# PIED PIPER

## SERVICE MANUAL

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## GENERAL PROCEDURES

1. Always disconnect the power cord from the wall outlet before removing any covers.

2. Use caution when servicing the product with the cover off and power applied. There is potentially lethal voltage and current in the area of the power supply. Never wear jewelry or neck chains when servicing electrical appliances. Make voltage measurements according to the direction of the service manual. Other test points, which are electrically common, may not be as safe as the one mentioned in the service manual.

3. Remember that magnetic tools and floppy disks are arch enemies. Be extra careful if you are using the customer's disks to try to identify a problem.

4. Before removing the disk drive, you will see the following:

**WARNING**

**Any adjustment made to this disk drive may change the location of recorded information on the floppy disk. This may prevent the customer from being able to read any disks written during the period the drive was out of adjustment. Discuss this with the customer. Perhaps the customer's disks should be read by this drive and copied onto new diskettes by a properly adjusted drive before any adjustments are make.**

The same is true if you replace a misaligned drive with a new one. Check with your supervisor to see if there is a company policy of customer notification prior to disk drive repair/replacement.

5. This service manual contains three levels of comments:

*NOTE: A note is used to inform you of helpful information for the next step of the procedure.*

**CAUTION**

*A caution is used to call your attention to information that might prevent damage to equipment.*

**WARNING**

**A warning is used to call your attention to a safety hazard or a situation that would cause serious damage to equipment.**

6. User feedback is always welcome. Please use the postage paid publication comment sheet located at the end of the service manual to input your comments.

## Specifications

### PIED PIPER Specifications

| | |
|---|---|
| MICROPROCESSOR: | Z-80 |
| RAM (Read/Write) Memory | 65536 (64K) Bytes |
| Word Length | 8 Bits |
| ROM (Read Only Memory) | 4096 (4K) Bytes available |
| KEYBOARD: | Standard 62 key version except all keys repeat if held down. |
| DISK DRIVE | Mitsubishi Model M485X |
| Storage Capacity | 776K Bytes (Formatted) |
| Sides | 2 (Double Sided) |
| Tracks per inch | 98 |
| INPUT VOLTAGE | 110 VAC 60 Hz. |
| POWER SUPPLY OUTPUT VOLTAGES | +5 VDC, + 12 VDC and -12VDC |
| OUTPUTS: | |
| Composite Video for monitor | RCA type jack |
| Composite Video and 12v for RF modulator | DIN connector |
| Parallel Printer Output | DB-25 type connector |

OPTIONS:

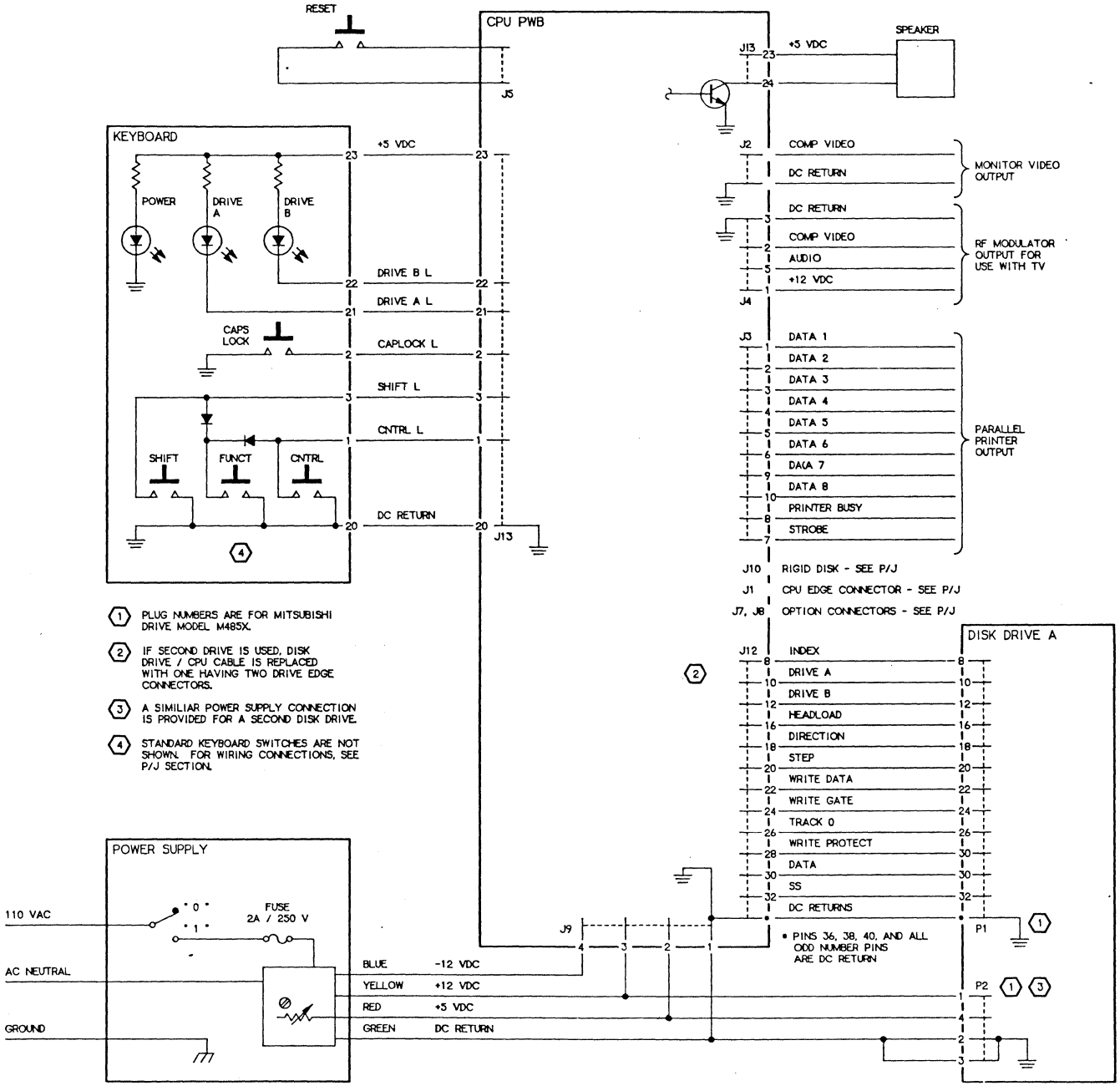
Second (external) 5 1/4" disk drive, requires a new Drive/CPU Cable and extension harness for low voltage power.

Rigid disk drive (external), requires Rigid Drive/CPU cable and power harness.

Two line, 80 character liquid crystal display. While not available at this time, a picture of an early unit is shown on the User's Manual cover.

