This special edition of Interchange is devoted to the Video-1. As with most designs, even though the prototypes work exactly as planned, the final production units have problems. Before you panic and wonder what sort of a lemon you've spent your money on, relax. The problems thus far encountered are minor in nature and require very few parts and less than an hour to correct.

There are four Service Bulletins included in this issue and there will probably be an additional two Service Bulletins published in the September issue.

In this issue:

SB1 Addresses a video noise problem.

SB2 Addresses a printed circuit board wiring error which inhibits the analog circuitry and affects the mode and data latches.

SB3 Addresses a marginal gain in the analog circuit operational amplifiers.

SB4 Addresses a marginal light pen pulse amplitude.

In the September issue will be an analog power supply improvement which increases the +8 VDC and -8 VDC outputs to +10 and -10 VDC. This bulletin also reduces the operating temperature of the analog power supply.

Some complaints have been received concerning the inability of the Video-1 to run the software if programmed in an INTEL 2716. This problem will be the topic of the other Service Bulletin in the September issue. For you experimenters in the group, the problem seems to be the result of the EPROM being at the farthest point on the PCB from the power and ground connections. Several boards have been made to accept INTEL 2716's by ty ing J3-22 (Aim Ground) to U112 (EPROM) pin 12 (video ground). This fix is not being published as a bulletin in this issue due to the potential for ground loops affecting other areas of the Video-1.

In order to maintain a history of modifications made to each Video-1 board there is a "Modification Marking" step in each Service Bulletin. Please do this step. If at some later time you should sell your Video-1 the buyer will need to know what the actual configuration of the board is, or, if you have problems six months from now you will need a reference and the marking of the Service Bulletins on the back of the board will provide that reference.

If you are experiencing difficulties in assembling or operating your Video-1 the Troubleshooting and Assistance Group members are the first people to contact. That group's current chairman is John Andersen at Collins, mail station 120-120.

AIM VIDEO

General

It's been a busy month! As of this printing all of the VIDEO-1 boards and kits have been shipped or sold.

As I promised in the special VIDEO-1 edition of Interchange published a few weeks back, this edition contains additional service bulletins for improving the performance of your VIDEO-1.

The bulletins included in this issue are:

SB 5 - Auxiliary RAM Phase 2 Referencing

SB 6 - A/D Improved Resolution

SB 7 - Analog Power Supply Improvements

SB 8 - EPROM Operation Improvement

SB 9 - Video Color Saturation Improvement

In the August Interchange, Editor Dave Griffey included a statement that all submittals to the Interchange regarding the use of the VIDEO-1 should be sent to either Rich Ketcham or myself. The intent of that statement was to allow Rich or me to try out potential board modifications prior to publication and should not be construed to mean that we are trying to control what is to be published. All Interchange submittals should continue to be sent to Dave Griffey. When a modification is submitted, Dave will copy it for Rich and me; we will then try it out and comment on our results in the same issue.

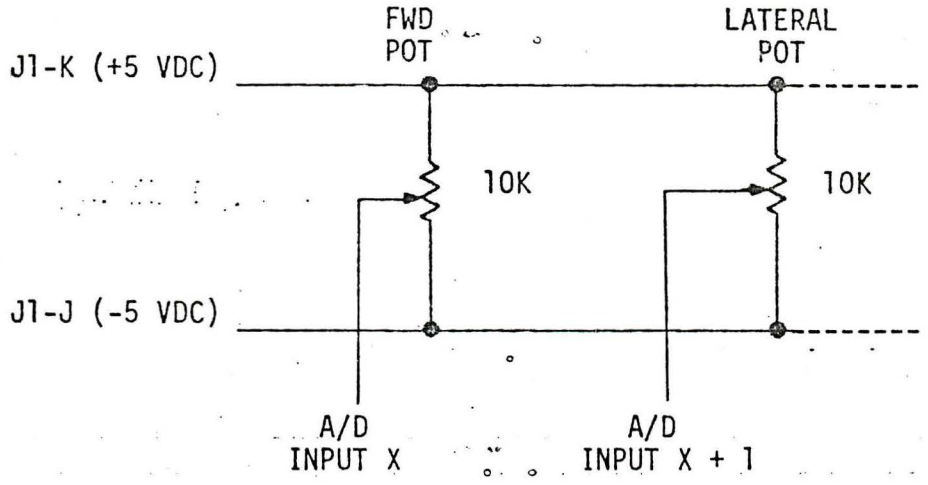
Rich Ketcham has begun working on software modifications to the video handler. As far as I know the only suggestions for corrections/modifications to the software have been:

1. The addition of the delete function
2. The ability to use a control key to reinstate the handler after a quit or blast.
3. The addition of cursor functions

If you have any other suggestions or comments on the handler please pass them on to Rich as soon as possible so an updated handler can be published.

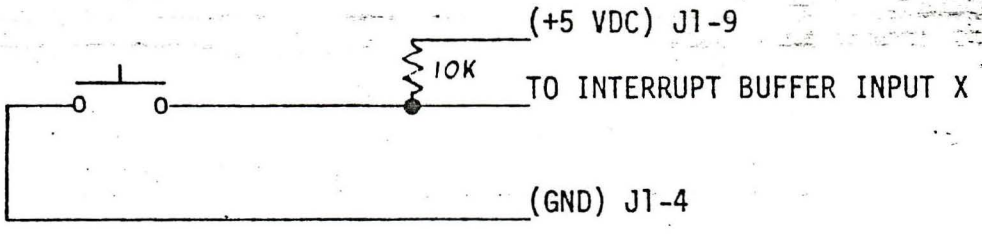
Game Playing

Most of the TV games now on the market offer some form of user interface in addition to the main keyboard (i.e. paddles, keypad, etc.). The VIDEO-1 may be used in similar fashion by connecting potentiometers or joysticks to the A/D input pins. The recommend configuration for converting a joystick is shown below:

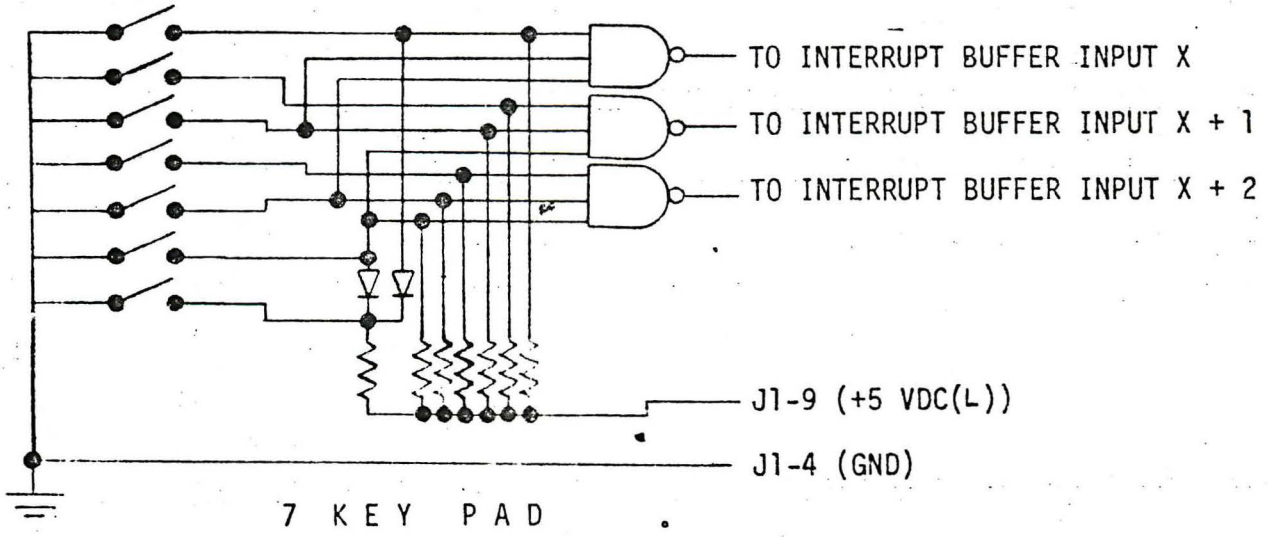


Up to four joysticks may be connected in this manner (or 8 potentiometers).

A game keypad may be connected to the interrupt buffer inputs either individually wired or multiplexed, thereby providing connections for up to 64 different keys. The recommended configuration for switches or keys is:



INDIVIDUAL KEYS



MULTIPLEXED KEYS

Manual Corrections:

Manual errors seem to continue creeping out of the woodwork. Here is a listing of the latest corrections:

Page 2-5 The RAM locations for the first two entries in the table should read:

1000 - 13FF	U27, U28
1400 - 17FF	U29, U30

Page 4-21 Step 4 should read: ". . .present at U93, Pin 3. . ."

Page 4-21 Step 11 should read: "000F JMP 0000"

Page 9-9/9-10 (Schematic Sheet 4) On U7 Pin 1 is shown tied to ground. U7 Pin 1 should be shown tied to +5V.

General Information

Carlos Wright reports that alignment of the A/D section is simplified by reversing the order of adjustments for R31 and R32 shown on page 4-22.

Options:

1. Those of you interested in utilizing a separate bipolar power supply for the analog section should note:

   The "spare" terminal on TB1 (TB1-4) is not truly spare. TB1-4 is actually connected to the output of the switching supply prior to the linear regulators. By removing U115 from its socket the switching supply is disabled allowing an external negative supply to be connected via TB1-4. By jumpering across U114 an external positive supply may be connected to TB1-3. With U114 jumpered, the external supply feeds the positive voltage linear regulators directly. The recommended voltages to be supplied using this method are plus and minus 12 VDC.

2. Those of you interested in further expansion of your AIM-VIDEO-1 System should note:

   The traces connecting the top 8K of the auxiliary memory section have been paralleled to connector J4. J4 is a .10 inch centered pin field on the front edge of the VIDEO-1 near U82. The twin rows of J4 just happen to match the spacing necessary for use of a Collins blue-line connector. J4 includes data lines DØ - D7, address lines AØ - A9, 1K boundary chip selects for addresses 6000 - 7FFFH, + 5 VDC, and ground.

3. I will be providing some new "toys" for everyone in the next few months though prices have yet to be established. Those toys include:

   A. An anyboard with 8000 holes in the same profile as the VIDEO-1.

   B. A language expansion card which plugs into the AIM.

   C. An EPROM expansion card which plugs into the VIDEO-1.

Graphics Primer II

Last month I tacked a graphics primer onto the end of my VIDEO-1 update which explained how to use BASIC to plot individual points on the screen using the following subroutine:

```
1000  X1 = INT (X/8)
1010  R1 = X - (X1*8)
1020  Z = PEEK (38880 + X1 - (Y*32))
1030  POKE (38880 + X1 - (Y*32)), 2^(7-R1) OR Z
1040  RETURN
```

To draw circles with that subroutine the following program may be used:

```
 5  POKE 40959, 355
10  INPUT "RADIUS"; R
20  FOR T = 0 TO 100
30  X = 128
40  X = X + INT (R * SIN (T))
50  Y = 95
60  Y = Y - INT (R*COS(T))
70  GOSUB 1000
80  NEXT
```

In steps 30 and 50 above the center point of the circle is specified.

