PART TWO: REPAIRING THE POCKET/POUCH STORAGE PERIPHERALS

This chapter consists of reference material on the theory of operation, diagnostics, and repair of the Pocket/Pouch Peripherals.

POCKET/POUCH STORAGE PERIPHERAL OVERVIEW

The pocket/pouch storage peripherals are a set of floppy disk and streaming tape drive peripherals which utilize the internal floppy disk drive controller of the GRiDCASE 1500 systems in order to operate. There are five peripherals of this kind. Table 2-1 illustrates the available pocket/pouch peripherals.

The peripherals are accessed across the external peripheral bus connector, located on the rear panels of the systems. The systems only support one peripheral at a time. The external peripheral bus is GRiD proprietary, and described in more detail in the section Theory of Operations below. A +5 VDC power line on the bus allow the double density and high density pocket floppy drives to be powered by the host system. The pouch peripherals (3402, 3403, and 3404) require an external +16 VDC supply in order to operate.

PIN #	SIGNAL TYPE	DESCRIPTION
1,3,5..33		Ground
2	In	Mode select (high density/low density)
4	In	In use (not used)
6	In	Drive select 3 (not used)
8	Out	Index
10	In	Drive select 0
12	In	Drive select 1 (not used)
14	In	Drive select 2 (not used)
16	In	Motor on
18	In	Direction select (out- "down"/in- "up")
20	In	Step
22	In	Write data
24	In	Write gate
26	Out	Track 00
28	Out	Write protect
30	Out	Read data
32	In	Side select (side 0/side 1)
34	Out	Disk change

Table 1-5. Common Floppy Interface Bus Pin-Out

The External Peripheral Bus

The external peripheral interface on the GRiDCASE 1500 rear panel is a slight modification of the common floppy interface bus. Not all of the pins of the common floppy interface bus are used, and extra pins have been added to allow the systems to identify the peripherals attached to the bus. Table 2-3 shows the pin definitions of the external peripheral bus. The signal Drive Select 2 on the external peripheral interface of the GRiDCASE 1500 becomes the signal Drive Select 0 on the peripheral backplane. The signals Floppy Address Select, Tape Preset, Density indication, and 3 or 5 ~ are generated by the backplanes to indicate the configuration of the peripheral drive. Unless otherwise indicated, all signals are negative logic (low = true).

POCKET/POUCH STORAGE PERIPHERAL THEORY OF OPERATION

The generic pocket/pouch peripheral consists of two parts: a backplane interface board, and an OEM drive (signal and power cables may be present as well). The backplanes are used to interface between the external peripheral bus (a bus common to the current GRiD systems) and a common floppy interface bus (a bus common to many of the OEM drives on the market, and common to all of the drives used in the pouch/pocket peripherals). Additionally, the pouch peripheral backplane (used in the pouch peripherals) provides regulated +12 and +5 VDC to the drives. A relay on the pouch peripheral backplane, activated by the host system's +5 VDC, switches external +16 VDC power to the voltage regulators. This insures that the pouch peripherals are not being powered when the system is off.

External Peripheral Diagnostics

As the external peripherals share the floppy drive controller circuitry in the GRiD systems, they function in much the same way as the internal floppy drives. The floppy drive peripherals (32170, 3401, 3402, and 3404) are tested with the same program that is used to test the internal floppy drives, QUICKCHK.EXE.

The Common Floppy Interface Bus

The external peripheral bus is an extension of a common 34-pin floppy interface bus found on most of the current OEM floppy drives. This bus provides drive selection, servo control, status/synchronizing signals, and data signals. All data signals are serial and encoded in a Modified Frequency Modulation (MFM) format. All signals on the bus are negative logic (low = true) and TTL compatible. Table 2-2 shows the pin definitions for the common floppy interface bus. All odd-numbered pins on the bus are ground.

