

# DRIVING FORCE INSTRUCTIONS

## SERIES 2 EXPANSION BOARD

We strongly recommend that you completely clean and repaint your Pac-Man cabinet yellow. It is necessary to undercoat the cabinet first or the side decals will show through. We use and recommend Zinsser Brand 3 Purpose Bin Primer Sealer. It primes white, seals, and dries in about 25 minutes.

### PART 1

**1.** It is essential that the Pac-Man logic board be tested prior to commencement of this conversion. Switch Pac-Man machine on and play at least two games to ensure that all functions of the logic board are working correctly.

**2.** Remove logic board assembly from the cabinet and place component side up on a clear work bench.

**3.** Remove V RAM Addresser sub board from location 5S. This sub board may be secured by a plastic tie wrap, if so simply cut the tie wrap.

**4.** Remove bus controller sub board at location 6D. Again it may be necessary to cut a tie wrap.

**5.** Remove Pac-Man ROMs at locations 6E, 6F, 6H, 6J, 5E, and 5F.

**6.** Remove Z80 CPU from location 6B. The following components removed from your board should be stored away in a safe place for possible future use: Z80 CPU (6B); Pac-Man ROMs (6E, 6F, 6H, 6J, 5E, 5F); V RAM Addresser sub board (5S).

**7.** Remove new expansion board from packing box and place component side down on the right hand side of the Pac-Man logic board. Connect the 40 pin ribbon connector to the socket at 6B, and the 24 pin ribbon connector to the socket at 5E.

**8.** Replace the bus controller sub board into socket at 6D.

**9.** Fold expansion board over the Pac-Man logic board and connect the 28 pin ribbon connector to the socket at 5S. The expansion board is held in place by two self-adhesive posts. Ensure that the logic board is clean so that they can stick.

**10.** We suggest that at this point in the conversion you replace the Pac-Man logic board in the cabinet, replace the edge connector and switch the machine on. Observe the monitor to see that the flashing name "Driving Force" appears and a pair of flags are visible at the top of the screen.

If these images are visible on the screen you can safely proceed to part 2 of these instructions. If the screen does not display these images remove the logic board and recheck step by step the conversion to this point.

### PART 2

**1.** Remove board assembly to a clear work bench.

**2.** Remove ribbon connectors from the new expansion board and remove expansion board.

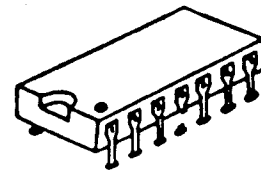
**3.** Remove bus controller sub board at 6D.

**4.** The new Driving Force game takes advantage of new technology not found in the original Pac-Man board. In order to increase the video and sound quality of the Pac-Man board the following modifications are required.

**5.** Remove color ROMs at locations 7F and 4A (*store these with the Z80 and other ROMs for future use*).

**6.** Cut and lift pin #4 of IC 3N. Cut and lift pin #5 of IC 4C.

IC 3N

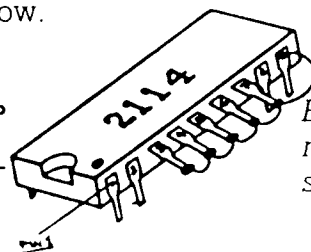


**7.** Connect wire from lifted pin #4 IC 3N to pin #2 of IC 2P.

**8.** Remove RAM chips at locations 4P and 4L.

**9.** Lift pins 3, 4, 5, 6, 7 of both RAM chips and replace ICs into sockets 4P and 4L so that the lifted pins do not go back into the socket. On each RAM chip link together the bent-out pins 3, 4, 5, 6, and 7 to pin 9 with a piece of wire. See illustration below.

IC 4P  
&  
IC 4L

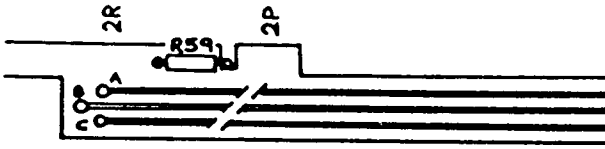


*Ensure that the wire connecting strap does not short out on pin #8.*

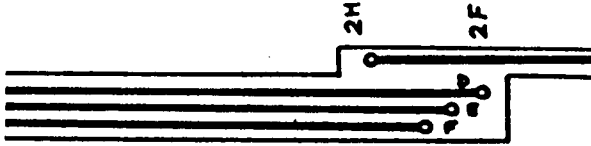
**10.** Connect green wire from pin 1 of Molex pin strip to pad B. Connect blue wire from pin 2 of Molex pin strip to pad C. Connect red wire from pin 3 of Molex pin strip to pad A. See below. **IM**

