

TECHNICAL NOTES MANUAL CONTENTS

| | | |
|------|--|---------|
| I. | Introduction | |
| | Table of Contents | I-1.1 |
| | Purpose of this manual | I-2.1 |
| | How to use this manual | I-3.1 |
| II. | Problems/Solutions Notes | |
| | Attache resets or "locks up". | II-1.1 |
| | Overscan observed on external monitor. | II-1.1 |
| | CTRL-G "hangs" Attache in terminal mode. | II-1.1 |
| | Softcom 7 bit data transfers don't clear 8th bit. | II-1.1 |
| | Softcom transfers of 1 record or >256 records. | II-1.1 |
| | Multiplan arrow keys not functioning. | II-1.1 |
| | Communications BREAK key doesn't function properly. | II-1.1 |
| | Graphics escape codes misplace points. | II-1.1 |
| | Sound Generator register 0 misloaded. | II-1.1 |
| | System tracks destroyed on some diskettes. | II-1.1 |
| | Clock/calendar can not be accessed with compiled BASIC | II-1.1 |
| III. | Operator/Product Notes | |
| | Power on/off procedure | III-1.1 |
| | Transporting your Attache | III-2.1 |
| | Communications break key | III-3.1 |
| | Disk drive head cleaning | III-4.1 |
| | CP/M 2.2 | III-5.1 |
| | Demo Disk 7/29/82 | III-6.1 |
| | Evaluation Disk 7/29/82 | III-7.1 |
| | Demo Disk Rev. A | III-8.1 |
| | CP/M 2.2.3 | III-9.1 |
| IV. | Firmware Notes | |
| | Rev. F Monitor EPROM | IV-1.1 |
| | VT-52 terminal emulation | IV-2.1 |
| | Rev. G Monitor EPROM | IV-3.1 |

| | |
|--|----------|
| V. Software Notes | |
| MBASIC serial port access | V-1.1 |
| CP/M IOBYTE Implementation | V-2.1 |
| BIOS 2.3.3 update | V-3.1 |
| Changing keyboard characters | V-4.1 |
| Charton data file format | V-5.1 |
| Polygon Fill routine | V-6.1 |
| CMOS RAM allocation | V-7.1 |
| Softcom with the Xerox 820 | V-8.1 |
| MBASIC PORTS program | V-9.1 |
| AUTO boot utility | V-10.1 |
| MOVSYS utility | V-11.1 |
| GETSYS/PUTSYS utilities | V-12.1 |
| Programming BAUD rates | V-13.1 |
| VI. Hardware Notes | |
| Attache I/O Ports | VI-1.1 |
| Interrupt I/O | VI-2.1 |
| Sound Generator | VI-3.1 |
| Display subsystem | VI-4.1 |
| Programming the Z80 CTC | VI-5.1 |
| Attache disk format | VI-6.1 |
| VII. Service Notes | |
| Attache electrostatic discharge protection | VII-1. |
| CRT alignment procedure | VII-2.1 |
| Monitor EPROM removal/installation | VII-3.1 |
| TEAC disk drive removal/installation | VII-4.1 |
| 6301 data separator PROM | VII-5.1 |
| interpreting Z test errors | VII-6.1 |
| Remex drive spindle speed adjustment | VII-7.1 |
| Serial ports MBASIC test program | VII-8.1 |
| VIII. Printer Notes | |
| Popular Printer switch settings | VIII-1.1 |
| IX. Communication Notes | |
| EIA RS-232C interface | IX-1.1 |
| X. Multifunction Board Notes | |
| XI. Attache Demonstration Diskette | |
| XII. WordStar Printer Installation | |
| XIII. Attache Expansion Port Interface | |

Purpose of the Technical Notes

The Technical Notes are intended to supplement the Attache manuals with additional technical information which may not be documented elsewhere. The Attache Technical Notes, the Attache Technical Manual and the Attache Service Guide should be available to any technical person working with the Attache. Some users, especially large accounts, may also find the Attache Technical Notes helpful.

While every attempt was made to verify the technical information contained herein, suggestions, comments, and corrections are appreciated. Please use the form enclosed.

Otrona Advanced Systems makes no representations or warranties with respect to the contents hereof and especially disclaims any implied warranties of merchantability or fitness for any particular purpose. Further, Otrona Advanced Systems reserves the right to revise this publication and to make changes from time to time in the content without obligation of Otrona Advanced Systems to notify any person of such revisions or changes.

Otrona Advanced Systems
4755 Walnut Street
Boulder, CO 80301
(303) 444-8100

How to use the Technical Notes

The Attache Technical Notes are divided into 13 major sections:

- I. Introduction
- II. Problems/Solutions Notes
- III. Operator/Product Notes
- IV. Firmware Notes
- V. Software Notes
- VI. Hardware Notes
- VII. Service Notes
- VIII. Printer Notes
- IX. Communication Notes
- X. Multifunction Board Notes
- XI. Attache Demo Diskette Documentation
- XII. WordStar Printer Installation
- XIII. Attache Expansion Port Interface

Each page of the Attache Technical Notes has a footing which consists of a section number, note number, and page number for easy reference.

The purpose of each section is summarized below:

I. Introduction

The introduction section contains the current Table of Contents, the purpose of the Attache Technical Notes, and an explanation of how to use it.

II. Problems/Solutions Notes

The Problems/Solutions section is where to look for common "bugs" that inevitability end up even in a product as well designed as the Attache. Listed with each problem is a recommended solution and a reference to more information.

III. Operator/Product Notes

The Operator section gives hints on usage of the Attache. Attache products are also documented in this section. The release date, version, and contents are listed for each product.

IV. Firmware Notes

The Firmware section gives technical information about the Attache's various ROM's, PROM's, and EPROM's.

V. Software Notes

The Software section contains various information about Attache software including features of CP/M, file formats, usage instructions, and other general hints.

VI. Hardware Notes

The Hardware section provides the information needed for accessing the various devices of the Attache.

VII. Service Notes

The Service section details various diagnostic problems, procedures, and specifications.

VIII. Printer Notes

The Printer section summarizes interfacing information for many of the popular printers available.

IX. Communication Notes

The Communication section explains the RS-232C, RS-422, and RS-423 interface standards. It also addresses various technical issues involving computer communications.

X. Multifunction Board Notes

The Multifunction section is devoted to technical hints, etc. about the use of the Attache Multifunction Board.

XI. Attache Demo Diskette Documentation

This document describes each of the Attache demo programs.

XII. WordStar Printer Installation

Instructions for installing letter-quality printers supported by WordStar are found in this section.

XIII. Attache Expansion Port Interface

This document provides a detailed explanation of how to interface to external devices using the Attache's Expansion Port.

TECHNICAL NOTES MANUAL COMMENTS

Please respond to the following questions, then send this form to:

Otron Advanced Systems
Technical Support Department
4755 Walnut Street
Boulder, CO 80301

Your response will help us improve our manuals.

Name: _____

Telephone: _____

Title: _____

Company: _____

Address: _____

Comments, Suggestions, or Corrections:

PROBLEM/SOLUTION NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: Problems and Solutions

| Product | Problem | Cause | Solution | Reference |
|-----------------|--|------------------|--|-------------------------|
| Attache | machine resets or keyboard "hangs" | static discharge | install ground to power supply | X-1.1 |
| Attache | overscan on external monitor | firmware | install Rev. G monitor EPROM | V-1.1 |
| Attache | CTRL-G resets Attache in terminal mode | firmware | install Rev. G monitor EPROM | V-1.1 |
| Softcom | 8th bit not cleared during 7 bit transfers | software | PIP new=old[Z] | CP/M Guide |
| Softcom | transfers of 1 record fail | software | DDT file SAVE 1 file | CP/M Guide |
| Attache | Multiplan arrow keys do not function correctly | CP/M BIOS | install CP/M version 2.2.3 | IV-4.1 VI-3.1 |
| Attache | graphic escape codes misplaced some points | CP/M BDOS | use ASM program & BDOS function 6 - direct I/O | CP/M Guide |
| MBASIC compiler | clock/calendar can not be accessed | | end escape code sequence with a semicolon | Operator Guide page 9-9 |
| Attache | system tracks destroyed on some disks | hardware | power up without diskettes loaded | III-1.1 |

| <u>Product</u> | <u>Problem</u> | <u>Cause</u> | <u>Solution</u> | <u>Reference</u> |
|----------------|---|--------------|------------------------------|------------------|
| Attache | CTRL ^ ,_, - do not produce correct ASCII codes | CP/M BIOS | next release of Attache BIOS | |
| Attache | list status does not work correctly | CP/M BIOS | next release of Attache BIOS | |
| Attache | BREAK key doesn't function properly | CP/M BIOS | next release of Attache BIOS | |
| Attache | register 0 of the sound generator not loaded properly | CP/M BIOS | next release of Attache BIOS | |

OPERATOR NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: Recommended power on/off procedures

The recommended power on procedure is as follows:

1. Place the Attache upright and move the handle to one of its two positions. Set the Attache in an operating position.
2. Release the keyboard by pressing the two tabs at the top of the case. Connect the keyboard cable.
3. Connect the power cord and turn the on/off switch of the Attache to the on position.
4. If a sign on message similiar to the one below does not appear within approx. 30 seconds take your sick Attache to your dealer for a prompt diagnosis of the problem.

OTRONA ATTACHE

NO DISK OR DISK NOT READABLE
NOW IN TERMINAL MODE

5. Insert system diskette in the top drive and reset the machine. If the CP/M signon does not appear within approx. 10 seconds try a backup copy of the system disk.
6. Insert application diskette in the bottom drive and procede.

Refer to the Operators Guide getting started section for more information.

The recommended power off procedure is as follows:

1. Remove the diskettes from the disk drives.

If you have REMEX drives gently close the push tab.

If you have TEAC drives the levers should be left horizontal.

NOTE: Do not open and close drive doors without inserting a diskette. Doing so may cause damage to the head locking mechanism.

2. Turn the power on/off switch of the Attache to the off position and disconnect the power cord.
3. Close the keyboard and move the handle to the carrying position.

Refer to the Operators Guide getting started section for more information.

OPERATOR NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: Transporting your Attache

The Attache is designed to be compact, powerful, and rugged. Outlined below are suggested travel precautions to insure reliable Attache performance trip after trip.

- * Follow the recommended power on/off procedures. (see III-1.1)
- * Use a travel bag if the Attache will be exposed outdoors.
- * Use the plastic shipping bag if the Attache will be exposed to extreme conditions. (i.e. dust, moisture)
- * Allow the Attache to acclimate to operating conditions.
- * The Attache may be x-rayed, however do not allow diskettes to be x-rayed as valuable information may be erased.
- * Do not subject the Attache to sudden shocks or severe vibration. (i.e. don't drop it!)
- * If you are not hand carrying your Attache, ship it only in an Attache shipping carton and use the carboard inserts for the disk drives.

OPERATOR NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: Communications BREAK key

Some mainframe and minicomputers require a BREAK key for certain functions to be performed. CP/M version 2.2.3 and later will produce a break sequence whenever CTRL-LINE FEED is pressed. This key only operates when the operating system is loaded - therefore it will NOT work in Terminal Emulation Mode but will work using Softcom and other communication programs.

OPERATOR NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: Disk Drive Head Cleaning

It is recommended that a commercially available, solvent type, double-sided head cleaning disk be used to clean both REMEX and TEAC disk drive heads. The heads should be cleaned approximately once per month following the procedure below.

- 1) Follow the instructions provided with the cleaning disk for applying the solvent to the cleaning disk.
- 2) Install the double-sided cleaning disk in the drive whose heads are to be cleaned.
- 3) Cold boot the system to enter the ATTACHE's terminal mode.
- 4) Enter the diagnostic mode by typing CTRL-LINE FEED.
- 5) Enter a 'Z' to clean the heads on drive A: or a '1Z' to clean the heads on drive B:.

The test will last approximately 30 seconds before stopping.

The regular cleaning of the disk drive heads will increase media life and improve the accuracy with which the data is transferred to and from the diskette.

PRODUCT NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: CP/M 2.2 system software disk
(shipped prior to November 1982)

NOTICE! This software is obsolete! Do not use!

| Filename.ext | Purpose | Version |
|--------------|--------------------------------------|---------|
| ASM.COM | CP/M 8080 Assembler utility | |
| ED.COM | CP/M line editor program | |
| DDT.COM | CP/M Dynamic Debugging Tool | |
| DUMP.ASM | CP/M file dump utility source | |
| DUMP.COM | CP/M file dump utility program | |
| FORMAT.COM | disk format utility program | 1.4 |
| INSTALL.COM | WordStar printer install utility | 4.2 |
| LOAD.COM | CP/M load HEX file utility | |
| MBASIC.COM | Microsoft BASIC intrepreter | 5.21 |
| PIP.COM | CP/M Perphiperal Interchange Program | |
| STAT.COM | CP/M device status utility | |
| SUBMIT.COM | CP/M batch command utility | |
| SYSDUP.COM | system track copying utility | 1.4 |
| TIME.COM | clock/calendar setting utility | 1.8 |
| WS.COM | WordStar word processing program | 3.00 |
| WSMSGS.OVR | WordStar overlay file | |
| WSOVLY1.OVR | Wordstar overlay file | |
| XSUB.COM | CP/M input redirection for SUBMIT | |

PRODUCT NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: Demo Disk 7/29/82 (CP/M 2.2/1)

NOTICE! This software is obsolete! Do not use!

| Filename.ext | Purpose | Version |
|--------------|--------------------------------------|---------|
| ATTACHE.BAS | MBASIC demo program | 1.0 |
| AXIOM.VAL | VALET overlay file | |
| BACKUP.COM | disk copy utility program | 1.5 |
| BOXES.BAS | MBASIC demo program | 1.0 |
| CIRCLE.BAS | MBASIC demo program | 1.0 |
| COSTANAL.BAS | MBASIC demo program | 1.0 |
| DATE.BAS | MBASIC demo program | 1.0 |
| DDT.COM | CP/M Dynamic Debugging Tool | |
| DISPLAY.BAS | MBASIC demo program | 1.0 |
| DUMMY.VAL | VALET overlay file | |
| EPSON.VAL | VALET overlay file | |
| FORMAT.COM | disk format utility program | 1.5 |
| GO.COM | utility to execute program in memory | |
| GRAPH-N.BAS | MBASIC demo program | 1.0 |
| INSTALL.COM | WordStar printer install utility | 4.2 |
| LABELS.BAS | MBASIC program to create labels | 1.0 |
| MAGAZINE | article text file about the Attache | |
| MAG-ORG | copy of article about the Attache | |
| MAP.BAS | MBASIC demo program | 1.0 |
| MBASIC.COM | Microsoft BASIC (ATTACHE 1.5) | 5.22 |
| MX100.BAS | MBASIC demo program | 1.0 |
| PIP.COM | CP/M Perphiperal Interchange Program | |
| PLOT.BAS | MBASIC demo program | 1.0 |
| PORTS.BAS | MBASIC utility to setup serial ports | 1.0 |
| QUAD.BAS | MBASIC demo program | 1.0 |
| SOFTCOM.COM | communications data transfer program | 1.15 |
| STAT.COM | CP/M device status utility | |
| SUBMIT.COM | CP/M batch command utility | |
| SYSDUP.COM | system track copying utility | 1.5 |
| TIME.BAS | MBASIC demo program | 1.0 |
| TIME.COM | clock/calendar setting utility | 1.8 |
| TWIRL.BAS | MBASIC demo program | 1.0 |
| VALET.VAL | VALET overlay file | |
| WS.COM | WordStar word processing program | 3.00 |
| WSN.COM | WordStar installed for a NEC printer | 3.00 |
| WSMSGS.OVR | WordStar overlay file | |
| WSOVLY1.OVR | Wordstar overlay file | |
| XSUB.COM | CP/M input redirection for SUBMIT | |

PRODUCT NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: Evaluation Disk 7/29/82 (CP/M 2.2/1)

NOTICE! This software is obsolete! Do not use!

| Filename.ext | Purpose | Version |
|--------------|--------------------------------------|---------|
| ATTACHE.BAS | MBASIC demo program | 1.0 |
| AXIOM.VAL | VALET overlay file | |
| BACKUP.COM | disk copy utility program | 1.5 |
| BOXES.BAS | MBASIC demo program | 1.0 |
| CIRCLE.BAS | MBASIC demo program | 1.0 |
| COSTANAL.BAS | MBASIC demo program | 1.0 |
| DATE.BAS | MBASIC demo program | 1.0 |
| DDT.COM | CP/M Dynamic Debugging Tool | |
| DISPLAY.BAS | MBASIC demo program | 1.0 |
| DUMMY.VAL | VALET overlay file | |
| EPSON.VAL | VALET overlay file | |
| FORMAT.COM | disk format utility program | 1.5 |
| GO.COM | utility to execute program in memory | |
| GRAPH-N.BAS | MBASIC demo program | 1.0 |
| INSTALL.COM | WordStar printer install utility | 4.2 |
| LABELS.BAS | MBASIC program to create labels | 1.0 |
| MAGAZINE | article text file about the Attache | |
| MAG-ORG | copy of article about the Attache | |
| MAP.BAS | MBASIC demo program | 1.0 |
| MBASIC.COM | Microsoft BASIC (ATTACHE 1.5) | 5.22 |
| MX100.BAS | MBASIC demo program | 1.0 |
| PIP.COM | CP/M Perphiperal Interchange Program | |
| PLOT.BAS | MBASIC demo program | 1.0 |
| PORTS.BAS | MBASIC utility to setup serial ports | 1.0 |
| QUAD.BAS | MBASIC demo program | 1.0 |
| STAT.COM | CP/M device status utility | |
| SUBMIT.COM | CP/M batch command utility | |
| SYSDUP.COM | system track copying utility | 1.5 |
| TIME.BAS | MBASIC demo program | 1.0 |
| TIME.COM | clock/calendar setting utility | 1.8 |
| TWIRL.BAS | MBASIC demo program | 1.0 |
| VALET.VAL | VALET overlay file | |
| WS.COM | WordStar word processing program | 3.00 |
| WSN.COM | WordStar installed for a NEC printer | 3.00 |
| WSMSGS.OVR | WordStar overlay file | |
| WSOVLY1.OVR | Wordstar overlay file | |
| XSUB.COM | CP/M input redirection for SUBMIT | |

PRODUCT NOTE**Product:** Attache**Supercedes:** N/A

April 15, 1983

Subject: Demo Disk Rev. A (CP/M 2.2.3)

| Filename.ext | Purpose | Version |
|--------------|--------------------------------------|---------|
| ATTACHE.BAS | MBASIC demo program | 1.0 |
| AUTO.COM | "auto boot" utility | 1.7 |
| BACKUP.COM | disk copy utility program | 1.7 |
| BARSAMPL.CHT | Chariton data file | |
| BOXES.BAS | MBASIC demo program | 1.0 |
| CHARTON.BAS | MBASIC business graphics program | 1.1 |
| CHARTONF | polygon fill routine overlay | |
| DATE.BAS | MBASIC demo program | 1.0 |
| DDT.COM | CP/M Dynamic Debugging Tool | |
| DUMP.ASM | CP/M file dump utility source | |
| DUMP.COM | CP/M file dump utility program | |
| FORMAT.COM | disk format utility program | 1.8 |
| GO.COM | utility to execute program in memory | |
| GRAPH-N.BAS | MBASIC demo program | 1.0 |
| INSTALL.COM | WordStar printer install utility | 4.2 |
| LINSAMPL.CHT | Chariton data file | |
| LOAD.COM | CP/M load HEX file utility | |
| MAGAZINE | article text file about the Attache | |
| MAGAZINE.BAK | copy of article about the Attache | |
| MAP.BAS | MBASIC demo program | 1.0 |
| MBASIC.COM | Microsoft BASIC (ATTACHE 1.5) | 5.22 |
| MX100.BAS | MBASIC demo program | 1.0 |
| PIESAMPL.CHT | Chariton data file | |
| PIP.COM | CP/M Perphiperal Interchange Program | |
| PORTS.BAS | MBASIC utility to setup serial ports | 1.0 |
| PRINTER.VL1 | VALET overlay file | |
| SOFTCOM.COM | communications data transfer program | 1.15 |
| STAT.COM | CP/M device status utility | |
| SUBMIT.COM | CP/M batch command utility | |
| SYSDUP.COM | system track copying utility | 1.8 |
| TIME.BAS | MBASIC demo program | 1.0 |
| TIME.COM | clock/calendar setting utility | 1.8 |
| UPDATE.COM | update system tracks utility | 1.0 |
| UPDATE01.SUB | submit file for updating system disk | |
| VALET.VL1 | VALET overlay file | |
| WS.COM | WordStar word processing program | 3.00 |
| WSMSGS.OVR | WordStar overlay file | |
| WSOVLY1.OVR | Wordstar overlay file | |
| XSUB.COM | CP/M input redirection for SUBMIT | |

PRODUCT NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: CP/M 2.2.3 system software disk

| Filename.ext | Purpose | Version |
|--------------|--------------------------------------|---------|
| ASM.COM | CP/M 8080 Assembler utility | |
| ATTACHE.BAS | MBASIC demo program | 1.0 |
| AUTO.COM | "auto boot" utility | 1.7 |
| BACKUP.COM | disk copy utility program | 1.7 |
| BARSAMPL.CHT | Chariton data file | |
| BOXES.BAS | MBASIC demo program | 1.0 |
| CHARTON.BAS | MBASIC business graphics program | 1.1 |
| CHARTONF | polygon fill routine overlay | |
| DATE.BAS | MBASIC demo program | 1.0 |
| DDT.COM | CP/M Dynamic Debugging Tool | |
| DUMP.ASM | CP/M file dump utility source | |
| DUMP.COM | CP/M file dump utility program | |
| ED.COM | CP/M line editor program | |
| FORMAT.COM | disk format utility program | 1.8 |
| GO.COM | utility to execute program in memory | |
| GRAPH-N.BAS | MBASIC demo program | 1.0 |
| INSTALL.COM | WordStar printer install utility | 4.2 |
| LINSAMPL.CHT | Chariton data file | |
| LOAD.COM | CP/M load HEX file utility | |
| MBASIC.COM | Microsoft BASIC (ATTACHE 1.5) | 5.22 |
| PIESAMPL.CHT | Chariton data file | |
| PIP.COM | CP/M Perphiperal Interchange Program | |
| PORTS.BAS | MBASIC utility to setup serial ports | 1.0 |
| PRINTER.VL1 | VALET overlay file | |
| STAT.COM | CP/M device status utility | |
| SUBMIT.COM | CP/M batch command utility | |
| SYSDUP.COM | system track copying utility | 1.8 |
| TIME.BAS | MBASIC demo program | 1.0 |
| TIME.COM | clock/calendar setting utility | 1.8 |
| VALET.VL1 | VALET overlay file | |
| WS.COM | WordStar word processing program | 3.00 |
| WSMSGS.OVR | WordStar overlay file | |
| WSOVLY1.OVR | Wordstar overlay file | |
| XSUB.COM | CP/M input redirection for SUBMIT | |

FIRMWARE NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: Revision F Monitor EPROM

Otrona has completed changes to the monitor EPROM and the new revision is now available to owners of ATTACHE.

Changes that were implemented are:

- a) The initialization of the CRT controller chip has been modified. This modification corrects the overscan problem that has been experienced with some external monitors.
- b) The keyclick volume of the terminal mode has been reduced.
- c) "R" test error reporting has been changed to prevent the rapid scrolling of the error information.
- d) The ADM-3A clear screen and home cursor function (CTRL-Z) has been implemented.
- e) The VT-52 reverse line feed (ESC-I) has been implemented.
- f) The spurious problems caused by a bug with CTRL-G have been fixed.
- g) The initial sign-on message temporarily displayed following a cold-boot is now "OTRONA ATTACHE [F]". This indicates that the unit a revision "F" monitor EPROM.

Refer to the Monitor EPROM removal/insertion Service Note for further information.

FIRMWARE NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: DEC VT-52 Terminal Emulation

The Attache emulates the DEC VT-52 Terminal escape codes listed below:

| | |
|---------|------------------------|
| ESC A | Cursor Up |
| ESC B | Cursor Down |
| ESC C | Cursor Right |
| ESC D | Cursor Left |
| ESC H | Cursor Home |
| ESC I | Reverse Line Feed |
| ESC J | Erase to end of screen |
| ESC K | Erase to end of line |
| ESC Ylc | Direct Cursor Move |

At the present time the Attache does NOT support generating escape codes for the arrow keys.

In terminal emulation mode the screen does not scroll downward when reverse line feed is received while the cursor is on the top line of the display.

Product: Attache

Supercedes: Revision F

Subject: Revision G Monitor EPROM

Some internal and external CRT monitors have exhibited a wavering problem with the revision F monitor EPROMs. This problem results from the manner in which the CRT controller chip is initialized. The initialization parameters for the CRT controller chip are stored in the monitor EPROM.

A new Monitor EPROM, REV G, has been issued and this revision supercedes the REF F EPROM. In the revision G monitor EPROM, the initialization parameters for the CRT controller chip have been changed to conform to RS-170 Specifications. This EPROM will solve the wavering problem and allow all external monitors which conform to the RS-170 standard to be used with ATTACHE.

Note: All video monitors do not conform to the RS-170 specification. It is recommended that you check with the monitor manufacturer to verify the RS-170 specification for any video monitor that you intend to use with ATTACHE.

ATTACHE's horizontal sync specifications are:

| | |
|---------------------|---------|
| HSync (back porch) | = 5.2uS |
| HSync | = 5.2uS |
| HSync (front porch) | = 1.3uS |

All other changes that were implemented in REV F remain in REV G.

The Otrona part number is 21-002732 Rev G for the revision G monitor EPROM. Refer to the Monitor EPROM Insertion and Removal Service Note for the procedure of replacing this EPROM.

Changing of the monitor EPROM may require realignment of the CRT. Refer to the Service Note on CRT Alignment for this procedure.

SOFTWARE NOTE

Product: Attache

Supercedes: 82:006

April 15, 1983

Subject: MBASIC Serial Port Access

Listed below is a MBASIC dumb terminal emulation program, for demonstration purposes only.

