HT101A 286 USER'S MANUAL

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SECTION 1.0

1.1 PRODUCT DESCRIPTION

The HT101A 286 is a high performance AT-compatible motherboard that provides high speed processing while maintaining full compatibility with the IBM PC/AT, The HT101A 286 mother-board is designed to be mounted in a standard PC/XT, "baby AT," or PC/AT-type enclosure and uses industry-standard power supply inputs, connectors, expansion board sockets, and so forth. Simply stated, you can design a new system or upgrade your existing system with no modifications to existing or available components. In fact, your HT101A 286 may already have been installed into a complete system by your dealer.

1.2 PROCESSOR AND SYSTEM SPECIFICATIONS

Processor type:	Intel or AMD 80286 rated at 12 MHz/10MHz
System speed:	12 MHz and 6 MHz software, keyboard, and switch selectable
Coprocessor:	8 MHz 80287 (optional)
Memory Type:	0 Wait State: 100ns 1 Wait State: 120ns
Memory Capacity:	512KB/640KB/1MB/2MB/4MB Using DIP/SIP/SIMM (see section 2.3)

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
SECTION 2.0

2.1 LAYOUT OF HT101A 286 MOTHERBOARD
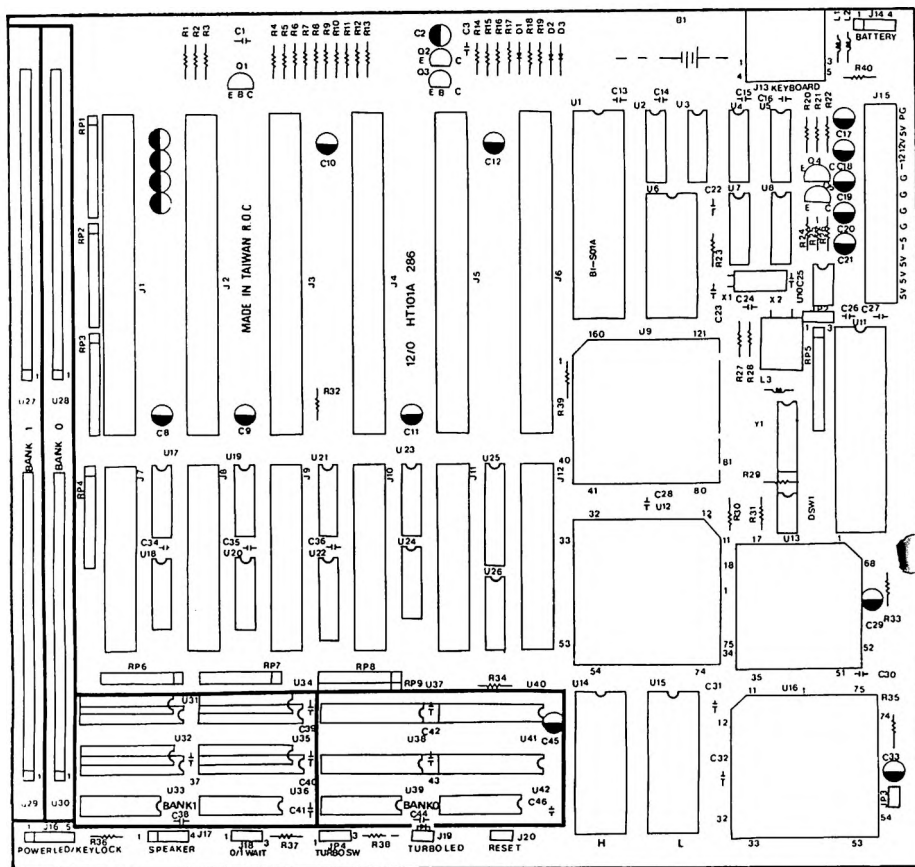
2.2 JUMPER/CONNECTOR DESCRIPTION

J14		External Batttery Connector
J13		Key Board Connector
JP2		Co-Processor Clock 25 MHz (Asynchronous) CPU Clock (Synchronous)
J18		Wait State Select Fixed Zero Wait State Fixed One Wait State
J19		Turbo LED
J20		Reset
JP4		Turbo Switch [Ctrl][Alt][+] Hi-Speed (Keyboard Control) [Ctrl][Alt][-] Lo-Speed (Keyboard Control) Hi-Speed only
J16		Power LED/Keylock
J17		Speaker
JP3		Enable Parity Check Disable Parity Check

J13 Key Board Connector

Pin #	Assignments
1	Key Board Clock
2	Key Board Data
3	Spare
4	GND
5	+5V

J14 Battery Connector

Pin #	Assignments
1	+6V D.C. Battery Input
2	N/C
3	N/C
4	GND

J15 Power Connector

PS1	
Pin #	Assignment
1	Power Good
2	+5V
3	+12V
4	-12V
5	GND
6	GND

PS2	
Pin #	Assignment
7	GND
8	GND
9	-5V
10	+5V
11	+5V
12	+5V

J16 Keyboard Lock & power LED

Pin #	Assignments
1	LED Power
2	Spare
3	GND
4	Key Board Lock
5	GND

J17 Speaker Connector

Pin #	Assignments
1	Signal
2	N/C
3	GND
4	+5V

2.3 DIP SWITCH FUNCTION DESCRIPTION

DSW-1 "ON" COLOR MODE / "OFF" MONOCHROME MODE

DSW-2	DSW-3	DSW-4	MEMORY	BANK 0	BANK 1
ON	ON	OFF	512K	256K SIMM/SIP x 2 or 41256 x 2 44256 x 4	
ON	OFF	ON	640K	256K SIMM/SIP x 2 or 41256 x 2 44256 x 4	4164 x 2 4464 x 4
ON	OFF	OFF	1024K	256K SIMM/SIP x 2 or 41256 x 2 44256 x 4	256K SIMM/SIP x2 or 41256 x 2 44256 x 4
OFF	OFF	ON	2M	1M SIMM/SIP x 2	
OFF	OFF	OFF	4M	1M SIMM/SIP x 2	1M SIMM/SIP x 2

WARNING:
The system will not work if you install both SIMM and SIP type of DRAM in Bank O's and Bank 1s at the same time.

