

ASSEMBLY INSTRUCTIONS FOR THE 8-64K PBUFF SHORT FORM KIT (VERSION 2.2)
AND THE 256K PBUFF SHORT FORM KIT (VERSION 3.2).

Items supplied in kit:-

One bare single sided printed circuit board.
One 2716, 2732 or 2764 EPROM programmed with PBUFF Ver 2.2, or Ver 3.2
These assembly instructions.

The kit builder should have a reasonable tool kit which will include a Multi-Meter. A logic probe may be needed to help you with any hardware problems that you could run into. The logic probe I use is a 3800A. It is available at most electronic outlets for around \$20.00 Don't rush out and buy a logic probe because I said you may need one, you probably won't, but if you do run into real strife then it may be the only way out.

The following items are needed to complete the project:-

I have broken this into Section A, Section B, and Section C.

Section A items are needed only if you don't have an existing power supply capable of delivering +5 volts at around 300mA

I have used Dick Smith Catalogue numbers on some components only for reference purposes. You may find other outlets more convenient.

SECTION A. (External power components.)

Plug-pack 9 volts AC or DC at 400-600mA. The current required to run the full 8 memory chips is just under 300mA, but I would recommend a larger supply than this as a safety margin. PBUFF will accept AC or DC input. Experienced builders may prefer to use a suitable AC transformer.

(DSE Cat H-2155 9.5VAC multi-tap @ 1A)

IF YOU WISH TO ADD A SERIAL BOARD LATER ON, THEN A 9 VOLT AC SUPPLY MUST BE USED SO THAT -12 VOLTS CAN BE GENERATED FOR IT'S RS232 CIRCUITS.

Diodes D1-D4 1N4002 (4)

Capacitor C3 10uF Tantalum @16 Volts.

Capacitor C4 2500uF Electrolytic @16 Volts. (DSE Cat R-4195)

7805 +5 Volt regulator in TO-220 case.

Small flag type heat sink to suit regulator. (or clip on type DSE Cat H3415)

Section B. (Main board components.)

Capacitors BC1-BC13 .01uF Ceramic (13) (bypass caps)

Capacitor C1 220pF Ceramic

Capacitor C2 22uF Tantalum @16 Volts.

Capacitor C5 150pF Ceramic

Capacitor C6 680pF Ceramic

Resistor R1 100K

Resistor R2 270 OHMS

Resistor R3 10K

Resistors R4-R7 4K7 (4)

Resistor R8 150 OHMS

Resistor R9 4K7

Resistor R10 1K

Resistor R11 4K7

Z80A CPU

8255 Programmable Peripheral Interface.

74LS00 Quad 2-input NAND gate.

74LS04 Hex inverter.

Crystal 3.58MHz in a small case. (DSE Cat K-6031)

Transistor Q1 BC548 Any NPN Small Signal Amp will do. (BC108, BC148,

BC208, or DSE CAT Z-1308 DS548)

VERSION 2.2 ONLY.....

4164(s) 64K dynamic RAMs. One required for 8K, two for 16K, four for 32K, and eight for 64K. Any type are suitable, as the software provides for both 7 bit and 8 bit address refresh. This includes Texas Instruments TMS 4164's.

VERSION 3.2 ONLY.....

41256(s) 256K dynamic RAMs. Eight required.

Section C. (Misc. components.)

Chip sockets:- My usual rule is to fit sockets to all 40 pin devices, all ROM, and all RAM. This only leaves the two 74 series chips without sockets, so my advice is to fit sockets for all I.C.'s. If you experience problems debugging the hardware of this project then sockets will be a life saver.

Sockets Required:-

40 pin (2)

28 pin (1)

14 pin (2)

16 pin 8K (1) 16K (2) 32K (4) 64K (8)

If you are going to expand your memory at a later stage, then it would be advisable to fit the full eight RAM sockets now.

Version 3.2 only..... The full 8 sockets must be fitted. 256K (8)

Two push button (make) momentary switches for the RESET and TEST buttons.

SPST switch for the COPY switch. (Optional hardware pause SPST switch.)

One red LED 5mm, and LED mounting bezel. (DSE Cat Z-4030, and H-1910)

One male standard Centronics flat ribbon crimp type connector.

One female standard Centronics flat ribbon crimp type connector.

Approx. 3 feet of 36 wire flat ribbon cable.

A suitable case. I have designed the board mountings to fit the Dick Smith Cat H-2505. This is a superb plastic case at the price of \$12.50

ASSEMBLY:-

Can't think of anything else that we need, so if you have all of the above parts let's get to it.

The very first thing that must be done is to install the bare wire straps. Strip the insulation off some single conductor wire. I use telephone type two pair cable.

Have a look at the Printer Buffer Overlay. This is drawn from the component side of the board. Now look at your printed circuit board. One side has the artwork or tracks, the other side is bare except for the drilled holes. The bare side is known as the component side, and the artwork side is the solder side of the board. Compare the overlay sheet with the component side of the board. You will now see where these straps are to be connected.

There are thirty-one (31) bare straps to be installed, and one insulated jumper. Do not install the strap marked "X" just yet. This is explained later on. Install the straps from the component side of the board and pull them tight from the solder side of the board, BUT.. only 29 of them. The bare strap that you are about to install just above R4 carries +5 volts, and the strap above BC12 is ground. Don't pull these two straps tight. Leave a small loop in them so that they can be used for connecting your multi-meter, or logic probe leads to. These straps can then be soldered and the excess cut off with a pair of side cutters. Install the insulated jumper as shown on the overlay. Notice that it crosses three bare straps. This is why it needs to be insulated.

