



MY APOLOGIES TO OUR READERS FOR TAKING SO LONG WITH PART 2 OF THIS PROJECT. THE ORIGINAL IDEA WAS TO PRODUCE A PRINTED CIRCUIT BOARD AND OFFER IT FOR SALE TO INTERESTED PERSONS. UNFORTUNATELY THE COST OF PRODUCING SUCH A BOARD IS WELL OVER \$200.00 AND OUT OF MY REACH.

THE ALTERNATIVE IS TO USE EXISTING BOARDS WHICH CAN BE USED WITH SOME MODIFICATIONS. THE TWO BOARDS ARE :-

- 1) - ETI 687 SUPER II 34 K RAM BOARD.
- 2) - DAVID NEWCOMBE 32K RAM BOARD - SEE LAST ISSUE FOR DETAILS.

IN THIS ARTICLE I'LL BE USING DAVID'S BOARD AS AN EXAMPLE AND MOST OF THE IDEAS SHOULD APPLY TO THE ETI 687 BOARD AS WELL.

CORRECTION - IN PART 1 THE CIRCUIT OF IC 1 IS INCORRECT. THE CORRECT CIRCUIT APPEARS AT TOP LEFT OF THIS PAGE.

WHEN I WAS DESIGNING 128K S/WAYS RAM I ALSO DESIGNED CIRCUITS FOR 32K VIDEO RAM, 64K BASIC ROM, 128K DOS ROM, 128K RAM DISK AND 64K FOR 6000H-67FFH RANGE ALL USING S/WAYS OR BANK SWITCHING TECHNIQUES. INADVERTANTLY I USED THE WRONG CIRCUIT.

DAVIDS RAM BOARD IS DESIGNED TO HOLD 4 X 8K RAM CHIPS IF USED WITH VZ 200 OR 2 X 8K AND 1 X 2K RAM CHIPS PLUS A 74LS00 IF USED WITH VZ 300. TO USE WITH VZ 300 ONLY 98K (3 X 32K + 1 X 2K) CAN BE PLACED ON BOARD AND WITH VZ 200 80K (2 X 8K + 2 X 32K). THE MISSING 32K CHIPS COULD BE PIGGYBACKED OR PUT ON DAVIDS 64K ROM BOARD WHICH CAN HOLD UP TO 4 X 16K EPROMS.

THERE ARE ONLY 2 DIFFERENCES BETWEEN 8K AND 32K RAM CHIPS AND ARE MARKED WITH AN ASTERICK ON THE PINOUTS ABOVE. THEY ARE :-

- PIN 1 8K +5V - 32K A14
- PIN 26 8K +5V - 32K A13

WHAT IT MEANS IS THAT WE CAN PUT 32K RAM CHIPS IN PLACE OF 8K RAM CHIPS ON THE BOARD. PINS 1 AND 26 MUST BE BENT UP 90 DEG. OR MORE PRIOR TO INSERTING INTO SOCKETS.

ONE HELPFULL FEATURE OF DAVID'S BOARD IS IT'S ABILITY TO TAKE A PIGGYBACK ROM BOARD WITH ALL THE REQUIRED SIGNAL LINES AVAILABLE BAR FOUR, RESET, A13, C000 AND E000. IC'S 1 TO 4 FROM 128K RAM CIRCUIT COULD BE PUT ON A PIECE OF VEROBOARD AND UNIT PLUGGED IN WHERE THE ROM BOARD IS SUPPOSED TO GO.

THE DRAWING DEPICTING REVERSE SIDE OF BOARD SHOWS WHERE ALL THE REQUIRED SIGNAL LINES ARE. A13 CAN BE HAD FROM TWO LOCATIONS AND BOTH ARE MARKED. RESET IS AVAILABLE ONLY FROM EDGE CONNECTOR.