SECTION 3.0

3.1 FIRST TIME START-UP

The first time you start your system, you will need to follow some special procedures to specify your system configuration, initialize and format your hard disk, and install system software. This section explains these special procedures. Do not proceed until you are certain that your system has been properly installed and connected to an appropriate power source.

In this section, there are 3 procedures you will follow:

1. Turn on the system power.
2. Run the setup program to specify various system configuration parameters.
3. Initialize and format your hard disk.

3.2 TURNING ON THE POWER

Turn on the system power by first turning on the video display power switch, then turning on the power switch on the side or back of the system unit. The system will go through it's automatic power on self test (POST) and then attempt to boot (that is, to load the operating system from a disk drive).

Since your disks are not formatted, and the system doesn't yet know what type of disks your system has, you will get an error message when POST completes.

You are now ready to run the SETUP program. The way in which your setup program operates depends on whether your computer has the QUADTEL, AMI or the AWARD BIOS. The following sections give the setup procedure instructions for those three kinds of BIOS.

3.3 QUADTEL 286 SETUP

The SETUP program lets you specify your system's configuration of diskette drives, hard disk drives, video display, memory, date, time, and other setup informations. The SETUP program is build-in BIOS -- Diskette is not necessary for the SETUP.

NOTE
The following procedure is assuming the your system has the QUADTEL 286 BIOS installed. If your system has had a different BIOS installed, these procedures will not work.

To run SETUP, simultaneously press the CTRL, ALT, and S keys, the following window will be displayed:

```
┌─────────────────────────────────────────────────────────────────────────┐
│           Extended BIOS Setup - Copyright 1989, 1990 Quadtel Corporation  │
├─────────────────────────────────────────────────────────────────────────┤
│  Current Date: [07/13/1989]            Video System:   [Monochrome]       │
│  Current Time:  [08:33:45]                                                │
│                                                                           │
│  [  640K] System Memory                Power Up Speed:[Fast]              │
│  [ 3456K ] Extended Memory                                                │
│                                                                           │
│                                                                           │
│  Diskette Drive 0: [360 KB, 5 1/4 ]                                       │
│  Diskette Drive 1: [1.44 MB, 3 1/2]                                       │
│                                                                           │
│  Fixed Disk 0: Type:[   2]   CY: 615   HD: 4   ST: 17   LZ: 615   WP: 300 │
│  Fixed Disk 1: Type: [None]                                               │
├─────────────────────────────────────────────────────────────────────────┤
│  ↑↓      Move       F5 Previous Value        F9  Automatic Configuration  │
│  F1      Help       F6 Next Value            F10 Save Configuration       │
│  Esc     Exit                                                             │
└─────────────────────────────────────────────────────────────────────────┘
```

The Setup screen will allow you to modify the time, date, and setup information contain in the clock CMOS RAM. This information is used by the system BIOS for system configuration.

Use the arrow keys to select the item you want to change. When the item is selected, press F5 to select the previous (smaller) value and F6 to select the next (larger) value.

Press F9 to automatically configure the system. This will determine the amount of memory in the system and set default values for the system memory, extended memory, and video type. Auto configuration for the fixed disk is not performed and must be set manually.

Automatic configuration is especially useful if you are adding or subtracting memory. Simply add a memory board or add memory to the system board, invoke the setup utility and press F9 to set the proper memory configuration.

Press F10 to save the current configuration. The configuration, with the exception of the time and date, is not saved until F10 is pressed. Press ESC to exit from the SETUP program. If you have not saved the changes you made, you can do so at this time.

3.4 QUADTEL BIOS HARD DISK DRIVE TABLE

The Quadtel 286 BIOS supports a total of 46 drive type and one user definable drive type (Type 47). On the following page there is a table containing the standard 46 drive type provided.

The user definable drive type allows the user to create drive parameters for both fixed d 0 of fixed disk 1. Using the built in SETUP program, you can specify the cylinders, heads, sectors, write precomp, and landing zone for a specific drive.

Default Hard Disk Drive Table

Type	Cylinders	Heads	Sectors	Write Precomp	Landing Zone
1	306	4	17	128	305
2	615	4	17	300	615
3	615	6	17	300	615
4	940	8	17	512	940
5	940	6	17	512	940
6	615	4	17	-1	615
7	462	8	17	256	511
8	733	5	17	-1	733
9	900	15	17	-1	901
10	820	3	17	-1	820
11	855	5	17	-1	855
12	855	7	17	-1	855
13	306	8	17	128	319
14	733	7	17	-1	733
15	Reserved				
16	612	4	17	0	663
17	977	5	17	300	997
18	977	7	17	-1	997
19	1024	7	17	512	1023
20	733	5	17	300	732
21	733	7	17	300	732
22	733	5	17	300	733
23	306	4	17	0	336
24	612	4	17	305	663
25	612	2	17	300	612
26	614	4	17	-1	614
27	820	6	17	-1	820
28	977	5	17	-1	977
29	1218	15	36	-1	1218
30	1224	15	17	-1	1224
31	823	10	17	512	823
32	809	6	17	128	809
33	830	7	17	-1	830
34	830	10	17	-1	830
35	1024	5	17	-1	1024
36	1024	8	17	-1	1024
37	615	8	17	128	615
38	1024	8	26	-1	1024
39	925	9	17	-1	925
40	1024	9	17	-1	1023
41	918	15	17	-1	917
42	1024	15	17	-1	1023
43	823	10	34	-1	822
44	969	5	34	-1	968
45	969	7	34	-1	968
46	969	9	34	-1	968

3.5 QUADTEL BIOS CHECKPOINT CODES (For System integrator or Dealer)

During the Power On Seft Test (POST), the BIOS signals a checkpoint by outputting a code to I/O address 80H. This code can be used to establish how far the BIOS executed through the power on sequence and what test is currently being performed. This is done to help to troubleshoot faulty system boards. You can purchase a CHECKPOINT CARD to perform the checkpoint function.

