.
50	" R " Ramp Exit	180-5090-00
51	" G " Ramp Enter	180-5090-00
52	" G " Ramp Exit	180-5090-00
53	Left Return Lane	500-5707-00
54	Left Outlane	500-5707-00
55	Right Outlane	500-5707-00
56	Right Return Lane	500-5706-00
57	Right Drop Target Top	180-5092-01
58	Right Orbit Top	500-5707-00
59	Left Drop Target Top	180-5092-01
60	Left Orbit Top	500-5706-00
61	Not Used	— - — - —
62	Gun Trigger	180-5093-00
63*	Left Flipper Cabinet via Q7 (Transistor) on SSFB	180-5124-00
64*	Right Flipper Cabinet via Q5 (Transitor) on SSFB	180-5124-00



72 Playfield Switch Wiring Diagram

No. & Description
o Rose Millions
o Jackpot
o Enter
ON
d Lwr. Cntr. "Slash"
o Gun Millions
o Jackpots
o Enter
s
ke Pit
l Bottom "Gilby"
pot
kpot

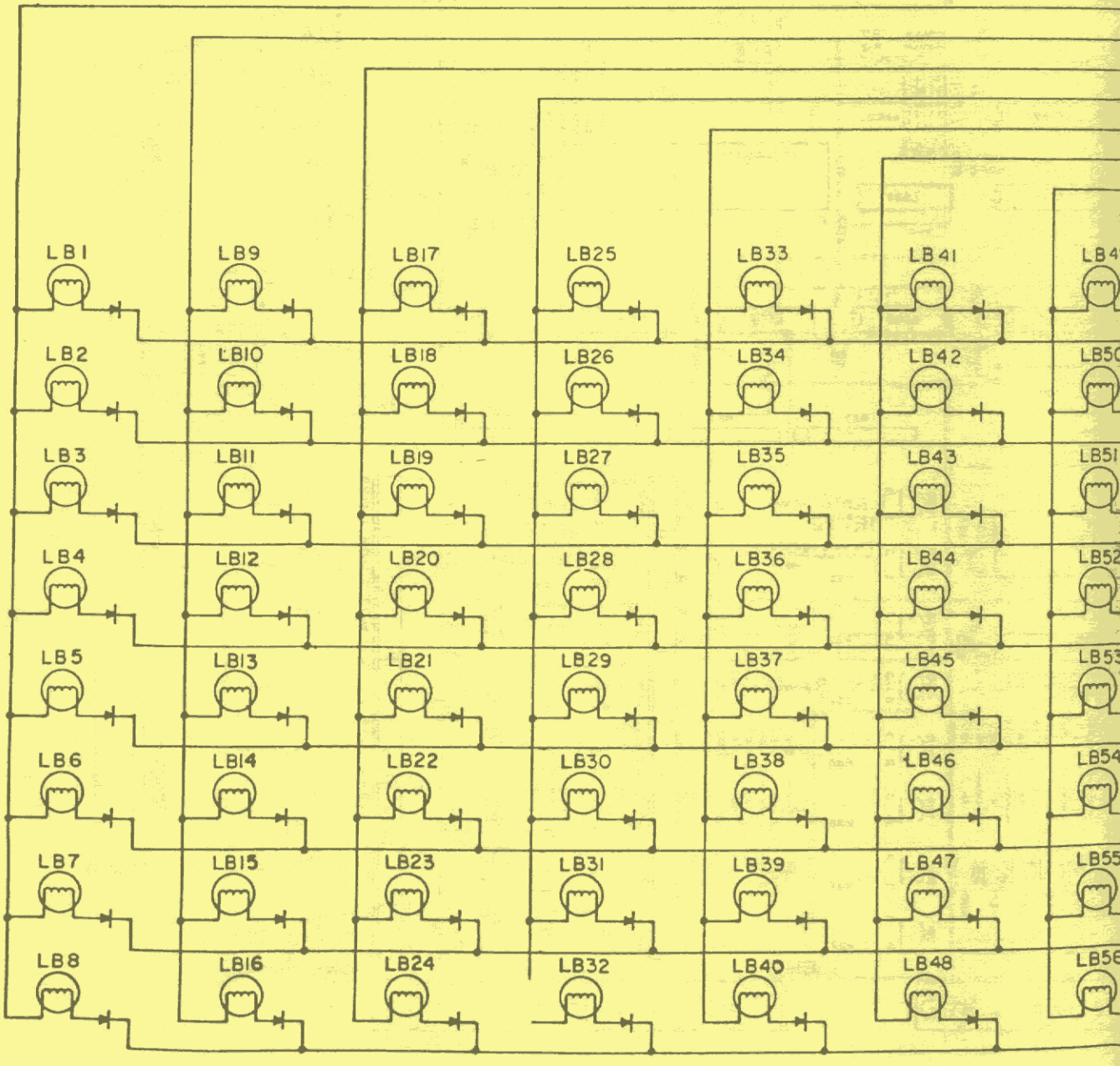
Lamp Matrix No. & Description	
49	Matt Scoring
50	Slash Solo
51	Lite COMA
52	Gilby Rolls
53	Extra Ball
54	Mystery Scoop
55	Left Shooter/Left Ramp
56	Roll
57	Left Top Lane "J" of JAM
58	Middle Top Lane "A" of JAM
59	Right Top Lane "M" of JAM
60	Back Stage Pass
61	Slash
62	Right Shooter Lane
63	Extra Ball Button
64	Credit

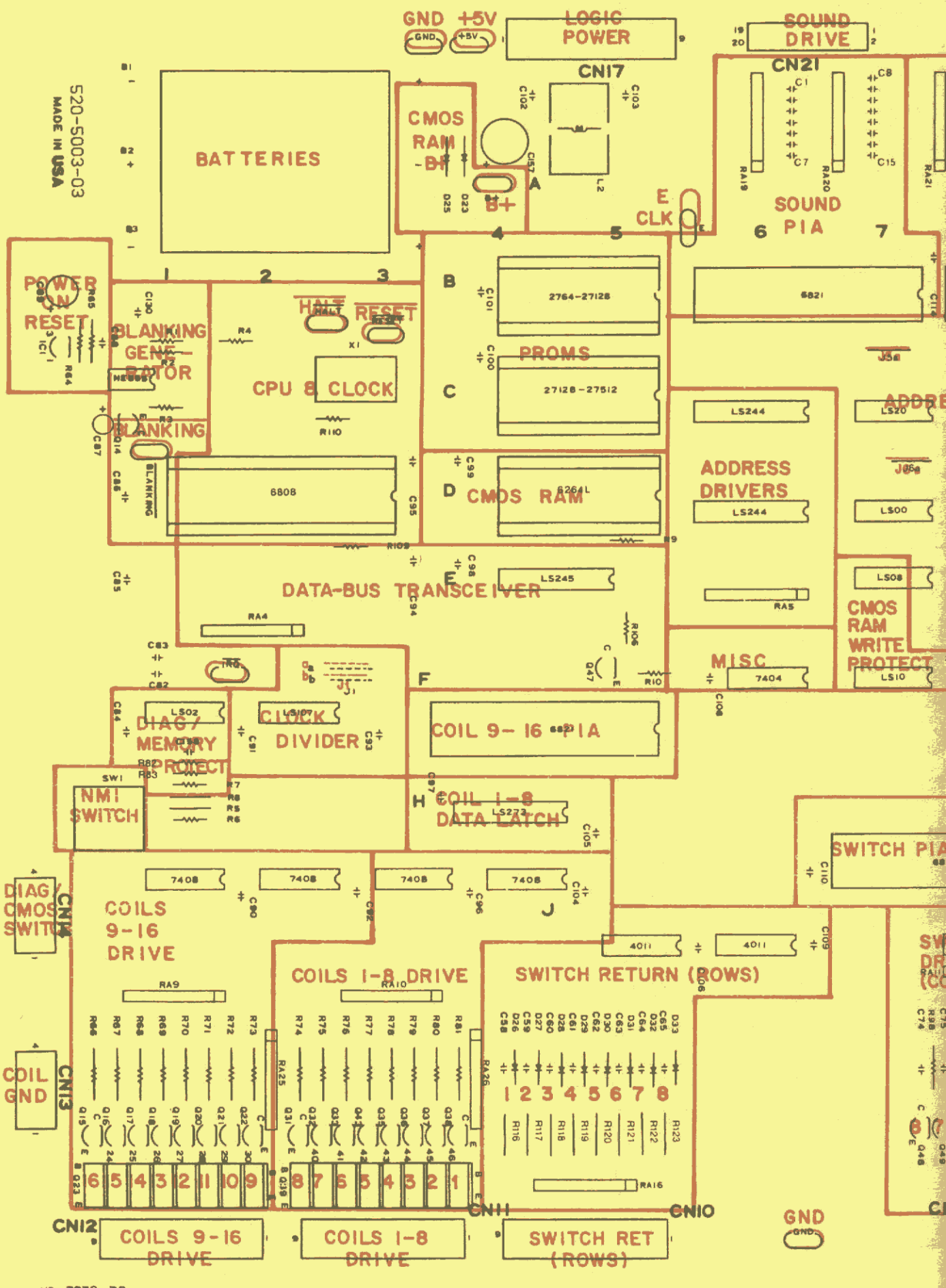


Lamp Matrix No. & Description	
01	Cross Grid Top "Dizzy"
02	" **R** " of —**R**—OCK
03	" **O** " of R—**O**—CK
04	" **C** " of RO—**C**—K
05	" **K** " of ROC—**K**—
06	COMA
07	Multi-Ball Ready
08	Add Band Members
09	Same Player Shoots Again
10	Cross Grid Left "Matt"
11	Double Mode
12	" **R** " of —**R**—OSES
13	" **O** " of R—**O**—SES
14	" **S** " of RO—**S**—ES
15	" **E** " of ROS—**E**—S
16	" **S** " of ROSE—**S**—

Lamp Matrix No. & Description	
17	Left Outlane Patience
18	Left Return Lite Rock
19	Cross Grid Upr. Center "Axl"
20	" **G** " of —**G**—UNS
21	" **U** " of G—**U**—NS
22	" **N** " of GU—**N**—S
23	" **S** " of GUN—**S**—
24	" **N'** " of Guns —**N'**— Roses
25	Right Outlane Michelle
26	Right Return Lite Guitar
27	Captive Ball
28	Cross Grid Right "Duff"
29	" **D** " of —**D**—UFF
30	" **U** " of D—**U**—FF
31	" **F** " of DU—**F**—F
32	" **F** " of DUF—**F**—

Lamp Matrix	
33	" **R** " Ran
34	" **R** " Ran
35	" **R** " Ran
36	Magnets
37	Cross Gr
38	" **G**" Ram
39	" **G**" Ram
40	" **G**" Ram
41	Riot Ball
42	Axl 3-Bal
43	Dizzy Ba
44	Duff Roc
45	Super Sn
46	Cross Gr
47	RIOT Jac
48	Super Ja