Please note that an MBASIC program is interpreted which means that meaningful communication can only take place at approximately 300 BAUD. The techniques illustrated here should enable one to interface to plotters, digitizers, and other similar devices.

```
10 REM ****
20 REM *
30 REM * Name: TERMINAL
40 REM * Rev.: 1.0
50 REM * Date: August 3, 1982
60 REM *
70 REM * Desc: Emulate a 300 BAUD Dumb Terminal in MBASIC
80 REM *
90 REM ****
100 RBF% = 1 : REM Receive Buffer Full Mask
110 TBE% = 4 : REM Transmit Buffer Empty Mask
120 INQUIRY% = 16 : REM Z80 SIO Status Request Command
130 DAT% = 240 : REM Comm. Data I/O Port
140 STATUS% = 241 : REM Comm. Status I/O Port
150 REM
160 REM Check for incoming character, echo and display
170 REM
180 OUT STATUS%,INQUIRY% : CHECK% = INP(STATUS%)
190 IF (CHECK% AND RBF%) = 0 THEN GOTO 240
200 CHAR% = INP(DAT%) : GOSUB 290
210 REM
220 REM Check for keyboard key pressed, transmit, and display
230 REM
240 CHAR$ = INKEY$
250 IF CHAR$ = "" THEN GOTO 180
260 CHAR% = ASC(CHAR$)
270 IF CHAR% = 27 THEN SYSTEM
280 GOSUB 290 : GOTO 180
290 REM
300 REM Transmit and display character
310 REM
320 OUT STATUS%,INQUIRY% : CHECK% = INP(STATUS%)
330 IF (CHECK% AND TBE%) = 0 THEN GOTO 320
340 PRINT CHR$(CHAR%) ; : OUT DAT%,CHAR%
350 RETURN
```

SOFTWARE NOTE

Product: Attache

Supercedes: 82:007,015

April 15, 1983

Subject: CP/M IOBYTE Implementation

The CP/M STAT command may be used to change the logical to physical device assignments of the system. Refer to your CP/M guide for information on the syntax of this command. Outlined below is the ATTACHE implementation of system devices.

| CP/M Device | Logical Device | Physical Device | I/O bits |
|-------------|----------------|-----------------|----------|
|-------------|----------------|-----------------|----------|

| | | | |
|------|------|--------------|----|
| LST: | TTY: | Comm. Port | 00 |
| | CRT: | Internal CRT | 01 |
| | LPT: | Printer Port | 10 |
| | UL1: | Printer Port | 11 |
| PUN: | TTY: | Comm. P crt | 00 |
| | PTP: | Internal CRT | 01 |
| | UP1: | Printer Port | 10 |
| | UP2: | Comm. Port | 11 |
| RDR: | TTY: | Comm. Port | 00 |
| | PTR: | Printer Port | 01 |
| | UR1: | Internal CRT | 10 |
| | UR2: | Comm. Port | 11 |
| CON: | TTY: | Comm. Port | 00 |
| | CRT: | Internal CRT | 01 |
| | BAT: | Printer Port | 10 |
| | UC1: | Internal CRT | 11 |

Default Devices

I/O Byte Default Value

LST: = LPT:

Logical Devices

| | | | |
|------|------|------|------|
| LST: | PUN: | RDR: | CON: |
|------|------|------|------|

PUN: = TTY:

I/O bit values

| | | | |
|----|----|----|----|
| 10 | 00 | 00 | 01 |
|----|----|----|----|

RDR: = TTY:

I/O bit positions

| | | | |
|----|----|----|----|
| 76 | 54 | 32 | 10 |
|----|----|----|----|

CON: = CRT:

SOFTWARE NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: CP/M BIOS 2.2.3, new and updated programs

New Programs:

| | | |
|-------------|-----|--|
| AUTO.COM | 1.7 | Allows user to create "auto-boot" system. |
| UPDATE.COM | 1.0 | Updates operating system. (Dealer Use Only!) |
| CHARTON.BAS | 1.1 | Plots line, bar, and pie charts. Saves charts. |
| CHARTONF | 1.1 | Used by Charton to perform polygon fills. |
| PRINTER.VL1 | 1.1 | Used by Install function of VALET. |

Updated Programs:

| | | |
|------------|------|---|
| BACKUP.COM | 1.7 | Escape key exits program. No warm boot done on exit. Formats diskette if needed. |
| FORMAT.COM | | Escape key exits program. No warm boot done on exit. |
| SYSDUP.COM | 1.8 | Escape key exits program. No warm boot done on exit. |
| TIME.COM | 2.0 | Escape key exits program. No warm boot done on exit. Clock Not Set message different. Interface to BIOS clock read routine different. |
| VALET.VL1 | 1.1 | Alarms now have 3 modes of operation; Message, Command Line, and Immediate Command Line. Alarm rings 3 times 2 seconds apart, then waits 4 min. Immediate Command Line execution delayed 4 min. by pressing CTRL-Backspace. Functions added to calculator mode. Calculator displays 8 stack registers and 8 memory registers. Install function for popular printers added. Screen Dump allows user to issue line feeds to printer and re-initializes it on exit. DUMMY.VAL integrated with VALET.VAL to increase speed. Valet bypasses BDOS and accesses disk directly. Menus and prompts more user friendly. |
| MBASIC.COM | 5.22 | Graphics commands added. Written in Z80 code. |

BIOS 2.2.3 Update

- Display Scroll Left, Scroll Right, and Scroll Fill deleted.
ESC W and ESC blank added to access sound chip.
ESC c and ESC d added to turn cursor off/on.
ESC ; added to set printer port rate from value in CMOS RAM.
ESC < added to set comm. port rate from value in CMOS RAM.
ESC 2 added for graphics plot block function.
ESC 3 added to clear graphics memory.
ESC 4 added for graphics block fill function.
ESC 5 added to set mask for graphics block fill function.
ESC 6 does not clear graphics memory.
ESC \ also now clears graphics.
ESC Z also resets attributes, word wrap flag, and cursor on.
ESC ' added to enable WordStar character translation.
ESC a added to disable WordStar character translation.
CTRL-X added to flush keyboard buffer.
CTRL-Z also now clears graphics.
All non escape sequence characters limited to 7 ASCII values.
All graphics addresses received without any line offset.
All graphics addresses checked for out of range values.
Graphics scroll with text, clearing bottom line.
 (Full scroll only, not active region.)
Bug fixed affecting scrolling active region of 1 line.
- Disk I/O All disk I/O routines changed to interrupt driven.
Motor start bug fixed.
Step rate changed from 12 ms to 6 ms.
Disk errors reported in english instead of FDC result bytes.
FDC result bytes may be displayed on error by pressing CTRL-R.
User has the option of retrying, warm boot, or ignore after
 a hard disk error occurs.
Errors reported by the FDC are not passed back to the BDOS.
- Misc. Bell tone now always at maximum volume.
Break key added for comm. port. (CTRL-LF)
Comm. port routines pass 8 bit values.
8 user interrupt vectors added.
Some variable storage and jump vectors added to page 0 to
 facilitate external program interfacing.
Keypress sound no longer changes while holding a key down.
Warm Boot now passes control to CCP+3 instead of CCP.
SuperCalc key bug fixed.

SOFTWARE NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: Changing the keycode tables of the Attache BIOS

The BIOS may be modified to change the definition of most of the keys on the Attache keyboard. The procedure for doing this is summarized on the following page. As an example a NULL is substituted for CTRL-C. Each time CTRL-C is pressed the system will interpret it as a NULL.

While in WS mode 6 keys are position-dependent. The keys affected are the four arrow keys, CTRL ^, and CTRL -.

| Key Pressed | WS Code |
|-------------|-------------------|
| up arrow | in WS becomes 05H |
| left arrow | in WS becomes 13H |
| right arrow | in WS becomes 04H |
| down arrow | in WS becomes 18H |
| CTRL ^ | in WS becomes A8H |
| CTRL - | in WS becomes 86H |

Codes OFFH through OFBH are used as follows by the Attache BIOS:

| Code | Key(s) Pressed | Attache Function |
|------|----------------|-------------------------------------|
| OFFH | CTRL-ESC | Enter VALET setup mode |
| OFEH | caps lock | CAPS LOCK toggle |
| OFDH | CTRL-caps lock | activate numeric keypad mode |
| OFCH | CTRL-backspace | delay command immediate VALET alarm |
| OFBH | CTRL-line feed | communications break key (66.7 ms) |

Note: These codes should not be changed.

Procedure for changing the code produced by pressing a key:

1. Determine the value produced by the keyboard when this key is pressed: (Note: Refer to the keyboard matrix diagrams.)

Example: The CTRL-C character.

The Attache keyboard provides 8 bits of information.

shift key not pressed → NOT SHIFT = 1
control key is pressed → CONTROL = 1
row in keyboard matrix → ROW = 100
col in keyboard matrix → COLUMN = 011

These 8 bits are received from the keyboard in the following format:

| | | | | |
|----------|-----------|------|-----------------------|--------|
| function | NOT SHIFT | CTRL | ROW | COLUMN |
| bit # = | 7 | 6 | 5 4 3 2 1 0 | |

therefore the code produced by this key is 11100011 binary, E3 hexadecimal, or 227 decimal.

2. Add the value produced by the keyboard to the address of the beginning of the key code tables. (F694H in version 2.2.3)

| | |
|--------|---|
| F694H | address of the key tables |
| +00E3H | value produced by the keyboard for CTRL-C |
| F777H | address of the code produced by the BIOS |

The result is the address of the code produced by the BIOS when this key is pressed on the keyboard.

3. Calculate the address of this code when the BIOS image is loaded into memory:

| | |
|--------|----------------------------------|
| DAO0H | normal location of Attache BIOS |
| -1F80H | location of BIOS image in memory |
| BA80H | BIOS image address offset |

therefore if the code address is F777H then it's BIOS image address is:

| | |
|--------|-----------------------------|
| F777H | code address in normal BIOS |
| -BA80H | BIOS image address offset |
| 3CF7H | code address in BIOS image |

4. Change the key code tables of the Attache BIOS using DDT.

Change the key code tables as follows: (user entries in lowercase)

Insert your system disk in drive A:
Insert the disk to be modified in drive B:

A>B:
B>ddt getsys.com

DDT VERS 2.2
NEXT PC
0400 0100
-g100,0

| memory map | | |
|------------|--------|--|
| | : | |
| BCOOH | DDT | |
| 1F80H | BIOS | |
| 1180H | BDOS | |
| 0980H | CCP | |
| 0780H | boot | |
| 0100H | GETSYS | |
| 0000H | page 0 | |

A T T A C H E™ SYSTEM LOADING UTILITY VERS. 1.3
COPYRIGHT 1982, OTRONA CORP., BOULDER, CO

SYSTEM WILL BE LOADED FROM DRIVE B: SYSTEM TRACKS TO 780H IN MEMORY

LOAD>>
SAVE ANOTHER SYSTEM ?n

-s3cf7 address of value to change

3CF7 03 00 substitute NULL for CTRL-C
3CF8 04 .

-g0

B>savsys

A T T A C H E™ SYSTEM SAVING UTILITY VERS. 1.3
COPYRIGHT 1982, OTRONA CORP., BOULDER, CO

SYSTEM WILL BE COPIED FROM 780H IN RAM TO DRIVE B: SYSTEM TRACKS

SAVE >>
SAVE ANOTHER SYSTEM ?n
B>

— POSITION OF PHYSICAL KEYS IN KEYBOARD MATRIX —
 (UN-SHIFTED)

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|-------|-------|-------|-------|-------|-------|-------|------|
| 0 | BS | TAB | LF | XXXXX | XXXXX | CR | XXXXX | LOCK |
| 1 | SPACE | XXXXX | XXXXX | ESC | LEFT | RIGHT | UP | DOWN |
| 2 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3 | 8 | 9 | ' | ; | , | = | . | / |
| 4 | ' | a | b | c | d | e | f | g |
| 5 | h | i | j | k | l | m | n | o |
| 6 | p | q | r | s | t | u | v | w |
| 7 | x | y | z | [| \ |] | - | DEL |

— POSITION OF PHYSICAL KEYS IN KEYBOARD MATRIX —
 (SHIFTED)

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|-------|-------|-------|-------|-------|-------|-------|------|
| 0 | BS | TAB | LF | XXXXX | XXXXX | CR | XXXXX | LOCK |
| 1 | SPACE | XXXXX | XXXXX | ESC | LEFT | RIGHT | UP | DOWN |
| 2 | ^ | ! | @ | # | \$ | % | & | * |
| 3 | (|) | " | : | < | + | > | ? |
| 4 | ~ | A | B | C | D | E | F | G |
| 5 | H | I | J | K | L | M | N | O |
| 6 | P | Q | R | S | T | U | V | W |
| 7 | X | Y | Z | { | | } | - | DEL |

Attache BIOS key code tables (in ascending order by address)

SHIFT Table

Code Generated in HEX

Key Pressed

08 09 OA 00 00 OD 00 FE 20 00 00 1B BS TAB LF .. CR . LOCK SP .. ESC
01 06 1A 17 5E 21 40 23 24 25 26 2A 28 29 22 3A LFT RT UP DN ^ ! @ # \$ % & * () " :
3C 2B 3E 3F 7E 41 42 43 44 45 46 47 48 49 4A 4B < + > ? ~ A B C D E F G H I J K
4C 4D 4E 4F 50 51 52 53 54 55 56 57 58 59 5A 7B L M N O P Q R S T U V W X Y Z {
7C 7D 5F 07 | } DEL

CTRL-SHIFT Table

Code Generated in HEX

Key Pressed

```

08 09 OA 00 00 OD 00 FD 20 00 00 OC           BS TAB LF . . CR . LOCK SP . . ESC
93 84 92 83 1E 85 C8 D3 B3 B0 A2 AB B6 A3 27 3B LFT RT UP DN ^ ! @ # $ % & * ( ) " :
2C OC 2E 2F 00 01 02 03 04 05 06 07 08 09 OA OB , = . / ~ A B C D E F G H I J K
OC OD OE OF 10 11 12 13 14 15 16 17 18 19 1A 1B M N O P Q R S T U V W X Y Z {
1C 1D OC 19                                     | } - DEL

```

Normal Table

Code Generated in HEX

Key Pressed

08 09 OA 00 00 OD 00 FE 20 00 00 1B BS TAB LF . . CR . LOCK SP . . ESC
08 OC OB OA 30 31 32 33 34 35 36 37 38 39 27 3B LFT RT UP DN 0 1 2 3 4 5 6 7 8 9 ' ;
2C 3D 2E 2F 60 61 62 63 64 65 66 67 68 69 6A 6B , = . / ` a b c d e f g h i j k .
6C 6D 6E 6F 70 71 72 73 74 75 76 77 78 79 7A 5B l m n o p q r s t u v w x y z [
5C 5D 2D 7F] - DEL

CTRL Table

Code Generated in HEX

Key Pressed

08 09 OA 00 00 OD 00 FD 20 00 00 FF BS TAB LF . . CR . LOCK SP . . ESC
01 06 12 03 CE 11 OA OF 10 OB 16 02 D8 C9 27 3B LFT RT UP DN 0 1 2 3 4 5 6 7 8 9 ' ;
2C 81 2E 2F 00 01 02 03 04 05 06 07 08 09 OA OB , = . / ` a b c d e f g h i j k
OC OD OE OF 10 11 12 13 14 15 16 17 18 19 1A 1B l m n o p q r s t u v w x y z [
1C 1D 1F 14] - DEL

Numeric Keypad Table

Code Generated in HEX

Key Pressed

2A 2C 3D 2E 2F 60 61 62 63 64 65 66
67 68 35 31 32 33 30 6E 36 2B 71 72 73 74 34

* , = . / ' a b c d e f
5 1 2 3 0 n 6 + q r s t 4

————— PHYSICAL KEYBOARD LAYOUT ———

| | | | | | | | | | | | | | |
|------|------|---|-------|---|---|---|---|---|---|---|-----|------|------|
| ESC | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | - | = | BS |
| TAB | Q | W | E | R | T | Y | U | I | O | P | [|] | LF |
| CTRL | CAPS | A | S | D | F | G | H | J | K | L | ; | ' | RTRN |
| RST | SHFT | Z | X | C | V | B | N | M | , | . | / | SHFT | UP |
| DEL | ~ | \ | SPACE | | | | | | | | LFT | RT | DWN |

————— HEX codes produced with normal keyboard ———

| | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1B | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 20 | 2D | 3D | 08 |
| 09 | 71 | 77 | 65 | 72 | 74 | 79 | 75 | 69 | 6F | 70 | 5B | 5D | 0A |
| NA | NA | 61 | 73 | 64 | 66 | 67 | 68 | 6A | 6B | 6C | 3B | 27 | 0D |
| NA | NA | 7A | 78 | 63 | 76 | 62 | 6E | 6D | 2C | 2E | 2F | NA | 0B |
| 7F | 60 | 5C | 20 | | | | | | | | 08 | 0C | 0A |

————— HEX codes produced with SHIFT depressed ———

| | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1B | 21 | 40 | 23 | 24 | 25 | 26 | 2A | 28 | 29 | 5E | 5F | 2B | 08 |
| 09 | 51 | 57 | 45 | 52 | 54 | 59 | 55 | 49 | 4F | 50 | 7B | 7D | 0A |
| NA | NA | 41 | 53 | 44 | 46 | 47 | 48 | 4A | 4B | 4C | 3A | 22 | 0D |
| NA | NA | 5A | 58 | 43 | 56 | 42 | 4E | 4D | 3C | 3E | 3F | NA | 1A |
| 07 | 7E | 7C | 20 | | | | | | | | 01 | 06 | 17 |

————— HEX codes produced with CTRL depressed ———

| | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|------|------|------|----|------|----|----|
| 11 | 0A | 0F | 10 | 0B | 16 | 02 | 0F18 | 0F09 | 0F0E | 1F | 1101 | C8 | |
| 09 | 11 | 17 | 05 | 12 | 14 | 19 | 15 | 09 | 0F | 10 | 1B | 1B | 0A |
| NA | NA | 01 | 13 | 04 | 06 | 07 | 08 | 0A | 0B | 0C | 3B | 27 | 0D |
| NA | NA | 1A | 18 | 03 | 16 | 02 | 0E | 0D | 2C | 2E | 2F | NA | 12 |
| 14 | 00 | 1C | 20 | | | | | | | | 01 | 06 | 03 |

— HEX codes produced with CTRL & SHIFT depressed —

| | | | | | | | | | | | | | |
|----|------|------|------|----------|------|------|------|------|------|------|------|------|------|
| 0C | 1105 | 0A08 | 1013 | 0B131110 | 0B10 | 0B02 | 0B0B | 0B16 | 0B03 | 1E | 0C | 0C | 08 |
| 09 | 11 | 17 | 05 | 12 | 14 | 19 | 15 | 09 | 0F | 10 | 1B | 1D | 0A |
| NA | NA | 01 | 13 | 04 | 06 | 07 | 08 | 0A | 0B | 0C | 3B | 27 | 0D |
| NA | NA | 1A | 18 | 03 | 16 | 02 | 0E | 0D | 2C | 2E | 2F | NA | 1112 |
| 19 | 00 | 1C | | | 20 | | | | | 1113 | 1104 | 1103 | |

SOFTWARE NOTE

Product: Attache

Supercedes: April 15, 1983

Subject: Charton Version 1.1 data file format

Charton stores the data for pie, line, or bar charts in a file that can be read or written by a program. The format for these files is shown below. All values are either integer, real or a string of characters as indicated. The first value is an integer that indicates the type of chart represented by the data. This value is 1 for a bar chart, 2 for a line chart, and 3 for a pie chart.

Pie Chart data format:

| field type | use | range of values |
|------------|-----------------------------------|-----------------|
| integer | 3-pie chart | 1-2 |
| integer | # of slices | 1-24 |
| integer | -1-displaced, 0-whole, 1-exploded | -1-1 |
| real | slice area | >0 |
| string | slice title | 13 chars max |
| integer | 0-no offset, 1-offset | 0-1 |
| | . | |
| | . | |
| | . | |
| real | slice area | >0 |
| string | slice title | 13 chars max |
| integer | 0-no offset, 1-offset | 0-1 |
| string | chart title | 24 chars max |

Note: Slice area, slice title, and slice offset are repeated for each slice. Slice offset only appears if the chart is displaced.

Bar and Line Chart data format:

| field type | use | range of values |
|------------|-------------------------------------|-----------------|
| integer | 1=bar chart, 2=line chart | 1-2 |
| integer | # of bar/line types | 1-4 |
| integer | # points on horizontal axis | 1-16 |
| real | data for each bar/line type | >0 |
| integer | 0=numeric, 1=alpha horizontal label | 0-1 |
| string | labels for horizontal axis (1/pt) | n/a |
| string | bar/line labels (1/type) | 15 chars each |
| string | vertical axis title - line 1 | 20 chars max |
| string | vertical axis title - line 2 | 20 chars max |
| string | horizontal axis title | 40 chars max |
| string | chart title - line 1 | 40 chars max |
| string | chart title - line 2 | 40 chars max |

SOFTWARE NOTE

Product: Attache

Supercedes: April 15, 1983

Subject: Charton Version 1.1 data file format

Charton stores the data for pie, line, or bar charts in a file that can be read or written by a program. The format for these files is shown below. All values are either integer, real or a string of characters as indicated. The first value is an integer that indicates the type of chart represented by the data. This value is 1 for a bar chart, 2 for a line chart, and 3 for a pie chart.

Pie Chart data format:

| field type | use | range of values |
|------------|-----------------------------------|-----------------|
| integer | 3-pie chart | 1-2 |
| integer | # of slices | 1-24 |
| integer | -1-displaced, 0-whole, 1-explored | -1-1 |
| real | slice area | >0 |
| string | slice title | 13 chars max |
| integer | 0-no offset, 1-offset | 0-1 |
| | . | |
| | . | |
| | . | |
| real | slice area | >0 |
| string | slice title | 13 chars max |
| integer | 0-no offset, 1-offset | 0-1 |
| string | chart title | 24 chars max |

Note: Slice area, slice title, and slice offset are repeated for each slice. Slice offset only appears if the chart is displaced.

Bar and Line Chart data format:

| field type | use | range of values |
|------------|-------------------------------------|-----------------|
| integer | 1=bar chart, 2=line chart | 1-2 |
| integer | # of bar/line types | 1-4 |
| integer | # points on horizontal axis | 1-16 |
| real | data for each bar/line type | >=0 |
| integer | 0=numeric, 1=alpha horizontal label | 0-1 |
| string | labels for horizontal axis (1/pt) | n/a |
| string | bar/line labels (1/type) | 15 chars each |
| string | vertical axis title - line 1 | 20 chars max |
| string | vertical axis title - line 2 | 20 chars max |
| string | horizontal axis title | 40 chars max |
| string | chart title - line 1 | 40 chars max |
| string | chart title - line 2 | 40 chars max |

SOFTWARE NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: Polygon Fill Routine

The "CHARTONF" file contains an assembly language routine stored in ASCII format. This file can be loaded from a program and accessed using a "CALL" to the address at which it has been loaded. The program below loads this routine, draws a box, and fills it.

```
10 CLEAR ,&HC6FF : REM set highest memory location
15 PFILL = &HC700
20 REM load polygon fill routine
30 OPEN "I",1,"CHARTONF"
40 FOR ADDR = &HC700 TO &HCC00
50 INPUT #1,BITE
60 POKE ADDR,BITE
70 NEXT ADDR
80 GRAPH : REM clear screen
100 REM draw box
110 PLOT B(109,49) (209,169)
200 REM fill box
210 PATTERN% = 23 : SEEDX% = 159 : SEEDY% = 119
220 CALL PFILL(PATTERN%,SEEDX%,SEEDY%)
230 END
```

NOTES:

PATTERN% is the pattern number that you wish to fill with. Numbers 1-19 correspond to the numbers used in the block fill routines. There have been additional patterns added for a total of 24. Any number can be used as the PATTERN% but the only ones that remain consistant are 0-23. Any number other than these may fill with random patterns. Also note that you cannot clear a polygon with this routine.

SEEDX% and SEEDY% are integer coordinates of a point that falls inside the polygon you wish to fill. The fill routine starts at the point given as the seed and begins to fill downward in the polygon. Then the routine fills from the seed upward. It is important to realize that the routine starts at the seed and fills horizontally between the first two dots that are on. It is therefore impossible to fill a donut shape on one fill.

There is also a bug in the CHARTONF routine which makes it impossible to fill a polygon which encompasses a pixel within 4 pixels of the left-hand edge of the screen.

SOFTWARE NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: CMOS RAM Allocation

Read/Write to CMOS RAM is achieved by sending escape codes to the Attache display. It appears organized as 4 bit nybbles to the Z80 CPU. Addresses are 6 bits long and data are 4 bits long. It is important to add an offset of 40H to all characters sent to avoid being trapped by the CP/M BDOS. Refer to the Attache Operator's Guide for a description of the escode codes used to access CMOS RAM.