The following is a list of the checkpoint codes which are written before their respective tests:

POST Error Codes	
02	Flag test
04	Register test
06	System hardware initialization
08	Initialize chip set registers
0A	BIOS ROM checksum
0C	DMA page register test
0E	8254 timer test
10	8254 timer initialization
12	8237 DMA controller test
14	8237 DMA initialization
16	Initialize 8259/Reset coprocessor
18	8259 interrupt controller test
1A	Memory refresh test
1C	Base 64KB address test
1E	Base 64KB memory test
20	Base 64KB test (upper 16 bits)
22	8742 Keyboard self test
24	MC146818 CMOS test
26	Start first protected mode test
28	Memory Sizing test
2A	Autosize memory chips
2C	Chip interleave enable test
2E	First protected mode test exit
30	Unexpected shutdown
32	System board memory size
34	Relocate shadow ram if configured
36	Configure EMS system
38	Configure wait states

Continuation of Post Error Codes...

3A	Retest 64K base ram
3C	CPU speed calculation
3E	Get switches from 8042
40	Configure CPU speed
42	Initialize interrupt vectors
44	Verify video configuration
46	Initialize video system
48	Test unexpected interrupts
4A	Start second protected mode test
4C	Verify LDT instruction
4E	Verify TR instruction
50	Verify LSL instruction
52	Verify LAR instruction
54	Verify VERR instruction
56	Unexpected exception
58	Address line 20 test
5A	Keyboard ready test
5C	Determine AT or XT keyboard
5E	Start third protected mode test
60	Base memory test
62	Base memory address test
64	Shadow memory test
66	Extended memory test
68	Extended address test
6A	Determine memory size
6C	Display error messages
6E	Copy BIOS to shadow memory
70	8254 clock test
72	MC146818 real time clock test
74	Keyboard struck key test
76	Initialize hardware interrupt vectors
78	Math Coprocessor test
7A	Determine COM ports available
7C	Determine LPT ports available
7E	Initialize BIOS data area
80	Determine floppy/fixed controller
82	Floppy disk test
84	Fixed disk test
86	External ROM scan
88	System key lock test
8A	Wait for F1 key pressed
8C	Final system initialization
8E	Interrupt 19 boot loader
B0	Unexpected interrupt

All numeric entries are hexadecimal.

If error 1C, 1E, of 20 (base 64K RAM error) is detected by the BIOS, an additional word of information will be displayed to the screen and to port 80H. This word will reflect the bit or address line which failed. For example, if "1C 0002" is displayed, address line 1 (represented by bit one) has failed. If "20 1020" is displayed, then data bits 12 and 5 have failed in the upper 16 bits. Note that error 20 can only occur on 386 systems because they have a 32 rather than a 16 bit bus.

The same information will be output to port 80H. The checkpoint code will be output followed by a delay, the high order byte, another delay, and then the low order byte of the error. This will be repeated continuously.

3.6 AMI 286 SETUP

SETUP program lets you specify your system's configuration of diskette drives, hard disk drives, video display, memory, and date and time. The SETUP program is built-in BIOS -- Diskette is not necessary for the SETUP.

NOTE
The following procedure is assuming that your system has the AMI 286 BIOS installed. If your system has had a different BIOS installed, these procedures will not work.

To run SETUP, follow these procedures:

1. Simultaneously press the CTRL, ALT, and DEL keys to reboot the system (or turn the power on if the system is off). In a moment, the following message will appear on the screen:

<u>Press [DEL] key to run SETUP utility</u>

2. Press the DEL key (the one that shares the decimal point at the bottom of the numeric keypad).

3. Follow the instructions to continue until the setup is finished.

3.7 AMI BIOS HARD DISK DRIVE TABLE

Type	Cylinders	Heads	Write Precomp	Landing Zone	Capacity
1	306	4	128	305	10MB
2	615	4	300	615	20
3	615	6	300	615	31
4	940	8	512	914	62
5	940	6	512	940	47
6	615	4	FFFF	615	20
7	462	8	256	511	31
8	733	5	FFFF	733	30
9	900	15	FFFF	901	112
10	820	3	FFFF	820	20
11	855	5	FFFF	855	35
12	855	7	FFFF	855	50
13	306	8	128	319	20
14	733	7	FFFF	733	43
15	000	0	0000	000	00
16	612	4	0000	663	20
17	977	5	300	997	41
18	977	7	FFFF	997	57
19	1027	7	512	1023	60
20	733	5	300	732	30
21	733	7	300	732	43
22	733	5	300	733	30
23	306	4	0000	336	10
24	925	7	0000	925	54
25	925	9	FFFF	925	69
26	754	7	754	754	44
27	754	11	FFFF	754	69
28	699	7	256	699	41
29	823	10	FFFF	823	68
30	918	7	918	918	53
31	1024	11	FFFF	1024	94
32	1024	15	FFFF	1024	128
33	1024	5	1024	1024	43
34	612	2	128	612	10
35	1024	9	FFFF	1024	77
36	1024	8	512	1024	68
37	615	8	128	615	41
38	987	3	987	987	25
39	987	7	987	987	57
40	820	6	820	820	41
41	977	5	977	977	41
42	981	5	981	981	41
43	830	7	512	830	48
44	830	10	FFFF	830	69
45	917	15	FFFF	918	114
46	1224	15	FFFF	1223	152
47	USER TYPE				

2.8 AWARD 286 SETUP

The SETUP program lets you specify your system's configuration of diskette drives, hard disk drives, video display, memory, and date and time. The SETUP program is built-in BIOS --you don't need a diskette to do the SETUP.