Install the I.C. sockets into the board. Take note of the orientation of pin 1 of the I.C.'s, as I have not arranged the direction of the chips in a logical fashion. This has been done to minimize the size of the board, and the number of straps required. The RAM software drivers require the most significant bytes to be installed first, that is, an 8K buffer needs only the data bit 7 RAM chip installed. This is shown as E7 on the overlay. Capacitor BC7 is the bypass cap. for E7

Best I give you a table at this stage for the various memory sizes.

RAM chip configuration:-

	4164(s)	Capacitor(s)	
8K	install E7	and BC7	(Data bit 7)
16K	install E7, E3	and BC7, BC3	(Data bits 7 and 6)
32K	install E7, E3, E4, E2	and BC7, BC3, BC4, BC2	(Data bits 7, 6, 5 and 4)
64K	install all RAM chips	and all bypass capacitors.	
256K (Version 3.2)	install all RAM chips	and all bypass capacitors.	

Once you have determined which sockets are to be installed and have them in position, they can be soldered in.

Install all the resistors as shown on the overlay. Some of these will need to be mounted standing up on the board as the drilled hole centres don't allow for them to lay flat. This is done by bending one leg of each resistor over the main body of the resistor. This will now allow you to push the resistors into their mounting holes. They can now be soldered in and the legs cut off flush with the solder joint. Bend R1 down flat towards the edge of the board before soldering in.

Install the BC capacitors. (Refer to RAM chip configuration.) Install C1, C5, and C6 capacitors. Lay C6 down flush with the board before soldering in. Solder these caps in and trim off the legs as before.

HEY !!!! Instead of me saying solder in component "X" and trim off the legs, you just add "AND TRIM OFF THE LEGS", every time I mention "SOLDER IN", OK?

Capacitors C2, C3, and C4 are polarized and must be soldered in the correct way around. These caps. have a plus sign (+) on one end of them, or in the case of C4, a minus sign (-) on one end. Solder them into the board as per the overlay, BUT be careful when installing C4. You will notice a mounting hole near where C4 is to be installed. Depending on the physical characteristics of C4, you may need to leave enough length on the legs of C4 to allow it to be pushed to one side so that the mounting screw can be tightened up with a screwdriver.

Install diodes D1-D4. You will notice a bar up one end of the diodes. Make sure that these are also mounted the correct way as shown in the overlay. Solder in these components.

Solder in the 7805 regulator. The words "7805" must be facing towards the diodes. The heat sink can be fitted to the 7805.

Position transistor Q1 into the board and bend flat towards the edge of the board before soldering in. If you use a DS548, the "CBE" connections are marked on the case and line up with the overlay as far as the flat side is concerned. The BC548 and the others, although not marked, should mount into the board the same way. If you end up with some obscure brand that you are not sure of the pinout, try reversing the Q1 connections if the clock fails to run.

Solder in the crystal, don't push it fully into the board, but leave enough length on the legs to allow it to bend over the top of Q1, C6 and R1. This is done to reduce the height of the crystal so that it will not interfere with any additional board that may be mounted on top of the main PBUFF board. Make sure that the crystal case doesn't short with any components.

RESET button..... Connect two insulated wires (approx. 6 inches long) from the reset button to the two points as shown on the overlay.

COPY switch... The same wiring method as the reset button, a pair of wires connected from the holes marked COPY to the SPST switch.

OPTIONAL HARDWARE PAUSE.... Same as above again, but connected to the two "pause pads". The track between the pause pads must be cut before this function will work. This can be done with a sharp pair of side-cutters or a STANLEY knife.

TEST BUTTON..... Connect one insulated jumper from the pad marked TEST to one side of the TEST button. The other side of the TEST button must be connected to ground as per the TEST circuit. Ground can be found on one side of your RESET button.

DATA LED..... The LED has one leg longer than the other. The longest leg is the anode, and the short leg is the cathode. Connect an insulated wire from the anode to the hole marked LED+, and from the cathode to the hole marked LED-. (See overlay.)

All floating wiring goes into the component side of the board the same as any component.

PADS MARKED SERIAL BOARD POWER OUT.....

Used only for the SERIAL board and starting from the top (near C4) are :- Spare (future expansion only), +5V, +12V, and AC. The AC connection is used to generate -12V on the SERIAL board. A strip of 4 male pins must be soldered into these pads.

RIBBON CABLES:-

If a SERIAL (or I/O) board is to be installed later on, strips of male pins are soldered into the input and output pads. Read the SERIAL (or I/O) board assembly instructions before installing the flat ribbon cables.

Get your 3 feet of flat ribbon cable and using a vice, crimp one end of this cable onto the female (input) Centronics connector, and the other end onto the male (output) Centronics connector. Make sure that you line up the wire 1 through connection. This cable can now be tested between your computer and printer. If this checks out OK, measure back approx. 9 inches from the FEMALE connector (input) along side the wire 1 conductor. At this 9 inch mark, using a sharp pair of scissors, cut at right angles through the first 22 wires. You may need to first split the cable length ways at the first 22 wires point so that you do not cut the 23th wire with the scissors. You should have separated the through connections 1 to 11, and 19 to 29.

REMEMBER. In the ribbon cable, the wire numbers alternate. e.g.