CMOS RAM Organization

| Address | Data |
|---------|------|
| 000001 | 0101 |

values sent to the Attache display

| Address | Data |
|---------|----------|
| *100001 | *1**0101 |

* = don't care

| <u>Address</u> | <u>Use</u> | <u>Range (in HEX)</u> |
|----------------|---------------------------------------|------------------------------|
| 0 | System initialization flag | E = initialized |
| 1 | System initialization flag | 5 = initialized |
| 2 | 50 Hz flag | 9 = 50 Hz, else 60 Hz |
| 3 | Time initialization flag | E = initialized |
| 4 | Date initialization flag | 5 = initialized |
| 5 | Bell flag | even = on, odd = off |
| 6 | Volume | 0 through F |
| 7 | Printer baud rate | 0 through A (see table) |
| 8 | Communication baud rate | 0 through A (see table) |
| 9 | Key sound | 0 through 4 (see table) |
| 10 | Brightness (most significant nybble) | 00 through 1F |
| 11 | Brightness (least significant nybble) | 0 through 9 |
| 12 | Year (least significant digit) | 0 through 9 |
| 13 | Year (most significant digit) | 0 = off, F = on |
| 14 | Shift Lock Flag | F = none set, 1 - C |
| 15 | Next Alarm - Month | 0 through 3 |
| 16 | Next Alarm - Day (most significant) | 0 through 9 |
| 17 | Next Alarm - Day (least significant) | 0 through 2 |
| 18 | Next Alarm - Hour (most significant) | 0 through 9 |
| 19 | Next Alarm - Hour (least significant) | 0 through 6 |
| 20 | Next Alarm - Min. (most significant) | 0 through 9 |
| 21 | Next Alarm - Min. (least significant) | 1 through 6 |
| 22 | Next Alarm Number | 0 = message |
| 23 | Alarm Type - next execution mode | 1 = command 2 = immediate |

| <u>Baud Rate Table</u> | <u>Key Sound Table</u> |
|------------------------|------------------------|
| 0 75.0 | 0 OFF |
| 1 110.0 | 1 CLICK |
| 2 134.5 | 2 DINK |
| 3 150.0 | 3 BEEP1 |
| 4 300.0 | 4 BEEP2 |
| 5 600.0 | |
| 6 1200.0 | |
| 7 2400.0 | |
| 8 4800.0 | |
| 9 9600.0 | |
| A 19200.0 | |

SOFTWARE NOTE

Product: Attache

Supercedes: 82:012

April 15, 1983

Subject: Softcom with the Xerox 820

The Xerox 820 Port A must be initialized before Softcom can be used for data transfers. The short assembly language program listed below may be used for this purpose.

```
BAUDA    EQU 0      ; I/O Port for setting BAUD rate
CMDA     EQU 6      ; I/O Port for commands to channel A
RATEA    EQU 7      ; BAUD Rate value (consult Xerox manual)
;
        ORG 0100H    ; CP/M TPA
;
        MVI A,018H   ; channel reset
        OUT CMDA
;
        MVI A,1      ; point to register 1
        OUT CMDA
        MVI A,0      ; no interrupts
        OUT CMDA
;
        MVI A,3      ; point to register 3
        OUT CMDA
        MVI A,0C1H   ; Rx enable, Rx 8 bits/character
        OUT CMDA
;
        MVI A,4      ; point to register 4
        OUT CMDA
        MVI A,044H   ; no parity, 1 stop bit, x16 clock
        OUT CMDA
;
        MVI A,5      ; point to register 5
        OUT CMDA
        MVI A,0E8H   ; Tx enable, 8 bits/character, DTR on
        OUT CMDA
;
        RET          ; return to CP/M CCP
        END
```

SOFTWARE NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: MBASIC PORTS program for changing serial protocol

The MBASIC program PORTS.BAS may be used to change the protocol used by the serial ports during CP/M communications. An example run of this program appears below.

```
A>MBASIC PORTS
BASIC-80 Rev. 5.22
ATTACHE™ VER. 1.5
[CP/M Version]
Copyright 1977-1982 (C) by Microsoft
26180 Bytes free
```

A T T A C H E™ SERIAL PORT SETUP UTILITY COPYRIGHT 1982 OTRONA CORP., BOULDER, CO

| <u>Serial Port Function</u> | <u>[default]</u> | <u>Function Options</u> |
|-----------------------------|------------------|--------------------------------|
| Port Selection: ? | [C] | Options: (C)omm, (P)rinter |
| Number of Stop Bits: ? | [1] | Options: 1, 1.5, 2 |
| Parity Usage: ? | [N] | Options: (N)one, (E)ven, (O)dd |
| Number of Data Bits: ? | [8] | Options: 7, 8 |
| More changes: ? | [N] | Options: N, Y |

A>

SOFTWARE NOTE

Product: Attache

Supercedes: April 15, 1983

Subject: Using the AUTO boot utility

The CP/M CCP may be modified to execute the same command each time a "cold boot" is performed. During the procedure summarized below a DIR command is patched into the CCP command buffer. Each time the system is booted a directory listing will automatically be displayed.

All user entries are in lowercase.

A>auto

A T T A C H Etm AUTO-LOAD PATCH UTILITY VERS. 1.7
COPYRIGHT 1982, OTRONA CORP., BOULDER, CO

SYSTEM WILL BE LOADED FROM DRIVE A: MODIFIED , AND SAVED TO DRIVE A:

PRESS ANY KEY TO START >> (cr)

INPUT COMMAND LINE >>dir
PATCH AGAIN ? (Y OR N)n
A>

Note: AUTO.COM only works with CP/M 2.2.3 or later.

SOFTWARE NOTE

Product: Attache

Supercedes: April 15, 1983

Subject: MOVSYS operation for CP/M 2.2.3

The MOVSYS program will allow the user to reconfigure the CP/M system for a variety of memory sizes. The command line will consist of the program name (MOVSYS) and one or two optional parameters. The parameters will indicate the desired size of the new system and the disposition of the system after generation. The possible forms of the command line are as follows:

| | |
|-----------------|--|
| MOVSYS <cr> | Relocate and execute CP/M for the standard memory size (56K). Upon completion, the new system is executed but not saved on the disk. |
| MOVSYS n <cr> | Create a relocated CP/M system for an n kilobyte system (n must be in the range of 28 to 56). The system will be executed but not saved. |
| MOVSYS * * <cr> | Create a relocated CP/M for the standard memory size (56K) and leave it in memory (at 780H) for a SAVSYS operation. |
| MOVSYS n * <cr> | Construct a relocated CP/M for an n kilobyte system and leave it in memory (at 780H) for a SAVSYS operation. |

*** IMPORTANT *** Because MOVSYS uses a relocated copy of a CP/M image stored internally within itself the version of CP/M which it creates may be different than the version loaded on cold boot.

*** IMPORTANT *** A warm boot cannot be performed from a system which has been relocated and executed directly from memory. The CP/M contained on the system tracks may execute in a different area of memory, making a warm boot a potentially hazardous operation.

SOFTWARE NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: Using GETSYS and PUTSYS system utilities

The complimentary utilities GETSYS and PUTSYS with DDT may be used to load the CP/M operating system into memory, make modifications to it, and then save it back onto the system tracks of a diskette. An example of this procedure is listed on the following page.

Below is a map of the system image as it appears in memory when DDT gains control after trapping GETSYS's warm boot jump.

| address in hex | software |
|-------------------|----------|
| DA00 | BIOS |
| CC00 | BDOS |
| BC00 | DDT |
| 1F80 | BIOS |
| 1180 | BDOS |
| 0980 | CCP |
| 0780 | cboot |
| 0100 | GETSYS |
| 0000 | page 0 |

Insert your system disk in drive A:
Insert the disk to be modified in drive B:

A>B:
B>ddt getsys.com

DDT VERS 2.2
NEXT PC
0400 0100
-g100,0

A T T A C H Etm SYSTEM LOADING UTILITY VERS. 1.3
COPYRIGHT 1982, OTRONA CORP., BOULDER, CO

SYSTEM WILL BE LOADED FROM DRIVE B: SYSTEM TRACKS TO 780H IN MEMORY

LOAD>>
SAVE ANOTHER SYSTEM ?n

-
(Make modifications/patches as required.)

-g0

B>savsys

A T T A C H Etm SYSTEM SAVING UTILITY VERS. 1.3
COPYRIGHT 1982, OTRONA CORP., BOULDER, CO

SYSTEM WILL BE COPIED FROM 780H IN RAM TO DRIVE B: SYSTEM TRACKS

SAVE >>
SAVE ANOTHER SYSTEM ?n
B>

SOFTWARE NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: Programming BAUD rates

The recommended procedure for changing the Attache serial port(s) BAUD rate(s) is as follows:

1. Read the old BAUD rate code from the CMOS memory and store it in a temporary location.
2. Write the new BAUD rate code into the CMOS memory.
3. Send the escape code to the display driver that sets the BAUD rate for that port.
4. Execute the application software.
5. Restore the old BAUD rate code to the CMOS memory from its temporary location.
6. Send the escape code to the display driver that sets the BAUD rate for that port.

Note: Refer to the tables below for the correct CMOS RAM locations and BAUD rate codes.

| CMOS Address | Use | Range (in HEX) |
|--------------|-------------------------|-------------------------|
| 7 | Printer baud rate | 0 through A (see table) |
| 8 | Communication baud rate | 0 through A (see table) |

Baud Rate Table

| | | | |
|---|-------|---|---------|
| 0 | 75.0 | 6 | 1200.0 |
| 1 | 110.0 | 7 | 2400.0 |
| 2 | 134.5 | 8 | 4800.0 |
| 3 | 150.0 | 9 | 9600.0 |
| 4 | 300.0 | A | 19200.0 |
| 5 | 600.0 | | |

Listed below is an example MBASIC program.

```
10 REM
20 REM change the communication BAUD rate to 1200 temporarily
30 REM
40 ESC$=CHR$(27) : REM ASCII Escape character
50 GOSUB 100 : REM change BAUD rate to 1200
60 GOSUB 1000 : REM execute application routine
70 GOSUB 200 : REM restore BAUD rate
80 END

100 REM
110REM get old BAUD rate, store it, & change to 1200 BAUD
120 REM
130 PRINT ESC$;"?";CHR$(72); : REM read CMOS RAM location 8 (offset 40H)
140 OLD$ = INKEY$ : REM store old comm. BAUD rate
150 PRINT ESC$;"@";CHR$(72); : REM write to CMOS RAM location 8 (offset 40H)
160 PRINT CHR$(70); : REM new comm. BAUD rate = 1200 (offset 40H)
170 PRINT ESC$;"<" : REM set new comm. BAUD rate in CMOS RAM
180 RETURN

200 REM
210 REM restore old BAUD rate
220 REM
230 PRINT ESC$;"@";CHR$(72); : REM write to CMOS RAM location 8 (offset 40H)
240 PRINT CHR$(ASC(OLD$)+&H40); : REM restore old comm. BAUD rate (offset 40H)
250 PRINT ESC$;"<" : REM set comm. BAUD rate in CMOS RAM
260 RETURN
```

Refer to the CMOS RAM Allocation Software Note for more information on accessing the CMOS RAM.

Refer to the Operator's Guide for more information on Attache escape codes.

HARDWARE NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: I/O Port Locations and Purposes

| | | | | |
|------|--------|---|------|---------------------------------|
| OOEO | FPYBCA | = | OEOH | ;FLOPPY STATUS PORT |
| OOE1 | FPYBWR | = | OE1H | ;FLOPPY DATA PORT |
| OOE2 | DSPBCA | = | OE2H | ;DISPLAY BASE & CURRENT ADDRESS |
| OOE3 | DSPBWR | = | OE3H | ;DISPLAY BASE & WORD COUNT |
| OOE4 | STDBCA | = | OE4H | ;STD BUS BASE & CURRENT ADDRESS |
| OOE5 | STDBWR | = | OE5H | ;STD BUS BASE & WORD COUNT |
| OOE6 | SIOBCA | = | OE6H | ;SIO BASE & CURRENT ADDRESS |
| OOE7 | SIOBWR | = | OE7H | ;SIO BASE & WORD COUNT |
| OOE8 | DMACSR | = | OE8H | ;DMA COMMAND/STATUS REGISTER |
| OOE9 | DMAWRR | = | OE9H | ;DMA WRITE REQUEST REGISTER |
| OOEA | DMAWSM | = | OEAH | ;DMA WRITE SINGLE MASK BIT |
| OOEB | DMAWMR | = | OEBH | ;DMA WRITE MODE REGISTER |
| OOEC | DMACBP | = | OECH | ;DMA CLEAR BYTE FLIP-FLOP |
| OOED | DMATMP | = | OEDH | ;DMA TEMP REG & MASTER CLEAR |
| OOEE | SDSPY | = | OEEH | ;DISPLAY COMMAND/STATUS |
| OOEF | DMAWAM | = | OEFH | ;DMA WRITE ALL MASK REG BITS |

| | | | | |
|------|--------|---|------|-------------------------------|
| 00F0 | DCOMM | = | OFOH | ;COMM PORT DATA |
| 00F1 | SCOMM | = | OF1H | ;COMM PORT STATUS |
| 00F2 | DPRTR | = | OF2H | ;PRINTER PORT DATA |
| 00F3 | SPRTR | = | OF3H | ;PRINTER PORT STATUS |
| 00F4 | BAUDC | = | OF4H | ;BAUD TIMER FOR COMM PORT |
| 00F5 | BAUDP | = | OF5H | ;BAUD TIMER FOR PRINTER PORT |
| 00F6 | DSPINT | = | OF6H | ;DISPLAY INTERRUPT (60 HZ) |
| 00F7 | FPYINT | = | OF7H | ;FLOPPY INTERRUPT TIMER |
| 00F8 | DPIOA | = | OF8H | ;PIO PORT A DATA |
| | | | | ; AO-7 = LATCH DATA OUT |
| | | | | ; LO = MOTOR ON |
| | | | | ; L1 = GRAPHICS ENABLE |
| | | | | ; L2 = /EPROM ENABLE |
| | | | | ; L3-7 = DISPLAY BRNS. |
| | | | | ; AO-7 = 8910 DATA I/O |
| | | | | ; AO-3 = 5832 DO-3 I/O |
| | | | | ; A4-7 = 5832 AO-3 OUT |
| | | | | ; AO-3 = 5101 DO-3 I/O |
| | | | | ; A4-7 = 5101 AO-3 OUT |
| 00FA | DPIOB | = | OFAH | ;PIO PORT B DATA |
| | | | | ; B0-1 = 5101 A4-5 |
| | | | | ; B2-4 = OPERATION SELECT |
| | | | | ; 0 = 8910 ADDR LOAD |
| | | | | ; 1 = 8910 DATA LOAD |
| | | | | ; 2 = 5832 WRITE |
| | | | | ; 3 = 5832 READ |
| | | | | ; 4 = 5101 WRITE |
| | | | | ; 5 = 5101 READ |
| | | | | ; 6 = LATCH LOAD |
| | | | | ; 7 = NO-OP |
| | | | | ; B5 = /'138 OPERATION STROBE |
| | | | | ; B6 = /KEYBOARD DATA IN |
| | | | | ; B7 = /KEYBOARD CLOCK OUT |
| 00F9 | SPIOA | = | OF9H | ;PIO PORT A COMMAND |
| 00FB | SPIOB | = | OFBH | ;PIO PORT B COMMAND |
| 00FC | SFLPY | = | OFCH | ;FLOPPY COMMAND/STATUS |
| 00FD | DFLPY | = | OFDH | ;FLOPPY DATA |
| 00FE | DDSPY | = | OFEH | ;DISPLAY DATA |
| 00FF | DMAP | = | OFFH | ;RAM VIRTUAL MAP DATA |

HARDWARE NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: Interrupt I/O

Interrupt driven I/O can be effectively performed on the Attache provided the following points are remembered:

- 1) Z80 Interrupt Mode 2 is used by the Attache.
(i.e. vectored interrupts are used)
- 2) Attache system devices: (in the order serviced by the CPU)

| | | |
|------|------------------------|------------------------------|
| 1st) | AMD 9517A DMA | (controls the system bus) |
| 2nd) | Z80 Counter/Timer | (highest interrupt priority) |
| 3rd) | Z80 Serial I/O | (next interrupt priority) |
| 4th) | Expansion Port Devices | (lowest interrupt priority) |
- 3) The DMA channels have the following priority:

| | |
|------|--|
| 1st) | Floppy disk data transfer (single transfer mode) |
| 2nd) | Z80 Serial I/O channel A (comm. - not implemented) |
| 3rd) | Expansion Port Devices (implemented by the user) |
| 4th) | Z80 Serial I/O channel B (printer - not implemented) |
- 4) The CTC channels have the following priority:

| | |
|------|---|
| 1st) | Comm. Baud Rate (non-interrupt mode) |
| 2nd) | Printer Baud Rate (non-interrupt mode) |
| 3rd) | 60 Hz interrupt (keyboard service routines) |
| 4th) | 765 interrupt (floppy disk controller) |
- 5) Nested interrupts are not supported by the Attache BIOS.
- 6) The Z80 CPU Interrupt Register is initialized to OODAH by the Attache BIOS. **This should never be changed.**
- 7) There is space for an interrupt vector table at address ODACOH consisting of no more than 5 addresses of interrupt service routines.

Note: The location and number of address vectors for
interrupts supported by the Attache BIOS is
subject to change without notice.

Listed below is a simple example using interrupt driven I/O. This short assembly language program waits until a character is received by the communication port and then displays it on the internal CRT.

```
; Z80 SIO Interrupt driven I/O
;
BDOS: EQU 0005H ; BDOS entry point
DTA: EQU 00FOH ; SIO A Data
CTRLA: EQU 00F1H ; SIO A Status
DTB: EQU 00F2H ; SIO B Data
CTRLB: EQU 00F3H ; SIO B Status
SIOR1: EQU 01111000B ; INT on all Rx Characters
VECT: EQU 00COH ; Interrupt Vector
TABLE: EQU ODACOH ; address of interrupt table in BIOS
;
ORG 0100H ; TPA
LXI H,SERV ; load interrupt service routine address
SHLD TABLE ; store at interrupt table in BIOS
MVI A,2 ; SIO register number 2
OUT CTRLB ; point to register 2 of SIO channel B
MVI A,VECT ; data for register 2 of SIO channel B
OUT CTRLB ; set-up interrupt vector for SIO
MVI A,1 ; SIO register number 1
OUT CTRLA ; point to register 1 of SIO channel A
MVI A,SIOR1 ; data for register 1 of SIO channel A
OUT CTRLA ; enable Rx INT on all characters
LOOP: NOP ; wait for interrupt
JMP LOOP
;
SERV: IN DTA ; get character from SIO
MOV E,A ; pass character to register for BDOS
MVI C,2 ; console out BDOS function
CALL BDOS ; pass control to the BDOS
EI ; enable interrupts
DB OEDH ; return from interrupt
DB 04DH ; (second byte)
END
```

HARDWARE NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: Accessing the sound generator.

The sound generator, a General Instrument AY-3-8912, built into the Attache may be accessed by two different methods. The easiest method is to send the display an escape W followed by 15 bytes which represent the duration in 60th's second and R15 - R0 (Octal register #'s) of the sound generator. An escape b sent to the display will then repeat the sound previously specified.

The sound generator may also be controlled directly by an assembly language routine. Listed on the next page is an example routine.

Refer to the following chart for programming the sound generator.

| Register (# in octal) | Bit # | | | | | | | |
|--------------------------|--------|-----|---|-------|-----|-----|------|----------------------------|
| Register description | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| R0 | | | | | | | | |
| R1 Channel A Tone Period | X | X | X | X | | | | 8 bit fine tune channel A |
| R2 | | | | | | | | |
| R3 Channel B Tone Period | X | X | X | X | | | | 8 bit fine tune channel B |
| R4 | | | | | | | | |
| R5 Channel C Tone Period | X | X | X | X | | | | 8 bit fine tune channel C |
| R6 Noise Period | X | X | X | | | | | 5 bit period |
| R7 Enable | In-Out | | | Noise | | | Tone | |
| | 10B | 10A | C | B | A | C | B | A |
| R10 Channel A Amplitude | X | X | X | M | L3 | L2 | L1 | LO |
| R11 Channel B Amplitude | X | X | X | M | L3 | L2 | L1 | LO |
| R12 Channel B Amplitude | X | X | X | M | L3 | L2 | L1 | LO |
| R13 | | | | | | | | 8 bit fine tune envelope |
| R14 Envelope Period | | | | | | | | 8 bit coarse tune envelope |
| R15 Envelope Shape/Cycle | X | X | X | X | Cnt | Att | Alt | Hld |

```

; generate sound specified by 14 byte table (R15 first, R0 last)

DPIOA EQU 0F8H ; PIO port A data
SPIOA EQU 0F9H ; PIO port A status
DPIOB EQU OFAH ; PIO port B data

SOUND: DI ; keyboard disabled
       LXI H,EXPLODE ; point to explosion sound table
       MVI A,OCFH ; bit input/output mode
       OUT SPIOA
       XRA A ; all 8 bits output
       OUT SPIOA
       MVI A,OFFH ; no devices selected
       OUT DPIOB
       LXI B,14*256+DPIOA ; byte count + PIO A data port
LOOP: DCR B
      OUT (C),B ; sound generator register #
      INR B
      MVI A,OC3H ; enable chip select, command
      OUT DPIOB
      MVI A,OE3H ; disable chip select, command
      OUT DPIOB
      OUTI ; sound generator register data
      MVI A,OE7H ; disable select, data
      OUT DPIOB
      MVI A,OC7H ; enable chip select, data
      OUT DPIOB
      MVI A,OE7H ; disable chip select, data
      OUT DPIOB
      JRNZ LOOP
      EI ; keyboard enabled
      RET

EXPLODE: DB 0 ; R15 envelope -> decay, 1 cycle
         DB 56 ; R14 period = 2.05 seconds
         DB 0 ; R13
         DB 16 ; R12 \ select full amplitude range
         DB 16 ; R11 - under direct control of
         DB 16 ; R10 / envelope generator
         DB 7 ; R7 noise only, channels A,B,C
         DB 0 ; R6 set noise period to max.
         DB 0,0,0,0 ; R5-R2
         DB 0,0 ; R1,RO

NOTONE: DB 0,0,0,0 ; R15-R12 NOTE: It may be necessary
        DB 0FH,0FH ; R11,R10 to terminate a sound
        DB 0FH,0FH ; R7,R6 using this table -
        DB 0,0,0,0 ; R5-R2 this sequence turns
        DB 0,0 ; R1,RO off any sound

```

See also: Electronic Design March 29, 1979 and BYTE July 1979

HARDWARE NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: Accessing the display subsystem.

The Attache display subsystem is accessed using Z80 I/O instructions. The type of data being transferred and the line number or parameter selection is output to the display command/status port. The data is output to the display data port; at the same time the column number is output on the A8 - A15 address lines.

Because the screen scrolls a line offset must always be added to any line number sent to the display. The Attache BIOS contains a routine to compute the necessary line + offset. See the example below.

```
; Send an ASCII X character to row 0, column 0

CMD EQU 00EEH      ; display command/status port
DTA EQU 00FEH      ; display data port
CHAR EQU 00EOH     ; command for character transmission type
OFF EQU ODA9AH    ; compute line + offset routine in 2.2.3 BIOS
                  ; (OE33DH in 2.2 BIOS, OE28EH in 2.2/1 BIOS)

X:   MVI L,O        ; line #0
     CALL OFF         ; compute line + offset
     MVI A,CHAR       ; character transmission (see next page)
     OR  L             ; combine with line + offset
     OUT CMD          ; send to display command/status port
     MVI B,O          ; column #0
     MVI C,DTA         ; display data port
     MVI A,'X'         ; data for display
     OUT (C),A         ; transfer information to display
```

Character Transmission

| | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|-----------------|---|---|---|---|---|---|---|-----------------------------|
| display command | | 1 | 1 | 1 | | | | |
| | | | | | | | | <---- line # -----> |
| Z80 B register | 7 | x | | | | | | 0 |
| | | | | | | | | <---- column # -----> |
| Z80 A register | 7 | | | | | | | 0 |
| | | | | | | | | <---- character code -----> |

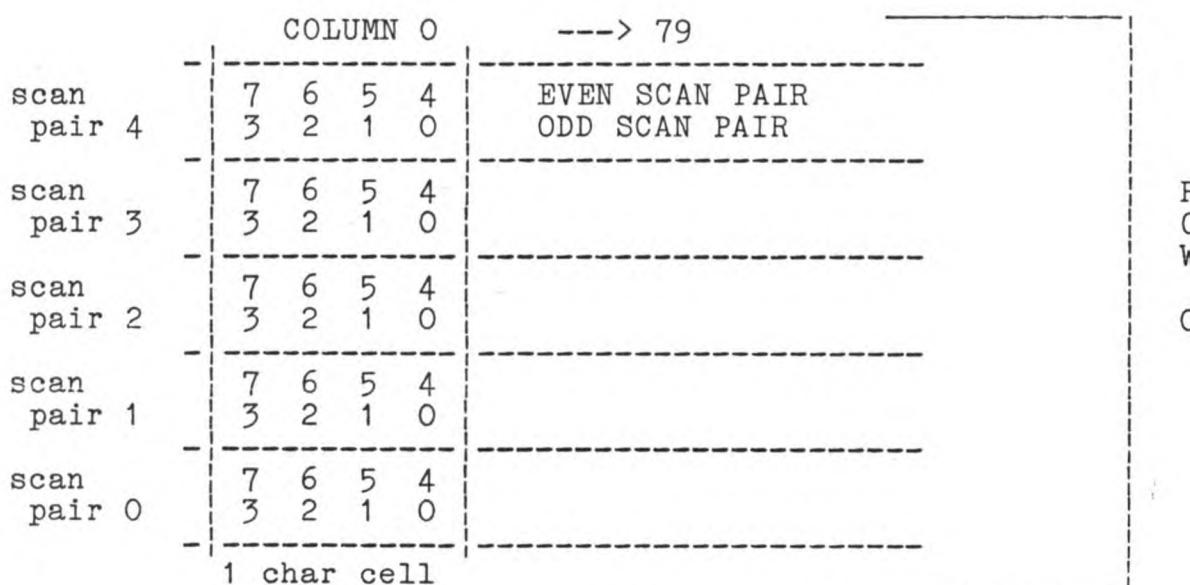
Attribute Transmission

| | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|--|---|---|---|---|---|---|---|-----------------------|
| display command | | 1 | 1 | 0 | | | | |
| | | | | | | | | <---- line # -----> |
| Z80 B register | 7 | x | | | | | | 0 |
| | | | | | | | | <---- column # -----> |
| Z80 A register | 7 | | | | | | | 0 |
| | | | | | | | | |
| Subscript | ^ | | | | | | | |
| Superscript | | ^ | | | | | | |
| (both = Strikethrough) | | | ^ | | | | | |
| Underline | | | | ^ | | | | |
| Double size | | | | | ^ | | | |
| Boldface | | | | | | ^ | | |
| Highlight | | | | | | | ^ | |
| Reverse video | | | | | | | | ^ |
| Alternate character set | | | | | | | | |
| (selects 2nd 4K of character ROM if present) | | | | | | | | |

Graphic Data Transmission

| | |
|-----------------|--|
| display command | 7 <hr style="border-top: 1px dashed black;"/> <hr style="border-top: 1px dashed black;"/> <- scan --> <---- line # -----> pair (0-4) |
| Z80 B register | 7 <hr style="border-top: 1px dashed black;"/> x . <hr style="border-top: 1px dashed black;"/> <----- column # -----> |
| Z80 A register | 7 6 5 4 3 2 1 0 <hr style="border-top: 1px dashed black;"/> <hr style="border-top: 1px dashed black;"/> <- data for --> <- data for --> even scan odd scan |

The following is the structure of a character cell for graphic data. Note: The screen is 80 cells wide by 24 cells high; and each cell is 4 dots wide by 10 dots high as shown below.