NOTE
The following procedure is assuming that your system has the Award 286 Modular bios installed. If your system has had a different BIOS installed, the SETUP procedure will not work.

To run SETUP, simultaneously press the CTRL, ALT and ESC keys after power on self test (POST) go through. The SETUP screen appears on your display (see following page). Follow the instructions to continue until the setup is finished.

AWARD SOFTWARE CMOS SETUP

		CYLS	HEADS	SECTORS	PRECOME
DATE (MM/DD/YY)	8/1/90				
TIME (HH:MM:SS)	11:06:33				
DISKETTE 1	1.2M				
DISKETTE 2	360K				
DISK 1	22	733	5	17	300
DISK 2	NONE				
VIDEO	EGA				
BASE MEMORY	512				
EXTENDED MEMORY	0				
ERROR HALT	NO DISK ERROR HALT				
SPEED SELECT	NO CHANGE				

↑ ↓ moves between items, ← → selects values
F10 records changes, F1 exits, F2 for color toggle

3.9 AWARD BIOS HARD DISK DRIVE TABLE

Type	Cylinders	Heads	Write Precomp	Landing Zone	Specified Disk
1	306	4	128	305	
2	615	4	300	615	Seagate 225
3	615	6	300	615	
4	940	8	512	940	
5	940	6	512	940	
6	615	4	0	615	
7	462	8	256	511	
8	733	5	0	733	Seagate 4038
9	900	15	0	901	
10	820	3	0	820	
11	855	5	0	855	
12	855	7	0	855	
13	306	8	128	319	Seagate 225
14	733	7	0	733	
15	Reserved				
16	612	4	0	663	
17	997	5	300	997	
18	997	7	0	997	
19	1024	7	512	1023	
20	733	5	300	732	
21	733	7	300	732	
22	733	5	300	733	Seagate 4038
23	306	4	0	336	
24	977	5	0		
25	1024	9	0	1023	Seagate 4096
26	1224	7	0	1223	Maxtor 2085
27	1224	11	0	1223	Maxtor 2140
28	1224	15	0	1223	Maxtor 2190
29	1024	8	0	1023	Maxtor 1085
30	1024	11	0	1023	Maxtor 1105
31	918	11	0	1023	Maxtor 1170
32	925	9	0	926	CDC9415
33	1024	10	0	1023	Generic 10hd
34	1024	12	0	1023	Generic 12hd
35	1024	13	0	1023	Generic 13hd
36	1024	14	0	1023	Generic 14hd
37	1024	2	0	1023	Generic 2hd
38	1024	16	0	1023	Generic 16hd
39	918	15	0	1023	Maxtor 1140
40	820	6	0		
41	809	6	0		
42	615	4	0		CMS-K40
43	1024	5	0	1023	Miniscribe 6085
44	1024	8	0	1024	
45	820	6	0		
46	1024	9	0		
47	615	6	0		

SECTION 4.0

I/O ADDRESS MAP AND I/O CHANNEL CONNECTORS

I/O ADDRESS MAP

Hex Range	Device
000-01F	DMA Controller 1,8237A-5
020-03F	Interrupt controller 1,8259A, Master
040-05F	Timer, 8254
060-06F	8042 (keyboard)
070-07F	Real-time clock, non-maskable interrupt (NMI) mask
080-09F	DMA page register, 74LS612
0A0-0BF	Interrupt controller 2, 8259A
0C0-0DF	DMA controller 2, 8237A-5
0F0	Clear Math Coprocessor Busy
0F1	Reset Math Coprocessor
0F8-0FF	Math Coprocessor
1F0-1F8	Fixed disk
200-207	Game I/O
278-27F	Parallel printer port 2
2F8-2FF	Serial port 2
300-31F	Prototype card
360-36F	Reserved
378-37F	Parallel printer port 1
380-38F	SDLC, bisynchronous 2
3A0-3AF	Bisynchronous 1
3B0-3BF	Monochrome display and printer adapter
3C0-3CF	Reserved
3D0-3DF	Color/graphics monitor adapter
3F0-3F7	Diskette controller
3F8-3FF	Serial port 1

I/O CHANNEL CONNECTORS

A SIDE, (SLOT J1 - J6)

I/O Pin	Signal Name	Input Output
A1	-I/O CH CK	Input
A2	SD7	Input/Output
A3	SD6	Input/Output
A4	SD5	Input/Output
A5	SD4	Input/Output
A6	SD3	Input/Output
A7	SD2	Input/Output
A8	SD1	Input/Output
A9	SD0	Input/Output
A10	-I/O CH RDY	Input
A11	AEN	Output
A12	SA19	Input/Output
A13	SA18	Input/Output
A14	SA17	Input/Output
A15	SA16	Input/Output
A16	SA15	Input/Output
A17	SA14	Input/Output
A18	SA13	Input/Output
A19	SA12	Input/Output
A20	SA11	Input/Output
A21	SA10	Input/Output
A22	SA9	Input/Output
A23	SA8	Input/Output
A24	SA7	Input/Output
A25	SA6	Input/Output
A26	SA5	Input/Output
A27	SA4	Input/Output
A28	SA3	Input/Output
A29	SA2	Input/Output
A30	SA1	Input/Output
A31	SA0	Input/Output
		Input/Output