Serial communications port and telephone modem output. This option will enable the operator to communicate over telephone lines to other computers and also the popular computer bulletin boards. This option will be offered as a installed kit when it's available. It consists of a small circuit board and a cable to connect it to the CPU PWB. With the RS-232-C serial port, many additional models of printers can be used.

# BLOCK SCHEMATIC DIAGRAM AND WIRING




60-PP-20006 A

## BLOCK SCHEMATIC DIAGRAM AND WIRING

INTEGRATED CIRCUIT INDEX (Note 1)

| LOC | IC TYPE | LOC | IC TYPE |
|---|---|---|---|
| U1 | 74LS374 | U38 | 74LS14 |
| U2 | 74LS74 | U39 | 74LS374 |
| U3 | 74LS32 | U40 | 74LS273 |
| U4 | 74LS163 | U41 | 74LS374 |
| U5 | 74LS08 | U42 | 74LS166 |
| U6 | 74LS138 | U43 | 74LS04 |
| U7 | 74LS74 | U44 | 74LS32 |
| U8 | 74LS04 | U45 | 74LS32 |
| U9 | 74LS74 | U46 | 74LS157 |
| U10 | 74LS02 | U47 | 74LS157 |
| U11 | 74LS00 | U48 | FD1793 |
| U12 | 74LS02 | U49 | DM7406 |
| U13 | 74LS399 | U50 | 74LS374 |
| U14 | 74LS244 | U51 | 8279 |
| U15 | 74LS08 | U52 | 74LS32 |
| U16 | 74LS86 | U53 | Z80 |
| U17 | 74LS32 | U54 | 74LS244 |
| U18 | 74LS374 | U55 | 74LS245 |
| U19 | 74LS04 | U56 | 4864 |
| U20 | 74LS20 | U57 | 4864 |
| U21 | 74LS04 | U58 | 4864 |
| U22 | FDC9216 | U59 | 4864 |
| U23 | 74LS122 | U60 | 74LS195 |
| U24 | 74LS148 | U61 | 74LS244 |
| U25 | 74LS245 | U62 | 74LS138 |
| U26 | 2672 | U63 | D2716 |
| U27 | MM2114 | U64 | 4864 |
| U28 | MM2114 | U65 | 4864 |
| U29 | MM2114 | U66 | 4864 |
| U30 | MM2114 | U67 | 4864 |
| U31 | 74LS74 | U68 | D2732 (Note 2) |
| U32 | 74LS32 | U69 | 74LS374 |
| U33 | 74LS00 | U70 | 74LS161 |
| U34 | 74LS74 | U71 | DM7406 |
| U35 | 74LS74 | U72 | 74LS02 |
| U36 | 74LS08 | | |
| U37 | 74LS373 | | |

*Note 1: Pin 1, of all IC's, is toward the left rear of the circuit board (Figure 1).*

*Note 2: U68, pin 1, of the IC, plugs into pin 3 of the socket.*

J1 CPU PWB EDGE CONNECTOR (Figure 1)

| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | +5 VDC | 29 | ADDRESS BUS 0 |
| 2 | +5 VDC | 31 | WR'/ |
| 3 | D.C. RETURN | 32 | RD'/ |
| 4 | D.C. RETURN | 33 | IORQ'/ |
| 7 | DATA BUS 3 | 34 | MREQ/ |
| 8 | DATA BUS 7 | 35 | AUDIO |
| 9 | DATA BUS 2 | 36 | CS 7 |
| 10 | DATA BUS 6 | 41 | BUSAK/ |
| 11 | DATA BUS 1 | 42 | BUSRQ/ |
| 12 | DATA BUS 5 | 43 | INTAK/ |
| 13 | DATA BUS 0 | 44 | INT0/ |
| 14 | DATA BUS 4 | 45 | WAIT/ |
| 15 | ADDRESS BUS 7 | 46 | NMI/ |
| 17 | ADDRESS BUS 6 | 47 | RESET/ |
| 19 | ADDRESS BUS 5 | 49 | CLOCK 4/ |
| 21 | ADDRESS BUS 4 | 53 | D.C. RETURN |
| 23 | ADDRESS BUS 3 | 54 | D.C. RETURN |
| 25 | ADDRESS BUS 2 | 55 | +12 VDC |
| 27 | ADDRESS BUS 1 | 56 | -12 VDC |

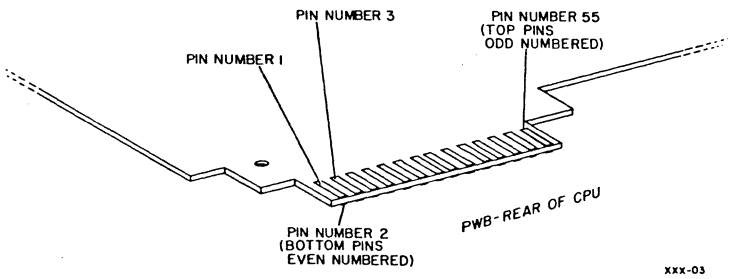



Figure 1. J1 CPU PWB Edge Connector

## BLOCK SCHEMATIC DIAGRAM AND WIRING

J7 (28 Pin Header Located on the CPU PWB)

| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | ADDRESS BUS 0 | 15 | DATA BUS 4 |
| 2 | ADDRESS BUS 1 | 16 | DATA BUS 3 |
| 3 | ADDRESS BUS 2 | 17 | DATA BUS 2 |
| 4 | D.C. RETURN | 18 | DATA BUS 1 |
| 5 | D.C. RETURN | 19 | DATA BUS 0 |
| 6 | +5 VDC | 20 | +5 VDC |
| 7 | CHIP SELECT5/ | 21 | D.C. RETURN |
| 8 | RESET/ | 22 | D.C. RETURN |
| 9 | CLOCK 4/ | 23 | IOWR'/ |
| 10 | INT1/ | 24 | IORD'/ |
| 11 | AUDIO | 25 | WAIT/ |
| 12 | DATA BUS 7 | 26 | CHIP SELECT 7/ |
| 13 | DATA BUS 6 | 27 | +12 VDC |
| 14 | DATA BUS 5 | 28 | -12 VDC |

J8 (28 Pin Header Located on the CPU PWB)

| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | ADDRESS BUS 0 | 15 | DATA BUS 4 |
| 2 | ADDRESS BUS 1 | 16 | DATA BUS 3 |
| 3 | ADDRESS BUS 2 | 17 | DATA BUS 2 |
| 4 | D.C. RETURN | 18 | DATA BUS 1 |
| 5 | D.C. RETURN | 19 | DATA BUS 0 |
| 6 | +5 VDC | 20 | +5 VDC |
| 7 | CHIP SELECT4/ | 21 | D.C. RETURN |
| 8 | RESET/ | 22 | D.C. RETURN |
| 9 | CLOCK 4/ | 23 | IOWR'/ |
| 10 | INT2/ | 24 | IORD'/ |
| 11 | AUDIO | 25 | WAIT/ |
| 12 | DATA BUS 7 | 26 | CHIP SELECT 7/ |
| 13 | DATA BUS 6 | 27 | +12 VDC |
| 14 | DATA BUS 5 | 28 | -12 VDC |

