

# HARDWARE

ALL 64k TUGRAM OWNERS :- Check your component listing against that below noting the alterations. IC I2 is shown on the cct. diagram as a 74LS244 but may be a 74LS245 if desired/more available. The most important point that was missed of the original sheet was that between IC's 9 & 10, there are three plated thro' holes that don't appear to go anywhere. For normal operation, the righthand pair (looking down on the board) should be linked. Should you wish to experiment with running Mtan at faster speeds, then link from the centre hole to the left.

## 64K DYNAMIC RAM BOARD

### COMPONENT LIST

#### IC's

8	Off	4164	(IC's 19-26)
X 2	Off	74LS32	(IC's 5, <del>XX</del> 14)
3	Off	74LS138	(IC's 1, 2, 15)
2	Off	74LS 244	(IC's 18, 12)
2	Off	74LS257	(IC's 7, 17)
2	Off	74LS393	(IC's 3, 11)
2	Off	74LS112	(IC's 9, 10)
K 2	Off	74LS04	(IC 8) & I3
1	Off	74LS30	(IC 6)
1	Off	74LS245	(IC 27)
1	Off	74LS27	(IC 16)
1	Off	74LS08	(IC 4)

#### RESISTORS

<del>2</del>	<del>Off</del>	<del>2.2K OHM 7-Commoned Resistor Network (S.I.L.)</del>	(RN 2, 3) <u>NOT</u> required
1	Off	2.2K OHM 7-Commoned Resistor Network (S.I.L.)	(RN 1)
4	Off	2.2K OHM 0.25W	(R 1-4)
2	Off	470 OHM 0.25W	(R 6, 7)
3	Off	1K OHM 0.25W	(R 5, 8)

#### CAPACITORS

9	Off	Tantalum 0.1uF 35V	(C 33-41)
31	Off	L.V. Discs 0.047 35V	(C 1-10, 12-32)
1	Off	22uF 10V	(C 42)
1	Off	10uF low voltage ceramic (high K type)	(C 11)
		47nF	

#### MISCELLANEOUS

1	Off	Edge Connector	64 Way A + B
1	Off	8.S.P.S.T. DIL Switch	(SW 2)
1	Off	4.S.P.S.T. DIL Switch	(SW 1)
1	Off	Crystal 16.0 MHZ	(XL 1)

#### THE SWITCH FUNCTIONS ARE AS FOLLOWS:

SWITCH 1	1.1 OFF TO OVERLAY TANEX RAM	(Fit with ON side toward R3,4)
	1.2 ON TO RECOGNISE INHRAM SIGNAL	
	1.3 ON TO RECOGNISE I/O SIGNAL	
	1.4 ON TO RECOGNISE BLOCK ENABLE	

SWITCH 2	SWITCHES OFF CAUSE RAM TO APPEAR IN FOLLOWING LOCATIONS.	(Fit with ON side toward RNI)
----------	--	-------------------------------

- 2.1 C000 C7FF
- 2.2 C800 CFFF
- 2.3 D000 D7FF
- 2.4 D800 DFFF
- 2.5 E000 E7FF
- 2.6 E800 EFFF
- 2.7 F000 F7FF

SWITCH 2.8 IS NOT USED

COMPONENT LIST

<u>IC's</u>			
8	Off	4164 (16)	
3	Off	5 74LS32 (16)	(IC's 19-26)
3	Off	7 74LS138 (16) ✓	(IC's 5, 13, 14)
2	Off	8 74LS 244 (26) ✓	(IC's 1, 2, 15)
2	Off	10 74LS257 (16) ✓	(IC's 18, 12)
2	Off	11 74LS393 (16) ✓	(IC's 7, 17)
2	Off	6 74LS112 (16) ✓	(IC's 3, 11)
1	Off	1 74LS04 (16) X2	(IC's 9, 10)
1	Off	4 74LS30 (16) ✓	(IC 8)
1	Off	9 74LS245 (26) ✓	(IC 6)
1	Off	3 74LS27 (16) ✓	(IC 27)
1	Off	2 74LS08 (16) ✓	(IC 16)
			(IC 4)

RESISTORS

2	Off	1K OHM 8-Commoned Resistor Network (S.I.L.)	(RN 2, 3)
4	Off	2.2K OHM 7-Commoned Resistor Network (S.I.L.)	(RN 1)
2	Off	2.2K OHM 0.25W	(R 1-4)
3	Off	470 OHM 0.25W	(R 6, 7)
	Off	1K OHM 0.25W	(R 5, 8)

CAPACITORS

9	Off	Tantalum 0.1uF 35V	(C 33-41)
31	Off	L.V. Discs 0.047 35V	(C 1-10, 12-32)
1	Off	22uF 10V	(C 42)
1	Off	10nF low voltage ceramic	(C 11)

MISCELLANEOUS

1	Off	Edge Connector	64 Way A + B
1	Off	8.S.P.S.T. DIL Switch	(SW 2)
1	Off	4.S.P.S.T. DIL Switch	(SW 1)
1	Off	Crystal 16.0 MHZ	(XL 1)

THE SWITCH FUNCTIONS ARE AS FOLLOWS:

## SWITCH 1

- 1.1 OFF TO OVERLAY TANEX RAM
- 1.2 ON TO RECOGNISE INHRAM SIGNAL
- 1.3 ON TO RECOGNISE I/O SIGNAL
- 1.4 ON TO RECOGNISE BLOCK ENABLE

## SWITCH 2

SWITCHES OFF CAUSE RAM TO APPEAR IN FOLLOWING LOCATIONS.

- 2.1 C000 C7FF
- 2.2 C800 CFFF
- 2.3 D000 D7FF
- 2.4 D800 DFFF
- 2.5 E000 E7FF
- 2.6 E800 EFFF
- 2.7 F000 F7FF

SWITCH 2.8 IS NOT USED