

FASSTCOM COMPUTERS LIMITED

**FS SERIES COMPUTER SYSTEMS
TECHNICAL MANUAL**

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Revision 3

FASSTCOM Technical Manual

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June 30, 1994

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Environmental Considerations

Temperature:

In general, a *FASSTCOM* system may be installed in any normal office environment where air temperature is held between 10° C (50° F) and 32° C (90° F) and where relative humidity is held between 20% and 80% (35% to 65% recommended).

Power:

FASSTCOM systems can use either 115Vac 60 Hz or 230Vac 50 Hz AC voltage. Power should be "clean" with good grounding. A surge suppressor or line conditioner should be used to protect the system unit from voltage fluctuation problems. In areas where lightning is common, verify that the power supply circuitry in the building is adequately protected.

Static:

Static electrical discharges at or near the system unit—or any item connected directly to the system unit—may cause loss of data and/or damage to the system. Use low static carpeting or treat the carpeting under or near the system unit and terminals with antistatic products.

Terminal Wiring:

If you are replacing a Wang 2200 system, the wiring already in place to connect terminals will normally work properly. However, cables lengths over 60 m (200 ft) may require the use of signal amplifiers.

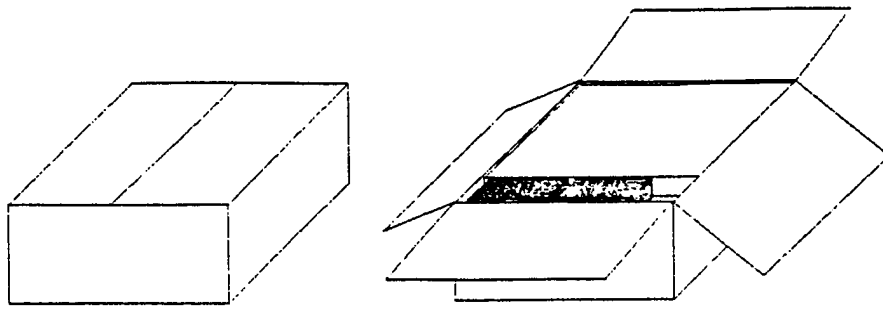
Access to Equipment:

Adequate physical access to all *FASSTCOM* equipment should be provided so that repair and maintenance tasks may be performed conveniently by the maintenance provider.

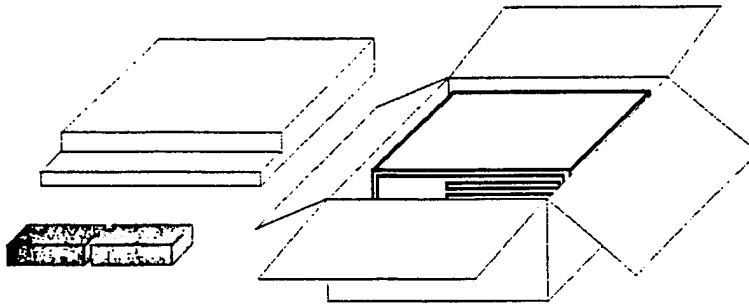
Ergonomics:

The physical placement of displays and keyboards, the lighting of work areas and the proper placement and adjustment of related furniture are important considerations with regard to user comfort and the successful installation of a system. However, these topics are beyond the scope of this manual.

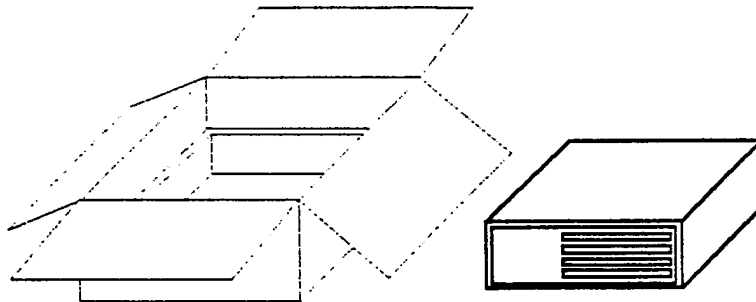
Unpacking and Assembly Instructions



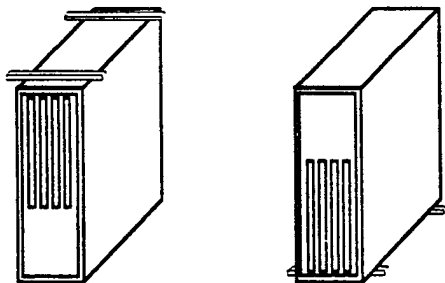
1. Place the shipping carton on its side and open it to expose the packing, accessory boxes and cables.



2. Remove the accessory boxes and cables and lift out the top packing material.



3. Lift out the system unit and place it on its side on a soft surface that will not scratch the paint.



Warning!
Do not allow the system chassis to fall over. This may result in damage to internal components—especially the hard disk drive(s).

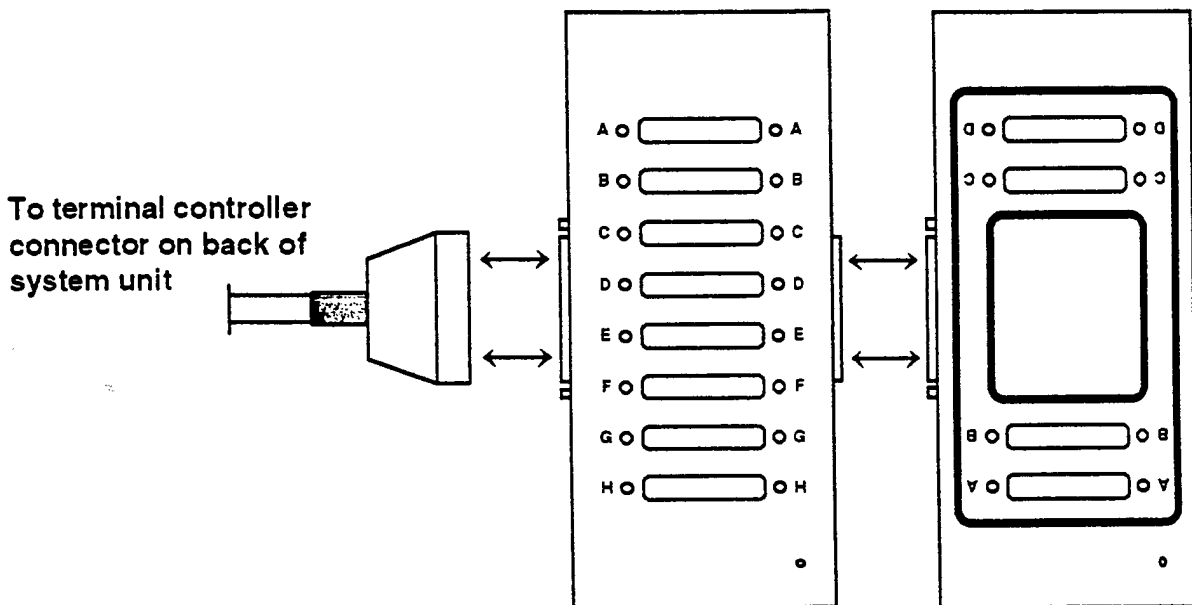
4. After the two system unit feet (stabilizers) have been located, turn the system unit upside-down and attach the feet with four thumb screws. Turn the system upright on a firm and stable surface.

