

HANKIN VIDEO TECHNICAL NOTES

-DEFENCE COMMAND-

## HANKIN VIDEO GAME - TECHNICAL NOTES

The HANKIN video cabinet contains the following harnesses. (Refer to Figure 1 - Interconnection diagram).

1. Main Harness (A & B)
2. Transformer Board Harness
3. Control Panel Harness (2 off for cocktail)
4. Logic Board Adaptor Harness

The Main Harness interfaces the control panels, monitor and all standard components such as START 1 & 2 buttons, coin mechanism, coin counter, etc. to the logic board via two 24-way Molex plugs (P1 and P2). P2 is dedicated to control panel signals while P1 carries all other signals to and from the logic board. The Main Harness also provides miscellaneous power to the TV monitor and fan from the transformer board via a third 24-way connector (J3).

The Transformer Board Harness is a custom design for each game. It supplies power to the logic board via P7 and miscellaneous power for the monitor, fan and cabinet via J3. In order to allow for an audio amplifier external to the logic board, the speaker circuit is wired to P3 in the Main Harness, as is the audio O/P from the logic board. When no external amplifier is required, links between corresponding pins of J3 are inserted in the Transformer Board Harness, to complete the audio circuit. Transformer Board wiring is shown in Figure 2.

The control Panel Harnesses are wired directly to the switches and LEDS used on each control panel. They interface to the Main Harness via Molex plugs and then via P2/J2 to the Logic Board. Control Panel wiring is shown in Figure 3.

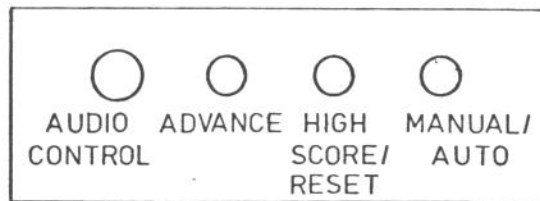
The Logic Board Adaptor Harness interfaces the Transformer Board Harness and the Main Harness to the logic board via J7 and J1 respectively.

Wiring Diagrams for the Main Harness and the Logic Adaptor Harness are provided in the Drawing Supplement.

The cocktail Defence Command uses a KZ14E monitor for which circuits are provided and used a 240V input switching regulator to supply +5V, +12V, -5V. A 240:110V transformer powers the monitor and fan only.

#### OPTION SETTINGS

Three switches are provided on the Audio/Test bracket mounted above the cash box. Layout of this bracket is as below.



SWITCHES OPERATED  
DOWN TO ACTIVATE

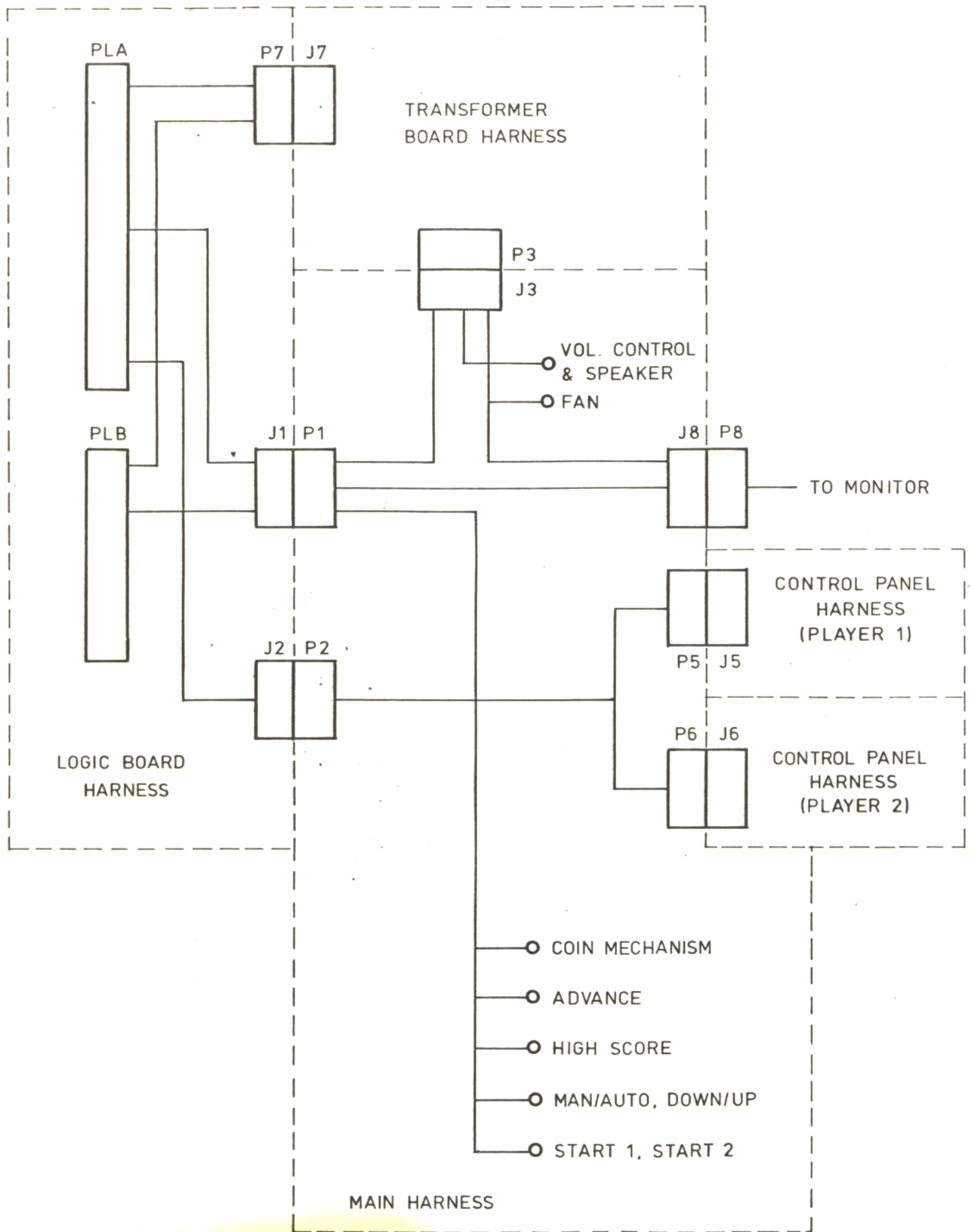
The option setting mode is entered by pressing ADVANCE with AUTO switch pressed. Pressing the ADVANCE switch (with AUTO down) steps through 28 functions which display housekeeping information and allow options to be set. The more important of these are listed below. Changes are made to option settings using the HIGH SCORE/RESET switch. With AUTO/MANUAL switch in AUTO, HIGH SCORE switch counts up. With AUTO/MANUAL switch in MANUAL, HIGH SCORE switch counts down.