PIN #	SIGNAL TYPE	DESCRIPTION
1,25		NC
4,7		Ground
2	In	Floppy address select (drive B/drive A)
3	In	External drive present
5	Out	Write protect
6	In	Density Indication (High density/low density)
8	In	Tape Present (Tape/Floppy)
9	Out	Direction
10	In	Disk change
11	Out	Low density (Low density/High density)
12	Out	Loqw density (High density/low density)
13	NC	Cable key
14	Out	+5 VDC
15	In	3 or 5 (3.5" or 5.25")
16	Out	Side select
17	In	Read data
18	In	Track 00
19	Out	Write gate
30	Out	Write data
21	Out	Step
22	Out	Motor enable
23	Out	Drive select
24	In	Index

Table 1-6. External Peripheral Interface Pin-Out

Pocket Floppy Disk Drives (32170/3401)

The pocket floppy drives consist of a backplane and an OEM 3.5" drive. A jumper, J1, when present indicates that the peripheral is a high density pocket floppy disk drive (3401), and when not present indicates that the peripheral is a double density drive (32170). Figure 2-1 below shows the components of the pocket floppy disk drives.

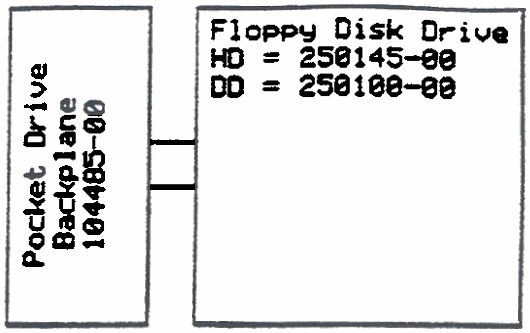

Figure 1-7. Pocket Floppy Disk Drive Components

Floppy Disk Drive: 3.5", half-heighth floppy drives are used in the pocket floppies. The 720 KB drive (GRiD P/N 250100-00) is used in the double density model (32170). The 1.44MB drive (GRiD P/N 250145-00) is used in the high density model (3401).

Pocket Peripheral Backplane: The backplane (GRiD P/N 104488-00) is common between the two models. The drive select switches (exposed on the rear panels of the pocket drives) are wired in parallel (either switch, when closed, changes the configuration of the drives). Details on the effect of the drive configuration switches are listed on the bottom of the unit. Jumper J1 informs the system that the drive is high density (jumper present) or double density (jumper not present).

NOTE: *Older models of the 32170 use a different backplane (GRiD P/N 103483).*

Pouch Floppy Disk Drives (3402/3404)

The pouch floppy drives consist of a backplane, an OEM 5.25" drive, and signal cables. An external +16 VDC supply provides +12 and +5 VDC to the OEM drive. Two barrel connectors on the rear panel of the peripheral are wired in parallel to allow the system and the peripheral to be daisy-chained to the external DC supply. A jumper, J1, when present indicates that the peripheral is a high density pouch floppy disk drive (3404), and when not present indicates that the peripheral is a double density drive (3402). Figure 4-241 shows the components of the pouch floppy disk drives.

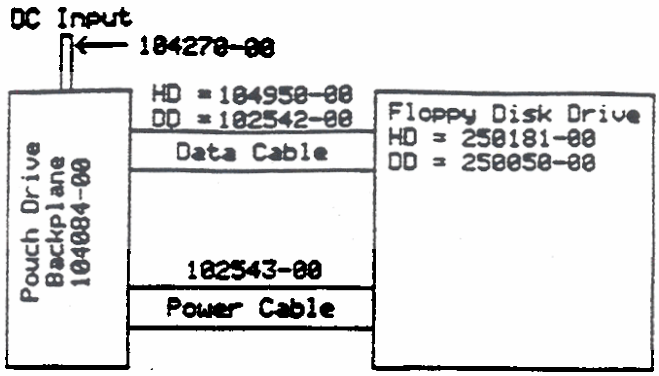

Figure 1-8.Pouch Tape Drive Components

Floppy Disk Drive: 5.25", half-heighth floppy drives are used in the pouch floppies. The 360 KB drive (GRiD P/N 250050-00) is used in the double density model (3402). The 1.2MB drive (GRiD P/N 250181-00) is used in the high density model (3404).

