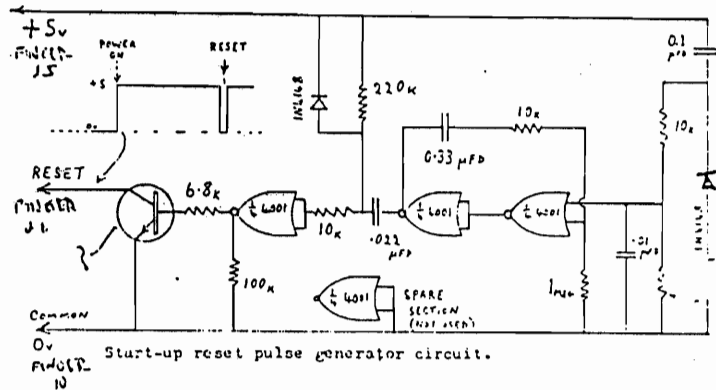


**BAD START-UPS**

Many CCII owners have had the problem of having to press the reset button immediately after switching on when the drive has failed to make the usual clatter of homing track zero. This trouble seems to be more prevalent in the 6.7B model.

If a RESET will cure this and give a correct start-up immediately after switch-on, then an automatic reset device should do the trick every time. I knocked one up and tried it on a CCII which often failed to start up correctly, it was a complete success and I have not had it fail to start properly since.

*my 6.7B OK  
HBD !!*

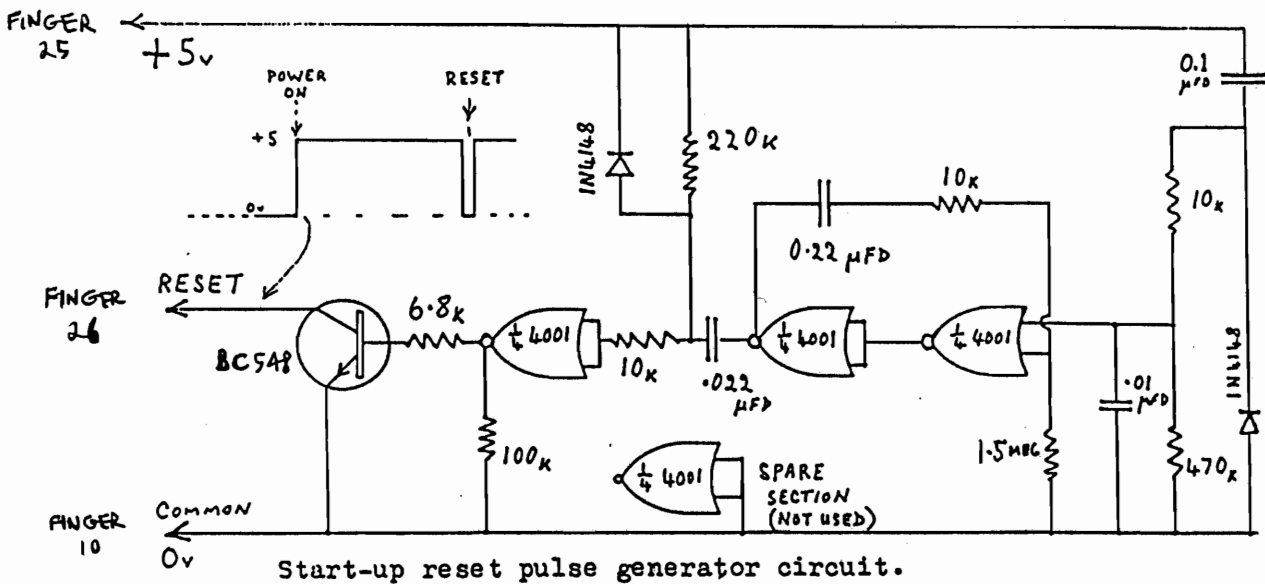
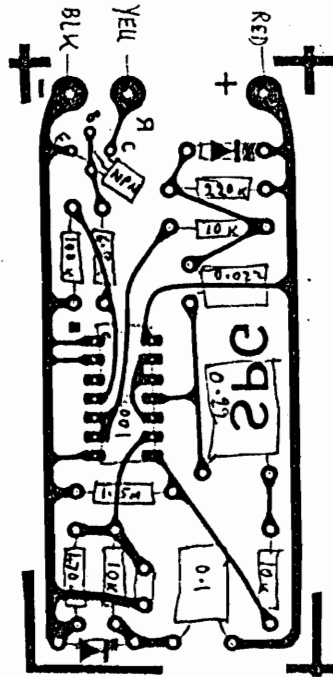
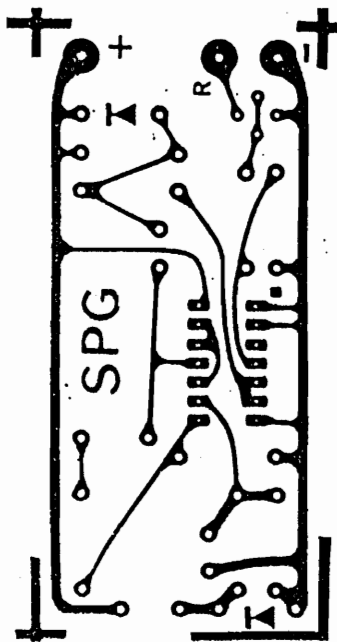


*noted ✓*

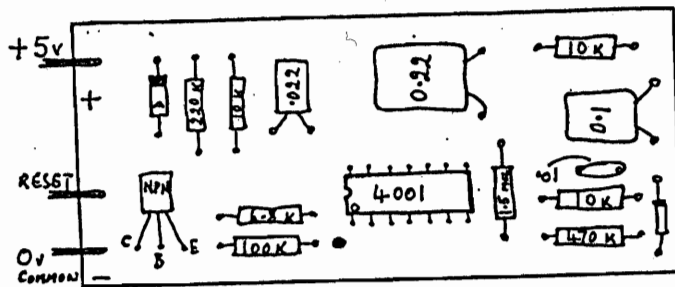
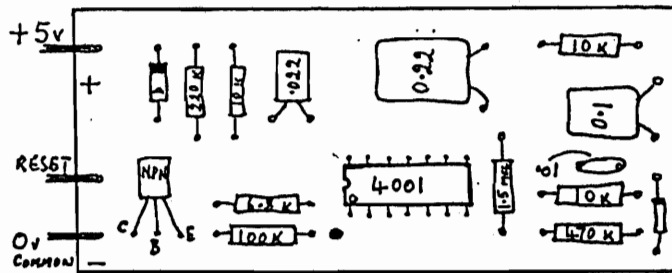
The circuit is quite simple, and it is also cheap, with easy to get parts. Only three connections are required, common, the 5 volts +ve rail, and to the reset line. Those who do not like to open the back up of the CCII can fit it into the keyboard - suitably covered and insulated of course, all three connections can be made there. About a third of a second after switch-on the circuit will produce a reset pulse which will then initiate a correct start. It is of no concern if the drive was going to start correctly anyway, as it just gets the signal to start again.

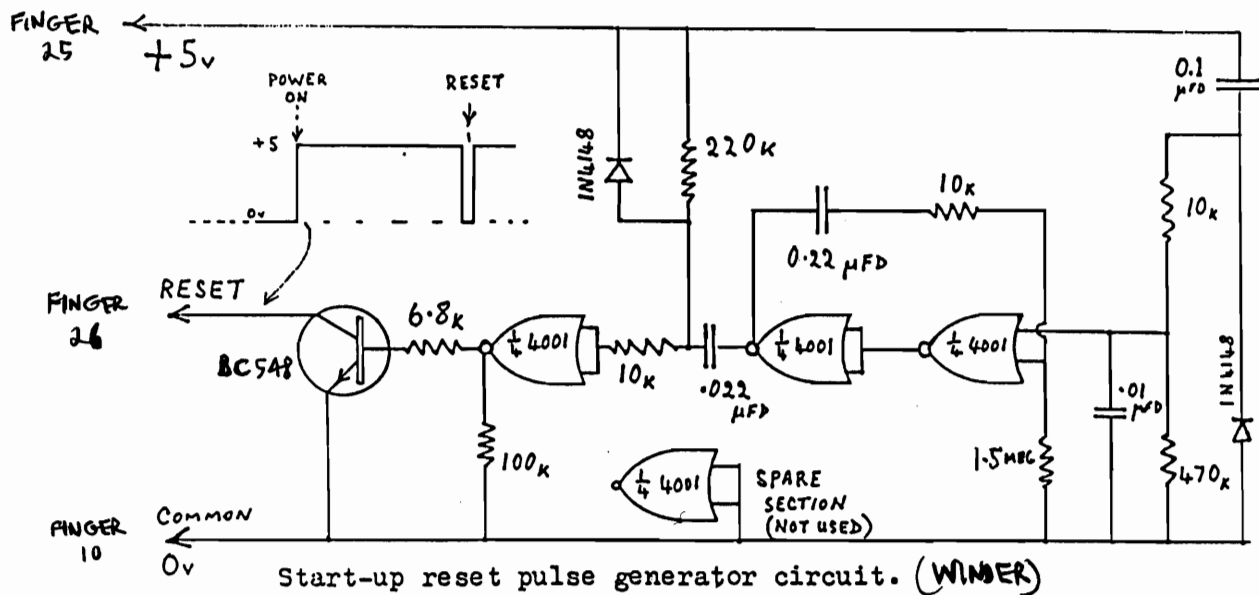
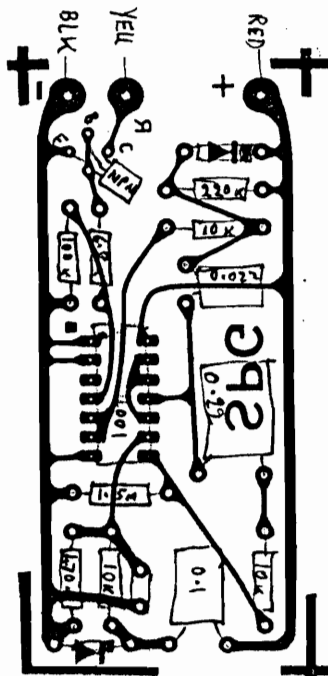
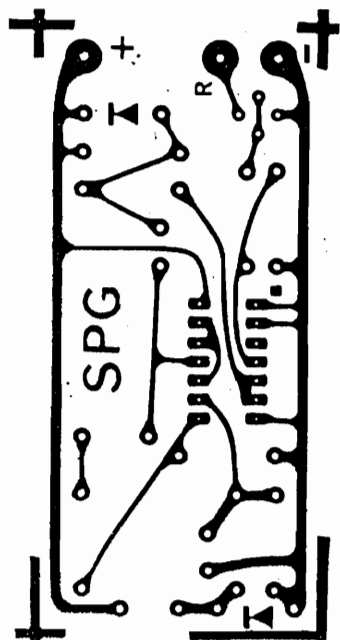
The circuit is as shown, check that you have it quite right before fitting it, making sure that the Integrated Circuit is the right way round. See the circuit for details. If time permits, I may produce a printed circuit board for this device.

**KEN WINDER**



P. 4 Nov 85 CUVIC  
FOR TEXT



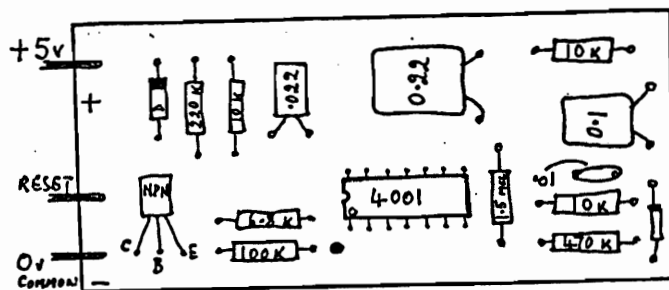
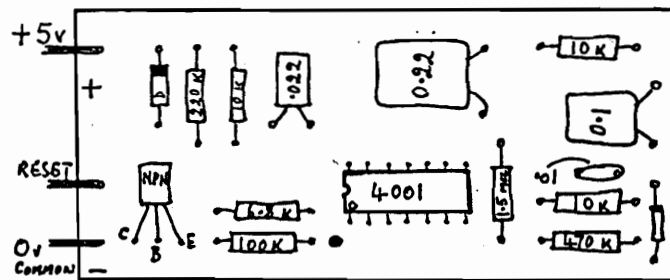


P. 4 Nov 85 CUVIC  
FOR TEXT

Fitted to  
6.78 keyboard!  
2/87

PARTS

- BC548 TRANSISTOR
- 4001 I.C.
- 2x 1N4148 DIODES
- 470K, 6.8K, 100K } RESISTORS
- 3x 10K, 220K, 1M }
- .022µF, .33µF, } CAPACITORS.
- .01µF, .1µF }





Installation of Soundware Kit.

\$20.00

FITTED TO  
879 (II)  
13-7-73

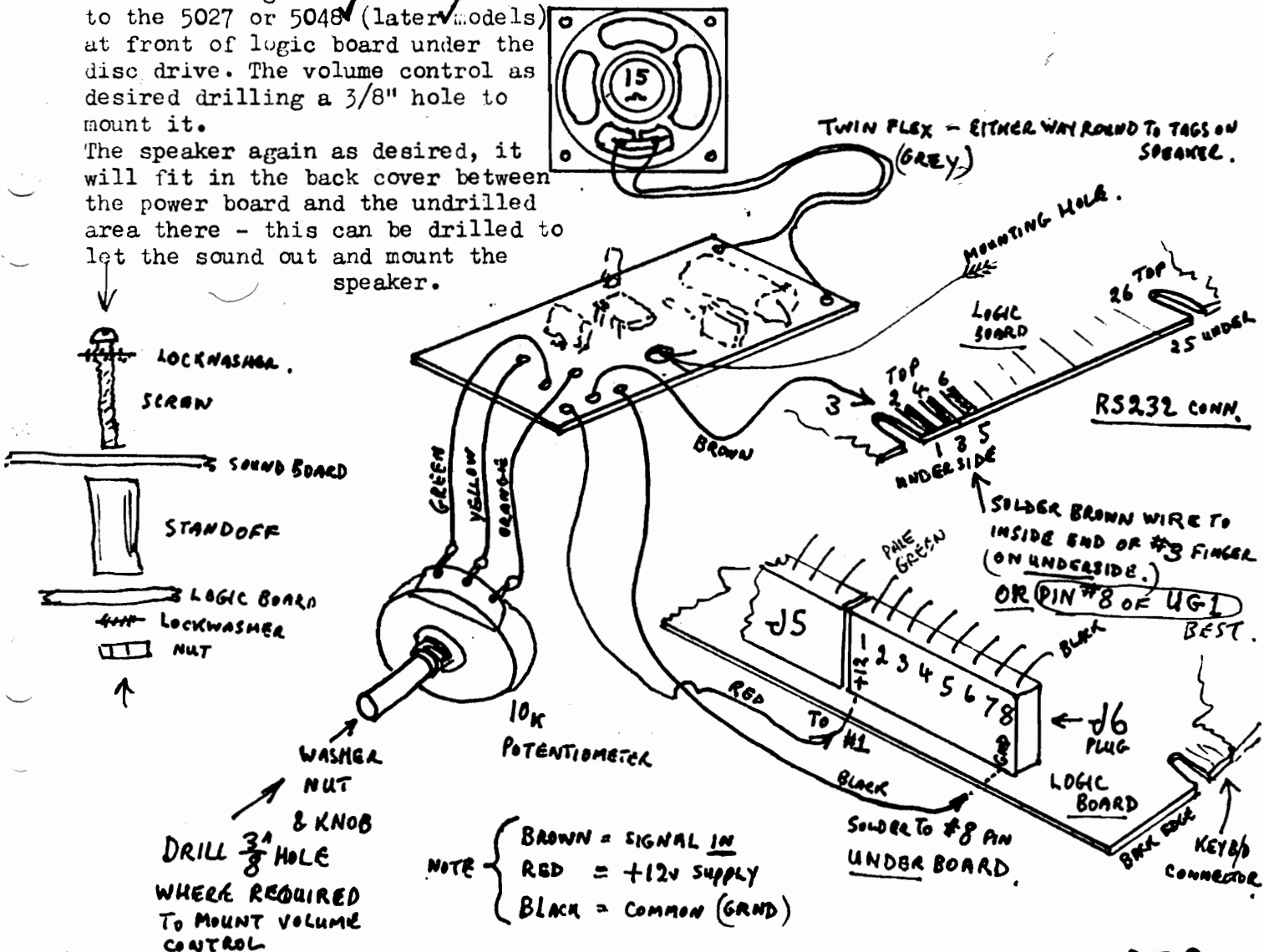
FITTED TO  
879 (II)  
11-5-74

The kit should be connected as shown below, the speaker is not polarised and the grey wires may be either way round. The brown wire goes to the output finger of the RS232 connector. The black wire is the common ground side of the logic board circuitry, (0 volts, common return for all the board). The red wire is the +12 volt supply input to the sound board.

The soundware can be used in any computer which can supply +12 volts at about 200 milliamps and has a output signal at the RS232 level. The actual consumption of the soundware is up to 200 milliamps at full maximum volume, (rarely if ever needed), at usual level about 50 milliamps, and silent it draws only a few milliamps idling.

Mount the soundware board on it's standoff using the hole next to the 5027 or 5048 (later models) at front of logic board under the disc drive. The volume control as desired drilling a 3/8" hole to mount it.

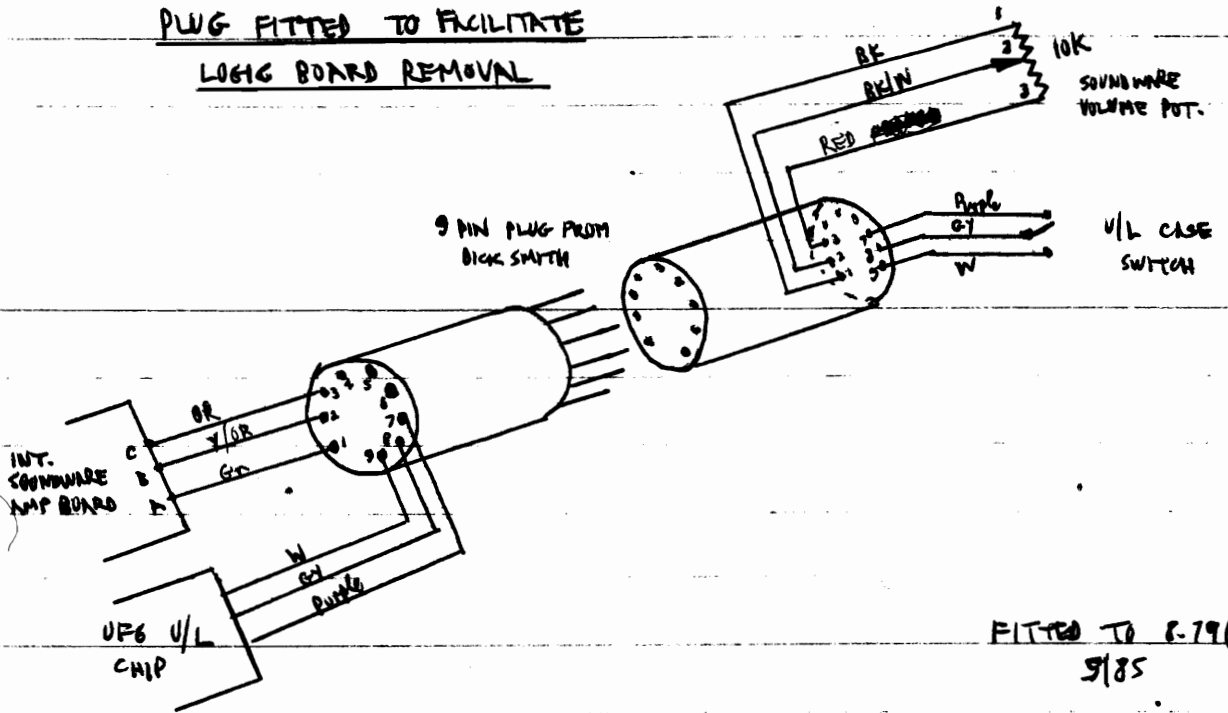
The speaker again as desired, it will fit in the back cover between the power board and the undrilled area there - this can be drilled to let the sound out and mount the speaker.



- 1) IF PRINTER IS LEFT ON WHEN SOUNDWARE IS USED, the printer prints trash (hash!)  
one line on first occasion only.
- 2) WITH PRINTER IN USE (printing); CAN TURN SOUNDWARE LEVEL DOWN and listen to info going to printer (MONITOR).

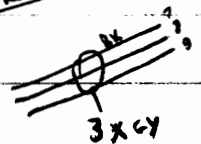
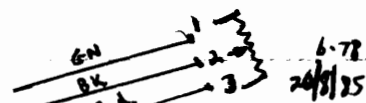
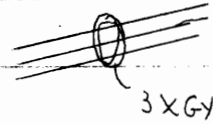
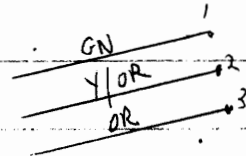


PLUG FITTED TO FACILITATE  
LOGIC BOARD REMOVAL



FITTED TO 8-79 (II)  
9/85

FITTED TO 8-79 (I)  
6/85



PROGRAM PACKAGE INSTALLERS

=====

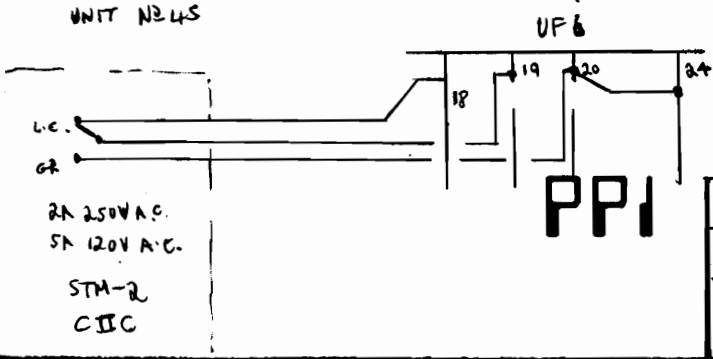
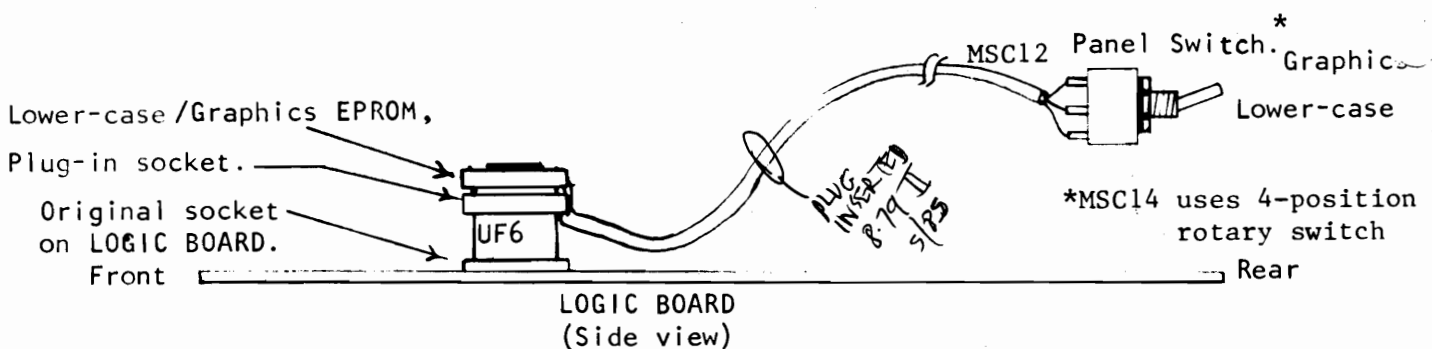
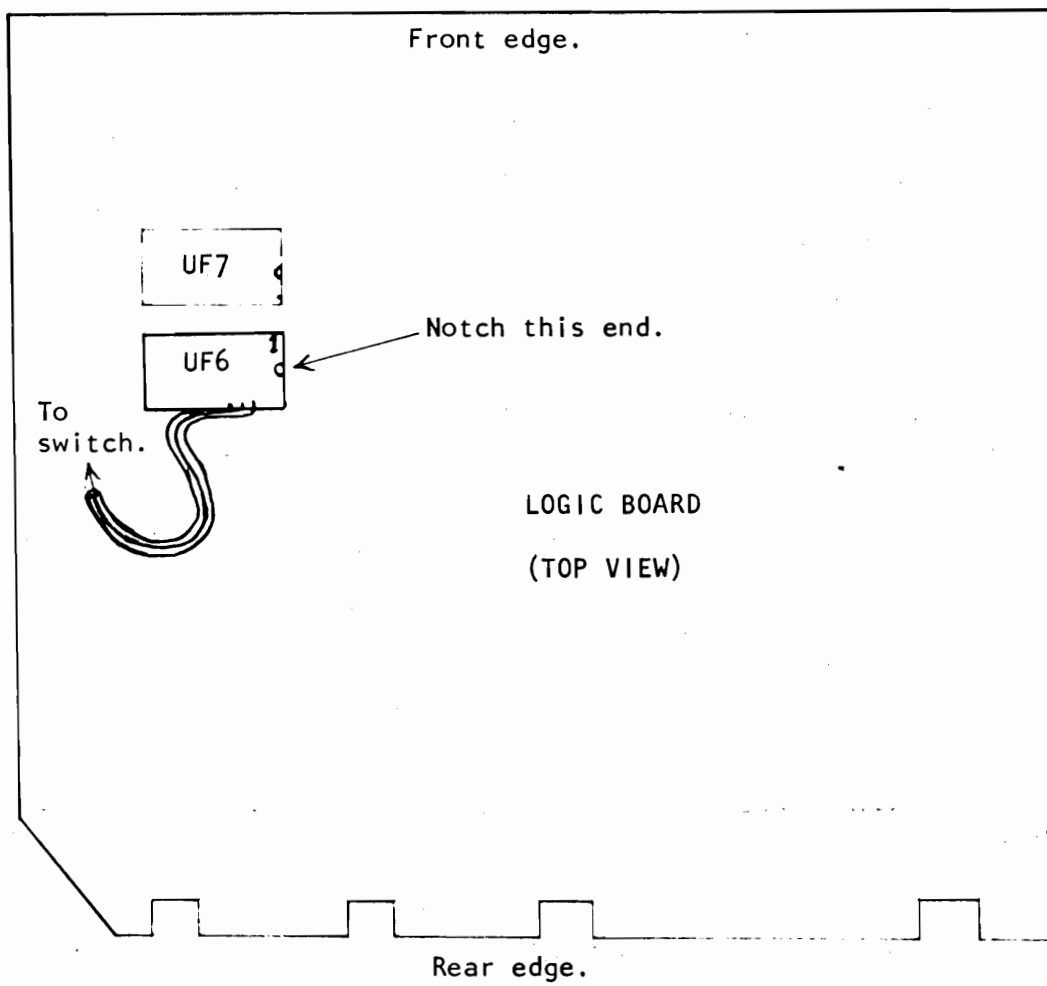
INSTALLATION INSTRUCTIONS