TWO MORE SIGNALS ARE NEEDED AND THEY ARE C000 AND E000 AND ARE MARKED WITH AN ASTERICK. THEY COME FROM ON BOARD DECODER WHICH DECODES THE FULL 64K IN 8K BLOCKS. THE DIODE AND GATE COMBINES THE TWO 8K BLOCK SIGNALS INTO ONE 16K BLOCK IN THE NEEDED RANGE OFF C000-FFFF WHICH ACTS AS AN ENABLE FOR IC 3.

ONCE YOU HAVE ASSEMBLED THE PLUG IN BOARD WE CAN PROCEED TOWARDS ASSEMBLY. IF USING WITH VZ 300 THEN THE 74LS00 DECODER COULD BE MOUNTED ON PLUG IN BOARD BY MAKING IT LONGER AND LETTING IT OVERHANG AT THE EDGE CONNECTOR END WHICH WOULD MAKE ROOM FOR THIRD 32K RAM CHIP ON RAM BOARD.

THE 32K RAM CHIPS ARE PLACED IN POSITIONS 4, 3 AND 2. THE CS (CHIP SELECT) SIGNALS COME FROM IC 4A TO 4B, PINS 3, 6 AND 11 AND GO TO CS POINTS MARKED ON 32K RAM BOARD. SOLDER A PIECE OF COVERED WIRE TO ONE OF A13 ADDRESS POINTS AND CONNECT OTHER END TO PIN 26 OF ALL 32K RAM CHIPS.

DO THE SAME WITH ADDRESS A14 DERIVED FROM PIN 10 OF IC2 AND SOLDER TO PIN 1 OF ALL 32K RAM CHIPS. THE 3 LEDS CAN BE INSTALLED NOW AND CAN BE REMOVED LATER IF DESIRED. THEY ARE HANDY IN TESTING CIRCUIT OUT. THE TRUTH TABLE FOR IC 3 CAN BE USED WITH THE LEDS TO TELL YOU WHICH BANK IS ACTIVATED.

PRESUMING ALL BUILT AND READY TO GO HOOK UP TO THE VZ LEAVING TOP OF CASE OFF POWER UP AND IF NO PUFF OF SMOKE PROCEED WITH TESTING UNIT. IF LEDS ARE CONNECTED THE LED CONNECTED TO D0, PIN 7 OF IC 2 SHOULD BE ON. USING LOGIC PROBE WE'LL TEST IC 3 OUT.

PIN 15 OF IC 3 SHOULD BE LO AND ALL OTHER O/P'S SHOULD BE HI, IF NOT THEN THERE'S AN ERROR IN ASSEMBLY. RESET VZ AND REPEAT AND IF OK PROCEED BY TESTING OTHER O/P'S ON IC 3 :-

OUT112,1 AND PIN 14 SHOULD BE LO, OTHERS HI - (BANK 1)
 OUT112,2 AND PIN 13 SHOULD BE LO, OTHERS HI - (BANK 2)
 OUT112,3 AND PIN 12 SHOULD BE LO, OTHERS HI - (BANK 3)
 OUT112,4 AND PIN 11 SHOULD BE LO, OTHERS HI - (BANK 4)
 OUT112,5 AND PIN 10 SHOULD BE LO, OTHERS HI - (BANK 5)
 OUT112,6 AND PIN 9 SHOULD BE LO, OTHERS HI - (BANK 6)
 OUT112,7 AND PIN 7 SHOULD BE LO, OTHERS HI - (BANK 7)
 OUT112,0 AND PIN 15 SHOULD BE LO, OTHERS HI - (BANK 0)

IF EVERYTHING CHECKS OUT THEN IT'S TIME TO PUT IT TO USE AND WHAT IT'S USED FOR IS UP TO YOU. YOU COULD TRY WRITING A NUMBER IN EACH BANK CORRESPONDING TO BANK AS A FINAL TEST.

THE 128K S/WAYS RAM CAN BE EXPANDED TO 256K BY REPLACING IC 3 WITH A 74LS154, AN 1 OF 16 DECODER WHICH HAS 16 O/P'S. ANOTHER QUAD AND GATE WOULD HAVE TO BE USED AND 4 EXTRA 32K RAM CHIPS.