J10 Rigid Disk Connector

| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| Note: all even pins are connected to D.C. Return | | | |
| 1 | HDAL0 | 19 | AB1 |
| 3 | HDAL1 | 21 | AB2 |
| 5 | HDAL2 | 23 | CHIP SELECT6/ |
| 7 | HDAL3 | 25 | IOWR'/ |
| 9 | HDAL4 | 27 | IORD'/ |
| 11 | HDAL5 | 29 | HWAIT/ |
| 13 | HDAL6 | 31 | HEDRES'/ |
| 15 | HDAL7 | 35 | HINTRQ' |
| 17 | AB0 | 37 | HDRQ' |

J13 Keyboard Connector

| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | CNTL/ | 13 | ROW 1 |
| 2 | CAPLOCK/ | 14 | ROW 2 |
| 3 | SHIFT/ | 15 | ROW 3 |
| 4 | COLUMN 0 | 16 | ROW 4 |
| 5 | COLUMN 1 | 17 | ROW 5 |
| 6 | COLUMN 2 | 18 | ROW 6 |
| 7 | COLUMN 3 | 19 | ROW 7 |
| 8 | COLUMN 4 | 20 | D.C. RETURN |
| 9 | COLUMN 5 | 21 | DRIVE A/ |
| 10 | COLUMN 6 | 22 | DRIVE B/ |
| 11 | ROW 0 | 23 | +5 VDC |
| 12 | COLUMN 7 | 24 | SPEAKER |

## Start Troubleshooting FIP

1. General Troubleshooting. (Perform this procedure first in order to save yourself time and trouble.)

   A. Confirm customer fault if possible. Use your software, as well as the customer's, to see if the problem is hardware or software related.

   B. Check for broken or burned parts.

   C. Check for staples, paper clips, or other conductors, which may be causing intermittent short circuits.

   D. Check for a disabled or cheated fuse.

   E. Check for bent pins on all connectors.

   F. Check the power supply output voltages. Refer to +5 VDC adjustment if the voltage is not +5 + 0.1 volts. Suspect a bad power supply if the ± 12 volt lines are off by more than 1.2 volts.

2. If your problem is listed below, go to that FIP.


WON'T TURN ON FIP ..... 9

FAILS SELF-TEST FIP ..... 11

WON'T WRITE DISK FIP ..... 12

WON'T READ DISK FIP ..... 13

NO DISPLAY FIP ..... 14

INCORRECT OR DISTORTED DISPLAY FIP ..... 14

KEYBOARD ENTRY PROBLEMS FIP ..... 15

NO PARALLEL PRINTER OUTPUT FIP ..... 17

INCORRECT PRINTER OPERATION FIP ..... 17

SYSTEM WON'T RESET FIP ..... 18

NO SERIAL (RS-232-C) OUTPUT FIP ..... 18


3. If your problem is not listed above, continue to the next page.

4. Check that the proper IC's are in the correct sockets, and pin 1 is toward the left rear of the PWB. Pin 1, of the IC, is identified by a small dimple near pin 1, or a large dimple at the pin 1 end of the chip (Figure 2).

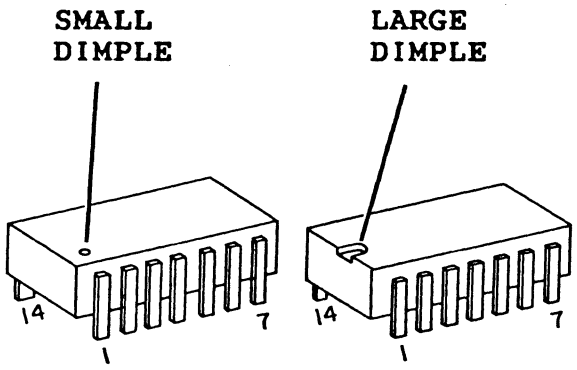



**Figure 2. Pin 1 Identification**

5. Begin part swapping in the following order. Check operation after each part is changed. There is probably only one bad part involved. Don't leave a new part in the customer's unit if no improvement was seen.

   (A) Power Supply. This is done first to prevent damaging your parts if the supply was providing high voltage. Ensure that the five volt output is properly adjusted before connecting the disk drive(s) and CPU PWB. If no improvement is seen with the new power supply installed, put the customer's supply back in after you have found the failure.

   (B) CPU PWB.

   (C) Keyboard/Speaker PWB.

   (D) Disk Drive.

**WON'T TURN ON FIP**

```
WITH POWER SWITCH SET ON "1", POWER LED LIGHTS?

YES  NO
|    |
|    CHECK AC POWER TO POWER SUPPLY.
|    P1 PIN 1 (WHITE) TO P1 PIN 3 (BLACK) ON THE POWER SUPPLY PWB
|    IS 110 VAC WHEN THE COMPUTER IS SWITCHED ON?
|
|    YES NO
|    |   |
|    |   CHECK AC VOLTAGE TO THE LINE FILTER.
|    |   VOLTAGE ACROSS THE LINE FILTER (WHITE TO BLACK WIRES) IS
|    |   110 VAC?
|    |
|    |   YES NO
|    |   |   |
|    |   |   DISCONNECT POWER CORD FROM COMPUTER.  VOLTAGE AT THE
|    |   |   COMPUTER END OF THE POWER CORD IS 110 VAC?
|    |   |
|    |   |   YES NO
|    |   |   |   |
|    |   |   |   REPLACE POWER CORD IF LINE VOLTAGE IS GOOD.
|    |   |   |
|    |   |   REPLACE LINE FILTER.
|    |   |
|    |   REPLACE POWER SWITCH.
|    |
|    CHECK THE DC VOLTAGE AT THE CPU PWB.
|        P9-1 (DC RETURN) TO P9-2 IS +5 VDC.
|        P9-1 (DC RETURN) TO P9-3 IS +12 VDC.
|        P9-1 (DC RETURN) TO P9-4 IS -12 VDC.
|    THE +5, +12 AND -12 VOLTAGES ARE GOOD?
|
|    YES NO
|    |   |
|    |   REPLACE THE PQWER SUPPLY AND PERFORM POWER SUPPLY
|    |   ADJUSTMENT.
|    |
|    CHECK RIBBON CABLE TO THE KEYBOARD FOR CONTINUITY OR
|    CONNECTOR DAMAGE. IF GOOD REPLACE THE CPU PWB.
|
PERFORM +5VDC ADJUSTMENT.
IF PROBLEM STILL EXISTS REPLACE THE CPU PWB.
```

**FAILS SELF-TEST FIP**

WITH DISK DRIVE DOOR(S) OPEN, UNIT FAILS SELF-TEST AND DISPLAYS FAILURE MESSAGE?

```
YES  NO
 |    |
 |    FAILURE OF SELF TEST COMES AFTER DISK DRIVE MOTOR STARTS?
 |
 |    YES NO
 |    |    |
 |    |    REPLACE CPU PWB.
 |    |
 |    REPLACE DISK DRIVE AFTER TRYING A KNOWN GOOD DISKETTE.
 |
J9-1 TO J9-2 ON THE CPU PWB IS +5 ± 0.1 VDC?

 YES NO
 |    |
 |    PERFORM POWER SUPPLY ADJUSTMENT.
 |
 REPLACE CPU PWB.
```

## WON'T WRITE DISK FIP

DISK DRIVE WILL READ DISKS PROPERLY?