Lower case for COMPUCOLOR 11 Mar 1982

=====

✓ 678 Filled 24-7-82  
✓ 879 " 12-2-83  
✓ 879 " 11-5-84

1. Remove all cables from rear of cabinet. (Power, Keyboard, disk, printer etc.)
2. Remove rear shell of Compucolor cabinet:
  - A. Remove three Philips-head screws along top, then one 3/16" slot screw from centre bottom.
  - B. Carefully withdraw rear shell about 8".
  - C. Unplug power supply cable and note (or mark) which end of the socket is top. The rear shell can then be completely removed.
3. Ideally the main logic board should be removed from the cabinet by unplugging the three red sockets near the keyboard connector. However with the aid of a good light the lower-case kit can be installed with the logic board in place.
4. Carefully remove the old graphics ROM from the socket in location UF6. (Lever up each end of the ROM gradually with a small flat-bladed screwdriver. See diagram for location of UF6. It is also marked on the logic board. (It is possible that on very early V6.78 machines, the UF6 ROM is not in a socket. Unfortunately there is no alternative to desoldering the ROM then soldering in a 24-pin socket.)
5. Plug the new graphics/lower-case unit into the now vacant UF6 socket. The switch cable should be towards the rear of the logic board. See diagram.
6. Determine a suitable location for the switch. (Usually in the front panel to the right of the screen, or at the rear top of the cabinet.) Drill a quarter inch hole to fit the switch. You will require a small spanner to secure the switch - or a pair of pliers.
7. Replace logic board (if removed).
8. Reconnect cable to the power supply plug. Check that the socket is the right way up and that the pins line up. (No extra pins at either end!)
9. Replace rear cabinet shell. This is the hard part. One method is to place the Compucolor face down on a folded blanket (to avoid scratches) then locate the bottom of the rear shell first. The rear of the logic board has two locating lugs which must fit into corresponding slots in the shell. You may need to use the screwdriver to help here. Finally match up the top of the cabinet. Replace screws. (Only the centre top and bottom are required in practice.)
10. Replace all cables.
11. Power on. To check that the installation has been successful, raise the CAPS LOCK key and type any letters. The new switch should enable you to select graphics symbols or lower-case. Capitals and numerics should be unaffected.



EPROM (WINDOW)  
MSL2716K  
81370 P  
JAPAN

PROGRAM PACKAGE INSTALLERS	
V1.1	Switchable Lower case/ Graphics Option.
V1.2	Feb 82 MSC12 &14
	Mar 82
	Dec 82
J.D.Newman	

PROGRAM PACKAGE INSTALLERS

INSTALLATION INSTRUCTIONS

EPROM/ROMPACK for COMPUCOLOR 11 Apr. 1983

=====

- ✓ 1. Remove all cables from rear of cabinet. (Power, Keyboard, disk, printer etc.)
- 2. Remove rear shell of CompuColor cabinet:
  - A. Remove three Philips-head screws along top, then one 3/16" slot screw from centre bottom.
  - ✓ B. Carefully withdraw rear shell about 8".
  - C. Unplug power supply cable and note (or mark) which end of the socket is top. The rear shell can then be completely removed.
- ✓ 3. Ideally the main logic board should be removed from the cabinet by unplugging the three red sockets near the keyboard connector. However with the aid of a good light the interface board can be installed with the logic board in place.

4. INTERFACE BOARD (RPIF): FITTED TO 8-79 (I) 11/5/85 (can also be inserted into 8-79 (II)).

Assuming that your CompuColor does not already have the ISC EPROM board, the interface board is plugged into the two J9 sockets above the FCS chips in locations UA4-UA7. Make sure that the board is the right way round (FRONT is towards the front of the CompuColor), and all pins line up.

On some machines, a small PCB marked: P/N 101268 is attached to the side of the analog board. This may have to be rotated slightly to clear the new interface board. (FITTED TO 6-78 only)

If you have the ISC board, this should be unplugged. Plug in the two upgrade chips supplied. (UA5 and UB3). Make sure that they are facing the correct direction. The end with the notch or dot must be nearest the analog board. (ONLY FOUND IN 8-79 (II))

5. SELECT CABLE and SWITCH (RPC2):

Drill a 10mm hole in the front panel on the right of the screen to fit the rotary switch. The knob is first removed then replaced using a small screwdriver. The left three positions of the switch are currently used to select the ROM banks. Plug the other end of the cable into the 16-pin socket on the RPIF marked "SWITCH". The cable should leave the RPIF towards the rear.

If you are using a two-position switch, the hole should be drilled with a 6mm diameter.

6. ROMPACK CABLE AND SOCKET (RPCS1):

The 26-way socket is ideally mounted on the top of the rear cabinet shell (centre). Cut away two of the plastic ribs leaving a hole 4cm. x 1.3cm. Insert the ribbon cable through this hole and position the ROMPACK socket to the left of this hole. (See diagram). Bolt the socket in place, facing the right of the CompuColor.

The 24-pin plug is plugged into the RPIF Bank 0 socket (labelled 4000H), and the single wire is inserted into the small plastic terminal post near the switch socket. (First raise the plastic

*Fitted black terminal with ribbon cable screen as supplied. ✓*

*NOT IN 8-79 CPU No. 1 correct IC's fitted only*

*NOT FITTED TV 8-79 CPU No. 1 or No. 2*

*CORRECT IC'S IN 8-79 NO. 1 & 2*

*FITTED 11/5/85 CORRECT IC'S; ISC BOARD REMOVED.*

*Fitted 4-10-85*

*Fitted to 8-79 I 7-11-85*

terminal about 1/8"; insert the wire then push the plastic back onto the RPIF to clamp the wire. See diagram for details. Note that the ribbon cable length is such that the rear shell must be kept close to the front of the CompuColor when connecting the 24-pin plug. ✓

#### 7. CABLE FOR SELECTION LOGIC (RPSL):

This short cable connects the RPSL on the RPIF board to the CompuColor 50-pin Bus. ?

Plug the 16-pin plug into the socket on the RPIF board marked "BUS". The other end should be plugged into the 50-pin Bus on the rear of the CompuColor logic board. } NOT FITTED

- ✓ 8. Replace logic board (if removed).
- ✓ 9. Reconnect cable to the power supply plug. Check that the socket is the right way up and that the pins line up. (No extra pins at either end!)

10. Replace rear cabinet shell. This is the hard part. (Particularly if the ROMPACK and RPSL cables are fitted.)

One method is to place the CompuColor face down on a folded blanket (to avoid scratches) then locate the bottom of the rear shell first. The rear of the logic board has two locating lugs which must fit into corresponding slots in the shell. You may need to use the screwdriver to help here. Finally match up the top of the cabinet. Replace screws. (Only the centre top and bottom are required in practice.) ✓

If difficulty is found in fitting the shell over the 50-pin plug, this plug should first be disconnected and inserted through the slot in the shell. When the cabinet is assembled, then the 50-pin socket may be connected.

- ✓ 11. Replace all external cables. (Power, keyboard etc.)
- ✓ 12. Power on.
- ✓ Enter (ESC) P to jump to 4000H. The currently selected EPROM program should immediately run.

---

The four left positions of the selector switch (if used), select banks: 0, 1, 2 and RPSL. Use (ESC) P FOR 4000H start address, or (ESC) \ for 5000H start.

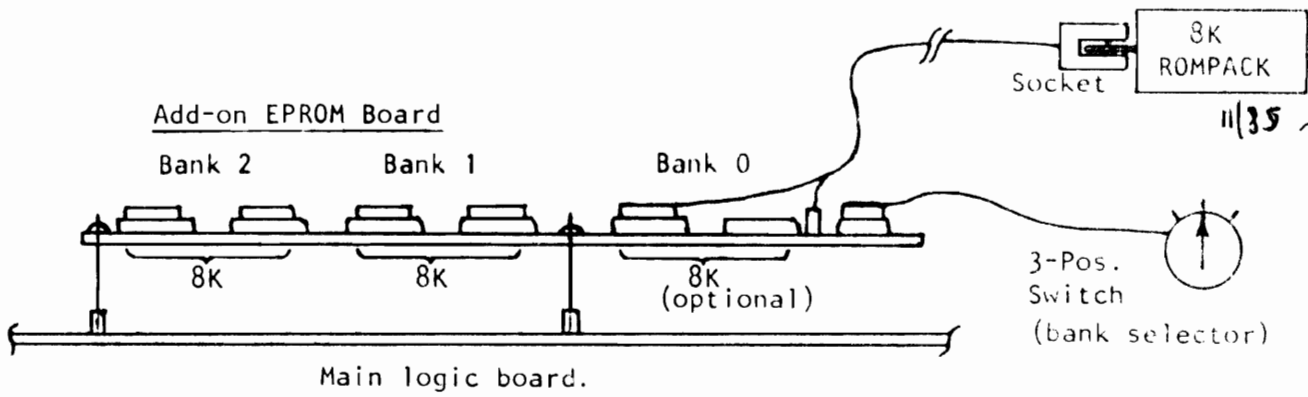
After switching between banks press CPU RESET. If you have been running one of the programs you may have to press COMMAND/RESET before selecting another bank.

In the RPSL position, port 0 can be sent the control value to select the required bank from either keyboard or a program. ?

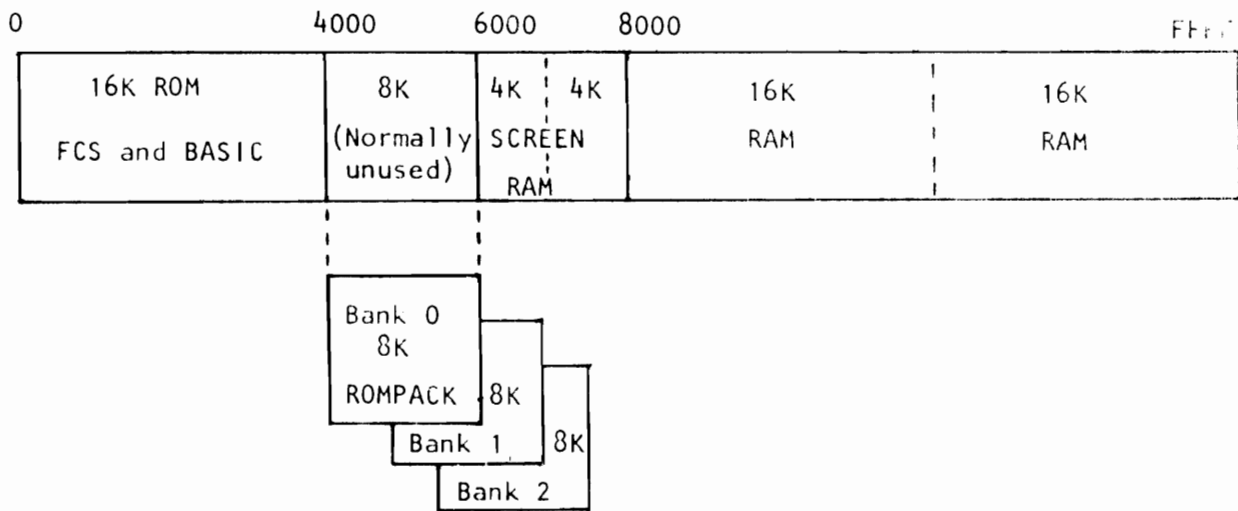
In BASIC type: OUT 0,0 for Bank 0. [ROMPACK]  
OUT 0,1 for Bank 1.  
OUT 0,2 for Bank 2.

(Bank 0 is power-on default.)

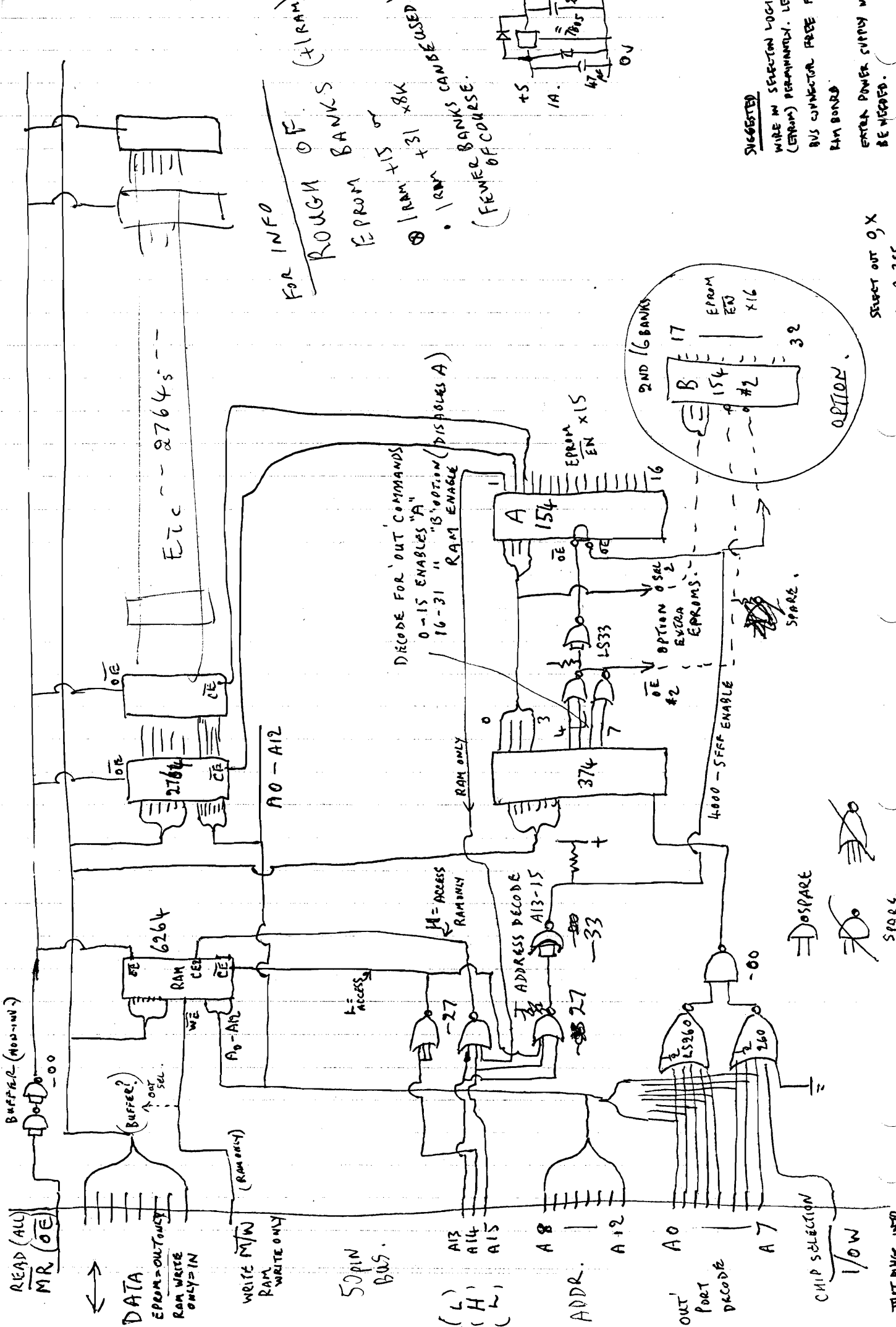
The RPSL will retain the last given value (0,1 or 2) until changed with another OUT statement or at power-off.



EPROM/ROMPACK System - Physical layout



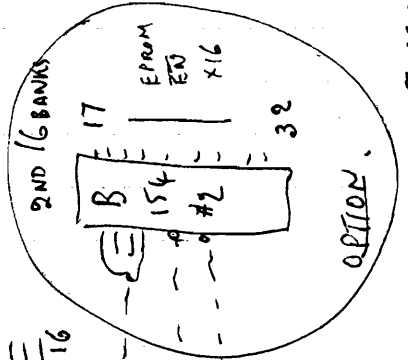
MEMORY MAP - COMPUCOLOR II



FOR INFO  
 ROUGH OF  
 BANKS  
 EPROM BANKS  
 • 1 RAM x 16 x 8K  
 • 1 RAM x 16 x 8K  
 (FEWER BANKS CAN BE USED)  
 (FEWER OF COURSE)

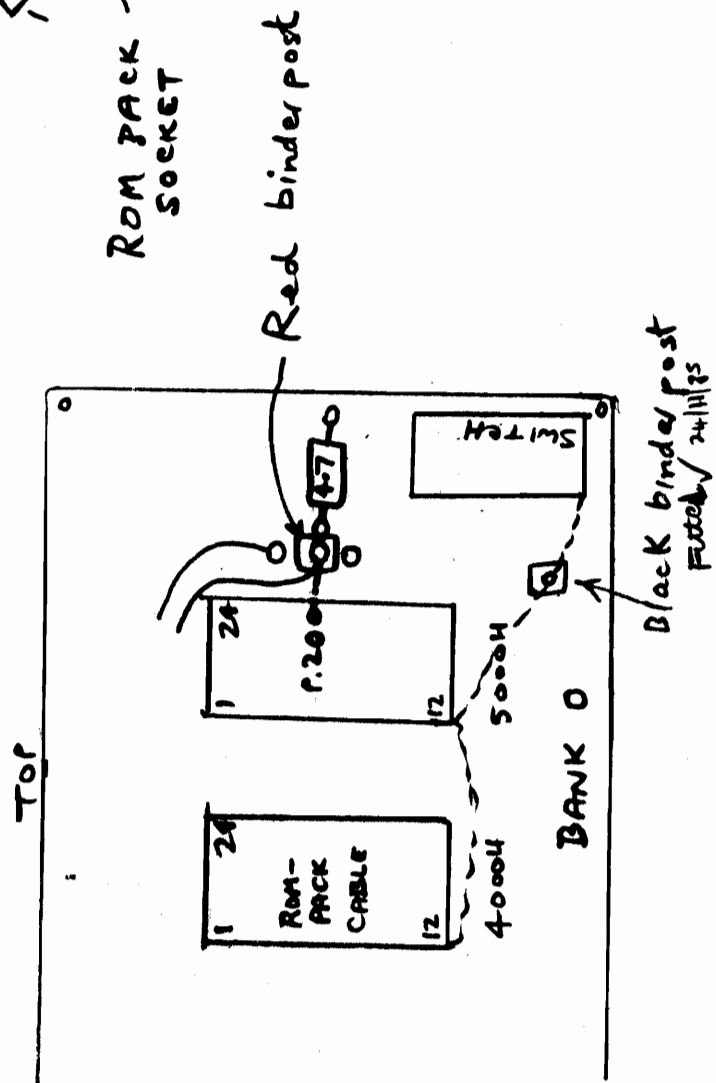
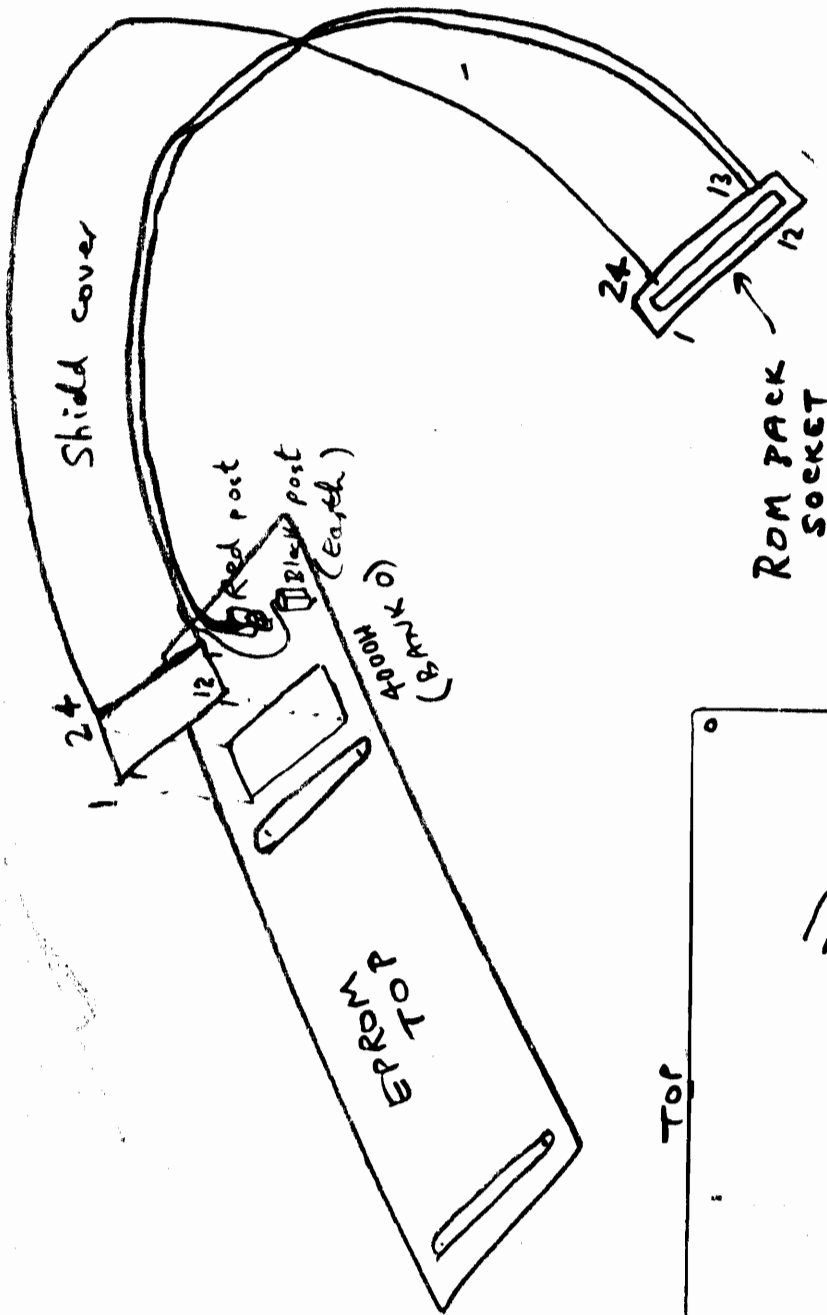
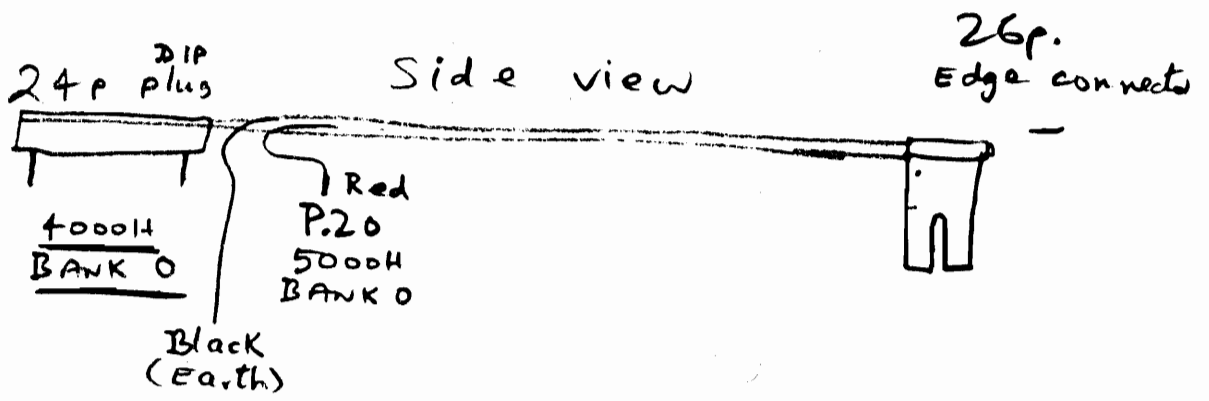
SUGGESTED  
 WIRE IN SELECTION LOGIC  
 (EPROM) PERMANENTLY. LEAVE  
 BUS CONNECTOR FREE FOR  
 RAM BOARD.  
 EXTRA POWER SUPPLY MAY  
 BE NEEDED.  
 2764 EPROMS.