## IMPORTANT

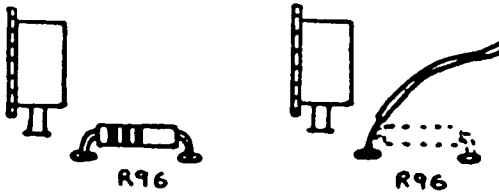
**PORTANT:** All the wires from the Molex pin strip connect to locations on the Pac-Man logic board.



11. Connect orange wire from pin 4 of the Molex pin strip to pad F. Connect brown wire from pin 5 of the Molex pin strip to pad D. Connect grey wire from pin 6 of the Molex pin strip to pad E. See below.



12. Cut out resistor R 96 near volume control. Connect purple wire from pin 7 of the molex pin strip to inner connection point of cut out resistor R 96.



13. Connect yellow wire from pin 8 of the Molex pin strip to pin 7 of IC 4B. Connect white wire from pin 9 of the Molex pin strip to pin 6 of IC 4B. Connect black wire from PN 10 of the Molex pin strip to lifted pin 5 of IC 4C.

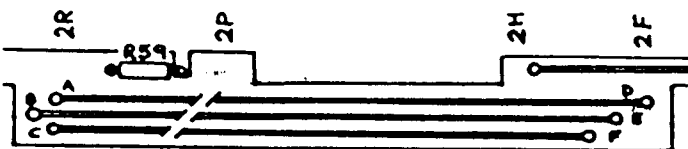
14. Insert new color PROM IC 82S126N in socket at 4A.

15. Insert new color PROM IC 82S123N in socket at 7F.

16. Refit bus controller sub board at location 6D.

17. Install expansion board onto logic board and connect 40 pin, 24 pin and 28 pin ribbon connectors to their respective sockets.

18. Using a sharp knife cut the 3 tracks near R59 as illustrated below.



19. The logic board assembly can now be reinstalled into the cabinet.

20. The kit comes complete with a new front control panel. It is necessary to remove the harness assembly from the Pac-Man control panel and install it on the new control panel. The joystick positions "UP" and "DOWN" are not used in this game. For left-handed players brake and accelerator buttons have been installed on the left hand side of the new control panel. It is necessary to run wires to these common to the right hand buttons. The accelerate button is connected to the one player button and the brake button is connected to the two player button. Left and right controls remain identical.

