

T H E D Y N A M I C P E T

The 16K, 32K and the new 8K use dynamic RAMs. They need to be refreshed continuously, otherwise they are unable to store information for any length of time. There is a special refresh circuitry on board to keep all of the 0's and 7's in tact.

The main difference between static (old 8K) and dynamic RAMs is that the static RAMs do not require refreshing.

Another difference is that static RAMs run off of one +5V supply line. The dynamic RAMs need three supply lines to operate; +5V, -5V and +12V.

The dynamic RAM chips used are; 4108 (1*8K) and 4116 (1*16K). To make up an 8 bit word or an 8 bit byte, we must use all 8 RAM'S.

The addressing of the RAMs is done via the 4 to 1 multiplexers (74LS153) which multiplex the address lines from the processor and the refresh address lines, so that we are able to address all 16/32K of RAM.

There are two important lines for troubleshooting. The Cas 0 and Cas 1, the block select lines for the lower and high 8K or 16K.

- By crossing over the two lines we can swap the two blocks of RAM over or select one block of RAM at a time.
- The change of the two memory blocks is done by lifting one end of resistors R41, R42 and crossing them over. These resistors are located in row G between I.C.'s 6, 7 and 8.

So if page 0 is bad and your computer freezes, then try the above. Connect bootloader to determine which RAM is bad.

The video RAMs are the 2114 (6114) chips located at F7 and F8. These RAMs do not store the character to be displayed on the screen, but the address of that character stored in the character generator ROM.

This RAM can be read or inputted from 2 directions. One by the refresh circuitry, so that we can continuously display that character on the screen, or if we want to change that character then the signal comes through from the processor and main memory. The video RAM is used as a buffer.

The data coming out of the ROM's D0-7 is going into an 8 bit parallel latch F9 (74LS373). The reason for using a data latch is because the processor uses the data for half a cycle and the screen uses the other half cycle to display the data. So there is a need to hold the data in a latch temporarily to give the processor and video a chance to access that data.

The data is then clocked out by VIDEO LATCH signal (coming from page 6 of your schematics).

Out of the latch, the 7 bit address A3-9 (page 8 on your schematics) is applied to the input of the character generator ROM located in F10.

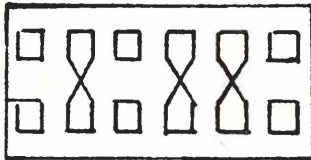
This is the address of the character to be displayed and not the character itself.

Address line A10 (page 8) is the 8th bit which is used to select upper/lower case or graphics. This signal comes back from the 6522 chip.

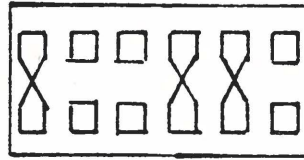
It is important for troubleshooting, to know all the different types of RAMs that are used.

The following is a list of RAMs that can be used for each model and how the jumpers are connected.

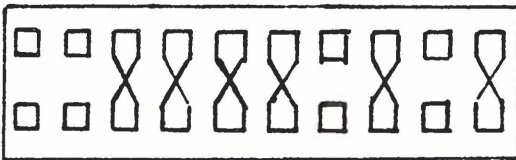
JUMPERS FOR THE DYNAMUC 8K PET



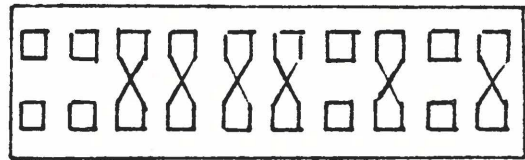
A B C D E F



A B C D E F



H I J K L M N P R S



H I J K L M N P R S

RAM TYPE

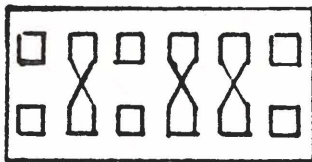
MK 4108P-30
 MK 4115P-30
 MK 4108P-40
 MK 4115P-40
 TMS 4108-25JDL-0
 TMS 4108-30JDL-0

RAM TYPE

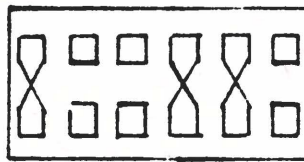
MK 4108P-31
 MK 4115P-31
 MK 4108P-41
 MK 4115P-41
 TMS 4108-25JDL-1
 TMS 4108-30JDL-1

NOTE: USE 8K RAMS IN ROW I ONLY.