YES NO
| |
| REFER TO **WON'T READ DISK FIP.**
|
PERFORM THE FOLLOWING TEST TO SEE IF UNIT WILL WRITE TO DISK.
1. RUN THE STAT.COM PROGRAM FROM THE SYSTEM DISK BY TYPING [**STAT**]. THE COMPUTER WILL RESPOND WITH THE AMOUNT OF SPACE LEFT ON THE DISK.
2. TYPE [**SAVE 22 TEST.COM**].
3. TYPE [**TEST**].

THE COMPUTER AGAIN RESPONDED WITH THE AMOUNT OF SPACE LEFT ON THE DISK?

YES NO
| |
| REPLACE THE DISK DRIVE. THE UNIT NOW PASSES THE TEST LISTED ABOVE?
|
| YES NO
| | |
| | INSTALL CUSTOMERS DISK AFTER REPLACING CPU PWB. UNIT NOW WORKS PROPERLY?
| | |
| | YES NO
| | | |
| | | REPLACE THE DRIVE AGAIN.
| | |
| | DONE.
| |
| DONE
|
THIS IS NORMAL OPERATION, EVERYTHING SEEMS OK.

**WON'T READ DISK FIP**

UNIT READS KNOWN GOOD DISK? CHECK BY LOADING OPERATING SYSTEM DURING REBOOT, OR USE VERIFY PROGRAM ON SYSTEM DISK, OR TYPE [DIR]?

```
YES  NO
|    |
|    VOLTAGE AT DISK DRIVE P2-2 (DC RETURN) AND P2-1 IS +12
|    VDC ± 1.2 VDC?
|
|    YES NO
|    |   |
|    |   REPLACE POWER SUPPLY.
|    |
|    VOLTAGE AT DISK DRIVE P2- 2 (DC RETURN) AND P2-4 IS +5
|    VDC ± 0.1 VDC?
|
|    YES NO
|    |   |
|    |   REPLACE POWER SUPPLY.
|    |
|    IS THE DISK DRIVE/CPU CABLE CONNECTED TO J12 ON THE CPU PWB?
|
|    YES NO
|    |   |
|    |   CONNECT TO J12 (J10 IS RIGID DISK DRIVE INTERFACE CONNECTOR).
|    |
|    CHECK CONTINUITY OF DISK DRIVE/CPU CABLE.  IF OK, REPLACE
|    DISK DRIVE.  UNIT NOW READS DISK?
|
|    YES NO
|    |   |
|    |   PUT CUSTOMER'S DISK DRIVE BACK IN AFTER REPLACING CPU PWB.
|    |   UNIT NOW READS DISKETTE?
|    |
|    |   YES NO
|    |   |   |
|    |   |   PUT CUSTOMER'S CPU PWB BACK AND REPLACE DISK DRIVE/CPU
|    |   |   CABLE.
|    |   |
|    |   DONE.
|    |
|    DONE
|
CUSTOMER'S DISKETTE IS FAULTY.
```

## NO DISPLAY FIP

MEASURE VOLTAGE AT J9-1 (DC RETURN) AND J9-2. VOLTAGE IS +5 VDC ± 0.1 VDC?

YES NO
| |
| PERFORM POWER SUPPLY ADJUSTMENT.
|
VOLTAGE AT J9-1 (DC RETURN) AND J9-3 IS +12 VDC ± 1.2 VDC
AND BETWEEN J9-1 (DC RETURN) AND J9-4 IS -12 VDC ± 1.2 VDC?

YES NO
| |
| REPLACE POWER SUPPLY AND PERFORM POWER SUPPLY ADJUSTMENT.
|
REPLACE CPU PWB. DISPLAY WORKS PROPERLY?

YES NO
| |
| PROBLEM IS WITH VIDEO CABLE, RF MODULATOR (IF USED), MONITOR, OR
| TELEVISION.
|
DONE.

## INCORRECT OR DISTORTED DISPLAY FIP

IF A MONITOR IS BEING USED, IT IS CONNECTED TO J2?
IF A TELEVISION IS BEING USED, THE RF MODULATOR IS CONNECTED TO J4?

YES NO
| |
| CONNECT TO PROPER OUTPUT JACK.
|
DEFECT APPEARS ON MORE THAN ONE TELEVISION OR MONITOR?

YES NO
| |
| FAILURE IS WITHIN MONITOR OR TELEVISION.
|
REPLACE CPU PWB.

KEYBOARD ENTRY PROBLEMS FIP

IS THE PROBLEM MULTIPLE CHARACTERS (KEY BOUNCE)? THIS IS DIFFERENT FROM THE AUTO REPEAT FEATURE WHEN THE KEYS ARE HELD DOWN. ALSO, THIS MAY BE A VERY INTERMITTENT PROBLEM THAT YOU WILL NOT HAVE TIME TO SEE YOURSELF.

YES NO
| |
| PRESSING ONE KEY RESULTS IN DISPLAY OF A DIFFERENT CHARACTER?
|
| YES NO
| | |
| | SOME KEYS DON'T WORK, OTHERS DO?
| |
| | YES NO
| | | |
| | | DOES POWER ON LED WORK?
| | |
| | | YES NO
| | | | |
| | | | DOES SHIFT KEY ALLOW YOU TO SELECT UPPER AND LOWER CASE
| | | | LETTERS?
| | | |
| | | | YES NO
| | | | | |
| | | | | REPLACE KEYBOARD/SPEAKER PWB.
| | | | |
| | | | REPLACE KEYBOARD/SPEAKER PWB.
| | | |
| | | DOES **DRIVE A** LED WORK WHEN DRIVE A IS SELECTED?
| | |
| | | YES NO
| | | | |
| | | | JUMPER DC RETURN (P9-1 ON CPU PWB) TO PIN 21 OF
| | | | KEYBOARD/CPU CABLE, DOES **DRIVE A** LED
| | | | LIGHT?
| | | |
| | | | YES NO
| | | | | |
| | | | | REPLACE KEYBOARD/SPEAKER PWB.
| | | | |
| | | | REPLACE CPU PWB IF WIRE 21 OF KEYBOARD/CPU CABLE
| | | | CHECKS OK.
| | | |
A B C D