21. Remove the Pac-Man monitor glass and insert the new "Driving Force" monitor glass. Install the new control panel.

22. Remove the Pac-Man header panel and install the new "Driving Force" header panel.

23. When the cabinet has been cleaned and repainted, the two side decals can be applied to complete the conversion.

### SUMMARY OF IC PIN CUTS

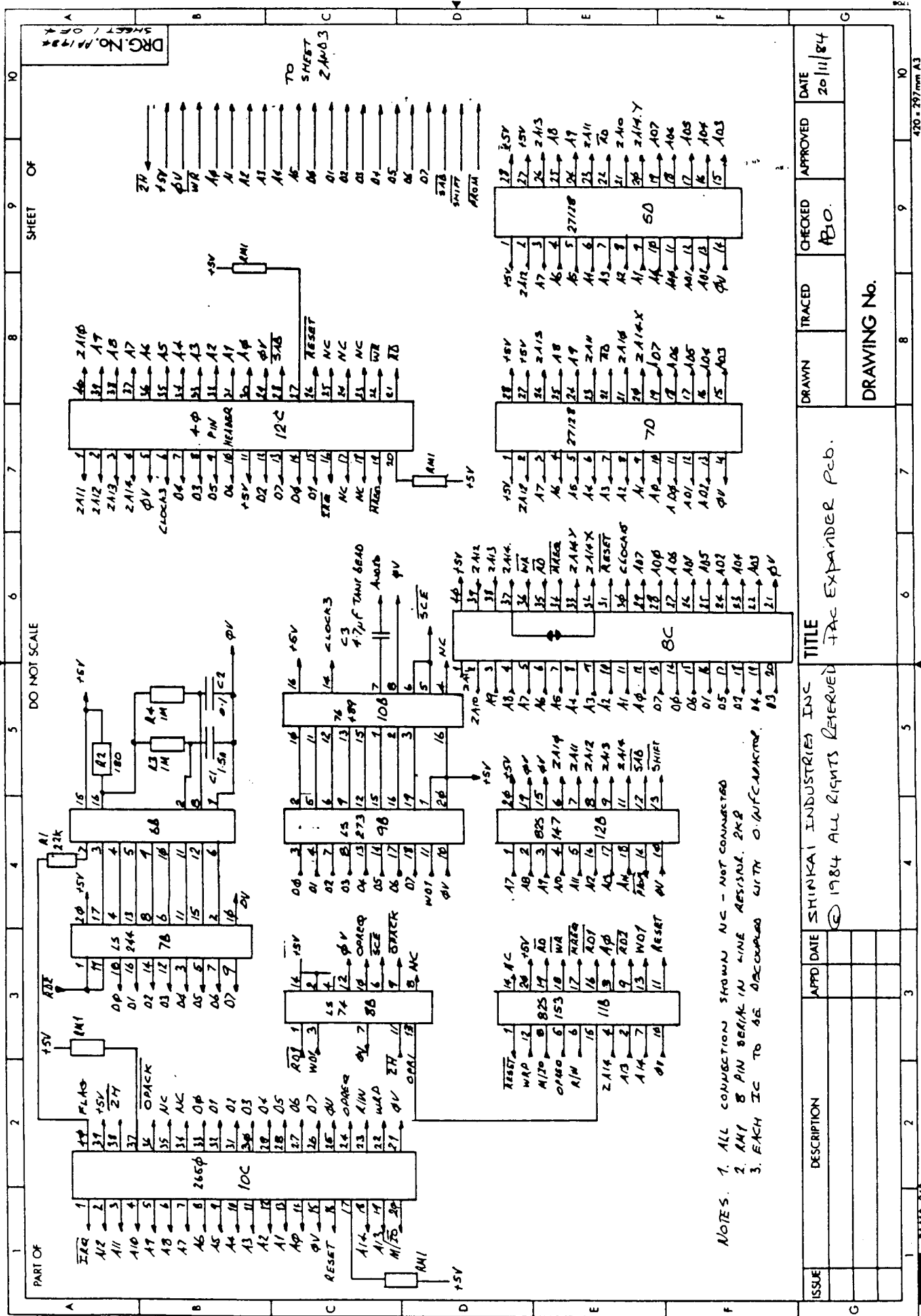
1. Cut and lift pin #4 of IC 3N.
2. Cut and lift pin #5 of IC 4C.
3. On IC's 4P and 4L lift and link pins #3, #4, #5, #6 and #7 and connect to pin #9.

### SUMMARY OF CONNECTIONS

1. Connect wire from lifted pin #4 of IC 3N to pin #2 of IC 2P.
2. From molex pin strip on the expansion board make the following connections:
  - Green wire to pad "B".
  - Blue wire to pad "C".
  - Red wire to pad "A".
  - Orange wire to pad "F".
  - Brown wire to pad "D".
  - Grey wire to pad "E".
  - Purple wire to connection point at R96.
  - Yellow wire to pin #7 of IC 4B.
  - White wire to pin #6 of IC 4B.
  - Black wire to lifted pin #5 of IC 4C.