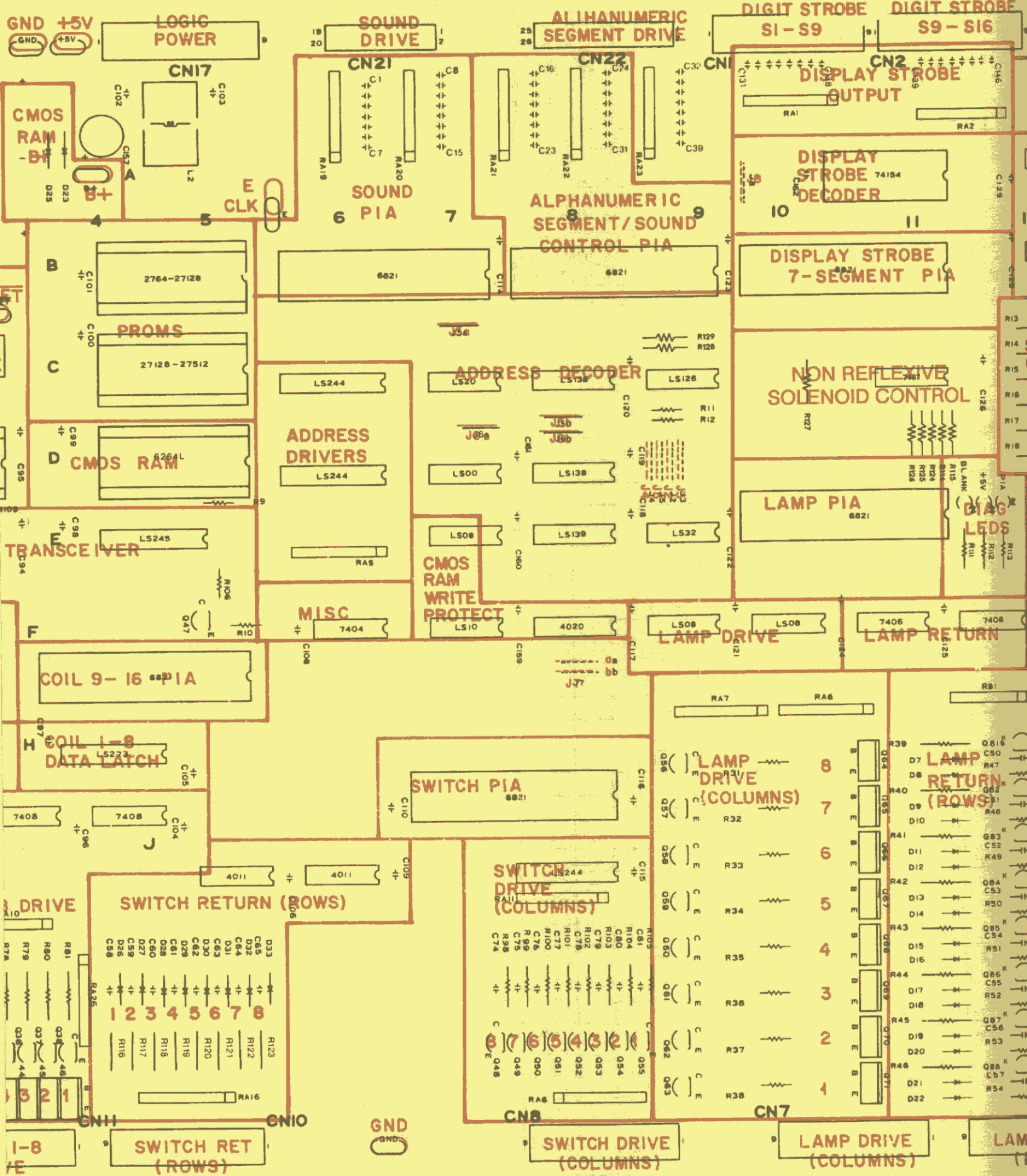


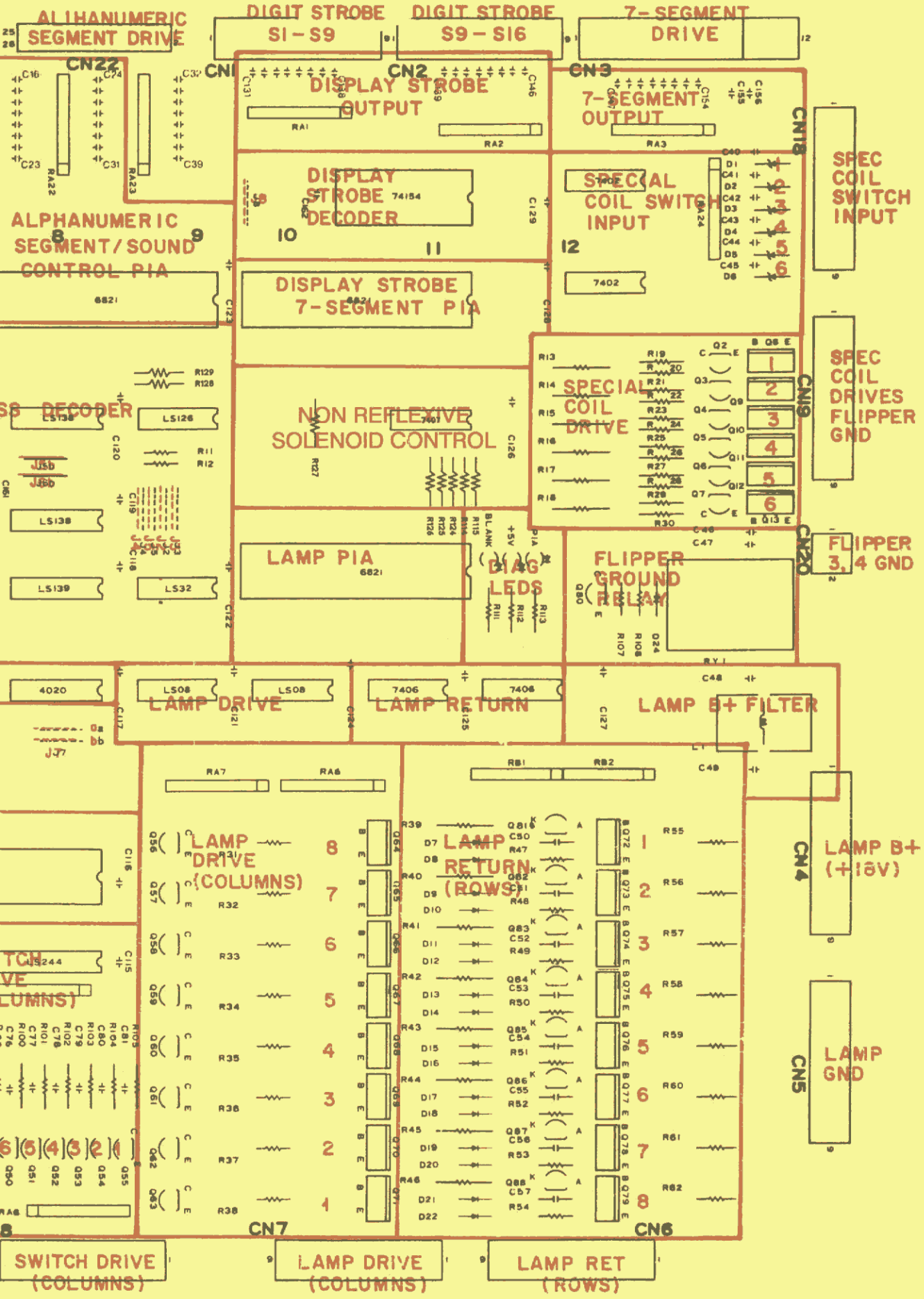


520-5003-03 REV.-A

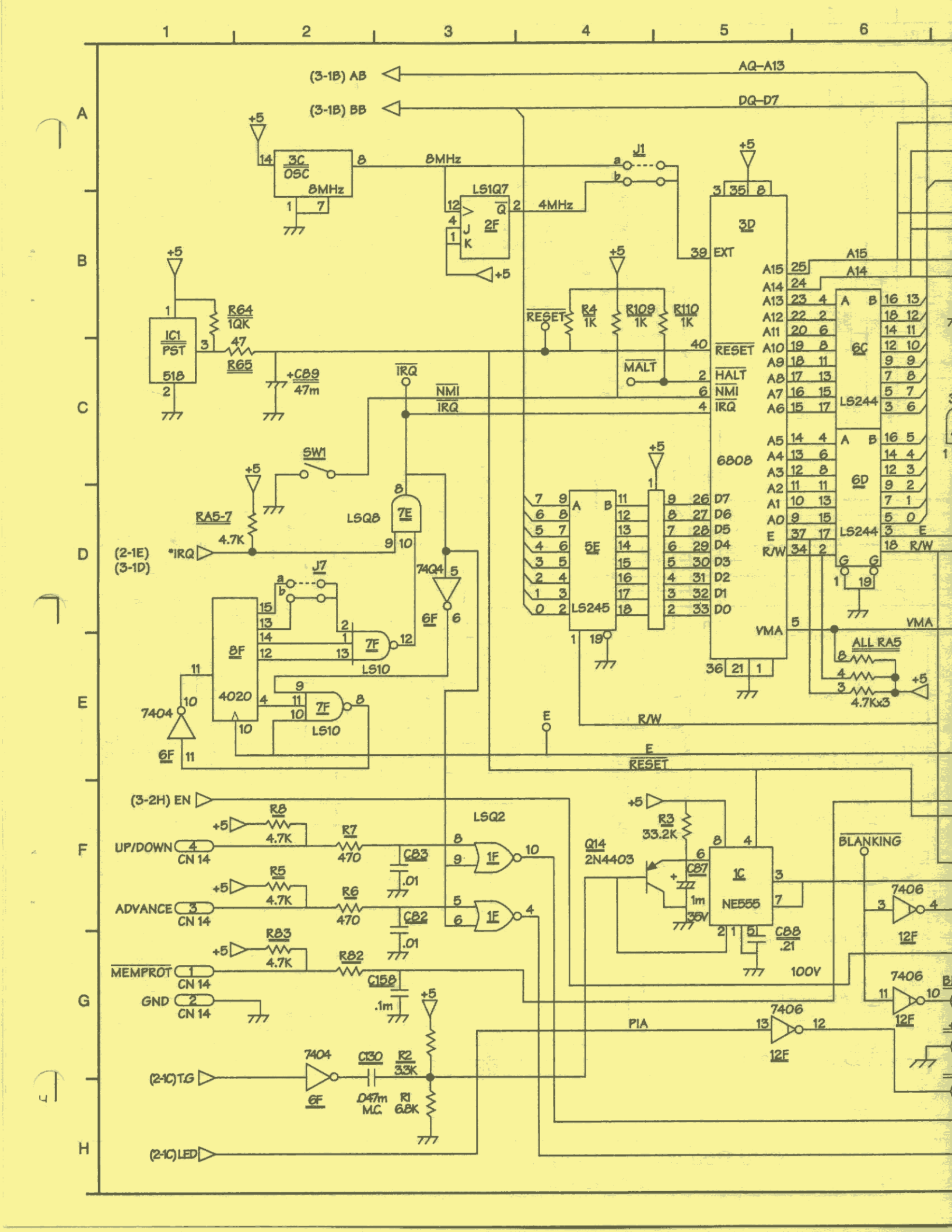
DE-0282-3A

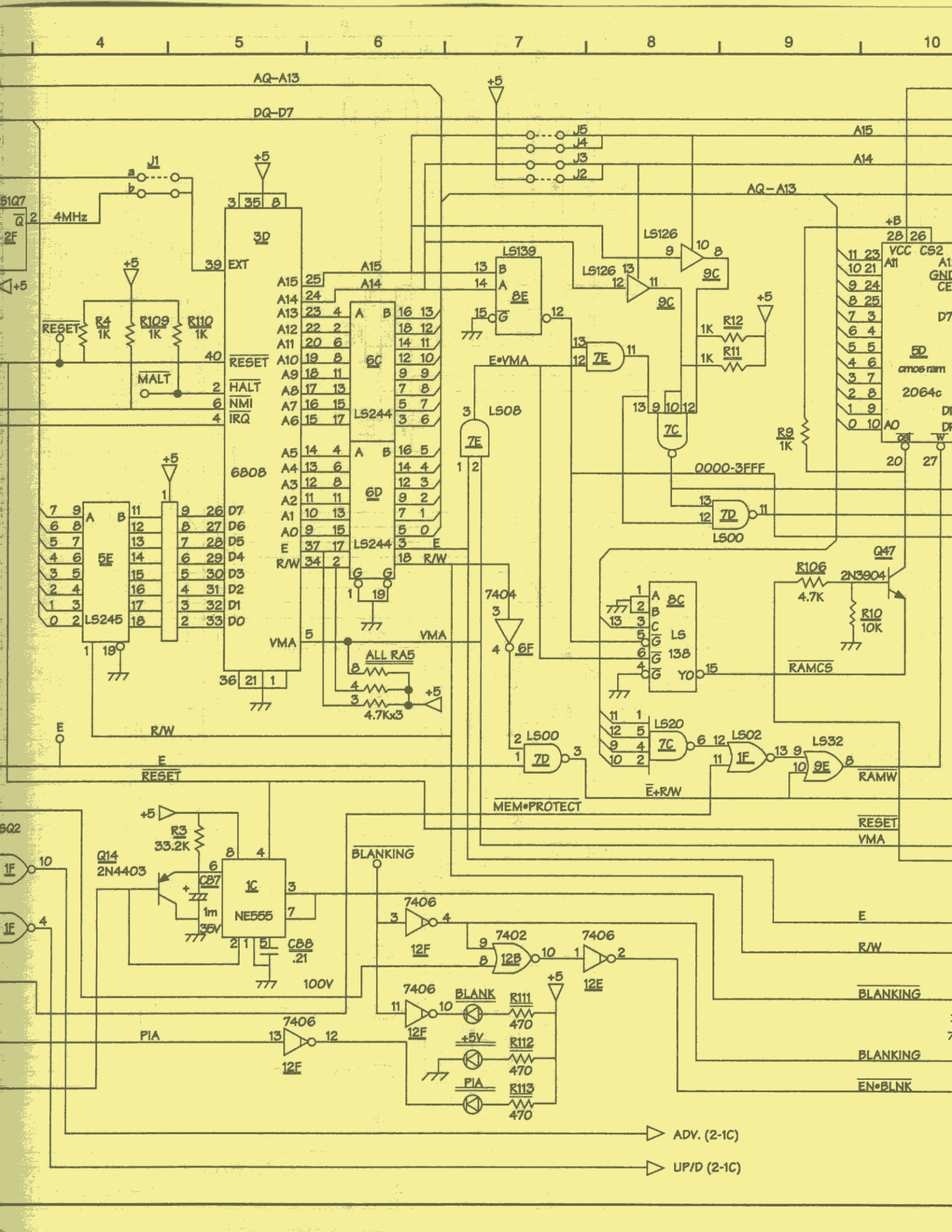
74 **CPU Board Assembly Diagram**

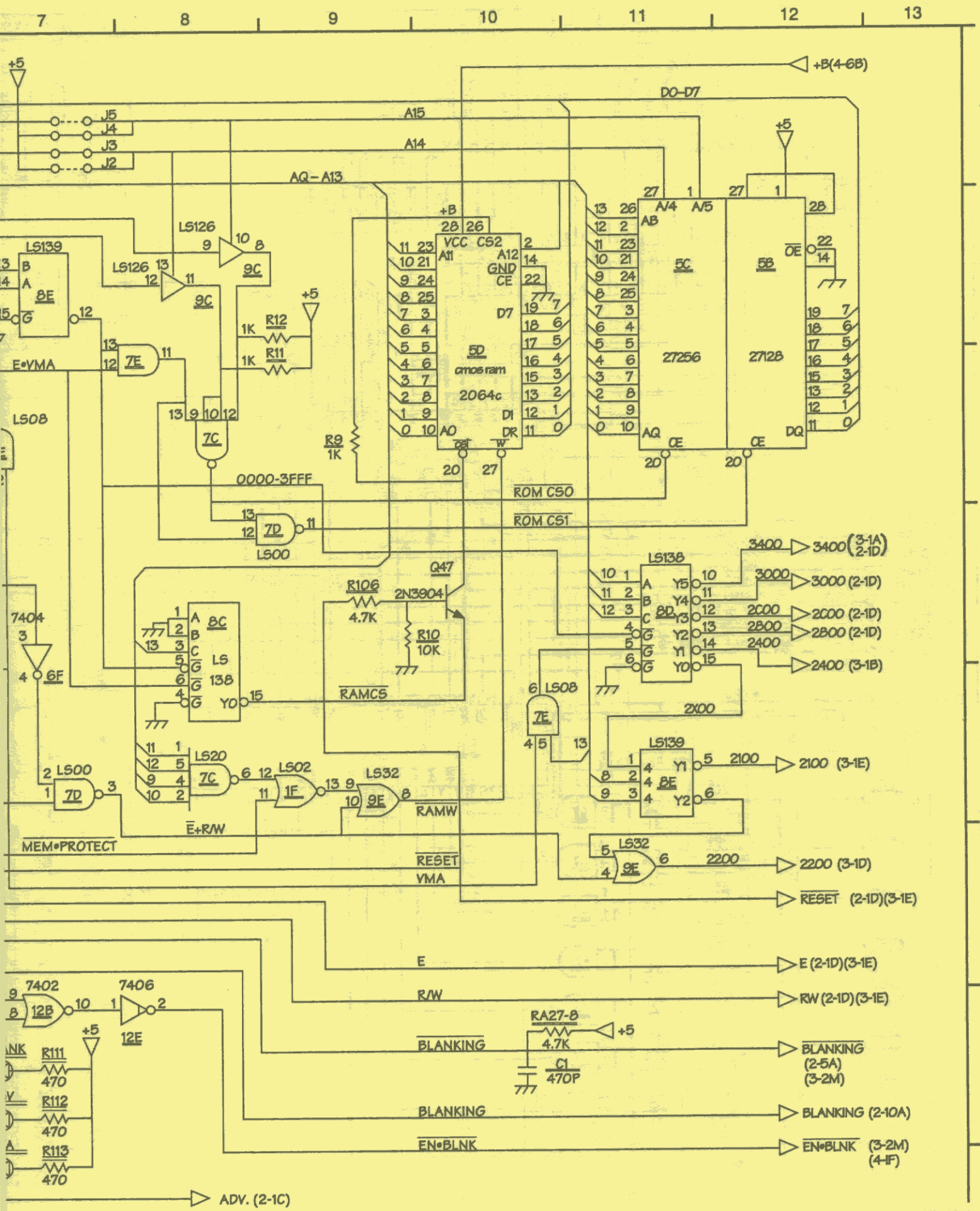

GND
+5V
LOGIC POWER
CN17
SOUND DRIVE
CN21
ALPHANUMERIC SEGMENT DRIVE
CN22
DIGIT STROBE S1 – S9
DIGIT STROBE S9 – S16
CN2
DISPLAY STROBE OUTPUT
CMOS RAM -B+
B+
E CLK
SOUND PIA
ALPHANUMERIC SEGMENT/SOUND CONTROL PIA
DISPLAY STROBE 74154 DECODER
DISPLAY STROBE 7-SEGMENT PIA
2764-27128
PROMS
27128-27512
ADDRESS DECODER
NON REFLEXIVE SOLENOID CONTROL
LS244
ADDRESS DRIVERS
CMOS RAM
6264L
LAMP PIA
DIAG LEDS
TRANSCEIVER
LS245
CMOS RAM WRITE PROTECT
MISC
7404
LAMP DRIVE
LAMP RETURN
COIL 9-16 PIA
COIL 1-8 DATA LATCH
SWITCH PIA
LAMP DRIVE (COLUMNS)
LAMP RETURN (ROWS)
SWITCH DRIVE (COLUMNS)
SWITCH RETURN (ROWS)
4011
CN11
CN10
CN8
CN7
SWITCH RET (ROWS)
SWITCH DRIVE (COLUMNS)
LAMP DRIVE (COLUMNS)



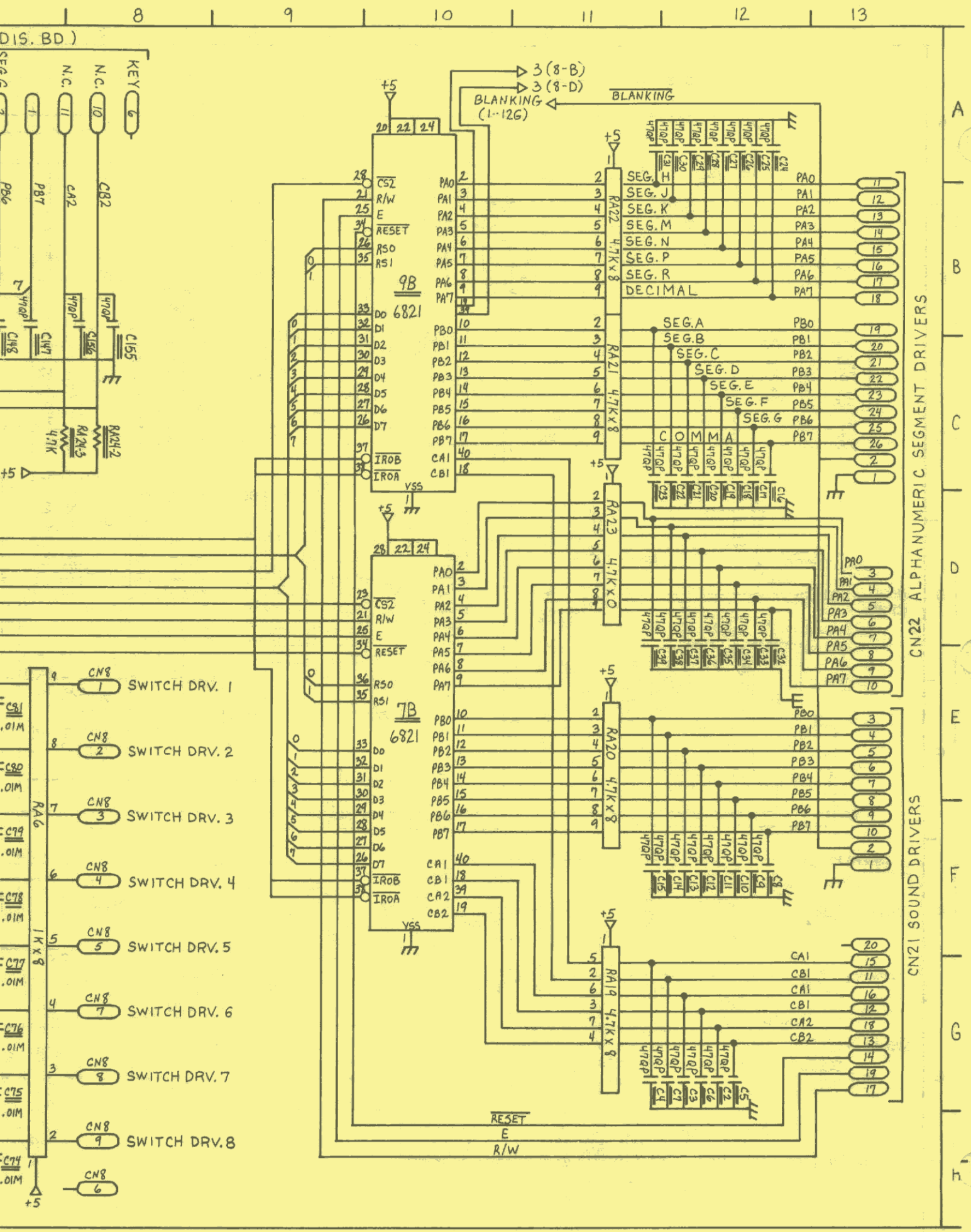
74 CPU Board Assembly Diagram


(3-1B) AB
(3-1B) BB
AQ-A13
DQ-D7
3C OSC 8MHz
8MHz
LS1Q7 2F
4MHz
J1
3D
EXT
IC1 PST 518
R64 1QK
47
R65
+C89 47m
RESET
R4 1K
R109 1K
R110 1K
MALT
HALT
NMI
IRQ
6808
6C
6D
LS244
A15
A14
A13
A12
A11
A10
A9
A8
A7
A6
A5
A4
A3
A2
A1
A0
E
R/W
VMA
SW1
RA5-7 4.7K
LSQ8 7E
(2-1E) (3-1D) *IRQ
J7
8F 4020
7F LS10
7404 6F
74Q4 6F
5F LS245
D7
D6
D5
D4
D3
D2
D1
D0
ALL RA5
4.7Kx3
(3-2H) EN
UP/DOWN CN 14
ADVANCE CN 14
MEMPROT CN 14
GND CN 14
R8 4.7K
R7 470
C83 .01
R5 4.7K
R6 470
C82 .01
R83 4.7K
R82
C158 .1m
LSQ2 1F
Q14 2N4403
R3 33.2K
C87 1m 35V
1C NE555
C88 .21 100V
BLANKING
7406 12F
PIA
(2-1C) TG
7404 6F
C130 .047m M.C.
R2 3.3K
R1 6.8K
(2-1C) LED

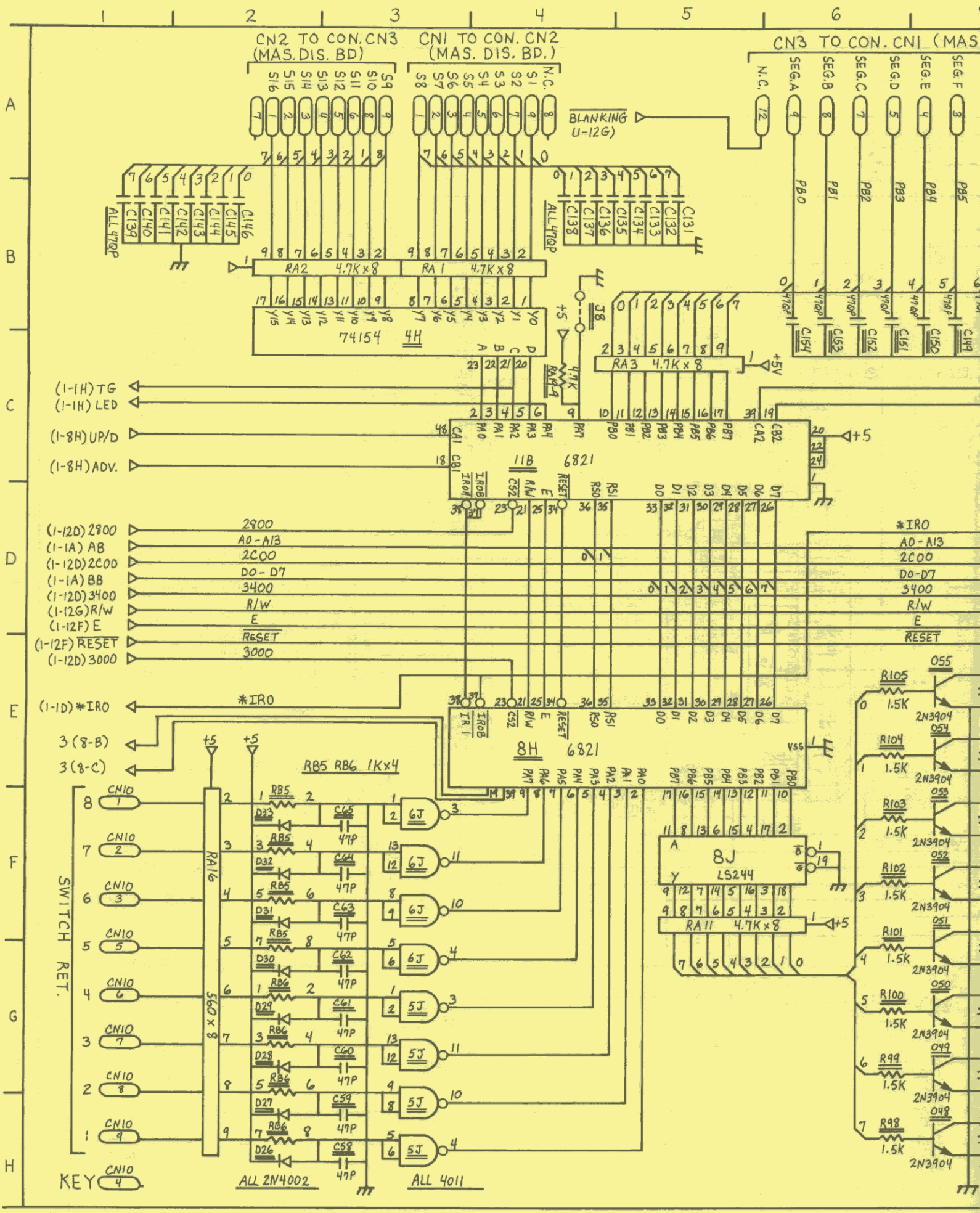

4
5
6
7
8
9
10
AQ-A13
DQ-D7
+5
J5
J4
J3
J2
A15
A14
AQ-A13
J1
4MHz
3D
EXT
RESET
HALT
NMI
IRQ
6808
R4 1K
R109 1K
R110 1K
MALT
A15
A14
A13
A12
A11
A10
A9
A8
A7
A6
A5
A4
A3
A2
A1
A0
E
R/W
6C
6D
LS244
LS139
8E
LS126
9C
7E
LS08
7C
7D
LS00
E•VMA
0000-3FFF
R12 1K
R11 1K
R9 1K
5D
cmos ram
2064c
5E
LS245
D7
D6
D5
D4
D3
D2
D1
D0
VMA
ALL RA5
4.7Kx3
7404
6F
8C
LS 138
Y0
RAMCS
Q47
2N3904
R106 4.7K
R10 10K
LS20
7C
LS02
1F
LS32
9E
RAMW
E+R/W
MEM•PROTECT
RESET
VMA
E
R/W
BLANKING
Q14
2N4403
R3 33.2K
C87 1m 35V
1C
NE555
C88 .21
100V
7406
12F
7402
12B
12E
BLANK
R111 470
+5V
R112 470
PIA
R113 470
BLANKING
EN•BLNK
ADV. (2-1C)
UP/D (2-1C)



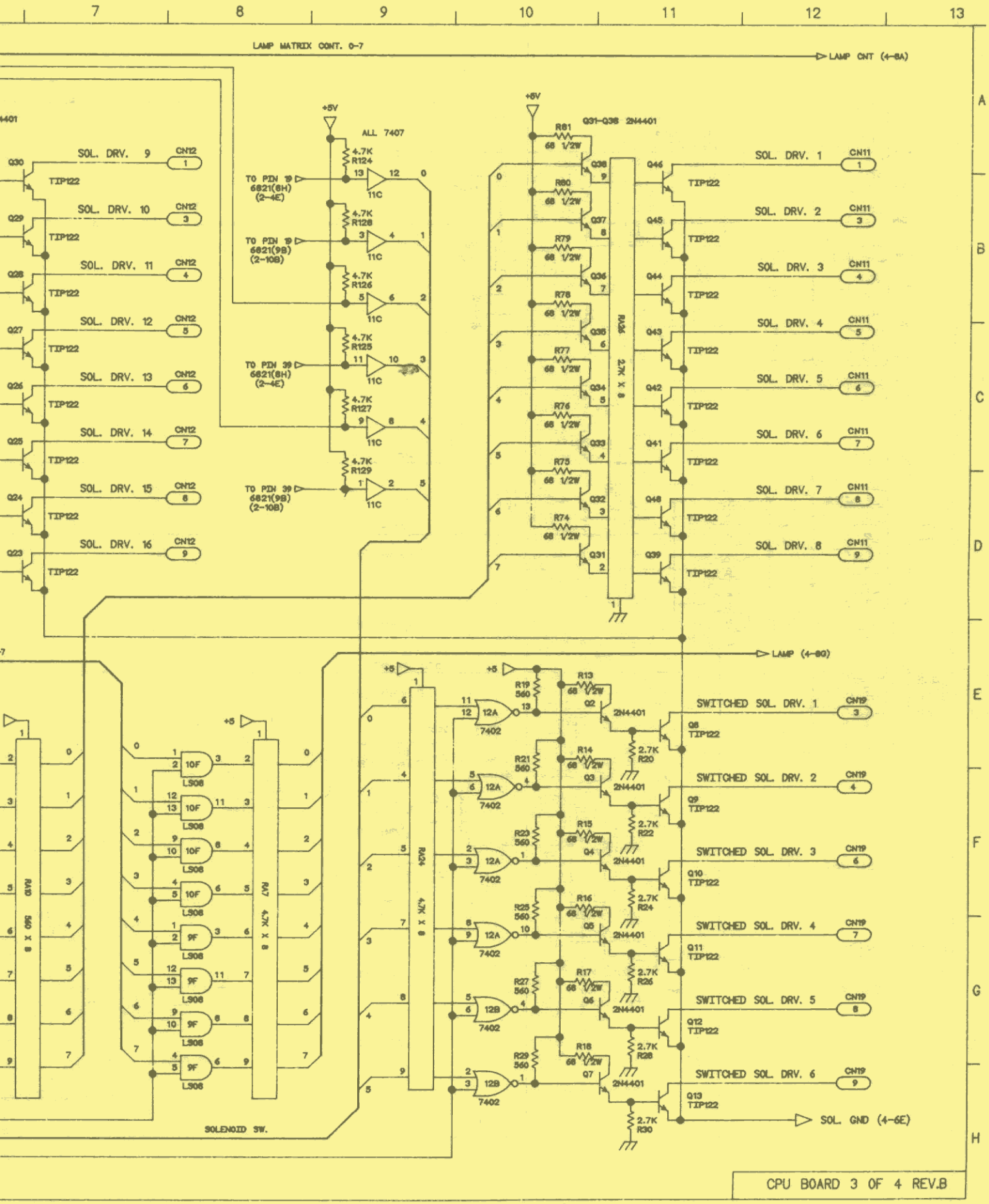
CPU Board Logic Diagram (Sheet 1 of 4)