Pouch Peripheral Backplane: The backplane (GRiD P/N 104084-00) is common between the 3402, 3403, and 3404 pouch peripherals. The drive select switches (exposed on the rear panels of the pocket drives) are wired in parallel (either switch, when closed, changes the configuration of the drives). Details on the effect of the drive configuration switches are listed on the bottom of the peripheral. Jumper J1 informs the system that the drive is high density (jumper present) or double density (jumper not present).

Cables: Three cables are used in the pouch floppy drives. The DC input cable (GRiD P/N 104270-00) consists of two barrel plug receptacles, for external DC input, and a three pin molex connector. The drive power cable (GRiD P/N 102543-00) runs between the drive and the backplane board. The drive signal cable differs between two drive models. The double density drive (3402) uses the signal cable with GRiD P/N 102542-00; the high density drive (3404) uses the signal cable with GRiD P/N 104950-00.

Pouch Tape Drive (3403)

The pouch tape drive consists of a backplane, an OEM tape drive, a cooling fan, and signal cables. An external +16 VDC supply provides +12 and +5 VDC to the OEM tape drive. Due to its power requirements, this peripheral requires an external +16 VDC supply independent of the host system's supply. Jumper J2 indicates to the host system that the peripheral is a pouch tape drive (3403). Figure 4-242 shows the components of the pouch tape drive.

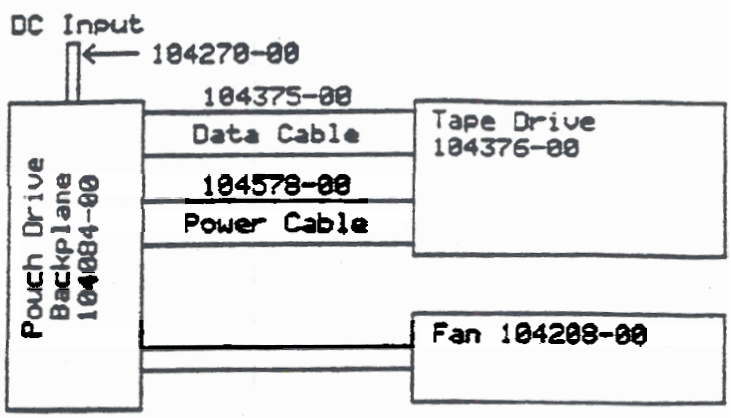

Figure 1-9. Pouch Floppy Disk Drive Components

Streaming Tape Drive: The IRWIN tape drive (GRiD P/N 104376-00) uses 40MB tape cartridges. Presently, this peripheral only works with the BACKEZ backup utility.

Pouch Peripheral Backplane: The backplane (GRiD P/N 104084-00) is common between the 3402, 3403, and 3404 pouch peripherals. The drive select switches (exposed on the rear panels of the pocket drives) are wired in parallel (either switch, when closed, changes the configuration of the drives). Details on the effect of the drive configuration switches are listed on the bottom of the peripheral. Jumper J2 GRiD Field Repair Course Outline informs the system that the drive is a tape drive (jumper present) or a floppy drive (jumper not present).

Fan: The pouch tape's fan runs off of the peripheral's +12 VDC.

Cables: Three cables are used in the pouch tape drive. The DC input cable (GRiD P/N 104270-00) consists of two barrel plug receptacles, for external DC input, and a three pin molex connector. The drive power cable (GRiD P/N 104578-00) runs between the drive and the backplane board. The drive signal cable (GRiD P/N 104208-00) runs between the drive and the backplane board.