- Function 01 : Displays number of coins through coin mechanism
- Function 08 : Allows point score, for which a bonus ship is awarded, to be selected. Recommended setting is 10 000.
- Function 09 : Allows number of ships per game to be selected. Recommended setting is 03.
- Function 10 : Must be set to 00 if credit selection other than 1 coin 1 play is required

- Function 11 : Left coin multiplier.  
Recommended set to 01
- Function 14 : Allows number of coins for credit to be selected
- Function 15 : Allows number of coins for bonus to be selected
- Function 16 : Allows minimum number of coins to be set  
(Set to 0)
- Function 17 : Free Play (Set to 0)

Settings for 20c, 30c, 40c play are as follows:

	<u>FUNCTION</u>		
	10	14	15
20c play	03	01	00
30c play	00	03	03
40c play	00	02	00



**FIGURE 1:** INTERCONNECTION DIAGRAM

DEFENCE COMMAND COCKTAIL MODEL WITH 14" MONITOR

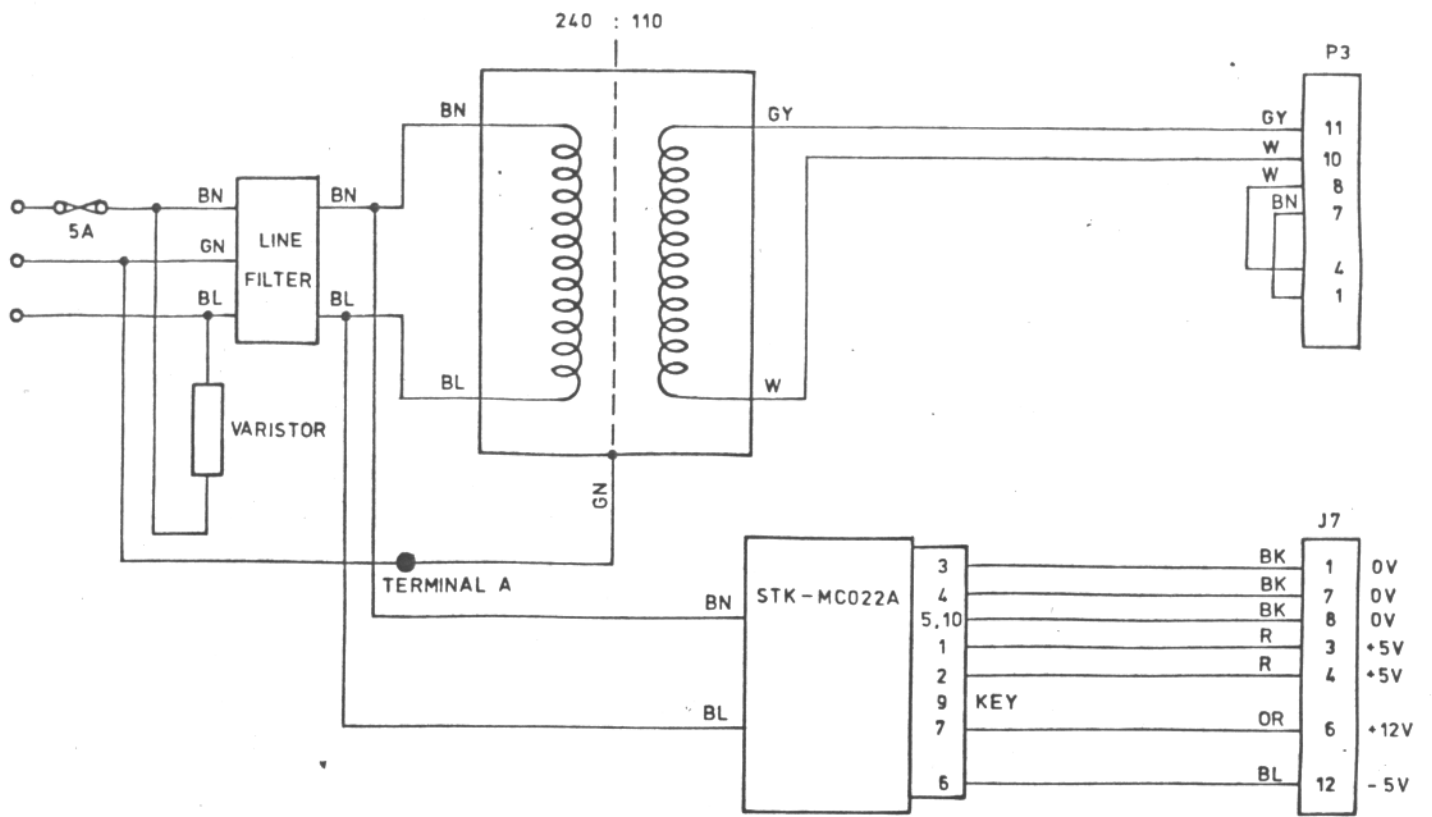


FIGURE 2: TRANSFORMER WIRING DIAGRAM (STK - MC022A)

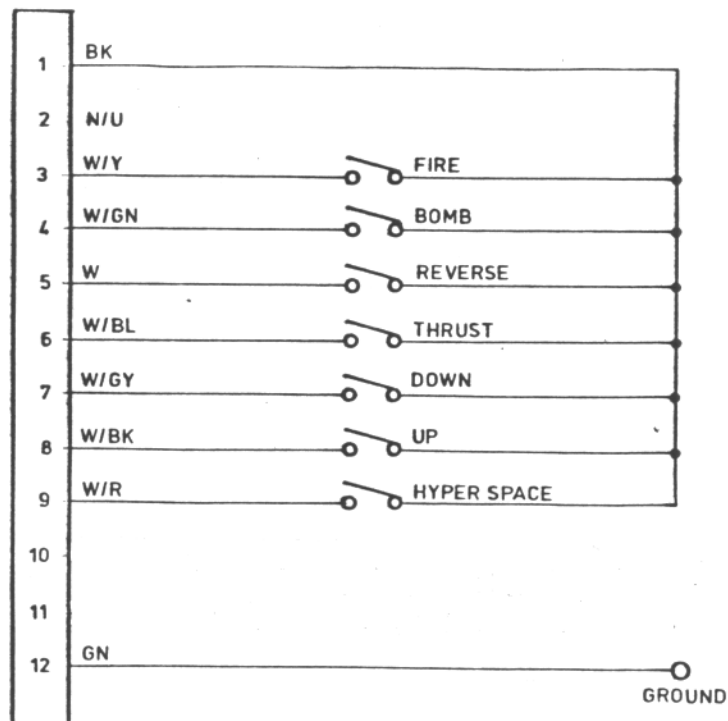


FIGURE 3: DEFENCE COMMAND CONTROL PANEL WIRING

TO SUIT: COCKTAIL CABINET WITH 14" MONITOR

P1 24 PIN LINE PLUG

PN	SOURCE	FUNCTION	COLOR
1	P1-4	SWITCH COMMON	BN
2	N/U		
3	N/U		
4	N/U		
5	J1-5	SPARE	W/O
6	J1-6		OB
7	N/U		
8	J1-5	COMP SYNC	P
9	N/U		
10	J1-1	RED	Y/R
11	J1-2	GREEN	Y/GRN
12	J1-3	BLUE	Y/BLU
13	J1-4	ADVANCE	BL/W
14	SWITCH 2	HIGH SCORE	DT/R
15	START 1	START 1 N/O	P
16	START 2	START 2 N/O	W/R
17	CONN MECH	CONN MECH N/O	Y
18			
19	CONN MECH	CONN MECH N/C	OR
20	SWITCH 3	MANUAL/DUP	W/R
21	J1-1	SPARE	OR
22	J1-1	SPARE	BN
23	J1-1	SPARE	R/BN
24	N/U		