Display Control Parameters Transmission

| | 7 | 0 |
|---|-------------------------------|---------------------------------|
| display command | 1 0 1 x | |
| note: see Standard Microsystems 5027 data sheet | | <- parameter -> selection |
| Z80 B register | x x x x x x x x | |
| Z80 A register | | |
| | | < data for selected parameter > |

HARDWARE NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: Programming the Z80 CTC

A Z80 CTC chip controls the BAUD rate of the internal Z80 SIO.
The CTC is I/O mapped at the following addresses:

Comm. Port CTC = 00F4H
Printer Port CTC = 00F5H

Refer to the following table to determine what bytes to send to the CTC chip for the desired BAUD rate.

| BAUD Rate | Command Byte | Data Byte |
|-----------|--------------|-----------|
| 75 | 0037H | 000DH |
| 110 | 0057H | 00AFH |
| 134.5 | 0057H | 008FH |
| 150 | 0057H | 0080H |
| 300 | 0057H | 0040H |
| 600 | 0057H | 0020H |
| 1200 | 0057H | 0010H |
| 2400 | 0057H | 0008H |
| 4800 | 0057H | 0004H |
| 9600 | 0057H | 0002H |
| 19200 | 0057H | 0001H |

Example ASM program to change the BAUD rate to 300 BAUD:

```
CMD EQU 0057H ; CTC command
DAT EQU 0040H ; CTC data for 300 BAUD
CTC EQU 00F4H ; I/O port CTC assigned to
;
BAUD300: MVI A,CMD
          OUT CTC
          MVI A,DAT
          OUT CTC
          RET
```

NOTE: The BAUD rate set by a program remains in effect until a "cold boot". For this reason any program which changes the BAUD rate should restore it to what is stored in CMOS RAM before returning. Remember that the VALET SET-UP will not reflect CTC programmed BAUD rates.

HARDWARE NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

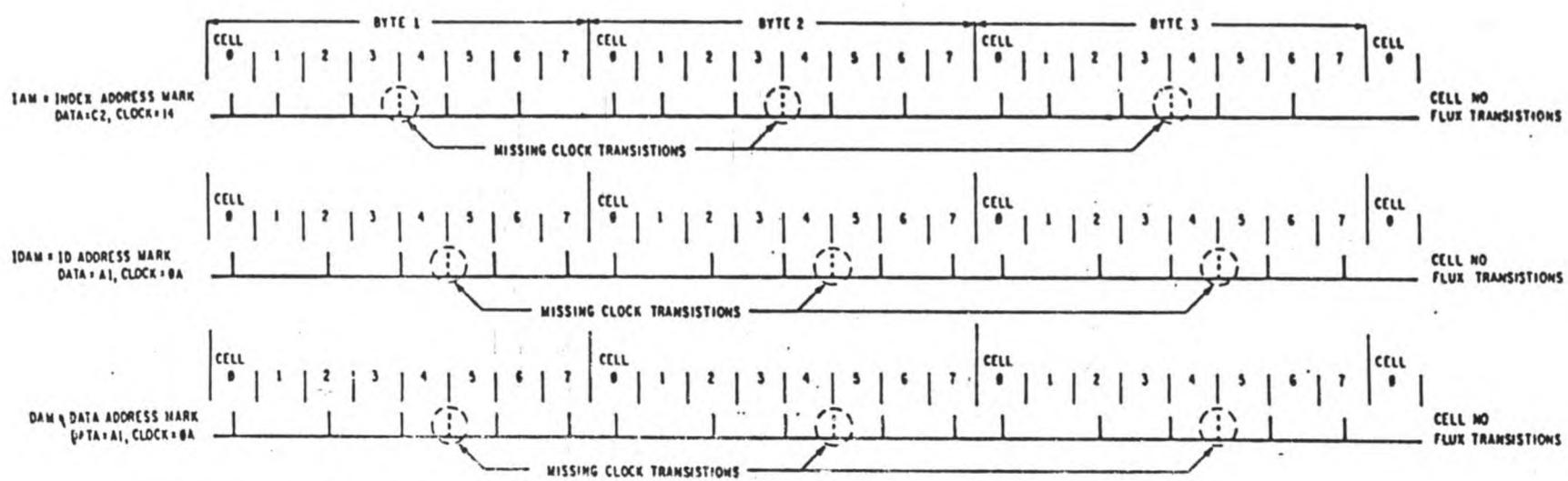
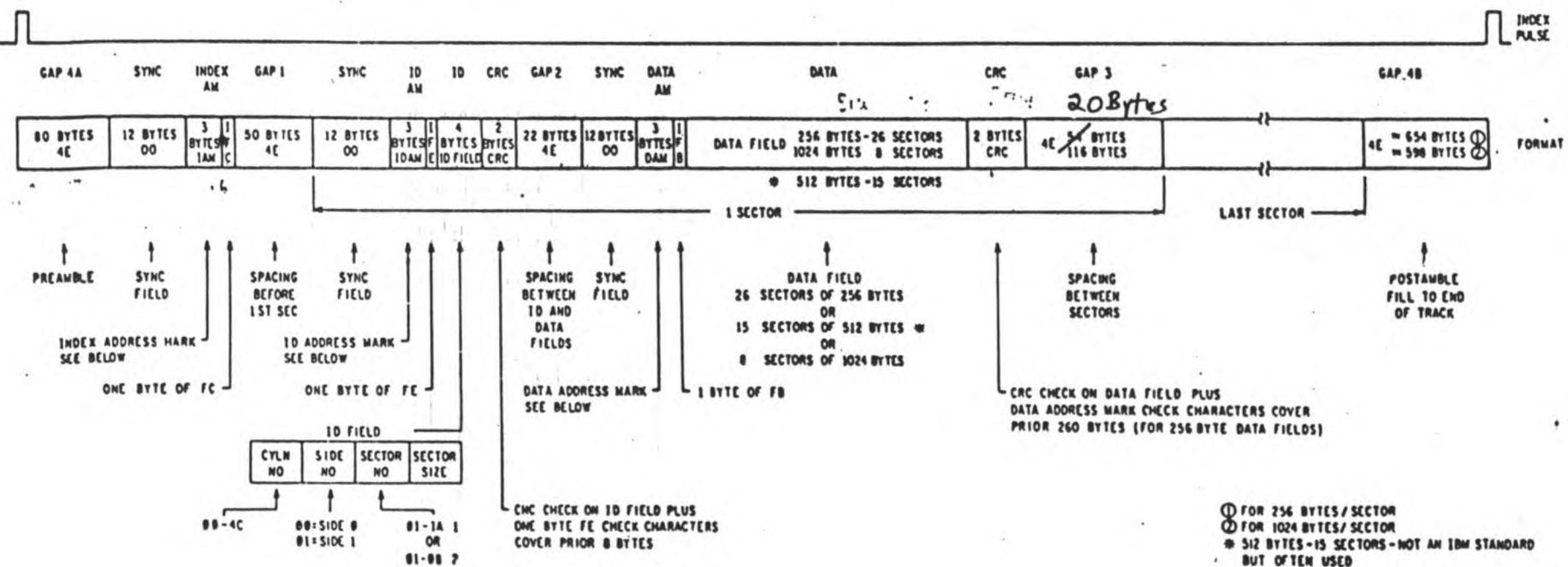
Subject: Diskette format

The Attache disk format differs from the IBM Double Density Recording Format attached in the following ways:

1. Gap 3 is 20 bytes long instead of 54 bytes.
2. The data field (sector) is 512 bytes.
3. Each track contains 10 sectors.
4. Tracks 0-39 are on side 0 (bottom side).
5. Tracks 40-75 are on side 1 (top side).
6. The sector skew is 2, i.e. the physical sectors are numbered 1 6 2 7 3 8 4 9 5 10.

Note: Each sector is de-blocked into 128 byte records by the Attache CP/M BIOS.

IBM Double Density Recording Format



SERVICE NOTE

Product: Attache

Supercedes: 82:003

April 15, 1983

Subject: Electrostatic discharge protection for Attaches

Machine resets, loss of memory, and keyboard lockout usually occur as a result of discontinuity between the cabinet and the chassis of the Attache. Detailed below is the procedure for correcting this problem.

1. Turn the power off.
2. Detach the keyboard and set the unit face down on a flat surface.
3. Remove the four screws which attach the feet to the Attache.
4. Carefully slide the cover off.
5. Apply masking tape over the power supply ventilation holes.
6. Remove all paint between the masking tape and the CRT frame.
7. Clean and mount the conductive sticky fingers vertically on the power supply between the ventilation holes and the CRT frame. Make sure the fingers open towards the CRT frame.
8. Remove all paint from the area of the cover which will make contact with the conductive sticky fingers.
9. Remove the masking tape and re-assemble the unit.

SERVICE NOTE

Product: Attache

Supercedes: 82:013

April 15, 1983

Subject: CRT Alignment Procedure

Some internal CRT monitors may not be electrically centered properly. When replacing a CRT module, the following procedure should be followed to insure correct alignment.

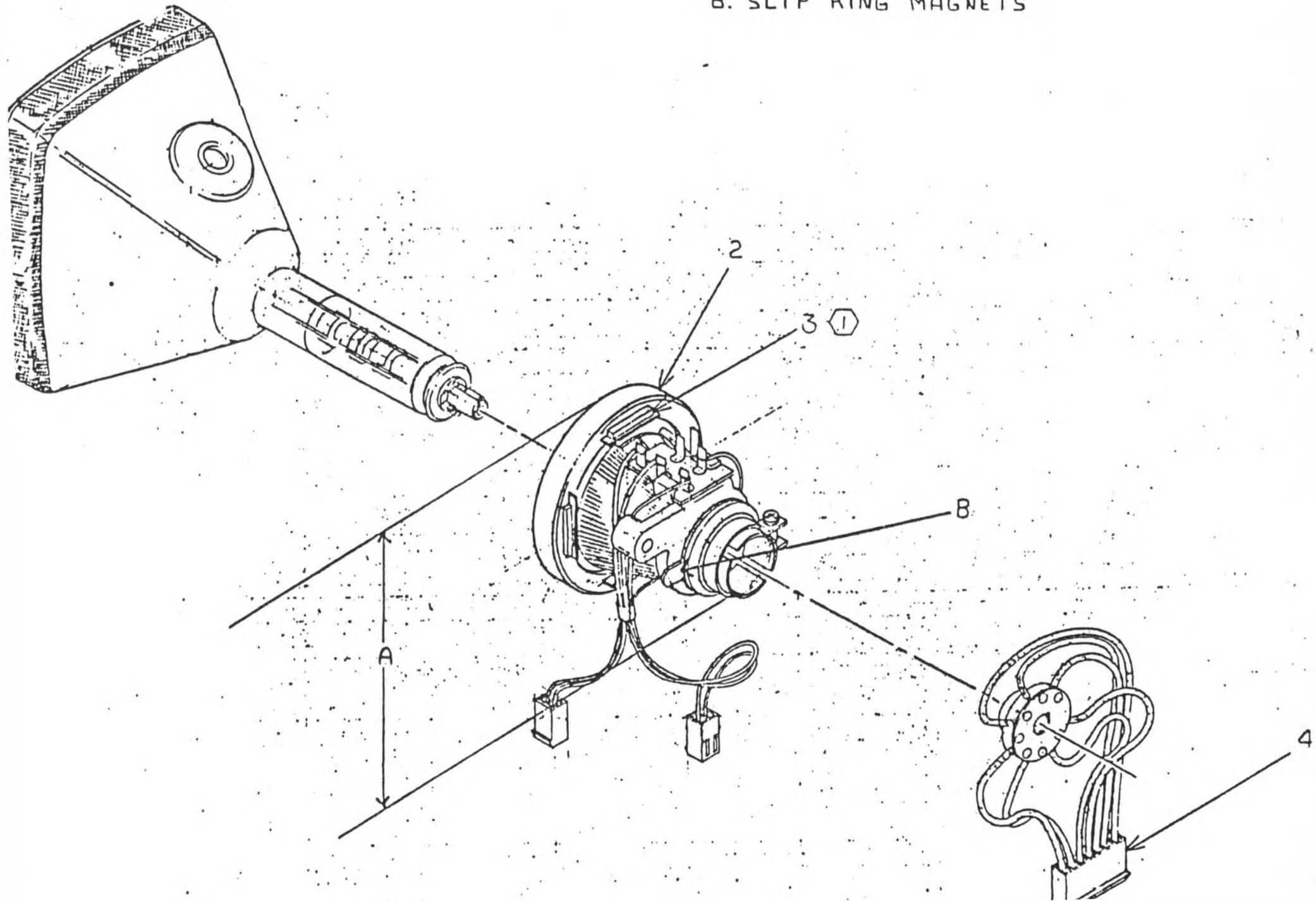
- 1) Remove the rear feet of the computer.
- 2) Place the computer standing with the front bezel on a table. Remove the outer skin by pulling straight up.
- 3) Remove the CRT module by unscrewing the six mounting screws, unplugging the signal cable, and lifting up and out.
- 4) Place the computer as if you were going to operate it.
- 5) Place a non-conductive prop underneath the front bezel so as not to short out any pins on the CPU board.
- 6) Place CRT module to the right of the machine, and plug the signal cable into position. Place the CRT module so that you have easy access to the yoke assembly. See the attached drawing for identification.
- 7) Connect a ground strap between the chassis of the computer and the chassis of the CRT frame.
- 8) Connect the keyboard to the computer.
- 9) Check that all components are not shorting against any conductive surface.

*** CAUTION ***

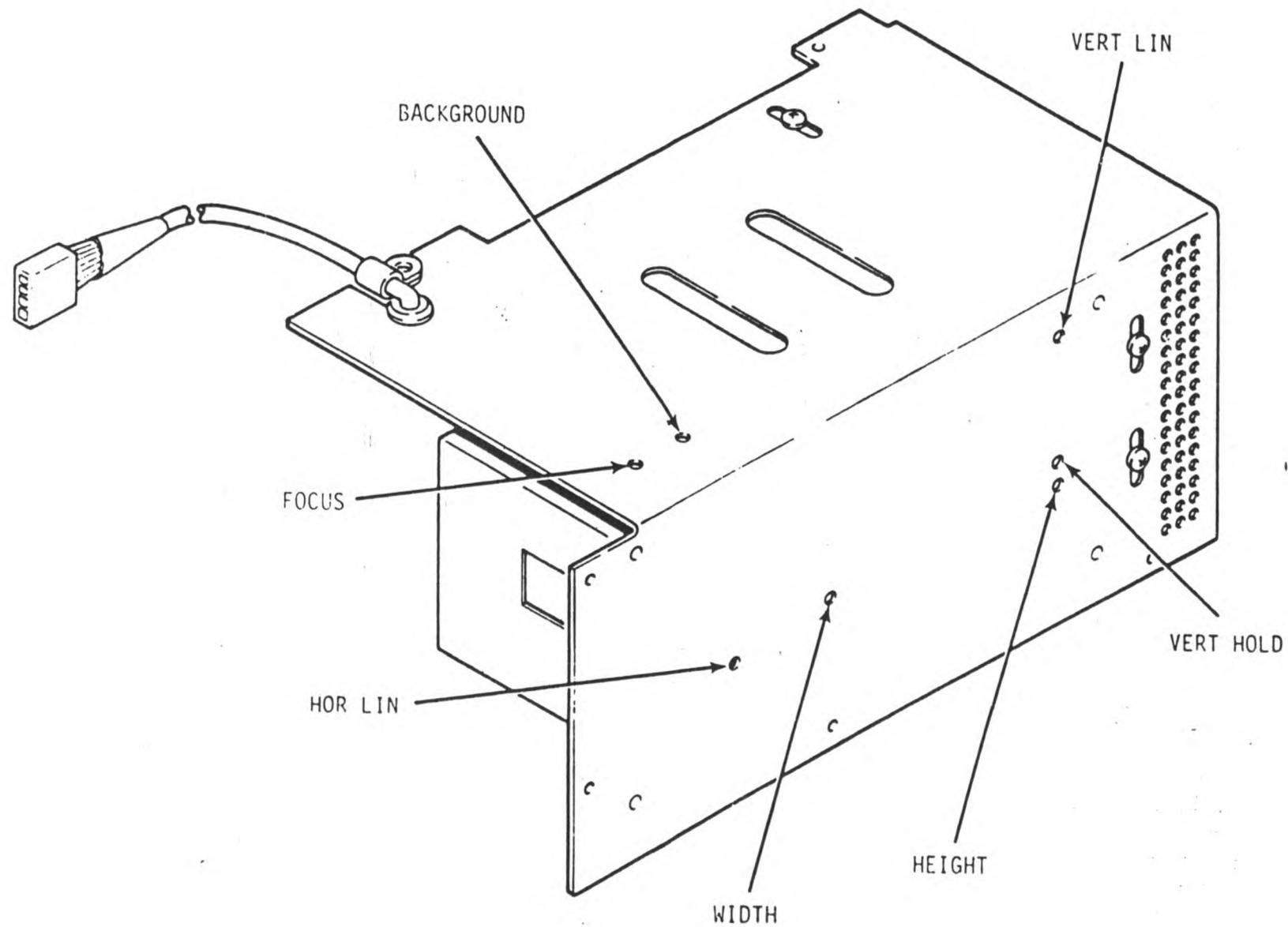
High voltage will be present on the yoke and the anode of the CRT when power is applied. Make sure you touch only insulated points during the adjustment procedure.

- 10) Connect the power cord to the computer.
 - 11) Turn the computer on.
 - 12) Verify that the computer is in terminal emulation mode.
 - 13) Pass control to the monitor by depressing CTRL and LINE FEED.
 - 14) After the @ appears press the G key to get the screen alignment pattern.
 - 15) Inspect the pattern displayed on the CRT for proper centering.
 - 16) Beging carefull not to touch any other part of the yoke assembly, adjust the two slip ring magnets until the pattern is centered. Refer to the drawing for the location of the slip rings.
-
- 17) At this point all adjustments should be complete. Turn the computer off and reassemble in reverse order of teardown.
 - 18) Verify that the pattern is centered on the screen prior to the installation of the outer skin. If the screen is not centered, repeat the above procedure until satisfactory results are achieved.

A. YOKE ASSEMBLY
B. SLIP RING MAGNETS



OTRONA



CRT ALIGNMENT / ADJUSTMENT

SERVICE NOTE

Product: Attache

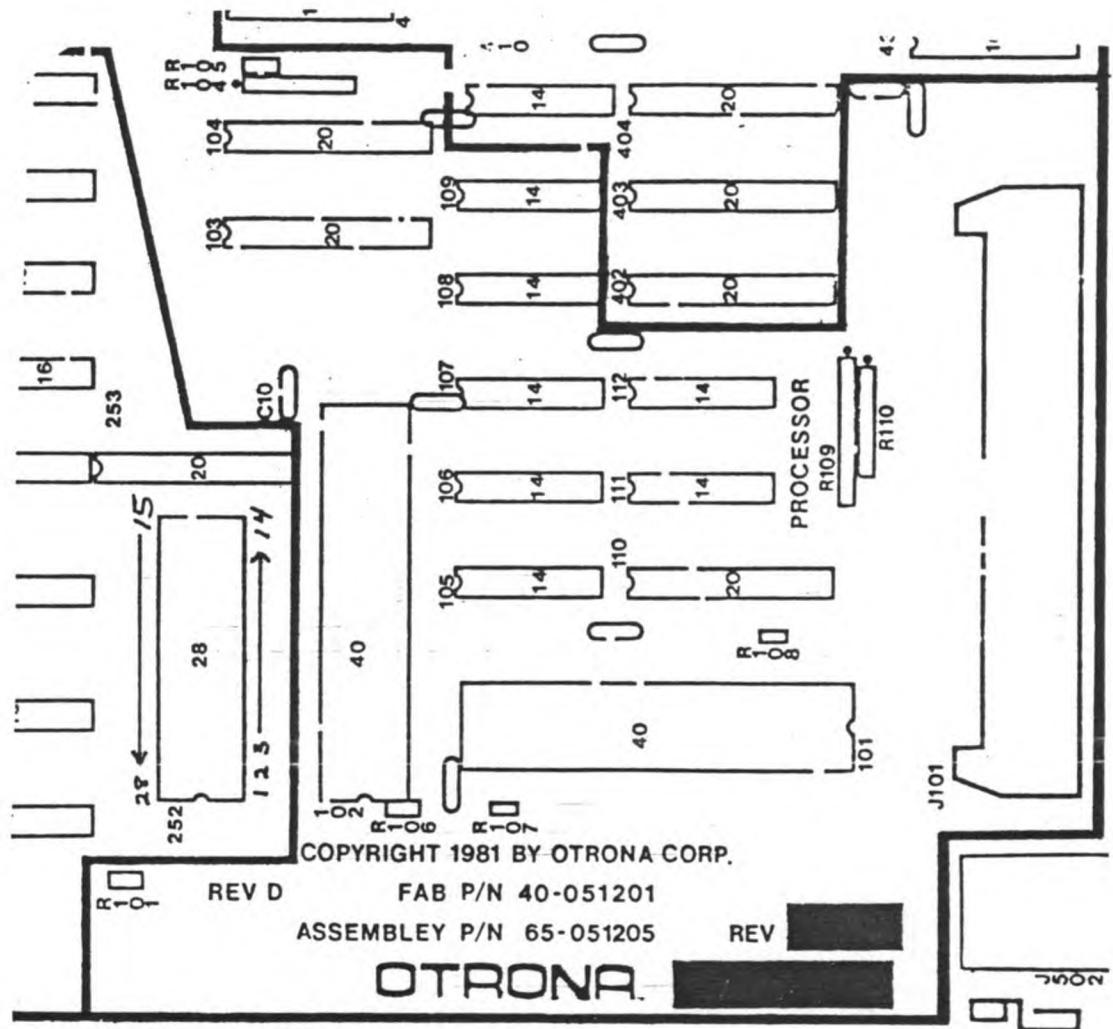
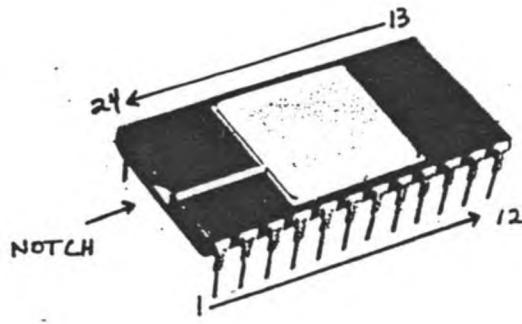
Supercedes: N/A

April 15, 1983

Subject: Monitor EPROM removal/insertion

To replace the monitor EPROM it is necessary to take the case off the ATTACHE, then remove the microprocessor board. Using the diagram on the following page, locate the Otrona name and the copyright area on the board. Now find the socket labeled 252, just above the REV *, where * is the board revision letter. Notice that the EPROM is a 24 pin integrated circuit in a 28 pin socket. Remove the old EPROM and insert the new one. Make sure that pin 1 of the new EPROM is inserted in pin 3 of the socket. Refer to the diagrams to determine pin 1 on the EPROM and socket if you are not familiar with the pin numbering schemes.

Note that the use of the new EPROM may require the realignment of the CRT. Refer to the CTR alignment Service Note for this procedure.



SERVICE NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: Insertion and Removal of a Single Teac Disk Drive

Remove the keyboard from the unit and place the handle in an open position.

Remove the cover from the ATTACHE by placing the unit with the CRT face down on a table and removing the four screws that hold the feet on the bottom of the unit. Slide the cover off.

Remove the eight disk drive module mounting screws. Two screws attach it to each of the following modules: the CRT module, the power supply module, the main board and the front bezel.

Remove the data cable from the main board and the power cable from the power supply. Carefully slide the drive module out of the unit.

To remove a single Teac disk drive from a drive module:

- 1) Remove the signal cable from the drive.
- 2) Remove the power cable from the drive.
- 3) Remove the four flat-head screws, which mount the drive to the mounting brackets.
- 4) Remove the drive from the mounting bracket.

To install a single Teac disk drive into a drive module:

- 1) Configure the drive for the proper drive location.

Refer to the figure on the following page for the locations of the jumpers and the R204 socket. They are on the bottom of the disk drive.

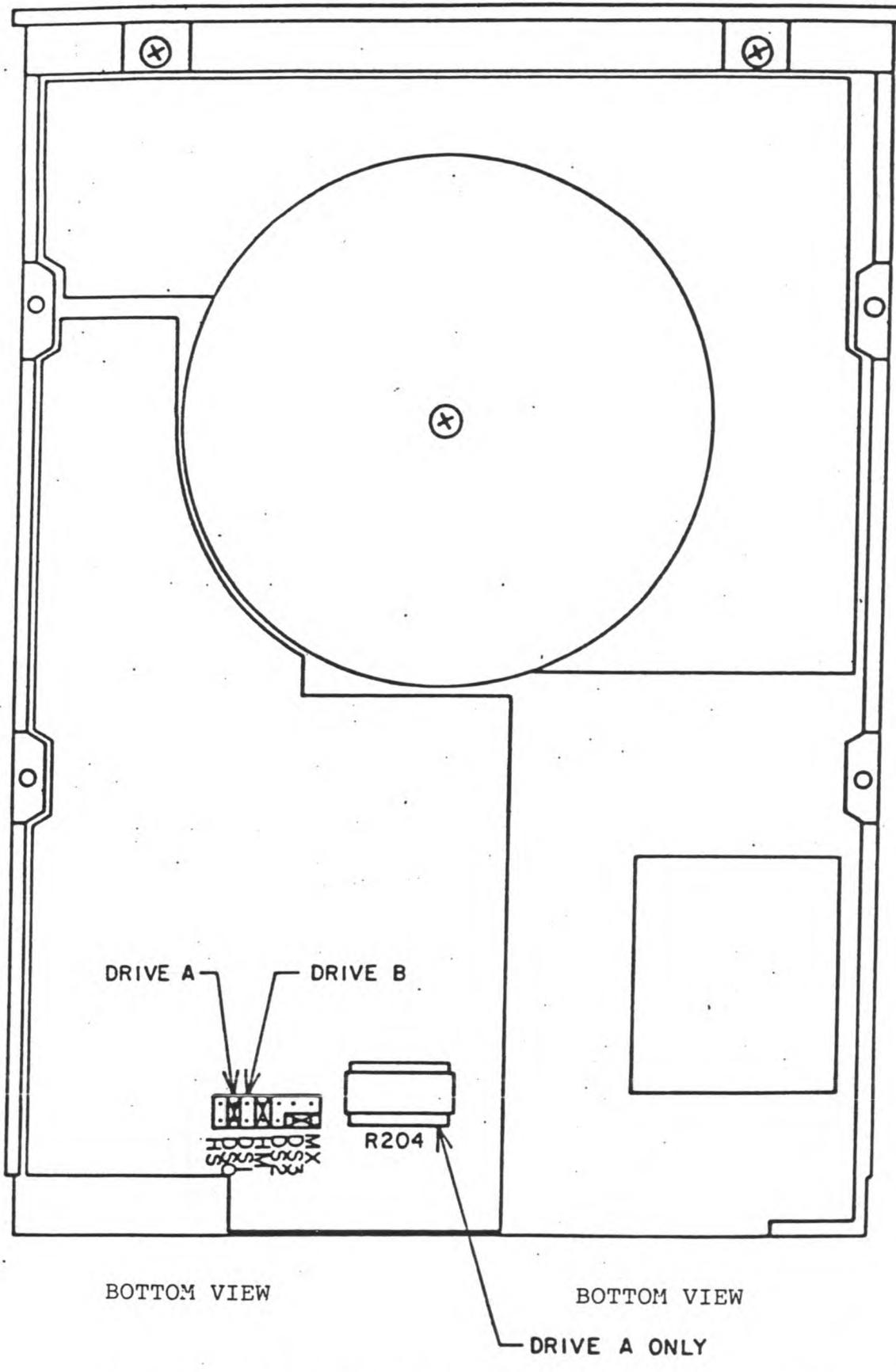
Drive A: Jumper DSO and see that DS1 is not jumpered
Check to see that R204 is in place.