SELECT OUT 0, X  
 X = 0-255



DISPARE  
 SPARE

JUST PLUGS INTO  
 50 PIN BUS







**COM-TRONICS**  
144 CLOVERSIDE Ct.  
BUFFALO, N. Y.  
14224

DOWN-LOADING DOCUMENTATION

by: Gordon Rusch

Information on sending and receiving BASIC programs from  
COMPUCOLOR to COMPUCOLOR through the RS-232-C port.

When you (the HOST) is sending a BASIC program to the remote computer (the SLAVE), you must follow these instructions. His job (the SLAVE) is simple, your's is more difficult. This is what must be done when communicating from COMPUCOLOR to COMPUCOLOR only.

THE SLAVE COMPUTER MUST:

- 1) CPU RESET
- 2) ESC - 'R' - 1            110 baud.
- 3) ESC - M                    Terminal mode.

THE HOST COMPUTER MUST:

- 1) COMMAND & CPU RESET    Reset all data and flags.
- 2) CPU RESET
- 3) ESC - 'R' - 1            110 baud.
- 4) ESC - M                    terminal mode.
- 5) ESC - W

At this point, you will receive the BASIC start up message from the SLAVE computer. 'MAXIMUM RAM AVAILABLE?'

- 6) ( CR )            Now you will receive his maximum ram, not your's
- 7) TYPE: POKE 33251,23:POKE 33265,0    ( CR ).

He (the SLAVE) will receive the READY prompt on his computer, not your's.

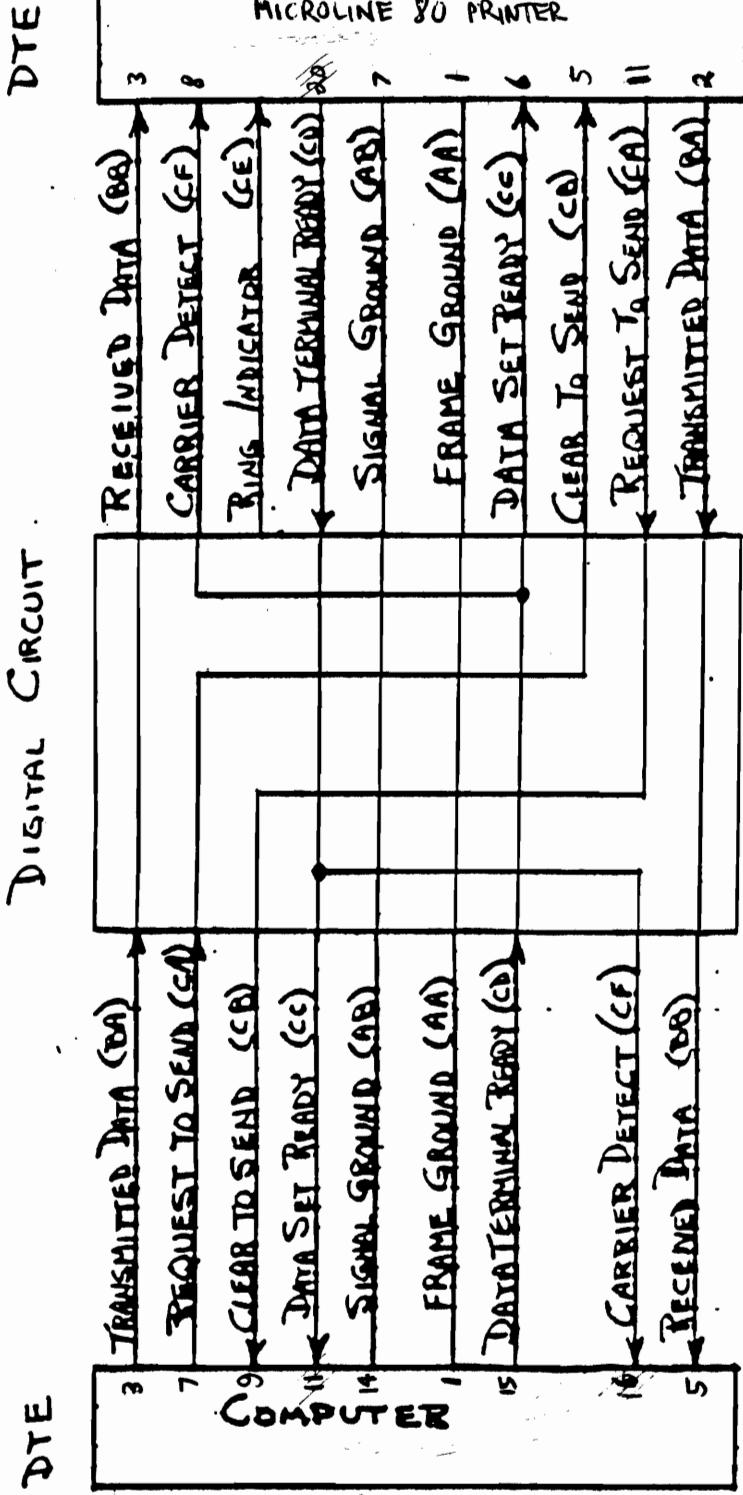
- 8) CPU RESET
- 9) ESC - 'R' - 1            110 baud
- 10) ESC - 'E'                Return to BASIC, your's.
- 11) LOAD "program"
- 12) TYPE: PLOT 27,18,1,27,13:LIST :PRINT :POKE 33265,0    ( CR ).

You are now sending your BASIC program to the SLAVE computer. His BASIC will now understand all in-coming data and put it in the BASIC loading address. When done, you will receive the READY prompt, but not the SLAVE, he will receive 3 ( CR )'s. At this point, the SLAVE may hit the CPU RESET and ESC E then list or save his new BASIC program. Now it's time for you and I to take a break while he play's with his new program. The 'LLIST' program will replace steps 10-12.

# RS - 232 INTERFACE

RS-232 PIN#	CC-II PIN#	SIGNAL DIRECTION		SIGNAL DESCRIPTION
		COMPUTER (DTE)	MODEM (DCE)	
1	1 ✓			FRAME GROUND - AC POWER GROUND. CAUTION: THIS PIN IS ALSO TIED TO THE SIGNAL GROUND IN THE CC-II. BE CAREFUL WHEN USING THIS AS A POWER GROUND.
2	3	====>		TRANSMITTED DATA - SERIAL DIGITAL DATA TRANSMITTED FROM THE COMPUTER TO THE MODEM.
3	5	<====		RECEIVED DATA - SERIAL DIGITAL DATA RECEIVED BY THE COMPUTER FROM THE MODEM.
4	7	====>		REQUEST TO SEND - MODEM ENABLE FOR DATA TRANSMISSION. NOTE: THIS SIGNAL IS TIED TO +12 VOLTS IN THE CC-II.
5	9	<====		CLEAR TO SEND - COMPUTER ENABLE FOR DATA TRANSMISSION. NOTE: THIS SIGNAL IS USED <u>ONLY IF</u> THE " <u>HANDSHAKE</u> " MODIFICATION IS INSTALLED IN THE CC-II.
6	11	<====		DATA SET READY - MODEM IS "ON LINE" AND READY. NOTE: THIS SIGNAL IS <u>NOT</u> USED IN THE CC-II.
✓ 7	13 & 14 ✓			<u>SIGNAL GROUND</u> - COMMON GROUND FOR ALL DIGITAL SIGNALS.
8	16	<====		DATA CARRIER DETECT - DATA IS BEING RECEIVED BY THE MODEM ON THE ANALOG CIRCUIT. NOTE: THIS SIGNAL IS <u>NOT</u> USED IN THE CC-II.
20	15	====>		DATA TERMINAL READY - COMPUTER IS "ON LINE" AND READY. NOTE: THIS SIGNAL IS TIED TO +12 VOLTS IN THE CC-II.
22	19	<====		RING INDICATOR - A RING SIGNAL IS BEING RECEIVED BY THE MODEM ON THE ANALOG CIRCUIT. NOTE: THIS SIGNAL IS <u>NOT</u> USED IN THE CC-II.

WIRE CABLE  
DIGITAL CIRCUIT



" NULL "  
MODEM

CIRCUIT	DESCRIPTION
A?	GROUNDS
B?	DATA
C?	CONTROLS

TYPICAL SYSTEM LAYOUT  
USING CONNECTING CABLE

## CHAPTER 9

## USING THE COMPUCOLOR II AS A TERMINAL

## 9.1 General Information

It is possible to connect the Compucolor to a remote computer as a sophisticated terminal. This is achieved with a standard three-wire RS232C cable attached to the serial input/output port at the rear of the Compucolor (see Figure 11.1). No control signals are required. (Each serial character from the remote computer should have 7 data bits + fixed (low) parity bit + 2 stop bits) or 8 data bits and no parity.

The Compucolor is set up to transmit and receive 8 bit ASCII characters and data which precludes parity checking. Therefore to incorporate a parity check it would be necessary to develop a special purpose communications program that executes in the users RAM workspace.

A problem encountered with microcomputers like the Compucolor is that they use the escape and ASCII control codes for special internal purposes and if these are put out, or 'sent', by the host computer then all sorts of difficulties can arise. It is most likely to occur when the host computer sends control codes other than NULL, RETURN, LINEFEED and ERASE PAGE.

See Figure 11.1 for wiring diagram for RS232C 'Modem' Edge Connector.

## 9.2 User Operation

- A. Press CPU reset (The Compucolor is now in CRT mode — small characters, colour BG = black, FG = green, line speed: 9600 baud)
- B. Press (ESC) key then R (no RETURN)
- C. Press a number between 1 and 6 to select speed

1 : 110 baud                      2 : 150 baud  
 3 : 300 baud                     4 : 1200 baud  
 5 : 2400 baud                    6 : 4800 baud

(7 : 9600 baud is CPU reset default) — (NOTE DEFAULT IS 1 STOP BIT, 7 = 2 STOP BITS)

Press (ESC) key again  
 Press M (terminal Mode)

The keyboard and screen are now connected directly to the remote CPU.

- D. Type CONTROL/C or RETURN several times to establish communication.

To revert back to local mode, press CPU reset then ESC E for BASIC, or ESC D for FCS.

The following points should be considered on entering Terminal Mode:

- 9.2.1 If you wish to work with large characters (16 lines/screen) and/or a different colour then these should be selected before selecting terminal mode (ESC M)

COLOUR Press required colour key (extended Keyboard) Press CONTROL/colour key (standard Keyboard)

LARGE CHARACTERS : Press 

A7
ON

 key.

- 9.2.2 If the Compucolor does not have the Lower Case modification fitted, then all output from the remote computer must be in upper case only other-wise graphics characters will appear on the screen.

9.2.3 The contents of the Compucolor memory (usually a BASIC Program) is completely undisturbed by operating in terminal mode. Thus the user can switch between local and remote operation without having to reload programs.

9.2.4 BASIC source code can be transmitted in either direction using utilities such as XFER, COMTRX or TERMII. (The latter two are available from COM-TRONICS Co).

BASIC source transfer to the Compucolor can be achieved at speeds up to 4800 providing each line has the LF removed and is followed by a pause of 700 ms.

9.2.5 Some control characters sent from the remote computer will affect the Compucolor operation.

9.2.6 If the serial line is left connected to the remote computer while operating the Compucolor in local mode, any unsolicited messages will appear on the screen. An executing program is not affected, however a portion of the current screen display may be lost.

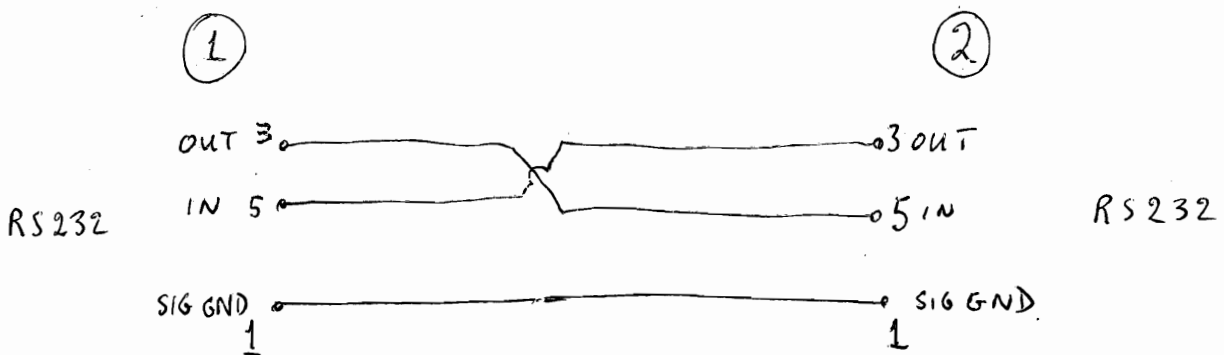
9.2.7 To delete last character entered when communicating with a system such as RSTS/E press DELETE CHARACTER, if the option is fitted (or SHIFT/\_ (underline) on standard keyboard). Do not use ← key.

Note: (i) On PDPII host computers running under RSTS/E the user should SET NO SCOPE to make the erase function work like a printer terminal. That is to correct PRANT into PRINT the user would rub out 3 characters and the display would look like this: PRANT/TNA/INT

(ii) To use a Compucolor as a terminal the user should also SET STALL. This will allow CONTROL/S and CONTROL/Q to suspend and recommence output from the host computer.

9.2.8 The Compucolor can be used as a full colour graphics terminal by transmitting the required 8 - bit control codes from the remote CPU. (See Table 8.1 and chapter 7 of graphics.)

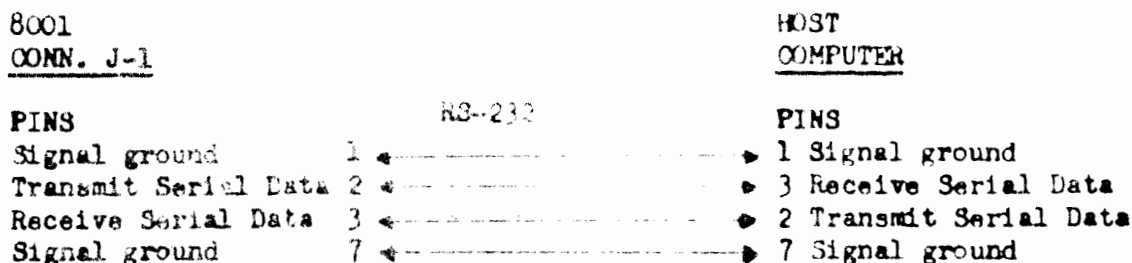
9.2.9 It is also possible for the ATTN BREAK key not to function in 'stand alone mode' if the line to the host computer is still plugged into the modem connector. Whether this problem arise or not will depend upon the wiring used to the host computer.



## INTERFACE PROCEDURE

It is important to follow this procedure in interfacing your ISC terminal to another computer.

1. Connect the following wires from the ISC terminal to your computer and try to keep the length below 50 feet.

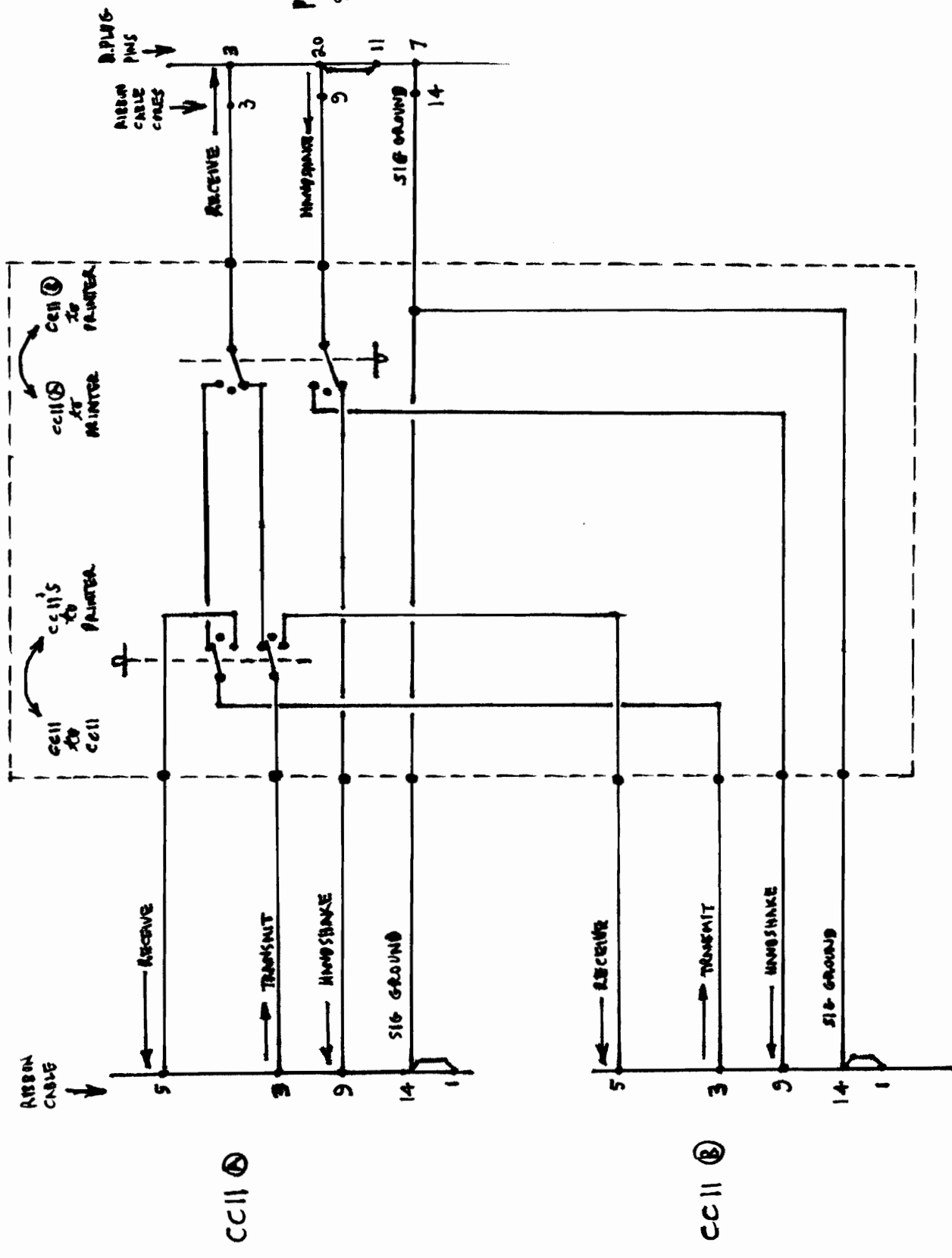


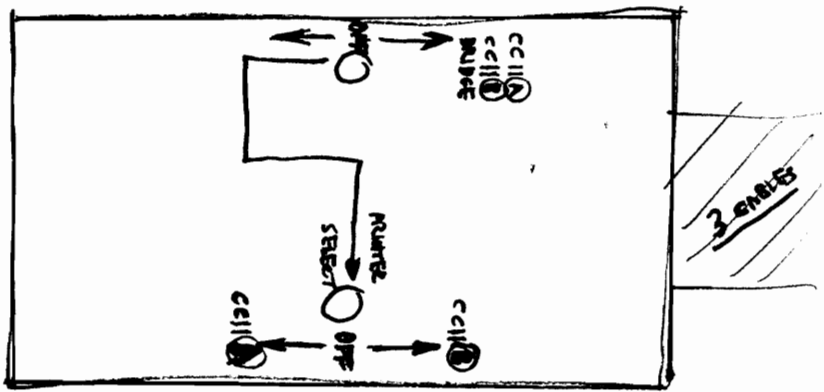
2. Set up the ISC terminal as follows, in this order:
  - A. Stop Bits      Control N=1 Stop Bit  
                    Control O=2 Stop Bits
  - B. Baud Rate      ESCAPE then R then # according to the Baud rate chart below.  
                    1=110   2=150   3=300   4=1200   5=2400   6=4800   7=9600
  - C. Duplex          Half = ESCAPE H  
                    Full = ESCAPE F  
                    Local = ESCAPE L
3. Now as you type characters from the keyboard they should appear on the screen. If no characters appear on the screen then check the following:
  - A. connections between the two computers
  - B. Baud, Stop Bits, Duplex
  - C. Host computer is receiving characters.
  - D. Type break key - Go to Step #3.
4. Now to check the ISC Terminal to see if it is transmitting and receiving.
  - A. disconnect all connections to Port J-1.
  - B. Short pins 2 to pin 3 with a wire.
  - C. Now type ESCAPE and then H
  - D. For every keystroke two (2) characters should appear on the screen.
  - E. If it works then check the Host Computer. If not do it again and then call your local Representative.
5. How to communicate between a remote terminal and the ISC 8051/8031 Micro-computer in BASIC:
  - A. Make sure the interface discussed in Step 1 is followed and the systems are communicating.
  - B. Type CPU Reset then ESCAPE followed by "W" then ( Return ).
  - C. Type           Poke - 24918,96 ( Return )  
                  Console OUT Device = J-1 connector ( Pin 2 )  
                  Console IN Device = J-1 connector ( Pin 3 )