**Continued on next page.**

```
A    B    C    D
|    |    |    |
|    |    |    |
|    |    |    DOES DRIVE B LED WORK WHEN DRIVE B IS SELECTED
|    |    |    (DRIVE B MUST BE INSTALLED)? IF DRIVE B IS NOT
|    |    |    INSTALLED ANSWER THIS QUESTION YES.
|    |    |
|    |    |    YES NO
|    |    |    |   |
|    |    |    |   JUMPER DC RETURN (P9-1 ON CPU PWB) TO PIN 22 OF
|    |    |    |   KEYBOARD/CPU  CABLE, DOES DRIVE B LED
|    |    |    |   LIGHT?
|    |    |    |
|    |    |    |   YES NO
|    |    |    |   |   |
|    |    |    |   |   REPLACE KEYBOARD/SPEAKER PWB.
|    |    |    |   |
|    |    |    |   REPLACE CPU PWB IF WIRE 22 OF KEYBOARD/CPU
|    |    |    |   CABLE CHECKS OK.
|    |    |    |
|    |    |    IF PROBLEM STILL EXISTS, REPLACE KEYBOARD/SPEAKER PWB
|    |    |    AND CPU PWB.  CHECK OPERATION AFTER EACH
|    |    |    PART SWAP.
|    |    |
|    |    REPLACE KEYBOARD/SPEAKER PWB.  IF PROBLEM STILL EXISTS
|    |    REPLACE CPU PWB.
|    |
|    IF KEYBOARD/CPU CABLE IS INSTALLED PROPERLY, REPLACE CPU
|    PWB.
|
REPLACE CPU PWB.
```

**NO PARALLEL PRINTER OUTPUT FIP**

IF THERE IS A SERIAL CARD INSTALLED (SERIAL PORT A AND PORT B) JUST ABOVE THE RESET BUTTON. THE PARALLEL OUTPUT IS INHIBITED AND CANNOT BE USED WITH THE SERIAL CARD INSTALLED.

WITH PRINTER CONNECTED, MEASURE VOLTAGE ON J3-8 (PARALLEL CONNECTOR ON CPU PWB). VOLTAGE MEASURED IS +5 VDC?

YES NO
| |
| CPU CAN'T SEND AN OUTPUT BECAUSE THIS SIGNAL TELLS IT THE
| PRINTER IS BUSY. CHECK WIRING INTERFACE TO PRINTER.
|
REPLACE CPU PWB.

**INCORRECT PRINTER OPERATION FIP**

THE PRINTER WORKS, BUT THE CHARACTERS PRINTED ARE WRONG?

YES NO
| |
| PARALLEL PRINTER - REPLACE CPU PWB.
| SERIAL PRINTER - REPLACE SERIAL PWB. IF PROBLEM STILL
| EXISTS REPLACE CPU PWB.
|
| IF PROBLEM STILL EXISTS SUSPECT PRINTER.
|
WIRING TO DATA LINES IS INTERCHANGED?

YES NO
| |
| REPLACE CPU PWB.
|
REWIRE AS SHOWN IN BSD.

## SYSTEM WON'T RESET FIP

SYSTEM RESETS WHEN RESET SWITCH IS PRESSED FOR FIVE SECONDS AND IS RELEASED?

YES NO
| |
| REPLACE CPU PWB.
|
NORMAL OPERATION. IF RESET SWITCH SEEMS INTERMITTENT, PERHAPS IT IS NOT BEING HELD LONG ENOUGH TO ALLOW THE DELAY CIRCUIT TO REGISTER THE TIME OUT FUNCTION.

## NO SERIAL (RS-232-C) OUTPUT FIP

USE THIS FIP IF THE COMPUTER WORKS BUT THE PRINTER OUTPUT OR THE COMMUNICATIONS OUTPUT DOES NOT WORK.

CHECK WIRING AND CONNECTIONS. IF GOOD, REPLACE THE SERIAL PWB AND TEST PRINTER. PRINTER WORKS PROPERLY?

YES NO
| |
| REPLACE THE CPU PWB.
|
COMMUNICATIONS OUTPUT WORKS PROPERLY?

YES NO
| |
| REPLACE CPU PWB.
|
DONE.

## TOP COVER

### REMOVAL

1. Disconnect the power cord.

**CAUTION:**
*Do not use magnetic tools to retrieve screws; damage to disk software could result.*

2. Remove the seven screws recessed in the bottom of the computer.

3. Remove the top cover. There is a plastic tab which engages in the top cover at the right front corner of the computer. This will allow the handle to be removed.

4. Disconnect Keyboard/CPU cable if cover is to be completely removed.

### REPLACEMENT

1. Connect Keyboard/CPU cable.

2. Install the handle.

3. Install the top cover. Ensure that the cover mates with the plastic tab on the front of the right side.

## POWER SUPPLY

### REMOVAL

1. Remove top cover.
2. Disconnect harness from CPU/PWB at connector J3.
3. Disconnect harness from disk drive (P2 if Mitsubishi drive).
4. Disconnect harness from optional drive if applicable.
5. Remove power supply.

### REPLACEMENT

1. Install new power supply. Do not connect harness to CPU/PWB and drive(s) at this time.

**WARNING**

**115 volts AC will be present during the following steps**

2. Attach power cord and switch on power.
3. Measure 5 Volt D.C. output across pins 1 and 2 of connector to CPU/PWB.
4. If necessary, adjust resistor to obtain +5 $\pm$ 0.1 Volts D.C. This is a rough adjustment of the power supply to ensure that no damage is caused when power is switched on, due to high voltage.
5. Switch off power and remove power cord.
6. Connect power supply harness to CPU PWB and disk drive(s).
7. Insert power cord. Switch on power and check for +5 $\pm$ 0.1 Volts D.C.. Adjust if necessary. This is the fine adjustment of the power supply because it is done under actual load.
8. Install top cover.

## DISK DRIVE

**WARNING**

**Any adjustment made to this disk drive may change the location of recorded information on the floppy disk. This may prevent the customer from being able to read any disks written during the period the drive was out of adjustment. Discuss this with the customer. Perhaps his disks should be read by this drive and copied onto new diskettes by a properly adjusted drive before any adjustments are made.**

**REMOVAL**

1. Remove top cover.

2. Disconnect power supply harness connector.

3. Disconnect disk drive/CPU cable.

4. Remove the two screws securing the bracket to the left side of the drive and the one screw securing the right side of the drive. Remove the drive.