5. Verify that the power supply input voltage switch is set to the correct voltage—115Vac or 230Vac. A small recessed switch next to the power cord connector on the back of the system unit should be set for the correct supply voltage.



6. Locate and unpack the 8-port terminal interface box(es) and the 4-port printer interface box(es). These boxes connect together using 37 pin connectors on the sides of each box. Locate the terminal interface cable. It has 37 pin connectors on each end and it is about 2/3m (24") in length. Note that one end of the cable has a male connector (gold pins showing) and the other end has a female connector (holes showing).

Minimum Terminal Controller and Interface Box Connection to Boot the System



7. Plug the male end of the terminal interface cable from terminal controller connector (on back of the system unit) into the female connector on the first terminal box. Plug the printer interface box into the other side of the terminal interface box.

WARNING !

Do not plug or unplug terminal or printer interface boxes while the system is powered on. This may result in damage to the boxes or the controller. In any case, an interface box that is not connected when the system is booted will not be operational until the system is powered down and up again.

8. The connectors (ports) on the top of each interface box are designated with a letter as follows:

On the first terminal interface box:

- A = terminal #1
- B = terminal #2
- etc.
- H = terminal #8

On the second terminal interface box:

- A = terminal #9
- B = terminal #10
- etc.
- H = terminal #16

The maximum number of terminal interface boxes which may be attached to the system unit depends on the model of *FASSTCOM* system.

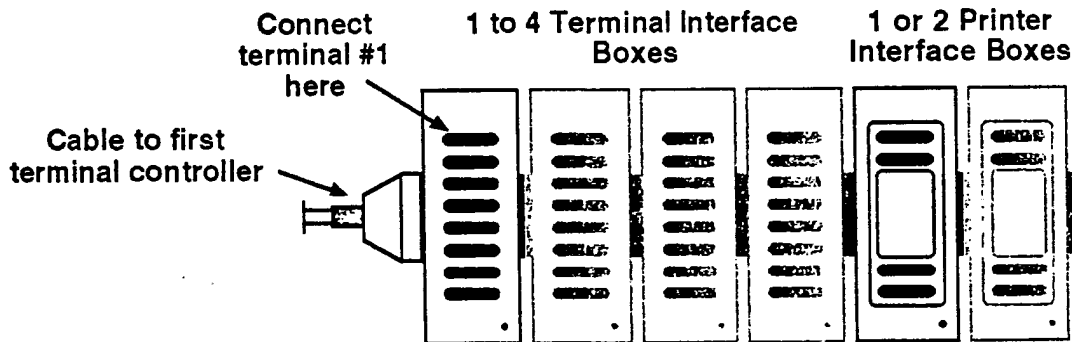
On the first printer interface box:

- A = printer 215
- B = printer 216
- C = printer 217
- D = printer 218

On the second printer interface box:

- A = printer 211
- B = printer 212
- C = printer 213
- D = printer 214

Maximum Terminal Controller and Interface Box Connection



9. A maximum of 4 terminal interface boxes may be attached to a single terminal controller cable. A maximum of 2 printer interface boxes may be attached. They must both be attached to the first terminal controller but they must be the last boxes attached.

10. Plug the power cord into the system unit and into a power outlet. You are now ready to start up the system. Refer to the next section for system boot instructions.

System Start-up Procedure—Booting FICE™

Before starting the *FASSTCOM* system for the first time, be sure that a cable from the first (or only) terminal controller connector on the back of the system unit (DB 37 male connector—37 pins) is properly screwed in place and that the other end is screwed into at least one terminal interface box. Make sure that the terminal which will be used to boot the system is connected to the connector labeled "A" on the first terminal interface box—the interface box connected directly to the cable from the system unit. This is terminal# 1 and it is the only terminal that will be active immediately after the system is turned on.

Booting FICE:

When turned on, the system unit will perform a series of silent self tests, test each floppy disk drive installed and emit a single beep from the internal speaker. After the beep, the boot card takes control of the system and the following message will appear on the screen of terminal #1:

```
FASSTCOM COMPUTERS LIMITED      REV n.m (DATA MEMORY xxxxxx KB)
PRESS RESET
```

After <SHIFT+RESET> is pressed, the following will appear:

```
KEY SF?
```

At this point you must indicate to the system which disk address should be used to load the FICE operating system. This may be done in 2 ways:

1. Press an SF KEY (Special Function Key) corresponding to a disk address and the system will immediately load FICE from the indicated address.
 - SF' 0 Load from disk address D11 (310)
 - SF' 1 Load from disk address D10 (B10)
 - SF' 2 Load from disk address D21 (320)
 - SF' 3 Load from disk address D20 (B20)
 - SF' 4 Load from disk address D31 (330)
 - SF' 5 Load from disk address D30 (B30)

Or:

2. Press SF' 15 to choose some other disk address.

Pressing SF' 15 will add a prompt to the screen requesting that you type in the disk address from which FICE is to be loaded.

```
KEY SF'? +FICE
DISK ADDRESS ?_
```

Type in any valid and available disk address and press <RETURN [ENTER]>.

```
KEY SF'? +FICE
DISK ADDRESS ?D23_
```

The boot card will then attempt to load the contents of a file named "+FICE" from the address selected by SF KEY or from the address typed in at the "DISK ADDRESS ?" prompt.