Drive B: Jumper DS1 and see that DSO is not jumpered
Remove R204 if it is in place.

Note: All single Teac drives will be shipped configured as A: drives.

- 2) Insert drive into the drive mounting bracket and fasten with four flat-head screws.
- 3) Connect the signal cable.
- 4) Connect the power cable so that it is on the outside of the signal cable.

Reinsert the drive module in the reverse order of removal.
Test the drive using the Z or 1Z test.



DRIVE COMES CONFIGURED FOR DRIVE A AS SHOWN ABOVE

TEAC MODEL FD 55B-48 TPI DISK DRIVE

SERVICE NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: Revision C Data Separator ROM

A new data separating algorithm has been implemented in revision C of the data separator ROM. This ROM contains the program that is responsible for generating the read window signal to the floppy disk controller chip.

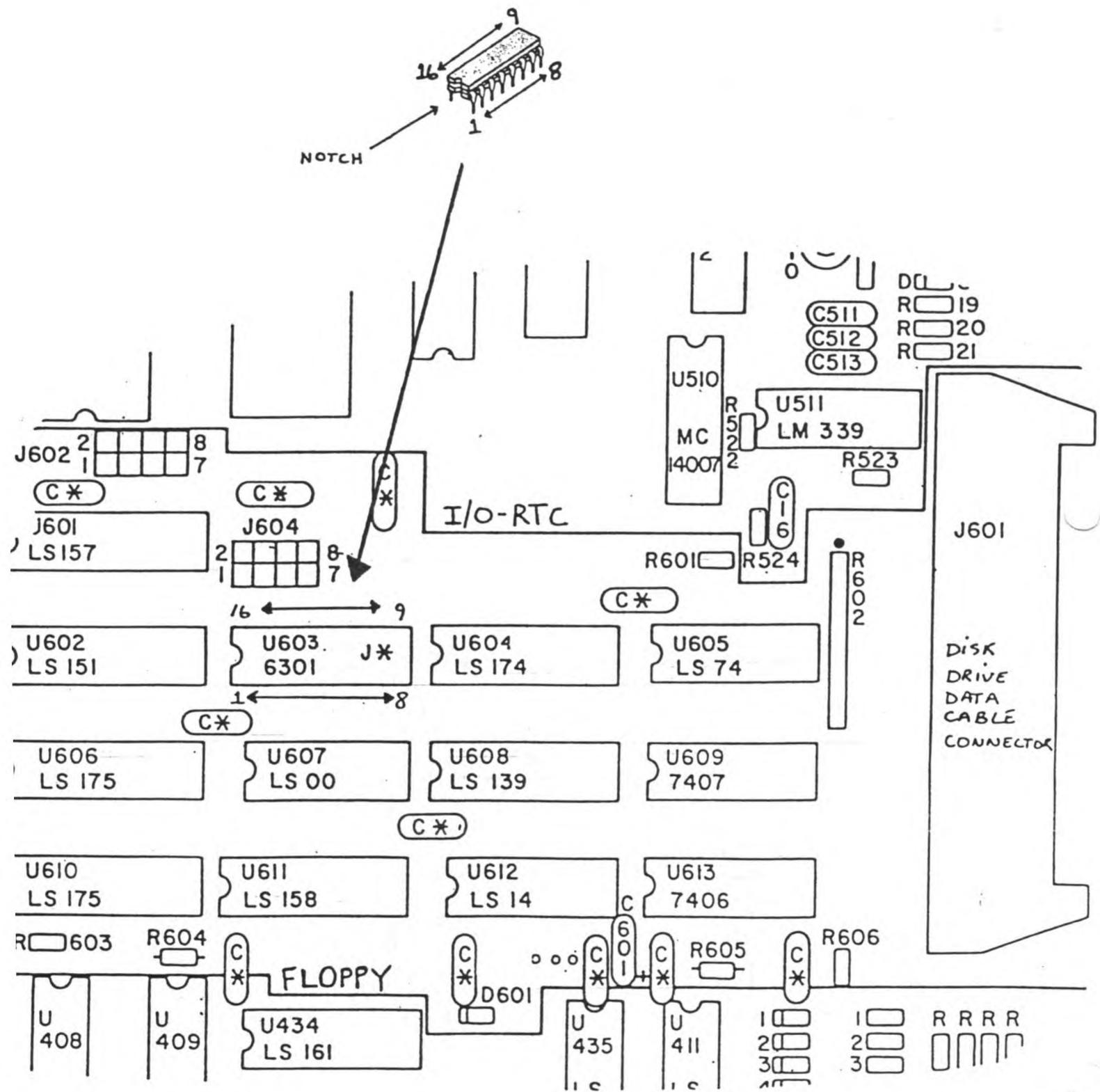
The read window is a signal that is used to separate the clock and data signals that are stored on the diskette. The data separator program compensates for variations of disk drives by increasing or decreasing the width of the data and clock portions of the read window. This change in the algorithm provides an increase in tolerance of spindle speed variations. Since spindle speed becomes less critical with the new algorithm, speed related BDOS and R/W errors should be reduced.

The indication of speed related problems are disk drives which indicate BDOS errors during use, but pass the Z test. Since the Z test writes information to the diskette and reads it back on the next revolution, the Z test is largely speed independent.

Speed related problems are also indicated by the non-transportability of diskettes. That is, diskettes that work fine on one drive or machine but indicate R/W or BDOS errors on another. This is because the data is being written and read at different speeds. Therefore, a read window signal which is better able to compensate for speed variations should reduce these speed related BDOS and Read/Write errors.

The Otrona part number for the data separator ROM is 21-063011. All units shipped with TEAC disk drives already have the revision C data separator ROM installed in them.

The data separator ROM is located on the CPU board, in the floppy section, in socket U603. It is accessable by removing the disk drive module. 011-* will be printed on the 6301, where the * is the revision letter of the program residing in the rom. Therefore, the new version has 011-C stamped on it. Refer to the diagrams on the following page for the location of the data separator ROM. Be sure to insert pin one of the ROM into pin one of the socket.



SERVICE NOTE

Product: Attache

Supercedes: 82:009

April 15, 1983

Subject: Interpreting "Z" test errors

The "Z" diagnostic test is used to verify the performance of **both the drive and the diskette**. It is not practical to test either as an individual item.

In viewing the results of the test, any failures, or apparent failures, are associated with both the drive and the diskette. **Always suspect the diskette as the failed item first and the drive second.**

"Z" test instructions

The full instructions for performing the "Z" diagnostic test and the associated error messages are detailed in the Attache Service Manual.

Any and all errors occurring during the test must be recorded. Otrona cannot provide support or authorize any repairs without these results. (Must use specified media - see below)

Test Media

The **only** acceptable media for performing the "Z" test is new, unused, Dysan 104/2D diskettes. Otrona will not accept **any** reported errors for support or repair performed with any other media.

Soft Errors

The manufacturers of diskettes specify that soft errors may and will occur. A soft error is one that may occur on a periodic or random basis but the data can be read with retries.

The "Z" test is extremely rigorous and does not allow for soft errors. You can determine if an error in the "Z" test is a soft error by entering the following command:

L U ____ V where ____ is the cchs value from the "Z" test error message.

If the specified sector is read successfully by the above test, then the error was a soft error and the drive is operating correctly.

An alternate and recommended procedure is to rerun the "Z" test on a second piece of media. Look for the occurrence of the same error.

SERVICE NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: Remex Disk Drive Spindle Speed Adjustment

Large variations in disk drive spindle speeds will produce BDOS and R/W errors. Therefore, it may be necessary to adjust the spindle speed of the disk drives if speed related problems are occurring.

Disk Drives with speed related problems will pass the Z test but will indicate BDOS or R/W errors during use. Since the Z test writes information to the diskette and reads it back on the next revolution, it is largely speed independent.

Speed related problems are also indicated by the non-transportability of diskettes. That is, diskettes that work fine on one drive or machine but indicate R/W or BDOS errors on another. This is because the data is being read and written at different speeds.

Disk drives which are not exhibiting these symptoms should not be adjusted.

This adjustment uses standard overhead fluorescent lighting found in most commercial buildings as a strobe light. Therefore, this adjustment must be done in a room with overhead fluorescent lighting. In addition, a small potentiometer adjustment screw driver and some torque-seal or nail polish will be needed.

To set the spindle speed of a REMEX disk drive.

- 1) Remove the keyboard from the ATTACHE and place the handle in an open position.
- 2) Remove the cover from ATTACHE.
- 3) Remove the disk drive module from the ATTACHE. Refer to figure 4 for this procedure if you are unfamiliar with it.

4) Prepare the drives for spindle speed adjustment.

For A: drives

- i) Remove the power and data cable from the A: drive.
- ii) Remove the A: drive from the module by removing the four screws which mount it to the module mounting brackets.
- iii) Remove the bottom cover from the A: drive if there is one in place. This cover is held by four phillips-head screws and covers most of the bottom of the drive when in place. This cover is not necessary on A: drives and may be left off during reassembly.

For B: Drives

- i) Remove the data cable from the B: drive.
- ii) Remove the bottom cover from the B: drive by removing the four phillips head screws which hold it in place. The covers on B: drives are mandatory and must be replaced during reassembly.

BEFORE PROCEEDING, ASSURE THAT THE ATTACHE AND ALL OF ITS MODULES ARE ON NON-CONDUCTIVE SURFACES. DAMAGE TO THE ATTACHE AND POSSIBLE INJURY MAY RESULT IF THE ATTACHE COMES IN CONTACT WITH CONDUCTIVE SURFACES.

- 5) Elevate the front of the unit with a non-conductive block and attach the keyboard to the ATTACHE. Attach the power cord to the unit and plug it into an A.C. outlet.
- 6) Stand the B: drive upright, near the power supply connectors. Connect the power cable from the drive module to the power supply.
- 7) Connect the disk-drive module's data cable to the CPU board.
- 8) Set the A: drive on its right side near the floppy data cable connector on the main board. The right side is the side furthest from the LED indicator light. Connect the shortest power cable from the power supply to the A: drive. Connect the end of the floppy data cable to the A: drive.
- 9) Power up the ATTACHE and enter monitor mode by entering CTRL-LINE FEED while in terminal mode.
- 10) Put a blank diskette in the drive A: Start the motor on the A: drive by entering the under-lined responses to the monitor prompt (@).

For A: Drives

@L

@U1V<return>

- 11) Refer to Figure 1 for the location of the timing marks. The outer ring of marks are to be used when the supply frequency is 60 Hz. as in the United States. The inner ring of timing marks are for 50 Hz. supply frequencies.
- 12) Refer to Figure 2 for the location of the speed adjustment potentiometer.
- 13) While viewing the timing marks under fluorescent lighting, slowly adjust the speed adjustment potentiometer until the marks on the flywheel appear to stop. That is, when the timing marks on the wheel do not appear to be rotating.
- 14) When the marks have appeared to stop, place a drop of torque-seal or nail polish between the adjustment screw and the housing of the potentiometer to keep it from moving.
- 15) Turn the unit off. Reassemble the disk drive module except for the bottom cover on the B: drive. Reattach the data and power cables to both drives.
- 16) Set the module on its side on a non-conductive block, near the power supply connectors, so that you can adjust the B: drive. Attach the disk drive power cable to the power supply. Attach the end of the data cable to the CPU board.
- 17) Put a disk in the B: drive. Turn on the Attache and enter the monitor mode by typing a CTRL-LINE FEED. Start the motor on the B: drive by entering the following underlined responses to the monitor prompt (@).

For B: Drives
@L
@U11V<return>
- 18) Follow steps 11-14 to set the speed of the B: drive.
- 19) Turn the unit off and replace the bottom cover on the B: drive.
- 20) Reassemble the ATTACHE and test the drives using the Z or 1Z tests.

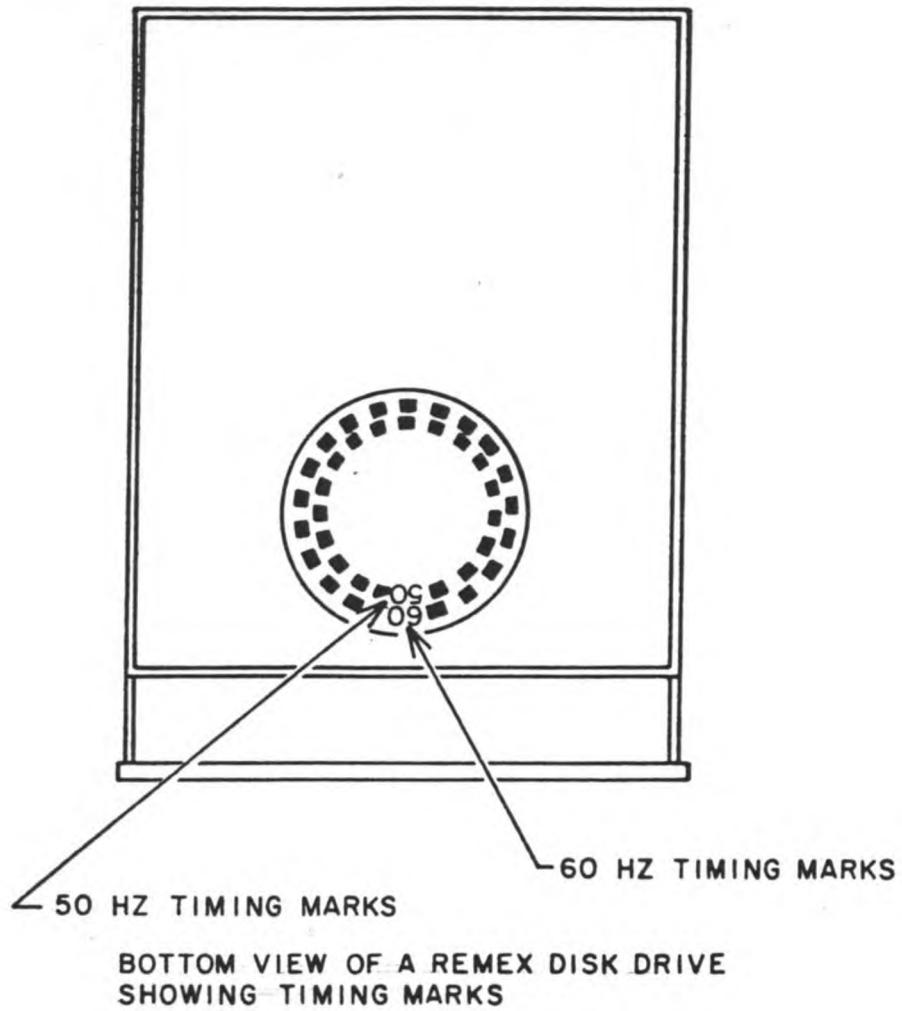
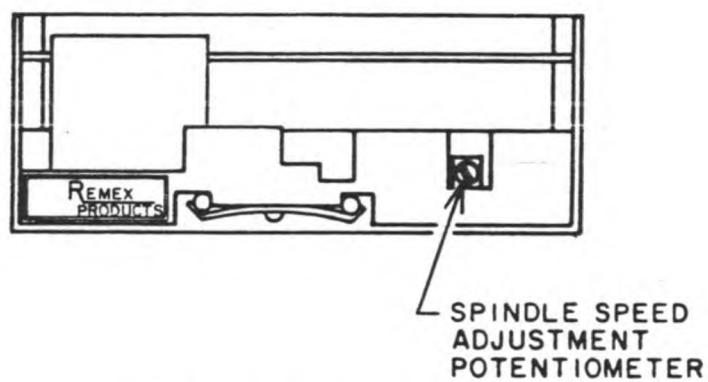


FIG. 1 (SCALE: HALF)



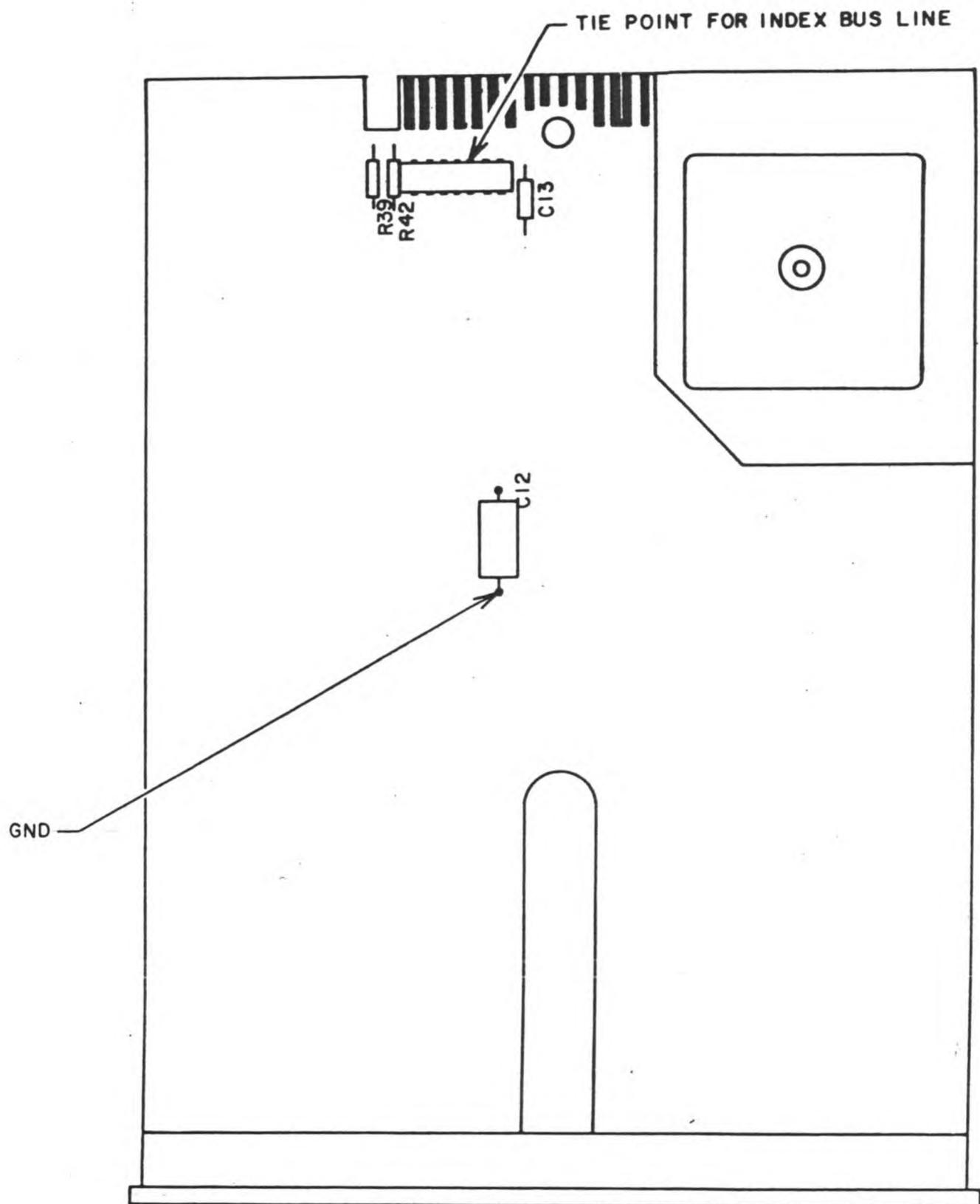
REAR VIEW OF A REMEX DISK DRIVE
SHOWING LOCATION OF THE SPEED
ADJUSTMENT POTENTIOMETER

FIG. 2 (SCALE: HALF)

ALTERNATE PROCEDURE

If you have a universal counter and are familiar with its use you may follow this procedure to adjust the spindle speed. The counter must have an accuracy of 100 microseconds.

- 1) Following steps 1,2, & 3 above, remove the disk drive module from the ATTACHE. Leave the power cable connected to the power supply, and data cable connected to the CPU board.
- 2) Refer to Figure 3 for the tie-point and ground location for attachment of the frequency counter. This tie point allows adjustment of either drive, depending on which is selected in step 3 below, but you must have a blank diskette in both drives to use this tie point. Set the counter for positive edge-triggering, period mode and scale it for 100's of milliseconds.
- 3) Follow steps 9 and 10 above to start the A: drive motor.
- 4) Adjust the spindle speed adjustment potentiometer shown in figure 2 until the period of the waveform is $200.0 \pm 0.5\text{mS}$.
- 5) Put a drop of torque-seal or nail polish between the adjustment screw and the housing of the potentiometer to keep it from moving.
- 6) Follow step 17 above to start the motor on the B: drive.
- 7) Following steps 4 and 5 of the alternate procedure, Adjust the spindle speed of the B: drive.
- 8) Reassemble the ATTACHE following the reverse order of disassembly.
- 9) Test the disk-drives using the Z or 1Z test.



TOP VIEW OF A REMEX DISK DRIVE SHOWING TIE POINT FOR USING A FREQUENCY COUNTER TO ADJUST SPINDLE SPEED

SERVICE NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: Serial Ports MBASIC Test Program

Listed below is a MBASIC program which can be used to test the operation of the Attache's serial ports.

```
10 REM
20 REM  Serial Port Test
30 REM
32 OUT 241,16 : OUT 243,16 : REM  reset external/special conditions
40 ESC$ = CHR$(27) : PRINT CHR$(26);ESC$;"S1"
50 PRINT TAB(8);"Attache Serial Port Test"
55 PRINT ESC$;"SO"
57 PRINT "Connect local stub to printer port."
58 PRINT "Connect Comm. cable to comm. port."
60 PRINT "Connect the above cables together."
65 PRINT "Set both ports to 19200 BAUD. Press ESC to exit."
70 PRINT "Characters pressed should appear on the display..."
80 PRINT : PRINT
90 CHAR$ = INKEY$
91 IF CHAR$ = "" THEN GOTO 90
92 IF CHAR$ = ESC$ THEN PRINT CHR$(26) : SYSTEM
93 CHAR% = ASC(CHAR$)
94 GOSUB 200 : REM  Comm. output routine
95 GOSUB 300 : REM  Printer input routine
96 GOSUB 400 : REM  Printer output routine
97 GOSUB 100 : REM  Comm. input routine
98 PRINT CHAR$; : GOTO 90
```

```
100 REM
110 REM Comm. Input routine
120 REM
140 STATUS% = INP(241) AND 1
150 IF STATUS% = 0 THEN GOTO 100
160 CHAR% = INP(240) : CHAR$ = CHR$(CHAR%)
170 RETURN
180 REM
190 REM Comm. Output routine
200 REM
220 STATUS% = INP(241) AND 4
230 IF STATUS% = 0 THEN GOTO 200
240 OUT 240,ASC(CHAR$)
250 RETURN
260 REM
270 REM Printer Input routine
280 REM
290 STATUS% = INP(243) AND 1
300 IF STATUS% = 0 THEN GOTO 280
310 CHAR% = INP(242) : CHAR$ = CHR$(CHAR%)
320 RETURN
330 REM
340 REM Printer Output routine
350 REM
360 REM
370 REM
380 REM
390 REM
400 REM
410 STATUS% = INP(243) AND 4
420 IF STATUS% = 0 THEN GOTO 400
430 OUT 242,ASC(CHAR$)
440 RETURN
```

PRINTER NOTE

Product: Attache

Supercedes: 82:002,010,011

April 15, 1983

Subject: Printer Set-Ups

Anadex DP9500 Series Printers

DIP switch 1

```
1 off  \
2 on   \
3 on    > form length
4 off  /
5 on   /
6 on    character font
7 on    7.5 second timeout
8 off   alternate character set #
```

DIP switch 2

```
1 off  \ disable skip
1 off  / over perfor
3 n/a  spare
4 off  6 LPI
5 off  \ no serial
6 off  / protocal
7 on   truncate long lines
8 off   no LF after CR
```

DIP switch 3

```
1 on    serial enabled
2 on    line width
3 on   \
4 on    \ 4800
5 off  / BAUD
6 off  /
7 on    8 bit word
8 off  1 stop bit
9 off  \ parity
10 off / disabled
```

Axiom IMP MiniPrinter

DIP switch 1

```
1 on      \ 80 CPI on
2 on      / power up
3 on      6 LPI
4 off     no LF on CR
5 off     8 bit word
6 off     no skip of perforation
7 on      variable format
8 on      standard print
```

DIP switch 2

```
1 on      \
2 on      > 1200 BAUD
3 on      /
4 on      not used
5 on      \
6 on      > form length
7 on      /
8 off    enable serial interface
9 on      RS-232C interface type
10 off   enable serial interface
```

C. Itoh 8510A Printer

DIP switch S1

```
1 open      \
2 closed   > US character set
3 open      /
4 open      66 lines/page
5 open      DC1/DC3 enabled
6 open      no LF at full buffer
7 closed   CR print command code
8 open      no LF after CR
```

DIP switch S2

```
1 closed.    slashed zero
2 open       buffer selected
3 open       not defined
4 open       not defined
5 open       10 CPI
6 closed   7 bit code (ASCII)
7 open      not selected on power
8 open      bidirectional printing
```

C. Itoh Serial Interface Card (RD type)

| | |
|-------------------------|--------------------------------|
| switch S21 | switch S23 |
| 1 open 1 stop bit | 1 closed \ RS-232C enabled |
| 2 closed CER enabled | 2 open / |
| 3 open \ parity | 3 open not defined |
| 4 closed / disabled | 4 open \ |
| 5 open not defined | 5 closed > RS-232C selected |
| 6 open 8 bit word | 6 open / |
| 7 open \ RDY/BSY | |
| 8 open / | |
| switch S22 | |
| 1 open \ | 1 closed \ DTR selected |
| 2 open > 9600 BAUD | 2 open / |
| 3 open / | 3 open \ RTS selected |
| 4 open not defined | 4 closed / |
| | 5 closed \ CTS not used |
| | 6 open / |
| | 7 open \ CD invalid |
| | 8 closed / |

Diablo 630 printer

| | |
|---------------------------|----------------------------|
| left DIP switch | right DIP switch |
| 1 off no ECS operation | 1 off no LF after CR |
| 2 off not used | 2 off \ 1200 |
| 3 off 8 bit ASCII | 3 on / BAUD |
| 4 off not used | 4 off not used |
| 5 off \ | 5 off \ no parity |
| 6 off > English | 6 off / checked |
| 7 off / | 7 off XON/XOFF protocol |
| 8 off not used | 8 off not used |

Gemini 10 Printer

| printer DIP switch | | | serial card DIP switch | | |
|--------------------|-----|-----------------|------------------------|-----|---------------|
| 1 | off | no paper signal | 1 | n/a | unused |
| 2 | off | CR print code | 2 | off | no parity |
| 3 | off | 8 bit interface | 3 | off | \ serial busy |
| 4 | off | no LF after CR | 4 | off | / one byte |
| | | | 5 | n/a | parity |
| | | | 6 | on | \ |
| | | | 7 | off | > 1200 BAUD |
| | | | 8 | off | / |

Serial Card Jumpers

| | | |
|----|-----|---|
| S1 | A-C | RS-232C levels |
| S2 | A-C | reversal of TTY TXD signal |
| S3 | A-C | to control RTS with RTS |
| S4 | A-C | to control CTS with CTS of host CPU |
| S5 | A-C | to control DCD with DCD of host CPU |
| S6 | A-C | to control DSR with DSR of host CPU |
| S7 | A-C | to set DTR output to +12V in ready status |
| S8 | B-C | to set REV-CH output to +12V in busy status |

A printer cable must be modified to provide pin 11 of the printer RS-232C interface to pin 5 of the Attache 15 pin connector.