PART THREE: CORRESPONDING WITH GRiD

Chapter Three describes how field service technicians should interact with GRiD. The section Working with the GRiD Resource Center describes how to return defective units, and get answers to users' hardware-related questions. The section Using the Parts Desk describes how to return defective sub-assemblies, and order spare parts, and use your Hardware Service Support Agreement (HSSA.) The section Course Evaluation is a request for your feedback concerning this course.

USING THE PARTS DESK

The parts desk supplies the field with spare parts, coordinates the sub-assembly repair process, and routes hardware questions to the proper personnel.

Ordering Spare Parts

After this course, your company needs to order in-house spares. Appendix B of this manual contains the spares needed to adequately support the products presented in this course. The quantities on the lists represent the spares needed to support 100 units. Ordering spare parts is a five-part process, as follows:

1. Determine the population of each GRiD product you are servicing in your area. For instance, 100 are GRiDCASE 1520s and 100 are GRiDCASE 1530s.

2. Take each population of units and divide the number of units in the population by 100 to get a multiplying factor. For instance, for a population of 100, the multiplication factor is 1; for a population of 150, the multiplication factor is 1.5.

3. For each item on the Recommended Spares Lists multiply the number of recommended spares by the multiplication factor arrived at in STEP 2. Make sure you have at least one of everything (Servicing 25 machines without a main logic board is impractical.)

4. Call the Parts Desk at (415) 683-9811 to obtain the current prices for the spare parts you are ordering.

5. Your company needs to generate a Purchase Order that must be approved by our credit department. Send it with your spares order to GRiD at the address below:

GRiD Systems Corporation
47211 Lakeview Boulevard
Fremont, CA 94538
attn: Parts Desk

Returning Defective Sub-assemblies

The procedure for returning of defective sub-assemblies for repair is similar to the procedure for ordering spare parts. The seven steps are as follows:

1. Call the Parts Desk at (415) 683-9811. Give them the Tracking Number for the unit (The tracking number is used to determine what warranties or service contracts exist on that unit.)

3. Give the Parts Desk a description of the the sub-assembly's malfunction. You should give them as much information as possible to aid in the repair process.

4. Give them the shipping address to which the replacement should be sent.

5. The Parts Desk gives you a Parts Exchange Order (PEO) number. Put this number on the outside of the returning shipping box.

6. If the part is being returned outside of warranty or a repair contract. Your company must generate a Purchase Order for the repair of the sub-assembly. The Parts Desk can lead you through this process.

7. Return the part to GRiD using the address that follows:

GRiD Systems Corporation
47211 Lakeview Boulevard
Fremont, CA 94538

HSSA: Hardware Service Support Agreement

The Hardware Service Support Agreement (HSSA) is your means of getting current information on hardware questions you may have about your units. After taking this class, you are entitled to a year of Hardware Service Support. After that, you must renew your HSSA for a fee. The HSSA entitles you to ask detailed questions of the system experts in the GRiD Repair Center and the GRiD hardware service training staff.

WORKING WITH THE GRID RESOURCE CENTER

This section describes the GRiD Resource Center and how you can interact with it. The GRiD Resource Center answers users' questions concerning their hardware and software. The GRiD Resource Center does not focus on Hardware Service issues, such as techniques for sub-assembly maintainance, but can answer questions you have about the general operation of the system. The GRiD Resource Center is also responsible for coordinating the return of defective units for repair.

Calling the GRiD Resource Center

The GRiD Resource Center's number is (415) 656-2100. When calling the GRiD Resource Center, always give the Tracking Number of the machine about which you are asking questions. Your questions need not be limited to malfunctioning machines, but you should give the GRiD Resource Center a Tracking Number of a machine you have that is of the type related to your question. For instance, if you have a question about GRiDCASEs, include the Tracking Number of a GRiDCASE your company owns.