As FICE loads, a message will be displayed showing which release of FICE is loading.

```
LOADING: FASSTCOM INTERACTIVE COMPUTER ENVIRONMENT RELEASE z.zz
(c) Copyright, Fasstcom Computers Limited, 1993, 1994
```

If +FICE can't be found or an error occurs while loading the contents of +FICE, an error message will be displayed and the boot process will stop.

Sample error messages while loading FICE

```
* File Not Found *
PRESS RESET
```

```
* Drive Not Ready *
PRESS RESET
```

```
* Sector Not Found *
PRESS RESET
```

After an error has been displayed, pressing <SHIFT+RESET> will clear the screen and return to the KEY SF'? prompt.

If +FICE loads successfully, the next step is to load and run the system generation program.

Loading The FICE BASIC System Generation Utility - "+SYSGEN":

After FICE has been loaded successfully, the boot card transfers control of the hardware to FICE. The first thing FICE does is to load a program named "+SYSGEN" from the same address used to load FICE. +SYSGEN is a FICE BASIC program supplied by FASSTCOM which allows you to configure the system for terminals, partitions and other parameters.

If +SYSGEN can't be loaded, one of the following messages will be displayed:

If +SYSGEN is not found

```
DATE: mm/dd/yy TIME: hh:mm:ss
READY FICE (TERMINAL 001, PARTITION 001)
LOAD RUN/D23,"+SYSGEN"
      ^
ERROR D82: File Not Found
```

If +SYSGEN is not a valid FICE BASIC program

```
DATE: mm/dd/yy TIME: hh:mm:ss
READY FICE (TERMINAL 001, PARTITION 001)
^
ERROR D88: Wrong Record Type
```

If one of these errors occurs, a working version of +SYSGEN should be copied to the platter on which FICE is stored. Then, either reboot the system or manually load and run +SYSGEN.

After +SYSGEN is loaded and begins executing you will be presented with the standard +SYSGEN menu. Refer to the section in this manual on using +SYSGEN for further information.

```
MON JUN 22 1994      *** SYSGEN PROGRAM ***      17:29
Config   Part/Term   Device Table   Driver Table   Other
```

Or, if a configuration developed with +SYSGEN has been designated to execute automatically ("auto-boot") the programmed terminals, partitions and other parameters will be immediately configured and the system will begin operation accordingly.

Note: You may substitute your own version of +SYSGEN or modify the one supplied by FASSTCOM in order to implement special start-up sequences.

FICE BASIC Commands

Commands are FICE BASIC statements which may be typed in and executed with the <RETURN [ENTER]> key. Most statements may be used as commands. A statement becomes a command when it is typed in without a beginning line number. This is known as using FICE BASIC in "immediate mode". When <RETURN [ENTER]> is pressed at the end of any statement without a beginning line number, FICE immediately executes the statement immediately. Certain statements may not be used as a commands and will result in a beep and an error message displayed on the terminal screen.

If a line number precedes the statement, the line number and statement are stored in memory as a program line. More than one statement may be included on a program line or in an immediate mode command by separating the statements with colons (":").

Examples:

Immediate mode commands:

- PRINT A, B** <RETURN> prints the values of variables A and B on the screen.
- LIST 100, 499** <RETURN> lists programs lines between 100 and 499 on the screen.
- PRINT A, B: LIST 100, 499** <RETURN> performs both of the above statements.

Program statements:

- 500 PRINT USING "## ##", A, B** <RETURN> creates a program line in memory numbered 500.
- 30000 A=A+1: PRINT A: GOTO 29000** <RETURN> creates program line 30000 which will execute three statements.

Several commands which are useful in setting up a *FASSTCOM* system are described on the following few pages. A more detailed description of each command is available in the FICE BASIC manual.

Preparing a disk platter for use:

A disk drive is divided into one or more areas called platters. (Refer to documentation about the Disk Configuration Utility if you need to create platters on an "unconfigured" drive.) A disk drive may be configured to have from 1 to 45 platters. Each platter is accessed by a 3-character address. The address is of the form "Dxy" where "D" indicates a disk-type address, "x" indicates which disk controller and "y" is the address of an individual platter. The "x" can be any of the following characters: "1235679AB". "y" can be any of the following characters: "0123456789ABCDEF". However, addresses that end in "0" or "F" are reserved for special devices. Addresses ending in "0" are used for floppy and other removable media disk drives. Addresses ending in "F" are used for tape drives.

Examples: D11, D5A, D94 and DA6 are typical disk platter addresses—310, B10, etc. are also valid.
D10, and D20 are floppy disk addresses.
D1F, D2F and D3F are tape drive addresses.

\$FORMAT DISK T/Dxy

Prepares platter Dxy for use or erases all data and programs on Dxy (if it has already been used). After formatting, every byte of every sector of the platter is set to HEX (00). Normally, all disk drives are formatted by FASSTCOM before shipping. Occasionally, it may be convenient to use the \$FORMAT command to erase platters.

VERIFY T/Dxx

This command tests each sector of a platter to see if it is readable. This command may be used at any time to search for bad sectors. It is fast and does not alter any data. VERIFY normally tests all sectors of a platter. But, if a sector range is specified (i.e. VERIFY T/Dxy, (0, 100)), only that part of the platter will be tested. The address of each bad sector found is listed on the screen.

SCRATCH DISK [']T/Dxy, LS=s1, END=s2

After a platter is formatted, it must be SCRATCHed before files can be stored on it. This command creates a catalog area to hold files on platter Dxy. "LS" is the size of the index of files at the beginning of the platter (starting at sector zero of the platter). "END" indicates the last sector that is reserved on the platter for the catalog. Data may be stored after the end of the catalog but not in cataloged (named) files. The apostrophe shown in square brackets[] is optional. However, it should always be included because it creates a more efficient index.

xy = Disk platter address.

s1 = Number of sectors in index (i.e. LS=120).

s2 = Last sector of the catalog area (i.e. END=65023).