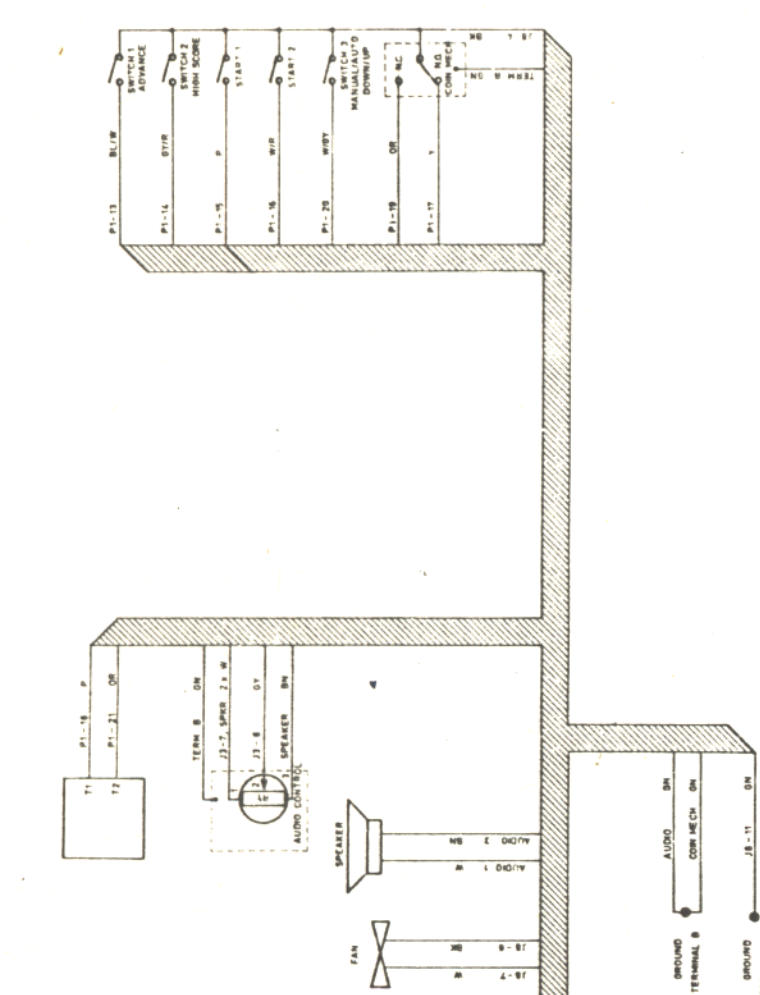
J3 24 PIN LINE PLUG

PN	SOURCE	FUNCTION	COLOR
1	P1-21	SPEAKER	BN
2	N/U		
3	N/U		
4	P1-23	SPARE	R/BN
5	P1-5	SPARE	W/O
6	P1-5	SPARE	OB
7	R1	SPEAKER 2	W
8	R1	SPEAKER 1	DT
9	N/U		
10	J3-1	110V HIGH	W
11	J3-2	110V LOW	BN
12	J3-3	110V C.T.	BR/W
13	J3-4	SPARE	W/O
14	J3-1	110V HIGH	W
15	J3-1	110V LOW	BN
16	N/U		
17			
18			
19			
20			
21			
22			
23			
24			

J8 15 PIN LINE PLUG

PN	SOURCE	FUNCTION	COLOR
1	P1-10	RED	Y/R
2	P1-11	GREEN	Y/GRN
3	P1-12	BLUE	Y/BLU
4	P1-13	SWITCH COMMON	BN
5	START 1		BN
6	P1-8	COMP SYNC	P
7	N/U		
8	J7-10	110V HIGH	W
9	FAN		
10	J7-11	110V LOW	BN
11	J7-12	110V C.T.	BR/W
12	N/U		
13	N/U		
14	J7-13	SPARE	W/O
15	J7-14	SPARE	W/R
16	J7-15	SPARE	W/BL

MAIN HARNESS - PART A



P2 24 PIN LINE PLUG

PN	SOURCE	FUNCTION	COLOR
1	P1-1	SWITCH COMMON	BN
2	N/U		
3	P1-3	PLAYER 1 FIRE	W/Y
4	P1-4	PLAYER 1 BOMB	W/BN
5	P1-5	PL 1 REVERSE	W
6	P1-6	PLAYER 1 THRUST	W/BL
7	P1-7	PLAYER 1 DOWN	W/O
8	P1-8	PLAYER 1 UP	W/BN
9	P1-9	PL 1 HYPER SP	W/R
10	N/U		
11	N/U		
12	P1-12	GROUND	BN
13			
14	N/U		
15	P1-3	PLAYER 2 FIRE	Y/W
16	P1-4	PLAYER 2 BOMB	BN/W
17	P1-5	PL 2 REVERSE	P
18	P1-6	PLAYER 2 THRUST	BL/W
19	P1-7	PLAYER 2 DOWN	Y/W
20	P1-8	PLAYER 2 UP	BN
21	P1-9	PL 2 HYPER SP	OR
22	N/U		
23	N/U		
24	P1-12	GROUND	BN

P5 13 PIN LINE PLUG

PN	SOURCE	FUNCTION	COLOR
1	P2-1	SWITCH COMMON	BN
2	N/U		
3	P2-3	PLAYER 1 FIRE	W/Y
4	P2-4	PLAYER 1 BOMB	W/BN
5	P2-5	PL 1 REVERSE	W
6	P2-6	PLAYER 1 THRUST	W/BL
7	P2-7	PLAYER 1 DOWN	W/O
8	P2-8	PLAYER 1 UP	W/BN
9	P2-9	PL 1 HYPER SP	W/R
10	N/U		
11	N/U		
12	P1-12	GROUND	BN