FITTED  
23/5/87

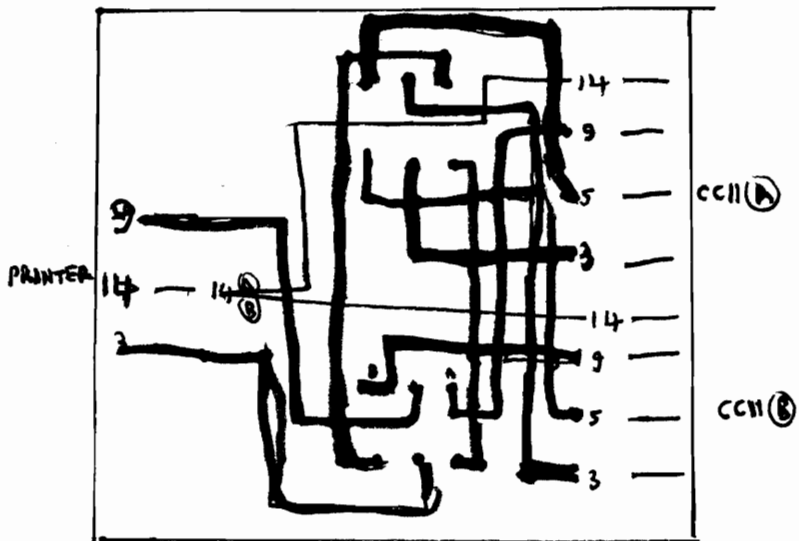
PRINTER  
SUPER 5

SWITCHING INTERF. CE





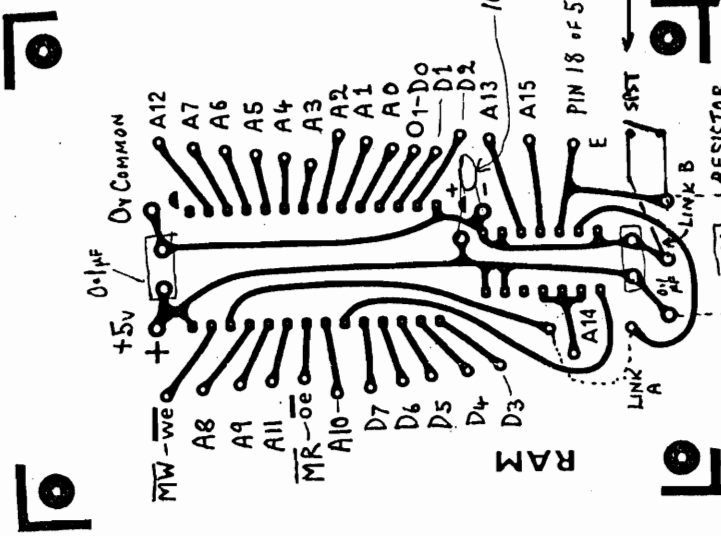
11/2





SEE WRITTEN DATA  
P-3 NOV-85 CUVIC  
P.C. BOARD REQUIRED

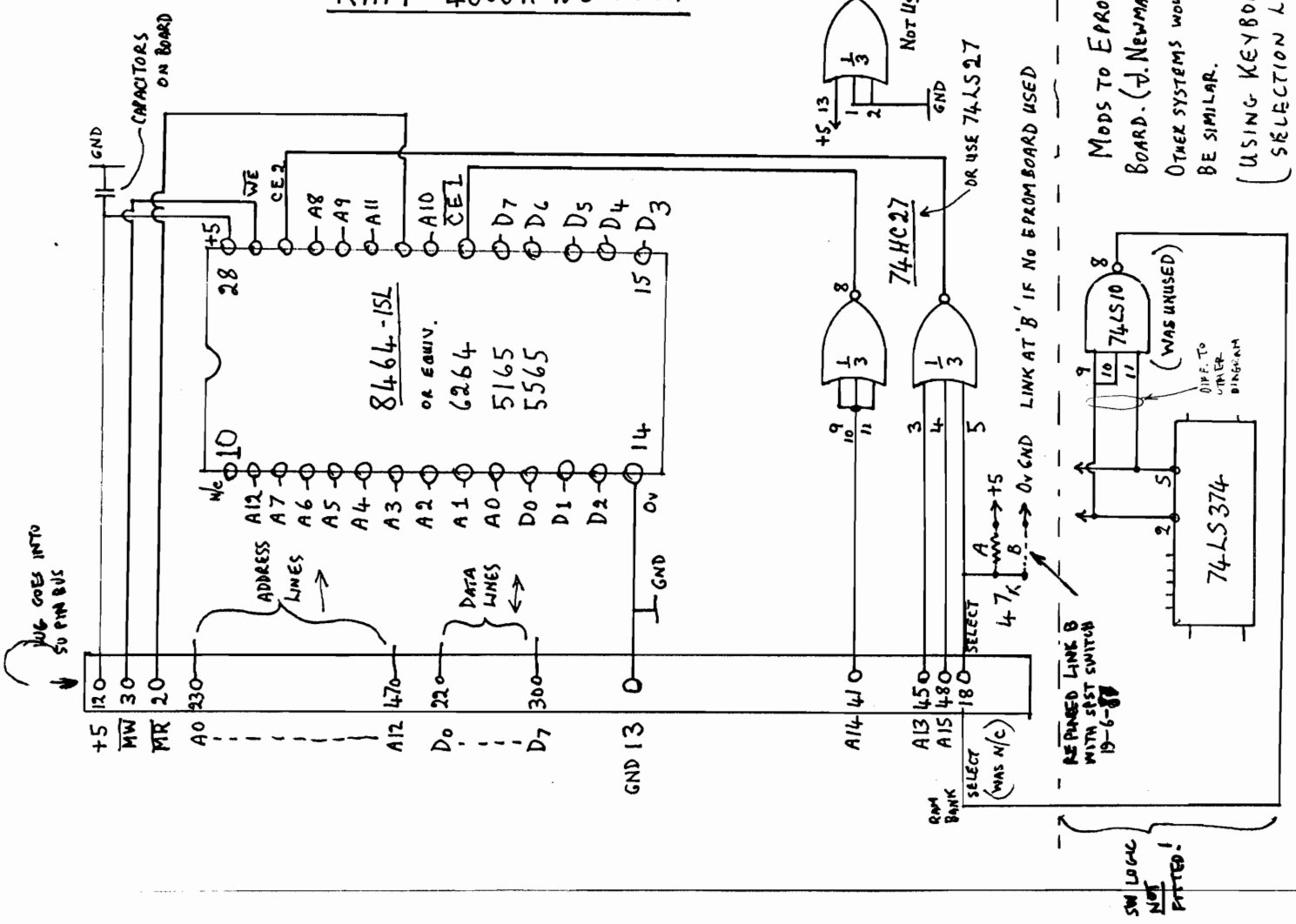
# RAM BOARD



COPPER TRACK SIDE

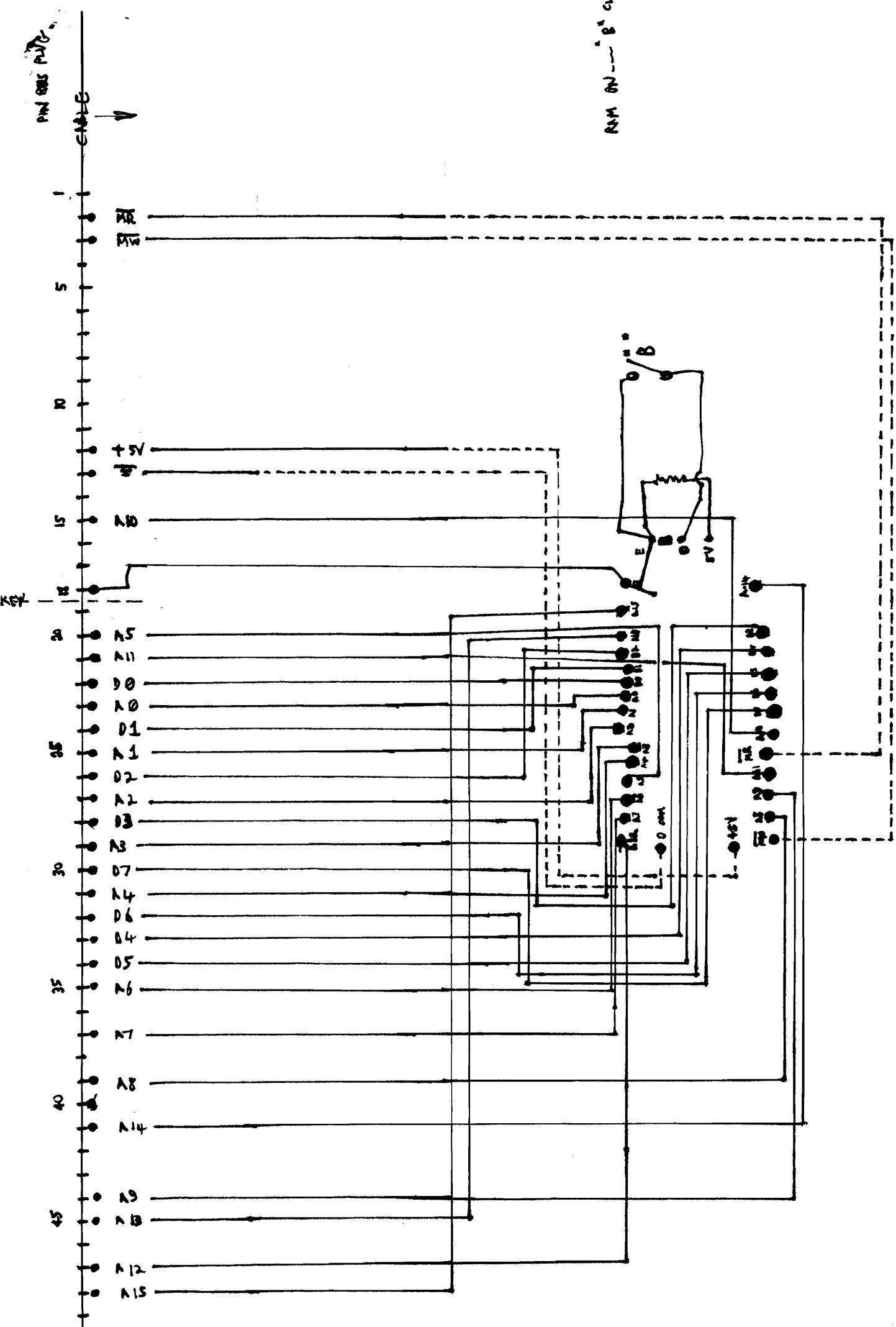
ALT. MODE IS TO PVT EPROM SWITCH TO POS. 5. & SWITCH ON RAM WITH SPST SWITCH.

## RAM - 4000H TO 5FFFH.



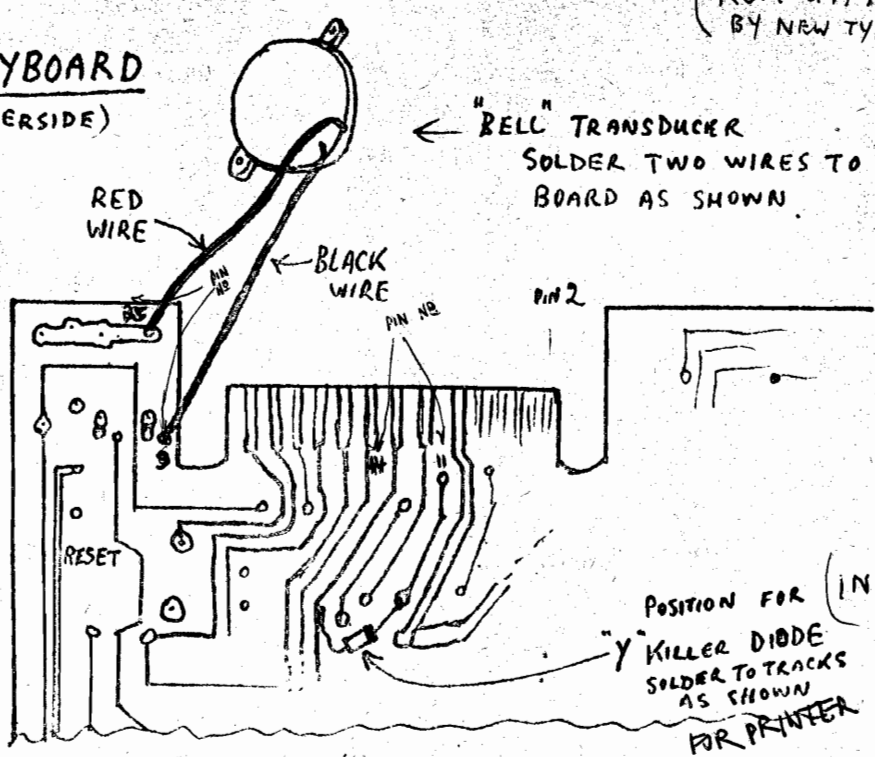
PIN ONE PLUG

RAM ON - B<sup>1</sup> closed



FOR 8.79 (OR FOR 6.78 IF  
ROM UA7 IS REPLACED  
BY NEW TYPE.

KEYBOARD  
(UNDERSIDE)

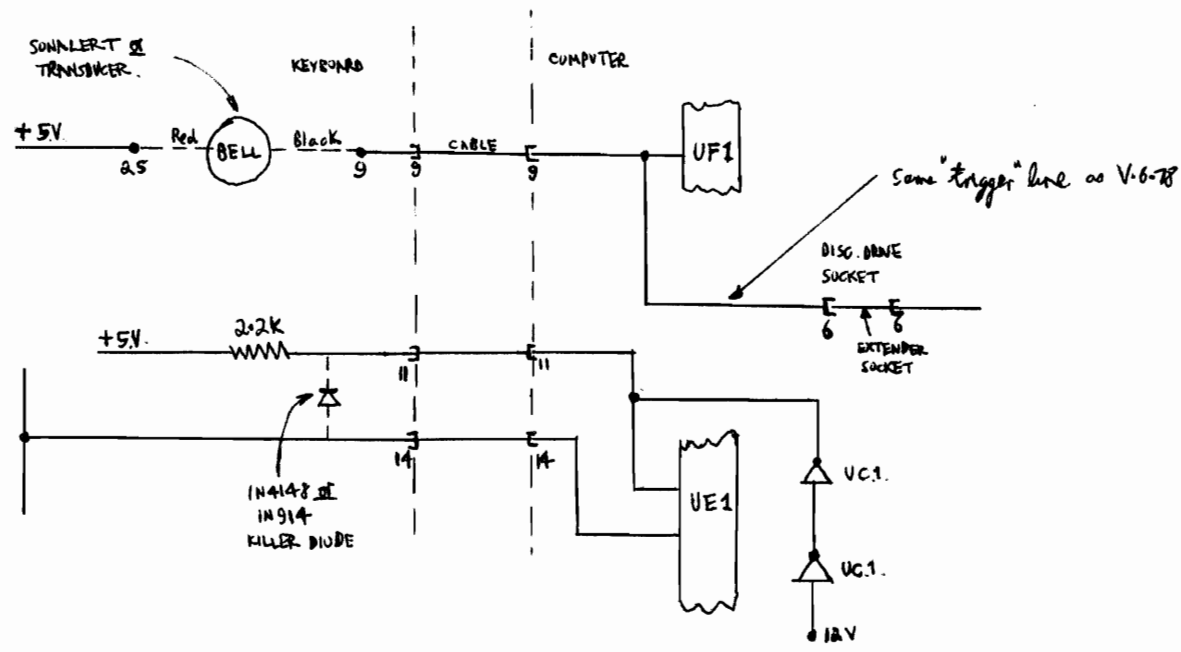


"BELL" TRANSDUCER  
SOLDER TWO WIRES TO  
BOARD AS SHOWN

Fitted  
to 8.79  
14-9-83

Fitted  
to 6.78  
11-11-83

Fitted 8.79  
2/10/83



Those with the version 8.79 software have available the option of installing a bell on their COMPUCOLOR IIs. As you know, there was no provision for a bell in the original design of the machine, but because a bell can be quite useful, there is now a way to attach this device to the computer.

First, and most obviously, the bell is great for punctuating computer programs that require user input. You can program the bell to sound when a mistake is made or when a response is required. The bell makes these programs more interactive because it focuses user attention at critical moments and disallows error. In real-time applications, the bell can add excitement with sound effects or indicate a time out.

Secondly, and this use is one you might not have thought of, the bell is very valuable in the debugging process. PLOT 7 is the command sequence that rings the bell, and by inserting PLOT 7's at various points in a program, you can determine if the program is passing certain statements. Or, if the program has to perform a given function a specified number of times, you can insert a PLOT 7 and audibly count to see if it's successful.

Assembly and installation of the bell is not especially difficult, but it requires a little bit of time. You will need:

- |   |                          |
|---|--------------------------|
| Sonalert assembly                             | soldering iron           |
| sponge, etc.                                  | needlenose pliers        |
| wire cutters                                  | 60/40 rosin core solder  |
| IN914 diode                                   | mounting bracket or glue |
| 16-pin socket                                 |                          |
| 1t. gauge (24-28 AWG) insulated stranded wire |                          |
| — two 12" lengths, one red, one black         |                          |

The Sonalert assembly can be purchased from Compucolor Corporation. Order part number #010015. The price is \$21.00. Or, you may be able to find the Sonalert at radio supply/hobby stores. The specs are:

Sonalert model SNP428  
 Volts 4 — 28 VDC  
 Amps .003 — .016  
 Manufactured by P. R. Mallory & Co., Inc.

**PIN 8 INCORRECT -  
 IS DISK SELECT  
 LINE! @ IS +5V.**

All other materials are readily available at radio supply/hobby stores.

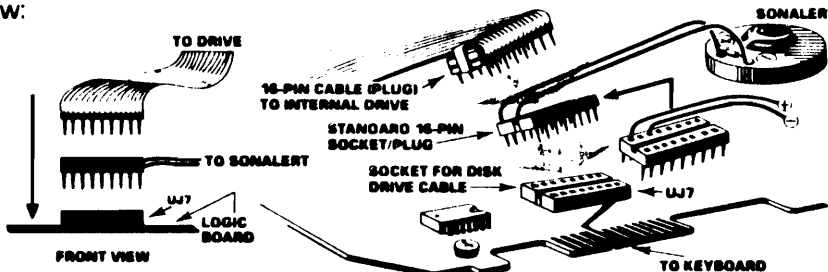
The procedure for equipping the COMPUCOLOR II with sound is as follows:

1. Add the IN914 diode to the Sonalert by soldering the negative side of the diode to the plus side of the Sonalert; and the positive side of the diode to the negative side of the Sonalert.
2. Attach the two 12 inch wires. A red wire for the +5VDC (+) side of the Sonalert, and a black wire for the minus (-) side of the Sonalert. Lightly twist the wires together. Bare the free ends of the wires and tin them with solder.
3. Attach the red wire to a +5VDC location on the logic board. One good place is Pin 8 of the J7 (internal disk drive connector). The black wire can be connected to Pin 6 of J7.
4. As J7 is a socket that the internal disk drive plugs into, the best method of connecting the Sonalert is with another socket. Note the drawing below:

**VIEW OF COMPUCOLOR II LOGIC BOARD**

Connect (+ Plus) side of SONALERT to pin 8 of UJ7.  
 Connect (- Minus) side of SONALERT to pin 6 of UJ7.

**Note:** For COMPUCOLOR II owners whose disk drive is mounted externally, no cable is used inside the machine to attach the disk drive. Therefore, the UJ7 socket is unused, and only the 16-pin plug is needed to attach the SONALERT.



**PREFER TO  
 HAVE IN  
 KEYBOARD**

5. Mount the Sonalert onto the inside of the COMPUCOLOR II cabinet. You can do this by gluing the speaker in place, or by using a bracket. The purists (and the daring!) can cut a hole into the COMPUCOLOR II cabinet and mount the Sonalert through the hole.

### Dual Speed Switch

Those CompuColor owners who regularly buy or trade software are aware of compatibility problems between drives. They also know that reading a disk at a slightly slower speed than the original writing speed overcomes many of the reading problems. This is usually achieved by drilling a hole in the disk cabinet, giving screwdriver access to the speed control potentiometer. The trouble with this is the difficulty of resetting to correct speed.

This modification is simply a switch to set the disk speed at one of two fixed speeds. By connecting a 2200 ohm resistor across half of the speed pot, the RPM drops by five. Use the SPEEDO program or the strobe indicator to set the normal speed (300). Reading speed for "foreign"

disks can then be set to 295 RPM at the flick of a switch. By reducing the value of the resistor, the difference between the two speeds increases. A 1000 ohm resistor gives a difference of 8 RPM. The switch should be fitted to a 1/4" hole on the front panel of the disk drive.

#### Parts required:

1. Miniature SPDT switch.
2. 2200 ohm .25 watt resistor.
3. Length of hookup wire.


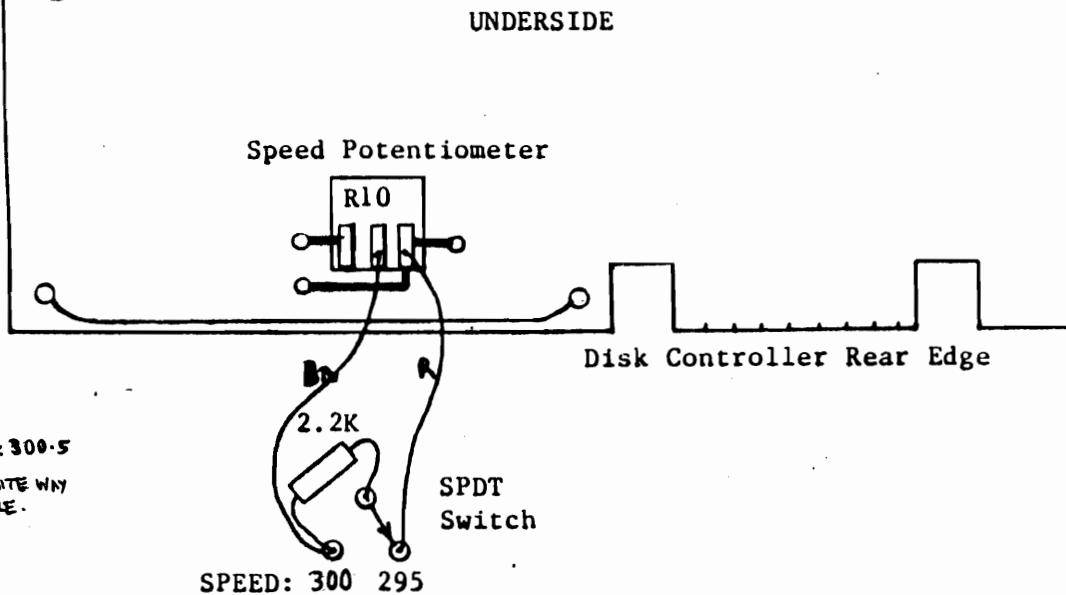
Install the parts as shown in Figures 5 and 6. 

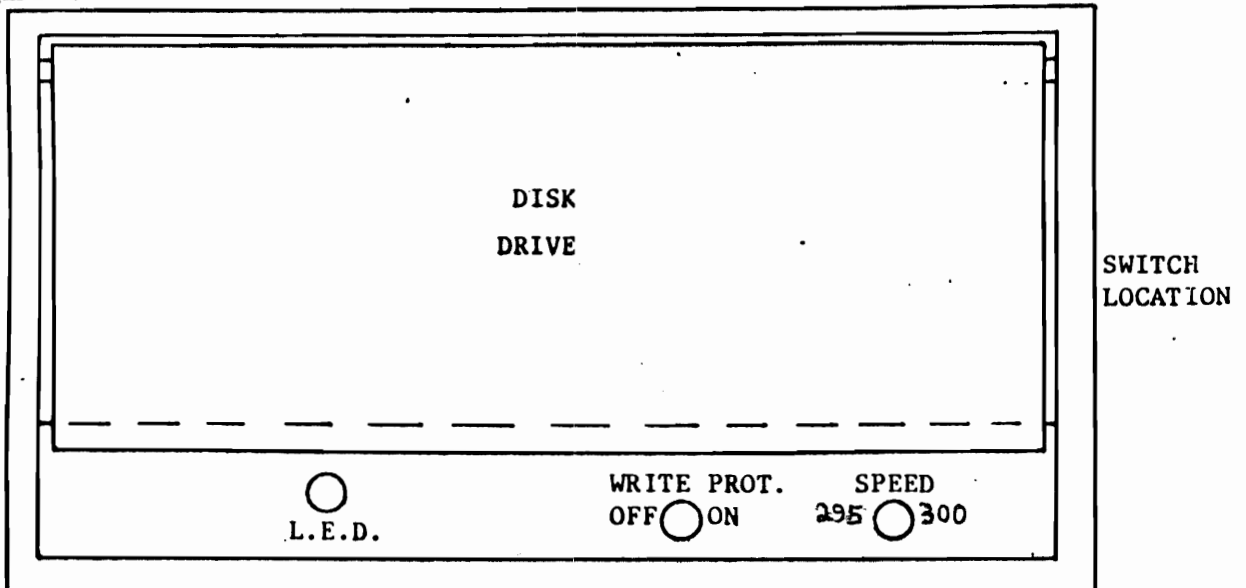
Figure 5



8-79  
Ritch  
24/7/73

TEST - 295 & 300-5  
NOTE - SW OPPOSITE WAY TO TOGGLE.

Figure 6



# COMPUCOLOR COLUMN

by Ralph Neill, of the Victorian Compucolor Users Group.

This is the first of a semi-regular series of columns specifically for the Compucolor II computer user. And, to the best of my knowledge, APC is the first magazine to make anything more than a token effort for CCII owners. We have been starved of information and know all-too-well the frustration of seeing endless program listings for every home computer other than the Compucolor.

It's not surprising that most publishers have been unwilling to devote much space to the CCII - there simply are not that many Compucolors around. The reason's simple enough - the "basic" Compucolor is far more expensive than the basic model of any other home computer. With the Compucolor you have to start near the top because the basic package includes a 5" drive as well as an RGB monitor.

It has a ROM-resident operating system that should be the envy of all others and a mixed graphics and text capability that makes the usual wishy-washy NTSC images pale by comparison. Sure, the maximum RAM is 32k, but don't forget the 8k of EPROM space or to ask owners of other systems how much RAM space they have left after loading Basic and DOS!

We Compucolor owners regard these truths as self-evident. But that doesn't alter the fact that the Compucolor II is something of an orphan. Intelligent Systems Corp. hatched the CCII as a stripped-down version of an Intecolor business machine - and then seemingly abandoned it. There's certainly been some pretty good software - but of hardware not a sign. There's a 50-pin bus, but for use with what? Compucolor certainly hasn't produced any add-ons and the market's not big enough to attract peripheral manufacturers.

Some work is being done in America, but, for us, the main impetus must come from the local user groups. Work is being done on an 8" floppy system and the hardware wizzards of the Victorian group have already produced a switchable lower-case/special graphics option and a programmable character generator. There's more to come including such things as game paddles! On the software scene the user groups are also making the running. This column was written using the low-cost "Word King" word processor and there's now a two-pass disassembler available - both programs were written by Bernie Muldowney who is the Victorian group's software guru.