Epson MX-80 printer with Graftrax-80

| DIP switch 1 | | | DIP switch 2 | | |
|--------------|-----|----------------------|--------------|-----|-----------------|
| 1 | off | 10 CPI | 1 | n/a | not used |
| 2 | on | print on CR | 2 | n/a | not used |
| 3 | on | print on buffer full | 3 | off | no LF after CR |
| 4 | off | not italic | 4 | off | not TRS-80 mode |
| 5 | off | not emphasized | | | |
| 6 | on | buzzer enabled | | | |
| 7 | on | slashed zero | | | |
| 8 | on | printer selected | | | |

Epson MX-80 printer with Graftrax-plus

| DIP switch 1 | | | DIP switch 2 | | |
|--------------|-----|--------------------|--------------|-----|----------------|
| 1 | off | 10 CPI | 1 | n/a | not used |
| 2 | n/a | not used | 2 | n/a | not used |
| 3 | off | paper out detected | 3 | on | no LF after CR |
| 4 | off | not italic | 4 | off | no skip |
| 5 | off | not emphasized | | | |
| 6 | on | buzzer enabled | | | |
| 7 | on | slashed zero | | | |
| 8 | on | printer selected | | | |

Epson MX-100 printer

DIP switch 1

| | |
|-------|---------------------|
| 1 off | 6 LPI |
| 2 off | 11" form length |
| 3 off | \ character size |
| 4 off | / (normal) 136/line |
| 5 off | not defined |
| 6 off | paper end detection |
| 7 on | US character set |
| 8 on | signal fixed |

DIP switch 2

| | |
|-------|--------------|
| 1 on | US character |
| 2 on | set used |
| 3 off | fixed signal |
| 4 on | no skip |

Epson 8141 Serial Interface Card

| | |
|-------|------------------------------------|
| 1 on | |
| 2 on | |
| 3 off | Set as shown for use at 9600 BAUD. |
| 4 off | |
| 5 off | This serial interface card can not |
| 6 off | be used for graphics printing. |
| 7 off | |
| 8 off | |

Epson 8145 Serial Interface Card

DIP switch 1

| | | |
|-------|---|-----------------------|
| 1 on | \ | 9600 BAUD |
| 2 off | \ | (use 4800 BAUD |
| 3 off | \ | for graphics) |
| 4 off | \ | |
| 5 on | { | Data Entry |
| 6 off | { | Ready Flag Control |
| 7 on | - | parity disabled |
| 8 off | - | n/a (odd/even parity) |

DIP switch 2

| | |
|-------|-----------------------|
| 1 off | 8 bit word |
| 2 on | reverse channel |
| 3 off | } marking when busy |
| 4 on | reverse channel valid |

Epson 8151 Serial Interface Card

| DIP switch 1 | DIP switch 3 |
|-----------------------|------------------------------------|
| 1 off data bit 8 | 1 on \ buffer handshake point |
| 2 n/a parity | 2 off / |
| 3 off eight data bits | 3 off disable bit 8 control |
| 4 on one stop bit | 4 n/a x-on/x-off or ack/nak |
| 5 off no parity | 5 on standard mode |
| switch 2 | 6 off disable select/deselect mode |
| | 7 off disable status mode |
| | 8 on normal busy |
| set for 9600 Baud | |

Epson Gold Eagle 8155 Serial Interface Card Jumpers

| Jumber Number | Setting |
|-----------------------|--|
| 1-6 BAUD rate | 6 jumpered; 1-5 open selects 9600 BAUD |
| 7 odd or even parity | n/a; disabled by jumper 9 |
| 8 stop bit select | jumpered selects 1 stop bit |
| 9 parity enable | open disables parity |
| 10 invert handshake | open |
| 11 normal handshake | jumpered |
| 12 CTS handshake | open disables CTS |
| 13 RTS handshake* | open disables RTS |
| 14 DTR handshake* | jumpered selects DTR |
| 15 handshake point | open selects 140 char |
| 16 word length | open selects 8 data bits |
| 17 serial test enable | open disables serial test |
| 18 MX-80 or MX-100 | jumpered for MX-80; open for MX-100 |
| 19-20 | both jumpered selects hardware handshake |

* NOTE: Some Gold Eagle manuals show DTR on J13 on page 4 and on J14 on page 5. DTR is actually J14 and RTS is J13.

| | |
|----|-----------------------------|
| S1 | off disables serial test |
| S2 | on enables serial interface |

Mannesmann Talley Printer

| | |
|-----------------|--|
| FORM LENGTH | 11 INCH |
| LPI | 6 |
| CPI | 10 |
| CR IMPLIES LF | NO |
| LF AT FULL LINE | NO |
| CHAR SET | USA |
| SLASH ZERO | NO |
| AUX CODE SET | E CODES |
| INTERFACE TYPE | SERIAL |
| BAUD | 9600 |
| NO. DATA BITS | 8 |
| NO. STOP BITS | 1 |
| PARITY | NONE |
| BUSY | LOW |
| PROTOCOL | XON/XOFF (answer no when setting parameters) |

A printer cable must be modified to provide pin 11 of the printer RS-232C interface to pin 5 of the Attache 15 pin connector.

NEC 5510/5515 Printers

G9BNF or G9DGD board

| | |
|-------|-----------------------------|
| 1 off | auto CR disabled |
| 2 on | clear all tab stops |
| 3 off | break enabled |
| 4 off | ETX/ACK protocol |
| 5 off | reverse channel active high |
| 6 off | ribbon lift enable |
| 7 on | \ BAUD rate |
| 8 on | / high = 1200 |

A printer cable must be modified to provide pin 19 of the printer RS-232C interface to pin 5 of the Attache 15 pin connector.

TEC F10-40/55 printers

DIP switch 40 (left)

| | |
|----------|------------------|
| 1 closed | \ 1200 |
| 2 open | / BAUD |
| 3 open | 8 bits |
| 4 closed | \ no |
| 5 open | / parity |
| 6 closed | 1 stop bit |
| 7 closed | ETX/ACK protocol |
| 8 closed | 1200 BAUD |

DIP switch 41 (right)

| | |
|----------|------------------|
| 1 open | serial |
| 2 open | no LF after CR |
| 3 closed | auto space on |
| 4 open | elite pitch |
| 5 closed | not proportional |
| 6 open | \ |
| 7 open | / 11 inch |
| 8 closed | / form length |
| 9 open | / |
| 10 open | normal hammer |

Okidata Microline 83A printer

DIP switch 1

```
1 off      8 bit code
2 off      no LF after CR
3 off      printer ignores DEL
4 n/a      unused
5 off      \
6 off      \  US ASCII
7 off      \  characters
8 off      /
```

DIP switch 2

```
1 on      SSD Mark when ready
2 on      \
3 off      > 1200 BAUD
4 on      /
5 off      not defined
6 off      no parity
jumper plugs
```

SP1 side B DTR always on
SP2 side A 8 data bits

Okidata Microline 84 printer DIP switch

```
1 off      8 bit code
2 off      no LF after CR
3 off      printer ignores DEL
4 n/a      unused
5 off      \
6 off      \  US ASCII
7 off      \  characters
8 off      /
```

Okidata High-Speed Serial Interface Board

DIP switch 1

```
1 n/a      odd/even parity
2 on       disables parity
3 off      8 data bits
4 off      \
5 on       > 4800 BAUD
6 on       /
7 off      LF as block end code
8 on       graphics enabled
```

DIP switch 2

```
1 on      \
2 on      > Simplex Busy selected
3 on      /
4 off      change DTR (DTR not used.)
5 off      SSD MARK when busy
6 off      disregard Carrier Detect
7 off      enables RS-232C
8 off      3-wire system
```

Okidata Super Speed Serial Interface Board

| | DIP switch 1 | | DIP switch 2 |
|-------|-----------------|-------|-------------------|
| 1 n/a | odd/even parity | 1 off | \ |
| 2 on | no parity | 2 on | > 9600 BAUD |
| 3 on | 8 data bits | 3 on | / |
| 4 on | DTR | 4 n/a | not used |
| 5 on | circuit test | 5 off | buffer setting |
| 6 on | print mode | 6 n/a | not used |
| 7 on | \ Ready/Busy | 7 off | RS-232C interface |
| 8 on | / on pin 20 | 8 off | 3-wire or 4-wire |

A printer cable must be modified to provide pin 11 of the printer RS-232C interface to pin 5 of the Attache 15 pin connector.

COMMUNICATION NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: EIA RS-232C interface

The information below should allow a technician to construct and/or debug cables between the Attache and any "RS-232 compatible" device. This information is necessary due to the way that vendors implement "RS-232" interfaces, sometimes omitting required signals, requiring optional ones, or worse, implementing signals incorrectly. There are two main classes of RS-232 devices, DTE (Data Terminal Equipment), and DCE (Data Communication Equipment). The serial ports on the Attache are configured as either a DTE or a DCE depending on what type of device is being interfaced.

| Pin | Circuit | Description | DTE | DCE |
|-----|---------|---------------------|--------|-------|
| 1 | AA | Protective Ground | ----- | ----- |
| 2 | BA | Transmitted Data | -----> | ----- |
| 3 | BB | Received Data | <----- | ----- |
| 4 | CA | Request to Send | -----> | ----- |
| 5 | CB | Clear to Send | <----- | ----- |
| 6 | CC | Data Set Ready | <----- | ----- |
| 7 | AB | Singal Ground | ----- | ----- |
| 8 | CF | Carrier Detect | <----- | ----- |
| 15 | DB | Transmitter Clock | <----- | ----- |
| 17 | DD | Receiver Clock | <----- | ----- |
| 20 | CD | Data Terminal Ready | -----> | ----- |
| 22 | CE | Ring Indicator | <----- | ----- |

| | | |
|------------------|----------|----------|
| Circuit Voltage | Negative | Positive |
| Binary State | 1 | 0 |
| Signal Condition | Marking | Spacing |
| Function | off | on |

The next two pages contain the recommended cable diagrams for the Attache serial ports.

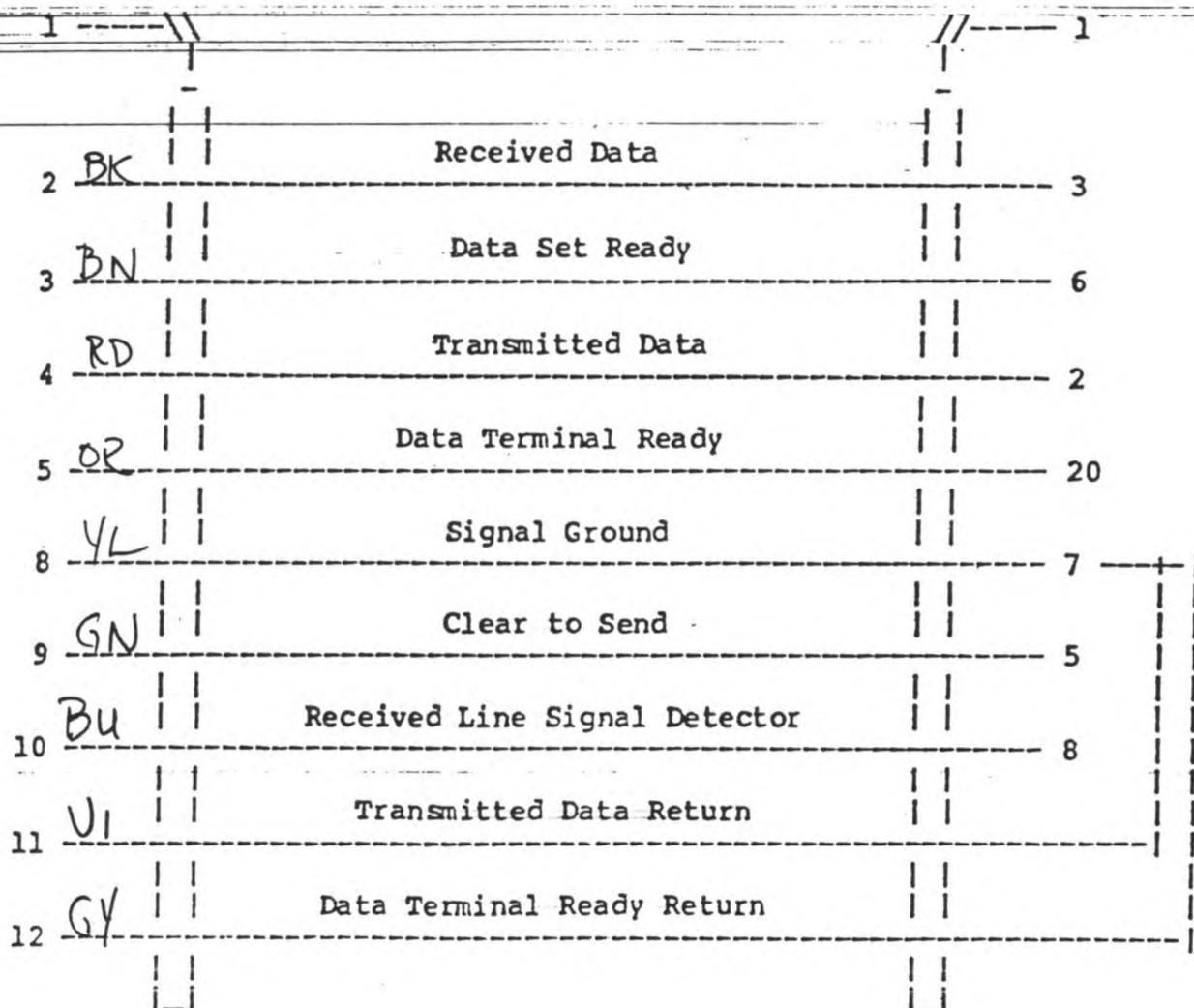
Local (Printer) Cable Pin Connections

Local RS-232: (attachment for printers and other local devices)

Attache(DCE)

(DTE) RS-232C

Protective Ground (Shield) Optional



15 Pin Male Connector

RS-232 Connector

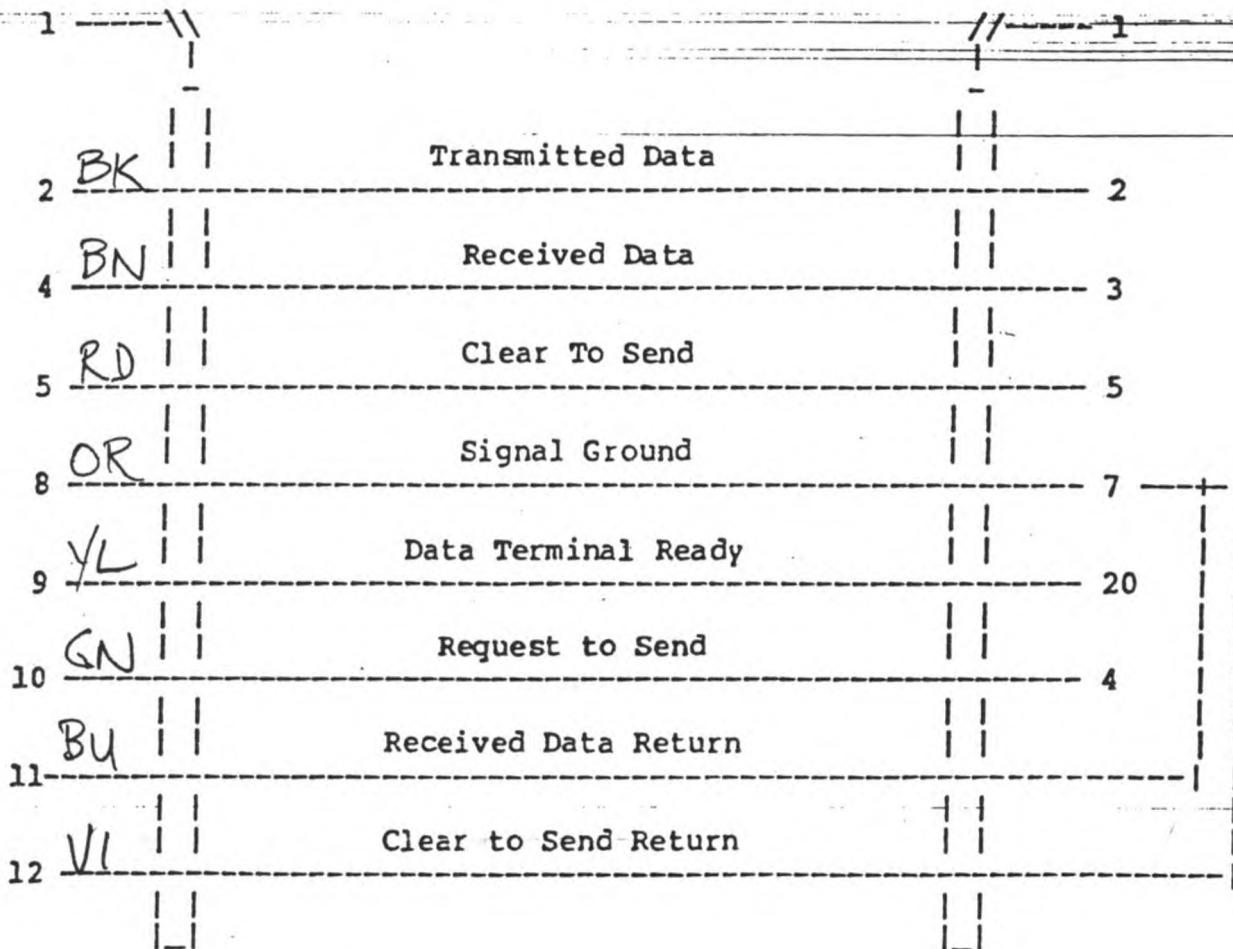
Comm (Communications) Cable Pin Connections

Communications RS-232: (attachment to another computer or a modem)

Attache (DTE)

(DCE) RS-232C

Protective Ground (Shield) Optional



15 Pin Male Connector

RS-232 Connector

OTRONA

OTRONA CORPORATION
4755 Walnut Street
Boulder, Colorado 80301
(303) 444-8100
TWX 910-940-3445

TO: OTRONA DEALERS AND REPRESENTATIVES
FROM: TECHNICAL SUPPORT DEPARTMENT
DATE: MARCH 3, 1983

Otron Advanced Systems is continually upgrading ATTACHE' in an effort to provide our resellers with a superior product. The enclosed items describe upgrades that will enhance the reliability of ATTACHE's containing Remex disk drives. Should you perform any upgrades, you will be reimbursed for your efforts. This packet includes complete information and instructions on these upgrade procedures.

We have enclosed Attache Service Notes, Operator Note, In-Warranty Upgrade Program, In-Warranty Upgrade Verification Forms, and 5 Revision C Data Separator Roms.

Service Notes (Revision C Data Separator Rom and Remex Drive Spindle Speed Adjustment) describe service procedures for Attache portable computers with Remex drives. These service procedures should be followed prior to returning Remex drive modules for repair.

REV C DATA SEPARATOR ROM - We recommend that each dealer install the Rev C Data Separator Rom if an Attache has been returned for service. This Rom should improve the performance and reliability of Attache portable computers. Only Remex drive systems will require this upgrade. The Rev C Data Separator Rom has been shipped with all Teac systems. Refer to Service Note X-5.1 for detailed information.

We have included 5 of these Roms (Part #21-063011) for your convenience. Discard the Rev B Rom when you install the Rev C Rom. You may place an order for additional Rev C Data Separator Roms with your Customer Service Representative. There is no charge for this component.

REMEX DRIVE SPINDLE SPEED ADJUSTMENT - The Remex Drive Spindle Speed should be adjusted only if an Attache has specific problems. Refer to Service Note X-10.1 for complete information on this procedure.

REV E MONITOR PROM - This monitor Prom should be upgraded from a Rev E to a Rev F only if a customer experiences any of the following: overscan problem on external monitors, problems with ADM-3A clear screen function, objections to keyclick volume in terminal mode, communications difficulty with other systems due to CTRL G bug. Refer to Technical Notes 82:014, 83:002 for detailed information. Refer to the Attache In-Warranty Upgrade Program for ordering and return information.

IN-WARRANTY UPGRADE PROGRAM - The above service and upgrade procedures are covered under Otron's In-Warranty Upgrade Program. Detailed information on service reimbursement and procedures is attached.

We feel confident these changes will further improve the reliability of ATTACHE', and appreciate your continued support. Contact your Customer Service Representative on our Dealer Hot Line if you need additional information.

SERVICE NOTE

Product: Attache

Supercedes: N/A

February 21, 1983

Subject: Revision C Data Separator ROM

A new data separating algorithm has been implemented in revision C of the data separator ROM. This ROM contains the program that is responsible for generating the read window signal to the floppy disk controller chip.

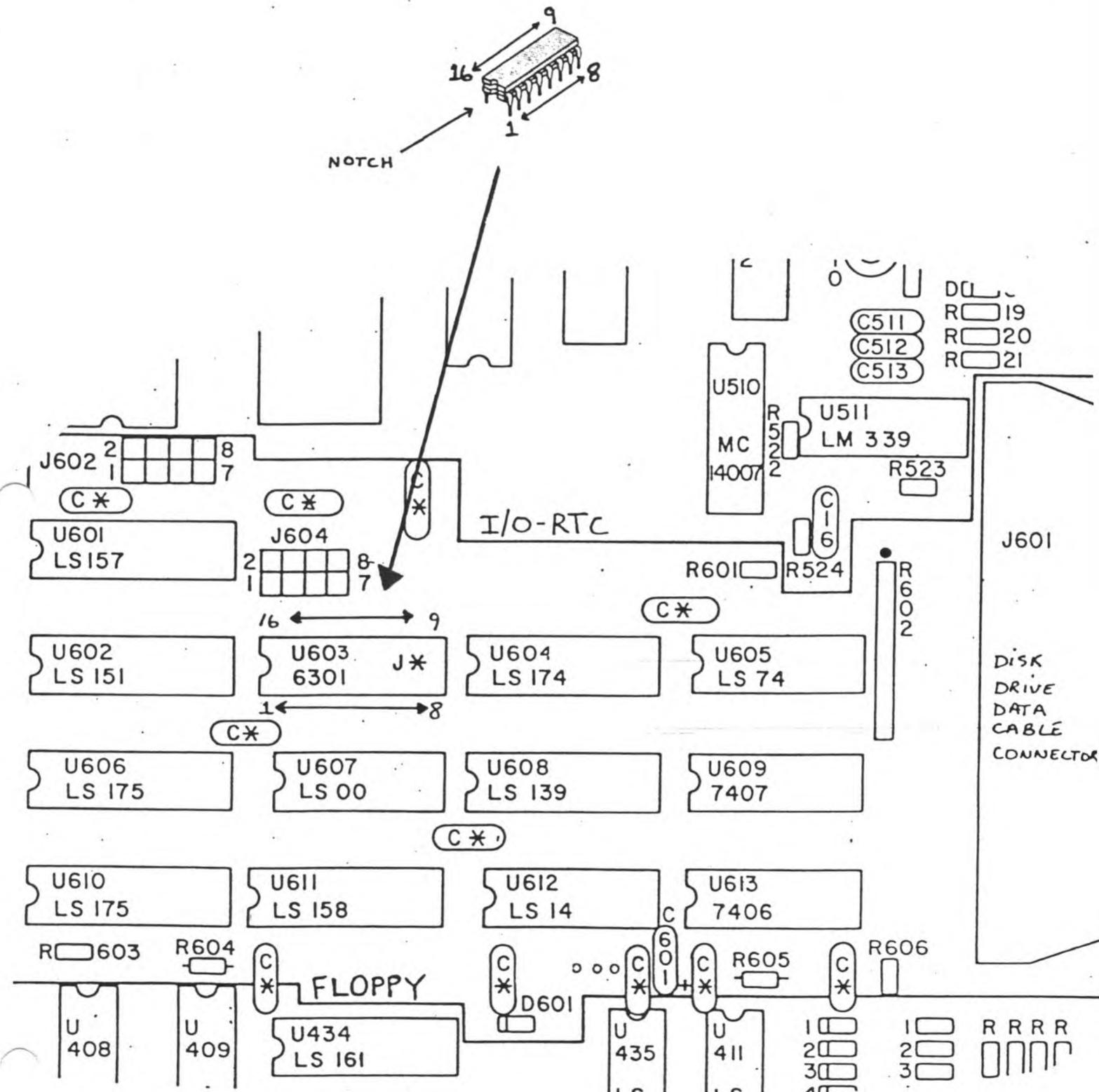
The read window is a signal that is used to separate the clock and data signals that are stored on the diskette. The data separator program compensates for variations of disk drives by increasing or decreasing the width of the data and clock portions of the read window. This change in the algorithm provides an increase in tolerance of spindle speed variations. Since spindle speed becomes less critical with the new algorithm, speed related BDOS and R/W errors should be reduced.