P6 12 PIN LINE PLUG

PN	SOURCE	FUNCTION	COLOR
1	P2-13	SWITCH COMMON	BN
2	N/U		
3	P2-15	PLAYER 2 FIRE	Y/W
4	P2-16	PLAYER 2 BOMB	BN/W
5	P2-17	PL 2 REVERSE	P
6	P2-18	PLAYER 2 THRUST	BL/W
7	P2-19	PLAYER 2 DOWN	DT/W
8	P2-20	PLAYER 2 UP	BN
9	P2-21	PL 2 HYPER SP	OR
10	N/U		
11	N/U		
12	P2-24	GROUND	BN

MAIN HARNESS - PART B



COLOUR CODE

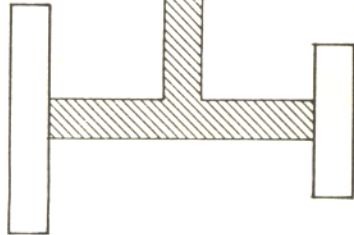
BN	BLACK	OR	ORANGE
BL	BLUE	P	PURPLE
BR	BROWN	R	RED
GR	GREEN	W	WHITE
DT	DRY	Y	YELLOW

NOTE THIS DRAWING APPLIES TO COCKPIT CABINET MODEL WITH 14" MONITOR.

PLA 44 WAY EDGE CONNECTOR

PIN	SOURCE	FUNCTION	COLOUR
A.1	P7-1	SWITCH COMMON	BK
B.2	P7-3	+5V	R
C.3	PLB-7	+12V	DR
D.4	PLB-11	-5V	BL
E	N/U	---	---
5	..	---	---
F	J1-22	SPEAKER -	BN
G	J1-23	SPEAKER +	R/IGN
H	N/U	---	---
7	..	---	---
J	J2-15	PLAYER 2 FIRE	Y/W
8	J2-16	PLAY 2 THRUST	BL/W
K	J2-16	PLAYER 2 BOMB	GN/W
9	J2-21	PL 2 HYPER SP	OR
L	J2-17	PL 2 REVERSE	P
10	J2-20	PLAYER 2 UP	BN
M	J2-19	PLAYER 2 DOWN	GY/W
11	J2-3	PLAYER 1 FIRE	W/Y
N	J2-6	PLAY 1 THRUST	W/BL
12	J2-4	PLAYER 1 BOMB	W/IGN
P	J2-9	PL 1 HYPER SP	W/R
13	J2-5	PL 1 REVERSE	W
R	J2-7	PLAYER 1 DOWN	W/GY
14	J2-8	PLAYER 1 UP	W/BK
S	J1-16	2 PLAYERS	W/R
15	J1-15	1 PLAYER	P
T	N/U	---	---
16	..	---	---
U	..	---	---
17	..	---	---
V	..	---	---
18	..	---	---
W	..	---	---
19	J1-20	MANIAUT. D/UP	W/GY
X	J1-13	ADVANCE	BL/W
20	N/U	---	---
Y	J1-14	HIGH SCORE	GY/R
21	J1-17	COIN 1	Y
Z	N/U	---	---
22	..	---	---

PLA



PLB



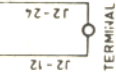
PLB 20 WAY EDGE CONNECTOR

PIN	SOURCE	FUNCTION	COLOUR
1,2	P7-7	SWITCH COMMON	BK
3,4	P7-8	..	BK
5,6	P7-4	+5V	R
7	PLA-C	+12V	DR
8	P7-6	..	OR
9	N/U	---	---
10	..	---	---
11	PLA-4	-5V	BL
12	P7-12	..	BL
13	J1-1	VIDEO 0V	BK
14	J1-8	VIDEO SYNC.	P
15	J1-10	VIDEO RED	Y/R
16	J1-11	VIDEO GREEN	Y/IGN
17	J1-12	VIDEO BLUE	Y/BL
18	N/U	---	---
19	..	---	---
20	..	---	---

SEE NOTE 1

P7 12 PIN LINE PLUG

PIN	SOURCE	FUNCTION	COLOUR
1	PLA-1	SWITCH COMMON	BK
2	N/U	---	---
3	PLA-2	+5V	R
4	PLB-6	..	R
5	N/U	---	---
6	PLB-8	+12V	DR
7	PLB-2	SWITCH COMMON	BK
8	PLB-4	..	BK
9	N/U	---	---
10	..	---	---
11	..	---	---
12	PLB-12	-5V	BL



J2 24 PIN LINE PLUG

PIN	SOURCE	FUNCTION	COLOUR
1	J1-1	SWITCH COMMON	BK
2	J2-13	..	BK
3	PLA-11	PLAYER 1 FIRE	W/Y
4	PLA-12	PLAYER 1 BOMB	W/IGN
5	PLA-13	PL 1 REVERSE	W
6	PLA-N	PLAYER 1 THRUST	W/BL
7	PLA-R	PLAYER 1 DOWN	W/GY
8	PLA-14	PLAYER 1 UP	W/BK
9	PLA-P	PL 1 HYPER SP	W/R
10	PLA-15	1 PLAYER	P
11	PLA-S	2 PLAYERS	W/R
12	TERM A	GROUND	GN
13	J2-1	SWITCH COMMON	BK
14	N/U	---	---
15	PLA-J	PLAYER 2 FIRE	Y/W
16	PLA-K	PLAYER 2 BOMB	GN/W
17	PLA-L	PL 2 REVERSE	P
18	PLA-B	PLAYER 2 THRUST	BL/W
19	PLA-M	PLAYER 2 DOWN	GY/W
20	PLA-10	PLAYER 2 UP	BN
21	PLA-9	PL 2 HYPER SP	OR
22	N/U	---	---
23	..	---	---
24	TERM A	GROUND	GN