## Lack of support

What this all boils down to is the simple fact that the Compucolor II is a superb device lacking in support. It will get manufacturing support only if enough units are sold. And that will happen if the package can be made attractive enough for people to make the initially high cash outlay.

Only the users can make that happen. Moves are underway to create formal links between the various user groups and now we have support from APC in the form of this column to help cement those links and produce really exciting hardware and software. If you want some suggestions, how about making the 50-pin bus more than just a decoration. And what about putting some of the Compucolor utilities on EPROM.

I hope this column will be a users' column - not my column! I hope it will become a means of national information exchange - operating tips, new ideas and programs. We all know that the Compucolor manual is most notable for what it leaves out. So if you've discovered something useful - share it! To set the ball rolling I have a couple of tips and a short but useful program.

The first tip is for owners of two disk drives. You've probably found the need to change the default device within a program or to just check the status. You won't find it easily in the manual but all you need to know is memory

location 33010. With drive CD0: selected as the default device PEEK(33010) will produce 48 decimal - ASCII for 0. For drive CD1: the memory contents would be 49 - ASCII for 1.

Quite obviously, the default drive can then be changed by POKING the appropriate value into location 33010 without having the usual FCS messages on the screen.

The second tip can be useful for specialised screen displays but will probably be of most interest to those with printers. The contents of memory location 33289 sets the number of columns sent to the terminal. Obviously, as far as the screen is concerned, the maximum is 64 and that is the default value. However, it can be changed by a simple POKE when a smaller or greater number of columns is required for printer output formatting.

## EZ Menu

The ability to use menu-driven programs via the AUTO key is a great convenience. But it's of little use with disks that are constantly being updated - until now that is. The aforementioned Bernie Muldowney has written a program called EZ-Menu (EZ for "easy").

What it does is display a directory listing on the default drive when AUTO is hit (assuming, of course, that you've saved the program as "MENU"). A cursor can then be moved up or down the listing with the cursor-up and space bar respectively. The program uses screen memory to "pick-off" the file name and type. There is a limit of 23 directory entries as the screen must not scroll. Hitting RETURN will load and run a file where appropriate while hitting L will just load it. The program caters for .BAS, .LDA, .PRG, .PIC, .DSP and .DIS files. In line 80 of the listing, the Flag-Off Control character should be inserted between the " " in the PRINT statement. In line 110, Control-cyan, shifted @ and Control-green should be placed between the "" for CY\$.

Well, that's the openers. Now what are needed are your contributions and suggestions. You can send them to me care of APC.

```

60 REM "EZMENU"
70 REM WRITTEN FOR THE COMPUCOLOR II BY BERNIE MULDOWNEY
80 PRINT " " : PLOT 6,2
110 CY$="" : KB=33278 : Y=6 : SC=28672
120 PLOT 15,12
130 PLOT 27,4 : PRINT "DIR" : PLOT 27,27
140 PLOT 3,0,Y : PRINT CY$ : PLOT 3,0,Y
150 POKE KB,0
160 G=PEEK(KB) : IF G=0 THEN 160
170 IF G=32 THEN Y=Y+1 : GOTO 140
180 IF G=28 THEN PLOT 3,0,Y : PRINT " " : Y=Y-1 : GOTO 140
190 IF G=76 THEN L=1 : GOTO 210
200 IF G()=13 THEN 140
210 AD=SC+128*Y
220 IF (PEEK(AD+2)()=48) OR (PEEK(AD+4)()=51) THEN END
230 NA$="" : FOR I=1 TO 6
240 CC=PEEK(AD+6+2*I) : IF CC=32 THEN I=6 : GOTO 240
250 NA$=NA$+CHR$(CC)
260 NEXT I
270 TY$=CHR$(PEEK(AD+22))+CHR$(PEEK(AD+24))+CHR$(PEEK(AD+26))
280 VE$=CHR$(PEEK(AD+30))+CHR$(PEEK(AD+32))
290 SP$=NA$+" "+TY$+" "+VE$
300 IF TY$="BAS" THEN 360
310 IF TY$="PRG" THEN 380
320 IF TY$="LDA" THEN 380
330 IF TY$="PIC" OR TY$="DSP" OR TY$="DIS" GOTO 400
350 PLOT 3,0,Y : PRINT " " : PLOT 3,42,Y : PRINT "NOT ALLOWED" :
Y=Y+1 : GOTO 140
360 IF L=1 THEN LOAD SP$ : END
370 GOTO 410
380 IF L=1 THEN PLOT 27,4 : PRINT "LOA "+SP$ : END
390 PLOT 27,4 : PRINT "RUN"+SP$
400 PLOT 12,27,4 : PRINT "LOA "+SP$ : PLOT 27,27 : END
410 LOAD SP$ : RUN
    
```

# COMPUCOLOR COLUMN

by *Ralphe Neill of the Victorian CompuColor Users' Group.*

The main program listing in this second column for CompuColor users is again from the Victorian Users' Group. That's not because I'm impossibly parochial - it's just that lead times in the magazine publishing world are such that I'm writing this column before many of your letters have had a chance to arrive.

Before going any further, I'd like to make a suggestion to anyone submitting programs. The statements for a number of CompuColor's unique features are meaningless to owners of other computers. Could I suggest that, wherever practicable, you include REM statements explaining the more esoteric PLOT functions so that people will have at least a chance of converting the program into another version of Basic.

The listing this time should be of immense interest to anyone with a Microline 80 printer - particularly if they're into graphics.

It allows you to dump the screen contents to the printer. The CompuColor already has that function, of course, via CONTROL X. But that's for ASCII characters only. This programme will give a dump of graphics blocks as well.

It was written by Peter Stuckey of the Victorian Group. He chose the microline 80 because of the graphics blocks it can print and because so many CompuColor owners have the Microline as their printer.

The program uses a machine language patch that's loaded from Basic via POKE statements to avoid the hassle of having to assemble a .PRG file.

Note that in its power-on configuration, the Microline 80 will print to the left with a somewhat distorted aspect ratio. This can be corrected with the (ESC) M (ESC) 8 (ESC) B (ESC) E sequence with the printer on after setting the CompuColor baud-rate.

Naturally, that line can be included in the program. The program takes a

few minutes to run, but I think you'll be delighted with the results!

Speaking of graphics, there's help at last for those of us still confused and unwilling to tackle heavy pictorial projects. Tony Watson and John Newman of W.A. CompuColor/Intercolor Users' Group have produced "Programming Color Graphics for CompuColor/Intercolor Computers".

It's an excellent book with a wealth of information on implementing the CompuColor's graphics features.

It should be available locally, but if you have any problems write to Tony Watson at the following address:

c/o WAIT Computing Centre,  
Kent Street,  
SOUTH BENTLEY, WA 5102

In the next column I will reproduce a couple of short examples from the book.

Still with the West, here's a couple of tips from that Users' Group's Magazine, CUWEST.

If you've been using colours extensively in a program make sure they have been reset before the run ends. Use this as the last line:

```
9999 PLOT 30, 16, 29, 18: END
```

The other tip is for those of you reading non-random files, such as .SRC files, from Basic.

The trick, says CUWEST, is to fully specify a new set of attributes in the FILE "R" statement. For example:

```
10 FN$="file-name.SRC"  
20 FILE "R", 1, FN$, 1; n, 128, 1  
30 GET 1; BL$ [128]  
40 PRINT BL$  
50 GOTO 30
```

In line 20, n is the maximum number of blocks (in decimal) in the file. You

can get the value from the directory under the heading "SIZE" but don't forget to convert it from hex first!

Apart from the user-developed software available free to all members, the Victorian Users' Group likes to encourage the development of advanced games and utility programs for which the writer gets a royalty. An example is the Word King program I mentioned in the last column.

Bernie Muldowney now has three new programs that should prove more than popular.

They're available in person or via mail-order from:

Panatronics P/L,  
691 Whitehorse Road,  
MONT ALBERT. Vic. 3127  
Tel: (03) 890-0579

All of the prices quoted are the same discount prices at which the items were first offered to Users' Group members!

First there's a disk catalogue program that uses random files to save directory information from your disks. It will print out listings, in alphabetical order if you want, of all the entries of disk names. You can even restore damaged directories. The asking price is \$30.

And for \$25 you can have the Labelling Disassembler that dumps all the labels to a printer as well as creating an .SRC file.

But the program that has us most excited is the Assembly Language Tutorial. It's a three-disk set with extensive documentation that uses graphics to explain what's going on in memory. The price is \$50.

I'm sure that other Groups have software available on the same royalty basis and I'd be delighted to hear about it.

Once again, you can send anything to me care of APC.

```

2 REM PAGE PRINTER - PRINTS DSP TYPE FILES
4 REM WRITTEN BY PETER STUCKEY FOR COMPUCOLOR II
6 GOTO 60000
8 DIM CH(63),PC(63),RE(63):CASE= 1:J= 0
10 PLOT 27,18,3,6,2:INPUT " NAME OF SCREEN
    ";B$:B$= B$+ ".DSP"
20 INPUT "TURN ON PRINTER";A$
30 PLOT 12,27,4:PRINT "LOA ";B$;" 7000 "
    :PLOT 27,27,27,13,27,6
110 FOR I= 0TO 63:CH= PEEK (28672+ 128* J+ 2* I)
130 IF PEEK (28673+ 128* J+ 2* I)< 128THEN CH= - CH
135 IF CH= - 32THEN CH= 0
140 CH(I)= CH:NEXT I
160 ON CASEGOSUB 1000,2000,3000,4000
180 FOR I= 0TO 63:PRINT CHR$( PC(I));:NEXT I:PLOT 13
210 CASE= CASE+ 1:IF CASE> 4THEN CASE= 1
220 IF CASE= 4THEN 160
225 J= J+ 1:IF J= 32THEN POKE 33265,0:END
230 GOTO 110
1000 FOR I= 0TO 63
1005 IF CH(I)< 0THEN PC(I)= - CH(I):RE(I)= 0:GOTO 1030
1010 PC(I)= 8* 16+ CALL (CH(I)AND 119)
1020 RE(I)= (CH(I)AND 136)/ 8
1030 NEXT I:RETURN
2000 FOR I= 0TO 63
2005 IF CH(I)< 0THEN PC(I)= - CH(I):RE(I)= 0:GOTO 2030
2010 PC(I)= 8* 16+ CALL (RE(I)+ (CH(I)AND 51)* 2)
2020 RE(I)= (CH(I)AND 204)/ 4
2030 NEXT I:RETURN
3000 FOR I= 0TO 63
3005 IF CH(I)< 0THEN PC(I)= - CH(I):RE(I)= 0:GOTO 3030
3010 PC(I)= 8* 16+ CALL (RE(I)+ (CH(I)AND 17)* 4)
3020 RE(I)= (CH(I)AND 238)/ 2
3030 NEXT I:RETURN
4000 FOR I= 0TO 63:PC(I)= 8* 16+ CALL
    (RE(I)):NEXT I:RETURN
60000 GOSUB 65410:RESTORE 60000
60010 DATA 229,197,245,123,22,0,31,210,
    -1,-1,14,1,205,-1,-1
60020 DATA 31,210,-1,-1,14,4,205,-1,-1,31,210,-1,-1,14,16
60030 DATA 205,-1,-1,31,31,210,-1,-1,14,2,205,-1,-1
60040 DATA 31,210,-1,-1,14,8,205,-1,-1,31,210
60050 DATA -1,-1,14,32,205,-1,-1,90,22,0,241,193,225,201
60060 DATA 71,122,129,87,120,201
60070 IF TM> 65300THEN TM= TM- 200
60080 FOR I= 1TO 74:READ A:POKE TM+ I,A- (A< 0):NEXT
60090 Z= TM+ 1:AD= 33283:GOSUB 65400
60100 Z= TM:AD= ER:GOSUB 65400
60110 Z= TM+ 16:AD= TM+ 9:GOSUB 65400
60120 Z= TM+ 69:AD= TM+ 14:GOSUB 65400
60130 Z= TM+ 25:AD= TM+ 18:GOSUB 65400
60140 Z= TM+ 69:AD= TM+ 23:GOSUB 65400
60150 Z= TM+ 34:AD= TM+ 27:GOSUB 65400
60160 Z= TM+ 69:AD= TM+ 32:GOSUB 65400
60170 Z= TM+ 44:AD= TM+ 37:GOSUB 65400
60180 Z= TM+ 69:AD= TM+ 42:GOSUB 65400
60190 Z= TM+ 53:AD= TM+ 46:GOSUB 65400
60200 Z= TM+ 69:AD= TM+ 51:GOSUB 65400
60210 Z= TM+ 62:AD= TM+ 55:GOSUB 65400
60220 Z= TM+ 69:AD= TM+ 60:GOSUB 65400:CLEAR 50:GOTO 8
65400 ZZ= INT (Z/ 256):POKE AD,Z- 256* ZZ:POKE
    AD+ 1,ZZ:RETURN
65410 ER= 32940:TM= 256* PEEK (ER+ 1)+ PEEK (ER):RETURN

```



# COMPUCOLOR COLUMN

I. ~~APC V. 2.# 5 DEC 81~~

II

by Ralphe Neill of the Victorian Users' Group

III - V2 N25 DEC 81 APC 30 PRINTING - WATSON/NEWMAN

This is only the third Compucolor Column to appear in APC, but already enough interest has been aroused to make sure that the Column is here to stay.

There has been contact between Australian users in Queensland, NSW, WA and Victoria and in future columns I'll be looking at some of the work that has been done by the various groups.

We've also heard from the Users' Groups in Rochester, New York and Canada. The immediate result is that we have some stunning new programmes in our library - but there's more to come.

The Canadians run the "Forum" newsletter and it's really first rate. You can get a year's subscription by sending a cheque for US\$25 to:

Canadian Compucolor Users' Group,  
21 Dersingham Crescent,  
Thornhill,  
Ontario,  
CANADA L3T 4P5

Another Canadian offering to keep in mind is an all-new Basic Editor known as "THE" Basic Text Editor.

In the "EDIT" mode the editor functions as a complete screen editor. The programme can be reviewed a page at a time or scrolled up and down.

It also combines the functions of "MERGE" and "RENUM" with all operations carried out in RAM - no worries about enough disk space to handle all of the read/write operations.

I've seen a demonstration of the new editor and it's brilliant.

We are trying to arrange some kind of

royalty agreement to make the programme available locally. In the meantime, you can get it by sending US\$49.95 to Quality Software Associates at the address printed above for the Newsletter.

Add US\$5.00 for air-mail postage if you're impatient.

## COMPUCOLOR GRAPHICS

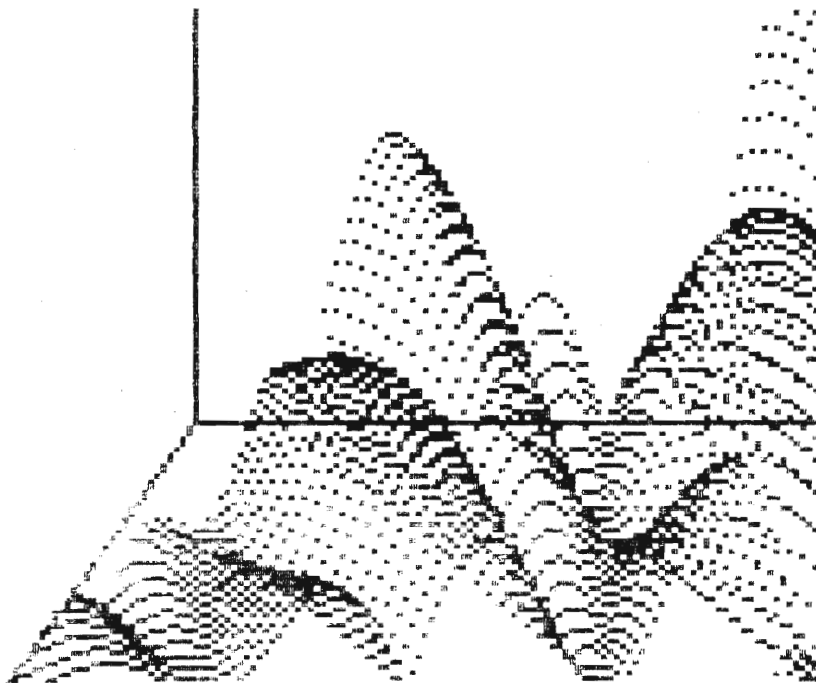
In the last Column I promised more on the book "Programming Colour Graphics for Compucolor/Intecolor

Computers" by Tony Watson and John Newman of the WA Users' Group.

I've had a copy of the book for a little while now and can honestly recommend it to you.

It provides a wealth of information on the CCI's unique graphics capabilities that, with a little study, should enable every user to get the best out of his machine.

The text is liberally sprinkled with demonstration programmes such as the one for drawing a 3-D plot reproduced on this page.



```
10 REM 3-D DRAWING PROGRAMME BY TONY WATSON AND JOHN NEWMAN
20 PLOT 12,6,3,2,0,0,242,30,50,30,127,30,50,127,50,255,6,6,3,64,
0,2
30 FOR I=0 TO 50 STEP 2 : FOR J=I TO 127
40 Z=J : X=I+J : Y=.5*X*SIN(X/10)+COS(Z/20) : Y=ABS(Y)
50 PLOT J,Y+I : NEXT J : NEXT I
60 PLOT 255,6,0,8,27,4 : PRINT "SAVE SCREEN.DIS 6000-7000" : PLO
T 27,27,6,6,8
```



```

FF3C 22D680      SHLD      80D6H      ;RESTORE 'END-OF-SOURCE' PTR
FF3F 2172FF      LXI       H,MSG01
FF42 CD4DFF      CALL      OSTR
FF45 3E45        MVI       A,45H      ;'E' EXIT TO BASIC
FF47 C34AFF      JMP       EXIT
FF4A C30000      EXIT:    JMP       0000H ;TO BASIC
FF4D C30000      OSTR:    JMP       0000H ;SEND A LINE TO SCREEN
FF50 3A0100      SETUP:   LDA       0001H
FF53 FE6C        CPI       6CH
FF55 C265FF      JNZ       VER879
FF58 213A05      VER678:  LXI       H,053AH ;EXIT
FF5B 224BFF      SHLD     EXIT+1
FF5E 21F433      LXI       H,33F4H      ;OSTR
FF61 224EFF      SHLD     OSTR+1
FF64 C9          RET
FF65 212024      VER879:  LXI       H,2420H ;EXIT
FF68 224BFF      SHLD     EXIT+1
FF6B 212A18      LXI       H,182AH      ;OSTR
FF6E 224EFF      SHLD     OSTR+1
FF71 C9          RET
FF72 110E0D0A    MSG01:  DB      17,14,13,10,'BASIC POINTERS RESTORED!',18
FF76 42415349
FF7A 4320504F
FF7E 494E5445
FF82 52532052
FF86 4553544F
FF8A 52454421
FF8E 12
FF8F 0F0D0A0A    DB      15,13,10,10,239
FF93 EF
FF94 (FEFF)      END      START      0 ERRORS

```

## NOW CP/M ON COMMODORE

### WE PRESENT THE SOFTBOX

Simply by plugging the SOFTBOX into the Commodore IEEE Port and loading the CP/M disk, the Commodore will run under the world's most popular disk operating system - CP/M. No internal connections or modifications to the Commodore are required.

The SOFTBOX allows you access to almost all microcomputer languages, including CIS COBOL, FORTRAN, CP/M PASCAL, APL, PL/1, CORAL 66 and Extended Microsoft BASIC (both interpreter and compiler), as well as the vast number of commercial accounting suites currently available under CP/M. Business applications and word processing packages designed to work with specific terminals (e.g. Lear Seigler ADM3A, Televideo 9122 or Hazeltine 1500) will need no modifications to work with the Commodore screen as the SOFTBOX allows the Commodore screen to emulate any of these devices.

#### Specifications:-

- \*\* Full 60K byte RAM.
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- \*\* Z80 CPU running at 4Mhz with no wait states.
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- \*\* Diskette containing CP/M system with utilities and full documentation included.  
Please specify which disk format (3040/4040/8050) when ordering.
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When ordering your SOFTBOX and software, please ensure that you specify the correct model number of your Commodore CPU and Disk Drive.

PRICE: \$1290.00 (ex Tax).



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614-1551.

# COMPUCOLOR COLUMN

by Ralphe Neill of the Victorian Users' Group

## 4th COLUMN?

By now the exciting news must have started filtering through to many of you that the Compucolor II is no longer an orphan-child!

Software and hardware support for the Compucolor and Intecolor micro-computers is now assured!

For those of you who haven't heard the details, here's a brief run-down of what's been happening.

Intelligent Systems Corp. decided last year to stop making the CCII partly because of the new FCC regulations on RFI and partly because they were losing money on the deal.

ISC had finally discovered what we knew all along – the CCII was grossly under-priced when compared with other micros fitted with the options necessary to bring them up to the CCII's capabilities.

All was gloom! The new ISC product – the Intecolor 3651 – was essentially software-compatible with the CCII, but we didn't have a great deal of faith in the ISC's ability to produce the goods.

Now all that has changed with a new company called Intelligent Computer Systems – ICS for short (confusing isn't it?).

It seems that ICS will effectively be ISC's main marketing arm and will be handling all Compucolor and Intecolor software and hardware.

The software will include that from ISC itself as well as the top-quality products coming in from users – things like COMP-U-WRITER and a machine language data-base that does searches in seconds rather than minutes!

There's not likely to be any hardware from ISC for the CCII – but ICS will be handling products developed by users.

## LOCAL DISTRIBUTION

All of the above would be rather pointless if there wasn't also some support in Australia, but a national distributor

and a Victorian agent had already been appointed at the time of writing. The national distributor is: –

Color Computer Systems Pty Ltd.,  
58 Valley Road,  
Hornsby, NSW 2077

The man to speak to there is Tony Sforcina who has already brought thousands-of-dollars-worth of software into the country and Victorian users can get it at: –

Panatronics Pty Ltd.,  
691 Whitehorse Road,  
Mont Albert, Vic. 3127.

The General Manager of Panatronics is Neil Brandie – well-known to Victorian users through his enthusiastic help and support.

By the time this appears, other agents will probably have been appointed and I'll give you the details in the next column.

## THE COMPUCOLOR III

No, that's not a misprint – there could well be a Compucolor III appearing on the market soon.

It is to be built in Italy under licence from ISC. It will support 8 inch drives and it seems that it will be similar in performance to the Intecolor 3651.

Nothing more than that is known at the moment, but I'll keep you informed.

If nothing else, it's a further indication that our favourite micro is far from dead!

## QUICK TIPS

The tip in the last Compucolor Column about using (ESCAPE) (E) after hitting (ESCAPE) (W) by mistake has already saved quite a few programs – so here's a few more tips that, if not quite as useful as the last one, will at least save a few key-strokes.

Did you know that, when in FCS, you can use keys other than RETURN

to initiate a command?

Try ERASE PAGE when listing a DIR to a cluttered screen. You can also use A7 ON and A7 OFF.

And hitting the down-arrow instead of RETURN after entering DIR will list only the directory header – useful if you just want to identify a disk that has a lot of directory entries.

## "AUSSI" GRAPHICS

This column's program listing gives a quite spectacular display. It comes from Mr D. Niven of the NSW Users' Group.

The DATA statements do look a little daunting but the results will be well worth the effort.

And, as the display it initially produces is a cleaned-up version of the map of Australia from an early Australian ColorCue, you could save considerable time by using those earlier DATA statements if you've saved them.

## THE AUSTRALIAN SOURCE

The Australian Source will be operating by the time you read this. Initially, it's in Melbourne only but will be operating in Sydney within three months and then in other capital cities at further three-month intervals.

You may have noticed from the advertisements that the Compucolor II is not one of the "approved" systems.

But don't worry too much – what it means is that there will be no programs available specifically designed for the CCII as there will be for the "approved" micros.

All of the other facilities of the Australian Source will, of course, be available and there's nothing to stop us building up our own libraries with world access.