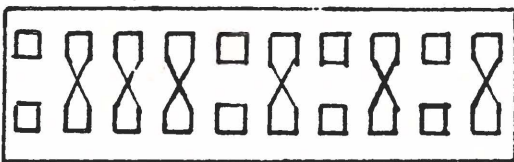
JUMPERS FOR THE DYNAMIC 16K PET



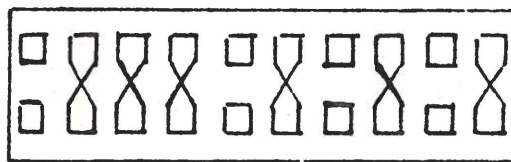
A B C D E F



A B C D E F



H I J K L M N P R S



H I J K L M N P R S

RAM TYPE

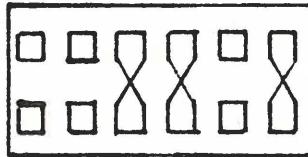
MK 4108P-30
 MK 4115P-30
 MK 4108P-40
 MK 4115P-40
 TMS 4108-25JDL-0
 TMS 4108-30JDL-0

RAM TYPE

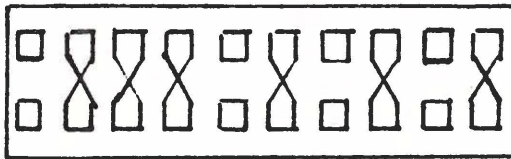
MK 4108P-31
 MK 4115P-31
 MK 4108P-41
 MK 4115P-41
 TMS 4108-25JDL-1
 TMS 4108-30JDL-1

NOTE: USE 8K RAMS IN ROWS I AND J.

JUMPERS FOR THE DYNAMIC 16K PET



A B C D E F



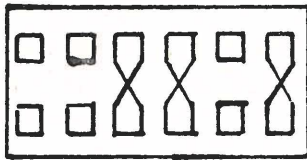
H I J K L M N P R S

RAM TYPE

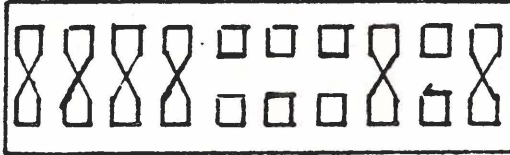
TMS 4116-25NL
TMS 4116-15NL
uP 416C-1
HM 4716A-4
MB 8116 N
MB 8116 H
TMS 4116-30JH
TMS 4116-25JL
C 2117-4
C 2117-3
TMM 416D-3
LH 4116-3
MK 4215P-2
MK 4215P-3
MK 4215P-4
MK 4116P-3
MK 4116P-4

NOTE: USE 16K RAMS IN ROW I ONLY.

JUMPERS FOR THE 32K PET



A B C D E F



H I J K L M N P R S

RAM TYPE

TMS 4116-25NL
TMS 4116-15NL
uPD 416C-1
HM 4716A-4
MB 8116 N
MB 8116 H
TMS 4116-30JH
TMS 4116-25JL
C 2117-4
C 2117-3
TMM 416D-4
LH 4116-3
MK 4215P-2
MK 4215P-3
MK 4215P-4
MK 4116P-3
MK 4116P-4

NOTE: USE 16K RAMS IN ROWS I AND J.

Typical Faults:

When the computer is switched on and cannot reset;

- Remove keyboard connector and connect plugs to use bootloader.
- If the message on the screen is: adr 7 bad it refers to the 0 page of RAM, Row I.
- If all the RAMs are O.K., then check buffers I 10 and I 11 (74LS244).
- If the screen shows only retrace lines, then check I.C. G 11 (74LS20).