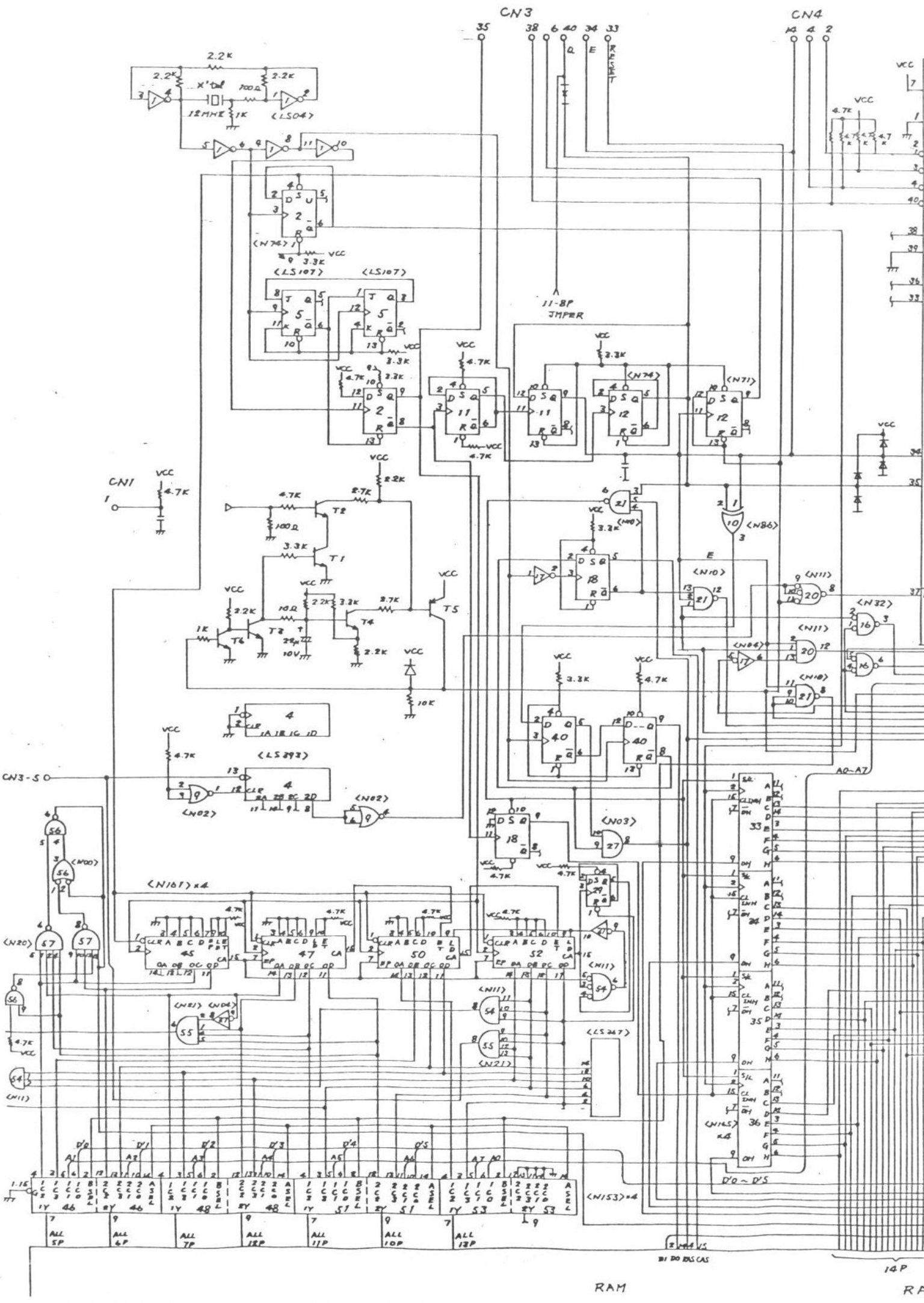
J1 24 PIN LINE PLUG

PIN	SOURCE	FUNCTION	COLOUR
1	PLB-13	VIDEO 0V	BK
2	J2-1	SWITCH COMMON	BK
3	N/U	---	---
4	..	---	---
5	..	---	---
6	..	---	---
8	PLB-14	VIDEO SYNC	P
9	N/U	---	---
10	PLB-15	VIDEO RED	Y/R
11	PLB-16	VIDEO GREEN	Y/IGN
12	PLB-17	VIDEO BLUE	Y/BL
13	PLA-X	ADVANCE	BL/W
14	PLA-Y	HIGH SCORE	GY/R
15	PLA-15	1 PLAYER	P
16	PLA-S	2 PLAYERS	W/R
17	PLA-21	COIN 1	Y
18	N/U	---	---
19	..	---	---
20	PLA-19	MANIAUT. D/UP	W/GY
21	N/U	---	---
22	PLA-F	SPEAKER -	BN
23	PLA-6	SPEAKER +	R/IGN
24	N/U	---	---