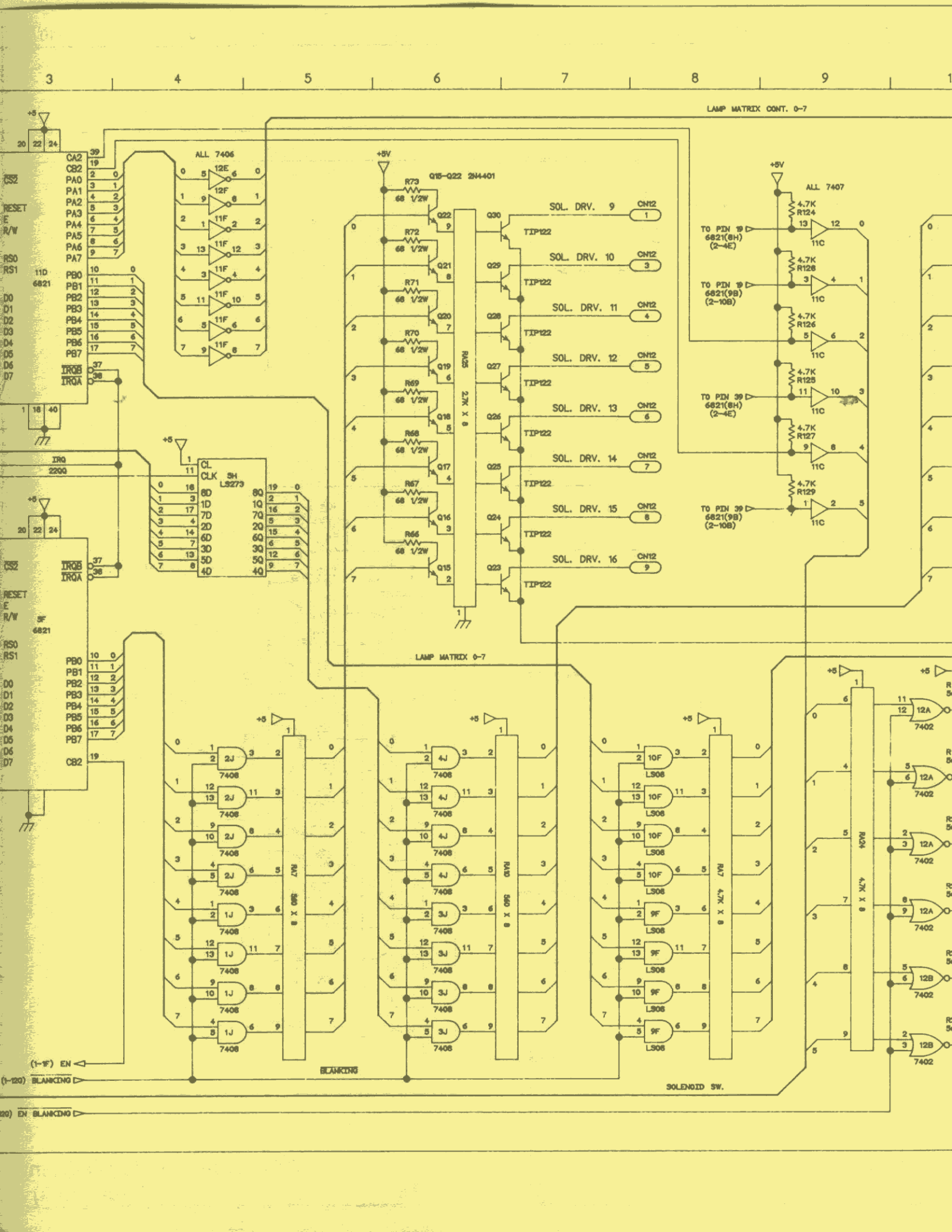
CPU Board Logic Diagram
(Sheet 2 of 4)

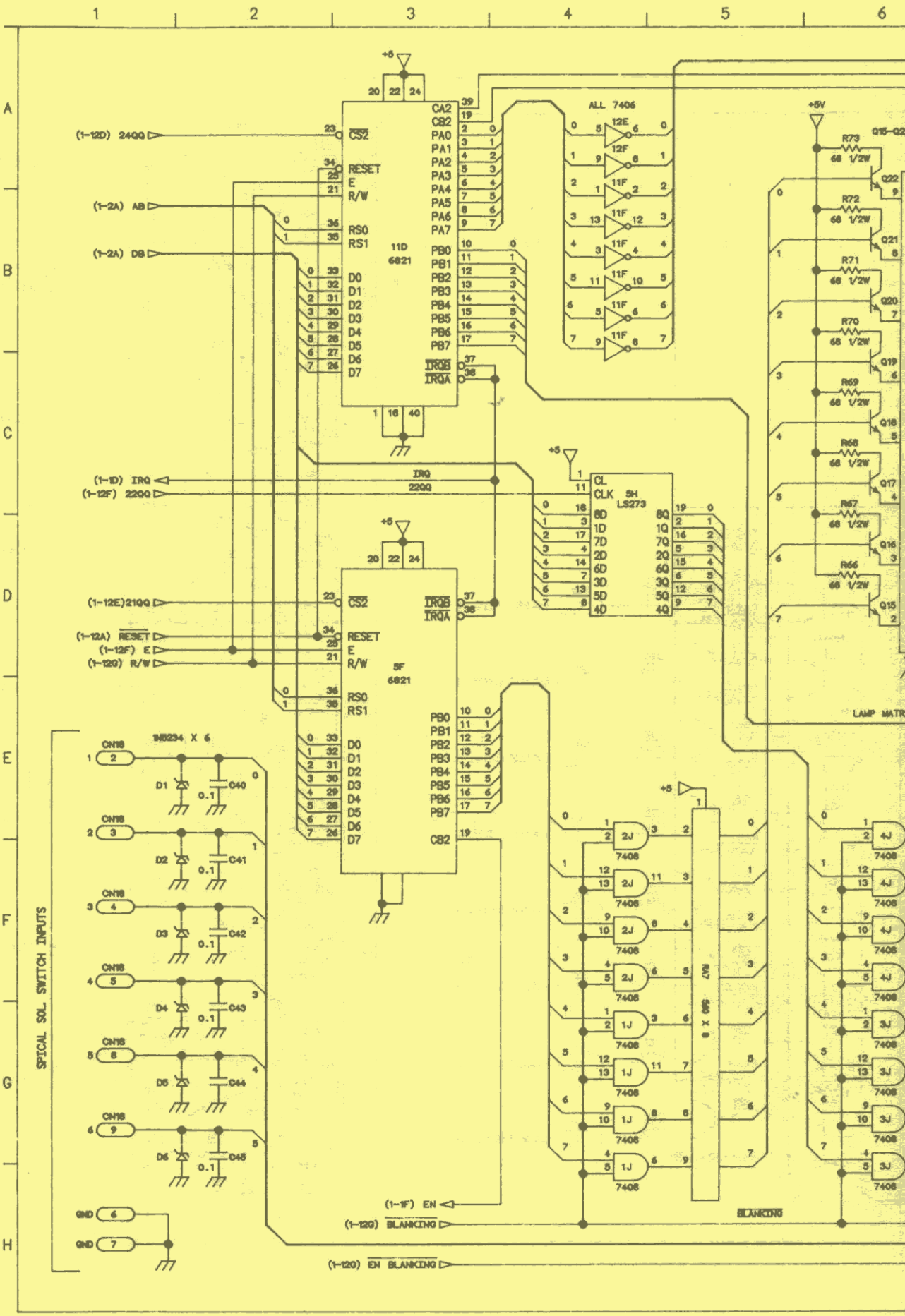


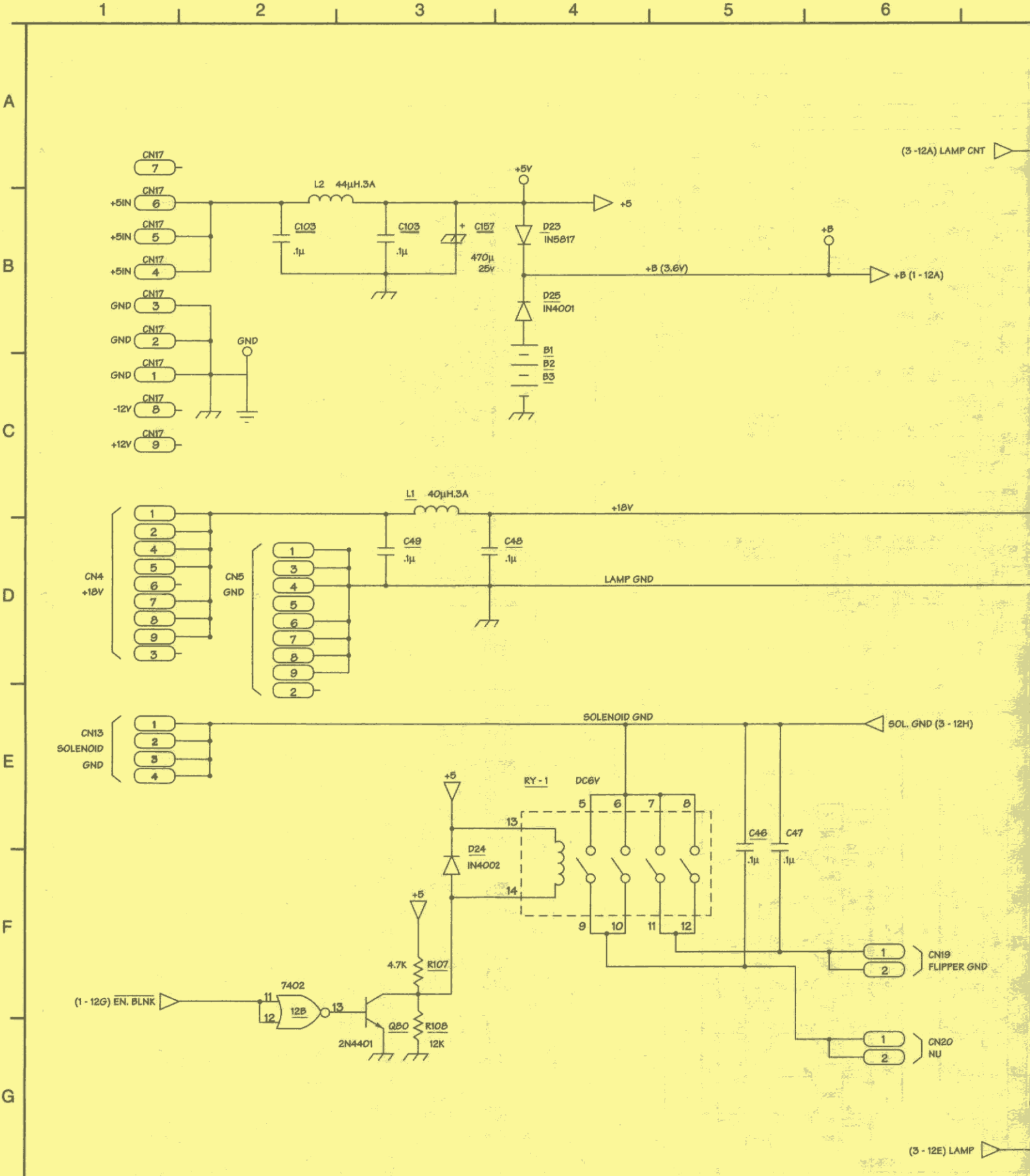
CPU Board Logic Diagram
(Sheet 2 of 4)



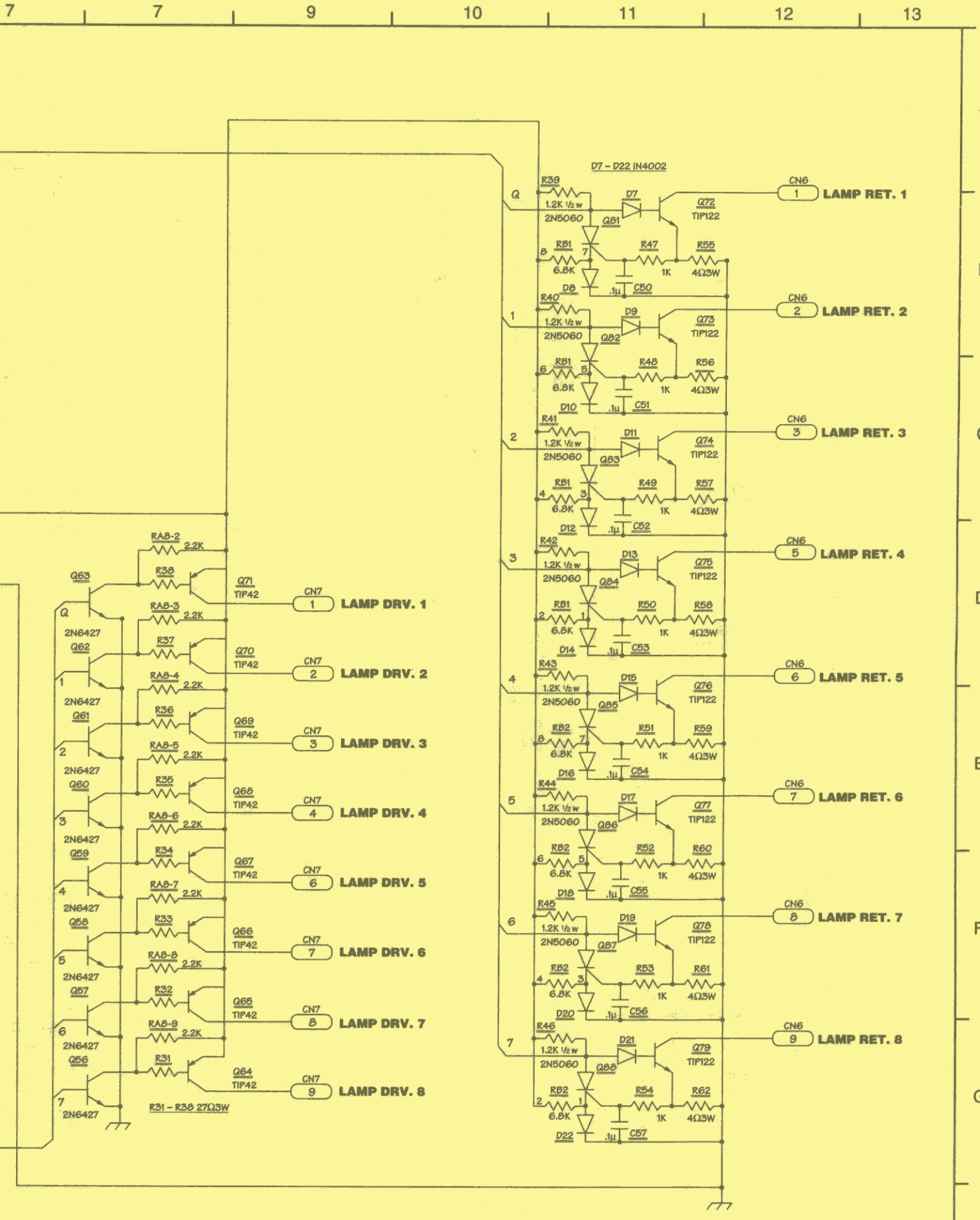
CPU Board Logic Diagram (Sheet 3 of 4)


LAMP MATRIX CONT. 0-7
ALL 7406
ALL 7407
Q15-Q22 2N4401
SOL. DRV. 9
SOL. DRV. 10
SOL. DRV. 11
SOL. DRV. 12
SOL. DRV. 13
SOL. DRV. 14
SOL. DRV. 15
SOL. DRV. 16
TIP122
LAMP MATRIX 0-7
BLANKING
SOLENOID SW.
(1-1F) EN
(1-12G) BLANKING
(2-2G) EN BLANKING

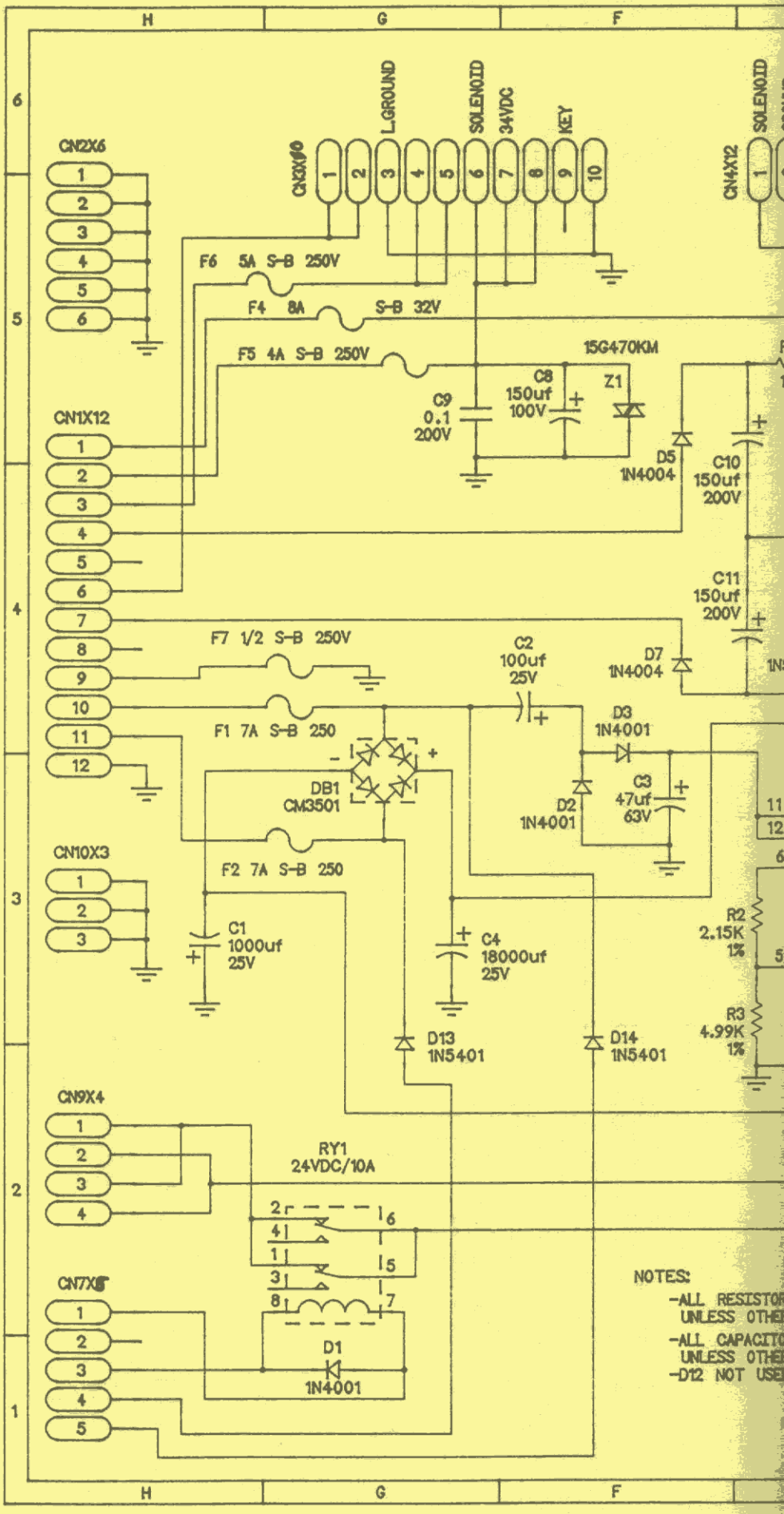

1
2
3
4
5
6
A
B
C
D
E
F
G
H
+5
11D
6821
5F
6821
CS2
RESET
E
R/W
RS0
RS1
D0
D1
D2
D3
D4
D5
D6
D7
PA0
PA1
PA2
PA3
PA4
PA5
PA6
PA7
PB0
PB1
PB2
PB3
PB4
PB5
PB6
PB7
CA2
CB2
IRQB
IRQA
(1-12D) 24QQ
(1-2A) AB
(1-2A) DB
(1-1D) IRQ
(1-12F) 22QQ
(1-12E)21QQ
(1-12A) RESET
(1-12F) E
(1-12G) R/W
IRQ
22QQ
ALL 7406
12E
12F
11F
CL
CLK
5H
LS273
8D
1D
7D
2D
6D
3D
5D
4D
8Q
1Q
7Q
2Q
6Q
3Q
5Q
4Q
+5V
R73
R72
R71
R70
R69
R68
R67
R66
68 1/2W
Q22
Q21
Q20
Q19
Q18
Q17
Q16
Q15
LAMP MATR
SPICAL SOL SWITCH INPUTS
1N5234 X 6
CN18
D1
D2
D3
D4
D5
D6
C40
C41
C42
C43
C44
C45
0.1
GND
(1-1F) EN
(1-12G) BLANKING
(1-12G) EN BLANKING
2J
1J
4J
3J
7408
RN7 56 X 8
BLANKING