B SIDE, (SLOT J1 - J6)

I/O Pin	Signal Name	Input Output
B1	GND	Ground
B2	RESET DRV	Output
B3	+5Vdc	Power
B4	IRQ9	Input
B5	-5Vdc	Power
B6	DRQ2	Input
B7	-12Vdc	Power
B8	0WS	Input
B9	+12Vdc	Power
B10	GND	Ground
B11	-SMEMW	Output
B12	-SMEMR	Output
B13	-IOW	Input/Output
B14	-IOR	Input/Output
B15	-DACK3	Output
B16	DRQ3	Input
B17	-DACK1	Output
B18	DRQ1	Input
B19	-REFRESH	Input/Output
B20	CLK	Output
B21	IRQ7	Input
B22	IRQ6	Input
B23	IRQ5	Input
B24	IRQ4	Input
B25	IRQ3	Input
B26	-DACK2	Output
B27	T/C	Output
B28	BALE	Output
B29	+5Vdc	Power
B30	OSC	Output
B31	GND	Ground

C SIDE, (SLOT J7 - J12)

I/O Pin	Signal Name	Input Output
C1	SBHE	Input/Output
C2	LA23	Input/Output
C3	LA22	Input/Output
C4	LA21	Input/Output
C5	LA20	Input/Output
C6	LA19	Input/Output
C7	LA18	Input/Output
C8	LA17	Input/Output
C9	-MEMR	Input/Output
C10	-MEMW	Input/Output
C11	SD08	Input/Output
C12	SD09	Input/Output
C13	SD10	Input/Output
C14	SD11	Input/Output
C15	SD12	Input/Output
C16	SD13	Input/Output
C17	SD14	Input/Output
C18	SD15	Input/Output

D SIDE, (SLOT J7 - J12)

I/O Pin	Signal Name	Input Output
D1	-MEM CS16	Input
D2	-I/O CS16	Input
D3	IRQ10	Input
D4	IRQ11	Input
D5	IRQ12	Input
D6	IRQ15	Input
D7	IRQ14	Input
D8	-DACK 0	Output
D9	DRQ 0	Input
D10	-DACK 5	Output
D11	DRQ 5	Input
D12	-DACK 6	Output
D13	DRQ 6	Input
D14	-DACK 7	Output
D15	DRQ 7	Input
D16	+5Vdc	Power
D17	-MASTER	Input
D18	GND	Ground

CMOS RAM Address Map

Addresses	Description
00-0D	*Real-time clock information
0E	*Diagnostic status byte
0F	*Shutdown status byte
10	Diskette drive type byte, drives A and B
11	Reserved
12	Fixed disk type byte, drives C and D
13	Reserved
14	Equipment byte
15	Low base memory byte
16	High base memory byte
17	Low expansion memory byte
18	High expansion memory byte
19-2D	Reserved
2E-2F	2-byte CMOS checksum
30	*Low expansion memory byte
31	*High expansion memory byte
32	*Date century byte
33	*Information flags (set during power on)
34-3F	Reserved

Real-Time Clock Information
(Addresses 00-0D)

Byte	Function	Address
0	Seconds	00
1	Second alarm	01
2	Minutes	02
3	Minute alarm	03
4	Hours	04
5	Hours alarm	05
6	Day of week	06
7	Date of month	07
8	Month	08
9	Year	09
10	Status register A	0A
11	Status register B	0B
12	Status register C	0C
13	Status register D	0D

SECTION 5.0

DMA CHANNELS, SYSTEM INTERRUPTS, AND SYSTEM TIMER
DMA CHANNELS

Channel	Function
0	Spare (8-bit transfer)
1	SDLC (8-bit transfer)
2	Floppy disk (8-bit transfer)
3	Spare (8-bit transfer)
4	Cascade for DMA controller 1
5	Spare (16-bit transfer)
6	Spare (16-bit transfer)
7	Spare (16-bit transfer)

DMA CONTROLLER REGISTERS

Hex Address	Command Codes
0C0	CH0 base and current address
0C2	CH0 base and current word count
0C4	CH1 base and current address
0C6	CH1 base and current word count
0C8	CH2 base and current address
0CA	CH2 base and current word count
0CC	CH3 base and current address
0CE	CH3 base and current word count
0D0	Read status register/Write command register
0D2	Write mode register
0D4	Read temporary register/Write command register
0D6	Write mode register
0D8	Clear byte pointer flip-flop
0DA	Read status register/Write command register
0DC	Write mode register
0DE	Write all mask register bus

PAGE REGISTER ADDRESSES

Page Register	I/O Address
DMA Channel 0	0087
DMA Channel 1	0083
DMA Channel 2	0081
DMA Channel 3	0082
DMA Channel 5	008B
DMA Channel 6	0089
DMA Channel 7	008A
Refresh	008F

INTERRUPTS

Level	Function
0	System timer output 0
1	Keyboard output buffer full
2	Interrupt from Controller 2 (levels 8-15)
3	Serial port 2
4	Serial port 1
5	Parallel port 2
6	Diskette controller
7	Parallel port
8	Real-time clock
9	Software redirected to INT 0AH
10	Reserved
11	Reserved
12	Reserved
13	80287
14	Hard Disk Controller
15	Reserved

TIMERS

Channel	Function
0	System timer
1	Refresh request generator
2	Tone generation for speaker

APPENDIX

QUADTEL
Extended BIOS Software

The Extended BIOS Software System is a collection of utility programs which work in conjunction with the system BIOS to provide additional functions to the AT compatible system.

To display the Extended BIOS Software main window, press [Ctrl][Alt][S]. The system will re-boot on exit from the Extended BIOS Software System.