NOTES: 1. 1. PLAYER & 2 PLAYERS ARE TERMINATED AT J1 FOR CABARET, UPRIGHT & 16" MONITOR COCKTAIL MODELS; & AT J2 FOR 20" MONITOR COCKTAILS.  
 2. THIS DIAGRAM APPLIES TO KAGA DENSHI PCB'S ONLY  
 3. FOR UPRIGHT & CABARET MODELS, J2-12, J2-24 & TERMINAL A ARE NOT USED.

ITEM	DESCRIPTION	RECD	MATERIAL	REMARKS
A	Hopkin & Co Pty Ltd	SCALE	NTS	PASSED
	DEFENCE COMMAND LOGIC BOARD ADAPTOR HARNESS WIRING DIAGRAM	DATE	18/5/81	
		DRAWN	A P	DRAWING NUMBER
		TRACED		HD1171
		CHECKED		

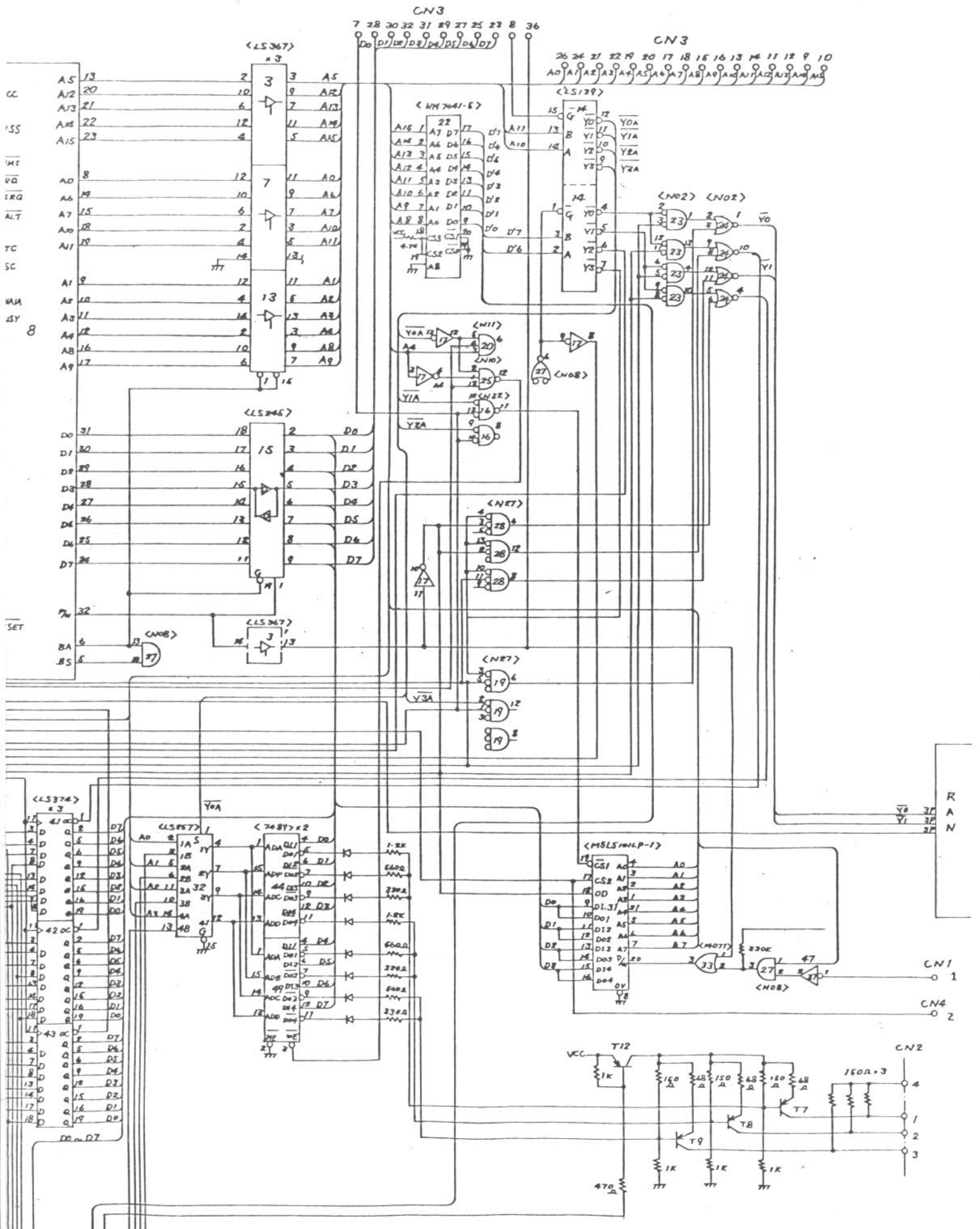


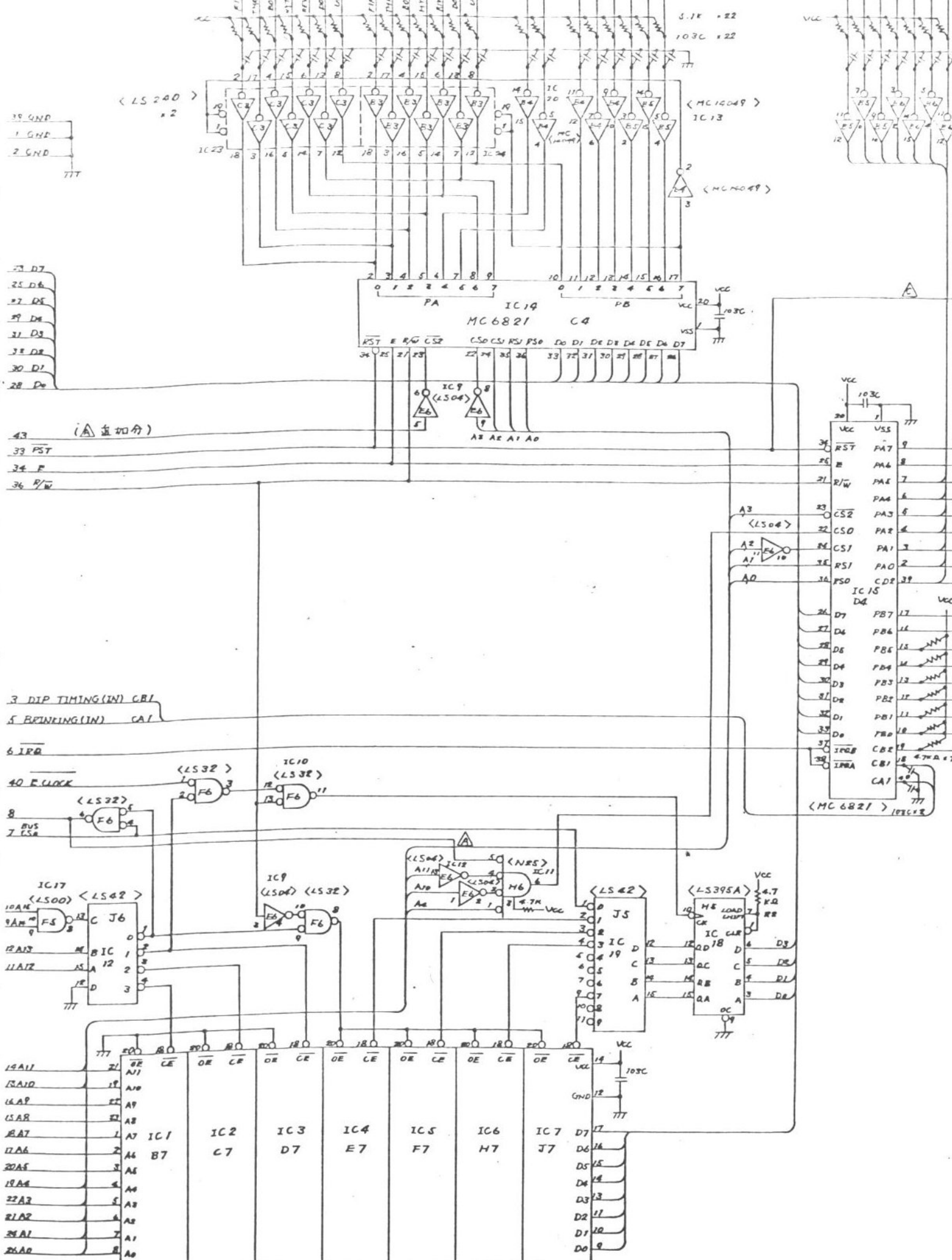


CN3-50

	D'0	D'1	D'2	D'3	D'4	D'5	D'6	D'7	D'8	D'9	D'10	D'11	D'12	D'13
A1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
A2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
A3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
A4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
A5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
A6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
A7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
A8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
A9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
A10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
A11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
A12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
A13	13	13	13	13	13	13	13	13	13	13	13	13	13	13

RAM 14P





(LS240) \* 2

(MC14049) IC13

(MC14049)

IC19  
MC6821  
C4

IC9 (LS04)  
IC10 (LS32)

IC15  
MC6821

23 D7  
25 D6  
27 D5  
29 D4  
31 D3  
33 D2  
30 D1  
28 D0

43 (A 直加分)  
33 RST  
34 E  
36 R/W

3 DIP TIMING(IN) CB1  
5 BRINKING(IN) CA1

6 IPB  
40 CLOCK

IC17 (LS00) (LS42)  
10A M FS  
9A M FS  
12A17 M BIC  
11A17 M A

14A11 2L  
13A10 1P  
16A9 2Z  
15A8 2Z  
18A7 1L  
17A6 2Z  
20A5 3Z  
19A4 2Z  
22A3 2Z  
21A2 2Z  
24A1 2Z  
26A0 2Z

IC1	IC2	IC3	IC4	IC5	IC6	IC7
B7	C7	D7	E7	F7	H7	J7