1, 19, 2, 20, 3, 21, 4, 22 etc. You will be using connections 1-11 and 29. Using a sharp pair of scissors, nick between each wire so that they can be separated by hand back about an inch. Check the pin numbering on the Centronics plugs and locate pin 1. On the now split end of the cables, strip the first wire at the pin one end. Use your multi-meter to verify that this wire is pin 1. So twelve wires must be stripped in each cable and soldered into the board. That is, wires 1-11 and 29. Bend the unused wires back, and tape up to prevent possible short circuits. **MAKE SURE THAT YOU CONNECT THE SHORT CABLE WITH THE FEMALE CONNECTOR ATTACHED, TO THE INPUT HOLES.**

THE "X" STRAP..... This strap is used to select upper or lower half of the EPROM. A 2732 or 2764 can be supplied with 2 versions of software. EG:- Upper bank 256K Version, lower bank 64K version. This EPROM would be labeled as follows :- PBUFF V3.2/V2.2 Without the "X" strap in, Ver 3.2 is selected. Installing the "X" strap will select Ver 2.2 If the strap needs to be installed, use an insulated jumper to connect the two pads together. This may need to be a loose strap to allow it to loop around the output cable or header. If you have a V3.2/V2.2 EPROM, then the kit can be tested in the V2.2 mode with one only 4164 or 41256 as the 41256 chips look like 4164's when V2.2 is selected.

Don't install the chips yet. Connect up your power-pack, transformer, or +5 volt supply. The power pack connection points are shown on the overlay. As the circuit has a diode bridge at the input, it doesn't matter which way around you connect the positive and negative terminals. If you are using an existing +5 volt supply then connect the power up to the +5volts and ground "loop" straps.

With your multi-meter check that ground and +5 volts are not shorted together. Power up the unit and check that the +5 volts is there before proceeding. Check the polarity of the +5 volts. All OK? Power down and install chips E12 (8255) and E13 (74LS04).

DON'T---DON'T---DON'T---PUT ANY CHIPS IN THE WRONG WAY AROUND. YOU WILL MOST CERTAINLY DESTROY THEM!!!!!!!!!!!!!!

CHECK THE OVERLAY FOR PIN 1 ORIENTATION. THE NOTCH UP ONE END OF THE CHIP, AND THE SMALL BLACK DOT SHOWS PIN 1 LOCATION. YOU WILL FIND SIMILAR MARKINGS ON EACH CHIP. Power up again and check the +5 volts. If the LED is not already on, press the reset button. The LED should light up brightly.

NO LED?..... Then you have one of the following faulty:- E12, E13, RESET button, Reset circuit, LED, LED circuit, or more likely you have the LED wired in back to front.

LED OK?..... Power down, and install E9 (74LS00), E10 (Z80A), and E11 (EPROM), and power up. **NOTE**** The EPROM supplied could be a 24 pin chip (2716/2732 or equiv.) or a 28 pin chip. (2764 or larger.) This EPROM will install without any hardware modifications, as the software is burnt into the top half of a 2732 or top quarter of a 2764. Just make sure that if a 24 pin device is installed, that the top 4 positions of the socket are left blank. (See overlay.) I hear you ask, "Why provide an 8K EPROM for about 1K of program?" The larger EPROM's are becoming cheaper than the smaller EPROM's to buy. For this reason, I now intend to do all my artwork in 28 pin design....

The LED should be flashing at approx. 1 cycle per second. If the LED is flashing, it indicates that the Z80A is running and the software is doing it's job, but a RAM fault exists. With no RAM installed this is to be expected. If the LED doesn't flash then move on to the "IT DOESN'T WORK DEPARTMENT".

Happy and no smoke? Good it's time to insert one RAM chip. Power down and insert a RAM chip into socket E7 (Data bit 7) watching out for pin 1 (look at the overlay, it's pointing towards E9.) **COPY ON/OFF.....** The copy switch is in the COPY ON position when the switch contacts are made, and in the COPY OFF position when the switch contacts are open. Switch to COPY ON, power up and check your volts again. At this stage, the LED should be flashing at approx. 3 cycles per second, which indicates that RAM is present and can be written to and read from.

Switch to COPY OFF. The LED should go out. Press the reset button. The data LED should light up brightly. Release the reset button and the LED should go out. This indicates that the software is working.

All looking OK? Power down, install additional RAM chips to suit your memory requirements, (Version 3.2 all eight 41256's must be installed.) and power up again. Repeat the above simple test procedures using the COPY and RESET switches. A simple RAM test is performed before the LED will flash. This test may not show up a shorted track, or a faulty RAM in some cases. If you have a suspect RAM, it can be further tested on it's own in the DATA bit 7 position by setting COPY ON, power up, and the LED should flash at approx. 3 CPS. If at any time the LED flashes at approx. 1 CPS, then a RAM fault has been detected.

LOOPBACK TEST.... What still happy? Power down, connect the output port pins 1 (STROBE), 10 (ACK), and 11 (BUSY) to the input port pins 1, 10, and 11. This can be done by simply plugging the input and output Centronics connectors together. If you have wired up a DB-25 connector in, and a Centronics connector out as some IBM and Microbee users have done, then 3 jumper leads can be used to connect pin 1 to pin 1 etc. When this has been done, set COPY OFF, power up, and press TEST. The TEST function outputs a sign on message to the printer. In this case, it outputs a string of characters to it's own input port that keeps cycling through the buffer until RESET is pressed. The TEST function will light up the DATA LED to about half brilliance.