A slight modification of the above circle program will cause the program to draw an outward spiralling star. Simply add line 75:

```
75 R = R + 1
```

When the program asks for "Radius?" Input 1.

Another modification to the circle program causes the program to draw a spoked wheel. Change line 10 to:

```
10 FOR T = 0 TO 50
```

Change line 20 to:

```
20 FOR R = 0 TO 100
```

Add line 75:

```
75 NEXT
```

To draw a "3D" coil change the circle program as follows:

Add: 15 INPUT "X"; X: INPUT "Y"; Y

Delete lines 30 and 50

The above circle program and its variations tend to be rather coarse due to the lack of a method to connect the dots. I will try to provide a dot link (draw line) subroutine in next month's Interchange.

The other program I promised for this issue was a light pen handler. Quite honestly, I ran out of time and didn't get that program written. Instead, let me explain what that handler was going to consist of and maybe you can work it out on your own (if not I will try to publish a handler next month).

The apparent randomness around a specified point is the result of trying to use an analog pulse to specify a digital address. Variations in the slope of the light pen's leading edge will cause a horizontal variation in screen position. The diameter of the light pen is such that the pen can see as many as three different raster scan lines. If the light pen is at a Pixel boundary vertical variation will result.

To minimize the horizontal and vertical errors there are several possible handler variations. The first (and least complicated) method would be to read the light pen several times and to average the results.

Another (and definitely classier) method of handling the light pen errors would be to establish a 32 byte buffer somewhere in memory, store the first row of Pixel information in the buffer and replace the Pixel row with a white line. Restore the Pixel information on the first row and repeat the process on successive rows causing a white horizontal line to traverse the screen without destroying the screen contents. The light pen data would still have to be averaged but this method would allow the light pen to write white on black and provide a self-verification by allowing the handler to test that a white Pixel was stored at the proper Pixel location. If written properly, this handler could be made to traverse the screen only as far as light pen, repeat the appropriate Pixel rows until an adequate number of samples was taken, average the samples and provide an accurate Pixel location quite rapidly.

SERVICE BULLETIN 1

TO THE VIDEO-1

Subject: Video Noise

Numerous reports have been received of excessive snow and/or diagonal "herring-bone" noise on the television screen. This bulletin provides a permanent modification to the Video-1 to substantially reduce the video noise.

Parts Required:

Qty	Designator	Description	Part Number
1	C136	1000 pF Capacitor, Ceramic	913-3279-030
2	C137, C138	82 pF Capacitor, Ceramic	913-3281-410

Modification Procedure:

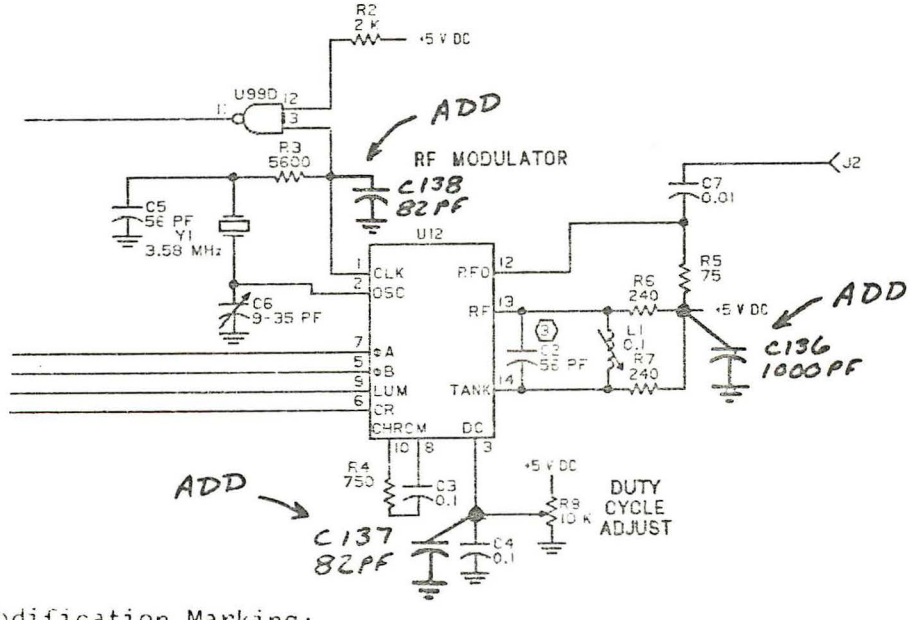
1. On the top side of the printed circuit board connect the 1000 pF capacitor (C136) between R5 (+5V side) and the surrounding ground plane. Keep the capacitor leads as short as possible.

2. On the bottom side of the printed dircuit board connect a 82 pF Capacitor (C137) between U12 pins 3 and 4.

3. On the bottom side of the printed circuit board connect a 82 pF Capacitor (C138) between U12 pin 1 and the surrounding ground plane.

Manual Changes:

1. On page 9-3/9-4 mark the schematic as shown:



Modification Marking:

1. On the bottom side of the printed circuit board under the board part number, mark "SB1" in indelible ink.

SERVICE BULLETIN 2

TO THE VIDEO-1

Subject: Printed wiring error - analog to digital section on production Video-1 circuit boards a circuit trace was incorrectly added.

Parts Required: None

Modification Procedure:

1. On the bottom side of the printed circuit board cut the trace between U123 pins 2 and 3.

Manual Changes: None

Modification Marking:

On the bottom side of the printed circuit board under the board part number, mark "SB2" in indelible ink.

SERVICE BULLETIN 3

TO THE VIDEO-1

Subject: Increasing the analog circuits' step size

Some applications of the Video-1 may require a larger voltage swing than ± 2.5V. This bulletin allows the user to increase the digital to analog output to 0 to +4V (D/A #1) or ± 4V (D/A #2).

Parts Required:

Qty	Designator	Description	Part Number
3	R24, R30, R35	4.7K OHM 1/8W 5% Resistor	745-1863-650

Modification Procedure:

1. Remove the 3K OHM Resistors from locations R24, R30, and R35.

2. Install 4.7K OHM Resistors at locations R24, R30 and R35.

Manual Changes:

1. On page 9-5/9-6 change the value shown for R24, R30, and R35 from 3K OHM to 4.7K OHM.

Modification Marking:

1. On the bottom of the printed circuit board under the board part number, mark "SB3" in indelible ink.

SERVICE BULLETIN 3

TO THE VIDEO-1

Subject: Increasing the analog circuits' step size

Some applications of the Video-1 may require a larger voltage swing than ± 2.5V. This bulletin allows the user to increase the digital to analog output to 0 to +4V (D/A #1) or ± 4V (D/A #2).

Parts Required:

Qty	Designator	Description	Part Number
3	R24, R30, R35	4.7K OHM 1/8W 5% Resistor	745-1863-650

Modification Procedure:

1. Remove the 3K OHM Resistors from locations R24, R30, and R35.

2. Install 4.7K OHM Resistors at locations R24, R30 and R35.

Manual Changes:

1. On page 9-5/9-6 change the value shown for R24, R30, and R35 from 3K OHM to 4.7K OHM.

Modification Marking:

1. On the bottom of the printed circuit board under the board part number, mark "SB3" in indelible ink.

SERVICE BULLETIN 4
TO THE VIDEO-1

Subject: Light Pen Sensitivity

The raster scan pulse from the light pen is occasionally of insufficient amplitude to provide a satisfactory gate edge. This bulletin provides a permanent modification to the Video-1 to increase the current to the light pen photocell and provide a higher amplitude pulse out.

Part Required: None

Modification Procedure:

1. Remove 100 OHM resistor R12 and replace with a jumper wire.

Manual Changes:

1. On page 9-5/9-6 in the upper left corner draw a jumper around R12 and cross out R12.

Modification Marking:

1. On the bottom side of the printed circuit board under the board part number, mark "SB4" in indelible ink.

SERVICE BULLETIN 5

TO THE VIDEO-1

Subject: Improved RAM Decoding

Occasional reports have been received of RAM faults occuring, particularly at 4K boundaries while utilizing the editor or BASIC. This bulletin provides a permanent modification to the VIDEO-1 which adds clock phase 2 qualification of the auxiliary RAM chip select lines.

Parts Required: None

Modification Procedure:

1. On the bottom side of the printed circuit board cut the trace between U7 Pin 13 and U98 Pin 3.

2. On the bottom side of the printed circuit board cut the trace going to U28 Pin 4.

3. On the bottom side of the printed circuit board add a jumper from U87 Pin 11 to U98 Pin 3.

4. On the bottom side of the printed circuit board add a jumper from U116 Pin 19 to U28 Pin 4.

Manual Changes:

1. On page 9-9/9-10 add a line from U87D Pin 11 to the right. Label that line "AC15(3)"

2. On page 9-7/9-8 change the label of the input line to U98 Pins 2 and 3 from "AB15" to "AC15(4)".

Modification Marking:

1. On the bottom of the printed circuit board under the board part number, mark "SB5" in indelible ink.

SERVICE BULLETIN 6

TO THE VIDEO-1

Subject: Improved Analog to Digital Converter Resolution

The operation of the successive approximation register varies between vendor types as to when the output is valid. With some types the output is valid at the leading edge of conversion complete, with others the output is now valid until the trailing edge. This bulletin provides a permanent modification to the VIDEO-1 to latch the SAR data with the chip select line rather than the conversion complete line to allow the SAR adequate settling time.

Parts Required: None

Modification Procedure:

1. On the top of the printed circuit board cut the trace between U121 Pin 8 and U102 Pin 11. Refer to the top layer circuit traces diagram on page 9-19/9-20 of the VIDEO-1 manual to determine the routing of this line.

2. On the bottom of the printed circuit board add a jumper from U102 Pin 1 to U102 Pin 11.

Manual Changes:

1. On page 9-5/9-6 change the schematic as follows:

   A. X out the line between U121C Pin 8 and U102 Pin 11.

   B. Add a line from U102 Pin 1 to U102 Pin 11.

Modification Marking:

1. On the bottom side of the printed circuit board under the board part number, mark "SB6" in indelible ink.

SERVICE BULLETIN 7

TO THE VIDEO-1

Subject: Analog Power Supply Improvements

In order to provide higher voltages to the analog circuitry for more linear operation several power supply modifications are required. As a side effect of these modifications power supply noise is reduced and the supply runs cooler. This bulletin is highly recommended for those VIDEO-1's on which the analog circuitry is extensively used.