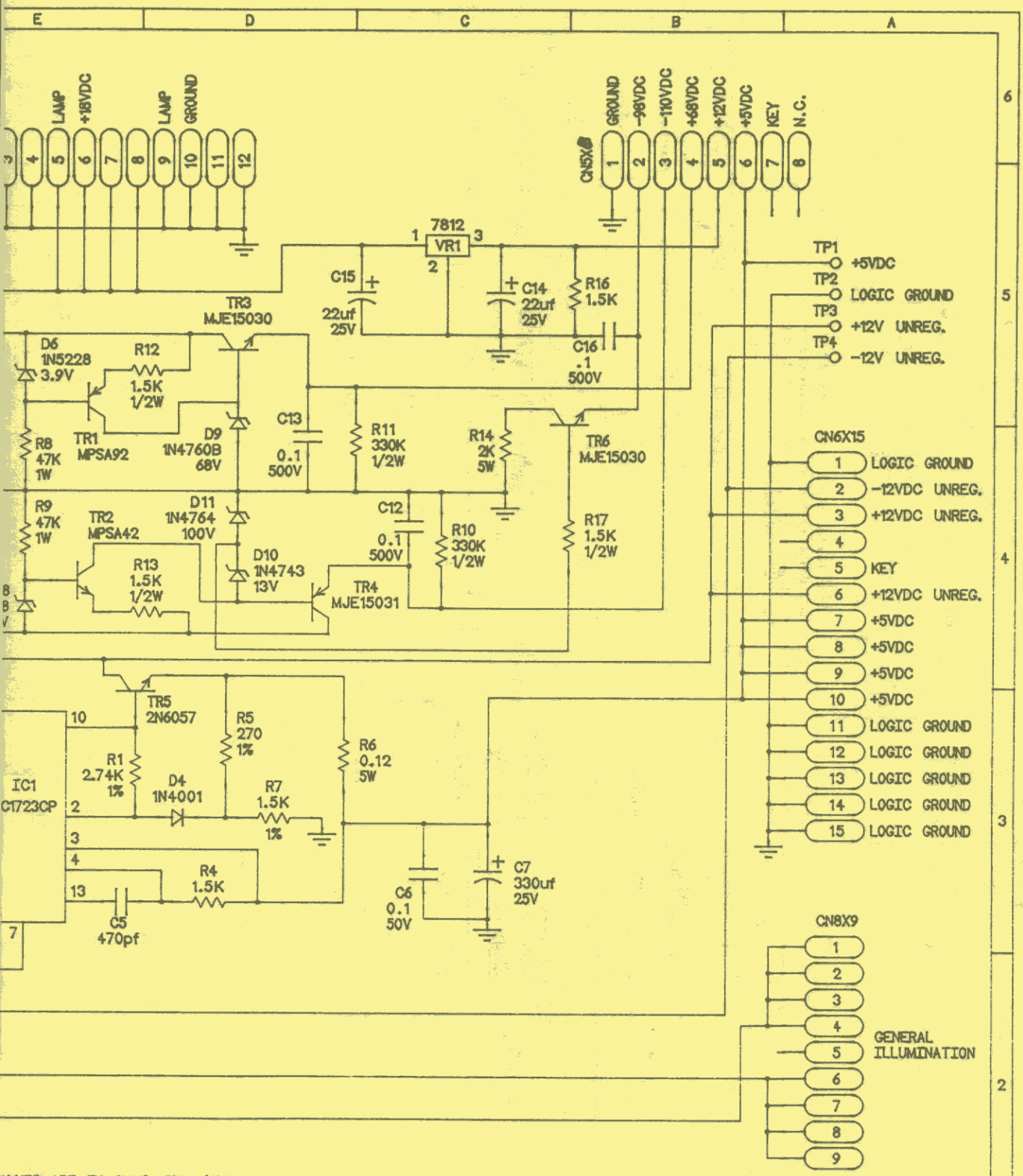


CPU Board Logic Diagram
(Sheet 4 of 4)



CPU Board Logic Diagram (Sheet 4 of 4)

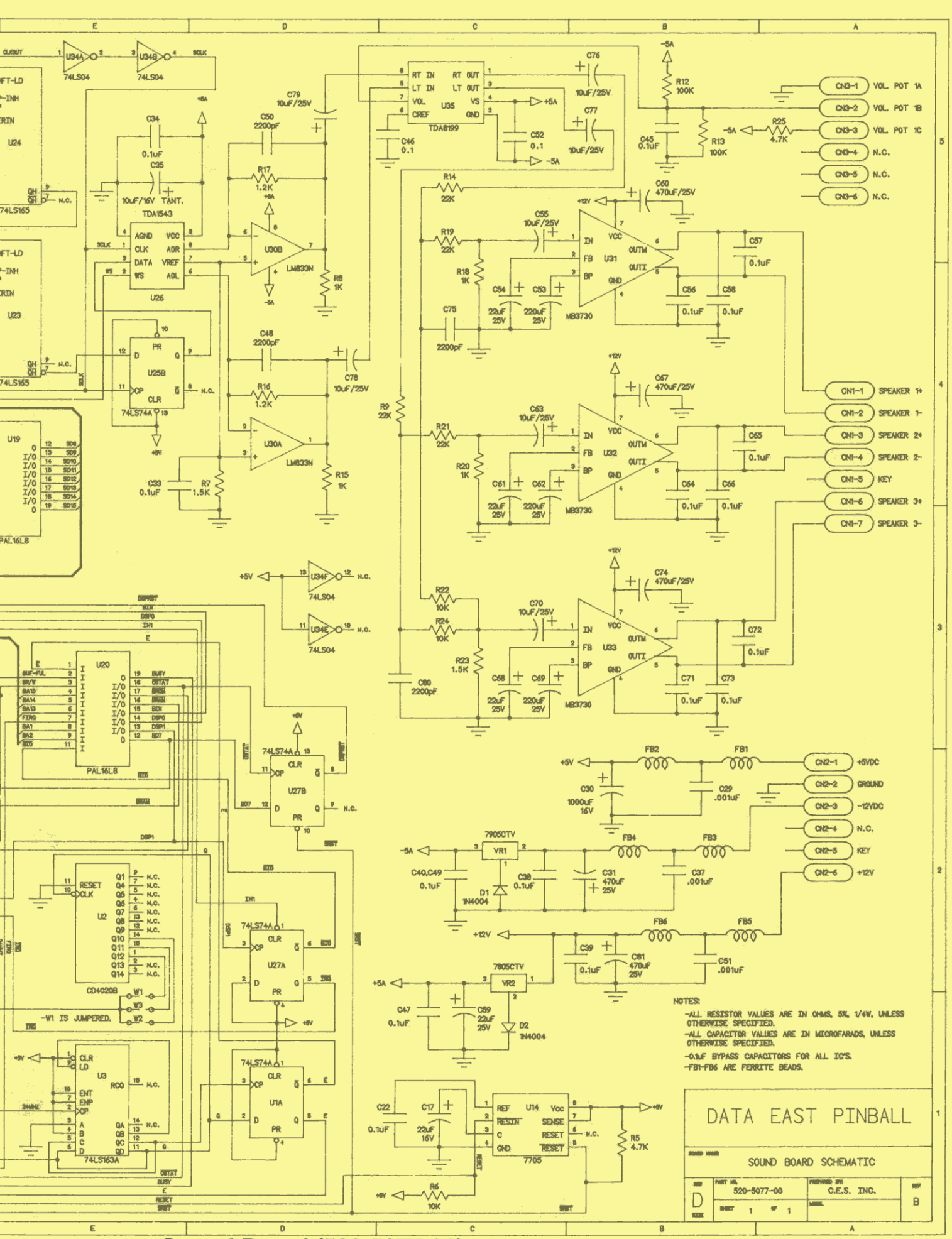

H
G
F
6
5
4
3
2
1
CN2X6
CN3X10
L.GROUND
SOLENOID
34VDC
KEY
CN4X12
SOLENOID
F6 5A S-B 250V
F4 8A S-B 32V
F5 4A S-B 250V
15G470KM
C8
150uf
100V
Z1
C9
0.1
200V
D5
1N4004
C10
150uf
200V
C11
150uf
200V
CN1X12
F7 1/2 S-B 250V
C2
100uf
25V
D7
1N4004
F1 7A S-B 250
D3
1N4001
DB1
CM3501
D2
1N4001
C3
47uf
63V
CN10X3
F2 7A S-B 250
C1
1000uf
25V
C4
18000uf
25V
R2
2.15K
1%
R3
4.99K
1%
D13
1N5401
D14
1N5401
CN9X4
RY1
24VDC/10A
CN7X5
D1
1N4001
NOTES:
-ALL RESISTOR
UNLESS OTHE
-ALL CAPACITO
UNLESS OTHE
-D12 NOT USE



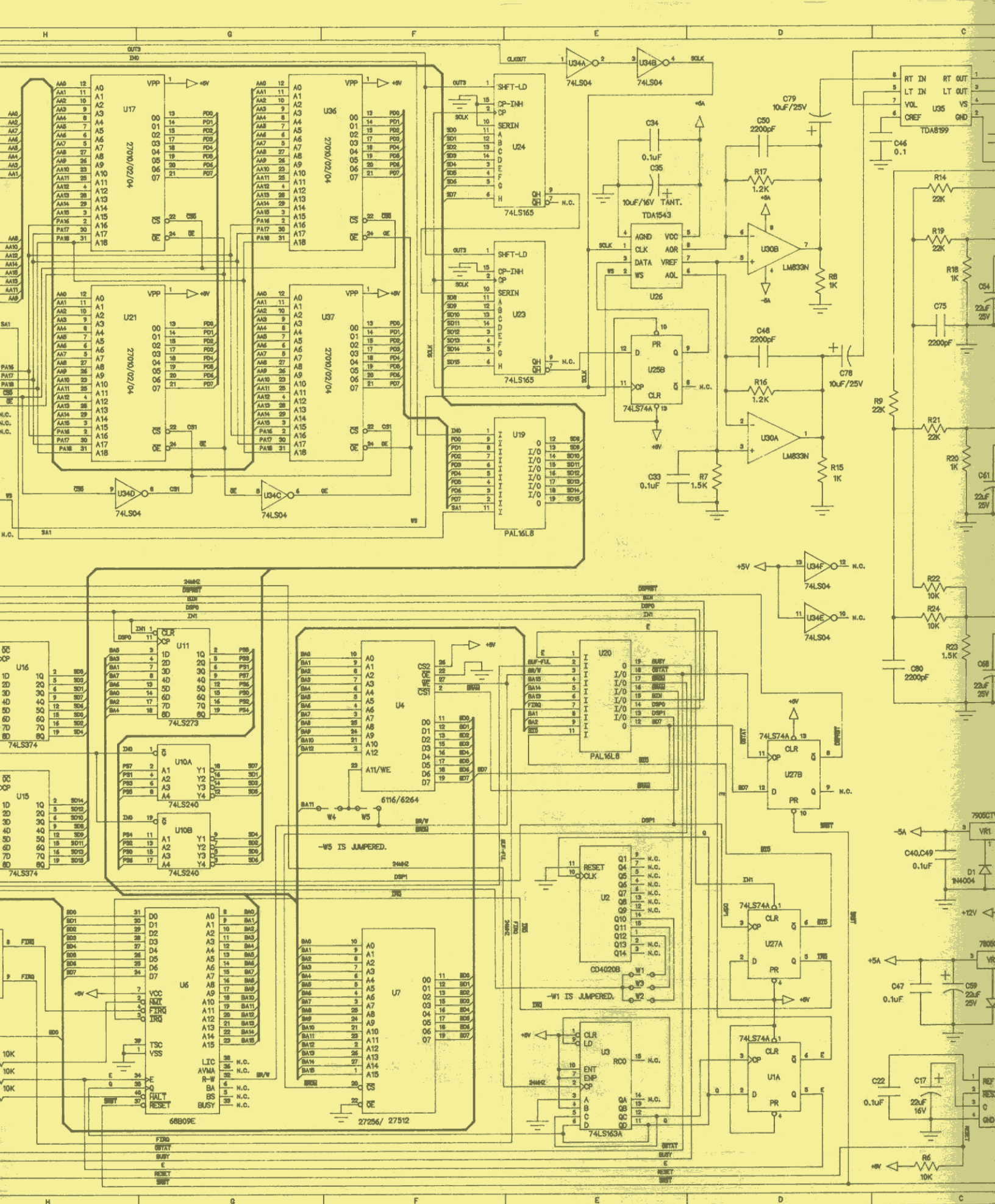
ALUES ARE IN OHMS, 5%, 1/4W,
SE SPECIFIED.
VALUES ARE IN MICROFARADS,
SE SPECIFIED.

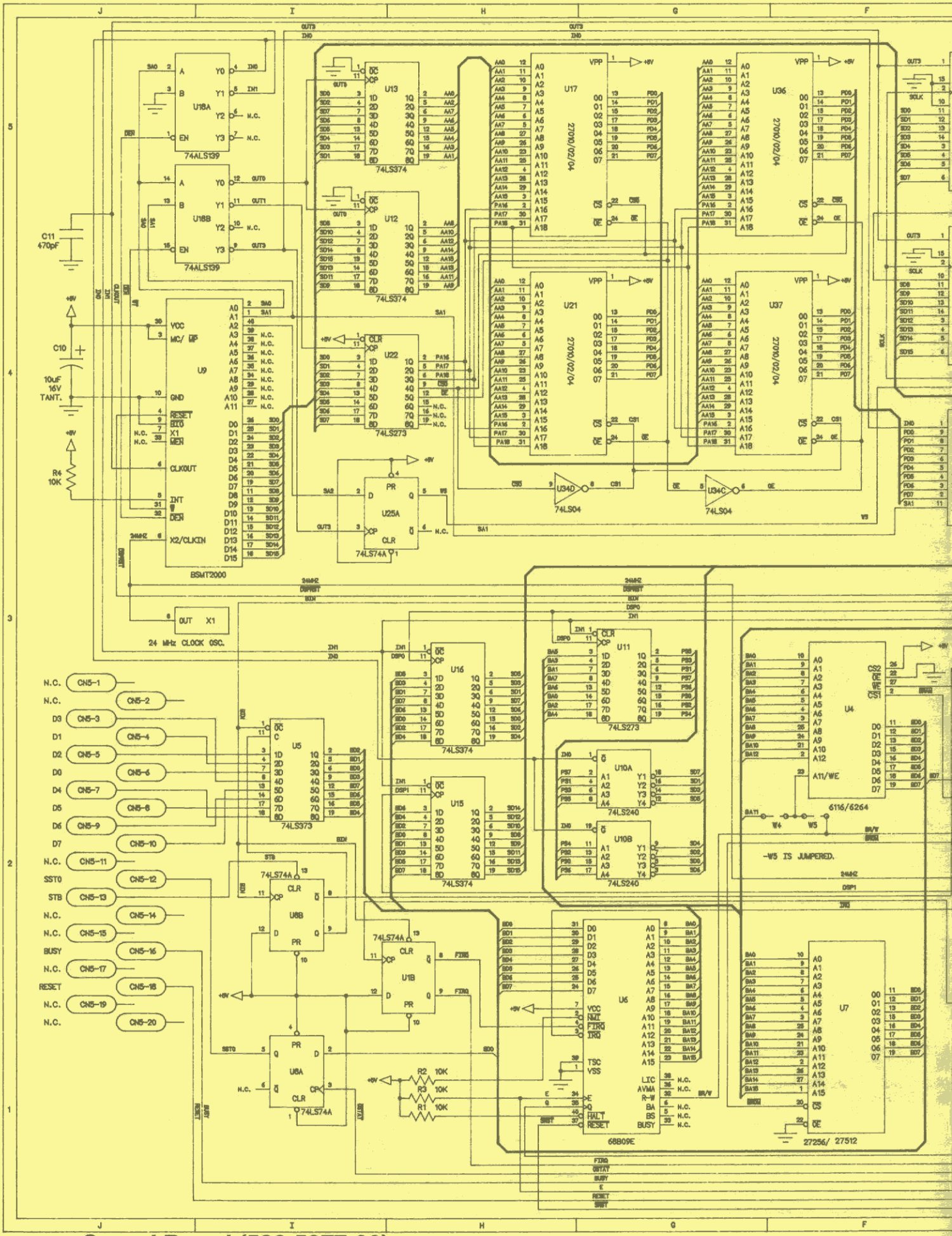
DATA EAST PINBALL
POWER SUPPLY BOARD SCHEMATIC

PREPARED BY:	DWG	PART NO.	REV
CES INC.	C	520-5047-02	A
	SIZE	SHEET 1 OF 1	MODEL

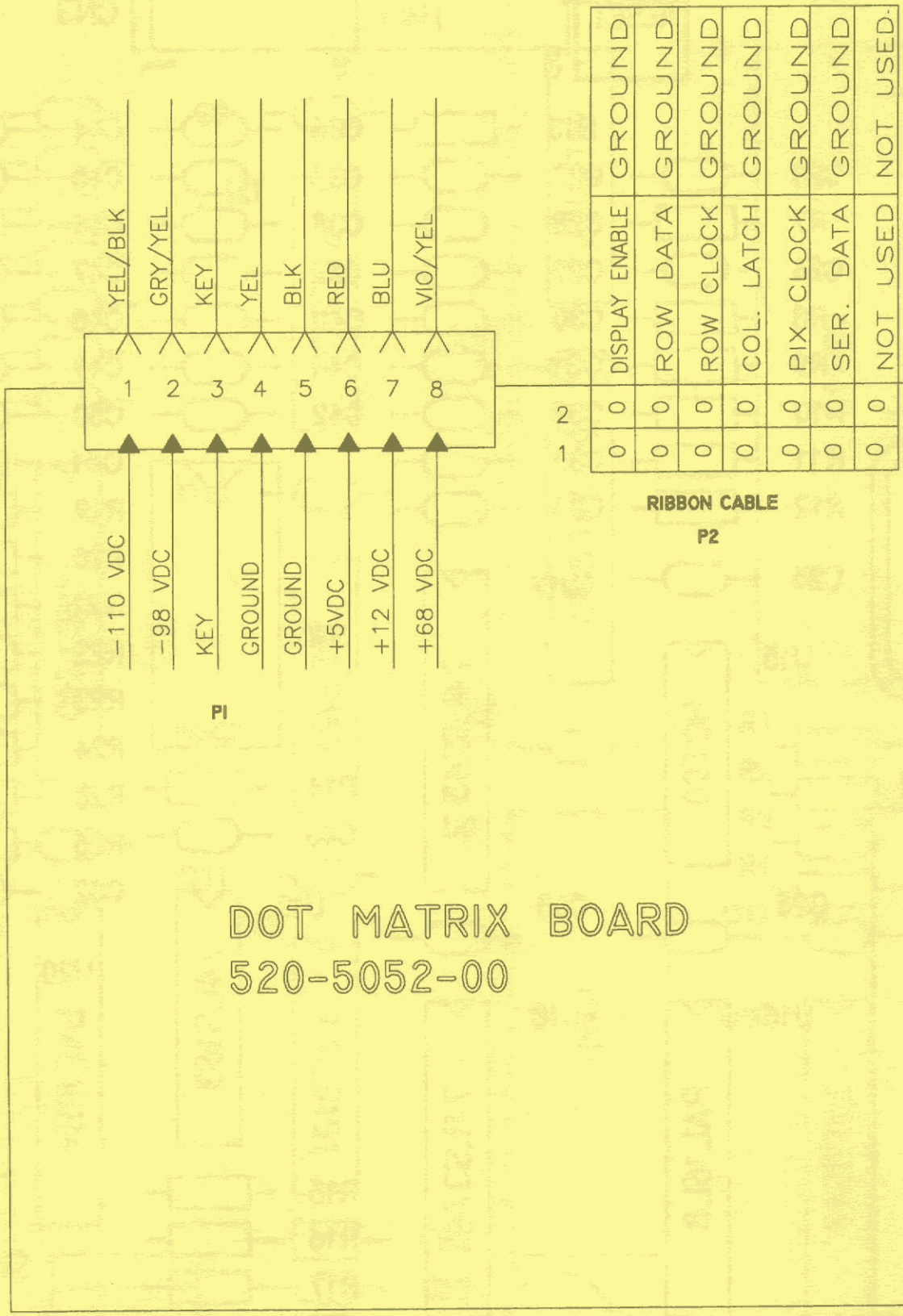


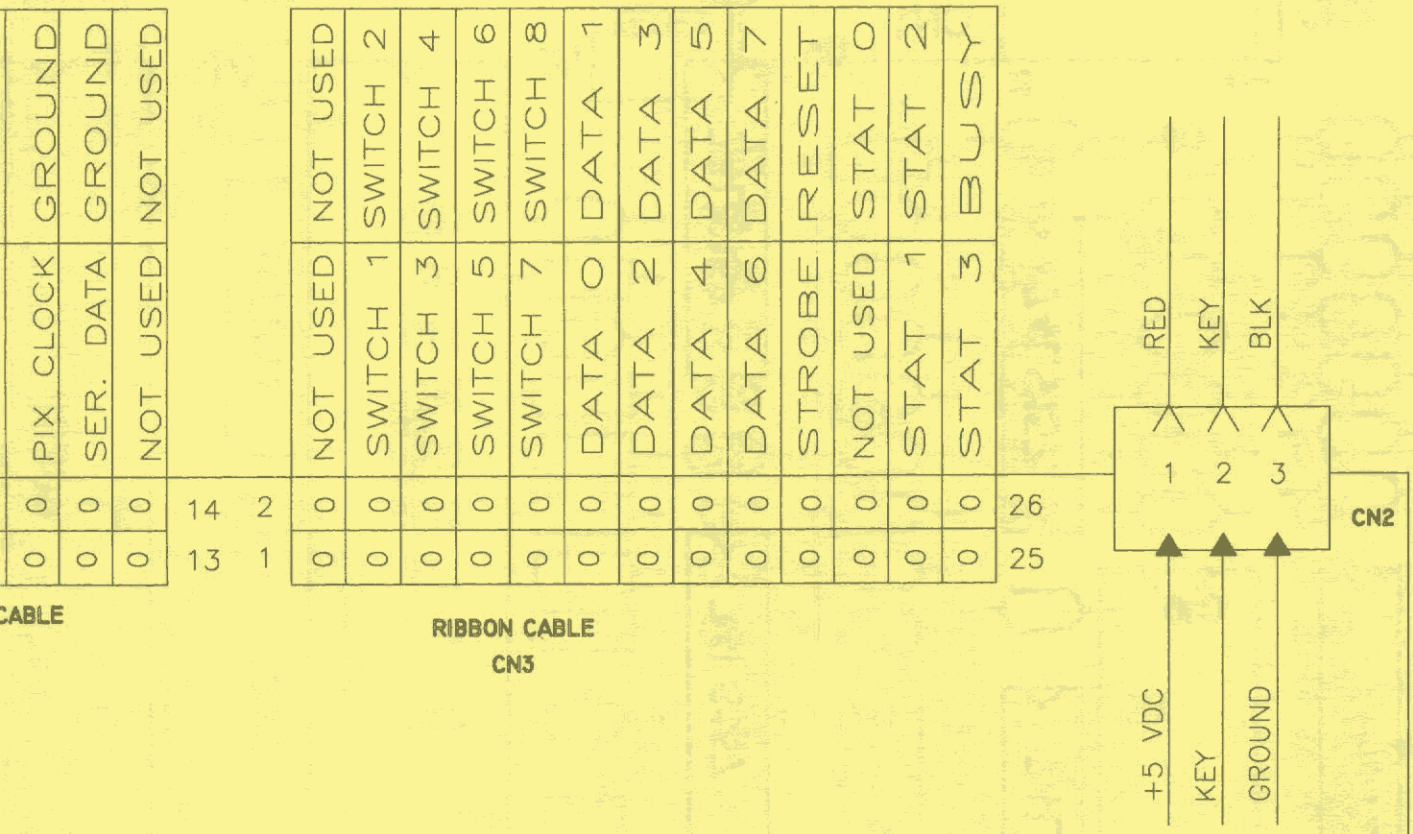
Sound Board (520-5077-00)