Still happy? Power down, connect a printer, set COPY OFF and power up and press TEST. If all is well you should get the sign on message complete with memory size information. When the test facility is used, a ROM check is also done. If any byte in the ROM is incorrect then an error will be reported on the printout.

Power down, have a quick read through the OPERATOR INSTRUCTIONS, connect your computer to the input plug. Power up, and try printing a file. It either works OK, or doesn't work at all. If it works then you can slap it in a box, and forget it. Bob's your Uncle. If it doesn't work then go on to the "IT DOESN'T WORK DEPARTMENT". Hey, that's now.

BUT FIRST, TIME FOR A CAUTION !!!!!!! WHEN DRILLING THOSE HOLES IN THE FRONT OF YOUR CASE, MAKE SURE THAT THE FRONT PANEL HARDWARE DOESN'T INTERFERE WITH THE COMPONENTS ON YOUR PBUFF BOARD. IE:- 7805'S, HEAT SINKS ETC.

"IT DOESN'T WORK DEPARTMENT."

YES, with the full RAM installed, the 7805 will get warm enough to burn your finger, but no other component should.

I don't intend to hand feed you a step by step "POWER UP, POWER DOWN, POWER UP" type format. Any

time you plug or unplug any connector or chip then all power must be turned off. Disconnect the input and output plugs.

Let me outline the five major faults found in kits:-

- (1) Bad socket solder joints. (open circuit)
- (2) Faulty socket connections. (open circuit)
- (3) Solder shorts between tracks. (short circuit)
- (4) Point not soldered. (open circuit)
- (5) Artwork or tracks faulty. (open or short.)

Faults 1 and 2 can usually be found with a logic probe. Any pin on any chip should be in one of three states. High, low, or bobbing. Well almost every pin. If no LED's light up, this is known as a high impedance state. Check over all chips for ground, +5 volts and other signals. Make sure that there are no high impedance states anywhere.

Exceptions to the Rules:-

The input and output ports of the 8255 could show anything random as this may not get programmed correctly on power up.

The data bus may also show high impedance states under certain conditions. Pressing the reset button will bring some life into the data bus.

If a high impedance state is found where it shouldn't belong, then check with your meter for a connection between the solder pad under the board and the pin of the chip for zero ohms. If you find no connection then pull out the chip and check between the solder pad and the socket connector itself. Still no connection? Try soldering this point again. If this doesn't work then you could be up for a complete socket replacement. A nasty job for a newcomer.

Sometimes, bending the legs of the chips at a slightly different angle, or just pulling and re-inserting a chip can remove socket problems.

Faults 3 and 4 are ones that you have created. A close visual inspection and perhaps a check around with an ohm meter will usually overcome this fault.

A magnifying glass may help you.

Fault 5 is the result of my board manufacturer. Should never happen, but it does from time to time. I have threatened him with instant death if it happens again. Can be overcome using faults 3 and 4 detecting methods.

CLOCK SIGNAL CHECKS.....

With a logic probe check E10/6. This should be bobbing up and down, as this is the clock signal. No clock? Remove E10 and check E13/12 for activity. Still no clock? Check E13/13. If no clock is found here, try removing E13 and test the socket contact of E13/13. No clock? It has to be one of the following:- Crystal, C1, C6, R1, R2, or Q1. Is Q1 connected the right way around?

If you are getting the clock to pin 6 of the CPU socket without the Z80A in, and no clock with the Z80A in, then it may be the Z80A itself.

If you have a good range of spare chips then substitution may bring results.

CLOCK WORKING, BUT STILL NO RESULTS?

Remove E7 and check that the LED flashes at approx. 1 CPS. The software checks the RAM and if none is present the LED is flashed at the slow rate. If this checks out OK, then it should mean that the system is working up to the point short of a RAM check. Install E7, set COPY ON and check for the faster flash rate. If this checks out then it appears that the system is working.

OK, where do we go from here? Perhaps you have incorrectly wired up the output plug. For instance, a high on the output port busy signal will stop any printout.

When the input and output plugs are connected together, COPY OFF, and TEST pressed, pins 1,10, and 11 should be bobbing.

Press the reset and check the MREQ line, Z80A pin 19. If it is bobbing then the CPU is attempting to read the ROM.

Press the reset and check the IORQ line, Z80A pin 20. If this is active then the CPU is attempting to access the 8255 ports.

Check all ROM and RAM signals. All pins except ground and +5 volts should be active.

The CPU... Activity on most pins. Reset can be checked using the reset button. Pin 26 should be low when the reset button is pressed and high when the reset button is released.

E13/6 should show the inverse levels to the CPU/26. (See the reset circuit diagram.) The 8255/35 should be the same levels as E13/6.

As mentioned before, the DATA LED should light up when the RESET button is pressed, and go out when released. This is an indication that the reset circuitry is working correctly.

WAIT (24) should be high. BUSREQ (25) high. INT (16) high. A13 (3) bobbing after reset means that the CPU is trying to send information to the printer. NMI (17) high, goes low when TEST pressed.

QUINELLA TEST...

What would happen if you had a short between Address 7 and Data bit 3, or A13 and ground, or etc., etc., I don't know, but I dare say the beast won't work at all. How do you find these shorts?? Do what I call a quinella test.

Using your meter, check for zero ohms between pin 1 and pin 2 of the Z80A. Then check pin 1 and 3, 1 and 4, right up to pin 1 and 40. Step on to pin 2 and 3, 2 and 4 etc., up to pin 2 and 40. Get the idea? You end up checking pin 39 and 40. Zero ohms will be found at some points, as these points are tied together. Check the circuit to verify these shorts. If a short is found where it shouldn't be, you have found your problem, well at least you know which tracks to look at. This quinella test can be done on all chips if no fault is found at the Z80A. Try the 8255 next.