Returning Defective Units

To return a unit for repair or replacement, call the GRiD Resource Center. You will be asked to supply some information and be given a Product Repair Order (PRO) number to ship back with the unit. You will be asked for the unit's Tracking Number, your shipping address, and a brief description of the unit's problem. If the unit is out of warranty, or not covered by a repair contract, you must include a Purchase Order for the amount of the repair of the unit. Make sure you tell the GRiD Resource Center your Purchase Order number for the repair of the unit. The GRiD Resource Center gives you a Product Repair Order number. You should write this number on the shipping carton after GRiD's address. Put it in the form as in the following example.

GRiD Systems Corporation
46600 Landing Parkway
Fremont, CA 94538
attn: PRO 710-9999

Other GRiD Resource Center Services

There are other services the GRiD Resource Center provides; the communications loopback tester is an example.

Communications Loopback Tester

The GRiD Resource Center provides a number you can call to test the serial communications capability of your unit. To access this service and/or load a communications software package call (415) 657-2448. This is a loopback connection, what you type on the keyboard at your end is echoed back to your screen.

APPENDIX A: GRIDCASE 1500 POST BEEP CODES

During system boot, GRiDCASE 1500 systems run a series of internal diagnostics located in the Boot/BIOS ROMs. These diagnostics comprise the Power-On-Self-Test known as the POST. Should an error occur in one of these diagnostics, the system boot fails, and the system speaker indicates the failing test with a series of beeps, somewhat like Morse code. The code works in the following manner. Three groups of beeps, with short pauses between each group of beeps, are heard. For instance, a group of two beeps, then a group of three beeps, and then a group of four beeps (2-3-4) indicates a RAM chip or data line failure of bit B(hex) in the first 64K of RAM. The codes are transmitted quickly, and learning to distinguish the sound pattern may take some time. Once the display circuitry has been tested, the beep codes are disabled, and any errors in the POST are displayed on the screen.

Beep Code	Error Description
1-1-3	CMOS (time of day chip) write/read failure
1-1-4	BIOS ROM checksum failure
1-2-1	Programmable interval timer failure
1-2-2	DMA initialization failure
1-2-3	DMA page register failure
1-3-1	RAM refresh verification failure
1-3-3	1st 64K RAM chip or data line failure — multiple bit
1-3-4	1st 64K RAM odd/even logic failure
1-4-1	1st 64K RAM address line failure

1-4-2	1st 64K RAM parity test failure
2-1-1	1st 64K RAM chip or data line failure - Bit 0
2-1-2	1st 64K RAM chip or data line failure - Bit 1
2-1-3	1st 64K RAM chip or data line failure - Bit 2
2-1-4	1st 64K RAM chip or data line failure - Bit 3
2-2-1	1st 64K RAM chip or data line failure - Bit 4
2-2-2	1st 64K RAM chip or data line failure - Bit 5
2-2-3	1st 64K RAM chip or data line failure - Bit 6
2-2-4	1st 64K RAM chip or data line failure - Bit 7
2-3-1	1st 64K RAM chip or data line failure - Bit 8
2-3-2	1st 64K RAM chip or data line failure - Bit 9
2-3-3	1st 64K RAM chip or data line failure - Bit A
2-3-4	1st 64K RAM chip or data line failure - Bit B
2-4-1	1st 64K RAM chip or data line failure - Bit C
2-4-2	1st 64K RAM chip or data line failure - Bit D
2-4-3	1st 64K RAM chip or data line failure - Bit E
2-4-4	1st 64K RAM chip or data line failure - Bit F
3-1-1	Slave DMA register failure
3-1-2	Master DMA register failure
3-1-3	Master interrupt mask register failure

3-1-4	Slave interrupt mask register failure
3-2-4	Keyboard controller failure
3-3-4	Video RAM failure
3-4-1	Screen initialization failure
3-4-2	Screen retrace test failure

APPENDIX B: GRiDCASE 1500 RECOMMENDED SPARES LIST

Below is a list of the recommended spares for the GRiDCASE 1520 and 1530 systems. The quantities listed are based upon the spares needed to service a population of 100 systems.