SCRATCH T/Dxy, "FILENAME"

This command scratches the file "FILENAME". The file is not removed from the platter but it is marked unusable in the index. To remove scratched files, the MOVE command must be used. Refer to the next page for the syntax of the MOVE command.

Note: SCRATCH and SCRATCH DISK are very different commands. Scratching a platter prepares the platter to hold files. Scratching a file marks the file as unusable.

Putting data or files on a platter:

COPY T/Dxy₁, (s₁, n) TO T/Dxy₂, (s₂)

This command *copies sectors* from the first platter starting sector **s₁** for **n** sectors to the second platter starting at sector **s₂**.

COPY T/Dxy₁, (20, 1000) TO T/Dxy₂, (100).

MOVE T/Dxy₁, TO T/Dxy₂

This command *copies the index and all cataloged files* from one platter to another without copying scratched files. The source platter is unchanged. The destination platter is automatically scratched to match the index and catalog size of the source platter.

MOVE T/Dxy₁, "FILENAME" TO T/Dxy₂

This command *copies the file "FILENAME"* from one disk platter to another leaving the original on the source platter.

Note: **COPY** copies *sectors* regardless of sector content.

MOVE copies *unscratched files* individually or as part of a catalog.

Using LIST to view programs or lists of program names:

SELECT DISK Dxy

This command sets the default address of the disk platter against which you want your next command to be executed.

LIST DCT Lists the index of cataloged files on the default platter.

LIST D Lists the program in memory to the screen. If you want to see just a part of the program, you can use a starting line number (**LIST D 1000,**) or a range of line numbers (**LIST D 1000, 2000**). One screen of program lines will be displayed at a time. To see the another screen just press <RETURN>.

CLEAR This will erase the program in memory and clear the screen.

LIST DT Displays the addresses and table numbers of all devices entered into the device table including disk platters and printers. Two screens are generated, Press <RETURN> for the second one.

SELECT LIST xxx

This command selects a device address for **LIST** output so that you can list program lines, file names or the device table to the screen or a printer. The default is device address is **005** (the screen).

Example: **215** = system printer, **204** = local printer (attached to terminal).

Loading, Running and Halting a Program:

LOAD T, "FILENAME"

This will load a program file into memory.

RUN

This command resolves (checks) the program currently loaded into memory and starts execution of the program at the lowest line number. It is also possible to start a program at a particular line by typing **RUN nnnn <RETURN>** where **nnnn** is a numbered line in the program. To start a program at a particular line and on a particular statement within the line use the command **RUN nnnn, ss <RETURN>** where **ss** the statement number.

SHIFT+HALT - This is not a command but a special keystroke combination.

Holding down the <SHIFT> key and pressing the <HALT> key will cause a running program to halt at the end of the current statement—at the next colon or end of the line. Halting a program suspends the execution of statements but does not alter the state of the program or any variables in memory. Thus, a halted program may be restarted from the point where it was halted. If the program is already halted, <SHIFT+HALT> will cause the next statement to be displayed and executed. This allows a programmer to observe the sequence of events in a program, display or alter variables and alter the course of execution one statement at a time.

To continue execution of a halted program, type in **CONTINUE <RETURN>**. The program will continue after the last executed statement. However, if any program line has been deleted, altered or created, the program can't be restarted. Instead, a **RUN <RETURN>** command must be entered and the program will start at the lowest line number.

SHIFT+RESET - This is not a command but a special keystroke combination.

Hold down the <SHIFT> key and press the <RESET> key. This will stop a running program and erase what is on the screen but it will not clear the program from memory. A terminal should always respond to <SHIFT+RESET>. If a Wang terminal is being used and <SHIFT+RESET> has no effect make sure that the keyboard is in upper case mode ("A/a" switch is in the upper position). If <SHIFT+RESET> still does not work, the terminal may have a failed terminal or the operating system may have stopped.

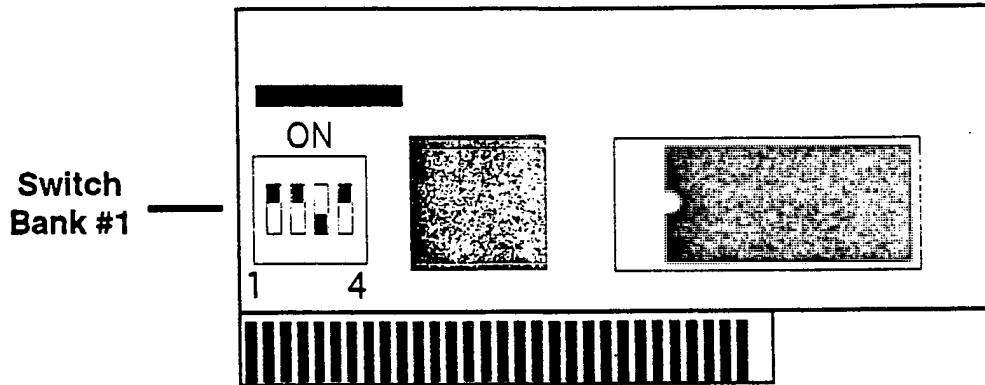
Factory Set-up

Normally, all *FASSTCOM* systems are configured by *FASSTCOM* to the customers specifications and "burned in" to test for proper configuration, operation and component quality. After testing, the system is shipped fully assembled directly to the customer's location. Under these conditions, no further set-up changes are required and the system is ready to run.

However, if a system is to be upgraded or if it is specially ordered unconfigured (system unit without drives), certain switch and jumper settings on the terminal controller(s), SCSI controller(s) and boot card may need to be changed. Some parameters in the CMOS memory on the motherboard may need to be changed as well. This section of the manual describes the purpose and proper settings for the switches and jumpers of all affected components.