If your printout is almost correct, but you get things like upper case "A" changing to "B" and "1" changing to "2" You have data bit zero set all the time. "A" is 41Hex, and "B" is 42Hex, so data bit zero is never clear. You will need an ASCII to Hex lookup table to sort this one out. If you don't understand the Hex jumbo, ASK someone who does. Once you have determined which data bit(s) is faulty, try swapping the chip in this ram position with another to see if the fault conditions change. This will prove the ram chip. In most cases it will not be the ram chip, but your soldering or a faulty socket at the "BAD" location.

I could write a hundred pages and still not cover your problem, but with the above information and a little common sense, you should be able to overcome all but the really obscure fault.

NOTES AND ERRATA.....

Dumping files into the buffer at 3.58MHZ or 1.79 MHZ takes the same time. The printer busy or idle has no effect on the loading time. This means that the Z80A is spending most of its time waiting for your computer to send data.

A SHORT CHAT ON CENTRONICS SIGNALS....

So called Centronics compatible interface signals aren't always compatible.

WIRES 1-11 should be the same on most computers/printers, however the Microbee for instance, needs the input strobe (wire 1) pulse stretched. This is covered in the Microbee engineering notes.

WIRE 12 is the Paper out signal. A high on 12 signals the computer that the printer is out of paper. (PRINTER OUTPUT SIGNAL.)

WIRE 13 is the SLCT (printer selected) A high indicates that the printer is ready to receive data. (PRINTER OUTPUT SIGNAL.)

The following lists the major differences of most common types of printers available today. Check your manual for more information.

Wire 14 may be an AUTO-LINEFEED signal. A low on this line will print a line feed after every carriage return. This may be a dip switch setting in the printer. (PRINTER INPUT SIGNAL.)

WIRE 31 may be PRINTER INIT. Low to re-init the printer. (PRINTER INPUT.)
 WIRE 32 may be ERROR. Low when paper out, off line, or error.
 (PRINTER OUTPUT.)
 WIRE 36 SELECT IN may need to be low. Could be a dip switch setting in the printer. (PRINTER INPUT SIGNAL.)
 To load the buffer with the printer off line, you may need to disconnect the wire 13 and 32 through connection, and ground the input wire 12.

People are finding new uses for PBUFF all the time. After all, it is a data acquisition and retrieval system. Interfacing to some odd devices has caused headaches. The output busy seems to be one of the problem areas. A 4K7 pullup resistor to +5V overcame one users problem, another had to double buffer (using two inverters) the O/P busy before it would drive his cash register that has a 390 ohm pullup resistor.

Any constructive comments or criticism on these instructions would be appreciated.
 HAPPY COMPUTING DON

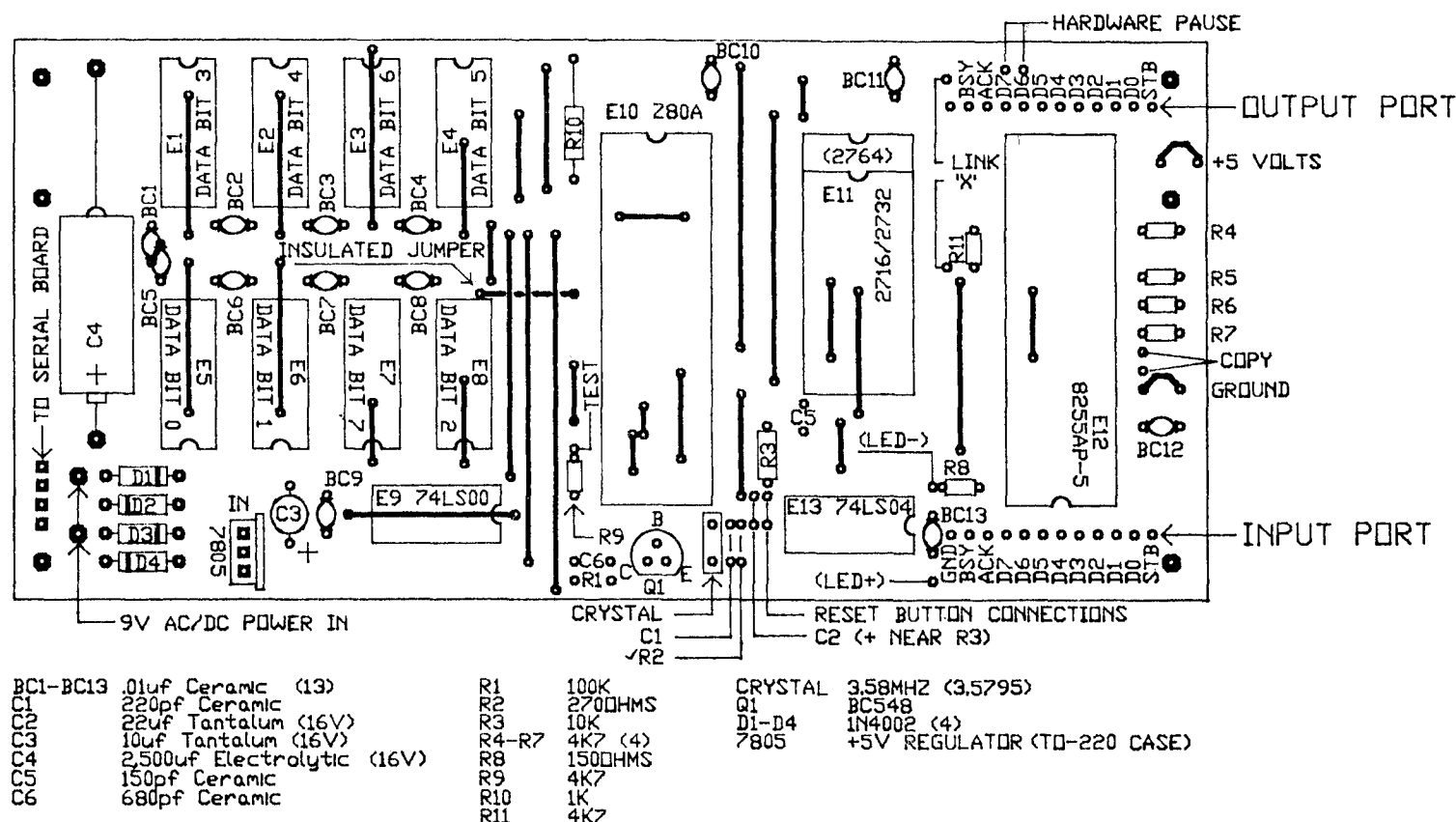
VERSIONS AND DIFFERENCES.....