(Based on a service population of 100 machines)

OPTION	QUANTITY	DESCRIPTION	PART #
1520	3	152X PROCESSOR PWB	104014-00
1530	3	153X PROCESSOR PWB	104078-00
STD	2	15XX REAR PANEL PWB	104128-00
STD	3	15XX VIDEO CARD	104056-00
STD	2	15XX KEYBOARD 72 KEY	104029-00
STD	4	15XX 4/OUT DC/DC LCD	104144-00
STD	2	15XX LCD ASSY - YELLOW	104777-00
283	2	15XX LCD ASSY - BLUE	104775-00
281,282	4	15XX 4/OUT DC/DC PLASMA	104145-00
282	2	15XX PLASMA ASSY 640X400	104778-00
281	?	15XX PLASMA ASSY 640X200	104691-00

STD,302	8	15XX 256 KB RAMSTICK	300701-00
304,308	3	15XX 1 MB RAMSTICKS	300804-00
STD	2	15XX DUAL FDD BACKPLANE	104193-00
STD	4	15XX 1.4MB FLOPPY DRIVE ASSY	250145-00
320	2	15XX HD 20MB/FDD BACKPLANE	104176-00
321	2	5XX HD 20MB/FDD BACKPLANE	104176-00
321	2	15XX HARD DRIVE 20 MB	250171-00
321	2	15XX 1.4MB FLOPPY DRIVE ASSY	250145-00
324	3	15XX HD BACKPLANE 40MB	105970-00
324	2	15XX HARD DRIVE 40 MB	250195-00
331	2	15XX MODEM 2400 BAUD	104243-00
332	2	15XX MODEM MNP	105858-00
STD	1	15XX (DOMESTIC) MECH. SPARES	104645-00
STD	1	15XX (FOREIGN) MECH. SPARES	104646-00

APPENDIX C: INVALID CONFIGURATION CODES

CODE	MEANING
00	Drive A invalid
01	Drive B invalid
02	CMOS ship lost power
03	MOS chip checksum bad
04	Base memory low byte invalid
05	Base memory high byte invalid
06	Extended memory low byte invalid
07	Extended memory high byte invalid
08	Video adapter mismatch*

*(valid on new EXP only if you have a video card in the base)

APPENDIX D: 1500 SERIES ROM BIOS ERROR MESSAGES

BOOT ERROR MESSAGES

MESSAGE	POSSIBLE CAUSE	ACTION
Diskette read failure	Pocket floppy not connected securely; bad floppy disk in unit; backplane board loose	Check disk and cables, reboot
Not a boot diskette	Pocket floppy not connected securely; bad floppy disk in unit; backplane board loose	Check disk and cables, reboot
No boot device available	Pocket floppy not connected securely; bad floppy disk in unit; backplane board loose	Check cables, power down/up
Hard disk read failure	Backplane board loose; hard disk failure	Power down/up
No boot sector on hard disk	Backplane board loose; hard disk failure	Power down/up; FDISK

MESSAGES DURING NORMAL OPERATION

MESSAGE	POSSIBLE CAUSE	ACTION
Unexpected SW interrupt	Software installed incorrectly; pocket floppy not connected securely; internal connector loose	Check cables; install software; power down/up
Unexpected HW interrupt	Software installed incorrectly; pocket floppy not connected securely; internal connector loose	Check cables; install software; power down/up