Quick Reference Switch Settings Boot Card

Diagram of Boot Card



Switch Bank #1

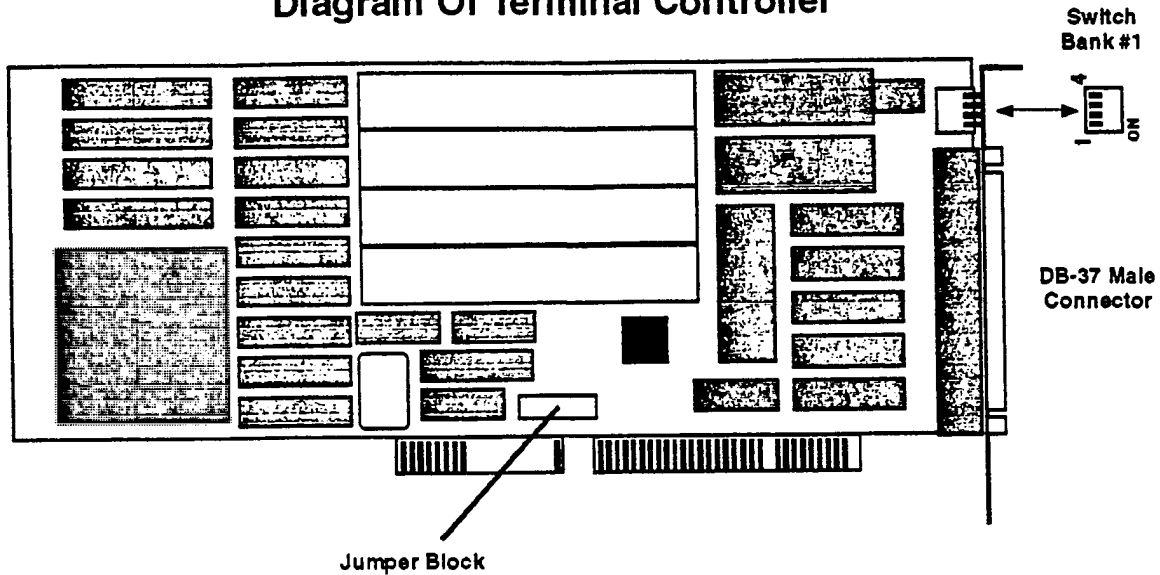
Term #1 Speed	1	2	3	4	
2400 Baud	on	on	on	on	
9600 Baud	on	on	on	off	
19,200 Baud	on	on	off	on	(Default)
38,400 Baud	on	on	off	off	

NOTES:

1. The boot card provides communication with the disk drives and terminal #1 before FICE is loaded into main memory (the system has just been powered on). The switch bank on the boot card determines the speed of the terminal port "A" (port #1) on the first terminal interface box connected the first terminal controller card. All other terminal and printer ports are inactive until FICE has been loaded.
2. The secondary function of the boot card is to provide a unique ID number for the system unit. This number can't be changed without replacing the boot card.

Quick Reference Switch Settings RISC Based Terminal Controller

Diagram Of Terminal Controller



Switch Bank #1

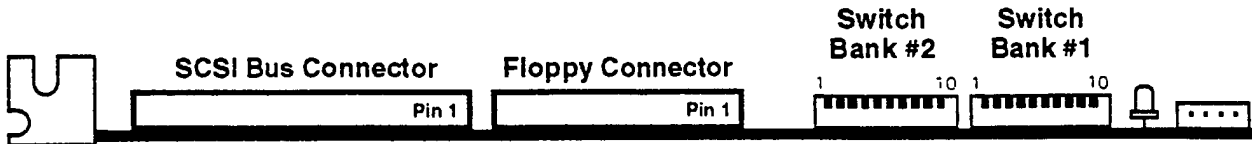
Controller #	1	2	3	4
1 (Terms 1-32)	on	on	on	off
2 (Terms 33-64)	off	on	on	off
3 (Terms 65-96)	on	off	on	off
4 (Terms 97-128)	on	on	off	off

NOTES:

1. Switch bank #1 on each terminal controller is accessible from the rear of the system unit through a small hole in the mounting bracket.
2. No two controllers may have the same switch settings.
3. Controllers must be numbered starting with one and they must be numbered consecutively.
Example: 1,2,3 *not* 1,3,4.
4. All jumpers are open (out).
5. Terminal controller boards may be installed in any ISA bus slot on the motherboard except those two slots adjacent to the CPU chip. This is because a small fan and heat sink are mounted on top of the chip and they interfere with full length ISA boards.
6. Printer interface boxes may only be attached to the first terminal controller and only as the last 1 or 2 interface boxes.

Quick Reference Switch Settings for BusLogic VL Bus SCSI-II Controller

Diagram of Connector Edge of SCSI Controller Board



Switch Bank #1

SCSI Mode	1	2	3	4	5	6	7	8	9	10
SCSI-II	on	on	on	on	on	off	off	on	on	on
SCSI-I	on	on	on	on	on	on	on	on	on	on

Switch Bank #2

Disk Base Addr	1	2	3	4	5	6	7	8	9	10
310	on	on	on	on	off	on	on	on	on	on
320	off	on	off	off	on	on	on	on	on	on
330	off	on	on	on	on	on	on	on	on	on

NOTES

1. Switches 6 and 7 on bank #1 are factory set for SCSI-II devices. If SCSI-I disk drives are used, these switches should be changed to the SCSI-I setting. Using a SCSI-I drive with SCSI-II settings may cause disk errors. SCSI-I and SCSI-II devices may be mixed on the same controller.
2. These SCSI controllers must be inserted in one of the 2 VL Bus slots at the bottom of the motherboard. Refer to the section which describes the motherboards.
3. If three SCSI controllers are used, the third controller is of a different type and must be inserted into an ISA slot. Refer to the section on the BusLogic ISA SCSI-II controller.