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3330 SCOTT BOULEVARD
SANTA CLARA, CALIFORNIA 95050
TELEPHONE: (408) 727-1130 TELEX: 171141
CABLE ADDRESS COMBUSMAC

MAIN LOGIC ASSEMBLY PARTS CROSS REFERENCE

<u>REF. DES.</u>	<u>DESCRIPTION</u>	<u>PART NO.</u>
C1-C13, C18-C23, C26-C31	.01 UF 50V	900020-01
C33-C40 C46-C61, C71-C80, C84	.01 UF 50V	900020-01
C14, C16, C24	.01 UF 50V	900020-01
C15, C17, C25, C67	47UF 16V Electrolytic	900100-33
C32, C41-C43, C45	10UF 25V Tant	900402-13
C44	10UF 20V Tant	900402-09
C62	22PF 200V	900010-42
C63	4700UF 25V Electrolytic	900100-45
C64, C65	680UF 16V Electrolytic	900101-41
C66, C69, C70	.02UF 200V	900010-37
C68	.01UF 50V	900010-38
C81-C83	.1UF 50V	900010-20
CR1-CR9	47UF Tant	900401-04
CR10-CR13	IN5402 3/A 200V	900753-01
J4, J9	IN4001 IA 50V	900750-01
J5	25 PIN DUAL HEADER	903311-02
J7	20 PIN HEADER	903307-02
J8	7 PIN HEADER	903307-10
J10	9 PIN HEADER	903302-16
J11	7 PIN HEADER	903307-09
Q1, Q4	7 PIN HEADER	903307-08
Q2, Q5	TIP29	902653-01
Q3, Q6	2N4401	902652-01
R1, R4	2N3904	902658-01
R2, R6, R18-R25	1.5K 1/4W 5%	901550-69
R3, R5, R12-R14, R26	10K 1/4W 5%	901550-20
R27, R40, R43-R46	1K 1/4W 5%	901550-01
R49-R52	1K 1/4W 5%	901550-01
R7-R9, R28, R30	1K 1/4W 5%	901550-01
R10, R48	470 1/4W 5%	901550-58
R11, R47	2.4K	901550-85
R15, R16	5.1K	901550-03
R17	1M	901550-84
R29	3.3K	901550-02
R31-R38	680	901550-31
R39	680HM	981550-94
R41, R42	390HM	901550-93
SH1	270HM	901550-90
SH2	6 PACK DIP SHUNT	904777-06
UA2	10 PACK DIP SHUNT	904777-10
UA3	LM555 TIMER	901523-01
UA4, UG10	74LS04 HEX INV.	901521-02
	74LS00 NAND GATE	901521-01

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CABLE ADDRESS COMBUSMAC

<u>REF. DES.</u>	<u>DESCRIPTION</u>	<u>PART NO.</u>
UA5	74LS10 NAND GATE	901521-24
UA7-UA9	MC 3446 INTERFACE BUS.	901524-01
UA10	7417 HEX BUFFER	901522-01
UB2	7425 NAND GATE	901522-20
UB3, UC3, UE7, UE10	74LS244 BUFFER	901521-13
UI9, UI10		
UC4	6502 MPU.	901435-01
UC5	6522 VIA	901437-01
UC6, UC7	6520 PIA	901436-01
UC9	74159 4 TO 16 LINE DECODER	901522-22
UD2	74154 4 TO 16 LINE DECODER	901522-13
UD6	6332-007 ROM	901465-01
UD7	6332-008 ROM	901465-02
UD8	6316-011 ROM	901447-24
UD9	6332-009 ROM	901465-03
UE3-UE6	74153 SCHOTTKY 4/1 MUX	901522-26
UE11	74LS165 SHIFT REG.	901521-12
UF1, UG1, UH4	74S08 SCHOTTKY AND GATE	901525-05
UF2, UF4	74177 COUNTER	901522-03
UF3, UF5, UF6	74LS157 or 74157 DATA SEL	901521-11
UF7, UF8	2114 RAM	901453-01
UF9	74100 or 74LS393 LATCH	901522-02
UF10	6316-004 ROM CHAR. GEN.	901447-10
UG2, UG11	74LS20 NAND GATE	901521-04
UG5	74191 SYNC. COUNTER	901522-21
UG6, UG8, UH6, UH8	74LS107 FLIP FLOP	901521-08
UG7	74S10 SCHOTTKY NAND GATE	901525-06
UG9	74LS74 FLIP FLOP	901521-06
UH1, UH5	74S113 SCHOTTKY	901525-07
UH2, UI1	74504 SCHOTTKY HEX INV.	901525-01
UH3, UI11	74S00 SCHOTTKY NAND GATE	901525-04
UH9, UH11	74LS93 COUNTER	901521-07
UH10	74LS08 AND GATE	901521-03
UI2-UI9, UJ2-UJ9	4108 RAM FOR 16K	901470-02
UI2-UI9, UJ2-UJ9	4116 RAM FOR 32K	901470-01