Parts Required:

Qty	Designator	Description	Part Number
2	R69, R70	Resistor, 1K Ohm, 1/4 W	745-0748-000
1	R71	Resistor, 470 Ohm, 1/4 W	745-0736-000
1	CR4	Zener Diode, 18V, 1N4112	353-9039-170
1	CR5	Zener Diode, 10V 1N758A	353-2724-000
1	Replaces Q2	Transistor, 2N2222A	352-0661-020
1	Replaces Q1	Transistor, 2N2907A	352-0551-010
1	Replaces C72	Capacitor, Tantalum, 22µF 35V	184-8086-010
1	Replaces C73	Capacitor, Tantalum, 33µF 35V	184-9102-880

Modification Procedure:

1. Carefully remove Q1 and Q2 from the printed circuit board and discard.
2. Remove C72 and C73 from the printed circuit board and discard.
3. Remove R16 from the printed circuit board and discard.
4. On the top of the printed circuit board cut the trace between the bases of Q1 and Q2.
5. On the top of the printed circuit board cut the trace that connected U115 Pin 3 to the bases of Q1 and Q2.
6. On the bottom of the printed circuit board cut the trace between the bases of Q1 and Q2.
7. On the bottom of the printed circuit board jumper from U114 Pin 1 (+24V) to the hole for R16 which connects to the collector of Q1.

8. Bend the base leads of the replacement transistors between the collector and emitter leads. Install a small piece of insulating sleeving over the base lead of each transistor to avoid contacting the leads during installation.

9. Install the 2N2222A in location Q2 (emitter to ground). Leave the leads long enough on the underside of the board to jumper to.

10. Install the 2N3907A in location Q1 (emitter to + 24 VDC). Leave the leads long enough on the underside of the board to jumper to.

11. Install the 22 Microfarad electrolytic capacitor in location C72. Be sure to observe the polarity as specified on the layout drawing (Page 9-14 in the VIDEO-1 in the manual).

12. Install the 33 Microfarad tantalum capacitor in location C73 (plus side to the ground plane).

13. Refer to Figure 1. On the underside of the printed circuit board install

    A. One 1K ohm resistor from the hole from R16 (which contains the jumper to +24V) to the base of Q1.

    B. One 1K ohm resistor from the base of Q2 to the emitter of Q2 (ground).

    C. One 470 Ohm resistor from U115 Pin 3 to a convenient hole in any board.

    D. The 18V zener diode from the base of Q1 (cathode end) to a hole in the anyboard adjacent to the hole used for the 470 ohm resistor.

    E. The 10V zener from the base of Q2 (cathode end) to a hole in the anyboard adjacent to the previously used holes.

14. Jumper the three adjacent anyboard holes used for R71, CR 4, and CR5 together.

Testing and Alignment:

1. Carefully inspect the power supply section for lead or solder shorts before applying + 24 VDC to TB1-3.

2. Measure the voltage at TB1-4 and adjust R20 for -10 VDC $\pm$ .1V.

3. Measure the voltage at the plus side of C68 and adjust R14 for + 10 VDC $\pm$ .1V.

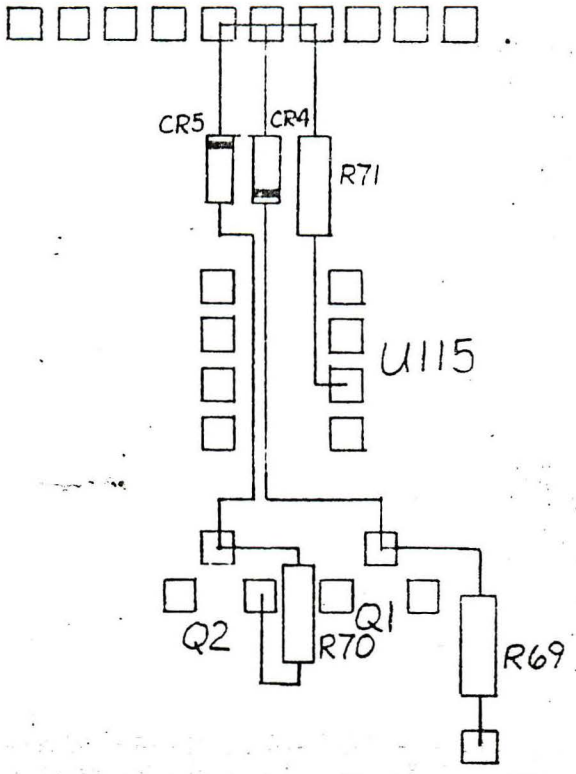


Figure 1 (Shown looking at the bottom of the printed circuit board)

Manual Changes:

1. Change the schematic on page 9-9/9-10 to reflect Figure 2.

Modification Marking:

1. On the bottom side of the printed circuit board under the board part number, mark "SB7" in indelible ink.

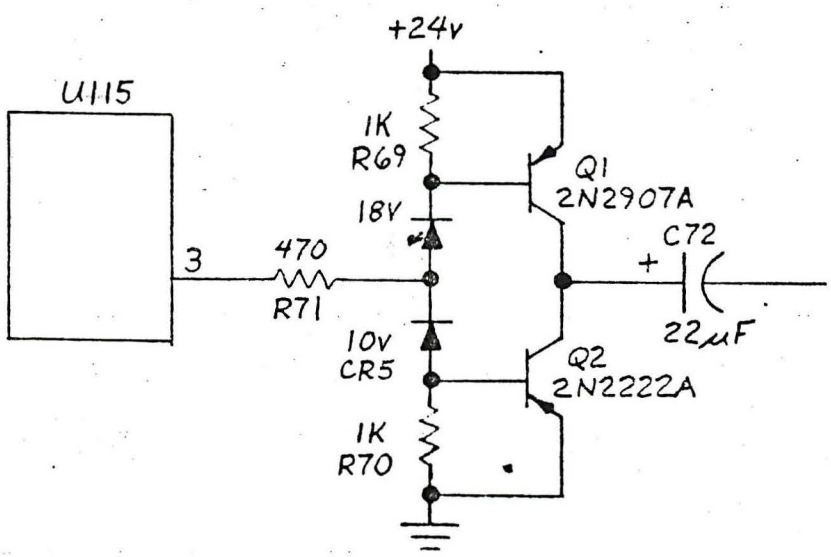


Figure 2

SERVICE BULLETIN 8

TO THE VIDEO-1

Subject: EPROM Vendor Compatibility

Some Intel EPROM's do not work properly on the VIDEO-1 due to an excessive current draw immediately after being chip selected that the ground plane cannot handle. This bulletin provides an optional modification to the VIDEO-1 to enable Intel EPROM's to work properly.

Parts Required: None

Modification Procedure:

1. On the underside of the printed circuit board add a jumper from J3 Pin 22 (AIM ground) to U112 Pin 12 (EPROM ground).

Manual Changes: None

Modification Marking:

1. On the bottom side of the printed circuit board under the board part number, mark "SB8" in indelible ink.

SERVICE BULLETIN 9

TO THE VIDEO-1

Subject: Video Color Saturation

This bulletin (in conjunction with Service Bulletin 1) adds additional power supply isolation for the video RF tank which sharpens the color graphics resolution.

Parts Required:

Qty	Designator	Description	Part Number
1	R72	Resistor, 240 Ohm 1/8 W	745-1863-340

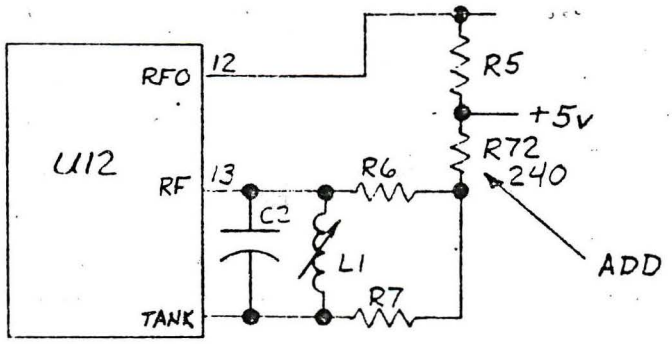
Modification Procedure:

1. On the top of the printed circuit board cut the trace between R5 and R6 (the ends closest to J2).

2. On the bottom of the printed circuit board add the 240 ohm resistor between R5 and R6 on the ends closest to J2.

Manual Changes:

1. On page 9-3/9-4 change the schematic to reflect the addition of R72.



Modification Marking:

1. On the bottom side of the printed circuit board under the board part number, mark "SB9" in indelible ink.

VIDEO-1 MANUAL CORRECTIONS

1. Page 4-7 - At the end of the paragraph following step 27 delete the words "....final assembly".

2. Page 4-12 - Step 5 should read " .... press "RETURN","/", and type "00". ..."

3. Page 4-17 - Steps 21 and 22 should both read "... press "RETURN", "/", and type ..."

4. Page 7-2 - All brackets ([or]) on page 7-2 should have been parenthesis.

5. Page VI-3/VI-4 - The kit lists for kits 2 and 3 on this page are scrambled. Attached is a revised copy of page VI-3/ VI-4 which replaces the existing page.

6. Page 4-17 - Step 23 should read "...adjust potentiometer R21..."

7. Page 9-14 - Figure 9-5 shows the wrong polarity of C73 and C74.

NOTE: 18v Regulators have been packed in some of the Kit 2 sets, instead of a 15v Regulator. This Regulator will work just as well as the other in the Analog Supply but the voltage to the 555 timer and other regulators will be higher than the manual specified 15± 1v.

NOTE: Some PN's listed in the manual maybe substituted by its Military Version IE.
351 1526 050 substitute 351 1526 070

1	0.1-μH coil	240-2715-000	L2
1	47 μF, 35 V, T	184-9102-890	C66
1	47 μF, 20 V, T	184-9102-190	C67
3	10 μF, 20 V, T	184-9102-170	C68, C73, C74
2	0.01 μF ceramic	913-3279-110	C70, C71
1	15 μF, 20 V, T	184-9086-490	C72
3	15 pF, mica	912-4141-130	C76, C83, C92
3	68 pF, mica	912-4141-330	C79, C86, C95
1	82 pF, mica	912-4141-350	C98
57	0.1 μF, ceramic	913-3279-200	C69, C130, C131, C132, C77, C78, C80, C81, C75, C87, C88, C82, C84, C85, C89, C90, C113, C114, C91, C93, C94, C96, C97, C104, C105, C106, C107, C108, C109, C110, C111, C112, C100, C101, C102, C103, C99, C115, C116, C117, C118, C119, C120, C121, C122, C123, C124, C125, C126, C127, C128, C129, C130, C131, C132, C133, C134
6 ft	Shielded, twisted pair	439-0650-000	-
6 in	Tubing, alum, 0.200 ID	804-3084-022	-
1	Screw, 0.25 in 4-40	343-0133-000	-
1	Nut, hex 4-40	313-0132-000	-

4.0 AUXILIARY MEMORY COMPONENTS KIT LIST (KIT 3)

QTY	DESCRIPTION	CPN	REFERENCE DESIGNATION
1	74LS245	351-1849-020	U116
4	74LS138	351-1526-030	U25, U26, U83, U84
1	74LS244	351-1841-030	U103
34	0.1-μF capacitor	913-3279-200	C22 to C55

5.0 SOCKET KIT LIST (KIT 4)

QTY	DESCRIPTION	CPN	REFERENCE DESIGNATION
7	8-pin socket	220-0075-010	
12	14-pin socket	220-0075-020	
19	16-pin socket	220-0075-110	
68	18-pin socket	220-0075-090	
17	20-pin socket	220-0075-080	
1	24-pin socket	220-0075-130	
1	40-pin socket	220-0075-150	

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VIDEO-1 UPDATE

In case any of you are wondering why there haven't been any Video-1 updates lately, I have been in the process of moving to Seattle. My AIM is now up and running again but it may be months before I see my workbench.