Detailed Switch and Jumper Setting Information

VLBus SCSI-II Controller

Description	Switch Bank	Switch #	Settings	Options
Host Controller ID	1	1,2,3	off off off on off off off on off on on off off off on on off on off on on on on on	ID=0 ID=1 ID=2 ID=3 ID=4 ID=5 ID=6 ID=7 (Standard)
SCSI Parity	1	4	off on	Disabled Enabled (Standard)
DOS Disk Size > 1 GByte	1	5	off on	Enabled Disabled (Standard)
Controller Initiates Synchronous Negotiation	1	6	off on	Enabled Disabled (Standard)
Maximum Synchronous Data Rate	1	7	off on	10 Mbytes/sec 5 Mbytes/sec (Standard)
VL-Bus Clock Speed (Local CPU Speed)	1	8,9,10	on on off off on off on on on off off on on off on off on off on on on ?? ?? ??	20 MHz 25 MHz 33 or 40 MHz Reserved 50 Mhz 25/50 MHz (clock Doubled) 33/66 MHz (clock doubled) All other settings are reserved
Host I/O Port Address	2	1,2,3	To Be Changed	
Host BIOS	2	4,5	To Be Changed	
Host Interrupt Request	2	6,7,8	off off off on off off off on off on on off off off on on off on off on on on on on	Reserved Reserved 15 14 12 9 10 11 (Standard)
Reserved	2	9,10	- - -	Reserved
Jumpers: W14, W15 and W16 select floppy addresses. All other jumpers are out (open).				
		W14, W15 & W16	out out out out in in in in in	No Floppy Primary Floppy (D10 or D20) Secondary Floppy (D70 or D80)

FASSTCOM Computers Limited

Quick Reference Switch Settings for ISA Bus SCSI-II Controller

Diagram of Connector Edge of Board

NO DIAGRAM INFO AVAILABLE

Switch Bank #1

Disk Base Addr	1	2	3	4	5	6	7	8
310	on	on	on	on	on	on	on	on
320	on	on	on	on	on	on	off	on
330	on	on	on	on	on	on	on	off

Switch Bank #2

Disk Base Addr	1	2	3	4	5	6	7	8
310	on	on	on	on	off	on	on	on
320	off	on	off	off	on	on	on	on
330	off	on	on	on	on	on	on	on

NOTES

1. This SCSI controller must be inserted in an ISA Bus slot on the motherboard. Refer to the section which describes the motherboards.
2. This kind of SCSI controller is only used in an FS-MINI system or when a third controller is needed in a larger system.

Detailed Switch and Jumper Setting Information

ISA Bus SCSI-II Controller

Description	Switch Bank	Switch #	Settings	Options
Host Controller ID	1	1,2,3	off off off	ID=0
			off off off	ID=1
			off on off	ID=2
			on on off	ID=3
			off off on	ID=4
			on off on	ID=5
			off on on	ID=6
			on on on	ID=7 (Standard)
SCSI Parity	1	4	off	Disabled (Standard)
			on	Enabled (Standard)
DOS Disk Size > 1 GByte	1	5	off	Enabled (Standard)
			on	Disabled (Standard)
Controller Initiates Synchronous Negotiation	1	6	off	Enabled (Standard)
			on	Disabled (Standard)
Maximum Synchronous Data Rate	1	7	off	10 Mbytes/sec (Standard)
			on	5 Mbytes/sec
VL-Bus Clock Speed (Local CPU doubled)	1	8,9,10	on on off	20 MHz
			off on off	25 MHz
			on on on	33 or 40 MHz
			off off on	Reserved
			on off on	50 Mhz
			off on off	25/50 MHz (clock Doubled)
			on on on	33/66 MHz (clock doubled)
Host I/O Port Address	2	1,2,3	off off off	Reserved
			on off off	134H - 137H
			on off on	234H - 237H (320 base addr)
			on on off	334H - 337H (310 base addr)
			off off on	Reserved
			on off on	130H - 133H
			off on on	230H - 233H
			on on on	330H - 333H (310 base addr)
Host BIOS	2	4,5	off off	Disabled (310 base addr)
			off on	0B000H (320 base addr)
			on	0C000H (330 base addr)
Host Interrupt Request	2	6,7,8	off off off	Reserved
			off off off	Reserved
			off off on	15
			on off off	14
			off off on	12
			on off on	9
			off on on	10
			on on on	11 (Standard)
Reserved	2	9	- - -	Reserved

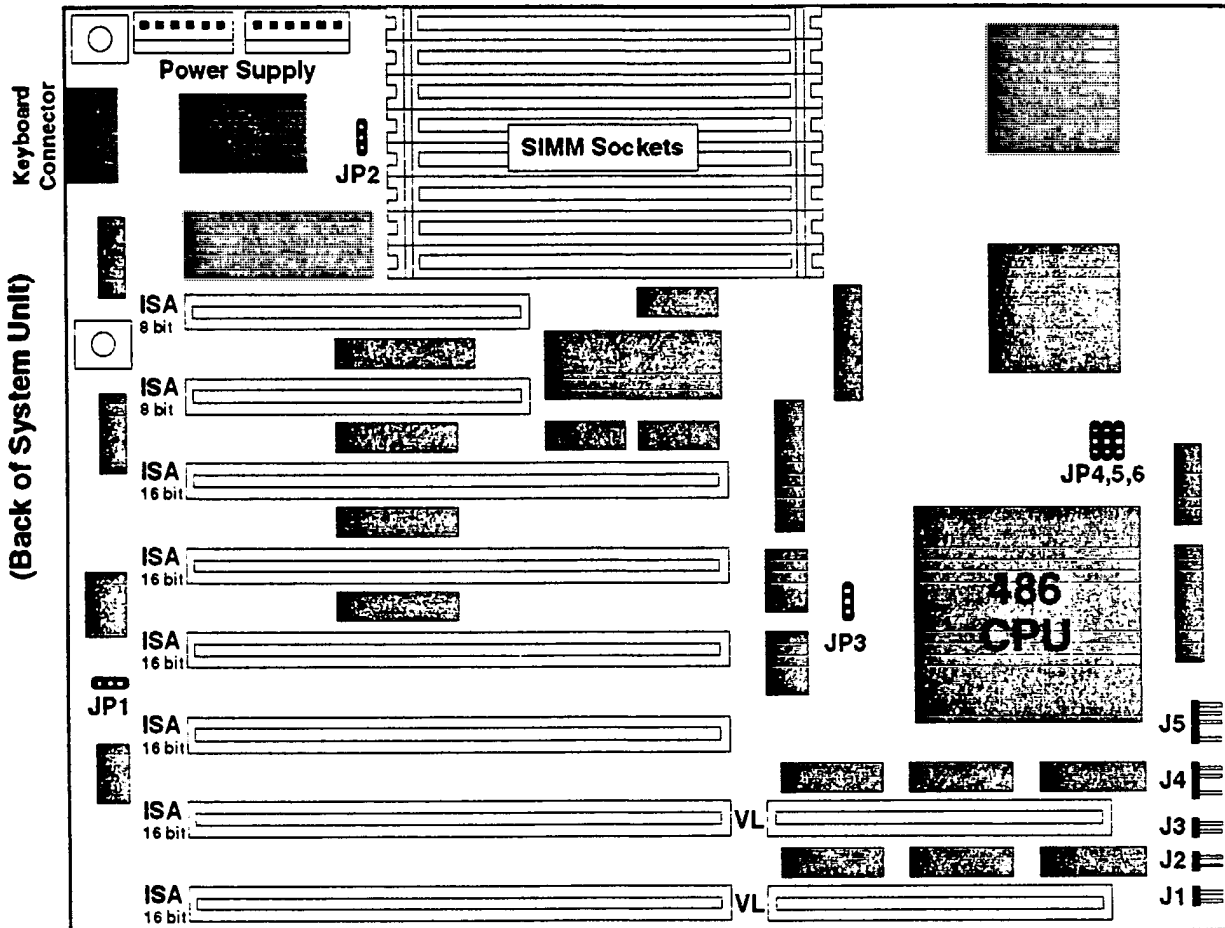
Jumpers: W14, W15 and W16 select floppy addresses. **All other jumpers are out (open).**