The indication of speed related problems are disk drives which indicate BDOS errors during use, but pass the Z test. Since the Z test writes information to the diskette and reads it back on the next revolution, the Z test is largely speed independent.

Speed related problems are also indicated by the non-transportability of diskettes. That is, diskettes that work fine on one drive or machine but indicate R/W or BDOS errors on another. This is because the data is being written and read at different speeds. Therefore, a read window signal which is better able to compensate for speed variations should reduce these speed related BDOS and Read/Write errors.

The Otrona part number for the data separator ROM is 21-063011. All units shipped with TEAC disk drives already have the revision C data separator ROM installed in them.

The data separator ROM is located on the CPU board, in the floppy section, in socket U603. It is accessable by removing the disk drive module. Ø11-* will be printed on the 6301, where the * is the revision letter of the program residing in the rom. Therefore, the new version has Ø11-C stamped on it. Refer to the diagrams on the following page for the location of the data separator ROM. Be sure to insert pin one of the ROM into pin one of the socket.



ATTACHE Demonstration Diskette

Version 1.3

November 19, 1982

Otrona Advanced Systems
4755 Walnut Street
Boulder, Colorado 80301
(303)444-8100
TWX 910-940-3445

The Attache Demonstration Diskette has been prepared for Otrona's Dealers and Manufacturer's Representatives. This diskette contains various programs for demonstrating Attache's capabilities.

The following pages define the contents of the demonstration diskette and how to run the programs.

Attache System Programs

| | | |
|------------|------------|--------------|
| AUTO.COM | GO.COM | TIME.COM |
| BACKUP.COM | MBASIC.COM | UPDATE.COM |
| FORMAT.COM | SYSDUP.COM | UPDATE01.SUB |

Attache Basic Demonstration Programs

| | | | |
|-------------|-------------|-----------|-----------|
| ATTACHE.BAS | DATE.BAS | MAP.BAS | PORTS.BAS |
| BOXES.BAS | GRAPH-N.BAS | MX100.BAS | TIME.BAS |

Attache WordStar-Plus Programs

| | |
|---|-----------------------------|
| WS.COM | INSTALL.COM |
| Overlay Files: WSOVLY1.OVR WSMSSGS.OVR | |
| Text | File: MAGAZINE MAGAZINE.BAK |

Attache Charton Programs

| | |
|--------------|--------------|
| BARSAMPL.CHT | LINSAMPL.CHT |
| CHARTON.BAS | PIESAMPL.CHT |
| CHARTONF | |

Attache Valet Programs

| | |
|-----------|-------------|
| VALET.VL1 | PRINTER.VL1 |
|-----------|-------------|

Attache CP/M System Programs

| | | | |
|----------|----------|----------|------------|
| DDT.COM | DUMP.COM | PIP.COM | SUBMIT.COM |
| DUMP.ASM | LOAD.COM | STAT.COM | XSUB.COM |

Attache Communications Program

SOFTCOM.COM

**** Note: This program is NEVER to be copied for distribution by you for any reason !! It is licensed software !! We provide it to you at our expense so you can demonstrate Attache's communications ability. You can also use it to down-load software from other systems as a service to your customers.**

File Software Protection

All files on the diskette have been set to a Read Only (R/O) status except the MAGAZINE file. File protection status can be changed on the diskette using the STAT program. We encourage you to leave the file status set to R/O as the diskette is originally supplied.

All programs having the file extension COM are executed by entering the file name without the extension.

AUTO Revision: 1.0

This program will allow you to create a "turn-key" system; one that will power up with the same applications program every time. This will save time for users always wanting to use a specific software package, such as WORD-STAR. To get a particular software program, such as CHARTON or WORD-STAR, to be automatically available when the system is booted, run AUTO. It will display the following message on the screen:

SYSTEM will be loaded from drive A: modified, and saved to drive A.

Press any key to start >>

Input command line >> MBASIC CHARTON

This example causes Charton to automatically come up when the system is booted, either by power-up or Shift/Reset.

BACKUP Revision: 1.5

This utility will copy the entire contents of the diskette in drive A:, including CP/M, to the diskette in drive B: and verify that the information was correctly written. If necessary, BACKUP will format the diskette in drive B: as the copy is performed.

Note: All data on the diskette in drive B: will be destroyed and overwritten with the data from drive A:.

FORMAT Revision: 1.5

This utility formats the diskette in drive B:. All diskettes must be formatted before they can be used by CP/M.

Note: All data on the diskette in drive B: will be destroyed.

GO Revision: Not Applicable

This utility allows immediate execution of the program already residing in memory from a previous CP/M load and execution. This utility may not work with all programs.

If you run 'STAT', for example, get the available R/W storage on the diskette, and then want the status on all programs on the diskette, enter the command 'GO *.*'. Go works with STAT, PIP, MBASIC, SOFTCOM, and other programs.

MBASIC Revision: 1.5 Microsoft: 5.23

Microsoft Interpretive Basic is provided on this diskette. You may re-enter MBASIC with your program intact by using "GO" without parameters if no transient programs have been run since exiting MBASIC.

SYSDUP Revision: 1.4

Formatted diskettes do not contain the CP/M operating system unless it is specifically copied onto it. This utility copies the operating system on the diskette in drive A: onto the diskette in drive B:.

TIME Revision: 1.8

This utility is used to set the Attache clock with the desired date, day of the week, and time.

UPDATE

This command file will update customer's disks to the new CP/M operating system, Rev 2.2.3 (of November 19, 1982) and will retain the original serial number on the disk. See procedure below.

UPDATE01

This file will update customer's system diskettes to the November 19 release level. The update includes Charton and Valet software, new as of that date. The simple update procedure steps follow:

1. Have the customer bring in a SYSTEM DISKETTE that has no files or data other than the system on it.
2. Put the customer's diskette in drive "B" and your demo disk in drive "A".
3. Type "UPDATE" and follow the instructions on the screen. This will update the operating system and retain the original serial number.
4. Next, type "SUBMIT UPDATE01". This will automatically transfer (PIP) all the new software including Charton and Valet onto the customer's disk.

These programs are executed from CP/M by entering the following command: MBASIC <PROGRAM NAME> <Return>

To run the 'ATTACHE' demo enter: MBASIC ATTACHE <Return>

From MBASIC enter: RUN "<PROGRAM NAME>" <RETURN>

ATTACHE Revision: 1.0

This free-running demonstration displays a series of screens on Attache's features, functions, and benefits. The demonstration uses the real-time clock, so be sure that you have set it before running the program.

The following are the screens in the demonstration:

Screen 1 Title

Graphics, boldface, double size characters, and other screen attributes are used to welcome the viewer.

Screen 2 Display

The full capabilities of Attache's display capabilities are shown. The user immediately realizes that Attache offers much more than just another terminal or microcomputer.

Screen 3 Map

A map of the Southwestern United States demonstrates Attache's fast graphics capabilities with intermixed text. High resolution graphics means high accuracy and clean displays.

Screen 4 Plot - Bar Graph

The real power of business graphics and Attache's flexibility are brought home with this real world application. Bar chart representation of data can be instantly understood.

ATTACHE (continued)

Screen 5 Plot - Line Graph

The same data, which the viewer is already familiar with, is shown in a different format. The versatility of Attache to present the same data in a number of formats is demonstrated.

Screen 6 Twirl

A fast moving graphics display which shows the high resolution and speed of Attache graphics.

Screen 7 Circle

Attache circle drawing capability is shown.

Screen 8 WordStar-Plus

A sample of word processing is shown with a simulated WordStar-Plus screen. The text on the screen informs the viewer of some word processing benefits.

Screen 9 Spread Sheet Calculator

This display is of a generic spreadsheet program (not an actual software package). This real world application has probably accounted for more sales of desktop computers than any other application package.

Screen 10 Closing Display

A 'Thank You' message for watching the demonstration. Again, special features of Attache are shown with multiple display capabilities and the current day, date, and time.

Special Instructions:

The demonstration can be advanced immediately from a completed 'Screen' to the next one without a delay by pressing the 'Space Bar'. The demonstration can be exited by pressing 'CTRL X'. After

BOXES

Revision: 1.0

```
*****
* This fast action graphics demonstration is guaranteed *
* to draw attention and excitement. *
*
* The ever-changing and random pattern are simply fas- *
*inating and intriguing. *
*
* Once you've got their attention, be sure to show them *
* the 'Attache' demonstration previously described. *
*
* Exit: Enter 'CTRL X' *
*****
*****
```

DATE

Revision: 1.0

This demonstration displays the day of the week and date. This program is on the diskette to show the simplicity of accessing this information. Feel free to list this program for the viewer.

GRAPH-N

Revision: 1.0

The standard block fill patterns available with Attache Basic are displayed.

If the 20 patterns don't fit the users fancy, they can create their own with the Graph-M command!

MAP

Revision: 1.0

This demonstration performs the same function as Screen 3 of the 'Attache' demonstration.

MX100

Revision: 1.0

This simple utility lets you set the special capabilities of the Epson MX100 printer.

POTS

Revision: 1.0

Attache's serial ports are configured for the most popular asynchronous format. There may be occasions where you need a different format and this utility will assist you. Ports is a serial port setup utility which changes the default parameters of the Z80 SIO. This will enable you to setup Attache to communicate with other systems. The default settings of both ports are: 8 data bits, 1 stop bit, and no parity.

POTS (continued)

Once the serial parameters are setup they will remain in effect until a cold boot is performed. System parameters which can be changed by Ports are: number of stop bits, parity useage, and number of data bits.

TIME Revision: 1.0

This demonstration displays the time. This program is on the diskette to show the simplicity of accessing this information. Feel free to list this program for the viewer.

WS

Revision: 3.0

This command executes WordStar-Plus configured for Attache and any 'Teletype' like printer.

This configuration will print on virtually **any** printer. If you have access to a letter-quality printer, don't short change yourself and use this WordStar-Plus configuration. See WSN and Install below.

INSTALL Revision: 4.2 (For WordStar-Plus 3.0)

If your letter-quality or special-capability printer isn't a SpinWriter, just use Install to configure WordStar-Plus for your needs. Almost all of the most popular printers can be accommodated.

Overlay Files: WSOVLY1.OVR WSMSSGS.OVR

These are special files used by WordStar-Plus and should never be accessed by the user.

Text Files: MAGAZINE MAGAZINE.BAK

MAGAZINE

Magazine allows you to perform word processing demonstrations and change the text.

MAGAZINE.BAK

Magazine.bak provides a back up copy of the magazine article above. If you've practiced editing text with WordStar and the text in magazine file, you can restore Magazine to its original state by copying over it with this file.

BARSAMPL.CHT

This file contains a sample bar chart (histogram) created using Charton. Since one picture is worth a thousand words, we're showing copies of all the sample charts on this diskette. We first displayed each chart using Charton, then used Valet screen print capability to output the chart and text to a printer. What a simple way to graphically illustrate Attache's graphics.

CHARTON

This program provides the capability for creating line charts, bar charts, and pie charts. You can display almost any type of comparative information. Since you specify the type of chart to create for each display, your data can be effectively displayed in different formats for various situations. Charts are created by entering values in response to a series of screen prompts. The chart is displayed instantly when all the values have been keyed. Once created, charts can be printed using the screen dump feature from VALET. You can also save the chart as a disk file for retrieval at a later time.

Charton programs are written in BASIC-80 and are located in two files on the diskette, CHARTON.BAS and CHARTONF.

LINSAMPL.CHT

This file is a sample line chart illustrated below.

PIESAMPL.CHT

This file contains one of the most popular chart types, a pie chart.

PRINTER.VL1

This file is used by Valet to store all the escape codes and other printer protocols for graphics printers. Valet accesses the information in this file for screen print functions.

VALET.VL1 Revision: 1.0

VALET is a multifunction software package that allows you to temporarily interrupt a program to perform other functions and then return directly to the program that was interrupted.

VALET functions include the following:

- set-up mode
- four-function calculator
- screen dump to print screen contents
- printer installation menus for screen dumps

VALET is menu driven and permits simple access to all its functions. To use VALET, press CTRL/ESC for set-up mode, and CTRL/ESC TAB for a menu of options. Next, just press the first letter of the desired option.

VALET'S SET-UP MODE allows you to change the screen brightness, type and volume of audible response to keystrokes, communication and printer baud rates, and turn the error/alarm bell on and off.

VALET ALARMS - This feature lets you set alarms that will display messages, remind you of appointments, or initiate program commands. As many as six different alarms may be set at one time. The alarms feature also lets you schedule programs for later execution. Commands may be chained together using the SUBMIT facility of CP/M, so the computer can be working even while you are occupied elsewhere. This can be especially cost-effective when used for scheduling data transmission during off hours when rates are lowest.

VALET CALCULATOR - This function provides the capability for temporarily exiting from a program, performing a calculation, and returning directly to interrupted program. Besides the four basic functions (add, subtract, multiply, and divide), VALET'S calculator supports scientific notation and uses an eight level automatic register stack as last-in-first-out storage areas. VALET'S calculator uses a 10-key mode to change the letters U,I,O,P,J,K,L,;,and M to the appropriate numeric representation. For more information on the calculator, read chapter 6 of the VALET Guide.

VALET SCREEN DUMP - The screen dump feature allows you to exit from your program and print all or part of the text or graphics on the display screen. The printer must have graphics capability to fully take advantage of all the screen dump options. For information on which graphics printers can be installed, read the December 1982 newsletter, or run the VALET install option.

Complete operating instructions are in the VALET Guide, and it's a good idea to work through each of the menu items before demonstrating VALET. VALET is a unique Attache feature and should prove very useful to most customers, so stress the ones that apply to your customer's applications and let VALET help you sell Attache.

DDT.COM

Bit-twiddlers know that every program can have "bugs". DDT is a tool for de-bugging programs. It has its own set of commands useful to programmers.

DUMP.ASM

This file contains the assembly language code for DUMP.COM. It's one you'll not need to access.

DUMP.COM

This is another tool for programmers. It displays the contents of a file in hexadecimal notation on the screen.

LOAD.COM

LOAD allows you to turn a ".HEX" file into an executable ".COM" file. When you assemble or compile programs, you'll get a ".HEX" file that will need to be converted to a ".COM" file before running.

PIP.COM

PIP stands for Peripheral Interchange Program, which simply means it's a program used for transferring data from one device to another in the system. You'll use it most frequently for copying one file from one disk drive to the other.

STAT.COM

This program is a simple way to display status information about disk space, read/write state, and device assignments. It can also be used to change device assignments.

SUBMIT.COM and XSUB.COM

These two programs allow you to execute a sequence of commands as if they were instructions in a program. This is very useful if a particular sequence is frequently used by an operator and it would be convenient to give a name to the sequence so it could be executed with a single command.

All the Attache CP/M system programs are documented in detail in the CP/M handbook with MP/M by Rodney Zaks, provided with your system.

SOFTCOM.COM

SOFTCOM is an extremely easy to use file transfer and communication utility program we've provided for you. It is the property of The Software Store and we pay a royalty fee for each copy we ship. So, as we mentioned earlier, it is **NEVER to be copied for distribution.** If you copy this diskette with BACKUP.COM, you've also copied SOFTCOM, so use PIP to transfer files, not BACKUP.

Installing Printers for WordStar-Plus

While printers or other peripheral devices may be connected and used immediately for most software, WordStar-Plus requires that the printer is "installed" for the system. This is because of the way that special characters are handled by different printers. Printer installation is a one-time-only procedure unless you change to a different printer.

The WordStar-Plus installation program (INSTALL.COM) resides on the Attache Software diskette. Installation procedures are included for each of the following printers:

| | |
|----------|---|
| STANDARD | Any "Teletype-like" printer (i.e. almost any printer) |
| DIABLO | DIABLO 1610/1620 daisy wheel printers |
| XEROX | DIABLO 1640/1650/630/Xerox 1700 daisy wheel printers |
| QUME | QUME Sprint 5 daisy wheel printers |
| NEC | NEC Spinwriter 5510/5520 thimble printers |
| TEC | C. Itoh/TEC Starwriter Printers |

If your printer is not listed here, select the option for a "Standard Teletype-like" printer or consult your dealer for help in determining which installation type is best for your printer.

WordStar-Plus installation parameters are stored in the WS.COM file. This file is called up when the WS command is executed from CP/M. If more than one printer type is frequently used, keep a second copy of the WS.COM file (with a different name) for instant interface with another printer. (For example, use WS.COM for printer A and then create WS1.COM for Printer B. You would then call up WordStar-Plus by typing WS for printer A, and WS1 for printer B.)

The WordStar-Plus Installation Program

The WordStar-Plus installation program is described in detail on the following pages. The procedure for using this program is as follows:

1. Insert the Attache Software diskette in Drive A and boot the system.
2. With the cursor at A>, type **INSTALL** and press **RETURN**.
3. Answer the questions as instructed on the following pages. Determine your answers for the Printer Menu, Communications Protocol Menu, and Driver Menu from the instructions that are provided for your specific printer type.
4. When you are finished with **INSTALL**, test your printer installation by printing a WordStar-Plus text file.

INSTALL

When INSTALL is executed, the following series of questions appears on the display screen. Answer each question as indicated, using the answer for your printer type.

Screen COPYRIGHT (C) 1981 MicroPro International Corporation
 INSTALL version 4.2 for MicroPro WordStar release 3.00

Do you want a normal first-time INSTALLlation of WordStar?
(Y = yes; N = display other options):

You Type N

Screen ***** WordStar INSTALLATION OPTIONS MENU *****

A - INSTALLation of a distributed WordStar,
 INSTALLing WSU.COM, producing WS.COM, and then
 running the INSTALLED WordStar.

B - INSTALLation or re-INSTALLation of a WordStar COM
 file of your choice, placing the newly INSTALLED
 WordStar in a file of your choice, and then
 exiting to the operating system.

C - Same as B except run the INSTALLED WordStar.

D - Modification of the INSTALLation of a WordStar
 COM file of your choice. The modified WordStar
 replaces the original file. The modified
 WordStar is then run.

PLEASE ENTER SELECTION (A, B, C, or D):

You Type C

Screen Filename of WordStar to be INSTALLED?

You Type WS and press RETURN.

Screen Filename for saving INSTALLED WordStar?

You Type WS and press RETURN.

(Note: if setting up more than one WordStar-Plus
 WS.COM file to support multiple printer types, save
 the installation file as something other than WS
 (such as WS1 or WS2) to reflect the printer type
 stored in that file. You then type that name when
 calling up WordStar-Plus to use that printer type.)

Screen MicroPro WordStar release 3.00 serial # WY08161J

***** WordStar TERMINAL MENU #1 *****

- | | | | |
|---|---------------------------|---|---------------------|
| A | Lear-Siegler ADM-3A | C | Lear-Siegler ADM-31 |
| D | Hazeltine 1500 | E | Microterm ACT-IV |
| F | Beehive 150/Cromemco 3100 | G | Imsai VIO |
| H | Hewlett-Packard 2621 A/P | I | Infoton I-100 |
| J | Processor Tech Sol / VDM | K | Soroc IQ-120/140 |
| L | Perkin-Elmer 550 (Bantam) | 2 | Terminal Menu #2 |
| Z | Terminal Menu #3 | Z | none of the above |
| U | no change | | |

PLEASE ENTER SELECTION (1 LETTER):

You Type U

Screen Previous selection kept unchanged:

terminal: OTRONA ATTACHE

OK (Y/N):

You Type Y

***** PRINTER MENU *****

(More specific info is displayed after choice is entered)

- | | |
|---|--|
| A | Any "Teletype-like" printer (ie almost any printer) |
| C | "Teletype-like" printer that can BACKSPACE |
| D | DIABLO 1610/1620 daisy wheel printer |
| E | DIABLO 1640/1650/630/Xerox 1700 series daisy wheel printer |
| F | QUME Sprint 5 daisy wheel printer |
| G | NEC Spinwriter 5510/5520 thimble printer |
| I | "Half-Line-Feed" Printers |
| M | I/O Master / O.E.M. Printer Combination |
| R | C. Itoh/TEC Starwriter Printer |
| U | no change |
| Z | none of the above |

PLEASE ENTER SELECTION (1 LETTER):

You Type the letter that corresponds to the menu item for your printer. Common printers for each option are described on the screen as follows:

A - Teletype-like printer. This selection will drive almost any printer. The printer must be capable of responding to ASCII printing characters, carriage return, and line feed only. Make sure any AUTO LF or LOCAL LF switch is OFF. If your printer is capable of backspacing, use CHOICE C instead for faster output. If you have a DAISY WHEEL or thimble printer shown on the menu, use the appropriate choice in order to obtain "Micro-justified" output and additional formatting capabilities.

Refer to your printer manual for instructions on patching in optional control sequences for ribbon color change, character pitch change, and half-line roll (for subscripts and superscripts) if your printer has these capabilities.

D - Diablo 1610/1620 printer. This choice is for the indicated daisy printers only. The serial versions of these printers should be interfaced at 1200 baud, otherwise printout will be very slow. To prevent buffer overflow with these printers interfaced at 1200 baud, specify "ETX/ACK" protocol at the next menu. Make sure any AUTO LF or LOCAL LF switch is OFF.

E - Diablo 1640/1650/630 printer. This selection also works for Xerox 1730/1740/1750 printers. This choice is for the indicated daisy printers only. The serial versions of these printers should be interfaced at 1200 baud, otherwise printout will be very slow. To prevent buffer overflow with these printers interfaced at 1200 baud, specify "ETX/ACK" protocol at the next menu. Make sure any AUTO LF or LOCAL LF switch is OFF.

F - Qume Sprint 5 printer. This choice is for the indicated daisy printers only. The serial versions of these printers should be interfaced at 1200 baud, otherwise printout will be very slow. To prevent buffer overflow with these printers interfaced at 1200 baud, specify "ETX/ACK" protocol at the next menu. Make sure any AUTO LF or LOCAL LF switch is OFF.

G - NEC Spinwriter 5510/20 printer. This choice is for the indicated daisy printers only. The serial versions of these printers should be interfaced at 1200 baud, otherwise printout will be very slow. If you have Model 5515 or 5525 use selection "D" (Diablo 1610) instead. To prevent buffer overflow with these printers at 1200 baud without using a cable adapter, specify "ETX/ACK" or "XON/XOFF" protocol at the next menu, and configure the printer appropriately. Make sure any AUTO LF or LOCAL LF switch is OFF.

R. - C. Itoh/TEC Starwriter

Screen (displays your printer selection)

OK (Y/N):

You Type Y

(If you selected the wrong printer, type N and you will be prompted for printer selection again.)

(The next screen to appear on the display is for selection of communications protocol. Select the option that corresponds with your printer selection.)

Screen ***** COMMUNICATIONS PROTOCOL MENU *****

A "Communications Protocol" is necessary with some printers to prevent printer buffer overflow and character loss.

E "ETX/ACK" Protocol
X "X-ON/X-OFF" Protocol
N NONE required (or handled outside of WordStar)
U no change

PLEASE ENTER SELECTION (E, X, N, B, or U):

You For Standard (any teletype-like printer) configuration, select option N for NONE required.

For all other printers, select option E for "ETX/ACK" protocol.

Screen (Displays your protocol selection)

OK (Y/N):

You Type Y

(The next screen to appear on the display is for driver selection. Select the option that corresponds with your printer selection.)

Screen

***** DRIVER MENU *****

Or, how should WordStar send characters to your printer?

- L CP/M "List" device (LST:)
- T CP/M primary console device (TTY:)
- C CP/M secondary console device (CRT:)
- P Port Driver (direct I/O to 8-bit ports)
- N Parallel Centronics Printer Driver
- Q Serial Driver on TRS-80 Model-2
- S User-installed driver subroutines
- U no change

PLEASE ENTER SELECTION (L,T,C,P,N,P,S,B or U):

You For Standard .(any teletype-like printer) configuration, select option L for CP/M List Output driver (LST:).

For all other printers select option P for the Port Driver (direct I/O to 8-bit ports).

Screen (Displays your driver selection)

OK (Y/N):

You Type Y

Note: all printer selections other than standard teletype will require additional patches. Instructions for these patches are itemized here. If a standard teletype-like printer was selected, the screen will bypass these questions and go directly to the question "Are the Modifications to WordStar Now Complete?" that follows the patch questions.

Screen The port driver directly accesses hardware port(s) to control printer. This driver is normally used with serial printers and a protocol. As hardware ports are very non-standard with respect to location and status information, you may have to provide data (Note that WordStar will try to determine the data all by itself) so WordStar can modify the port driver. Note that the port driver contains a "busy test", resulting in the best response when editing and printing simultaneously.

Are the printer ports "I/O" or "Memory Mapped" (I or M):

You Type I

Screen What is the output port for your printer? Do you wish WordStar to determine the values or should WordStar accept them from you (D or A):

You Type A

Screen What is the output port number in HEX:

You Type F2

Screen What is the output status port for your printer? Do you wish WordStar to determine the values or should WordStar accept them from you (D or A):

You Type A

Screen What is the output status port number in HEX:

You Type F3

Screen What are the bit(s) that change at the output status port when the output port becomes ready to accept a character for output (enter HEX value):

You Type 04

Screen Which bit(s) change(s) from a 0 to a 1 (enter HEX value):

You Type 04

Screen What is the input port for your printer? Do you wish WordStar to determine the values or should WordStar accept them from you (D or A):

You Type A

Screen What is the input port number in HEX:

You Type F2

Screen What is the input status port for your printer? Do you wish WordStar to determine the values or should WordStar accept them from you (D or A):

You Type A

Screen What is the input status port number in HEX:

You Type F3

Screen What are the input status port bits for your printer? Do you wish WordStar to determine the values or should WordStar accept them from you (D or A):

You Type A

Screen What are the bit(s) that change at the input status port when the input port has a character available for input. (enter HEX value):

You Type 01

Screen Which bit(s) change(s) from a 0 to a 1 (enter HEX value):

You Type 01

Screen ARE THE MODIFICATIONS TO WORDSTAR NOW COMPLETE? IF THEY ARE ANSWER YES TO THE NEXT QUESTION. IF YOU WISH TO MAKE ADDITIONAL PATCHES TO WORDSTAR'S USER AREAS, ANSWER NO.