U17
U36
U21
U37
27010/020/04
U24
U23
74LS165
U26
U25B
74LS74A
TDA1543
U30B
U30A
LM833N
TDA8199
U35
U34A
U34B
U34C
U34D
U34E
U34F
74LS04
U19
PAL16L8
U11
74LS273
U16
74LS374
U15
U10A
U10B
74LS240
U4
6116/6264
-W5 IS JUMPERED.
U20
U27A
U27B
U2
CD4020B
-W1 IS JUMPERED.
U3
74LS163A
U1A
U6
68B09E
U7
27256/ 27512
C79 10uF/25V
C50 2200pF
C34 0.1uF
C35 10uF/16V TANT.
C46 0.1
C48 2200pF
C78 10uF/25V
C33 0.1uF
C80 2200pF
C40,C49 0.1uF
C47 0.1uF
C59 22uF 25V
C22 0.1uF
C17 22uF 16V
R17 1.2K
R8 1K
R16 1.2K
R7 1.5K
R15 1K
R14 22K
R19 22K
R18 1K
R9 22K
R21 22K
R20 1K
R22 10K
R24 10K
R23 1.5K
R6 10K
D1 1N4004
7905CT
7805C
+5V
+12V
-5A
+8V

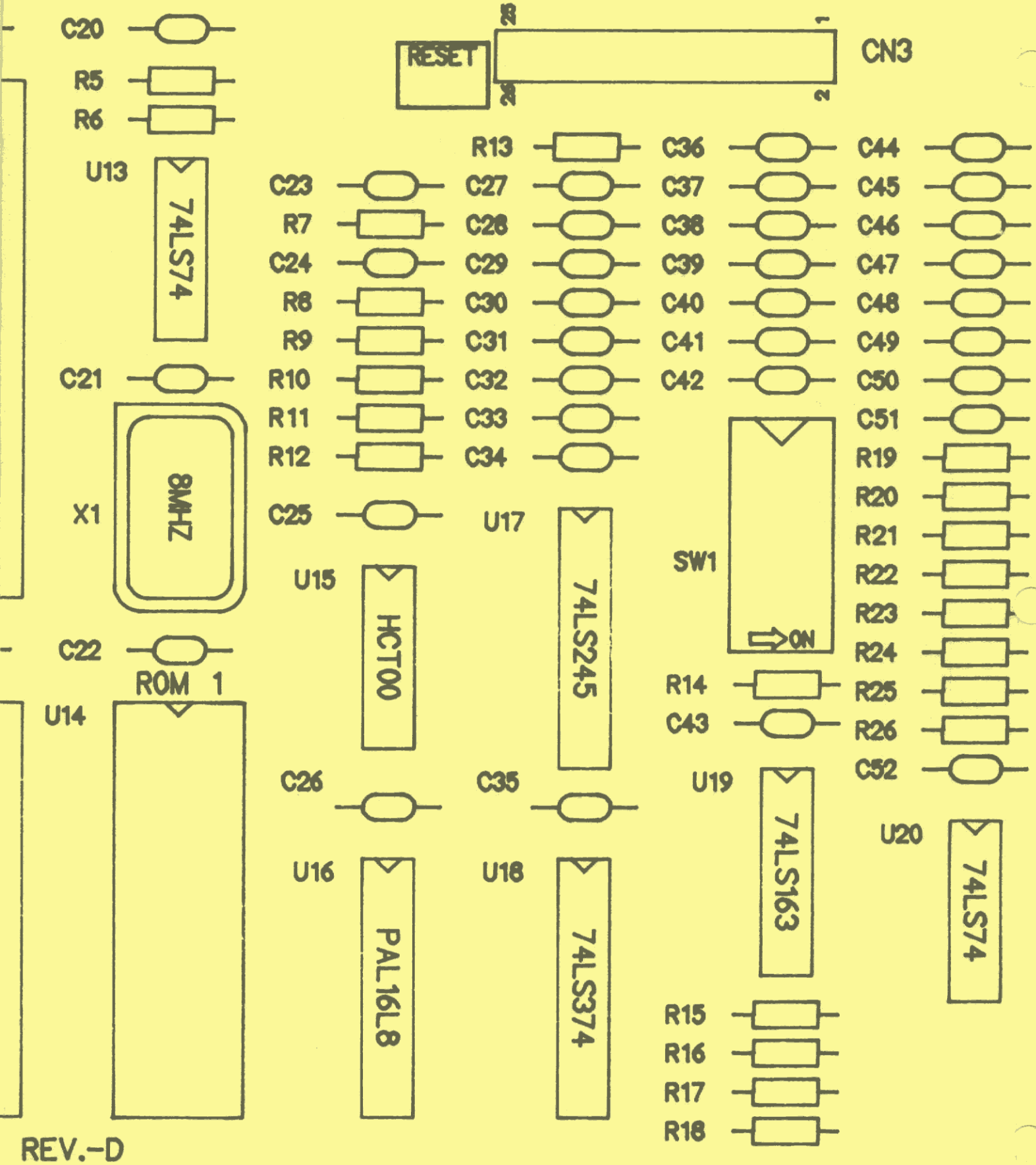


Sound Board (520-5077-00)


YEL/BLK
GRY/YEL
KEY
YEL
BLK
RED
BLU
VIO/YEL
1 2 3 4 5 6 7 8
-110 VDC
-98 VDC
KEY
GROUND
GROUND
+5VDC
+12 VDC
+68 VDC
P1
DISPLAY ENABLE
ROW DATA
ROW CLOCK
COL. LATCH
PIX CLOCK
SER. DATA
NOT USED
GROUND
NOT USED
2
1
14
13
RIBBON CABLE
P2
DOT MATRIX BOARD
520-5052-00

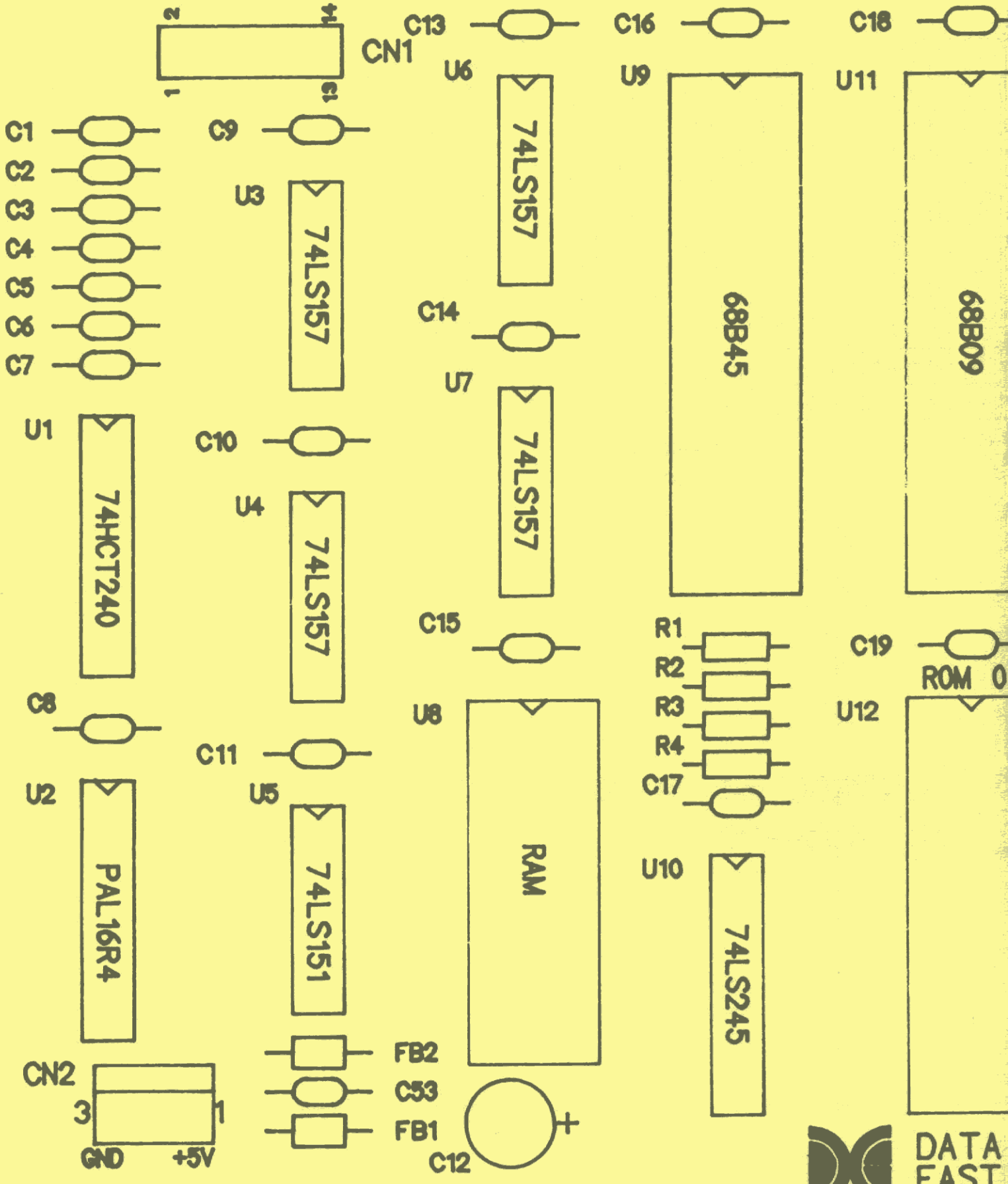


CONTROLLER BOARD
520-5055-00

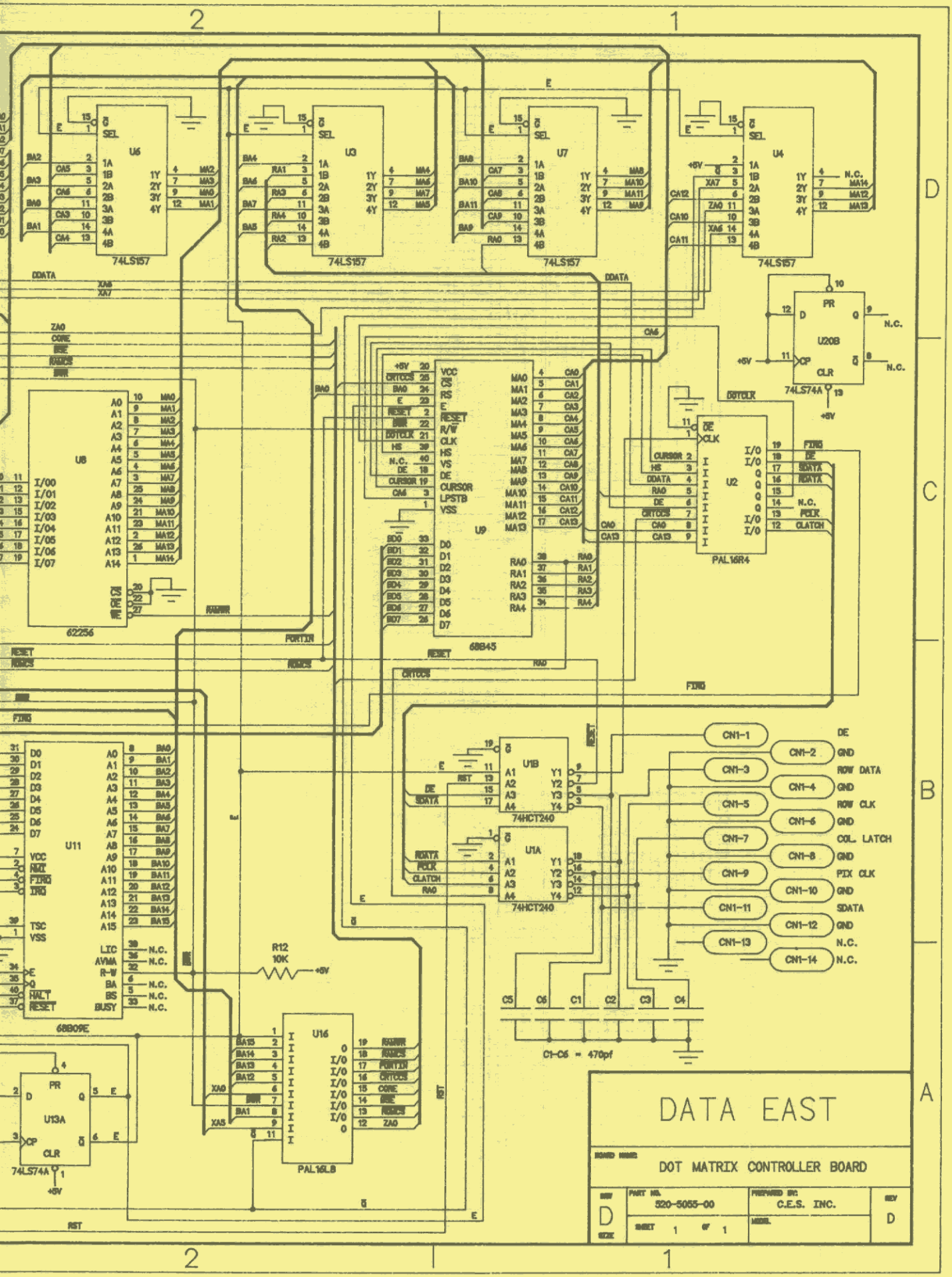


REV.-D
520-5055-00

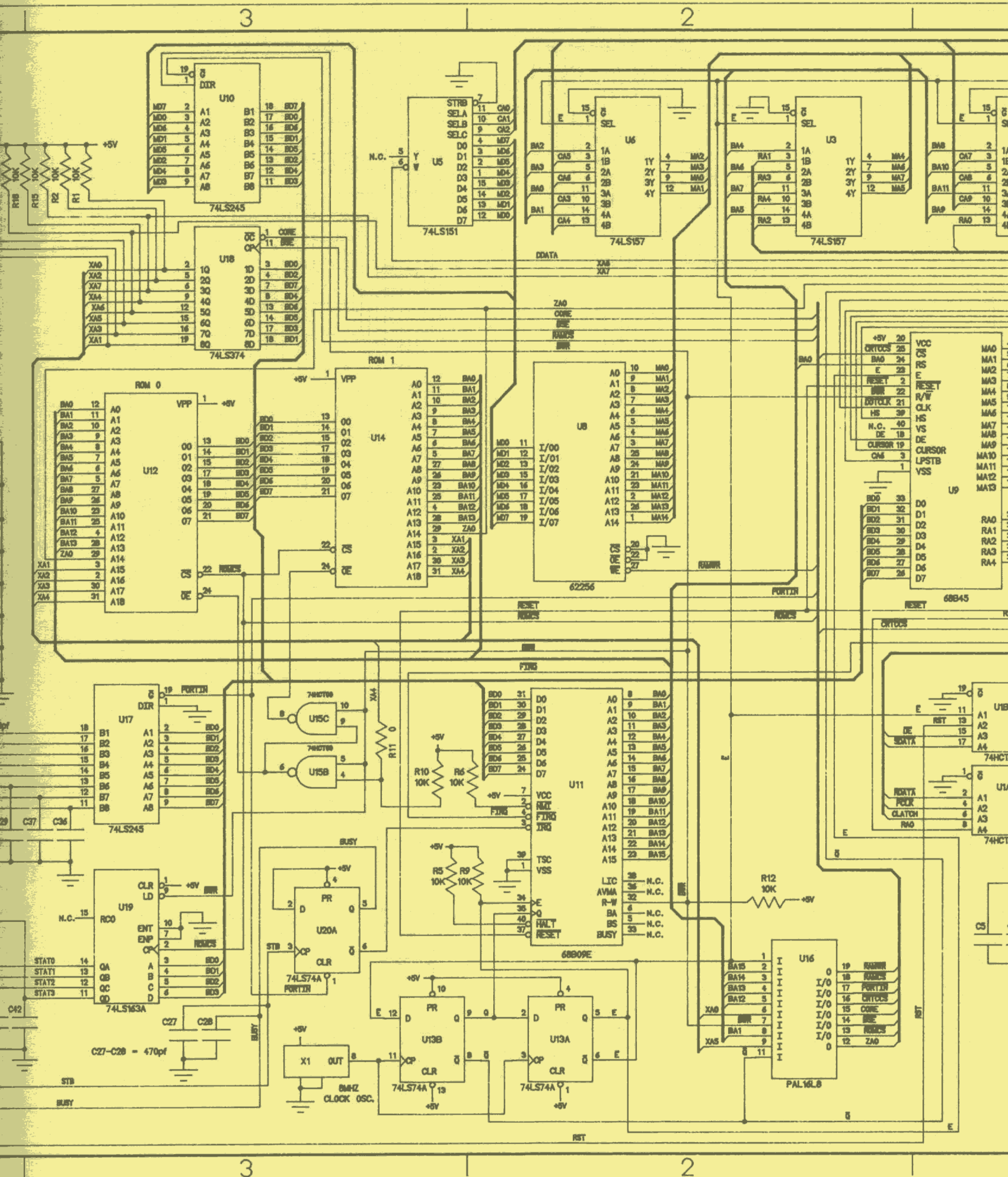
Display Controller Board
Component Layout