2716/2732 Substitution - Service Bulletin 11

For those of you interested in combining your alphanumerics and GAIM into a single 2732 EPROM, the modification is quite simple.

On a 2716 EPROM pin 21 is a programming pin which is tied to +5vdc for normal operation. On a 2732 pin 21 is the A11 address line input; this is the only significant difference between the two EPROMS.

To modify your Video-1 to accept a 2732 cut the trace between U112 pins 24 and 21 (this isolates pin 21). Add a jumper from U1 pin 19 to U112 pin 21. That's all there is to it!

When blowing the EPROM place the GAIM software in the lower 2K of the EPROM and the alphanumerics in the upper 2K. Since the mode latches typically come up as "FF" on start up this allows you to enter alphanumerics as usual with a *=9800, G/. The GAIM software is now available under software control by adding the following initialization to your existing GAIM programs:

```
10 POKE 40959, Ø:  REM - if bit 7 is set to Ø the lower half
of the EPROM is selected.
```

To switch from GAIM back to alphanumerics (to print data or end a program gracefully) add the following:

```
9999 POKE 40959, 136:  PRINT CHR$(3):  END
```

If you have the latest versions of alphanumerics and GAIM from the association you may switch back and forth between routines from BASIC, making a very professional looking display for such things as business plans where text would be alternated with graphs. If you have an early version of either alpha or GAIM the program may drop out to the monitor or get hopelessly lost when attempting the software swap described above.

Oct 81

2716/2532 Substitution - Service Bulletin 12

The use of a 2532 EPROM for alphanumerics and GAIM is not quite as straight forward as using a 2732 because the pin configuration is not identical.

On a 2532 pin 2Ø is $\overline{CS}$, pin 18 is A11, and pin 21 is the power down/programming pin. For normal operation pin 21 is tied to +5vdc so there is no requirement (as was the case with the 2732) to isolate pin 21. Instead, the trace from U113 pin 3 to U112 pin 18 ($\overline{CS}$) must be cut and the trace to pin 2Ø of U112 ($\overline{R/W}$) must be cut. In addition, on the top side of the PCB the trace between pins 1 and 2 of U113 must be cut.

Jumper from U113 pin 3 to U112 pin 2Ø. Jumper from U1 pin 19 to U112 pin 18. Jumper from J3 pin V to U113 pin 1.

The software configuration and controls described under SB-11 will also work with the 2532.

If you elect to modify your Video-1 with one of the above procedures please mark the board with the appropriate service bulletin number.

Steve Rines

Collins M/S 767-200

VIDEO-1 UPDATE

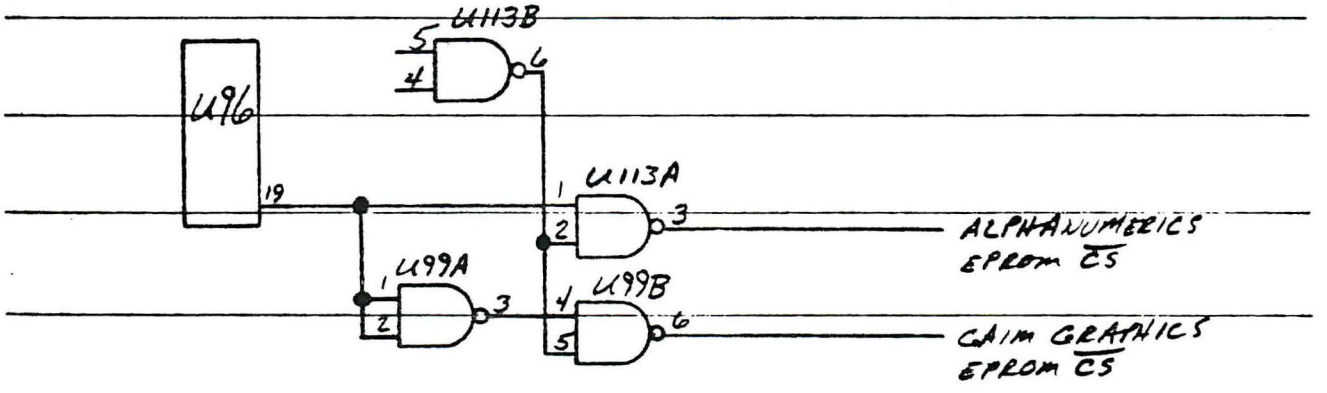
MAY 21

IN ATTEMPTING TO PREPARE THE PROMISED SERVICE BULLETINS FOR THIS MONTH'S UPDATE, I DISCOVERED A SCHEMATIC ERROR. ON SHEET 1 OF THE SCHEMATIC, U99A SHOULD BE LABELLED U99D AND U99B SHOULD BE LABELLED U99C. THE PIN-OUTS FOR EACH SHOULD BE CORRECTED TO MATCH.

IN THE APRIL ISSUE OF THE INTERCHANGE, BOB KNOLL RECOMMENDED ADDING EIGHT PULLUP RESISTORS TO THE AUX. MEMORY DATA LINES TO CORRECT FOR AN ERROR THAT OCCURS WHEN BASIC ALLOCATES MEMORY (DUE TO STRAY CAPACITANCE ON A PARTIALLY POPULATED BOARD). RATHER THAN SOLDER EIGHT RESISTORS TO YOUR VIDEO-1 IT IS EASIER TO PURCHASE TWO 4.7K SIP RESISTOR PACKS (CPN 350-4001-010), CUT OFF PINS 2,3,AND 4 OF THE SIPS, AND INSTALL THE SIPS IN AN UNUSED PAIR OF RAM SOCKETS. PIN 1 OF EACH SIP SHOULD BE INSERTED IN PIN 18 OF THE RAM SOCKET SO THAT PINS 5,6,7,AND 8 OF THE SIP ARE INSERTED INTO PINS 14,13,12,AND 11 OF THE SOCKET. ONCE THE AUX. RAM SECTION IS FULLY POPULATED THE SIP'S MAY BE DICARDED.

SINCE THE ASSOCIATION'S GROUP PURCHASE OF 2532'S HAS NOT YET ARRIVED, I HAVE NOT BEEN ABLE TO TEST THE PROPOSED SERVICE BULLETIN FOR COMBINING THE ALPHA HANDLER AND RICH KETCHAM'S GAIM SOFTWARE INTO A SINGLE EPROM. INSTEAD, I GOT TIRED OF WAITING AND INSTALLED A SECOND EPROM SOCKET IN THE ANYBOARD NEXT TO U99. I THEN PARALLELED ALL OF THE U112 PIN CONNECTIONS TO THE NEW SOCKET, WITH THE EXCEPTION OF THE CHIP SELECT, AND CUT THE TRACE BETWEEN U113 PINS 1 AND 2 ON THE TOP SIDE OF THE BOARD.

USING THE TWO REMAINING NAND GATES FROM U99 I CONSTUCTED THE FOLLOWING DECODE CIRCUIT:



I USED AN AVAILABLE PIN FROM THE A/D MODE LATCH (RATHER THAN THE VIDEO MODE LATCH) AS AN EPROM SELECT LINE TO AVOID ANY POSSIBILITY OF PRESENT OR FUTURE EPROM FIRMWARE CAUSING INADVERTANT EPROM SWITCHING.

WITH THIS DECODE CIRCUIT INSTALLED THE AIM STILL INITIALIZES THE ALPHANUMERICS HANDLER AS USUAL. TO ENTER GAIM IT IS NECESSARY TO QUIT THE HANDLER; POKE 40956,0; WARM START BASIC; THEN RUN THE GRAPHICS PROGRAM. TO REENTER THE ALPHA HANDLER, POKE 40956,128; ESCAPE BASIC; AND TYPE *=9800/G.

WHILE THIS IMPROVED MY LIFE CONSIDERABLY, IT WAS TOO COMPLICATED FOR MY SON TO USE. I THEN ADDED THE FOLLOWING PREAMBLE TO MY GRAPHICS PROGRAMS:

```
10 A$=CHR$(17):PRINT A$
20 POKE 40956,0
30 POKE 4,0:POKE 5,152:P3%=7:A=USR(29)
```

WHERE LINE 10 EXECUTES A CONTROL Q TO QUIT THE ALPHA HANDLER, LINE 20 SWITCHES THE EPROMS AND LINE 30 IS THE NORMAL GAIM INITIALIZATION.

USING THIS PREAMBLE MY GRAPHICS PROGRAMS EXECUTE DIRECTLY FROM THE ALPHA HANDLER WITH NOTHING MORE COMPLICATED THEN TYPING "RUN".

IN THE MAIN LOOP OF EACH GRAPHICS PROGRAM I ADDED A QUIT COMMAND AS FOLLOWS:

```
100 GET A$:IF LEFT$(A$,1)="Q" THEN POKE 40956,128:A=USR(1)
```

THE "POKE" SWAPS THE EPROMS, AND, WHEN THE BASIC ATTEMPTS TO EXECUTE THE A=USR COMMAND, SINCE ITS POINTERS ARE SET UP FOR 9800H, THE ALPHA HANDLER IS REINITIALIZED AND THE AIM ENDS UP BACK IN THE MONITOR. INSTEAD OF A NORMAL BASIC "END" I SUBSTITUTED: POKE40956,0:A=USR(1) TO GET THE SAME EFFECT.

SINCE I INSTALLED THE ABOVE MODIFICATION AND ADDED RICH'S SOFTWARE MY SON HAS BEEN USING THE AIM ALMOST EVERY NIGHT -- I EVEN CAUGHT MY WIFE USING THE AIM THE OTHER NIGHT (RICH PAID ME TO SAY THAT).

AS SOON AS THE 2532'S ARRIVE I WILL TRY OUT THE SB AND PUBLISH IT ALONG WITH A SOFTWARE PATCH TO MAKE IT ALL RUN.