### TRACK CUTS

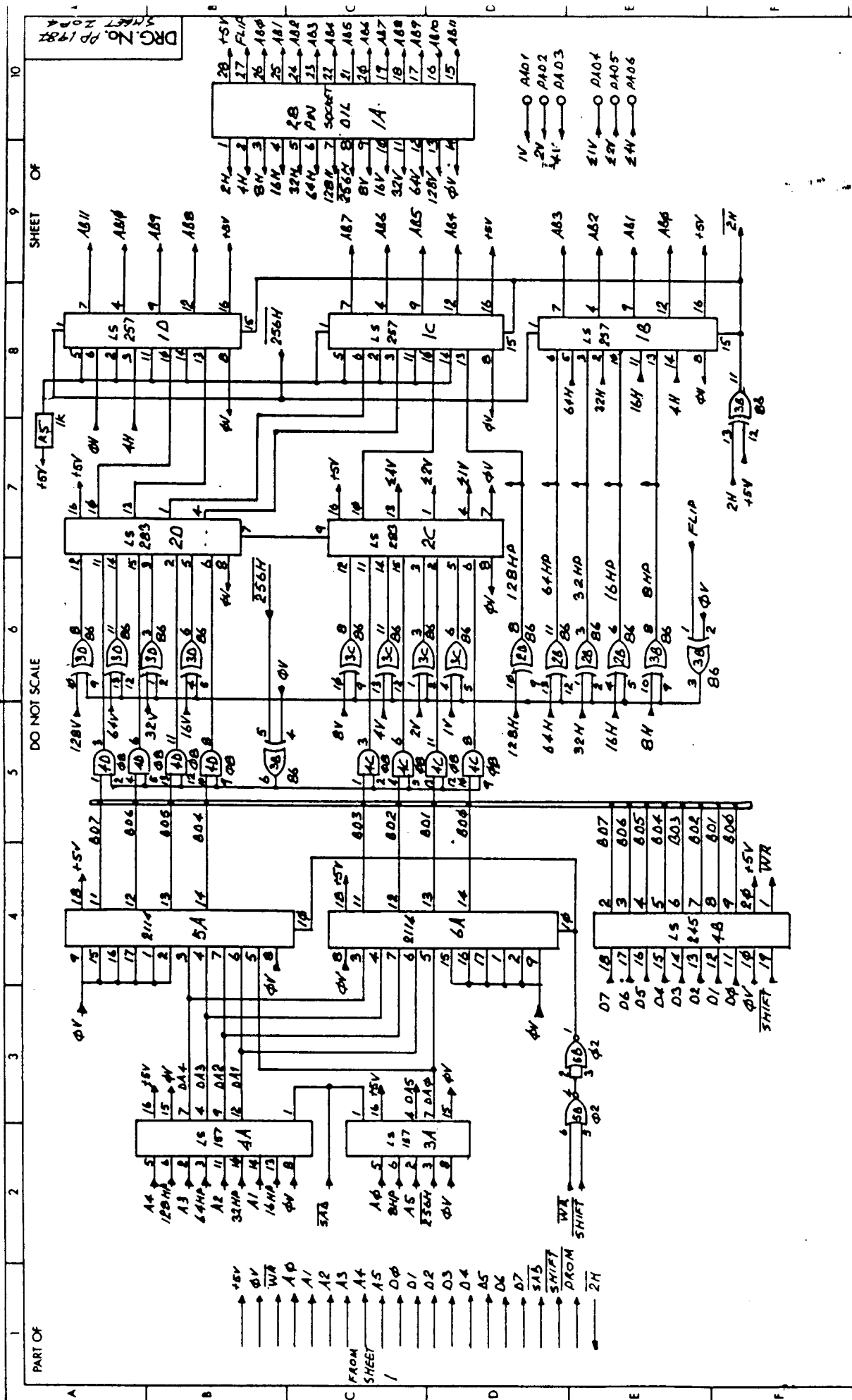
1. Cut 3 tracks located near R59 as illustrated.



NOTES: 1. ALL CONNECTION SHOWN NC - NOT CONNECTED  
 2. AMY 8 PIN SERIAL IN LINE RESISTOR. 2KΩ  
 3. EACH IC TO BE DISCONNECTED WITH CAPACITOR.

ISSUE	DESCRIPTION	APPD DATE	TITLE		DRAWING No.		TRACED	CHECKED	APPROVED	DATE
			SHINKAI INDUSTRIES INC.		JAC EXPANDER PCB.			ABO.		20/11/84

DRG. No. PD 1984  
 SHEET 2 OF 4



ISSUE	DESCRIPTION	APPD DATE	TITLE	DRAWN	TRACED	CHECKED	APPROVED	DATE
			SHINKAI INDUSTRIES INC			A20		20/11/84
			EXPANDER					
			(C) 1984 ALL RIGHTS RESERVED					