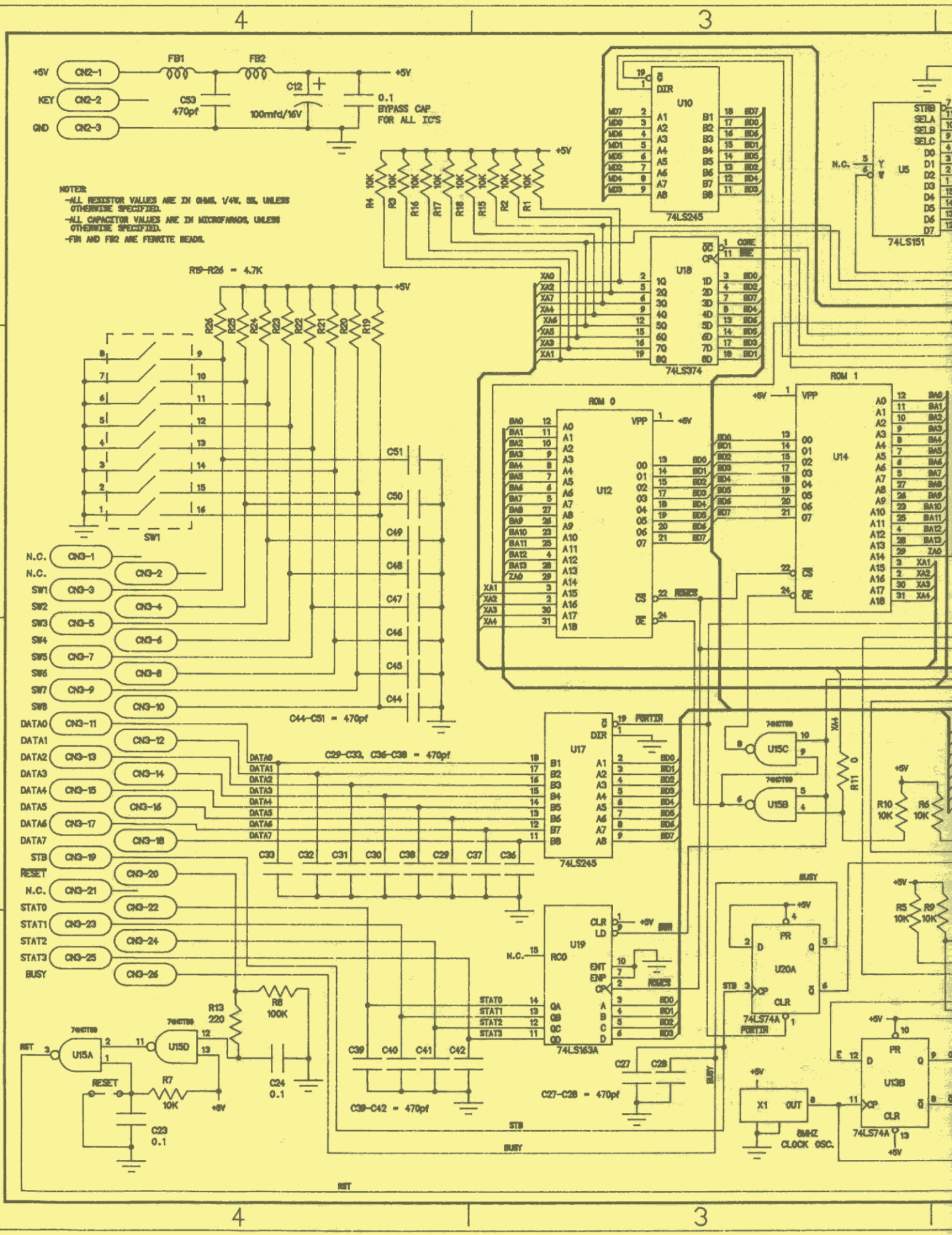


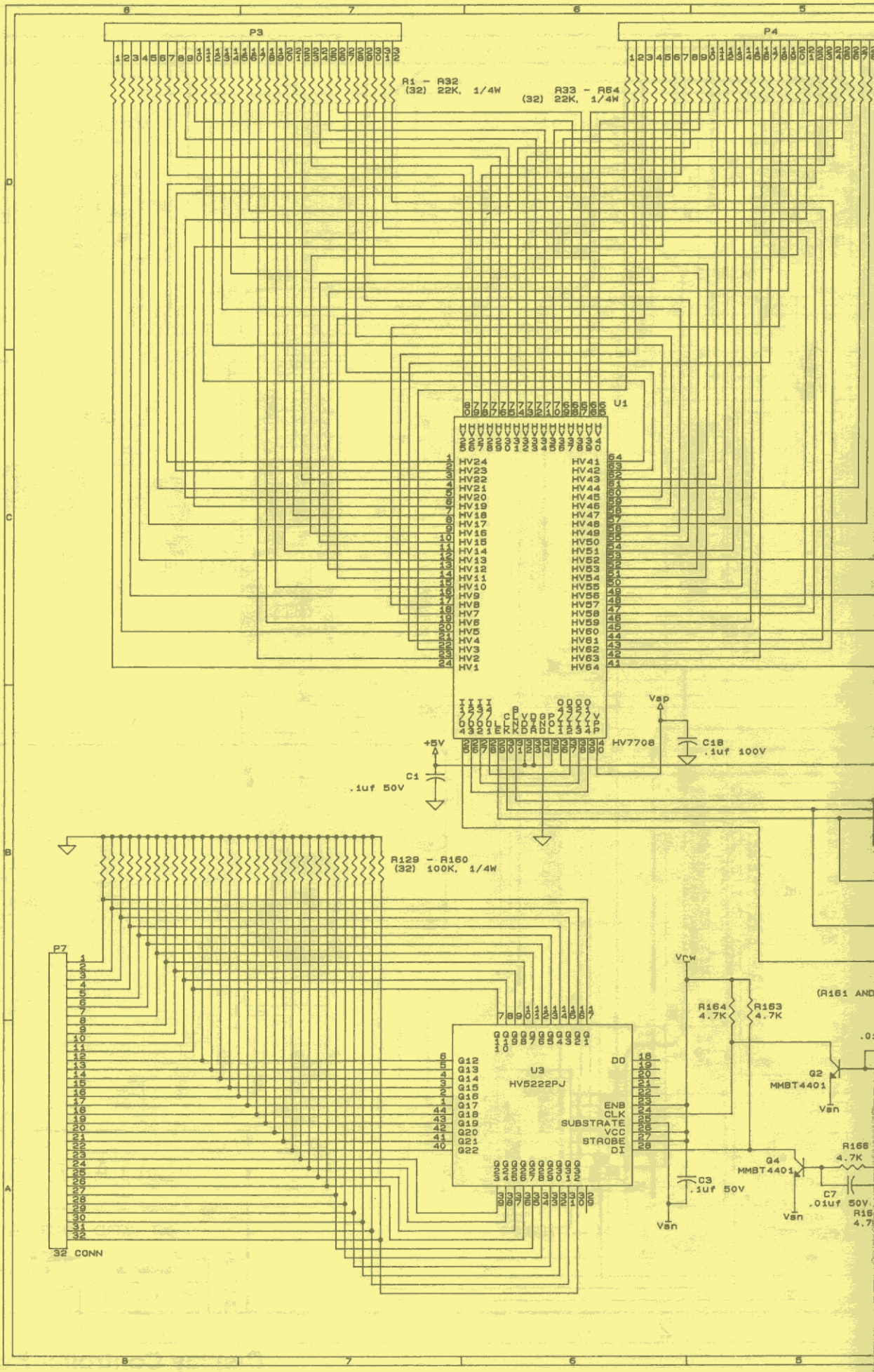
Display Controller Board
Component Layout

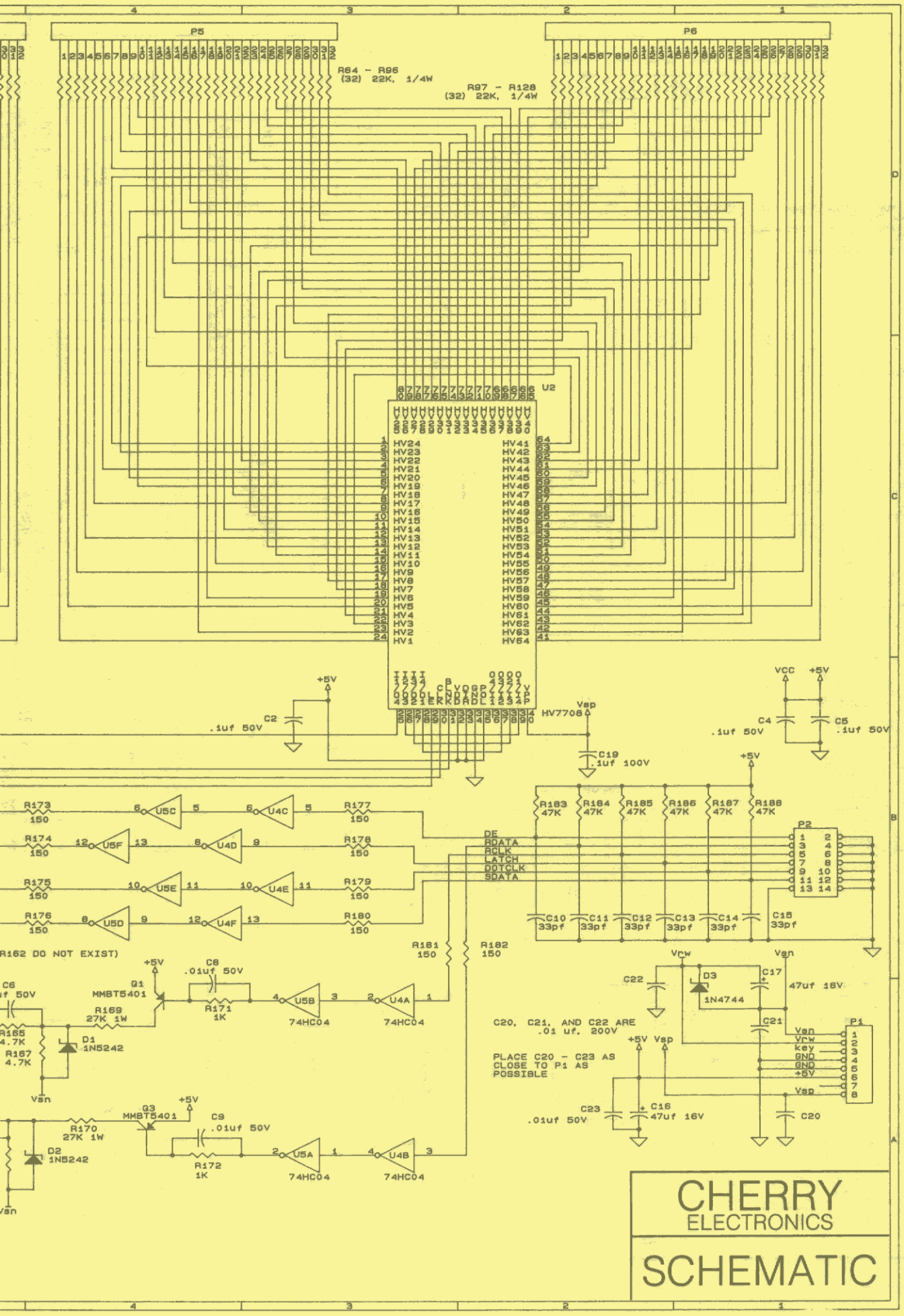


Display Controller Board Schematic


3
2
U10
74LS245
U5
74LS151
U6
74LS157
U3
74LS157
U18
74LS374
ROM 0
U12
ROM 1
U14
U8
62256
U9
68B45
U17
74LS245
U15C
U15B
74HCT00
U11
68B09E
U20A
74LS74A
U19
74LS163A
U13B
U13A
X1
8MHZ CLOCK OSC.
C27-C28 = 470pf
U16
PAL16L8
R12 10K
R11 0
R10 10K
R6 10K
R5 10K
R9 10K

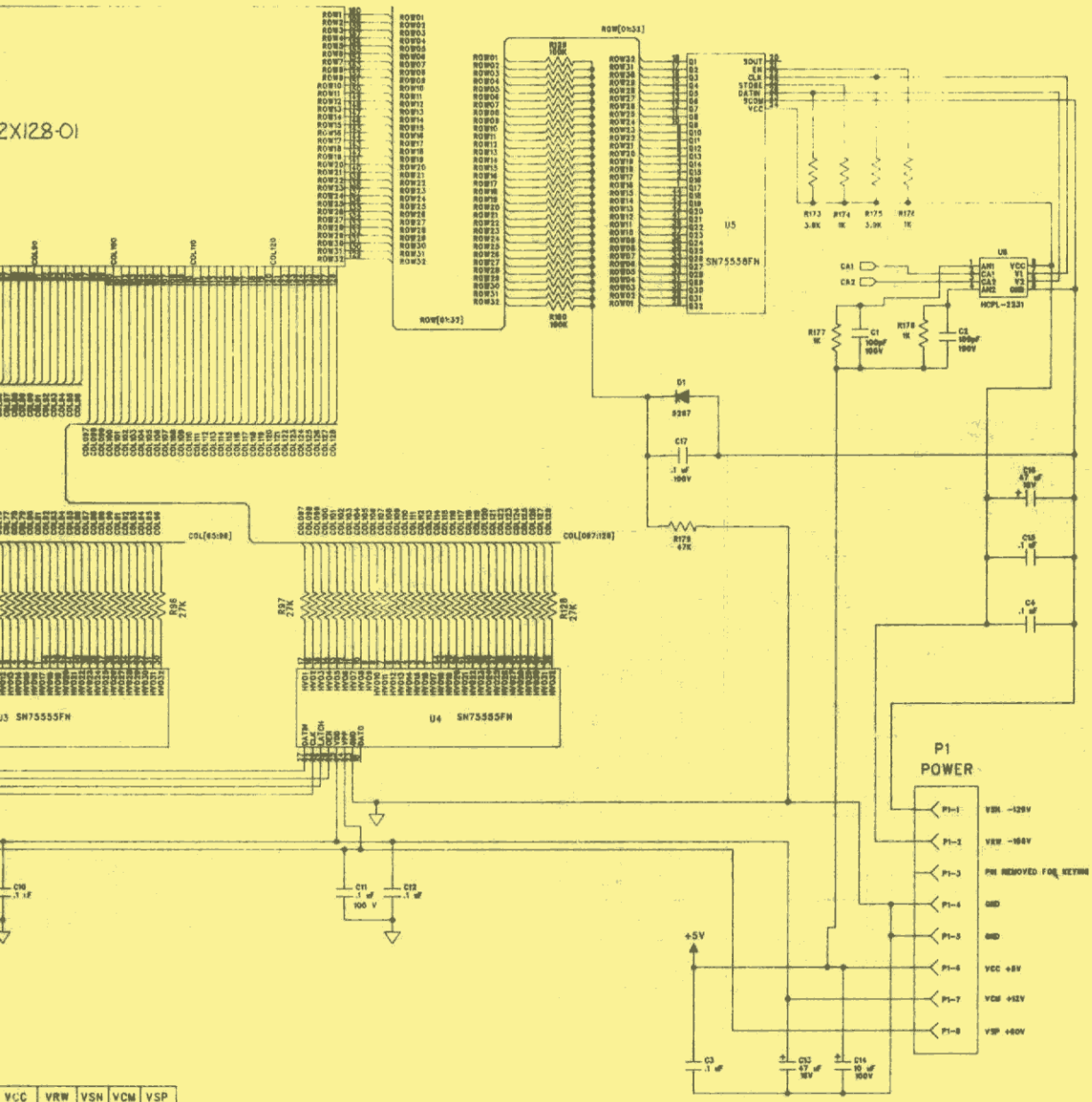

NOTES:
-ALL RESISTOR VALUES ARE IN OHMS, 1/4W, 5%, UNLESS OTHERWISE SPECIFIED.
-ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
-FB1 AND FB2 ARE FERRITE BEADS.
+5V
KEY
GND
CN2-1
CN2-2
CN2-3
FB1
FB2
C53
470pf
C12
100mfd/16V
0.1
BYPASS CAP FOR ALL IC'S
74LS245
74LS151
74LS374
R19-R26 = 4.7K
SW1
C51
C50
C49
C48
C47
C46
C45
C44
C44-C51 = 470pf
ROM 0
ROM 1
U12
U14
C29-C33, C36-C38 = 470pf
74LS163A
74LS74A
C39-C42 = 470pf
C27-C28 = 470pf
8MHZ
CLOCK OSC.
RESET
STB
BUSY
RST


P3
P4
R1 - R32
(32) 22K, 1/4W
R33 - R64
(32) 22K, 1/4W
U1
HV7708
HV24
HV23
HV22
HV21
HV20
HV19
HV18
HV17
HV16
HV15
HV14
HV13
HV12
HV11
HV10
HV9
HV8
HV7
HV6
HV5
HV4
HV3
HV2
HV1
HV41
HV42
HV43
HV44
HV45
HV46
HV47
HV48
HV49
HV50
HV51
HV52
HV53
HV54
HV55
HV56
HV57
HV58
HV59
HV60
HV61
HV62
HV63
HV64
Vsp
+5V
C18
.1uf 100V
C1
.1uf 50V
R129 - R160
(32) 100K, 1/4W
P7
32 CONN
U3
HV5222PJ
Q12
Q13
Q14
Q15
Q16
Q17
Q18
Q19
Q20
Q21
Q22
DO
ENB
CLK
SUBSTRATE
VCC
STROBE
DI
Vcw
R164
4.7K
R163
4.7K
Q2
MMBT4401
Vsn
Q4
MMBT4401
R166
4.7K
C3
.1uf 50V
C7
.01uf 50V
(R161 AND



84 Display Driver, Dwg. 1 (Cherry)

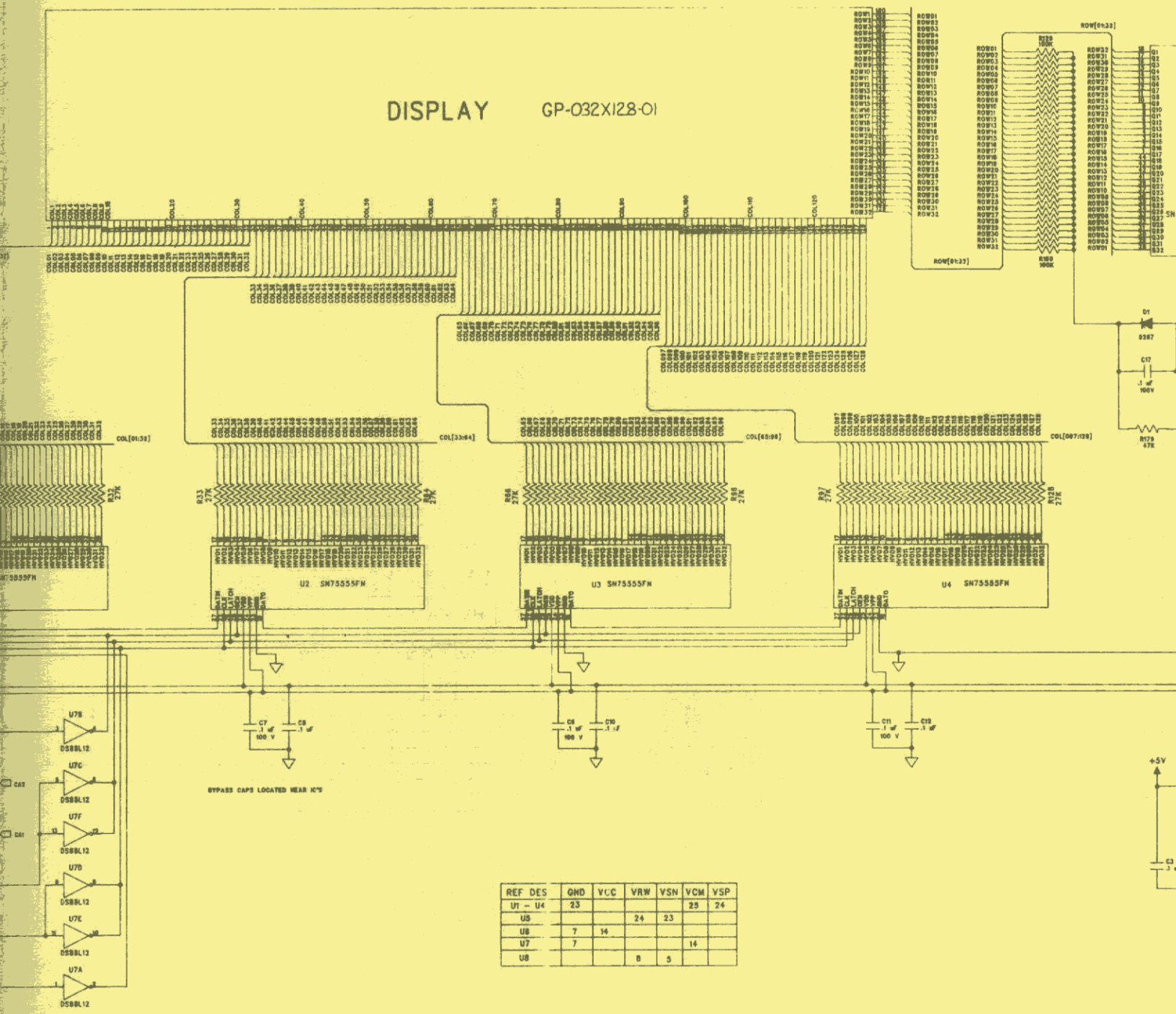
REV	DESCRIPTION
A	19030 CLASS 'A' RELEASE



VCC	VRW	VSN	VCM	VSP
			25	24
	24	23		
14				
			14	
	8	5		

PADS LOGIC VER. 2.03 FILE: DM32128.SCH	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES: XXX ± .005, XX ± .030, ANGLES ±	CONTR NO.	BABCOCK DISPLAY PRODUCTS, INC. 1051 S. EAST STREET ANAHEIM, CALIFORNIA 92805
		DRAWN BY RAY DEESE DATE 10-16-91	SCHEMATIC
	MATL / FINISH	CHECK BY DATE	
		APPR BY DATE	
		DO NOT SCALE PRINT	
6D-082D128-01	THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF BABCOCK AND IS TENDERED SUBJECT TO THE CONDITIONS THAT THE INFORMATION (A) BE RETAINED IN CONFIDENCE, (B) NOT BE REPRODUCED OR COPIED IN WHOLE OR IN PART AND (C) NOT BE USED OR INCORPORATED IN ANY PRODUCT, EXCEPT UNDER AN EXPRESS WRITTEN AGREEMENT WITH BABCOCK.	CODE IDENT. 06640	1510-0106 REV. A
NEXT ASSY / USED ON		SCALE	SIZE D SHEET 1 OF 1
APPLICATION			