**REPLACEMENT**

*NOTE: Any time you replace drives, make certain you are using a drive with similar specifications. If you have installed a new drive, check that the shorting plugs or jumpers are in the same position as the old drive. Figure 3 shows jumper locations for the Mitsubishi model M485X, double-sided 96 track per inch drive. Jumper locations are shown for drive 0 (A). If drive 1 (B) is being replaced, install the DS jumper in location 1.*

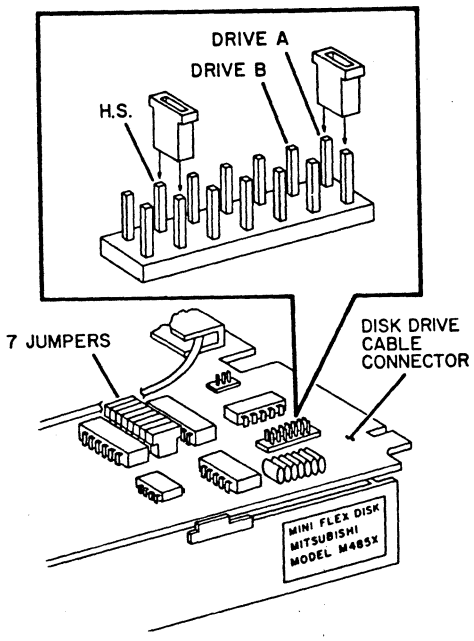



**Figure 3. Jumper Locations for Drive A**

## CPU PWB

### REMOVAL

1. Remove top cover.
2. Remove disk drive.
3. Remove four screws and disk bracket.
4. Disconnect power supply harness to CPU PWB.
5. Disconnect drive/CPU cable from CPU PWB.
6. Remove two screws securing the I/O panel to back of unit if equipped.
7. Remove five screws securing PWB to bottom of unit and remove CPU PWB.

### REPLACEMENT

**CAUTION:**

*The CPU PWB mounting screws and the disk bracket mounting screws might strip away the threads in the plastic bottom if tightened too much.*

Install CPU PWB.

## POWER SUPPLY

**ROUGH ADJUSTMENT** - (Performed in order to prevent damage when power is switched on if voltage is too high.)

1. Disconnect harness from CPU/PWB connector J9, and from the disk drive(s) connector P2.

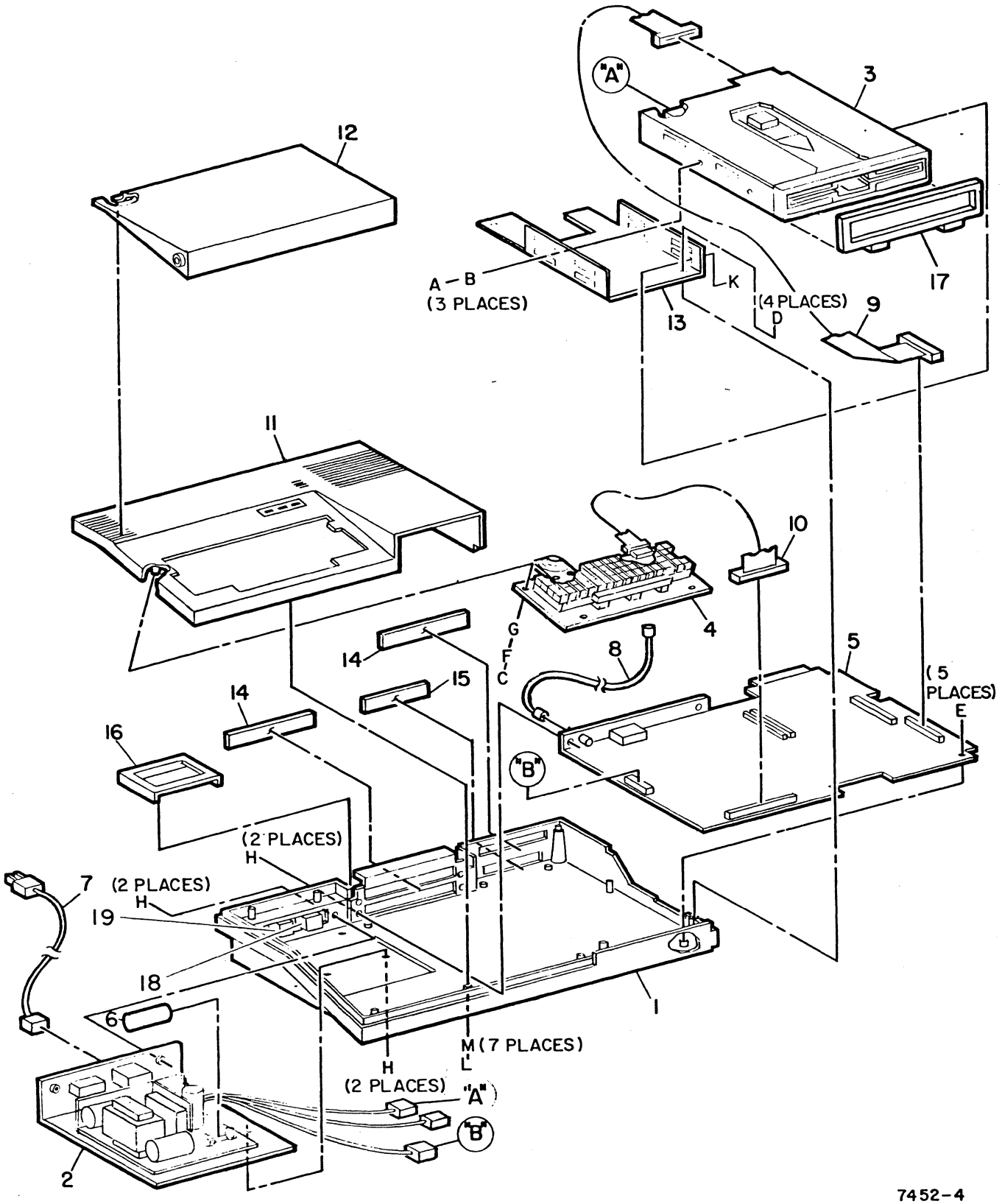
**WARNING**

**115 volts AC will be available during the following steps.**

2. Attach power cord and switch on power.
3. Measure +5 VDC output across pins 1(-) and 2(+) of the harness connector J1 going to the CPU/PWB.
4. If necessary, adjust resistor VR1 on the Power Supply PWB to obtain +5 $\pm$ 0.1 Volts DC.
5. Switch off power and remove power cord.
6. Connect harness to CPU PWB and disk drive(s).

**FINE ADJUSTMENT**

7. Switch on power and check across pins 1 and 2 of the harness connector J! to the CPU/PWB for +5 $\pm$ 0.1 Volts D.C. Adjust resistor if required.
8. Install top cover.