After [Ctrl][Alt][S] is pressed, this following window will be displayed:

```
┌─────────────────────────────────────┐
│                                      │
│        Extended BIOS Software        │
│     Copyright 1989, Quadtel Corp.    │
│                                      │
├─────────────────────────────────────┤
│   Setup                              │
│   Extended BIOS Features             │
│   System Information                 │
│   System Security                    │
│   Park Fixed Disks                   │
│   Format Fixed Disk                  │
├─────────────────────────────────────┤
│   ↑↓ Move   Enter Select   Esc Exit  │
└─────────────────────────────────────┘
```

The main window above will also be displayed if **F2** is pressed after a power-on self test (POST) error is displayed. Use the arrow keys to select the utility and then press **Enter**.

1.0 Setup

Please refer to section 3.3.

2.0 Extended BIOS Features

The Extended BIOS Features offers a number of functions to the BIOS which normally require seperate utility programs. If the Extended BIOS Features are selected, the menu below will be displayed:

```
┌─────────────────────────────────────────────────────────────────────┐
│          Extended BIOS Features, Copyright 1989, Quadtel Corp.        │
│                                                                       │
│  Auto-park Disk: [No]      Keyboard Click:      [No    ]              │
│     Quick Boot:  [No]      Keyboard Delay:      [3/4 Sec ]            │
│  Screen Saver:  [Disabled] Keyboard Rate:       [22/Sec ]            │
│                            Numlock Boot State:  [Auto    ]            │
├─────────────────────────────────────────────────────────────────────┤
│  ↑↓Move        F5  Previous Value    F9  Auto Configuration          │
│  Esc Exit      F6  Next Value        F10 Save Configuration          │
└─────────────────────────────────────────────────────────────────────┘
```

Use the arrow or tab keys to select the item to be changed. When the item is selected, press **F5** to select the previous value and **F6** to select the next value.

Automatic configuration can be accomplished by pressing **F9** (same as SETUP) . Pressing **F9** will cause the system to select default values for all of the options presented by the window.

After you have made your selections, press **F10** to save the current configuration. The configuration is not saved until **F10** is pressed. Press **Esc** to exit from this window. If you have not saved the changes you have made, you can do so at this time.

Features Configuration Information

This section describes in more detail the items which can be changed via the Features window.

Auto-park disk

This option selects whether the system BIOS should automatically park the fixed disk drive or not. If the option is enabled, after several senconds of inactivity, the system BIOS will park the fixed disk drive heads. Parking the heads helps save the disk media when the system is powered on or when the system is moved. This option can be incompatible with some types of fixed disk drives which are not BIOS compatible and could cause problems with programs which do not utilize the BIOS for fixed disk input and output. If you suspect that you have one of these drives or programs or have a problem after selecting the Auto-park Disk, discontinue using the option.

Quick boot

When this option is selected, the system BIOS will bypass the floppy disk drive tests, memory tests, and floppy disk drive boot on power-on or soft reset. This will cause the system to initialize and boot from the fixed disk in only a few seconds.

Note that if this option is selected, memory will not be tested and the floppy disk drive types defined in the SETUP window must be correct. In addition, you cannot boot from floppy disk drive A. If you require booting from floppy disk drive A, do not select the Quick Boot option.

Screen Saver

This option provided a way of blanking-out the screen after a specified period of system inactivity. You can select 10 minutes, 30 minutes, 60 minutes or disable the option. If no keyboard activity is detected by the BIOS during the duration selected, the screen will be blanked-out. When you return to work on your system and the screen is blanked-out, press any key on the keyboard and the screen will be redisplayed.

Screen Saver will prevent the data displayed on the screen from "burning" the monitor. On many monitors, if the same data is displayed on the screen for an extended period of time, it may be permanently burned into the screen.

WARNING: Some programs do not use the BIOS for keyboard handling. The most notable among these is Microsoft Windows. Do not use the Screen Saver if you are using any of these programs. In the event that you use Screen Saver with Windows or another similar program, the screen will blank-out after the selected duration of time regardless you have pressed a key or not. In addition, pressing a key after the screen has blanked-out will not bring the screen back. However, if you could exit from the program, the screen will return.

Keyboard click

This option, if selected, will cause the BIOS to click through the system speaker each time a key is pressed. This provides an audible feedback which indicates that a key has been pressed.

Keyboard delay

The keyboard delay is the amount of time which will elapse after a key is depressed before the key starts to repeat. The smaller the time which is selected, the sooner the key will start to repeat. You may select 1/4 second, 1/2 second, 3/4 second, or 1 second.

Keyboard rate

This option defines the rate at which the keybaord repeats while a key is depressed. The number you select is the number of keys per second that the keyboard will generate. The following values may be selected; 2,6,10,13,18,22,27, or 30.

Numlock boot state

This option defines how the NumLock key should be defined by the BIOS on power up or soft reset. The NumLock key on the keyboard is used to determine whether the cursor keys or the numeric keys are active on the keypad. Normally the BIOS will set the NumLock (select the numeric keys) if a 101 or 102 key keyboard is detected on power up. If an 84 key keyboard is detected the NumLock will be turned off (cursor keys selected). If Auto is selected for the NumLock Boot State, the BIOS will continue to operate in this way. You may also select On to always select the numeric keys regardless of the keyboard, or Off to always select the cursor movement keys.