V1.0 FEB-85 BASIC 8-64K BUFFER. NO SPECIAL FEATURES.
 V1.0 MAY-85 SMALL QUANTITY FOR ROD IRVING ELECTRONICS WITH R.I.E. SIGN-ON
 NO LONGER SUPPORTED. (SAME AS ABOVE.)
 V2.0 SEP-85 SINGLE/MULTIPLE COPY, HEX O/P, BETTER DIAGS.
 V3.0 SEP-85 256K VERSION OF ABOVE.
 V2.1 OCT-85 SERIAL BUFFER FULL SIGNAL, 32 BYTES BEFORE PBUFF IS FULL. USES CPU A12 AS O/P SIGNAL.
 (NOT NEEDED ON CURRENT SERIAL BOARD.)
 V3.1 OCT-85 256K VERSION OF ABOVE.
 V2.2 JAN-86 DOUBLE BACKSLASH SOFTWARE PAUSE ADDED.
 V3.2 JAN-86 256K VERSION OF ABOVE.

BOARD REVISIONS.....

DEC-84 FIVE PROTOTYPES FOR FIELD TESTING.
 REV A. FEB-85 FIRST 8-64K PRODUCTION BOARDS DESIGNED TO FIT STANDARD CASE.
 REV B. JUN-85 PIN 1 ALL RAMS JOINED TOGETHER TO ALLOW FOR POSSIBLE EXPANSION TO 256K IF THE SOFTWARE REFRESH OF 41256'S CAN BE ACHIEVED. MINOR CAPACITOR TRACK FAULT CORRECTED. C5 ADDED.
 REV C. JAN-86 SERIAL BOARD CONNECTOR ADDED. CLOCK CIRCUIT CHANGED TO TRANSISTOR DRIVER.
 NEW TEST SWITCH CIRCUITRY ADDED.
 REV D. MAR-86 28 PIN EPROM SOCKET PROVIDED. R10 ADDED.
 REV E. MAY-86 OPTIONAL HARDWARE PAUSE PADS ADDED. R11 AND "X" PADS ADDED TO ALLOW EASY SELECTION OF 2 VERSIONS OF SOFTWARE IN ONE EPROM.

PBUFF REV. E BOARD 1986(C) 1-MAY-86 by Don MCKENZIE



RESET

COPY-ON

TEST

DATA-LED



COPY-OFF

PBUFF PRINTER BUFFER

by Don MCKENZIE

OPERATOR INSTRUCTIONS.....

Any time the PBUFF is powered up, with COPY OFF, it is ready to accept data from the computer system. Set to COPY OFF, power up and press TEST. A sign on message complete with buffer memory size is printed. If there is a ROM checksum error, this will be reported on the printout.

Pressing the RESET with COPY OFF will light up the DATA LED very brightly.

Release the RESET and the LED will go out.

Pressing RESET will abort any current printout, clear the buffer, and set to ASCII (normal) output mode. PBUFF does a RESET on power up.

To use the PBUFF, print your file in the normal manner as per the computer system's operating instructions. The DATA LED will flash as data is accepted by PBUFF, and the printer will start operating. If the file to print is smaller than the PBUFF memory size then the PBUFF will get all DATA from the computer system, release the computer system for normal operation, and finish the printing job under its own control. If the file to print is larger than the PBUFF memory size then the DATA LED will light up brightly until 256 bytes (100hex.) are free, then PBUFF accepts another 256 bytes from the computer system. This pause can be seen on the DATA LED. When all data is finally loaded into the PBUFF, the LED will stay off and the computer system will be released for normal operation.

COPY.... PBUFF will only copy a file that is the same size or less than the total memory size of the buffer. EG:- A 64K buffer will only allow you to copy a 64K file or less, a 256K buffer will only allow you to copy a 256K file or less. In reality, a 64K buffer will store 65,280 bytes before a buffer overflow occurs and a 256K buffer will store 261,120 bytes. The start of the file to be copied is from the point data was loaded from the last RESET, or power up. If the TEST function was used after power up, this printout will be stored at the start of the buffer to be copied. A RESET can be used to clear this data from the buffer to be copied. To copy a file, set PBUFF to COPY OFF, press reset, load the file into PBUFF, and allow it to print. When finished, throw the copy switch to ON, then to OFF. An exact copy of the printed file will be produced. If multiple copies are required, leave the copy switch in the ON position. This will print the same file over and over until your printer runs out of paper, RESET is pressed, or COPY is set OFF.