STEVE RINES

P.S. IF YOU DECIDE TO MAKE THE MOD DESCRIBED ABOVE FOR TWO 2716 EPROM USAGE, PLEASE MARK SB10 ON YOUR BOARD SINCE A CUT WAS REQUIRED.

SR

BASIC EXTENSION (CONTINUED)

Despite the fact that both the Basic extension and the Video -1 use the same zero page location from $EC to $FF both work quite well in parallel as long as you don't use any of the Video -1 modes and be careful with the DEL function. However sometimes the system runs wild. In mild cases you can RESET and/or reinitialize at $0220, but in serious cases you have only one choice: POWER OFF.

EDITOR'S NOTE:

THE EXTENSION IS NOT COMPATIBLE WITH THE LAVENZ VIDEO SOFTWARE. YOU CAN USE THE EXTENSION IF YOU DON'T ENABLE YOUR VIDEO BOARD. PERHAPS SOMEONE WOULD LIKE TO FIX THIS PROBLEM —

I wonder whether the association could/should undertake an effort to create a "standard" Basic extension perhaps in a building block manner. The usage of zero page locations is going to create similar or even aggravated problems when we think of implementing a disk operating system, especially when somebody wants to run a favourite 2 year old program which still uses some zero page locations not used at that time.

Any suggestions/solutions/proposals/ideas?
In a further issue I will describe another 2 K Basic extension which provides, among additonal commands, a solution to the "Basic bug" mentioned in the JAN 1981 Interchange.

Karl H.Riesen
SWISSAIR OFT
Hangar 15 JFK Airport
JAMAICA (NY) 11430

(A TAPE WILL BE SENT TO THE SOFTWARE LIBRARY)

1.0 COMMON COMPONENTS KIT LIST (KIT 0)

QTY	DESCRIPTION	CPN	REFERENCE DESIGNATION
3	74LS85	351-1697-010	U5, U7, U8
1	74LS30	351-1523-140	U9
1	74LS10	351-1523-230	U10
2	74LS244	351-1841-030	U85, U86
2	74LS00	351-1523-110	U87, U113
2	74LS02	351-1523-220	U98, U120
1	74LS138	351-1526-030	U118
1	74LS32	351-1523-260	U119
10	0.1-μF capacitor	913-3279-200	C56 to C65
1	Terminal blk	367-1599-120	TB1
7	Stand-off, 0.25 in	540-9033-003	-
14	Screw, 0.25 in, 4-40	343-0133-000	-
7	Washer, 0.25 OD	310-0779-030	-
1	Printed circuit board	-	VIDEO-1

2.0 VIDEO COMPONENTS KIT LIST (KIT 1)

QTY	DESCRIPTION	CPN	REFERENCE DESIGNATION
1	74LS374	351-1821-030	U1
2	74LS245	351-1849-020	U2, U117
3	74LS244	351-1841-030	U3, U4, U88
1	74LS42	351-1526-050	U6
1	MC6847	128-0076-001	U11
1	MC1372	128-0076-002	U12
1	74LS00	351-1523-110	U99
1	1 kΩ, 1/4 W, 5%	745-0748-000	R1
1	2 kΩ, 1/4 W, 5%	745-0759-000	R2
1	5.6 kΩ, 1/4 W, 5%	745-0775-000	R3
1	750 Ω, 1/4 W, 5%	745-0744-000	R4
1	75 Ω, 1/4 W, 5%	745-0708-000	R5
2	240 Ω, 1/4 W, 5%	745-0726-000	R6, R7
1	10-kΩ trimmer	382-0012-290	R8
17	0.1-μF capacitor	913-3279-200	C1, C3, C4, C8, C9 to C21
1	47-pF capacitor	913-1098-020	C2
1	56-pF capacitor	913-4003-000	C5
1	0.01-μF capacitor	913-3281-320	C7
1	9- to 35-pF trimmer	917-1225-000	C6
1	0.001-μF capacitor	913-3281-270	C135
1	1-μH coil, adj	242-0447-220	L1
1	Phono jack		J2
1	Bracket, mtg	763-7388-004	-
2	Screw, 0.25 in, 4-40	343-0133-000	-
2	Nut, hex, 4-40	313-0132-000	-

3.0 FUNCTION COMPONENTS KIT LIST (KIT 2)

QTY	DESCRIPTION	CPN	REFERENCE DESIGNATION
1	LM319N	351-1166-010	U89
1	74LS112	351-1525-030	U90
7	74LS374	351-1821-030	U91, U92, U96, U102, U104, U105, U106
4	4051	351-8236-010	U93, U95, U110, U111
* 5	LF356N — 351 N	351-1287-040	U94, U97, U109, U130, U131
1	2502	128-0076-003	U100
3	1408	351-1152-010	U101, U107, U108
1	LM340T-15	351-1120-050	U114
1	555	351-1137-020	U115
1	74LS245	351-1849-020	U117
1	74LS00	351-1523-110	U121
1	4053	351-8236-020	U122
1	74LS123	351-1699-020	U123
1	LM318	351-1153-040	U124
1	LM317MP	128-0076-005	U125
1	LM337MP	128-0076-007	U126
2	LM340LAZ-5	128-0076-006	U127, U128
1	LM320LZ-5	128-0076-008	U129
1	2N2222A	352-0661-020	Q1
1	2N2907A	352-0551-010	Q2
2 ← 1	MRD370	128-0076-004	Q3
3	1N5415 — 1415	353-6558-010	CR1, CR2, CR3
2	1 kΩ, 1/8 W, 5%	745-1863-490	R9, R41
2	100 Ω, 1/8 W, 5%	745-1863-250	R11, R12
3	10 kΩ, 1/8 W, 5%	745-1863-730	R49, R48, R39
2	2 kΩ, 1/8 W, 5%	745-1863-560	R15, R17
8 ← 9 (19)	3 kΩ, 1/8 W 5%	745-1863-600	R22, R23, R24, R28, R29, R30, R33, R34, R35
1	27 kΩ, 1/8 W, 5%	745-1863-830	R36
1	2.4 kΩ, 1/8 W, 5%	745-1863-580	R46
3	4.7 kΩ, 1/8 W, 5%	745-1863-650	R38, R47, R55
1	36 kΩ, 1/8 W, 5%	745-1863-860	R49
1	150 kΩ, 1/8 W, 5%	745-1864-050	R50
1	300 kΩ, 1/8 W, 5%	745-1864-120	R51
3	1.5 kΩ, 1/8 W, 5%	745-1863-530	R45, R54, R67
10 (21)	47 Ω, 1/8 W, 5%	745-1863-170	R58, R59, R60, R61, R62, R63, R64, R65, R66, R67
2	20 Ω, 1/8 W, 5%	745-1863-080	R56, R57
1	120 Ω, 1/8 W, 5%	745-1863-270	R19
1	240 Ω, 1/8 W, 5%	745-1863-340	R13
4 1	45.3 Ω, 1 W, 1%	747-2178-970	R16
1	2-kΩ trimmer	382-0012-270	R20
4	5-kΩ trimmer	382-0012-280	R21, R25, R31, R14
3	10-kΩ trimmer	382-0012-290	R10, R26, R32
1	20-kΩ trimmer	382-0012-300	R53
1	100-kΩ trimmer	382-0012-330	R37
1	1-MΩ trimmer	382-0012-370	R52
3	1-MΩ network	350-4030-150	R42, R43, R44

4.0 AUXILIARY MEMORY COMPONENTS KIT LIST (KIT 3)

QTY	DESCRIPTION	CPN	REFERENCE DESIGNATION
1	74LS245	351-1849-020	U116
4	74LS138	351-1526-030	U25, U26, U83, U84
1	74LS244	351-1841-030	U103
34	0.1-µF capacitor	913-3279-200	C22 to C55
1	0.1-µH coil	240-2715-000	L2
1	47 µF, 35 V, T	184-9102-890	C66
1	47 µF, 20 V, T	184-9102-190	C67
3	10 µF, 20 V, T	184-9102-170	C68, C73, C74
2	0.01 µF ceramic	913-3279-110	C70, C71
1	15 µF, 20 V, T	184-9086-490	C72
3	15 pF, mica	912-4141-130	C76, C83, C92
3	68 pF, mica	912-4141-330	C79, C86, C95
1	82 pF, mica	912-4141-350	C98
57	0.1 µF, ceramic	913-3279-200	C69, C130, C131, C132, C77, C78, C80, C81, C75, C87, C88, C82, C84, C85, C89, C90, C113, C114, C91, C93, C94, C96, C97, C104, C105, C106, C107, C108, C109, C110, C111, C112, C100, C101, C102, C103, C99, C115, C116, C117, C118, C119, C120, C121, C122, C123, C124, C125, C126, C127, C128, C129, C130, C131, C132, C133, C134
6 ft	Shielded, twisted pair	439-0650-000	-
6 in	Tubing, alum, 0.200 ID	804-3084-022	-
1	Screw, 0.25 in 4-40	343-0133-000	-
1	Nut, hex 4-40	313-0132-000	-

5.0 SOCKET KIT LIST (KIT 4)

QTY	DESCRIPTION	CPN	REFERENCE DESIGNATION
7	8-pin socket	220-0075-010	
12	14-pin socket	220-0075-020	
19	16-pin socket	220-0075-110	
68	18-pin socket	220-0075-090	
17	20-pin socket	220-0075-080	
1	24-pin socket	220-0075-130	
1	40-pin socket	220-0075-150	

GPHØ4
AIM-65 GRAPHICS SOFTWARE

KICH
KETCHAM
6-5-8Ø

*** PRELIMINARY COPY ***

THIS ~~DOCUMENT~~ IS INTENDED IS PROVIDE INSTRUCTIONS IN THE USE OF THE UNIVERSAL POINT PLOT SOFTWARE "GPHØ4". GPHØ4 IS UNIVERSAL IN THAT IT IS CAPABLE OF PLOTTING DATA ~~GRAPHICS WILL~~ ~~UTILIZING~~ REGARDLESS OF THE VDG GRAPHICS MODE IN USE, THOSE MODES ARE LISTED BELOW

	MODE LATCH COEF.	VDG GRAPHICS MODE $(X,Y)_{MAX}$		COLOR PLOT OR ON-OFF } DGT CAPABILITIES
CSS = 1	$ F8 (248_{10})	64 × 64	⑧ ⓪	3 COLORS + OFF
	$ F9 (249_{10})	128 × 64	② ①	ON-OFF
	$ FA (250_{10})	128 × 64	③ ②	3 COLORS + OFF
	$ FB (251_{10})	128 × 96	④ ③	ON-OFF
	$ FC (252_{10})	128 × 96	⑤ ④	3 COLORS + OFF
	$ FD (253_{10})	128 × 192	⑥ ⑤	ON-OFF
	$ FE (254_{10})	128 × 192	⑦ ⑥	3 COLORS + OFF
	$ FF (255_{10})	256 × 192	⑨ ⑦	ON-OFF
CSS = Ø	$ FØ (240_{10})	SEE ⓪		
	$ F1 (241_{10})	" ①		
	$ F2 (242)	" ②		
	$ F3 (243)	" ③		
	$ F4 (244)	" ④		
	$ F5 (245)	" ⑤		
	$ F6 (246)	" ⑥		
	$ F7 (247)	" ⑦		