3.0 System Information

The Extended BIOS System Information window will display information about what is installed in your system. Selecting this option from the main menu will cause the following window to be displayed:

```
┌─────────────────────────────────────────────────────────────┐
│      System Information,  Copyright 1989, Quadtel Corp.       │
├─────────────────────────────────────────────────────────────┤
│  Processor: 80286              LPT1 Address: 0378H            │
│  Coprocessor: None             LPT2 Address: Unused           │
│                                LPT3 Address: Unused           │
│  BIOS ID: 0011A00003                                          │
│  BIOS Revision: 03.05.01       COM1 Address: 03F8H            │
│                                COM2 Address: 02F8H            │
│  Programmable Memory: 0K       COM3 Address: Unused           │
│  Other Memory: 1024K           COM4 Address: Unused           │
├─────────────────────────────────────────────────────────────┤
│                         Esc Exit                              │
└─────────────────────────────────────────────────────────────┘
```

The **Processor** indicator tells what type of processor the BIOS has detected in your system. The **Coprocessor** indicator will show whether or not you have a math coprocessor installed, and if so, what type it is. The **LPT** and **COM** indicators will show which communication ports are installed in your system.

The **BIOS ID** is a special code which tells a number of items about your system BIOS. The **BIOS Revision** will show what version of the system BIOS you are using.

Programmable Memory is the amount of memory which is controlled by the BIOS. This is memory which the BIOS programs on power-on or soft reset. **Other Memory** is memory which has been detected by the BIOS which is not under BIOS control. The sum of these two indicators is the total of your system memory, extended memory, and shadow memory. It will not include any **EMS** or other types of memory in your system.

After you have reviewed the items in the window, press **Esc** to exit.

4.0 System Security

System Security is provided to restrict access to your computer system. If you want to use system security, select this option and the following window will be displayed:

```
┌─────────────────────────────────────────┐
│         BIOS Password Control            │
│      Copyright 1989, Quadtel Corp.       │
├─────────────────────────────────────────┤
│    Enter new password:   [    ]          │
│    Validate new password:[    ]          │
├─────────────────────────────────────────┤
│  F1 Help    Enter Accept    Esc Exit     │
└─────────────────────────────────────────┘
```

Enter up to eight digits to use for a system password. After you have entered them, type them again for validation. The system requires that you enter the exact same sequence of digits both times. If you want to remove your password, simply press Enter twice without entering any password digits.

Be sure to remember your password! Use a password value which is easy for you to remember (e.g. your birth date, etc).

Using System Security-

Once a valid password has been entered, the BIOS will request the password each time the system is powered on or soft reset. The following window will be displayed:

```
┌─────────────────────────────────────────┐
│              System Login                │
│      Copyright 1989, Quadtel Corp.       │
├─────────────────────────────────────────┤
│      Enter password:  [    ]             │
├─────────────────────────────────────────┤
│              Enter Accept                │
└─────────────────────────────────────────┘
```

You must enter the same sequence of digits you entered to set the password. The BIOS will also request the password before you can enter the Extended BIOS System. This will prevent unauthorized access to the System Security control.

If you fail to enter the correct password the following window will be displayed:

Notice!
Invalid Password.
Press<any key>

After three attempts, if you have not successfully entered the password, this window will be displayed.

!! SYSTEM DISABLED !!
(011E03)

The system has been halted at this time and you must power down to retry entering a password.

Unlocking Passwords

QUADTEL provides a program to authorized manufacturers and OEM's for unlocking passwords. Therefore, if you lose your password, please give the code displayed in the SYSTEM DISABLED window to your dealer or manufacturer. They will give you back a password that will not be the same as the one orginally entered. However, it will work as well as the original.

Soft Key Lock

Soft Key Lock is provided in conjunction with password security so that the system can be temporarily locked from access. This is useful if you want to leave your system on and unattended for a short period of time and do not want anyone else to be able to access your system.

To lock your system, press [Ctrl][Alt][L]. When this key sequence is pressed, the screen will blank-out and the system will beep once. While the system is locked, the LED lights on the keyboard will blink. This is to remind you that your system is on and locked when you return.

To unlock the system, press [Ctrl][Alt][L] again. At this time the system will beep twice and wait for you to enter your password (no prompt will be displayed and the screen will remain blank-out). Enter your password digits followed by Enter. If you enter your password correctly, the screen will reappear and the system will be reactivated.

If you enter your password incorrectly, the sytem will beep once again and you will be returned to locked mode. Press [Ctrl][Alt][L] again to re-enter your password.

Some programs (like Microsoft Windows) bypass the BIOS for keyboard handling. **Soft Key Lock** will not work with these programs.

5.0 Park Fixed Disks

The Park Fixed Disk function will prepare the fixed disks for relocation. The fixed disk heads will be placed over the diagnostic cylinder so that vibrations will not cause errors on the usable media.

6.0 Format Fixed Disk

When the Fixed Disk Format system is selected, the following menu will be displayed:

```
+---------------------------------------+
|          Format Fixed Disk            |
|     Copyright 1989/90, Quadtel Corp.  |
+---------------------------------------+
|            Fixed Disk 0               |
|         Disk 1:  Not Installed        |
+---------------------------------------+
| ↑↓Move   Enter Select    Esc Exit     |
+---------------------------------------+
```

Use the arrow keys to choose the fixed disk to be formatted or analyzed and then press Enter to select it. Only fixed disk's which are present in the system may be selected. After you have made your choice, this warning will be displayed:

```
+---------------------------------------+
|              Warning !                |
+---------------------------------------+
| You have selected fixed disk format.  |
| This will DESTROY all data on the     |
| selected drive.                       |
|                                       |
+---------------------------------------+
|          Continue ?  Y/ [N]           |
+---------------------------------------+
```