I'll put my Australian Source account number in the next Column so you can leave messages for me – in the meantime, as ever, you can write to me care of APC.

```

100 REM "AUSSI" BY D. NIVEN
120 PLOT 6, 2, 15, 12 : INPUT "ENTER COLOUR-CODE (1-255) FOR PLOT 6
, X STATEMENT: "; YY
130 PLOT 6, YY, 12, 3, 64, 0 : I=180 : HI=127 : LO=63 : FOR J=1 TO I
140 READ X0, Y, X1 : PLOT 2, 250, X0, Y, X1, 255 : NEXT J
150 DATA 20, 20, 24, 19, 21, 26, 18, 22, 26, 19, 23, 27, 20, 24, 28
160 DATA 20, 25, 30, 19, 26, 31, 19, 27, 31, 19, 28, 34, 18, 29, 35
170 DATA 18, 29, 35, 17, 30, 37, 17, 31, 39, 17, 32, 39, 16, 33, 39
180 DATA 16, 34, 40, 15, 35, 41, 15, 36, 44, 14, 37, 45, 14, 38, 46
190 DATA 13, 39, 49, 13, 40, 51, 12, 41, 112, 12, 42, 113, 11, 43, 113
200 DATA 58, 40, 111, 62, 39, 111, 63, 38, 72, 73, 39, 111, 64, 38, 71
210 DATA 72, 38, 110, 64, 37, 71, 72, 37, 110, 64, 36, 71, 74, 36, 109
220 DATA 65, 35, 70, 74, 35, 108, 66, 34, 69, 74, 34, 108, 66, 33, 68
230 DATA 73, 33, 107, 67, 32, 67, 73, 32, 107, 73, 31, 73, 72, 30, 72
240 DATA 72, 29, 72, 74, 31, 106, 75, 30, 106, 75, 29, 76, 77, 29, 105
250 DATA 75, 28, 75, 78, 28, 105, 79, 27, 104, 79, 26, 104, 79, 25, 103
260 DATA 79, 24, 103, 79, 23, 103, 80, 22, 102, 80, 21, 102, 81, 21, 102
270 DATA 81, 20, 100, 82, 19, 90, 92, 19, 100, 83, 18, 89, 92, 18, 98
280 DATA 84, 17, 87, 92, 17, 95, 93, 16, 94, 85, 16, 86, 11, 44, 114
290 DATA 10, 45, 114, 10, 46, 114, 9, 47, 114, 9, 48, 114, 8, 49, 115
300 DATA 8, 50, 115, 8, 51, 9, 11, 51, 116, 7, 52, 8, 11, 52, 115, 10, 53, 115
310 DATA 10, 54, 115, 9, 55, 114, 9, 56, 114, 8, 57, 114, 8, 58, 114
320 DATA 8, 59, 115, 7, 60, 115, 7, 61, 115, 8, 62, 115, 8, 63, 115
330 DATA 7, 64, 114, 7, 65, 114, 7, 66, 114, 7, 67, 7, 9, 67, 113, 10, 68, 113
340 DATA 10, 69, 112, 11, 70, 112, 12, 71, 111, 12, 72, 111, 13, 73, 110
350 DATA 13, 74, 110, 14, 75, 109, 14, 76, 109, 16, 77, 110, 18, 78, 110
360 DATA 19, 79, 106, 20, 80, 106, 21, 81, 105, 22, 82, 105, 24, 83, 104
370 DATA 25, 84, 104, 26, 85, 104, 26, 86, 103, 27, 87, 102, 27, 88, 102
380 DATA 28, 89, 101, 28, 90, 100, 29, 91, 99, 29, 92, 98, 29, 93, 97
390 DATA 29, 94, 30, 32, 94, 97, 30, 95, 30, 33, 95, 96, 33, 96, 95
400 DATA 32, 97, 95, 32, 98, 95, 35, 99, 76, 80, 99, 94, 35, 100, 74
410 DATA 82, 100, 94, 35, 101, 72, 82, 101, 94, 36, 102, 71, 83, 102, 93
420 DATA 36, 103, 71, 83, 103, 93, 36, 104, 69, 83, 104, 93, 36, 105, 46
430 DATA 50, 105, 68, 83, 105, 93, 37, 106, 42, 49, 106, 67, 83, 106, 93
440 DATA 39, 107, 40, 48, 107, 65, 84, 107, 93, 48, 108, 64, 83, 108, 92
450 DATA 49, 109, 64, 83, 109, 91, 49, 110, 65, 83, 110, 89, 49, 111, 66
460 DATA 83, 111, 90, 50, 112, 66, 83, 112, 87, 50, 113, 66, 84, 113, 87
470 DATA 51, 114, 67, 83, 114, 87, 55, 115, 67, 83, 115, 87, 57, 116, 60
480 DATA 83, 116, 86, 84, 117, 86, 84, 118, 85, 84, 119, 85
490 DATA 85, 11, 87, 93, 11, 94, 85, 10, 94, 86, 9, 94, 87, 8, 93
500 DATA 87, 7, 92, 88, 6, 91, 88, 5, 91, 89, 4, 90
510 PLOT 30, 2, 246, 0
520 FOR Q=0 TO HI : PLOT Q, HI : NEXT
530 FOR Q=HI TO 0 STEP -1 : PLOT Q, HI : NEXT
540 FOR Q=0 TO HI : PLOT 246, 0, Q, HI, 250, 0, Q, HI : NEXT
550 PLOT 250, 0 : FOR Q=0 TO HI : PLOT Q, HI : NEXT
560 PLOT 246, 0 : FOR Q=LO TO 0 STEP -1
570 PLOT Q, HI, HI-Q, HI : NEXT
580 PLOT 250, 0 : FOR Q=LO TO 0 STEP -1
590 PLOT Q, HI, HI-Q, HI : NEXT
600 FOR Q=0 TO HI
610 PLOT 246, 0, Q, HI, HI-Q, HI, 250, 0, Q, HI, HI-Q, HI : NEXT
620 PLOT 246, 0 : FOR Q=0 TO LO : PLOT Q, LO, HI-Q, LO : NEXT
630 PLOT 250, 0 : FOR Q=0 TO LO : PLOT Q, LO, HI-Q, LO : NEXT
640 PLOT 246, 0 : FOR Q=0 TO HI : PLOT Q, HI : NEXT
650 FOR Q=0 TO LO : PLOT Q, LO, HI-Q, LO : NEXT
660 PLOT 250, 0 : FOR Q=HI TO 0 STEP -1 : PLOT Q, HI : NEXT
670 PLOT 250, LO+1 : FOR Q=0 TO HI : PLOT Q, HI : NEXT
680 FOR Q=127 TO 0 STEP -1
690 PLOT 246, 0, Q, LO, 246, LO+1, HI-Q, HI, 250, LO+1, Q, HI
700 PLOT 250, 0, HI-Q, LO : NEXT
710 FOR Q=LO TO 0 STEP -1
720 PLOT 246, 0, Q, HI, HI-Q, HI, 250, 0, LO-Q, HI, HI-LO+Q, HI : NEXT
730 PLOT 255 : GOTO 510

```

— INSTRUCTIONS —  
For "ONE BUTTON" PLOT CONTROL

With this modification to your CCII's standard or extended keyboard, you can have all the special plot control functions that the "Delux" keyboard has. The instructions on all the plot functions (FO-F15) are located in the large programming manual for your COMPUCOLOR II computer.

There are two charts located in this pamphlet for the purpose of indicating all key codes in ASCII and HEX.

The only parts needed for this modification is a single pole double throw (SPDT) momentary push button, three (3) 12" pieces of wire and a little solder.

To operate this control button, enter CRT mode and press (Control-B), then look up proper mode in figure 4. For example, VECT. INC. - 240, now press new plot control button and at the same time press the letter "P", then release and continue from instructions in your manual. That's all there is to it.

This modification WILL NOT harm your CCII Computer system. However I feel that it is important for you to realize that this modification may VOID the warranty on your keyboard and/or computer from COMPUCOLOR.

This is a very simple procedure. First, referring to Figure 2, brake the etch on the circuit board where indicated by the word "cut", then solder a piece of wire 12" long to the trace marked (A) to the normally closed side of the switch. Then solder another 12" piece of wire to the trace marked (B) and to the center (common) of your switch. Now for the last step. Cut a 12" piece of wire and solder it to the trace marked (C) and then to the normally open side of the switch.

Mount your new switch in a location about 1.5" above the blue color button and about 1.5" from the (AUTO) button. There is plenty of room for the button and the wires.

From: BUFFALO COMPUCOLOR USERS GROUP

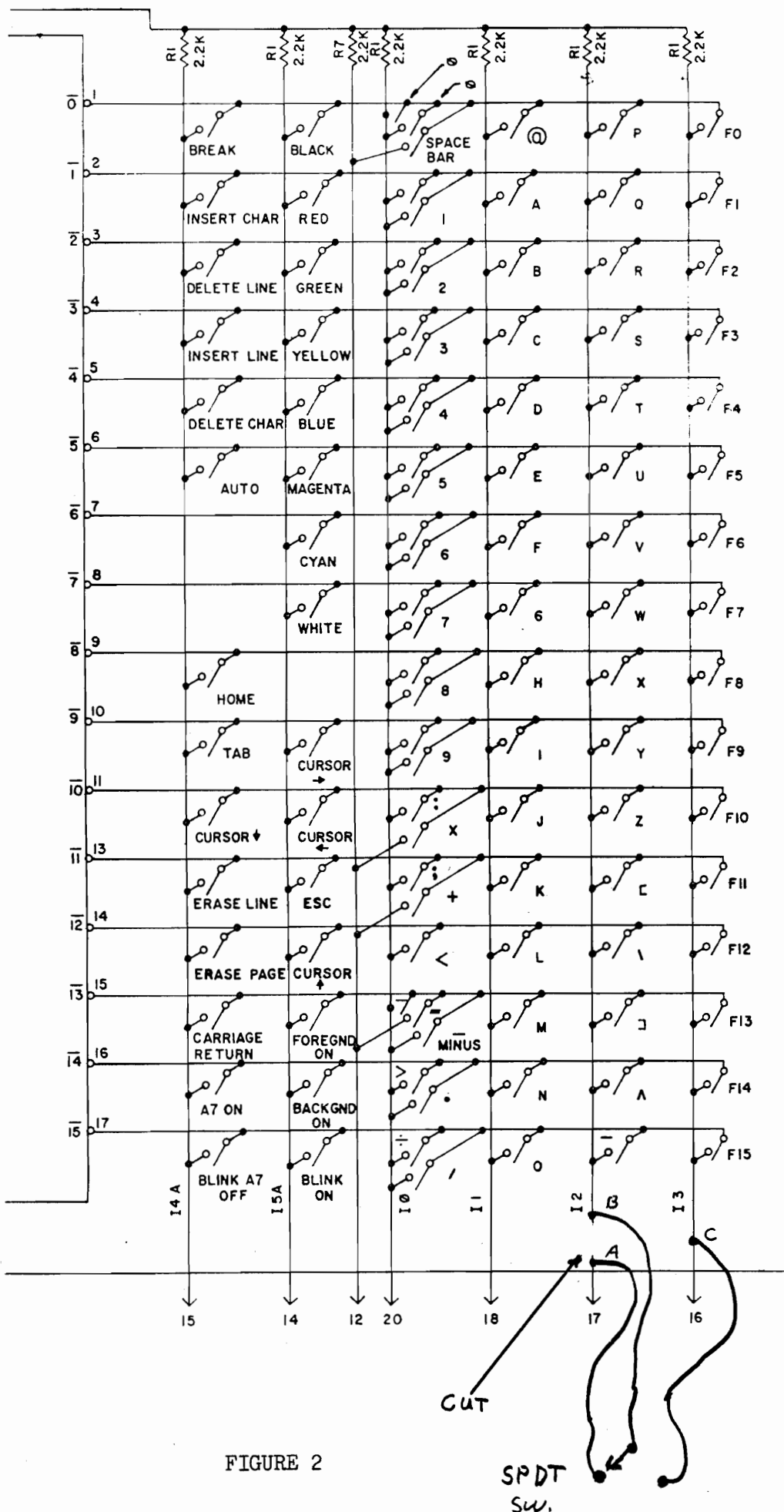


FIGURE 2

0	1	2	3	4	5	6	7
0	1	2	3	4	5	6	7
1	2	3	4	5	6	7	8
2	3	4	5	6	7	8	9
3	4	5	6	7	8	9	0
4	5	6	7	8	9	0	1
5	6	7	8	9	0	1	2
6	7	8	9	0	1	2	3
7	8	9	0	1	2	3	4
8	9	0	1	2	3	4	5
9	0	1	2	3	4	5	6
10	1	2	3	4	5	6	7
11	2	3	4	5	6	7	8
12	3	4	5	6	7	8	9
13	4	5	6	7	8	9	0
14	5	6	7	8	9	0	1
15	6	7	8	9	0	1	2

FIGURE 1

**INSTRUCTIONS FOR PLOT CONTROL BUTTON**

- 1) Place Computer in CRT Mode
- 2) Place Computer in Plot Mode "Ctrl B"
- 3) Determine Proper Key from chart at right.
- 4) Depress Plot Control Button at left and selected Key at the same time.

Keys from "p" to " " are Plot functions 240 to 255. (FO to F15)

Designed By BCUG of WNY

FIGURE 3

Key	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Standard	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
Shift	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
Control	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Key	P	Q	R	S	T	U	V	W	X	Y	Z	ε	ι	κ	λ	μ
Standard	30	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
Shift	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
Deluxe	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255
Key	Vect.	Vect.	Vect.	Y Bar	Y Bar	Y Bar	Y Bar	X Bar	X Bar	X Bar	X Bar	Point	Point	Point	Char.	Plot.
Vol.	inc.	Y1	X1	Inc.	YM	X	YC	Inc.	XM	Y	XO	Inc.	Y	X	Plot	Esc.
Control	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Key	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
Standard	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
Shift	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47

FIGURE 4

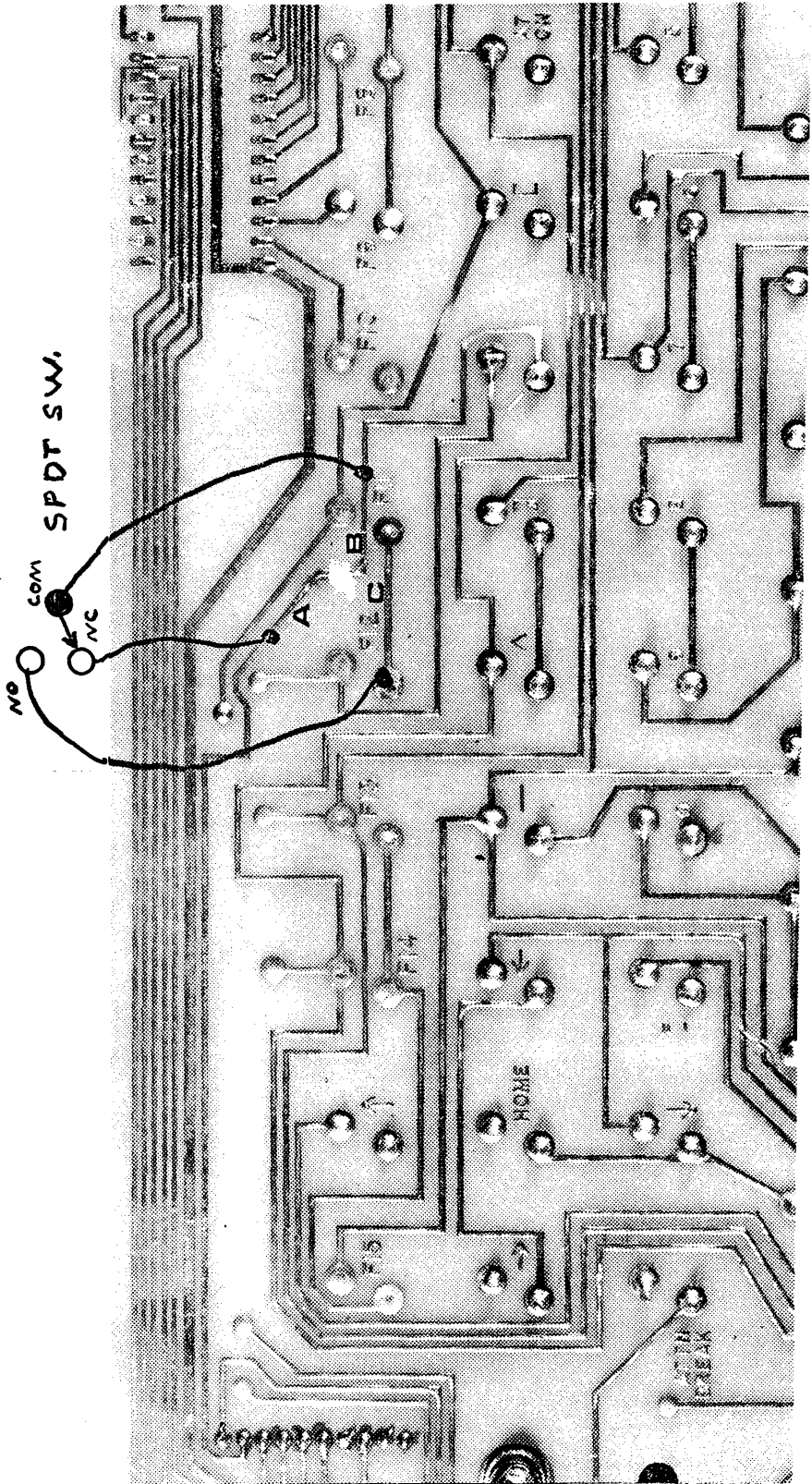


FIGURE 5



INSTRUCTIONS FOR PLOT CONTROL BUTTON

- 1) Place Computer in CRT Mode
- 2) Place Computer in Plot Mode "Ctrl B"
- 3) Determine Proper Key from chart at right.

4) Depress Plot Control Button at left and selected Key at the same time.

Keys from "P" to "O" are Plot functions 240 to 255. (F0 to F15)

Designed By BCUG of WNY

Key	●	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Standard	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
Shift	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
Control	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Key	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	~	-
Standard	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
Shift	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
Deluxe	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255
Key Mod.	Vect. Inc.	Vect. Y1	Vect. X1	Y Bar Inc.	Y Bar YM	Y Bar X	Y Bar Y0	X Bar Inc.	X Bar XM	X Bar Y	X Bar X0	Point Inc.	Point Y	Point X	Char. Plot	Plot. Esc.
Control	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Key Standard	0	1	2	3	4	5	6	7	8	9	+	1	<	=	>	7
Shift	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
Shift	32	33	34	35	35	37	38	39	40	41	42	43	44	45	46	47

```

1 REM ***** PROGRAM TO PLOT A FUNCTION ON SCREEN *****
2 PRINT:PRINT"THIS PROGRAM WILL PLOT A FUNCTION DEFINED IN STATEMENT 100"
3 PRINT:PRINT"WE HOPE THAT YOU WILL ENJOY USING THIS ABS MATH PLOTTER"
4 PRINT:PRINT"THANK YOU FOR YOUR INTEREST IN AMERICAN BUSINESS SYSTEMS, INC."
5 PRINT:PRINT"PLEASE CALL ON US SOON SO THAT WE MAY SERVE YOUR COMPUTER NEEDS"
6 PRINT:PRINT"THE PROGRAM HAS FNY(X)=SIN(X/P2)/(X/P2) IN STATEMENT 10 FOR DEMO.
PURPOSE ONLY"
7 PRINT:PRINT"MIN. AND MAX. VARIABLE ANGLE VALUES MUST BE ENTERED IN RADIAN$"
11 PRINT:PLOT15
12 P1=3.14159:P2=180/P1
100 DEF FNY(X)=SIN(X/P2)/(X/P2)
120 PRINT"IS THE FUNCTION TO BE PLOTTED IN LINE 100?. PLEASE ANSWER YES OR NO" PR
NT
135 PLOT 29: PLOT 23
130 INPUT T$: PRINT : PRINT
135 T$=LEFT$(T$,1): PRINT : PRINT
140 IF T$="Y" GOTO 400
150 PLOT 29: PLOT 17
200 PRINT "ENTER A FUNTION AND RE-RUN."
210 PRINT
220 PRINT"EI: 100 DEF FNY(X)=SIN(X)
230 PRINT " RUN"
240 GOTO 3020
300 PRINT"ENTER RANGE OF X (SMALLEST X, LARGEST X).",
410 INPUT X1,X2
415 PRINT
420 PRINT"ENTER RANGE OF Y (SMALLEST Y, LARGEST Y).",
430 INPUT Y1,Y2
500 X0=10
510 Y0=10
520 I1=160-X0-10
530 I2=190-Y0-10
540 X3 = I1/(X2-X1)
550 Y3 = I2/(Y2-Y1)
590 REM
1000 PLOT 13: REM CLEAR SCREEN
1005 PLOT 29: PLOT 17: REM AXI RED
1010 PLOT 2: REM SET PLOT MODE
1100 REM PLACE X AXIS
1110 PLOT 250
1120 PLOT X0: PLOT Y0: PLOT X0+I1
1130 PLOT 255: PLOT 29: PLOT 22: PLOT 2: PLOT 250: PLOT X0
1140 FOR I=1 TO 10: PLOT Y0+I*17: PLOT X0+I1: NEXT I
1150 PLOT 255: PLOT 29: PLOT 17: PLOT 2
1200 REM PLACE Y AXIS
1210 PLOT 246
1220 PLOT Y0: PLOT X0: PLOT Y0+I2
1224 PLOT 255: PLOT 29: PLOT 22: PLOT 2: PLOT 246: PLOT Y0
1226 FOR I=1 TO 10: PLOT X0+I*14: PLOT Y0+I2: NEXT I
1230 PLOT 255: PLOT 29: PLOT 19: REM AXIS # 'S IN YELLOW
1240 PLOT 3: PLOT 5: PLOT 46: PRINT XI

```

## THE CCII POWER SUPPLY

Ken Winder

Second to the disk drive the CCII power supply has come in for the most blame for a host of troubles, some of the criticism is justified, sometimes the power supply gets the blame for unrelated faults.

First one must realise that the power supply on the analogue chassis is a type known as a switch-mode supply. In this type of supply there is an oscillator which is used to drive and control a power-transistor switch feeding a transformer, the output of the transformer is rectified and is then distributed to the various circuits as required. This is the simple explanation.

In order to understand the various parts and functions of the switch-mode system used in the CCII you need to study the circuit, the essentials are shown on the circuit drawing. The first point is that the circuit converts direct current to direct current at another level (or levels). The original supplies to operate the circuit are obtained from the fifty cycles per second mains (60 in USA). This mains supply is from the power unit attached to the back of the CCII shell, this is a simple unit using a rectifier and a transformer followed by reservoir capacitors, the 150 volt line is also protected by a fuse, this should be a half ampere delay type, 3AG size.

The 150 volt supply is taken to the collector of the Q5 transistor, the 15 volt supply is taken to the two integrated circuits used for control and drive. It is important to note that the 150 volt supply is directly connected with the 240 volt mains, whereas the 15 volt supply is not. The two supplies are not connected together except by magnetic fields. The integrated circuit SG3524, is a switch-mode regulator, and the function of the UA3 IC is to provide the drive to the control transistor Q5. Pins 6 and 7 of UA3 have the frequency determining components connected to them, a 3.3k resistor and a .01  $\mu$ f capacitor, this gives in theory a frequency of about 30 kilocycles/sec., in practice it is nearer 20kHz, this being due to the effects of synchronisation pulses which are inserted into the system using the transistor Q10, this keeps the two ICs at the same frequency and in step with the computer operations to minimise interference.

From pin 16 of the IC there comes a 5 volt reference level used by some circuitry outside the power supply, and it is also divided by the two 2.2k resistors from that pin to ground, the mid-point being taken to pin 2. Pin 2 is now at 2.5 volts and steady since the 5 volt origin is stabilised, the input to pin 1 of the IC comes from the 5 volt output line which provides power to the 5 volt rails of the logic board. Since this feed-back of output voltage is divided by two it must equal 2.5 volts and it is compared with the 2.5 volts on pin 2. If there is a difference, the internal pulse-width determining sections of the IC will act to bring the two voltages to the same level. The correction for minor differences and component tolerances is allowed for by making the 500 ohm R22 adjustable, this then is the trimpot which sets the 5 volt rail to the exact level required.