DISPLAY GP-032X128-01



REF DES	GND	VCC	VRW	VSN	VCM	VSP
U1 – U4	23				25	24
U5			24	23		
U6	7	14				
U7	7				14	
U8			8	5		

PADS LOGIC VER. 2.03
FILE: DM32128.SCH

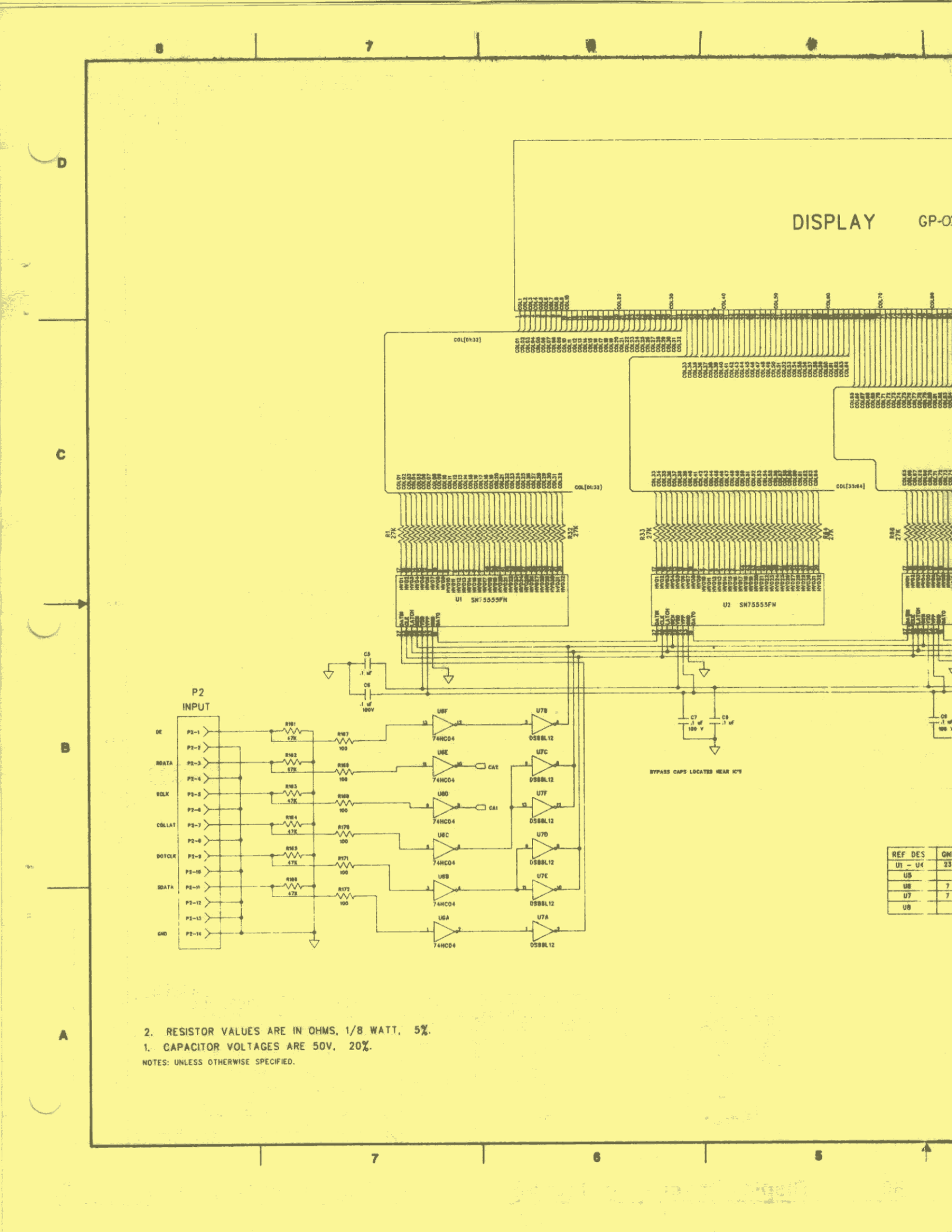
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.
TOLERANCES: XXX ± .005
XX ± .020
ANGLES ±

MATL | FINISH

GD-032X128-01

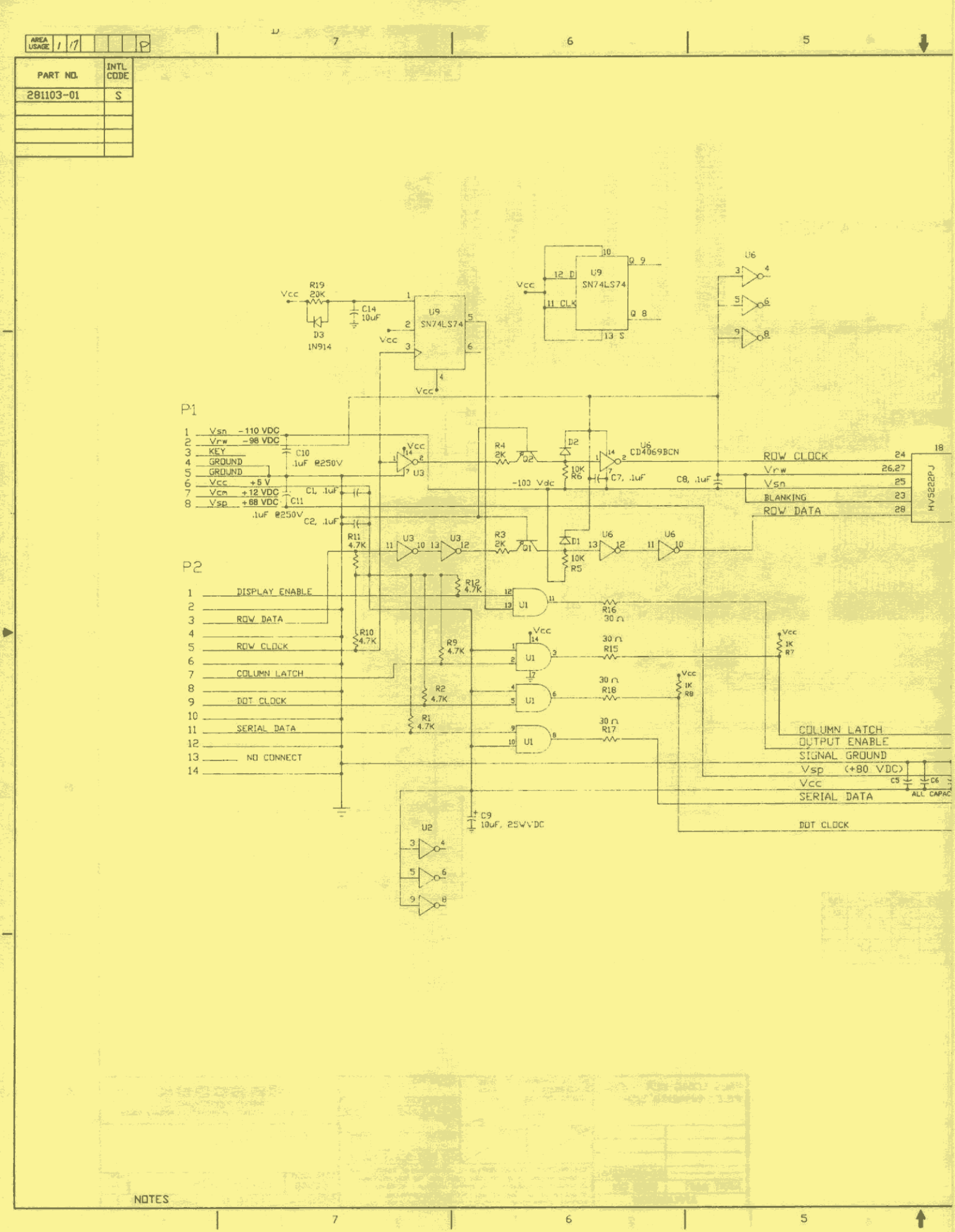
NEXT ASSY | USED ON

APPLICATION

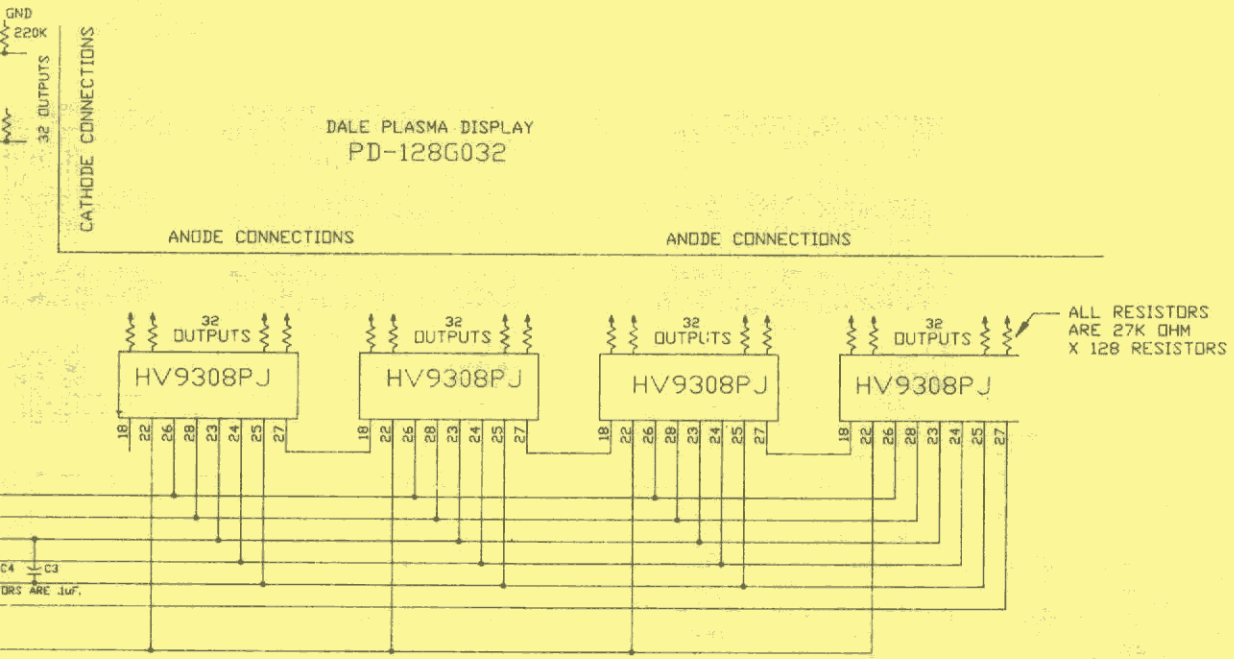


2. RESISTOR VALUES ARE IN OHMS, 1/8 WATT, 5%.
1. CAPACITOR VOLTAGES ARE 50V, 20%.

NOTES: UNLESS OTHERWISE SPECIFIED.


AREA USAGE
PART NO.
INTL CODE
281103-01
S
P1
P2
Vsn -110 VDC
Vrw -98 VDC
KEY
GROUND
GROUND
Vcc +5 V
Vcm +12 VDC
Vsp +80 VDC
DISPLAY ENABLE
ROW DATA
ROW CLOCK
COLUMN LATCH
DOT CLOCK
SERIAL DATA
NO CONNECT
SN74LS74
CD4069BCN
HVS222PJ
-100 Vdc
COLUMN LATCH
OUTPUT ENABLE
SIGNAL GROUND
Vsp (+80 VDC)
SERIAL DATA
DOT CLOCK
NOTES

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVED



281103

CLASS 2

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BREAK SHARP EDGES AND REMOVE BURR	MATERIAL	DR Paul Matijka	92-02-21
LIMITS APPLY OVER NON-PAINTED FINISHES		CHKD Vera Bateman	92-03-06
COMMERCIAL TOLERANCES APPLY TO STOCK SIZES		DSGN T. SHANK	3.02.96
GEOMETRIC SYMBOLS PER ANSI Y14.5		SR PROJ ENGR	
ALL MACHINE SURFACES ✓	FINISH	SECT SUPVR	
DIMENSIONS IN BRACKETS [ ] ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED		APPD KEITH RAYSBY	92-03-07

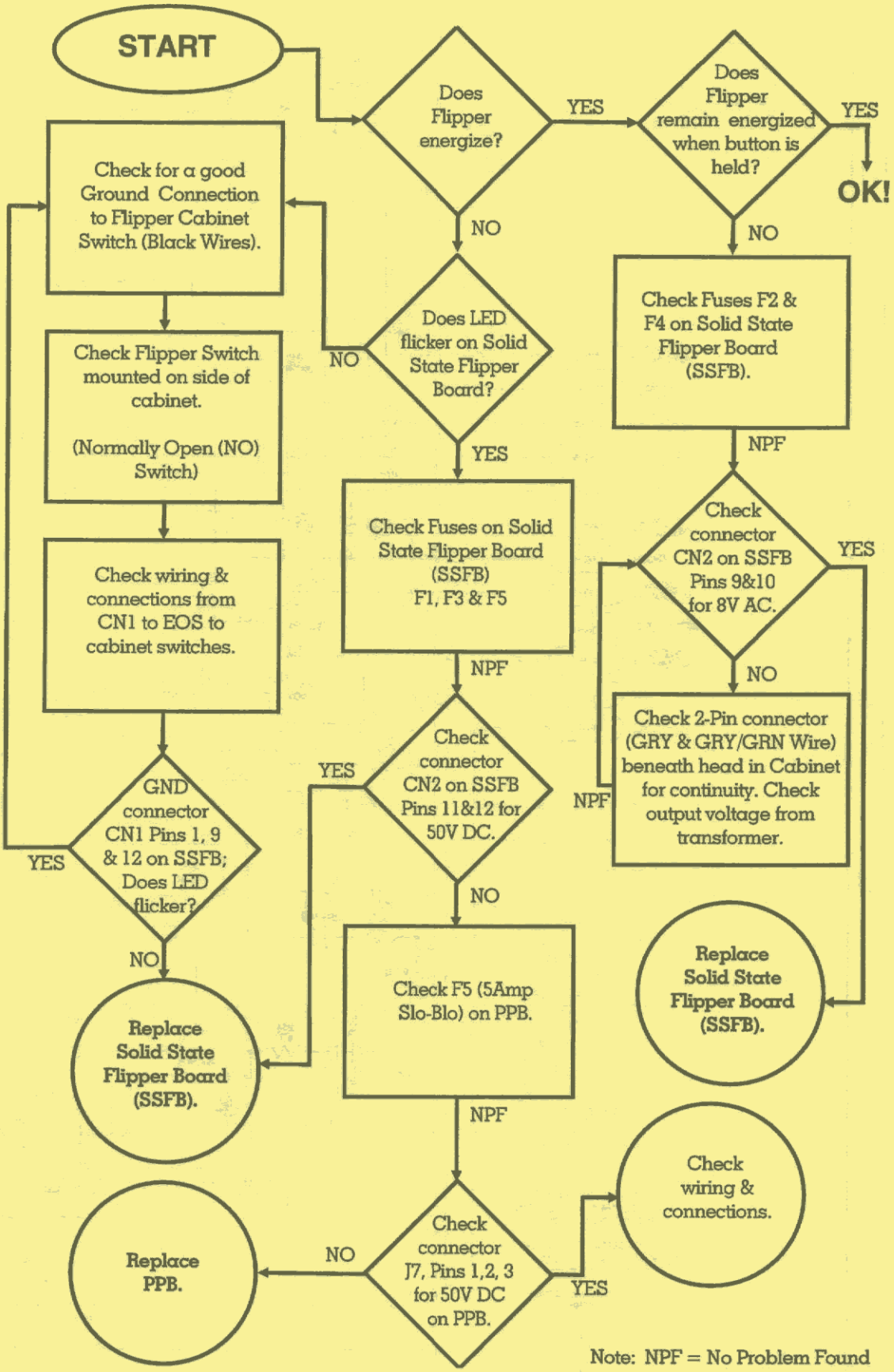
DALE ELECTRONICS, INC.
A COMPANY OF VISHAY
COLUMBUS, NEBRASKA

TITLE: ELECTRICAL SCHEMATIC
APD-128G032

SIZE	CODE IDENT NO.	DRAWING NO.
D	91637	281103

SCALE NONE | SHEET 1 OF 1

Solid State Flipper Circuit Troubleshooting Flowchart



Note: NPF = No Problem Found

New Solid State Flipper Board

We have redesigned our Solid State Flipper Board (S.S.F.B.) so that a misadjustment or failure of the End-of-Stroke (E.O.S.) Switch will not affect the operation of the flippers. The flippers will still work! The E.O.S. switch is strictly an added feature, not a functional part of the circuit (see E.O.S. Theory of Operation).

Theory of Operation for the Solid State Flippers

The Solid State Flipper Board is a Multiple Flipper Solenoid Driver Circuit. Each solenoid driver circuit contains a One Shot Timer, a 50V Driver, and an 8V Driver.

Looking at one circuit, Schmidt NAND gates U1A, U1b, and U1D make up the One Shot Timer. The timer length is controlled by R10, R33 and C2. The output of the timer is gated at U1C with the buffered switch input from Q6. The output of U1C controls the 50V driver circuit consisting of Q4, Q1, Q2, Q3, and D1. As long as the flipper button is activated, Q6 will keep the 8V driver circuit, SR1, on.

The 50 volts provides the actuation power to the flipper solenoid while the 8 volts provides the holding power.

E.O.S. Switch Theory of Operation

The End of Stroke (E.O.S.) Switch used in our flipper circuit is a Gold Peened Contact, Blade Switch Assembly, mounted on the flipper assembly.

Electrically, it is connected in series with the Cabinet Flipper Switch and the Flipper E.O.S. input on the Solid State Flipper Board (S.S.F.B.) connector CN1 which enables the 50 Volt DC Drive Circuit.

Refering to the Flipper Wiring Diagram, one side of the Flipper Cabinet Switch is connected to ground (BLK-Wire), the other side (BLU-VIO Wire) is connected to the flipper switch input on the S.S.F.B. connector CN1 which enables your 9 Volt DC holding voltage and is connected in series to the E.O.S. switch which is a normally closed switch.

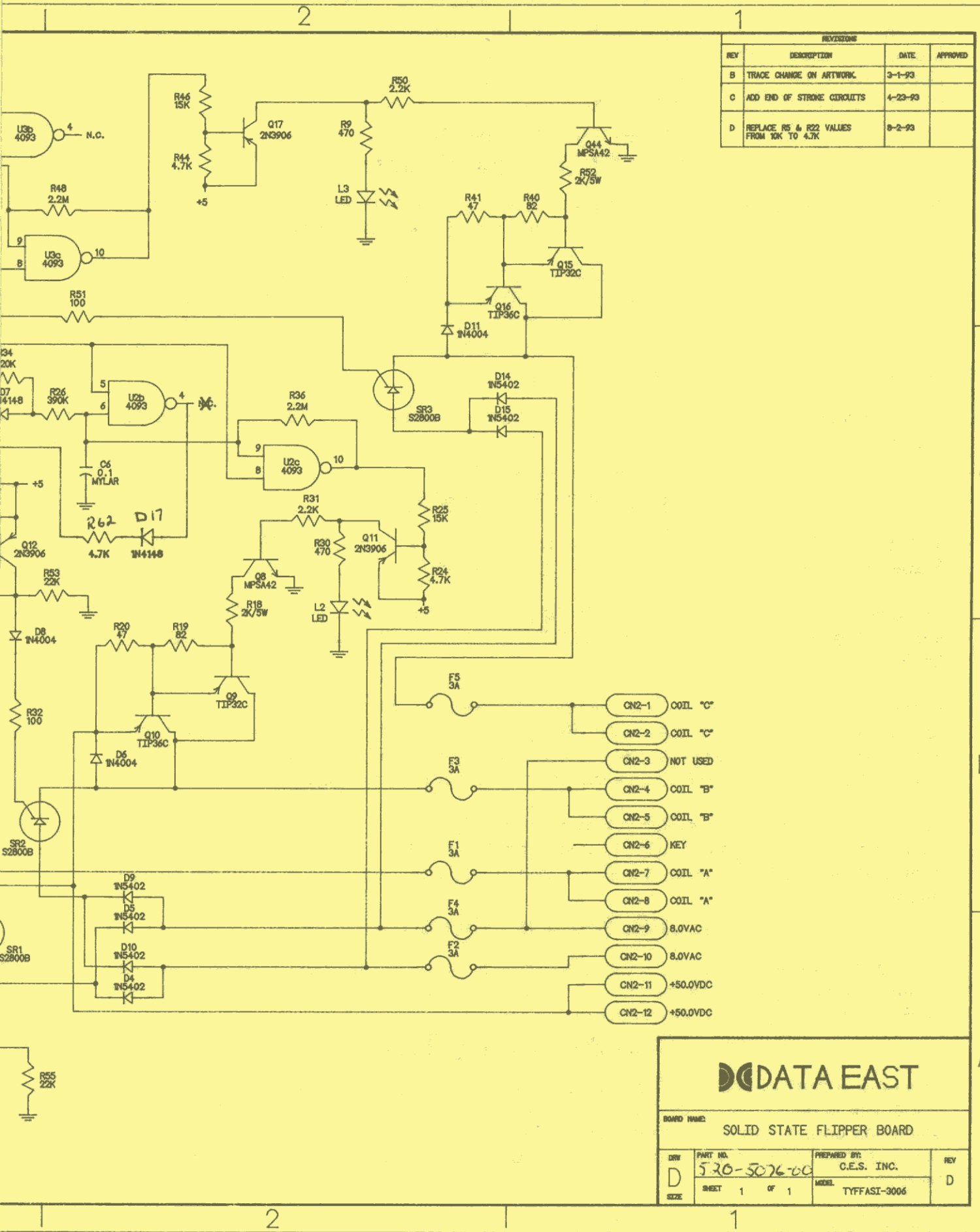
The function of the E.O.S. switch is to prevent the flipper bat from being knocked back by a high velocity shot on the playfield. If while holding the flipper in the up position, the bat is moved back 1/16" or more, the E.O.S. switch will close giving the coil another 50 Volt pulse.