Note that although the window above indicates that your data will be destroyed, this will not happen until you actually select a format or analyze option from the window below. If you do not intend to format or analyze your fixed disk, press N at this time; otherwise, press Y to continue.

```
┌─────────────────────────────────────────────────────────────────────┐
│                                                                       │
│   Format Fixed Disk  V1.06 Copyright 1989,90 Quadtel Corporation.    │
│  ─────────────────────────────────────────────────────────────────── │
│   Drive: 0          Heads: 4         Cylinders: 615                   │
│  ─────────────────────────────────────────────────────────────────── │
│   Cyl   Hd  │  Cyl   Hd  │  Cyl   Hd  │  Cyl   Hd  │  Cyl   Hd        │
│             │            │            │            │                  │
│             │            │            │            │                  │
│             │            │            │            │                  │
│             │            │            │            │                  │
│  ─────────────────────────────────────────────────────────────────── │
│   Interleave: [ 3 ]  │ Insert: Cyl [  0  ]  Hd [ 0  ]  │  Bad: 0     │
│  ─────────────────────────────────────────────────────────────────── │
│   ↑↓ Move        Ins/Del Bad track     F5 Scan for bad tracks        │
│                  F2 Clear table        F6 Analyze Surface            │
│                  F3 Print table        F7 Format Unformatted Drive   │
│   Esc Exit       F4 Set Interleave     F8 Format Preformatted Drive  │
│                                                                       │
└─────────────────────────────────────────────────────────────────────┘
```

The bad track table

The center portion of the window shown above contains the list of bad tracks which are currently recorded. This list is central to the processing of most of the format functions.

Bad tracks are areas of the fixed disk which cannot store data properly. A list of the bad tracks detected by the drive manufacturer are usually provided with the fixed disk drive when it is purchased. Some of these areas may work intermittently, but not be dependable for storing data. The fixed disk format system will format these tracks with a special attribute so that other programs (like DOS FORMAT) will not attempt to use these areas on the disk.

The bad track list is modified automatically by the Scan bad tracks command, the Analyze Surface command, and the Format Preformatted drive command. Each of these functions will add bad tracks they detect during their processing to the list above.

To add a bad track to the table manually, press **Ins**. Use the arrow keys or enter to select between cylinder and head fields. After the cylinder and head have been entered, press **F10** or **Enter** and the new entry will be added to the table. If an invalid head or cylinder value is entered, this window will be displayed:

```
┌─────────────────────────────┐
│          Notice !           │
├─────────────────────────────┤
│                             │
│       Invalid value.        │
│                             │
├─────────────────────────────┤
│       Press <any key>       │
└─────────────────────────────┘
```

To delete a bad track, use the cursor keys to position the cursor over the bad track entry to be deleted and then press the **[Del]** key. You will not be asked to verify the deletion, so use this function with care.

To clear the bad track table, press **F2** and all the entries from the bad track table will be cleared.

To print the bad track table, press **F3**. Be sure that a printer is attached and ready before initiating printing. The result of the print will be a table like the one below:

Cyl	Hd	Cyl	Hd	Cyl	Hd	Cyl	Hd	Cyl	Hd
12	1	22	4	23	5	35	0	43	4
55	3	56	4	66	2				

You can search the disk for all of the existing bad tracks if the drive has already been formatted. This is done by selecting **F5** (scan for bad tracks). This will cause the system to quickly test each track on the fixed disk to determine if it has already been formatted as bad. Each track found to be bad will be added to the list if it is not in the list already.

Setting interleave

Press **F4** to set the interleave. This is the value used by the format operation to interleave the fixed disk tracks. Consult your system documentation to choose an appropriate interleave. If you do not set the interleave manually, the default value of three (3) will be used. Note that the interleave set is the value which will be used to format, not necessarily the current value of your fixed disk.

Analyzing the fixed disk surface

If you do not need to reformat the entire fixed disk, but want to perform a thorough test of the media to detect any bad or marginal areas, select **F6** to analyze the surface. *This will perform a destructive analysis of the fixed disk media (all data on the fixed disk will be lost).*

Any bad tracks found during the analysis will be added to the bad track table automatically. As the bad tracks are found, they will be reformatted as bad so that a subsequent DOS FORMAT operation will not attempt to use these areas on the disk.

Formatting a new fixed disk drive

After installing a new fixed disk drive, you should enter the bad track information provided by the manufacturer into the bad track table (see above). After this has been done, press **F7**. This option is specifically for formatting a fixed disk drive which was previously unformatted. It will perform the following operations:

1. Each track of the fixed disk will be reformatted using the current interleave.
2. Each track in the bad track table will be reformatted as bad so that it cannot be used.

When the format operation is complete, it is usually a good idea to run a surface analysis to verify that no additional bad tracks can be found.

Formatting an already formatted fixed disk

If your fixed disk was formatted previously, you can press **F8** to select the option to automatically format pre-formatted drives. This will cause the following operations to take place:

1. The drive will be scanned for tracks which have already been marked as bad and these will be added to the bad track table.
2. Each track of the fixed disk will be re-formatted using the current interleave.
3. Each track in the bad track table will be re-formatted as bad so that it cannot be used.
4. A surface analysis will be performed on the media and any additional bad tracks found will be re-formatted as bad and added to the list.

Using this option is equivalent to performing a scan for bad tracks operation **F5**, followed by a format unformatted drive operation **F7**, followed by an analyze fixed disk operation **F6**. The only difference is that all three are done automatically and that the surface analysis performed here is not as thorough or as time consuming as that performed when **F6** is pressed.

If the bad track table from the manufacturer is available when the re-format of the drive is done, it is a good idea to enter that map before this operation is performed.

This will ensure that all of the tracks in that list are re-formatted as bad regardless of her or not they are found by the scan for bad track part of this operation.

After format is complete

The Fixed Disk Format commands perform low level format operations on the fixed disk drives. After these operation are complete, you should run the DOS FDISK command followed by the DOS FORMATcommand to prepare the media for use under DOS (or the corresponding utilities for another operation system). See your DOS manual for more information.

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