You OK (Y/N):

You Type Y

Screen CONFIRM TERMINAL AND PRINTER SELECTIONS:
terminal: OTRONA ATTACHE
Your printer selection
Your communications protocol selection
Your driver selection

OK (Y/N):

You Type Y

The installed configuration is then saved in the .COM file that was designated for storage in the question "Filename for saving INSTALLED WordStar?" and the system returns to A>.

HARDWARE NOTE

Product: Attache

Supercedes: N/A

April 15, 1983

Subject: Expansion Port Interface

The ATTACHE expansion port connector provides complete access to the internal bus signals of the computer for the addition of memory, special I/O, or other devices to the system. The lines available are a mixture of MOS and TTL and require buffering close to the connector. Power and space in the ATTACHE is only available for a single expansion card, though an external card frame could be used if connected via a buffered cable card.

Of the 256 I/O ports available on the Z80A processor, only the top 32 (OFEH-OFFH) are used by ATTACHE. For compatibility with other ATTACHE options and possible future versions, it is recommended that only the lower half of these addresses (0-7FH) be used in the design of custom interfaces.

| Bus Pin | Signal Name | Signal Function |
|---------|-------------|--|
| 4 | AOM | AOM-A15M make up the 16-bit address bus. They provide the address for both memory and I/O data exchanges. AOM is the least significant address bit while A15M is the most significant. AOM-A7M |
| 5 | A1M | are normally used to provide an 8-bit I/O address, although A8M-A15M may also be used with certain I/O instructions to provide 16 bits. AOM-A15M can |
| 6 | A2M | address up to 64K bytes of memory at a time (additional memory can be handled by taking advantage of ATTACHE's memory mapping facility.) |
| 7 | A3M | AOM-A6M are also used to provide a refresh address during refresh time (used by dynamic memories). (bidirectional) |
| 8 | A4M | |
| 9 | A5M | |
| 10 | A6M | |
| 11 | A7M | |
| 12 | A8M | |
| 13 | A9M | |
| 14 | A10M | |
| 15 | A11M | |
| 16 | A12M | |
| 17 | A13M | |
| 19 | A14M | |
| 18 | A15M | |
| 25 | DOM | DOM-D7M comprise an 8-bit data bus over which both |
| 26 | D1M | memory and I/O data transfers occur. DOM is the |
| 24 | D2M | least significant bit while D7M is the most |
| 20 | D3M | significant. (bidirectional) |
| 21 | D4M | |
| 22 | D5M | |
| 23 | D6M | |
| 27 | D7M | |

| Bus Pin | Signal Name | Signal Function |
|---------|----------------|--|
| 28 | CLK | System clock. This signal is the primary system timing reference. (ATTACHE output) |
| 29 | RES | System reset is generated at power up and as a result of activating the reset function on the ATTACHE keyboard. It is a pulsed signal synchronized to avoid disturbing the contents of dynamic memory. (ATTACHE output) |
| 41 | SIO-IEO | This signal passes interrupt priority from the lowest priority device inside ATTACHE, the serial I/O controller. A high level on this pin indicates that no devices inside ATTACHE are being serviced or awaiting service by a CPU interrupt service routine. (ATTACHE output) |
| 44 | /ON BRD MEMORY | This signal is low during transfers involving any segment of ATTACHE memory that is both enabled by the memory mapping hardware and selected by the appropriate address bits. It can be used as an input to the bus driver enable logic of custom interfaces. (ATTACHE output) |
| 37 | /INTRQ | Generated by I/O devices to indicate a request for interrupt service. (ATTACHE input) |
| 39 | /NMIRQ | Generated by I/O or special devices to indicate a request for a non-maskable interrupt. (ATTACHE input) |
| 35 | /WAITRQ | Used by I/O or memory devices needing longer time than normally provided to complete their bus operations. Note: this signal must be used with caution as memory refresh does not occur while the processor is waiting. (ATTACHE input) |
| 33 | /BUSRQ | /BUSRQ and /BUSAQM are attached to the 9517A DMA control processor which in turn attaches to the Z80A main processor to control direct memory transfer access to the ATTACHE bus. When /BUSRQ is activated (low) the processor halts all function at the end of it's next instruction cycle and indicates this by asserting /BUSAQM. All memory refresh stops, address, data, and control bus signals are placed in their high-impedance states, and control is expected from the device asserting /BUSRQ. (ATTACHE input) |

| Bus Pin | Signal Name | Signal Function |
|-----------------|-------------|---|
| 30 | /BUSAKM | See /BUSRQ explanation. (ATTACHE output) |
| 32 | /RFSHM | Indicates that AOM-A6M contain a refresh address for dynamic memories. (bidirectional) |
| 31 | /MREQM | Indicates that the address bus holds a valid address for a memory read or write operation and provides timing information. (bidirectional) |
| 40 | /IORQM | Indicates that the address bus holds a valid address for an I/O read or write operation and provides timing information. This signal is also generated in conjunction with a /M1M signal when an interrupt is being acknowledged to control gating of the interrupt vector to the data bus. (bidirectional) |
| 36 | /M1M | Asserted to indicate cycles in which an instruction op code is being fetched from memory. Also used in conjunction with /IORQM to indicate an interrupt acknowledge signal. (bidirectional) |
| 34 | /RDM | Asserted during a memory or I/O read cycle. (bidirectional) |
| 38 | /WRM | Asserted during a memory or I/O write cycle. (bidirectional) |
| 42 | ON BRD I/O | This signal is low during transfers involving any I/O device that is part of ATTACHE. It can be used as an input to the bus driver enable logic of custom interfaces. (ATTACHE output) |
| 2,3 | +12V | +12 volt power supply voltage source. (ATTACHE source) |
| 1 | -12V | -12 volt power supply voltage source. (ATTACHE source) |
| 46, 48,50 | +5V | +5 volt power supply voltage source. (ATTACHE source) |
| 43, 45,47,49 | GND | Signal ground |

The expansion bus signals are a mixture of TTL and MOS levels as dictated by the needs of the ATTACHE mainframe. They are easily converted to practical drive and loading characteristics using only five IC's on the custom interface, as will be described later. The characteristics of the various types of signals is tabulated below.

| Signal | Type | Characteristics |
|--|--|---|
| AOM-A15M, DOM-D7M | Bidirect. | Load or drive with no more than one PNP 74LS input/output (such as 74LS244 or 74LS245). |
| /RFSHM, /MREQM, /IORQM, /M1M,RDM, /WRM | Bidirect. with 10K pullup to +5V. | Load or drive with no more than one PNP 74LS input/output (such as 74LS244 or 74LS245). |
| /INTRQ, /NMIRQ, /WAITRQ, /BUSRQ | Input with 470 ohm pull-up to +5V | Driver must be able to sink 12 mA to GND. Open collector or 3-state driver is only necessary if signal is to be bused on the custom interface. |
| /BUSAKM, SIO-IE0, CLK,RES | Output | Can sink no more than .8 mA load to GND. |
| /ON BRD MEM, ON BRD I/O | Output | Can sink no more than 8 mA to GND. |

The following power levels are the maximum that can be drawn from the ATTACHE power supply for custom interfaces:

+5V @ 850 mA.
+12V @ 50 mA.
-12V @ 50 mA.

As most of the signals available on the expansion connector are derived directly from the Z80A-CPU processor, the Zilog Z80A data sheet is the best reference for timing information. For further information, refer to the ATTACHE circuitry involving the expansion connector as given in figure 1.

The shape and dimensions of a suggested custom interface PC board are shown in figure 2. The board will be guided at the expansion connector end by plastic card guides and attached at the rear of the computer by a metal plate.

Because the circuit board must span a relatively long distance in the computer without support, some form of stiffening must be implemented to avoid shorting or vibration problems. Figure 3 illustrates a bar which may be mounted above the PC board via 4-40 x .187 dia. x .250 l. spacers and 4-40 screws. Other forms of stiffening such as laminated bus bars or glued on plastic rails may also be used.

A suggested design of the metal attachment plate is shown in figure 4. This plate is attached to the end of the circuit board using Keystone 612 right angle brackets.

A 50-pin connector provides the expansion interface signals. The orientation of this connector is given in figure 2. For maximum reliability, a gold contact pin type connector is used in ATTACHE instead of the more common card-edge type. Some material (such as Mylar tape) should be placed between the bottom of the connector and the PC board to space it up .020" so it will properly mate with the connector in the computer. Recommended mating connectors are as follows:

| | |
|------------|-------------|
| AMP | 4-102083-1 |
| Berg | 65000-036 |
| ITT Cannon | UBS4B050A1D |

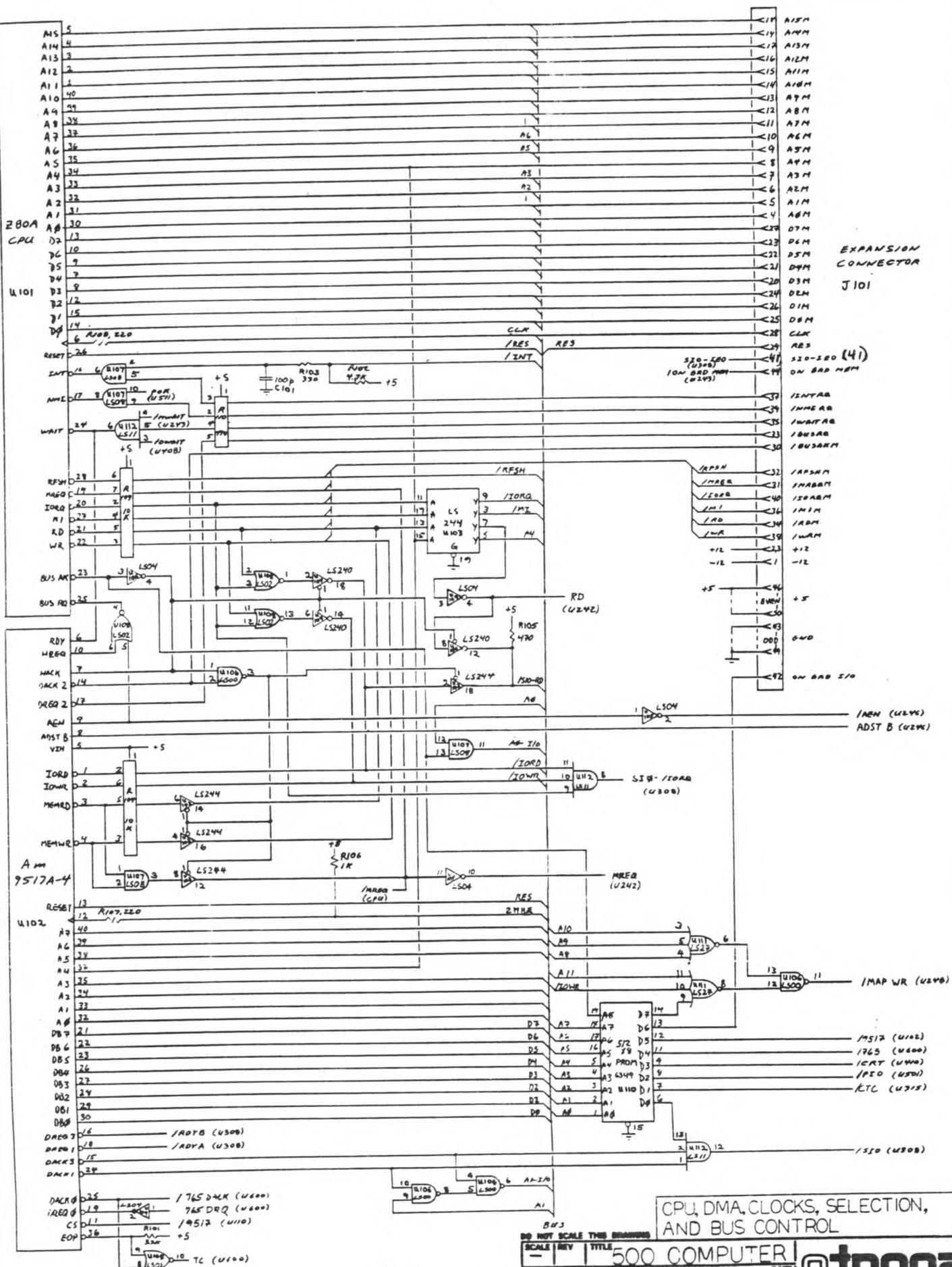
Vertical space within the computer is limited and places constraints on the components suitable for use on the option board. Soldered leads beneath the board should be clipped to extend no more than .062 inches from the board surface, and component height above the top board surface should be no greater than .375 inches.

Figure 5 shows the recommended buffer circuitry between ATTACHE and circuitry on the option board. These buffers should be placed for minimum lead length between them and the expansion connector.

Good electrical noise control is important to reliable operation of both ATTACHE and the custom expansion control. It is strongly urged that power and ground be bypassed with .01 microfarad ceramic capacitors at each IC and two 10 microfarad tantalum capacitors at opposite corners of the board. Power and ground traces should be as heavy as possible and should be matrixed across the board in both directions.

In order to promote sufficient cooling, IC's should be layed out lengthwise across the width of the PC board. Lower power dissipation design choices should be made where possible.

Troubleshooting of custom designs can easily be done using DDT (supplied with CP/M) or with the diagnostic monitor facilities built into ATTACHE.



CPU, DMA,CLOCKS, SELECTION, AND BUS CONTROL

| | | | | | | | |
|--|-----|----------|--|---|------|----------------------|--|
| DO NOT SCALE THIS DRAWING | | TITLE | | 500 COMPUTER | | @tronac | |
| SCALE | REV | DATE | | REL | DATE | | |
| | | DRAWN BY | | DBJ | | 1-7-74 | |
| MATERIAL | | MATERIAL | | DATE | | SHEET OF DRAWING NO. | |
| | | | | | | 1 7 40-051201 | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS IN INCHES | | | | TOLERANCES: .01-.02 .005-.006 ASSEMBLY-.005 | | | |

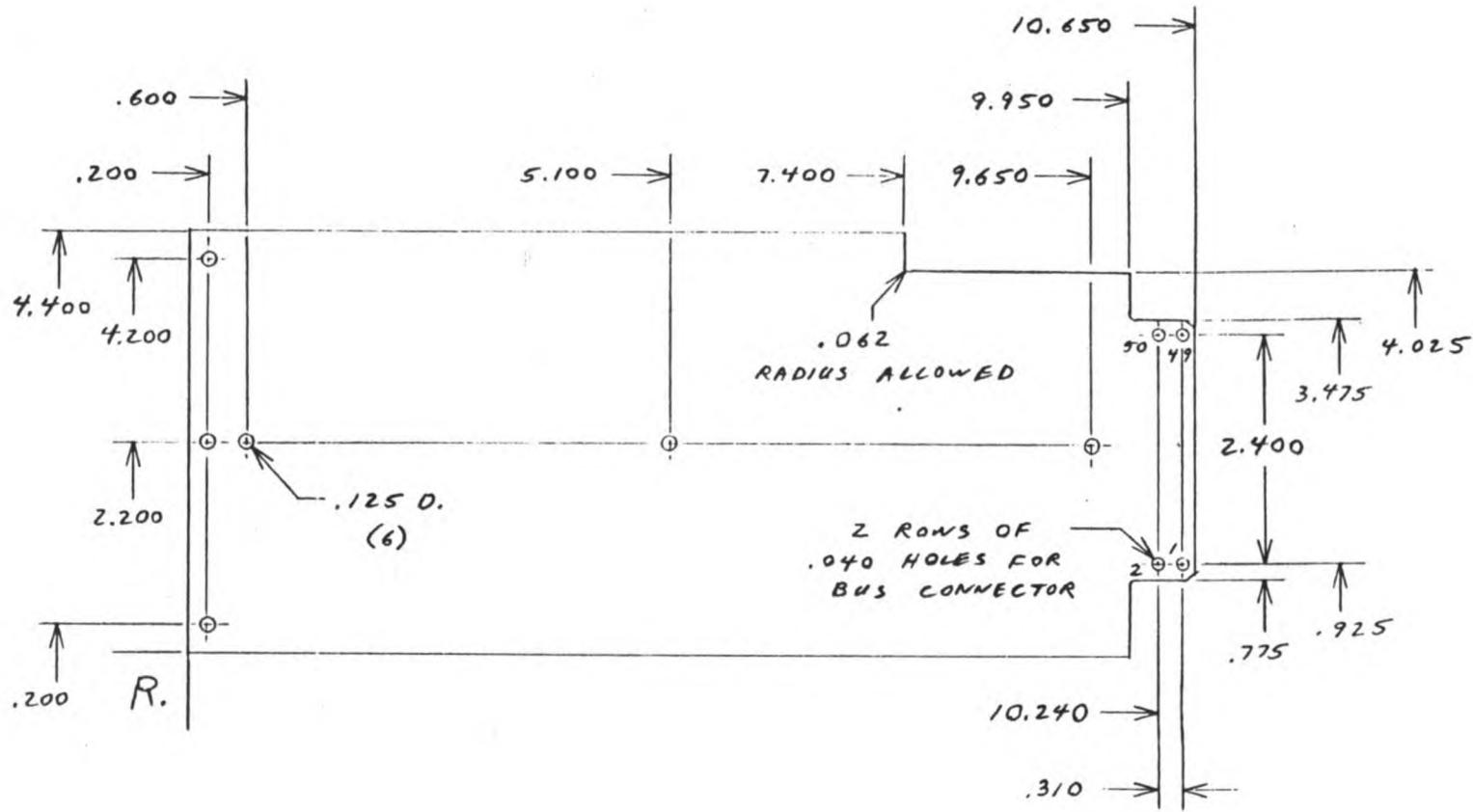


FIGURE 2

OPTION PC BOARD

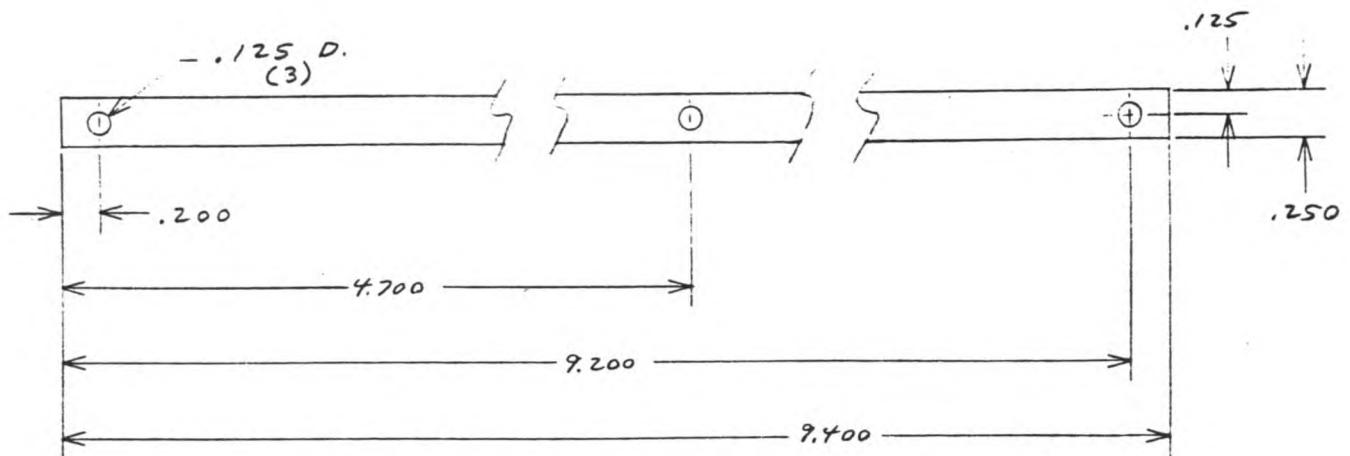


FIGURE 3 - STIFFENER (.031 ALUMINUM)

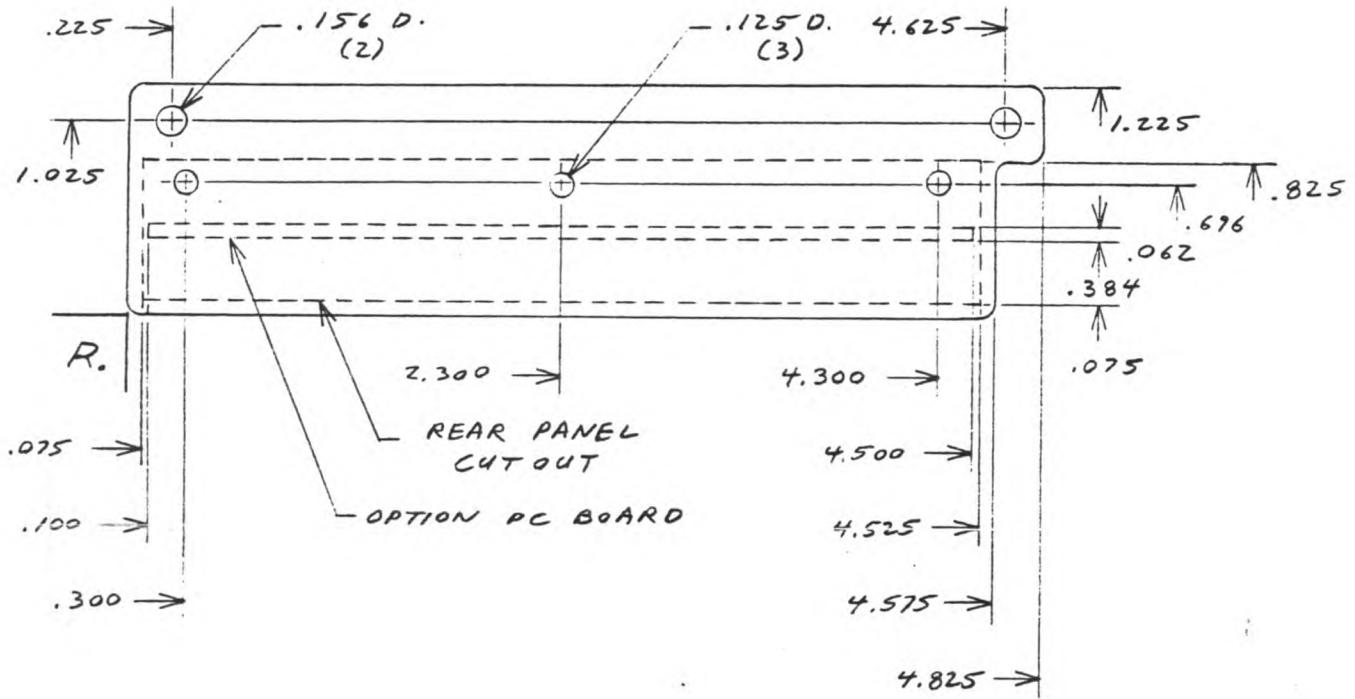


FIGURE 4 - OPTION REAR PANEL (.050 ALUMINUM)

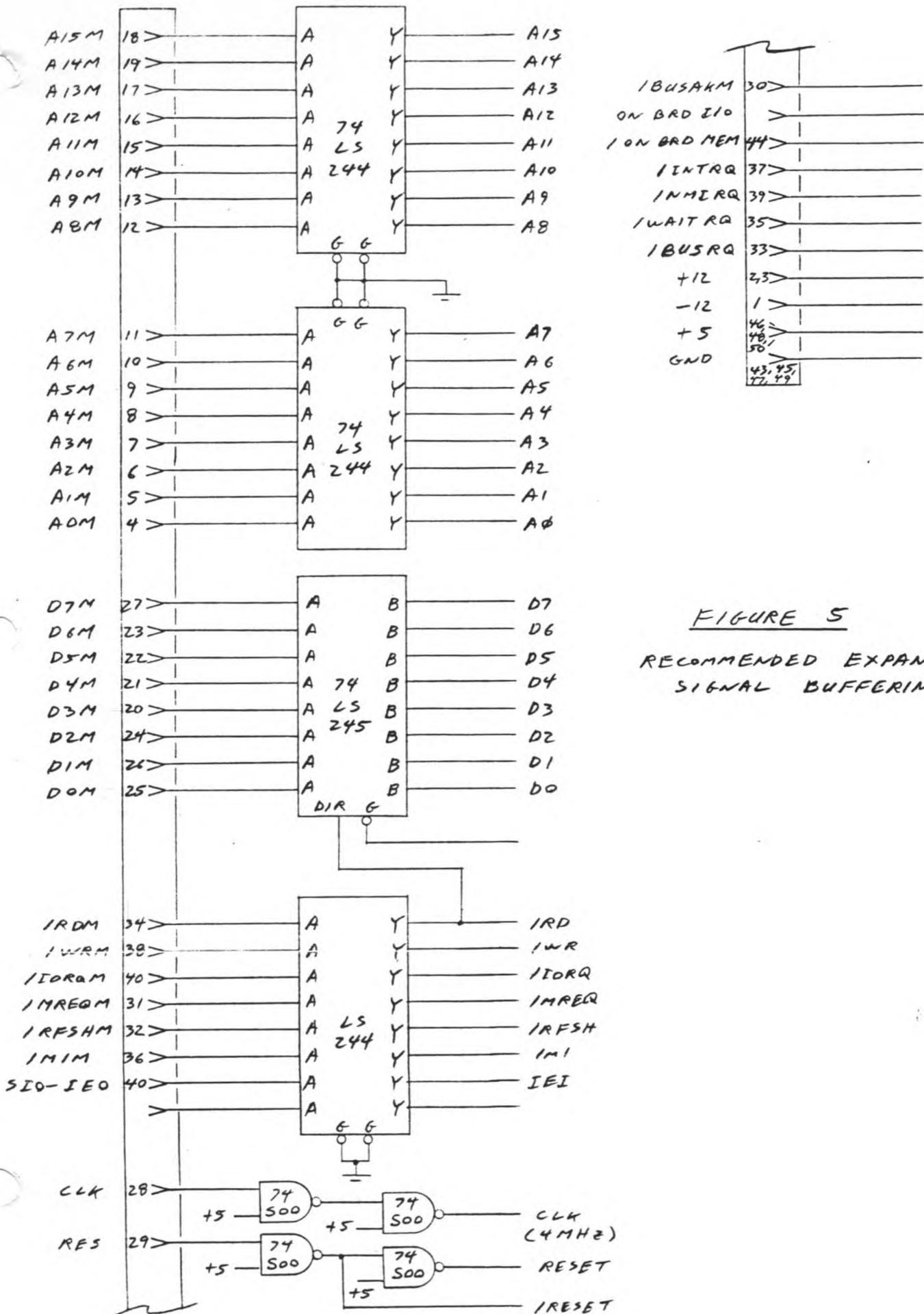


FIGURE 5
RECOMMENDED EXPANSION
SIGNAL BUFFERING