12
"A"
3
A – B
(3 PLACES)
K
(4 PLACES)
D
13
17
9
11
10
G
F
C
4
14
8
5
(5
PLACES)
E
14
15
16
"B"
(2 PLACES)
H
7
(2 PLACES)
H
19
18
6
1
M (7 PLACES)
L
H
(2 PLACES)
"A"
"B"
2
7452-4

| ITEM | PART NUMBER | | DESCRIPTION |
|---|---|---|---|
| | STM | XEROX | |
| 1. | 00-20000019 | 101N80 | BOTTOM COVER |
| 2. | 00-20000015 | 105N51 | POWER SUPPLY |
| 3. | 00-20000012 | 5N14 | DISK DRIVE |
| 4. | 00-20000002 | 110N48 | KEYBOARD/SPEAKER PWB |
| 5. | 00-20000000 | 140N210 | CPU PWB |
| 6. | | | FUSE 2A @ 250V |
| 7. | 00-20000042 | 105N62 | POWER CORD |
| 8. | | | VIDEO CABLE |
| 9. | 00-20000011 | 117N49 | ONE DISK DRIVE/CPU CABLE |
| 10. | | | PART OF ITEM 4 |
| 11. | 00-20000014<br>00-20000023 | 2N64<br>91N52 | TOP COVER (ORDER LABEL ALSO)<br>TOP COVER INDICATOR LAMP LABEL |
| 12. | 00-20000093 | 101N97 | KEYBOARD COVER |
| 13. | 00-20000013 | 30N29 | DISK DRIVE BRACKET |
| 14. | 00-20000020 | 101N81 | REAR EXPANSION COVER |
| 15. | 00-20000021 | 101N82 | REAR EXPANSION COVER |
| 16. | 00-20000022 | 3N52 | CARRYING HANDLE |
| 17. | 00-20000017 | 5N33 | DISK DRIVE BEZEL |
| 18. | 00-10026025 | 142N11 | AC LINE FILTER |
| 19. | 00-10026024 | 110N78 | AC SWITCH |

SEE NEXT PAGE FOR HARDWARE

STM ELECTRONICS CORPORATION

MEMORANDUM

DATE: March 2, 1984
TO: Xerox Service Centers
FROM: STM Electronics Corporation
SUBJECT: PIED PIPER ACCEPTANCE DISK #2 (or ACCEPTANCE TEST) PROCEDURE

"To test Pied Piper without a second drive attached, proceed as follows:

- Type "TEST PP"
- When test instructs "DIR B:" press the reset button and type "KEYTEST".

To test Pied Piper with a second drive attached, proceed as follows:

- Type "TEST PRO"

To run Burn Test on the Pied Piper without a second drive:

- Type "BURNPP"
- This test will loop until you press the DEL key several times when a command is displayed.

To run Burn Test on the Pied Piper with a second drive:

- Type "DO BURNPRO"
- This test will loop until you press the DEL key several times when a command is displayed."



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Telephone: (415) 326-6226 Telex 17-1627

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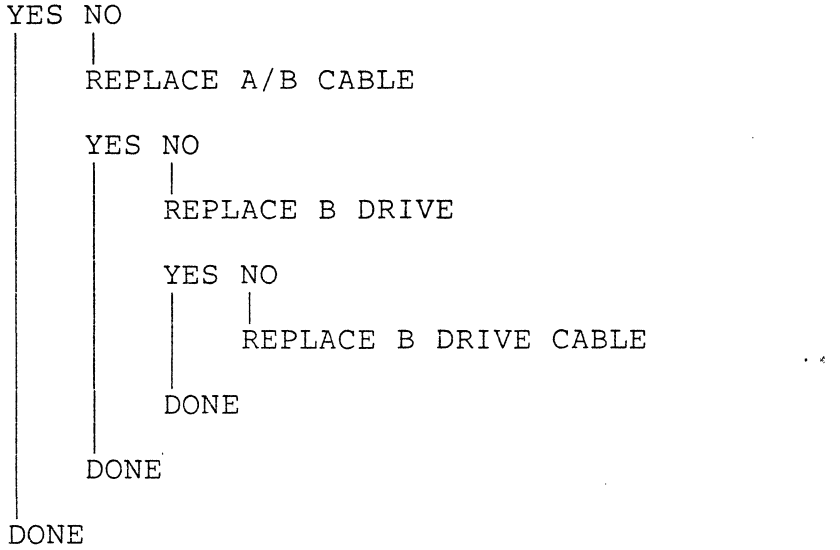
## DRIVE B: DIRECTORY COMMAMD FAILS

WITH DRIVE B: CABLE INSTALLED AND SCREWED IN, TYPE THE COMMAND "DIR B:". DIRECTORY DISPLAYED?



DRIVE B: VERIFY COMMAMD FAILS

AFTER TYPING "**VERIFY B:**" SYSTEM VERIFYS DISK

YES NO
| |
| REMOVE ALL JUMPERS (SEE PAGE 21 ADDENDUM)
|
| YES NO
| | |
| | REPLACE DRIVE
| |
| DONE
|
DONE

## MODEM FAILS TO OPERATE PROPERALLY

WITH MODEM TEST PLUG IN PORT "A", MODEMTST PROGRAM PASSES OK?

YES NO
| |
| REPLACE MODEM CARD
|
DONE

PIED PIPER (MODEMTST.PLG)

MODEM + RS-232-C SERIAL CARD TEST PLUG

BELOW ARE THE PIN CONNECTIONS FOR THE MALE 25 D-CONNECTOR TEST PLUG

| SHORT FROM PIN | TO PIN |
|---|---|
| 24 | 22 |
| 2 | 3 |
| | 8 |
| 4 | 5 |
| 6 | 20 |

(pin 8 also joins pins 2 and 3)

## DISK DRIVE

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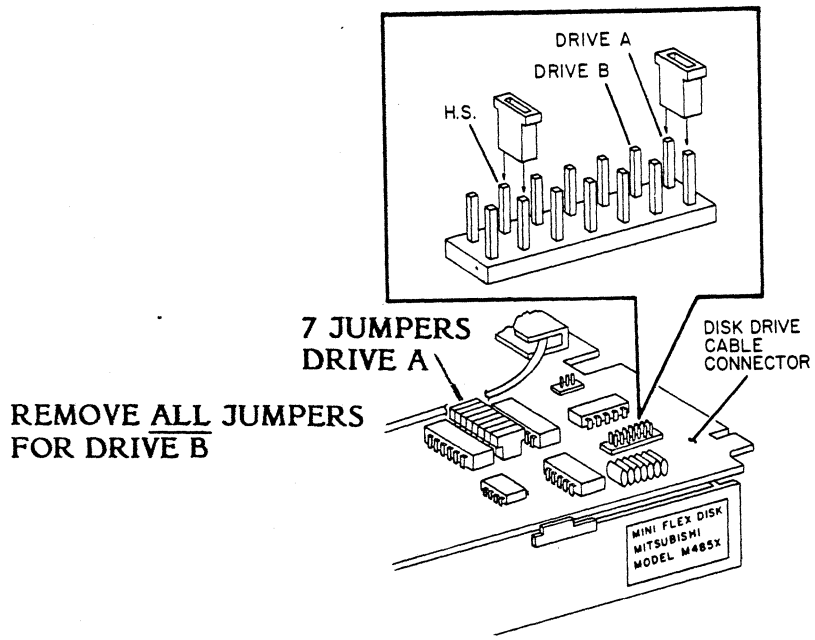


**Figure 3. Jumper Locations for Drive A**

# P I E D  P I P E R

## ACCEPTANCE TEST

## 1.0 Introduction

This document describes the operations of the burn-in test. The test is run prior to release of the system unit to the customer.