COPY ON Test function... Press RESET, set to COPY ON, press RESET. The LED will flash at approx. 3 cycles per second. This indicates a pass of system diagnostics. If at any time the LED flashes at approx. 1 CPS, then you have a RAM error. Setting COPY OFF will stop this test and ready the buffer.

Hexadecimal Output... Press RESET, set COPY ON, press TEST. LED will flash at approx. 3 CPS. Set to COPY OFF. PBUFF will now output all data in HEX format as follows :- MSB, LSB, space. As this requires three times the memory overhead to store, you can divide your buffer size by three. To abort printout or set back to ASCII (normal) mode, press RESET. BEWARE of internal printer buffer confusion in the HEX mode. As all output including control characters are converted to printable characters, the internal printer buffer is never "FORCED" to empty its contents. A known dummy file may need to be loaded into PBUFF in order to "FORCE PRINT" any remaining characters in the original file. Setting COPY ON then OFF will print the same file again, which will also "FORCE PRINT" the remaining characters.

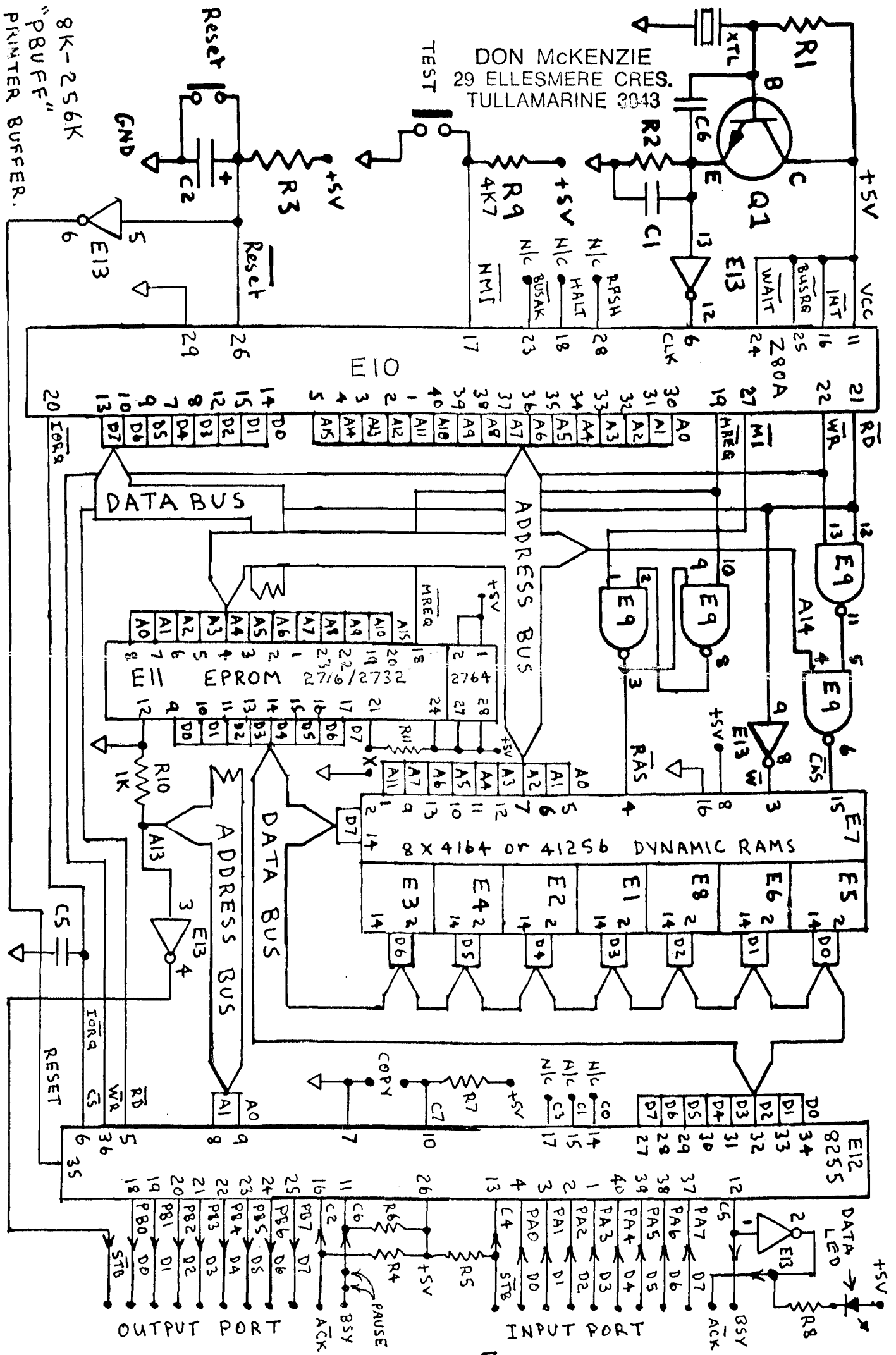
SOFTWARE PAUSE using a double backslash, "\\" string.....