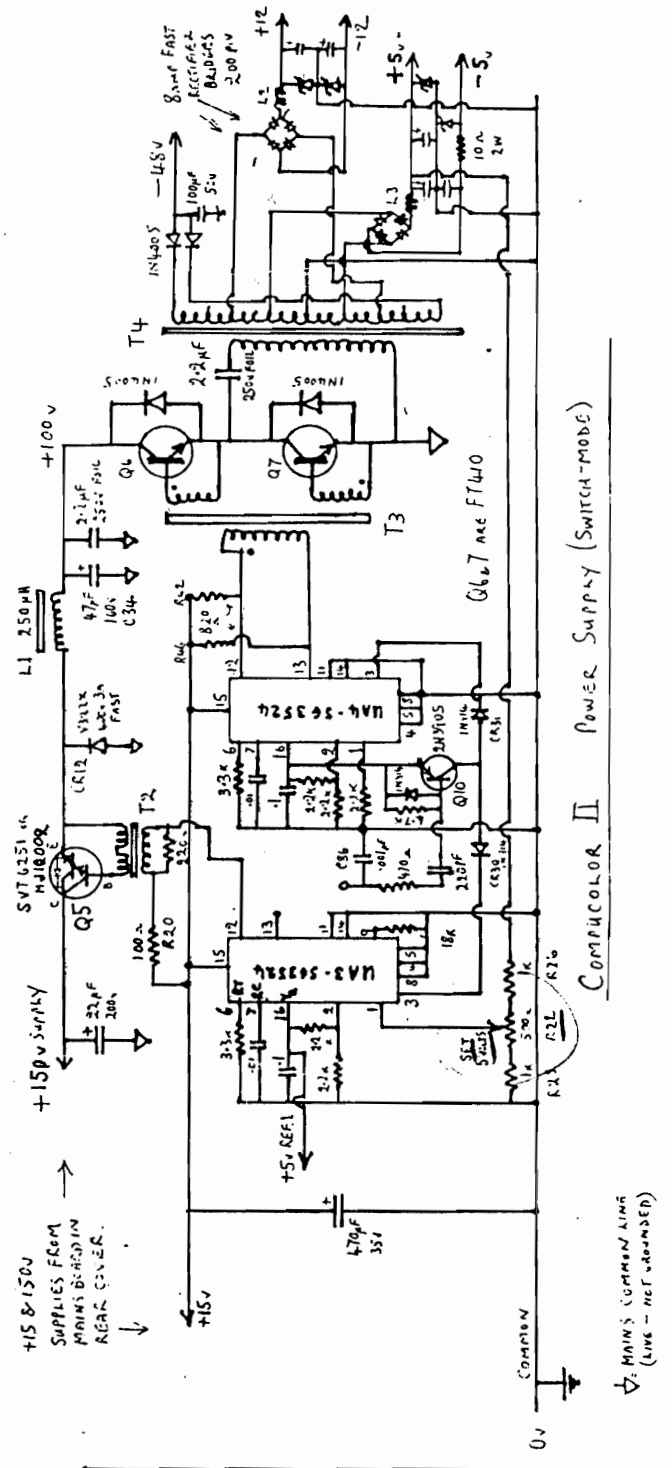
Next in the chain is the output path from pin 12 of UA3 which feeds pulses to the base of the power transistor Q5 in the 150 volt line. These pulses turn on the Q5

transistor through the coupling between windings of the T2 transformer, and so it allows current to pass through, energising L1 and bringing up the level of that line to about 100 volts, this is then fed to the transistors Q6 and Q7 which are connected in series with the following transformer being fed from the mid point between the two transistors. For the transfer of power the two Q6 and Q7 transistors have to be switched, this is done by the IC UA4. This IC UA4 operates in the same way that UA3 did with one difference, the output is always at maximum. Also because the IC has both of its outputs used the current in the primary of T3 is alternately reversed as the IC switches first one output pin and then the other to ground, this allows the current from the supply to flow via the 820 ohm resistor from +15 volts through the primary and the switching transistor in the IC. The current is limited to that passed by the value of 820 ohms. The resistor ending on the grounded pin merely passes current to ground without the flow performing any function. The current passed is well within the limits of the IC and so if need be there is still some room to increase the drive at this point. (To 470 ohms, R42 & R44).

When the primary of T3 is pulsed the pulses are passed into the bases of the two transistors Q6 and Q7, these are connected by polarising the windings so that only one can be on at any time, this is denoted by the dots at the winding ends. By this alternation the 2.2 mfd capacitor in series with the primary winding of T4 is alternately charged and discharged to pass current to T4. It is a characteristic of square-wave transformation that there is a fairly tight voltage relationship between primary and secondary, and, due to this if the primary is controlled the output will be also closely held to set values. For this reason the turns ratios of the output transformer will largely determine the output voltages to the various rails. The outputs are all derived from the one tapped winding, the centre being grounded for all supplies generated. We can therefore sense the level of the 5 volt rail and use this to control the total system.

One part of the system remains to be explained, this is the 150 volt line and the few components on the 100 volt side of the Q5 transistor. When Q5 is switched on it allows a pulse of current to be passed into the L1 coil since the coil resists pulsing and tries to smooth out the intermittent nature of the current the result is that the voltage and current as found at the Q6 collector is fairly steady though with some ripple. At the CR12 diode the current is really rough, as Q5 is turned off the current tries to keep flowing in L1 at a steady rate and if it were not for the presence of CR12 it would have no path open to it, so it passes into the diode to ground, this having the effect that stored energy in L1 produces a positive voltage at the Q6 end of L1 acting much like a flywheel in an electrical sense. Using the pulses from the supply line passed by Q5 and the stored energy of L1 the level at Q6 is maintained at about 100 volts and, of course the 47 mfd capacitor to ground also stores and smoothes this line. The addition of the 2.2 mfd capacitor across this same line is to provide high-frequency bypassing and transient reduction, electrolytic capacitors are not very good at high frequencies and so the 2.2 mfd is added. The two 2.2 mfd capacitors are wound-foil high-pulse rated types, if one is replaced it must be by one of the right type. The two diodes across the transistors Q6 and Q7 are to protect the

transistors against high pulse voltages developed by reason of the two transistors being switched off at the same time during part of the cycle. The maximum "on" time of the 3524 IC is 90%, this prevents overlap and in some circumstances this could be a disaster. The two diodes 1N4005 are ordinary low speed types, I believe they should be fast types, this is one place where costs appear to have been saved to no good purpose.



NO, IT IS NOT THE HUNCHBACK OF NOTRE DAME

The output circuits are fairly plain rectifiers and smoothing except for the inclusion of small filter chokes after the bridge rectifiers, also there are tantalum capacitors across the D.C. side to filter the high frequency ripple better, plus Zener diodes for safety in case of regulator breakdown. Safety Zeners are fitted to the logic board as protection in addition. The bridge rectifiers are fast types and should be replaced by fast ones if need be, the rating of the bridge is 8 amps, so they are conservatively rated, the other 1N4005 diodes in the transformer circuit should be fast types also as the entire rectification circuitry is at about 20kHz. The Transistors Q5, Q6 and Q7 are all high-frequency types, Q5 is a Darlington type with an inverse diode built in, so tests of this one may give you some funny results unless you know what to expect. The SG3524 IC is fairly easy to get, and there are alternative transistor types available in case of failures of the switch-mode transistors. The correct choice of replacements is most important.

#### PROBLEMS

There are several problems which have their origin in one particular feature of the circuit. The failure to do a boot-up reset is one, the collapsing, or shrinking and expanding of the display with the drive starting and stopping is another, and the failure to run on low mains voltages. All these complaints are symptoms of the power section being marginal. The major cause of this is that the two transistors Q6 and Q7 are too low in their current gain characteristics and when called on to deliver more current cannot do so as they are already being driven to their limit. The limit is when the base current is just enough to control the collector current being demanded. There are two solutions to this, one is cheap but not easy, the other is technically better and easy, but costs a little more. Since we are only talking about ten or twelve dollars it is not serious. The best and easiest way to cure this problem is to replace the two transistors Q6 and Q7 with suitable types having an appreciably higher gain, one type which generally gives good performance is the 2N3050, but - I generally test them for gain before using them, and if the gain is not at least twenty I put them aside for other jobs. I have serviced several sets with these troubles and the cure has been fully effective. It would not be hard to obtain a supply of suitable transistors with tested gain for this purpose. Why this inadequate performance was accepted by the makers is hard to understand, the FT410 is listed as having a minimum gain of 30 but this is not so, the Toshiba transistors used in this position are even worse with gains down to 10, and totally inadequate. These two transistors should also be fairly well matched, this being less important as the gain gets higher, and they have to be high-frequency types of at least 400 volts rating in a TO-3 case.

Another fault which has happened twice has been the burning across between tracks from the 150 volt to the 100 volt line, usually under one of the large capacitors. It was possible in one case to run the CCII with the Q5 transistor entirely removed from the machine! There was no regulation in this case, the voltage being held down by the safety Zener diodes on the boards. In some cases the replacement of a SG3524 IC appeared to make the CCII supply more sensitive to low mains voltage, this is also a manifestation of the low gain fault in the Q6/Q7 pair, the drive current from SG3524 ICs being subject to variations and affecting marginal systems.

The one warning you must not ignore about this type of supply is that it has direct connection with the mains, also do not "experiment", there is a lot of power available to cause havoc if you are careless. Do not say you were not warned.

I sometimes short the base of the scanning output transistor to its own emitter to kill the picture deflection when I want to make tests and waveform checks, using care and a well insulated clip-lead, and power off to connect and disconnect, I have no blow-ups in the scanning section. The drive to the line scan is not the same as a TV set, a TV set will keep on scanning with no signal, the CCII is triggered on each line by a pulse from the 5551 synchronising outputs, if no trigger is given the scan will not operate. It is almost impossible to check waveforms in the power supply, or anywhere else while the line deflection section is operating, due to the large high-intensity signals which fill the area around the analogue chassis.

Testing with a variac I find that the CCII will operate down to below 200 volt mains when it is fitted with transistors having suitable specifications. It must also be noted that if the run-on feature is fitted the drives will, for short times, be on together if you run two. This will load the power supply section even more than usual. Some minor screen shifting will always occur due to the slow response of the regulation circuit, there is some storage in various capacitors which will change too slowly to hide sudden fluctuations of the mains or loads.

In various versions of the CCII there are some circuit variations, I have not presented these as they affect the overall operation very little. In early versions only one 3524 was synchronised, in others different voltages may be produced from the section.

Perhaps this will help to reduce power supply troubles, the substitution of better performance types for Q6 and Q7 will work wonders.

```

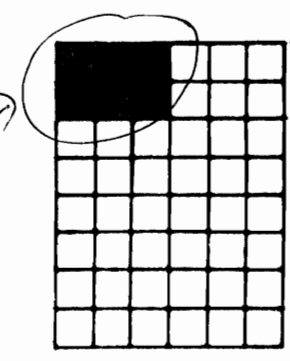
0 REM **** PROGRAM TO TRANSMIT A PAGE OF DATA IN COLOR TO
1 REM **** ANOTHER ISC TERMINAL OR ANY RS-232 TERMINAL.
3 REM
5 REM
10 A1=-25089:AB=-32768:AF=-25089
20 OUT6,255:OUT6,12:OUT6,13:OUT6,13:REM SET UP TERMINAL FOR TRANSMIT
30 PRINT"ARE WE GOING TO SEND TO ANOTHER ISC TERMINAL OR AN RS-232 PRINTER."
40 POKE A1,255:POKE A1+1,00:REM PUT FF IN 90FF AND 00 IN 9E00
45 PRINT:PRINT
50 INPUT" S FOR SCREEN AND P FOR PRINTER:";P$
60 IF P$<>"P" AND P$<>"S" THEN PLOT28:PLOT11:GOTO 50
200 FOR I= AB TO AF:OUT6,PEEK(I):IF P$="S" THEN NEXT I
210 C=C+1:I=I+1:IF C>79 THEN C=0:OUT6,10:OUT6,13:REM SEND CR LF @ LINE END.
220 NEXT I
230 END OF PROGRAM
240 :
250 REM ***** COMMENTS *****
260 :
270 REM THIS PROGRAM WILL SEND THE CONTENTS OF THE SCREEN TO ANY RS-232
280 REM DEVICE PROVIDING THE PROPER PARAMETERS ARE SET UP.
285 :
290 REM THIS PROGRAM HAS BEEN SET UP TO SEND THE WHOLE SCREEN BUT MAY
300 REM BE MODIFIED TO SEND ANY PART OF THE SCREEN.
320 END OFNOTES

```

```
1260 PLOT 3: PLOT 36: PLOT 46: PRINT "X - AXIS"
1265 PLOT 3: PLOT 70: PLOT 46: PRINT X2
1270 PLOT 3: PLOT 30: PLOT 47: PRINT "X INCREMENT = (";(X2-X1)/10;"")
1280 PLOT 3: PLOT 1: PLOT 44: PRINT Y1
1282 PLOT 3: PLOT 0: PLOT 26: Y5=(Y2-Y1)/10
1284 A$="( "; B$=")"; C$=STR$(Y5); D$=A$+C$+B$: PRINT D$
1285 PLOT 3: PLOT 0: PLOT 24: PRINT "AXIS"
1286 PLOT 3: PLOT 2: PLOT 22: PRINT "Y"
1350 PLOT 3: PLOT 1: PLOT 4: PRINT Y2
1375 PLOT 29: PLOT 20
1400 PLOT 3: PLOT 34: PLOT 0: PRINT "X - Y PLOT"
1500 PLOT 3: PLOT 1: PLOT 4
1900 PLOT 29: PLOT 23: PLOT 2: REM FUN. PLOTS IN WHITE.
2000 REM PLOT FUNCTION
2005 PLOT 253
2010 FOR X=1 TO 11: X5=(X/X3+X1): IF X5<>0 THEN 2030
2020 X5=.00001
2030 A=INT((FNY(X5)-Y1)*Y3+Y0)
2040 IF A>Y0+12 THEN 2100
2050 IF A<Y0 THEN 2100
2060 PLOT X+X0
2070 PLOT A
2080 PLOT 242
2100 NEXT X
3000 REM FINISHED
3010 PLOT 255
3015 PLOT 29: PLOT 21: REM CHANGES COLOR AT END.
3020 END
```

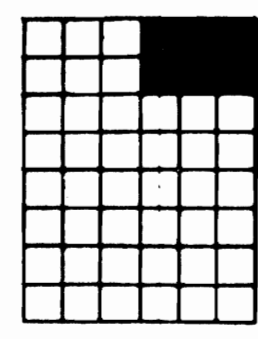
dot size in 6x8 character matrix

MI  
PLOT  
POINT  
SIZE  
(STD  
VERSION)



01 HEX

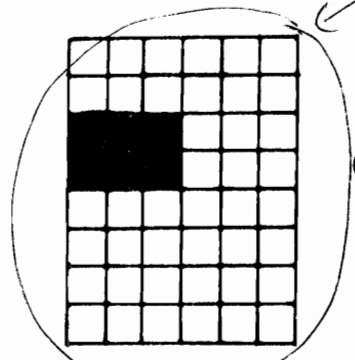
0 0 0 0 0 0 0 1



10 HEX

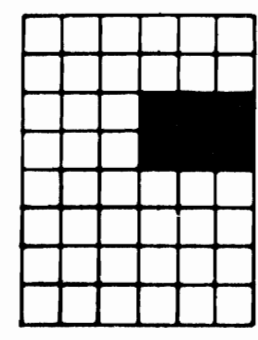
0 0 0 1 0 0 0 0

FORGROUNd  
COLOR SPEC  
DOWN TO  
0 NO CHARACTER  
POSITION



02 HEX

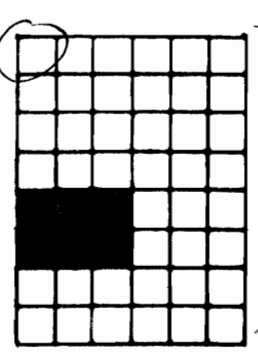
0 0 0 0 0 0 1 0



20 HEX

0 0 1 0 0 0 0 0

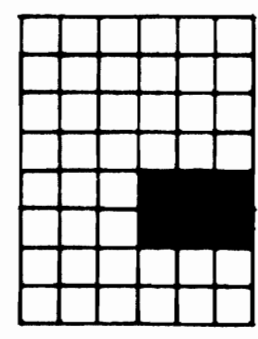
MINIMUM  
PLOT  
PL  
SIZE  
(HIGH  
RESOLUTION  
OPTION)



04 HEX

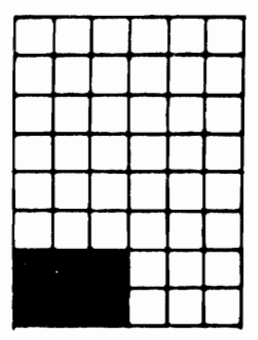
0 0 0 0 0 1 0 0

ONE 6x8 CHARACTER  
POSITION



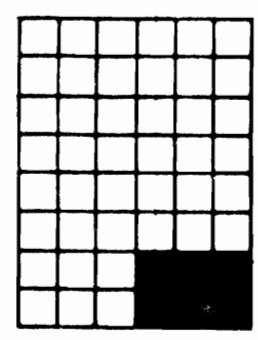
40 HEX

0 1 0 0 0 0 0 0



08 HEX

0 0 0 0 1 0 0 0

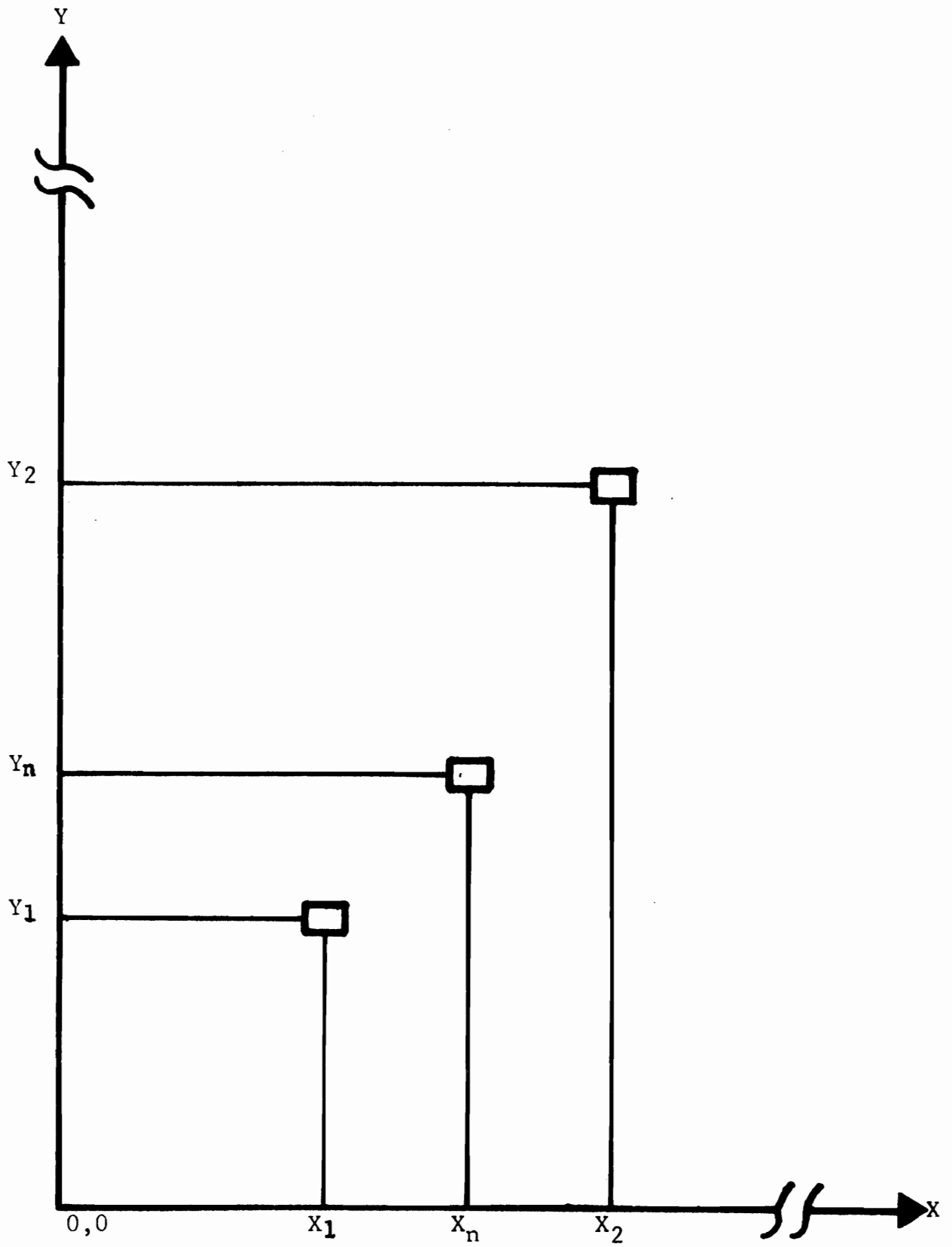


80 HEX

1 0 0 0 0 0 0 0

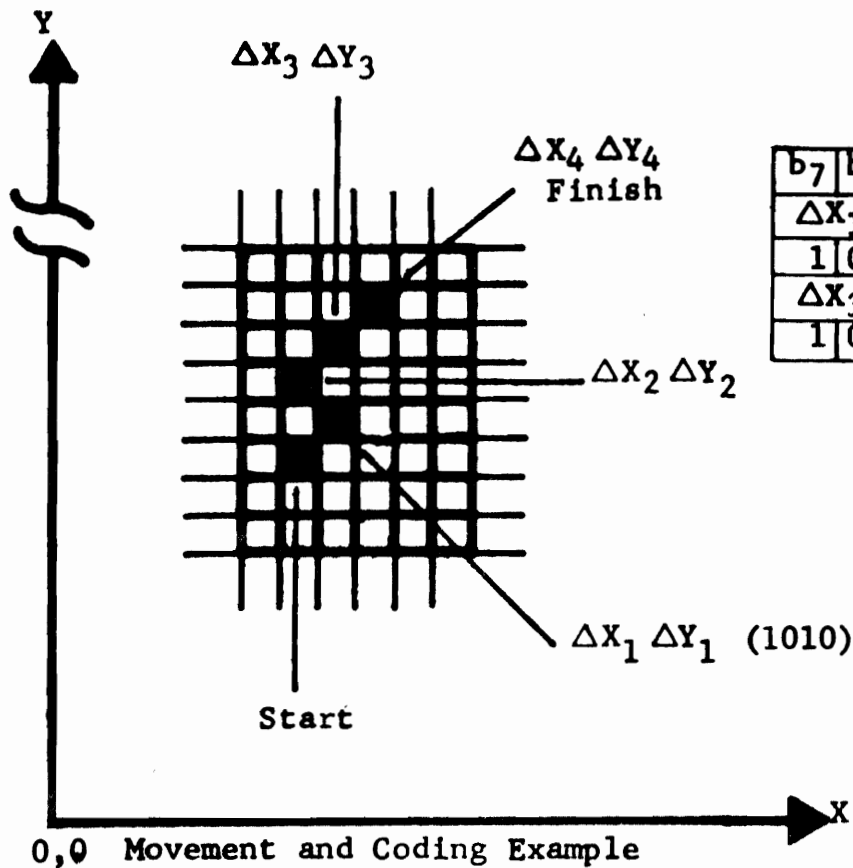
Note: Each of the above codes may be "ORed" for composite symbols.