GPHØ4

GPHØ4 IS ESSENTIALLY A COLLECTION OF ~~ONE GIANT~~ SUBROUTINES THAT ARE ~~IS~~ VDG GRAPHICS MODE INDEPENDENT AND AS SUCH, REQUIRES VARIOUS ~~PARAMEN~~ PARAMETERS TO BE SUPPLIED BY THE USER PRIOR TO SUBROUTINE EXECUTION. THESE ARE:

NAME	LOCATION	~~PURPOSE~~ PURPOSE
"MODE"	$7FFØ ($32752_{10}$)	THIS VARIABLE INFORMS THE SUBROUTINE WHAT MODE THE VDG CHIP IS IN. THIS VARIABLE SHOULD BE IDENTICAL TO THE VALUE STORED AT $DFFF ($40959_{10}$) AND NEED ONLY BE UPDATED AS OFTEN AS MODES OF THE VDG ARE CHANGED
"XGRAPH"	$7FF9 ($32761_{10}$)	THIS VARIABLE ~~CAN~~ SHOULD BE LOADED WITH THE X COORDINATE OF THE DATA POINT TO BE PLOTTED. SINCE THIS VARIABLE IS ONE BYTE IN LENGTH THE

VALUE OF XGRAPH MUST BE IN THE FOLLOWING RANGE

$\emptyset \leq$ XGRAPH ≤ 255

EXECUTION OF GPHØ4 WILL NOT ALTER THE CONTENTS OF XGRAPH. IF THE VALUE OF XGRAPH EXCEEDS THE CAPABILITIES OF THE VDG GRAPHICS MODE, GPHØ4 WILL NOT ACT (PLOT, ERASE, ECT.) ON THE PLOT POINT

~~"YGRAPH" $7FFA (32762)~~

"YGRAPH" $7FFA (32762) IS THE Y COORDINATE ~~TO BE A L~~ OF THE DATA POINT TO BE ACTED UPON BY GPHØ4. ITS DESCRIPTION IS IDENTICAL TO "XGRAPH"

"COLORP" $7FF2 (32754) THIS VARIABLE ~~IS USED BY THOSE~~ REPRESENTS THE COLOR ~~OF~~ THE PLOTTED POINT IS TO ACQUIRE AND IS USED ONLY BY THOSE GRAPHICS

MODES CAPABLE OF COLOR PLOTS (I.E. MODE 0, 2, 4 & 6), THE VALID VALUES FOR COLORP ARE:

COLOR CODES

0: COLOR SAME AS BORDER. (= OFF)

1: COLOR ONE

2: COLOR TWO

3: COLOR THREE

GPH04 WILL NOT ALTER THE ~~FFF~~ CONTENTS OF COLORP

COLORC $7FF3 (32755$_{10}$) THIS VARIABLE IS IDENTICAL TO "COLORP" BUT WHOSE USE WILL BE EXPLAINED ~~BELOW~~ LATER

PLMODE $7FFF (32767$_{10}$) PLOT MODE THIS IS THE MAIN VARIABLE USED BY ~~PLMODE~~ GPH04 AND IS USED TO INSTRUCT GPH04 WHAT FUNCTION TO PERFORM ON THE ~~DOT~~ DATA POINT ~~NUMBER~~

CONTAINED IN (XGRAPH, YGRAPH)

PLMODE CAN HAVE THE FOLLOWING VALUES:

PLMODE VALUE	FUNCTION
0:	ERASE DATA POINT CONTAINED IN (XGRAPH, YGRAPH)
1:	PLOT DATA POINT CONTAINED IN (XGRAPH, YGRAPH). IF THE VDG IS IN A COLOR PLOT MODE, (XGRAPH, YGRAPH) WILL BE PLOTTED IN THE COLOR CORRESPONDING TO THE VALUE IN "COLORP"
2:	GPHØ4 WILL INSPECT THE DATA POINT CONTAINED IN (XGRAPH, YGRAPH). IF THE DATA POINT IS 'OFF' {ON-OFF PLOT MODES} OR EQUAL TO COLOR CODE Ø {COLOR PLOT MODES} GPHØ4 WILL SET "STATUS" = Ø. IF (XGRAPH, YGRAPH) IS "ON" OR EQUAL TO COLOR CODES 1, 2 OR 3, STATUS WILL BE SET EQUAL TO 1

THE FOLLOWING PLOT MODES. WILL ONLY FUNCTION WHEN THE UDG IS IN A COLOR PLOT MODE.

3: THIS MODE WILL SET THE DATA POINT: (XGRAPH, YGRAPH) TO COLOR CODE Ø IFF (XGRAPH, YGRAPH) CONTAINS A COLOR CODE EQUAL TO THAT CONTAINED IN "COLORC", THIS ALLOWS THE USER TO SELECTIVELY ERASE DATA POINTS FROM A REGION, BASED ON COLOR.

4: THIS MODE WILL PLOT THE DATA POINT: (XGRAPH, YGRAPH) IN THE COLOR ~~CODE~~ CODE CONTAINED IN "COLORP" IFF (XGRAPH, YGRAPH) CONTAINS A COLOR CODE EQUAL TO THAT CONTAINED IN "COLORC". THIS ALLOWS THE USER TO SELECTIVELY PLOT DATA POINTS INTO A REGION, BASED ON ~~THE~~ COLOR

5: THIS MODE WILL INSPECT THE DATA POINT: (XGRAPH, YGRAPH) AND SET ~~SET~~ "STATUS" = 1 IFF (XGRAPH, YGRAPH) CONTAINS THE

COLOR CODE CONTAINED IN "COLORC".
IF (THE COLOR CODE OF XGRAPH, YGRAPH) DOES
NOT MATCH THE CODE CONTAINED IN
"COLORC", "STATUS" WILL BE SET
Ø. THIS MODE CAN BE USED
TO DETECT THE PRESENCE OF
DATA POINTS OF A CERTAIN COLOR
WITHIN A GIVEN RANGE.

~~STATUS $FFF~~

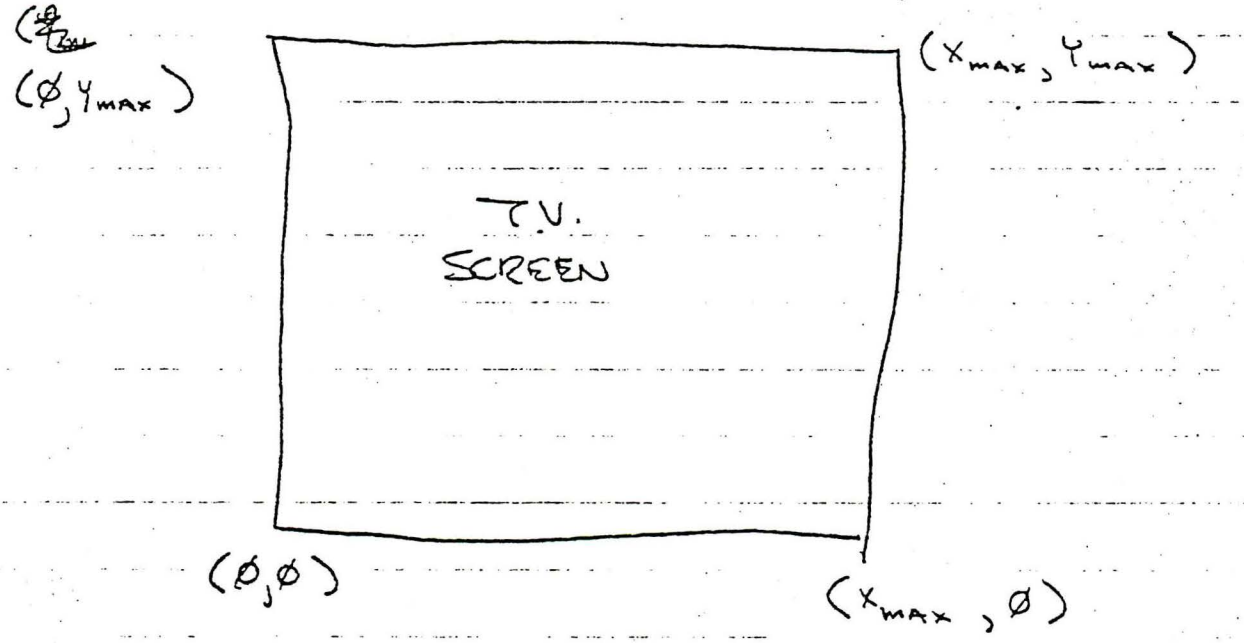
GPHØ4 WILL NOT ALTER
THE CONTENTS OF "PLMODE"

"STATUS" $7FFB ($(32763)_{10}$)

THIS VARIABLE CONTAINS
DATA SUPPLIED BY
GPHØ4 WHEN PLOT
MODES 2 & 5 ARE
EXECUTED.

SPECIAL NOTES ON USE

(1) GPHØ4 USES THE FOLLOWING FORMAT
FOR PLOTTING:



VDG MODE (PLOT MODE) {CSS = 1 OR Ø}	X_{MAX}	Y_{MAX}
Ⓞ	63	63
1	127	63
2	127	63
3	127	95
4	127	95
5	127	191
6	127	191
7	255	191

IF ^ XGRAPH OR YGRAPH EXCEED X_{MAX} OR Y_{MAX} WHEN GPHØ4 IS USED, GPHØ4 WILL NOT ACT UPON (XGRAPH, YGRAPH).

② GPHØ4 CONSISTS OF 3 PROGRAM MODULES (SUBROUTINES). THESE ARE

1) "PLOT": THIS SUBROUTINE HAS JUST BEEN DESCRIBED. WHEN THIS SUBROUTINE IS EXECUTED THE CONTENTS OF THE ACC, X & Y REGISTERS ARE LOST. THE ENTRY POINT OF "PLOT" IS $9857 ($39767_{10}$)

2) "PLOTDR": THIS SUBROUTINE IS IDENTICAL TO "PLOT" WITH THE EXCEPTION THAT THE CONTENTS OF THE ACC., X & Y REGISTERS ARE NOT DESTROYED. THE ENTRY POINT OF "PLOTDR" IS $9BØØ ($39680_{10}$) THIS IS THE SUBROUTINE THAT THE AIM-65 BASIC SHOULD USE WHEN USING ~ GPHØ4.