DRAWING No. 470-297mm A3  
 8550-943

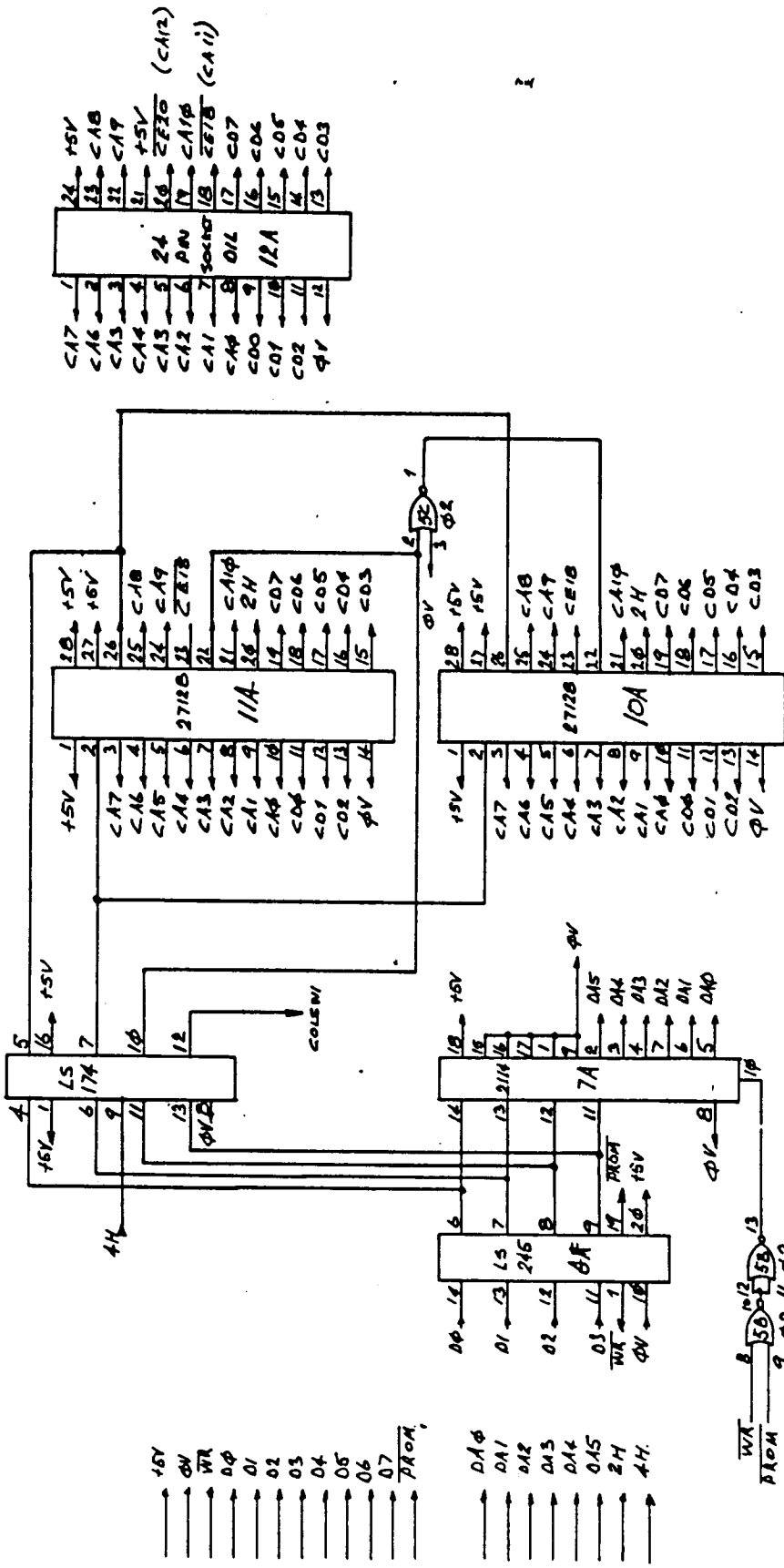
PART OF

DO NOT SCALE

SHEET OF

10

DRG. No. 00198K  
SHEET 3 OF 4



- +5V
- 0V
- WR
- 0Φ
- 01
- 02
- 03
- 04
- 05
- 06
- 07
- PROM<sub>1</sub>

- DAΦ
- DA1
- DA2
- DA3
- DA4
- DA5
- ZH
- 4H<sub>1</sub>

- WR
- PROM

ISSUE	DESCRIPTION	APPD DATE	TITLE	DRAWN	TRACED	CHECKED	APPROVED	DATE
			FAC EXPANDED			12-10		20-11-84

DRAWING No.

## **OPERATOR INFORMATION**

### **WARNING**

#### **F.C.C. REGULATION COMPLIANCE**

This conversion kit must be installed according to the instructions for F.C.C. regulation compliance. This is required to avoid radio frequency radiation and to comply with the limits for a class "A" computing device pursuant to subpart "J" of part 15 of F.C.C. rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

The operation of this equipment in a residential area is likely to cause interference—in which case the user will be required to take whatever actions are necessary to correct the interference at his own expense.

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