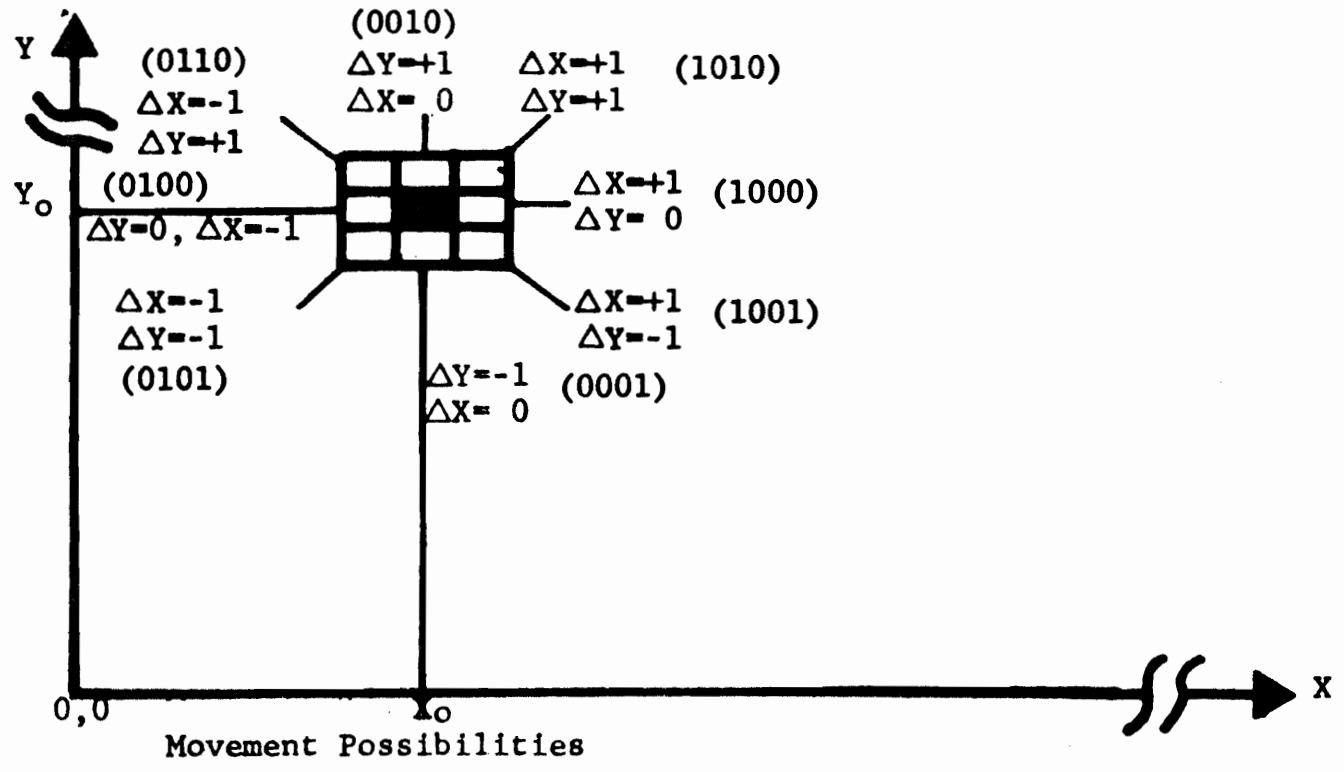


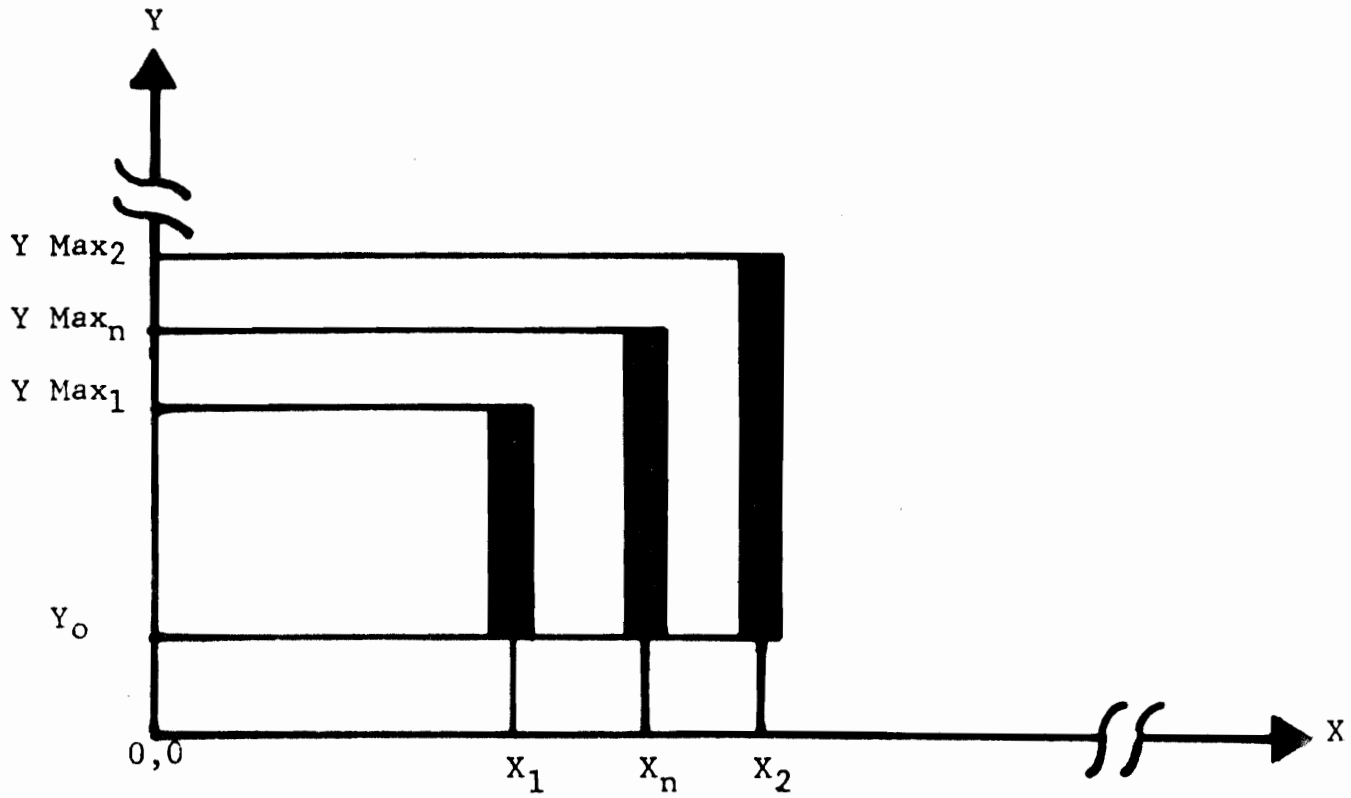
B-3

X POINT PLOT AND Y POINT PLOT

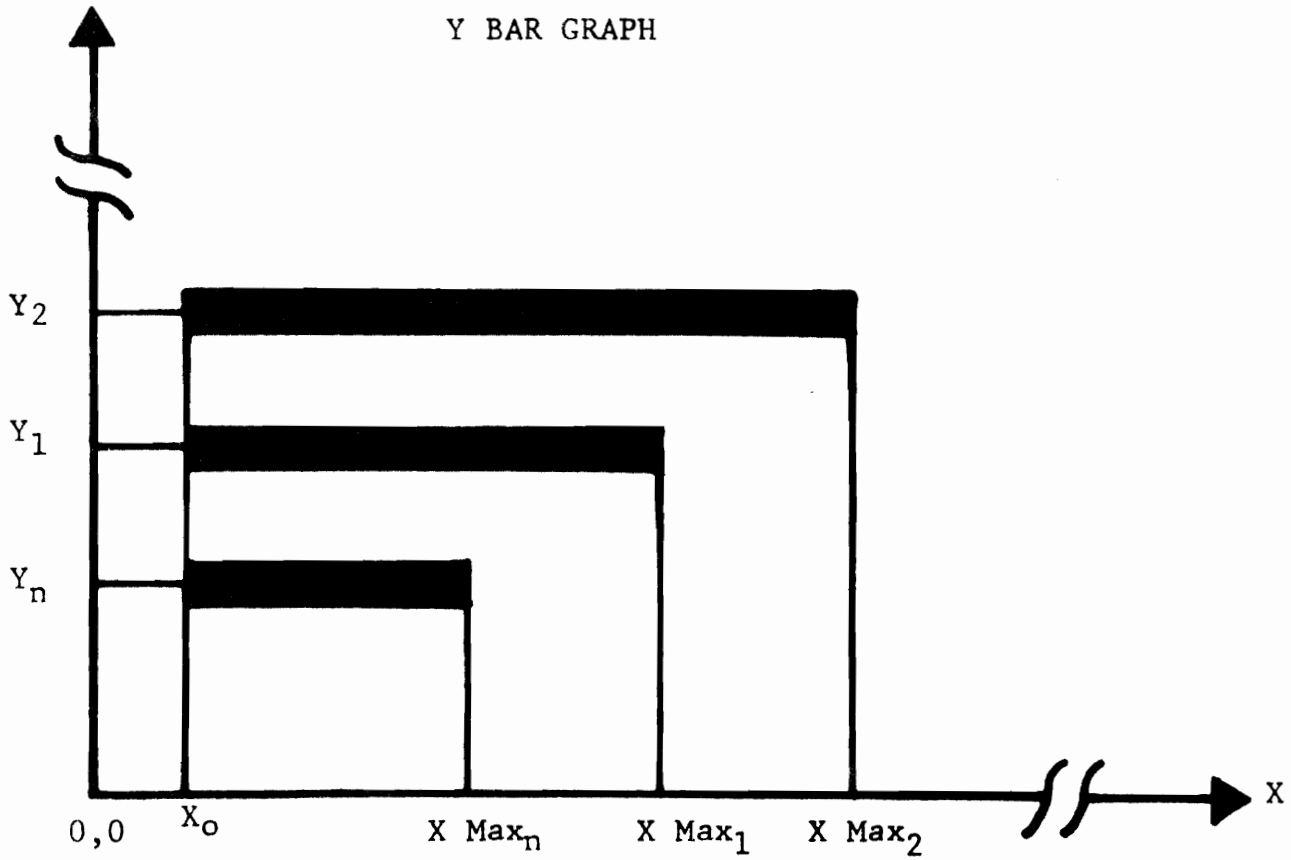


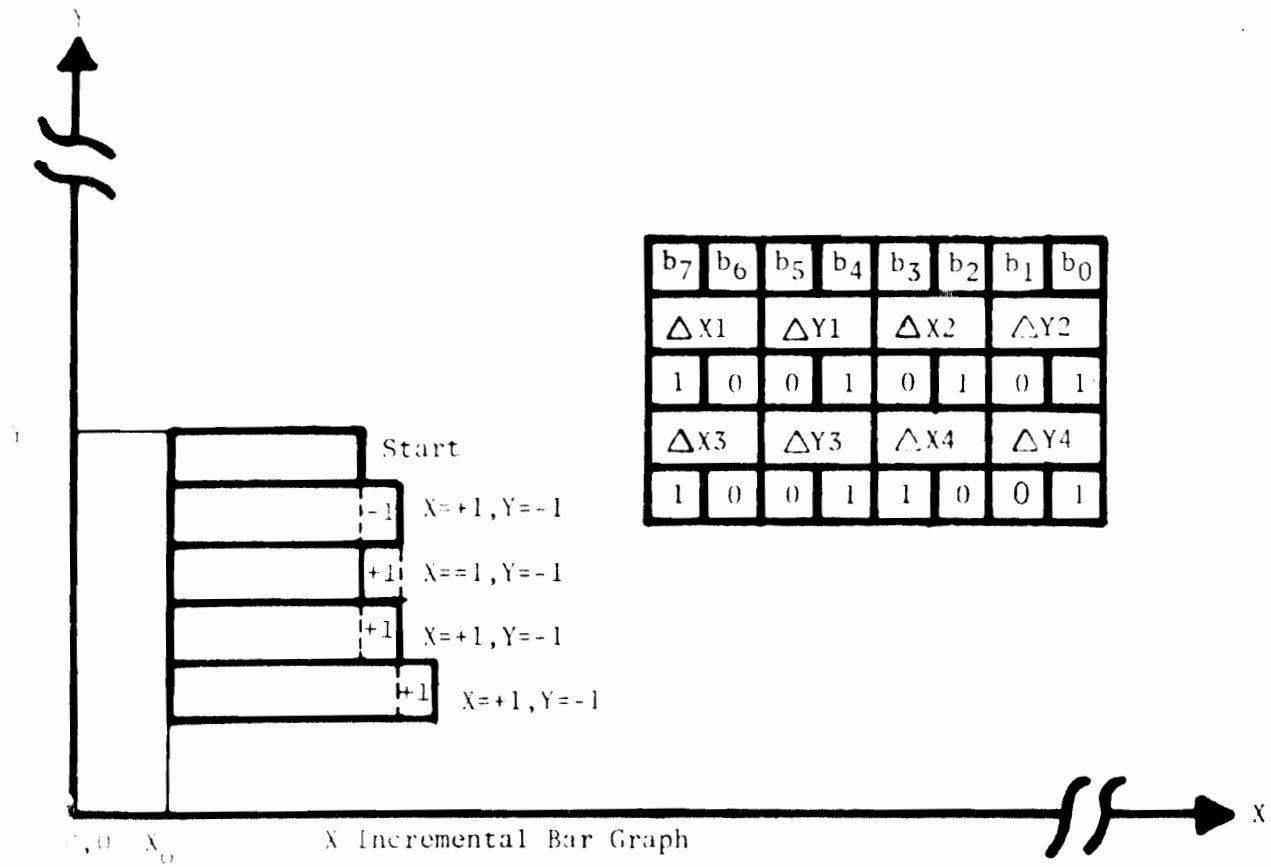
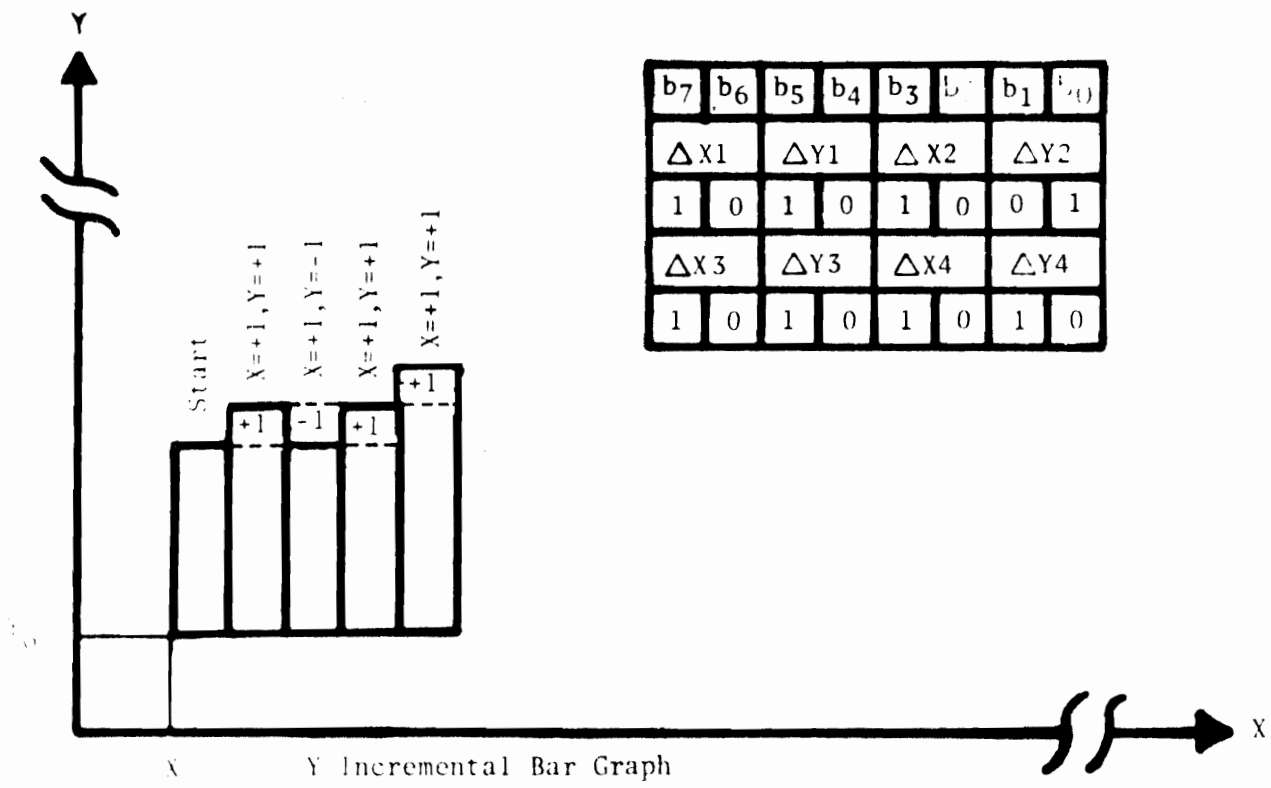
b <sub>7</sub>	b <sub>6</sub>	b <sub>5</sub>	b <sub>4</sub>	b <sub>3</sub>	b <sub>2</sub>	b <sub>1</sub>	b <sub>0</sub>
$\Delta X_1$	$\Delta Y_1$	$\Delta X_2$	$\Delta Y_2$				
1	0	1	0	0	1	1	0
$\Delta X_3$	$\Delta Y_3$	$\Delta X_4$	$\Delta Y_4$				
1	0	1	0	1	0	1	0





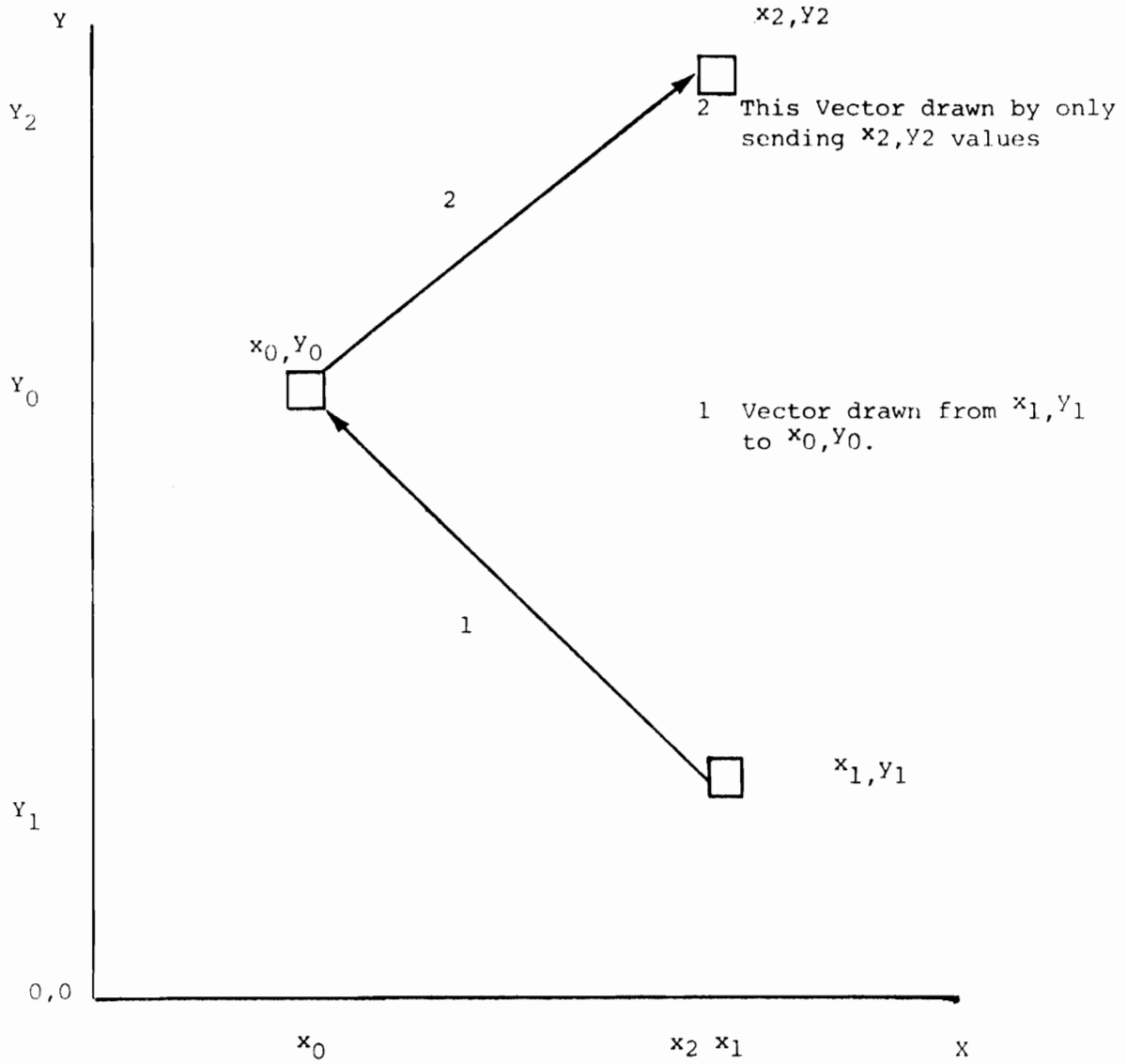
Y BAR GRAPH





Appendix B6

X INCREMENTAL BAR GRAPH, Y INCREMENTAL BAR GRAPH



NOTE: After the 1st Vector was drawn, then the  $x_0, y_0$  values become a new set of  $x_1, y_1$  for the second Vector going to  $x_2, y_2$ .

# LIST OF CONTROL AND ESCAPE CODES

## CONTROL

O	0 NULL	NO EFFECT
A	1 PROTECT	NO EFFECT
B	2 ENTER PLOT MODE	ALSO ENTERS X-Y POINT PLOT MODE AT THE SAME TIME
C	3 ENTER X-Y CURSOR MODE	03 X (0-79) Y (0-47)
D	4 EOT	NO EFFECT
E	5 ENQ	NO EFFECT
F	6 NEXT CHAR. IS VISIBLE STATUS	PLOT CHAR., BLINK, BGD-BLUE, GREEN, RED, FGD-BLUE, GREEN, RED
G	7 BELL	150 MS DURATION
H	8 CURSOR HOME	
I	9 CURSOR TABS	TABS EVERY 8 SPACES STARTING FROM FIRST COLUMN
J	10 LINE FEED	
K	11 ERASE LINE	
L	12 ERASE PAGE	
M	13 RETURN	
N	14 A7 BIT FLAG ON	LARGE CHARACTERS
O	15 BLINK & A7 BIT OFF	SMALL CHARACTERS AND NO BLINKING
P	16 SETS COLOR TO BLACK	
Q	17 RED	} FOREGROUND IF FLAG BIT OFF
R	18 GREEN	
S	19 YELLOW	
T	20 BLUE	
U	21 VIOLET	
V	22 CYAN	} BACKGROUND IF FLAG BIT ON
W	23 WHITE	
X	24 TRANSMIT PAGE	FROM CURSOR TO PAGE END OR FF, 00 SEQUENCE
Y	25 CURSOR RIGHT	
Z	26 CURSOR LEFT	
	27 ESCAPE CODE	HAS TO BE FOLLOWED BY A CODE FROM THE NEXT TABLE
\	28 CURSOR UP	
]	29 FLAG BIT OFF	} EFFECTS SPECIAL CHARACTER CODES, COLOR CODES AND PLOT ERASURE MODE
^	30 FLAG BIT ON	
_	31 BLINK BIT ON	
	32 - 95	ASCII UPPERCASE, PUNCTUATION AND NUMERALS
	96 - 127	ASCII LOWERCASE OR 32/64 SPECIAL CHARACTER SET
?	255 PLOT MODE ESCAPE	
.	254 CHARACTER PLOT	CANNOT GO DIRECTLY TO OTHER SUBMODES
-	253 X POINT PLOT	NEXT WORD 0-159
,	252 Y POINT PLOT	NEXT WORD 0-191
:	251 X - Y INCR. POINT PLOT	NEXT WORD GIVES NEXT 2 INCREMENTS 0-239
:	250 X0 OF X BAR GRAPH	NEXT WORD 0-159
9	249 Y OF X BAR GRAPH	NEXT WORD 0-191
8	248 XMAX OF X BAR GRAPH	NEXT WORD 0-159
7	247 INCR. X BAR GRAPH	NEXT WORD GIVES NEXT 2 H&V INCREMENTS FOR 2 HOR. BAR GRAPHS
6	246 Y0 OF Y BAR GRAPH	NEXT WORD 0-191
5	245 X OF Y BAR GRAPH	NEXT WORD 0-159
4	244 YMAX OF Y BAR GRAPH	NEXT WORD 0-191
3	243 INCR. Y BAR GRAPH	NEXT WORD GIVES NEXT 2 H&V INCREMENTS FOR 2 VERT. BAR GRAPHS
2	242 X0 VECTOR PLOT	NEXT WORD 0-159. X1Y1 PREVIOUSLY GIVEN BY CODES 253 & 252
1	241 Y0 VECTOR PLOT	NEXT WORD 0-191
0	240 INCR. VECTOR PLOT	NEXT WORD GIVES X & Y INCREMENTS OF BOTH ENDS OF THE VECTOR

ESCAPE

Ø	Ø	VISIBLE CURSOR MODE	
A	1	BLIND CURSOR MODE	FOR DUAL CURSOR OPERATION
B	2	PLOT VIA COLOR PAD	OR FROM CTL P THROUGH W
C	3	TRANSMIT CURSOR X-Y	Ø3, X, Y, Ø6, STATUS, ASCII CHR, CR
D	4	ENTER F.C.S.	
E	5	REENTER BASIC	SOURCE PROGRAM IN RAM NOT DESTROYED
F	6	SETS FULL DUPLEX	
G	7		
H	8	SETS HALF DUPLEX	
I	9		
J	10	SET WRITE VERTICAL	EFFECTS VISIBLE CURSOR ONLY
K	11	ROLL UP & WRITE L TO R	
L	12	SETS LOCAL MODE	
M	13		
N	14		
O	15	REENTER CPU O.S.	
P	16	INITS & ENTERS CPU O.S.	I/O BYTE & 2ND PORT UNAFFECTED
Q	17	CHARACTER INSERT MODE	CHARACTER DELETE MODE AVAILABLE USING DELETE KEY
R	18	BAUD RATE/STOP BITS SELECTION	IF A7 ON BEFORE SELECTION THEN 1 STOP BIT, OFF - THEN 2
S	19	TRANSFER TO ASSEMBLER	NOT AVAILABLE
T	20	TRANSFER TO TEXT EDITOR	NOT AVAILBLE
U	21	INSERT LINE	
V	22	DELETE LINE	
W	23	INITS & TRANSFERS TO BASIC	
X	24	PAGE MODE & WRITE L TO R	NO ROLLING
Y	25	TEST MODE	FILLS SCREEN WITH NEXT CHARACTER
Z	26	45 DEG. WRITE DOWN	
	27		PERFORMS A RETURN TO VISIBLE CHARACTER MODE
\	28	45 DEG. WRITE UP	
	29	BLOCK RECEIVE MODE	USES BLIND CURSOR TO POSITION DATA
^	30	JUMP TO 9FAØH	CRT O.S. BRANCHES TO 9FAØ HEX
.	31	TRANSFER TO CRT MODE	