W14 W15 W16 out out out No Floppy
out in in Primary Floppy (D10 or D20)

High Speed Intelligent Serial Controller

Information Not Available

8-Slot VL Bus Motherboard FS-MINI and FS-110

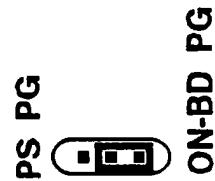


NOTES

1. A small fan and heat sink are mounted on top of the 486 CPU chip. Terminal and ISA SCSI controller cards will not fit into the slots aligned with the 486. Shorter ISA bus cards (such as a VGA video card used to set CMOS parameters) may be used in these slots.
2. The boot card must be inserted in one of the two 8-bit slots.
3. VL-Bus SCSI controller cards must be inserted into one of the VL slots (bottom of motherboard).
4. The keyboard connector (along with a video card and display) is used to set or change the CMOS parameters. Otherwise, it is not normally used.

8-Slot Motherboard Jumpers

JP1 Power Good: For maintenance use only. Improper power can generate a signal in either the external power supply or in circuitry on the motherboard. This jumper setting selects the source of this signal.



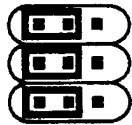
JP2 Display Adapter: For maintenance use only. This 3-pin header selects either CGA or MDA display adapter mode. However, for EGA or VGA display adapters, either setting is valid.



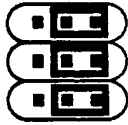
JP3 Clock Speed: Sets the main clock speed to either 25 MHz or 33 MHz. this should always be set for 33 MHz.



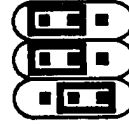
JP4, JP5 & JP6 Processor Type and Speed: These jumpers select the processor type.



**487SX or Pentium
Overdrive**



486SX



487DX or 486DX2

8-Slot Motherboard Connectors

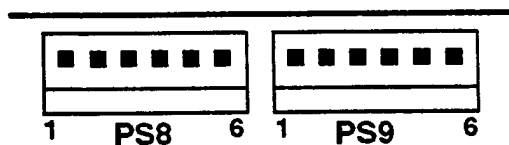
- J1 Turbo Switch:** Not Used.
- J2 Turbo Light:** Not Used.
- J3 System Reset:** For maintenance use only. Connects to RESET button on front of system unit.
- J4 Speaker Connector:** Connects to speaker inside system unit.
- J5 Power LED & Keylock:** Connects to power light but keylock portion is not used.

Power Supply Connectors

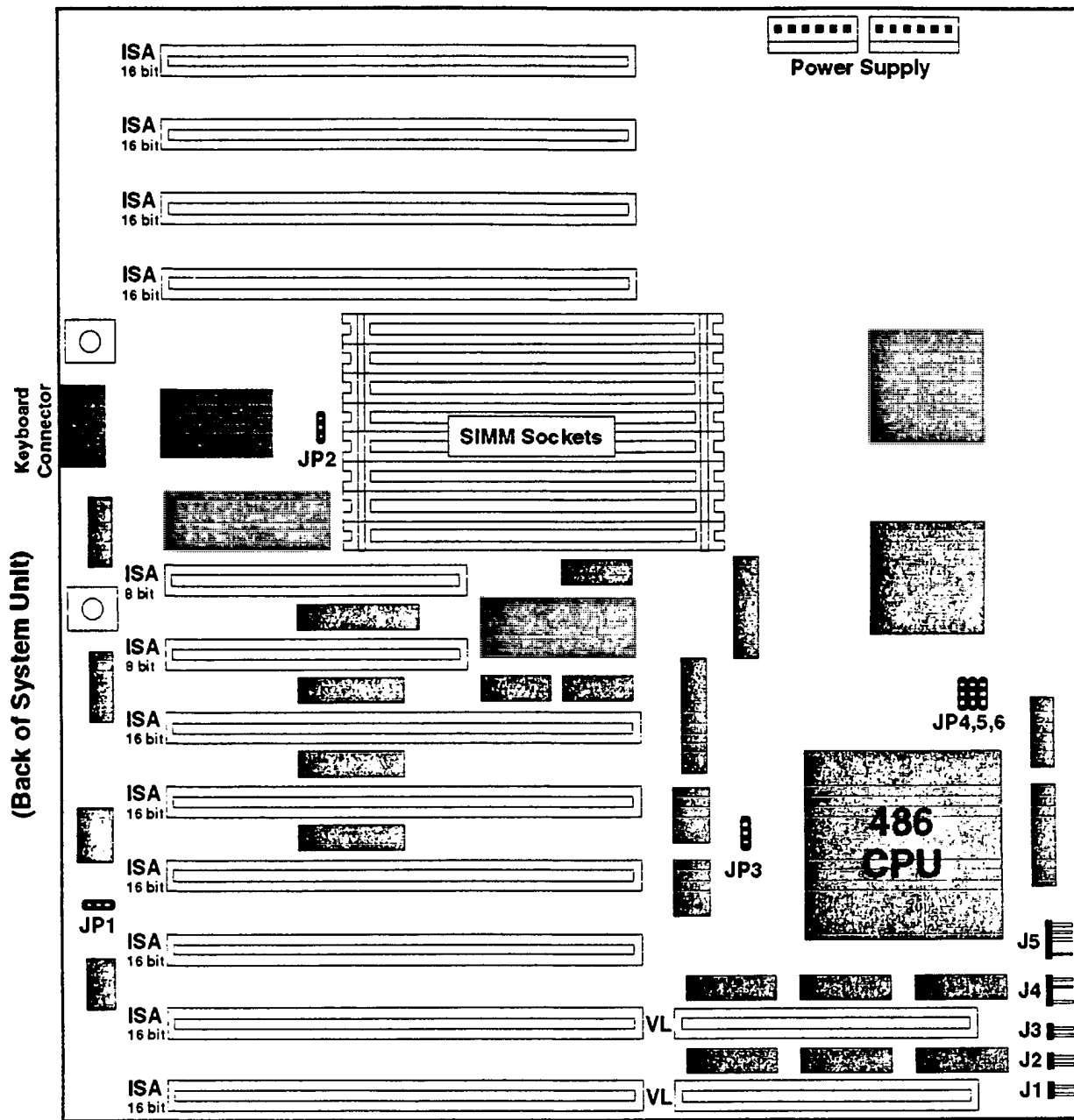
Two 6-pin connector blocks provide power, ground and signals to the motherboard.