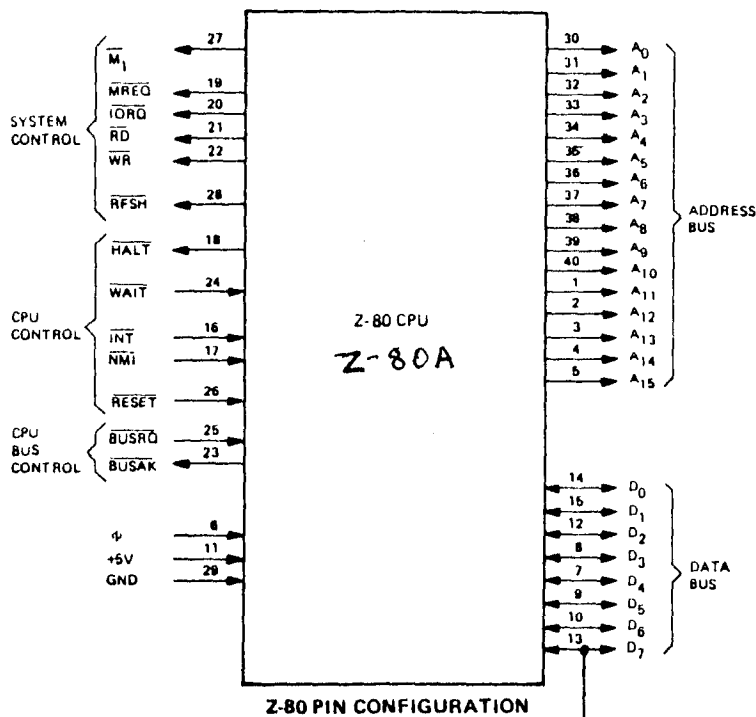
This pause string is two bytes of 5C HEX (92 DECIMAL) together. When the pause string is detected all output to the printer is halted, and input continues until the buffer is full. Switching the COPY switch to ON, then OFF will allow output to continue until the next pause string is detected. Don't leave the COPY switch in the ON position, as this will be the "COPY ON" condition when the buffer is empty.

On power up, the pause function is active. An override is available just in case you need to print the pause string, and you are not using the pause function. Read the OPERATOR INSTRUCTIONS and put PBUFF into the Hexadecimal Output mode, then press RESET. The pause function is now ignored. To re-install the pause function at this stage, you have to power the unit down, or print the TEST message.

HARDWARE PAUSE SWITCH (IF FITTED)..... Setting pause on (switch contacts open) will stop all output to the printer. Input will continue as normal. Setting pause off allows the printer to continue. Can be used in conjunction with the printer sharer switch as follows:- During printout, select pause, swap printers then release pause. No characters will be lost, and no "lock-up" conditions will occur.

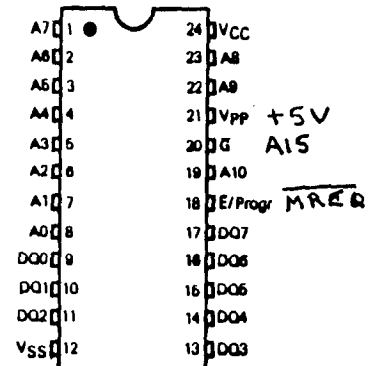
DON MCKENZIE
29 ELLESMERE CRES.
TULLAMARINE 3043



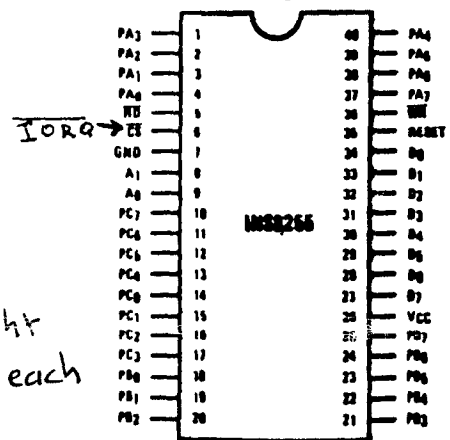


2716

PIN ASSIGNMENT

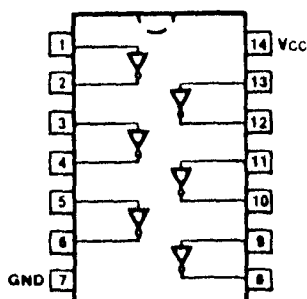


PA₀-7 Connect to Input.
Pin Configuration

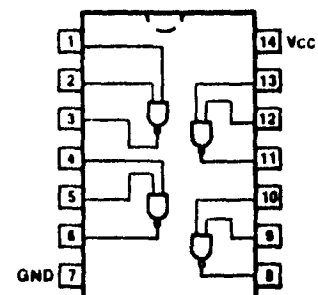


PB₀-7 Connect to Output.

74LS04
HEX INVERTER



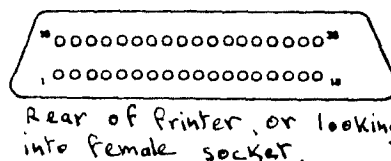
74LS00
QUAD 2-INPUT NAND GATE



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TULLAMARINE 3043

**STANDARD CENTRONICS
PRINTER PLUG
CONNECTIONS**

View - plug rear



Pin No	Signal	Pin No	Signal
19.	Signal Ground	7.	Data Bit 5
2.	Data Bit 0	8.	Data Bit 6
3.	Data Bit 1	1.	Data Strobe
4.	Data Bit 2	10.	Data Acknowledge
5.	Data Bit 3	11.	Input Busy Ready
6.	Data Bit 4	9.	DATA BIT 7