## 2.0 Activation

The burn-in test is automatically invoked by inserting the test diskette into the drive and the RESET button pressed.

## 3.0 Functions

The following are performed during the test:

- keyboard test
- printer port test
- memory test
- disk random access test
- disk sequential access test.

The keyborad test and the printer port test are run once with user interaction. The rests are run continuously automatically. An error log file named 'LOGFILE' will be created on the disk if it does not exist when there is any error. Subsequent error log will be appended to the file. Each of the test is descibed in detail below.

## 4.0 Keyboard Test

The keyboard test consists of 3 stages:

- key test
- LED lights test
- BELL test.

### 4.1 Key Test

During the key test, a layout of the keys of the keyboard is displayed on the screen. It consists of the following:

- 10 numeric keys (0 to 9),
- 26 alphabetic letters in lower case (a to z) and
- 10 special keys.

The user is instructed to enter the corresponding keys on the screen. When a key is entered, the corresponding display on the screen will disappear. The user will enter the keys until all the characters disappear. If a key is faulty, a wrong character may be generated and may not be recognised, thus the character will stay on the screen.

Whenver there is any faulty key, the test will not proceed to the next stage. The user should mark the unit as failed.

When all the characters have disappeared from the screen, testing will proceed on the following keys:

- control key
- capital lock key
- function key
- left shift key
- right shift key.

The user is instructed to enter the characters and the program will response accordingly.

## 4.2 LED Lights Test

This test checks the two LED indicator lights on the keyboard. The LEDs are turned on one after the other. The user is prompted to look at the light for Drive A and answer 'Y' or 'N' depending on whether the light is on. Similar question is asked for Drive B.

If either light does not turn on, the unit has failed.

## 4.3 BELL Test

The user is prompted to press RETURN to start the BELL test. The Bell should BEEP for a short while. If the user does not hear the BEEP, the unit has failed.

## 4.4 Keyboard Failure

After the above tests, the user has the option to continue or exit the keyboard test. If the keyboard failed any one of the above test, the user should enter CNTL-C to exit and terminate the test. (Section 10.0)

If the keyboard passed all the tests, the user should enter CNTL-C to exit the keyboard test to go to the other tests.

## 5.0 Printer Port Test

A test pattern will be printed on the printer if it is connected. If not, the user is prompted to connect and turn on the printer.

## 6.0 Memory Test

This test exercises all 64K memory of the system unit. Test patterns are written to the memory and read back to verify the contents. If there is any discrepancy, the error is logged in the log file. At the end of the test, the number of errors is displayed.

The marching bit technique is used in the test. The memory is split into two half. The upper half is tested first, followed by the lower half. Interrupt is disabled during the test, thus the screen is not updated correctly during the test.

## 7.0 Random Disk Access Test

This test is used to simulate the normal CP/M operation of file access, whereby the disk head is restored, sectors on the directory tracks read, followed by read/write on the data track sectors. The operation is initiated automatically and repeats 20 times. A log file is kept to record all disk access errors. The number of errors is displayed at the end of the test.

The test first restores the disk. Track 3 is then seeked and a sector is read randomly. The following is then repeated 6 times. A track is then seeked in the inner area, randomly between track 70 and 79. A test pattern is then written to a randomly selected sector. The content is read back and verified. If there is any error in the above procedure, it is logged in the log file.

At the end of the test, the error count is displayed.

## 8.0 Sequential Disk Access Test

This test reads all the disk sectors sequentially. If there is any error in reading the sectors, the location of the sector is displayed.

## 9.0 Test Termination

During the test, the user can terminate it only during breaks between the tests under CP/M control, by repeatingly pressing the DELETE key.

## 10.0 Error Log Display

When the test is stopped, the user can review the number of memory errors and random access disk errors by entering the command

LOGPRINT

# PIED PIPER™

# Specifications

## Hardware

| | |
|---|---|
| Processor | Z80A microprocessor/4 Mhz |
| Memory | 64K bytes of RAM<br>4K bytes of read only memory<br>2K bytes of video display buffer<br>2K bytes of read only memory for character generation |
| Keyboard | Full size, ASCII typewriter-style keyboard |
| Printer Port | Centronics type parallel printer port. |
| Display Capability | 24 lines of 80 characters for video monitor<br>24 lines of 40 characters for T.V. with horizontal scrolling feature to view 80 columns<br>Upper/Lower case plus character graphics |
| RF Modulator | Connector for RF modulator allows display on T.V. |
| Floppy Disk Drive | 5¼ inch slimline drive with 1M byte of unformatted storage, 784K bytes formatted |
| Power Supply | Switching power supply sufficient for extra floppy disk |
| Expandability | Dual RS232 serial ports<br>RS232 serial port plus built-in telephone modem; (300 baud auto-dial/auto-answer)<br>**Capable of accessing databases such as THE SOURCE℠ or Dow Jones®**<br>**2 line x 80 column liquid crystal display with vertical scrolling feature to view 24 lines**<br>**Interface for second floppy disk drive**<br>**Interface for hard disk drive** |

*Specifications subject to change without notice*

## Software

| | |
|---|---|
| Operating System | CP/M® 2.2<br>PIED PIPER™ Utilities including formatting, file transfer and backup with one disk drive |
| Application Programs | Perfect Writer™ — Word processing<br>Perfect Speller™ — 50,000 word spelling dictionary<br>Perfect Calc™ — Electronic spreadsheet<br>Perfect Filer™ — Data filing/merging system |
| Options | Supercalc®<br>MBASIC®<br>dBASE II™<br>Wordstar®<br>Multiplan™<br>Plus many others |

## General Description

| Dimensions | Height | Width | Depth | Weight |
|---|---|---|---|---|
| | 4.0 in. (10 cm) | 20.2 in. (51 cm) | 10.8 in. (27 cm) | 12.5 (5.6 kg) |

| | |
|---|---|
| Electrical Requirements | 115 VAC 60 Hz<br>230 VAC 50 Hz, optional<br>Power consumption 60 watts maximum |
| Environmental | Temperature 50°F-95°F (10°C-35°C)<br>Humidity 20%-80% |

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