POWER ON SELF-TEST (POST) ERROR MESSAGES

MESSAGE	POSSIBLE CAUSE	ACTION
Gate A20 failure	Faraday chip(s) loose; main logic board bad; loose connector	Power down/up
Unexpected interrupt in protected mode	Faraday chip(s) loose; main logic board bad; loose connector	Power down/up
Decreasing available memory	RAM Sticks loose or bad	Power down/up
Memory tests terminated by keystroke	User hit ESC kay during memory test	Don't hit ESC
Memory failure at xxxx	RAM Sticks loose or bad; loose connector	Power down/up
Display adaper failed using alternate	Video board loose or bad	Power down/up
No timer tick interrupt	Faraday chip(s) loose; main logic board bad; loose connectir	Power down/up
Shutdown failure	CMOS ship bad; CMOS chip batrery dead	Power down/up
Timer chip counter 2 failed	Faraday chip(s) loose; main logic board bad; loose connector	Power down/up
Keyboard...failure	Kayboard bad; user pressed boot key too early; keyboard conenctor loose	Power down/up
Keyboard is locked please unlock	Keyboard bad, user pressed boot key too early; keyboard connector loose	Power down/up
Diskette subsystem reset failed	Pocket floppy not connected securely; bad floppy disk in unit	Check cable; remove disk; Power down/up
Diskette drive 0 seek failure	Pocket foppy not connected securely; bad floppy disk in unit; backplane board loose	Check cable; remove disk; Power down/up
Diskette drive 1 seek failure	Pocket floppy not connected securely; bad floppy disk in unit; backplane board loose	Check cable; remove disk; Power down/up
Hard disk configuration error	CMOS chip bad; hard disk backplane board loose	Power down/up
Hard disk controller failure	Hard disk bad; had disk backplane board loose	Power down/up
Hard disk failue	Hard disk bad; hard disk backplane board loose	Power down/up
Time-of-day clock stopped please set current time	CMOS ship bad or battery dead	Set time, reboot
Time-of-day clock stopped	CMOS chip bad or batrery dead	Set time, reboot
Invalid configuration information; code 0	Meaning: Drive A invalid Switch settings incorrect; CMOS chip bad or battery dead	Correct switch settings, reboot
Invalid configuration information; code 1	Meaning: Drive B invalid Switch settings incorrect; CMOS chip bad or battery dead	Correct switch settings, reboot
Invalid configuration information; code 2	Meaning: CMOS chip lost power CMOS chip battery dead	Power down/up
Invalid configuration information; code 3	Meaning: CMOS checksum bad CMOS chip bad or batrery dead	Reboot
Invalid configuration information; code 4	Meaning: Base memory low byte value bad CMOS chip bad or battery dead	Reboot
Invalid configurartion information; code 5	Meaning: Base memory high byte value bad CMOS chip bad or battery dead	Reboot
Invalid configuration information; code 6	Meaning: Extended memory low value bad CMOS chip bad or battery dead	Reboot
Invalid configuration informtion; code 7	Meaning: Extended memory high value bad CMOS chip bad or battery dead	Reboot
Invalid configuration information; code 8	Meaning: Video adapter mismatch CMOS chip had or batrery dead; video add-in card on 1500 EXP	Power down/up or ignore
ROM bad checksum -xxxx	EXP add-in card ROM is loose or bad; memory failure	Power down/up

APPENDIX E: BIOS ROM RELEASE DATES

PRODUCT - 286

ROM #	BIOS	DATE
300777	-00	10-12-87
300778	-01	10-23-87
	-02	11-03-87
	-03	11-11-87
	-04	12-07-87
	-05	01-05-88
	-06	01-06-88
	-07	01-11-88
	-08	01-21-88
	-09	01-25-88
	-10	02-18-88
	-11	03-17-88
	-12	03-22-88
	-13	03-30-88
	-14	06-09-88
	-15	07-11-88
	-16	07-25-88
	-17	09-12-88
	-18	11-09-88
	-19	01-27-89
	-20	02-21-89
	-21	03-11-89

PRODUCT - 386

ROM#	BIOS	DATE
300787	-00	01-25-88
300788	-01	02-18-88
	-02	03-17-88
	-03	03-22-88
	-04	03-30-88
	-05	06-09-88
	-06	07-11-88
	-07	07-25-88
	-08	09-12-88
	-09	11-09-88
	-10	02-21-89
	-11	03-11-89