3) "CLEAR" IS A SPECIALIZE SUBROUTINE THAT WILL INCREMENT XGRAPH & YGRAGH THROUGH THE FOLLOWING RANGES.

XGRAPH: Ø → X_{MAX}

YGRAPH: Ø → Y_{MAX}

FOR EACH COMBINATION OF XGRAPH, YGRAPH "CLEAR" WILL EXECUTE "PLOT". THE RESULT OF EXECUTING "CLEAR" DEPENDS ON THE CODE PRESENT IN "PLMODE". IE: IF PLMODE = Ø, "CLEAR" WILL CLEAR THE SCREEN. IF PLMODE = 1, "CLEAR" WILL FLOOD THE SCREEN (IF THE VDG IS IN A COLOR GRAPHICS MODE THE SCREEN WILL FLOOD WITH THE COLOR EQUAL TO THE COLOR CODE IN "COLORP".) THE AUTHOR WILL LET THE USER'S EXPERIMENT WITH USING "CLEAR" WITH "PLMODE" = 3 & 4. THE ENTRY POINT OF "CLEAR" IS $9B0C ($39691_{10}$). THE VALUES OF X_{MAX} & Y_{MAX} USED IN THIS SUBROUTINE ARE DEPENDENT ON THE BIT PATTERN STORED IN "MODE" $7FFØ ($32752_{10}$)

(3) THE SUBROUTINES IN GPHØ4 UTILIZE THE FOLLOWING MEMORY LOCATIONS:

$ØØFØ ($240_{10}$) → $ØØF1 ($241_{10}$)

$7FFØ ($32752_{10}$) → $7FFF ($32767_{10}$)

ASIDE FROM THOSE LOCATIONS MENTIONED ABOVE AS REQUIRING USER INPUT, USERS ~~ABO~~ OF GPHØ4 MUST NOT UTILIZED THESE MEMORY LOCATIONS ~~[illegible]~~

(4) GPHØ4 OCCUPIES THE FOLLOWING MEMORY REGION ~~OF~~ IN THE PROTOTYPE EPROM

$9BØØ ($39680_{10}$) → $9CCF ($40143_{10}$)

THIS LEAVES ≈ ~~760~~ 86Ø BYTES OF UNALLOCATED EPROM MEMORY FROM $9CDØ ($40144_{10}$) → $9FF7 ($40951_{10}$)

(5) THIS IS PROTOTYPE SOFTWARE AND FUTURE VERSIONS MAY NOT ~~MAINTAIN~~ KEEP THE VARIABLE ADDRESSES SET FORTH IN THIS VERSION

(6) ~~GE~~ GO TO IT AND HAVE FUN WITH THIS STUFF

(7) VDGØD ~~[illegible]~~, THE ALPHA-NUMERIC ~~[illegible]~~ SOFTWARE COVERED IN A PREVIOUS DOCUMENT IS PRESENT IN YOUR EPROMS. CONSULT ITS ~~[illegible]~~ DOCUMENT FOR ~~ES~~ USE & OPERATION.

Rick Ketcham
6-5-80

```
==0000
;FILE  GPH04
==0000 PLXY=$EBAC

==0000 PHXY=$EB9E

==0000
       *=$00F0
==00F0 BASE
       *=*+2
==00F1
       *=$7FF0
==7FF0 MODE
       *=*+1
==7FF1 MINDEX
       *=*+1
==7FF2 COLORP
       *=*+1
==7FF3 COLORC
       *=*+1
==7FF4 COLOR0
       *=*+1
==7FF5 COLOR1
       *=*+1
==7FF6 MASK
       *=*+1
==7FF7 BITPOS
       *=*+1
==7FF8 INDEX
       *=*+1
==7FF9 XGRAPH
       *=*+1
==7FFA YGRAPH
       *=*+1
==7FFB STATUS
       *=*+1
==7FFC WCOMP
       *=*+1
==7FFD BYTE0
       *=*+1
==7FFE BYTE1
       *=*+1
==7FFF PLMODE
       *=*+1
==8000
       *=$9B00
==9B00 PLOTDR
209EEB JSR PHXY
48     PHA
205718 JSR PLOT
20ACEB JSR PLXY
68     PLA
60     RTS
```