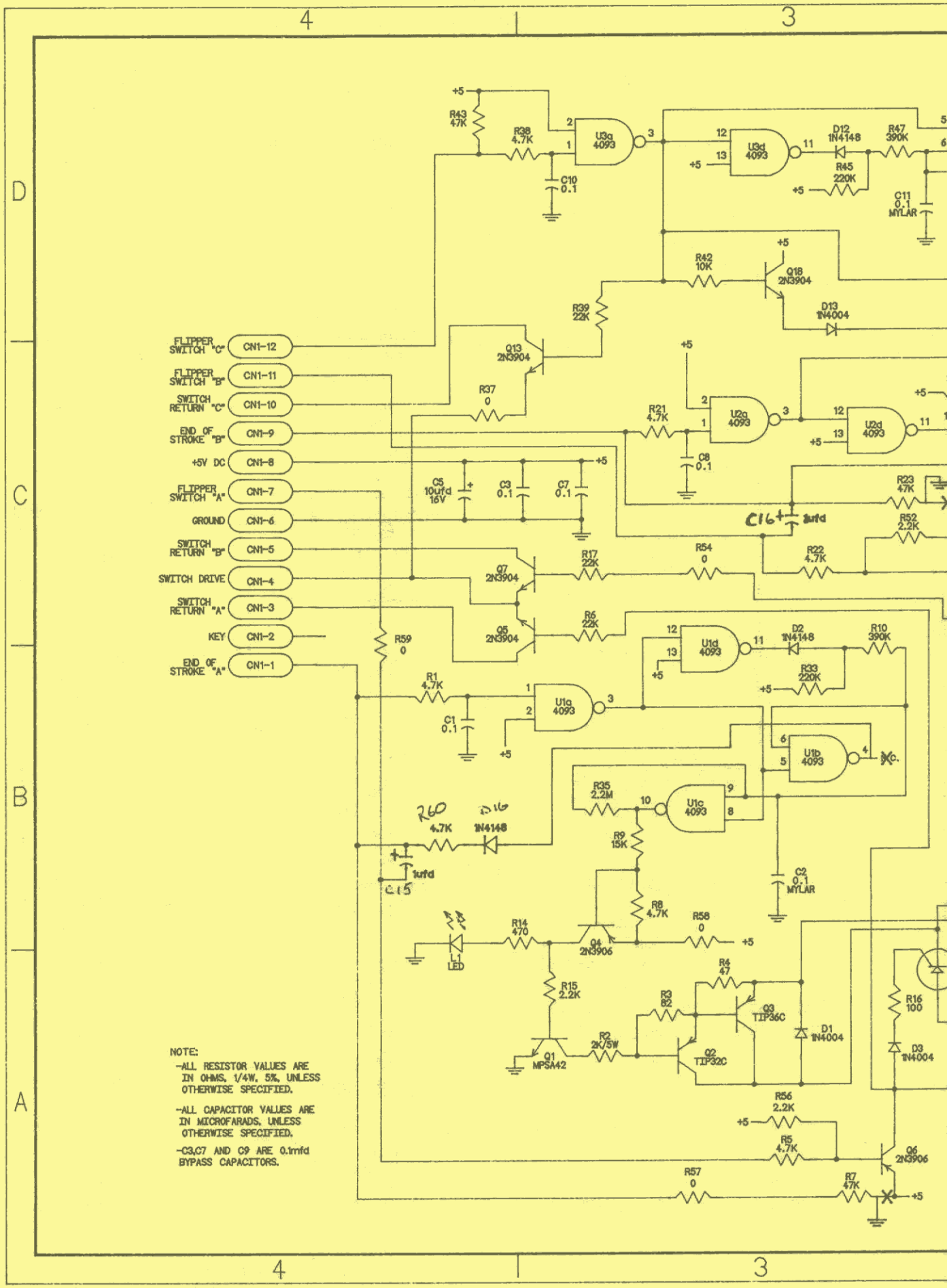
E.O.S. Switch Adjustment

The switch contacts should be adjusted so that when the solenoid is energized, the contacts stay closed for almost the full travel of the plunger. The contacts should open 1/16" before the plunger bottoms out or reaches maximum travel.

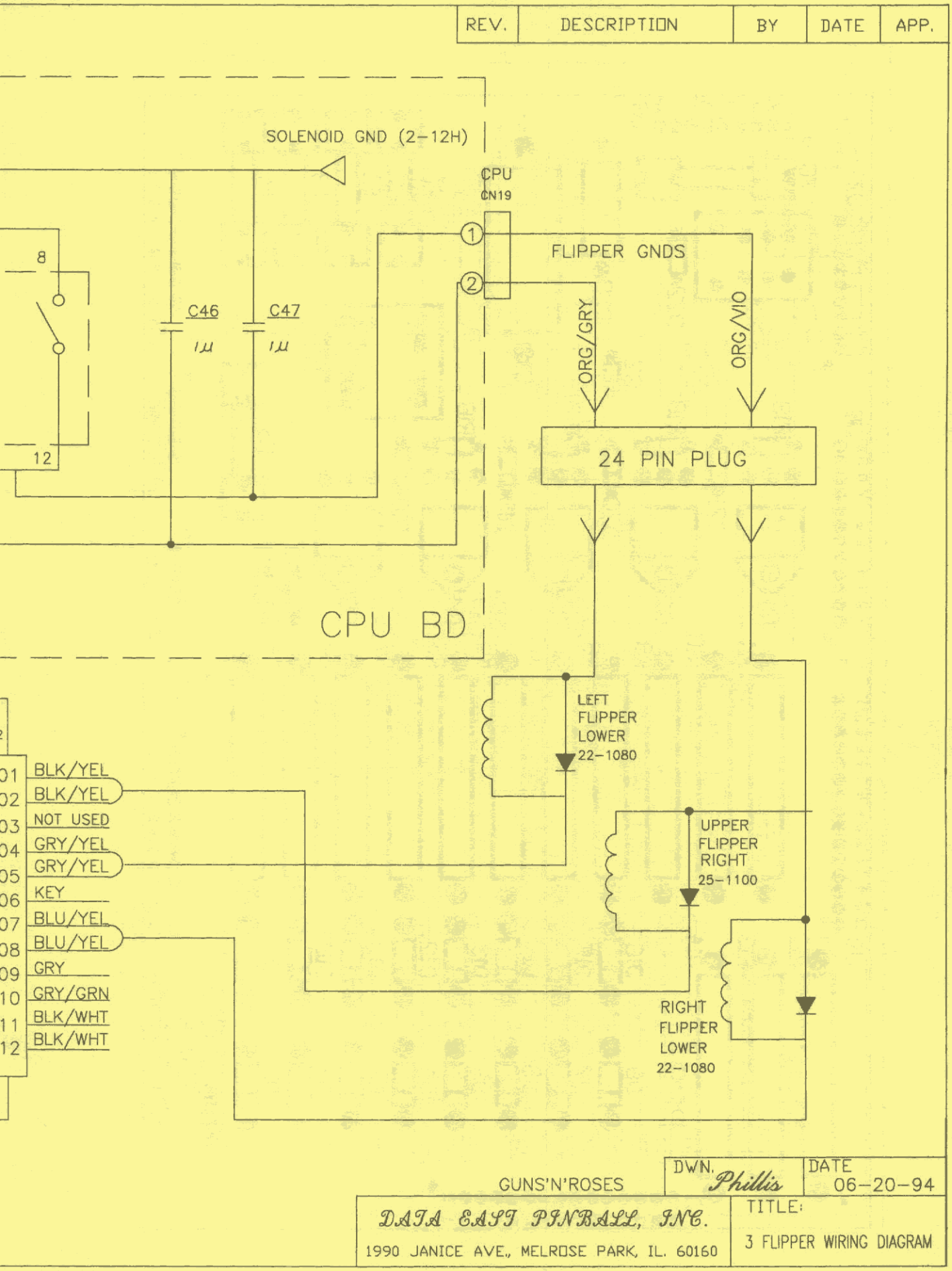
Troubleshooting Tips

The only indication of a problem you will have is the player complaining that when the flipper bat is being held in the up position, a high velocity shot from one of the playfield solenoids causes the ball to hit the flipper bat and physically knock it back. This will not occur if the E.O.S. is working. Check switch for alignment and continuity, replace if necessary.

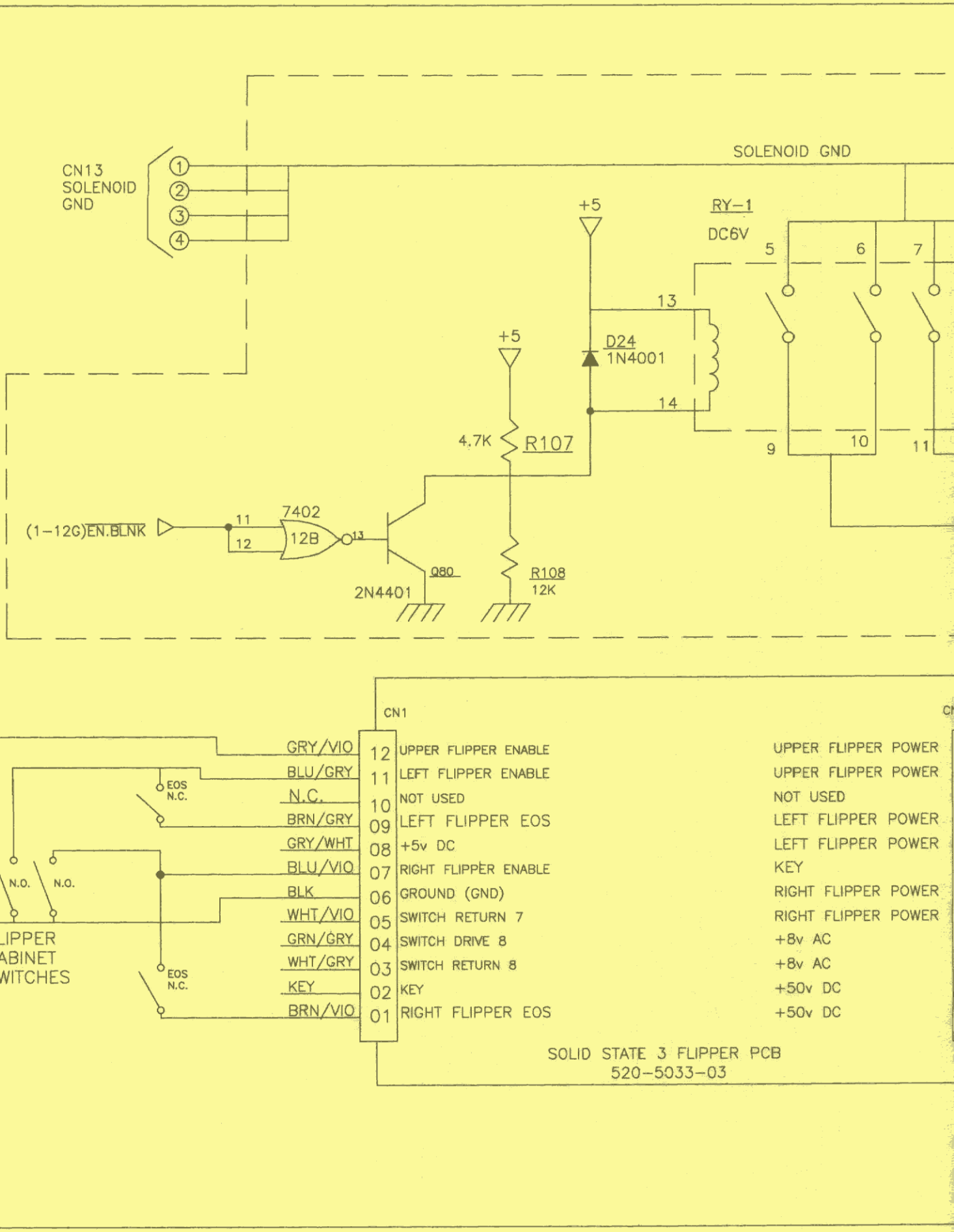

REVISIONS
REV | DESCRIPTION | DATE | APPROVED
B | TRACE CHANGE ON ARTWORK. | 3-1-93
C | ADD END OF STROKE CIRCUITS | 4-23-93
D | REPLACE R5 & R22 VALUES FROM 10K TO 4.7K | 8-2-93
R46 15K
Q17 2N3906
R44 4.7K
+5
R50 2.2K
R9 470
L3 LED
Q44 MPSA42
R52 2K/5W
R41 47
R40 82
Q15 TIP32C
Q16 TIP36C
D11 1N4004
U3b 4093
N.C.
R48 2.2M
U3c 4093
R51 100
SR3 S2800B
D14 1N5402
D15 1N5402
R36 2.2M
U2b 4093
U2c 4093
C6 0.1 MYLAR
R62
D17
4.7K
1N4148
R31 2.2K
R25 15K
Q12 2N3906
R30 470
Q11 2N3906
R24 4.7K
Q8 MPSA42
R18 2K/5W
L2 LED
R53 22K
D8 1N4004
R20 47
R19 82
Q9 TIP32C
Q10 TIP36C
D6 1N4004
R32 100
SR2 S2800B
D9 1N5402
D5 1N5402
D10 1N5402
D4 1N5402
SR1 S2800B
R55 22K
F5 3A
F3 3A
F1 3A
F4 3A
F2 3A
CN2-1 COIL "C"
CN2-2 COIL "C"
CN2-3 NOT USED
CN2-4 COIL "B"
CN2-5 COIL "B"
CN2-6 KEY
CN2-7 COIL "A"
CN2-8 COIL "A"
CN2-9 8.0VAC
CN2-10 8.0VAC
CN2-11 +50.0VDC
CN2-12 +50.0VDC
DATA EAST
BOARD NAME: SOLID STATE FLIPPER BOARD
DRW SIZE D
PART NO. 520-5026-00
SHEET 1 OF 1
PREPARED BY: C.E.S. INC.
MODEL TYFFASI-3006
REV D

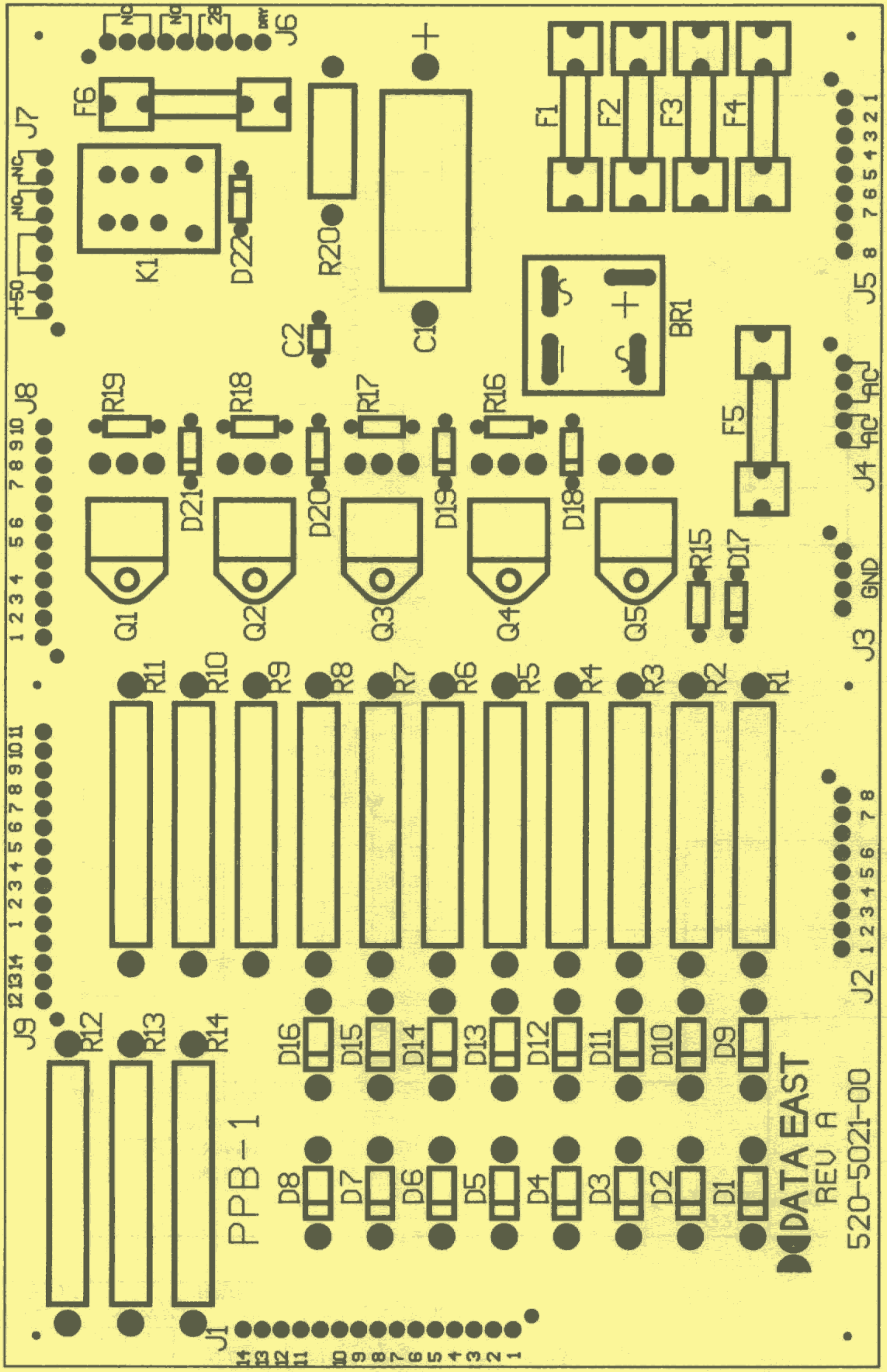


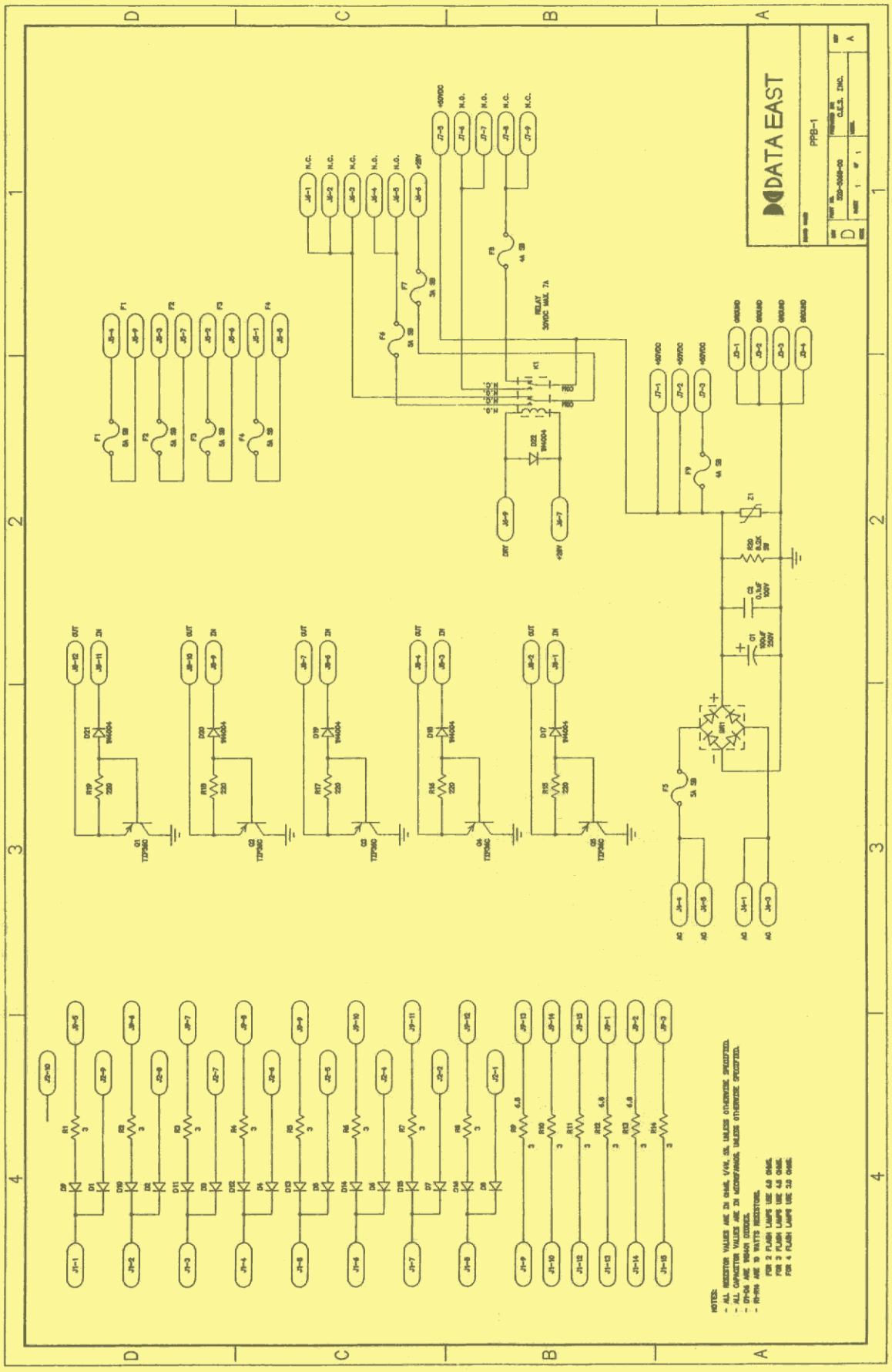
Solid State 3-Flipper Board Diagram



Solid State 3-Flipper Wiring Diagram


SOLENOID GND
CN13
SOLENOID
GND
1
2
3
4
+5
RY-1
DC6V
5
6
7
13
D24
1N4001
14
+5
4.7K
R107
9
10
11
(1-12G)EN.BLNK
11
12
7402
12B
13
Q80
2N4401
R108
12K
CN1
GRY/VIO
BLU/GRY
N.C.
BRN/GRY
GRY/WHT
BLU/VIO
BLK
WHT/VIO
GRN/GRY
WHT/GRY
KEY
BRN/VIO
12 UPPER FLIPPER ENABLE
11 LEFT FLIPPER ENABLE
10 NOT USED
09 LEFT FLIPPER EOS
08 +5v DC
07 RIGHT FLIPPER ENABLE
06 GROUND (GND)
05 SWITCH RETURN 7
04 SWITCH DRIVE 8
03 SWITCH RETURN 8
02 KEY
01 RIGHT FLIPPER EOS
UPPER FLIPPER POWER
UPPER FLIPPER POWER
NOT USED
LEFT FLIPPER POWER
LEFT FLIPPER POWER
KEY
RIGHT FLIPPER POWER
RIGHT FLIPPER POWER
+8v AC
+8v AC
+50v DC
+50v DC
EOS
N.C.
EOS
N.C.
N.O.
N.O.
N.O.
FLIPPER
CABINET
SWITCHES
SOLID STATE 3 FLIPPER PCB
520-5033-03


PPB-1
DATA EAST
REV A
520-5021-00


DATA EAST
PPB-1
C.E.S. INC.
RELAY
30VDC MAX 7A
NOTES:
- ALL RESISTOR VALUES ARE IN OHMS, 1/4W, 5% UNLESS OTHERWISE SPECIFIED.
- ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
- D1-D4 ARE 1N4004 DIODES.
- R1-R4 ARE 10 WATTS RESISTORS.
FOR 2 FLASH LAMPS USE 4.0 OHMS.
FOR 3 FLASH LAMPS USE 4.0 OHMS.
FOR 4 FLASH LAMPS USE 3.0 OHMS.