GPHØ4
ASSEMBLY
LISTING

6-5-80

KETCHAM

```
==9B00 CLEAR
48     PHA
20DEEB JSR PHXY
A900   LDA #0
8DF97F STA XGRAPH
8DFA7F STA YGRAPH
==9B11 CLEAR1
205738 JSR PLOT
EEFA7F INC YGRAPH
ACF17F LDY MINDEX
B9C03C LDA YMAX,Y
CDFA7F CMP YGRAPH
B0EF   BCS CLEAR1
==9B1D
A900   LDA #0
8DFA7F STA YGRAPH
EEF97F INC XGRAPH
ACF17F LDY MINDEX
B9B83C LDA XMAX,Y
CDF97F CMP XGRAPH
==9B2A
D0DC   BNE CLEAR1
A900   LDA #0
8DFA7F STA YGRAPH
==9B34 CLEAR2
205738 JSR PLOT
EEFA7F INC YGRAPH
ACF17F LDY MINDEX
B9C03C LDA YMAX,Y
CDFA7F CMP YGRAPH
B0EF   BCS CLEAR2
==9B41
20ADEB JSR PLXY
68     PLA
60     RTS
==9B47 PLOT
ADF87F LDA MODE
2907   AND #$07
8DF17F STA MINDEX
A8     TAY
B9B83C LDA XMAX,Y
CDF97F CMP XGRAPH
B001   BCS PLOT00
==9B5C
60     RTS
==9B5D PLOT00
B9C03C LDA YMAX,Y
CDFA7F CMP YGRAPH
B001   BCS PLOT01
60     RTS
==9B67 PLOT01
38     SEC
ADFA7F SBC YGRAPH
8DFB7F STA YCOMP
A900   LDA #0
8DFC7F STA STATUS
8DFD7F STA BITPOS
A001   LDA #1
```

```
==9BE3
ADF1?? LDA MINDEX
4A     LSR A
ADF9?? LDA XGRAPH
9001   BCC PLOT02
E8     INX
==9BED PLOT02
4A     LSR A
38     SEC
2EF7?? ROL BITPOS
CA     DEX
D0F8   BNE PLOT02
8DF8?? STA INDEX
ADF9?? LDA XGRAPH
2DF7?? AND BITPOS
==9BFE
8DF7?? STA BITPOS
A204   LDX #4
ADFC?? LDA YCOMP
85F0   STA BASE
A900   LDA #0
85F1   STA BASE+1
==9C04 PLOT04
06F0   ASL BASE
26F1   ROL BASE+1
CA     DEX
D0F9   BNE PLOT04
AEF1?? LDX MINDEX
BDC8?? LDA TYPE,X
F004   BEQ PLOT05
06F0   ASL BASE
==9C13
26F1   ROL BASE+1
==9C17 PLOT05
18     CLC
A5F1   LDA BASE+1
6980   ADC #$80
85F1   STA BASE+1
ACF8?? LDY INDEX
B1F0   LDA (BASE),Y
8DFD?? STA BYTE0
ADF1?? LDA MINDEX
==9C2A
4A     LSR A
9003   BCC PLOT06
4C77?? JMP PLOT14
==9C30 PLOT06
A903   LDA #3
8DF6?? STA MASK
ADF2?? LDA COLORP
8DF4?? STA COLOR0
ADF3?? LDA COLORC
8DF5?? STA COLOR1
```

```
==9BE3
A903    LDA #3
38      SEC
EDF7??  SBC BITPOS
A8      TAY
F015    BEQ PLOT07
==9BF1  PLOT08
0EF4??  ASL COLOR0
0EF4??  ASL COLOR0
0EF5??  ASL COLOR1
0EF5??  ASL COLOR1
0EF6??  ASL MASK
0EF6??  ASL MASK
==9C0?
88      DEY
D0EB    BNE PLOT08
==9C06  PLOT07
ADF6??  LDA MASK
2DFD??  AND BYTE0
8DFE??  STA BYTE1
ADF6??  LDA MASK
49FF    EOR #255
2DFD??  AND BYTE0
==9C1?
8DFD??  STA BYTE0
ADFF??  LDA PLMODE
C900    CMP #0
F042    BEQ PLOT09
C901    CMP #1
F039    BEQ PLOT0A
C902    CMP #2
==9C1?
F03?    BEQ PLOT0B
C903    CMP #3
F02?    BEQ PLOT0C
C904    CMP #4
F02?    BEQ PLOT0D
C905    CMP #5
F001    BEQ PLOT0E
60      RTS
==9C??  PLOT0E
ADFE??  LDA BYTE1
CDF5??  CMP COLOR1
D005    BNE PLOT0F
A901    LDA #1
8DFB??  STA STATUS
==9C4?  PLOT0F
60      RTS
==9C44  PLOT0D
ADFE??  LDA BYTE1
CDF5??  CMP COLOR1
F001    BEQ PLOT0A
60      RTS
```

```
==9C4D PLOT0A
ADF4FF LDA COLOR0
18     CLC
6DFDFF ADC BYTE0
ACF8FF LDY INDEX
91F0   STA (BASE),Y
60     RTS
==9C5A PLOT0C
ADFEFF LDA BYTE1
CDF5FF CMP COLOR1
F001   BEQ PLOT09
60     RTS
==9C63 PLOT09
ADFDFF LDA BYTE0
ACF8FF LDY INDEX
91F0   STA (BASE),Y
60     RTS
==9C71 PLOT0B
ADFEFF LDA BYTE1
F005   BEQ PLOT10
A901   LDA #1
8DFBFF STA STATUS
==9C7E PLOT10
60     RTS
==9C7F PLOT14
A980   LDA #$80
8DF6FF STA MASK
ACF7FF LDY BITPOS
F006   BEQ PLOT11
==9C8A PLOT12
4EF6FF LSR MASK
88     DEY
D0FA   BNE PLOT12
==9C90 PLOT11
ADF6FF LDA MASK
2DFDFF AND BYTE0
8DFEFF STA BYTE1
ADF6FF LDA MASK
49FF   EOR #255
2DFDFF AND BYTE0
==9C9E
8DFDFF STA BYTE0
ADFFFF LDA PLMODE
C900   CMP #0
F0C1   BEQ PLOT09
C901   CMP #1
F005   BEQ PLOT13
C902   CMP #2
==9CA9
F0C2   BEQ PLOT0B
60     RTS
```

```
==9C83 PLOT13
ADFD   LDA BYTE0
18     CLC
6DF6   ADC MASK
ACF8   LDY INDEX
91F0   STA (BASE),Y
60     RTS
==9C38 XMAX
3F     .BYT 63,127,1
27,127,127,127,127,2
55
7F
7F
7F
7F
7F
7F
FF
==9CCC YMAX
3F     .BYT 63,63,63
,95,?F,191,191,191
3F
3F
5F
5F
BF
BF
BF
==9C11 TYPE
00     .BYT 0,0,1,0,
1,0,. 1
00
01
00
01
00
01
01
        E,D
 ERR:-0= 0000
```

```
                PASS 1
9CD0            PASS 2
0000            ; FILE GPH04
0000  PLXY=$EBAC
0000  PHXY=$EB9E
0000                    *=$00F0
00F0  BASE              *=*+2
00F2                    *=$7FF0
7FF0  MODE              *=*+1
7FF1  MINDEX            *=*+1
7FF2  COLORP            *=*+1
7FF3  COLORC            *=*+1
7FF4  COLOR0            *=*+1
7FF5  COLOR1            *=*+1
7FF6  MASK              *=*+1
7FF7  BITPOS            *=*+1
7FF8  INDEX             *=*+1
7FF9  XGRAPH            *=*+1
7FFA  YGRAPH            *=*+1
7FFB  STATUS            *=*+1
7FFC  YCOMP             *=*+1
7FFD  BYTE0             *=*+1
7FFE  BYTE1             *=*+1
7FFF  PLMODE            *=*+1
8000                    *=$9B00
9B00  PLOTDR  209EEB    JSR PHXY
9B03          48        PHA
9B04          20579B    JSR PLOT
9B07          20ACEB    JSR PLXY
9B0A          68        PLA
9B0B          60        RTS
9B0C  CLEAR   48        PHA
9B0D          209EEB    JSR PHXY
9B10          A900      LDA #0
9B12          8DF97F    STA XGRAPH
9B15          8DFA7F    STA YGRAPH
9B18  CLEAR1  20579B    JSR PLOT
9B1B          EEFA7F    INC YGRAPH
9B1E          ACF17F    LDY MINDEX
9B21          B9C09C    LDA YMAX,Y
9B24          CDFA7F    CMP YGRAPH
9B27          B0EF      BCS CLEAR1
9B29          A900      LDA #0
9B2B          8DFA7F    STA YGRAPH
9B2E          EEF97F    INC XGRAPH
9B31          ACF17F    LDY MINDEX
9B34          B9B89C    LDA XMAX,Y
9B37          CDF97F    CMP XGRAPH
9B3A          D0DC      BNE CLEAR1
9B3C          A900      LDA #0
9B3E          8DFA7F    STA YGRAPH
```

```
9B41 CLEAR2  20579B JSR PLOT
9B44         EEFA7F INC YGRAPH
9B47         ACF17F LDY MINDEX
9B4A         B9C09C LDA YMAX,Y
9B4D         CDFA7F CMP YGRAPH
9B50         B0EF   BCS CLEAR2
9B52         20ACEB JSR PLXY
9B55         68     PLA
9B56         60     RTS
9B57 PLOT    ADF07F LDA MODE
9B5A         2907   AND #7
9B5C         8DF17F STA MINDEX
9B5F         A8     TAY
9B60         B9B89C LDA XMAX,Y
9B63         CDF97F CMP XGRAPH
9B66         B001   BCS PLOT00
9B68         60     RTS
9B69 PLOT00  B9C09C LDA YMAX,Y
9B6C         CDFA7F CMP YGRAPH
9B6F         B001   BCS PLOT01
9B71         60     RTS
9B72 PLOT01  38     SEC
9B73         EDFA7F SBC YGRAPH
9B76         8DFC7F STA YCOMP
9B79         A900   LDA #0
9B7B         8DFB7F STA STATUS
9B7E         8DF77F STA BITPOS
9B81         A202   LDX #2
9B83         ADF17F LDA MINDEX
9B86         4A     LSR A
9B87         ADF97F LDA XGRAPH
9B8A         9001   BCC PLOT02
9B8C         E8     INX
9B8D PLOT02  4A     LSR A
9B8E         38     SEC
9B8F         2EF77F ROL BITPOS
9B92         CA     DEX
9B93         D0F8   BNE PLOT02
9B95         8DF87F STA INDEX
9B98         ADF97F LDA XGRAPH
9B9B         2DF77F AND BITPOS
9B9E         8DF77F STA BITPOS
9BA1         A204   LDX #4
9BA3         ADFC7F LDA YCOMP
9BA6         85F0   STA BASE
9BA8         A900   LDA #0
9BAA         85F1   STA BASE+1
9BAC PLOT04  06F0   ASL BASE
9BAE         26F1   ROL BASE+1
9BB0         CA     DEX
9BB1         D0F9   BNE PLOT04
9BB3         AEF17F LDX MINDEX
```

```
9BE6           BDC89C LDA TYPE,X
9BB9           F004   BEQ PLOT05
9BEB           06F0   ASL BASE
9BBD           26F1   ROL BASE+1
9BBF PLOT05    18     CLC
9BC0           A5F1   LDA BASE+1
9BC2           6980   ADC #$80
9BC4           85F1   STA BASE+1
9BC6           ACF87F LDY INDEX
9BC9           B1F0   LDA (BASE),Y
9BCB           8DFD7F STA BYTE0
9BCE           ADF17F LDA MINDEX
9BD1           4A     LSR A
9BD2           9003   BCC PLOT06
9BD4           4C779C JMP PLOT14
9BD7 PLOT06    A903   LDA #3
9BD9           8DF67F STA MASK
9BDC           ADF27F LDA COLORP
9BDF           8DF47F STA COLOR0
9BE2           ADF37F LDA COLORC
9BE5           8DF57F STA COLOR1
9BE8           A903   LDA #3
9BEA           38     SEC
9BEB           EDF77F SBC BITPOS
9BEE           A8     TAY
9BEF           F015   BEQ PLOT07
9BF1 PLOT08    0EF47F ASL COLOR0
9BF4           0EF47F ASL COLOR0
9BF7           0EF57F ASL COLOR1
9BFA           0EF57F ASL COLOR1
9BFD           0EF67F ASL MASK
9C00           0EF67F ASL MASK
9C03           88     DEY
9C04           D0EB   BNE PLOT08
9C06 PLOT07    ADF67F LDA MASK
9C09           2DFD7F AND BYTE0
9C0C           8DFE7F STA BYTE1
9C0F           ADF67F LDA MASK
9C12           49FF   EOR #255
9C14           2DFD7F AND BYTE0
9C17           8DFD7F STA BYTE0
9C1A           ADFF7F LDA PLMODE
9C1D           C900   CMP #0
9C1F           F042   BEQ PLOT09
9C21           C901   CMP #1
9C23           F028   BEQ PLOT0A
9C25           C902   CMP #2
9C27           F043   BEQ PLOT0B
9C29           C903   CMP #3
9C2B           F02D   BEQ PLOT0C
9C2D           C904   CMP #4
9C2F           F013   BEQ PLOT0D
```

```
9C31           C905    CMP #5
9C33           F001    BEQ PLOT0E
9C35           60      RTS
9C36 PLOT0E    ADFE7F  LDA BYTE1
9C39           CDF57F  CMP COLOR1
9C3C           D005    BNE PLOT0F
9C3E           A901    LDA #1
9C40           8DFB7F  STA STATUS
9C43 PLOT0F    60      RTS
9C44 PLOT0D    ADFE7F  LDA BYTE1
9C47           CDF57F  CMP COLOR1
9C4A           F001    BEQ PLOT0A
9C4C           60      RTS
9C4D PLOT0A    ADF47F  LDA COLOR0
9C50           18      CLC
9C51           6DFD7F  ADC BYTE0
9C54           ACF87F  LDY INDEX
9C57           91F0    STA (BASE),Y
9C59           60      RTS
9C5A PLOT0C    ADFE7F  LDA BYTE1
9C5D           CDF57F  CMP COLOR1
9C60           F001    BEQ PLOT09
9C62           60      RTS
9C63 PLOT09    ADFD7F  LDA BYTE0
9C66           ACF87F  LDY INDEX
9C69           91F0    STA (BASE),Y
9C6B           60      RTS
9C6C PLOT0B    ADFE7F  LDA BYTE1
9C6F           F005    BEQ PLOT10
9C71           A901    LDA #1
9C73           8DFB7F  STA STATUS
9C76 PLOT10    60      RTS
9C77 PLOT14    A980    LDA #$80
9C79           8DF67F  STA MASK
9C7C           ACF77F  LDY BITPOS
9C7F           F006    BEQ PLOT11
9C81 PLOT12    4EF67F  LSR MASK
9C84           88      DEY
9C85           D0FA    BNE PLOT12
9C87 PLOT11    ADF67F  LDA MASK
9C8A           2DFD7F  AND BYTE0
9C8D           8DFE7F  STA BYTE1
9C90           ADF67F  LDA MASK
9C93           49FF    EOR #255
9C95           2DFD7F  AND BYTE0
9C98           8DFD7F  STA BYTE0
9C9B           ADFF7F  LDA PLMODE
9C9E           C900    CMP #0
9CA0           F0C1    BEQ PLOT09
9CA2           C901    CMP #1
9CA4           F005    BEQ PLOT13
9CA6           C902    CMP #2
```

```
9CA8           F0C2    BEQ PLOT0B
9CAA           60      RTS
9CAB PLOT13    ADFD7F  LDA BYTE0
9CAE           18      CLC
9CAF           6DF67F  ADC MASK
9CB2           ACF87F  LDY INDEX
9CB5           91F0    STA (BASE),Y
9CB7           60      RTS
9CB8 XMAX      3F      .BYT 63,127,127,127,127,127,127,255
9CB9           7F
9CBA           7F
9CBB           7F
9CBC           7F
9CBD           7F
9CBE           7F
9CBF           FF
9CC0 YMAX      3F      .BYT 63,63,63,95,95,191,191,191
9CC1           3F
9CC2           3F
9CC3           5F
9CC4           5F
9CC5           BF
9CC6           BF
9CC7           BF
9CC8 TYPE      00      .BYT 0,0,1,0,1,0,1,1
9CC9           00
9CCA           01
9CCB           00
9CCC           01
9CCD           00
9CCE           01
9CCF           01
9CD0                   .END
9CD0            ERRORS= 0000
```

Dec 81

AIM Sloppy I/O Decode Alternative

Tom Lillevig 120-254

I was very happy to see Larry Westergren's article (November Interchange) on a quick way to get more mileage out of the AIM A block. Since I happen to be very cheap, I thought that I would see if the AIM had enough spare gates so that I could do the decoding without having to spend 15 cents for an extra IC. The configuration I came up with is shown below. No traces need to be cut, but you do have to take the board out of your case so that you can run the wires on the backside. All of the extra gates add up to a propagation delay of about half an hour, but it seems to be working so far. I haven't had time to use any of the new memory space, but I will let you know when and what I do (looks like it will be easy to add 2k of 2114's to get four separate blocks of 512 byte memory).