- PS8** Pin #1: "Power Good" signal from the power supply.
Pin #2: +5 VDC
Pin #3: +12 VDC
Pin #4: -12 VDC
Pin #5: Ground
Pin #6: Ground

- PS9** Pin #1: Ground
Pin #2: Ground
Pin #3: -5 VDC
Pin #4: +5 VDC
Pin #5: +5 VDC
Pin #6: +5 VDC



12-Slot VL Bus Motherboard FS-1200 and FS-1500



NOTES

1. This motherboard is almost identical to the 8-slot motherboard except that there are four additional ISA 16-bit slots on the extended upper portion of the board.
2. The power supply connector is moved to the upper right corner of the board.

For information about jumpers and connector on this motherboard, refer to the previous section (8-slot motherboard).

CMOS Parameter Set-up

When installing additional memory or an additional floppy disk drive, certain parameters stored in CMOS memory on the motherboard must be changed. To access these parameters, a VGA video adapter card must be installed in the system unit and a VGA monitor and PC-style keyboard must be attached. These items provide access to a screen editor used to display and change the parameters.

With the monitor attached, the system unit will display a series of diagnostic messages when first turned on. When the system begins to cycle through the memory test, press and hold down the <CTRL>, <ALT> and <ESC> keys until the set-up screen appears. Follow the edit key instruction at the bottom of the screen to access, change and save the parameters.

Phoenix SETUP Utility (Version 1.00) 00				
(c) Phoenix Technologies Ltd. 1985, 1991 All Rights Reserved				
				Page 1 of 1
Standard System Parameters				
System Time:	10:02:23			
System Date:	Jan 01 1993			
Diskette A:	5.25 Inch, 1.2 MB			
Diskette B:	Not Installed			
Hard Disk 1:	Not Installed			
Hard Disk 2:	Not Installed			
Base Memory:	640 KB			
Extended Memory:	7488KB	Numlock on at boot:	NO	
Video Card:	Not Installed	Memory Relocation:	Enabled	
Keyboard:	Not Installed	BIOS Shadow:	Disabled	
CPU Speed:	Fast	Video Shadow:	Disabled	
ESC	F1	F2	Arrow up/down	+/-
Menu	Help	Sys Info	Field Value	

NOTES

1. The Time and Date parameters may be ignored. Time and Date can be set using FICE BASIC commands.
2. One or two diskettes may be installed of either size or density.
3. Leave the hard disk entries as "Not Installed". SCSI drives are not controlled by CMOS parameters.
4. Base Memory is always 640 KB. Extended memory varies according to the total amount of RAM memory installed.
5. Video Card and Keyboard may be left as "Not Installed".
6. CPU Speed should always be set to "Fast".
7. Memory Relocation should be "Enabled".
8. Bios Shadow and Video Shadow should be left as "Disabled".

FS-MINI

The **FS-MINI** is the smallest *FASSTCOM* system available. It comes in a minitower desktop case. The motherboard includes a **486 SX 33 MHz** CPU and 128KB cache. Although this system is the most economical offered by *FASSTCOM*, its performance is considerably faster than a Wang CS/386.

Minimum Configuration:

- 4 MB memory
- 4 terminals
- 4 TC ports
- 12 partitions
- 4 printers
- 1 ISA SCSI controller
- 1 hard disk drive
- 1 floppy (3.5" or 5.25")

Maximum Configuration:

- 128 MB memory
- 8 terminals
- 8 TC ports
- 16 partitions
- 8 printers
- 1 ISA SCSI controller
- 2 hard disk drives
- 2 floppies (1 3.5" and 1 5.25")

FS-100/200 Series

The **FS-100** series is the midrange of *FASSTCOM* systems. It comes in a desktide full tower case. The 8-slot motherboard includes a 486 DX2-66 MHz or DX4 100 MHz CPU and 128KB cache. This system provides twice the performance of the FS-MINI and offers tremendous expansion potential.

FS-110/120

Minimum Configuration:

- 486 DX2 66 MHz CPU (FS-110 system)
- 4 MB memory
- 8 terminals
- 240 partitions
- 4 system printers
- 1 VL Fast SCSI controller
- 1 hard disk drive
- 1 floppy (3.5" or 5.25")

Maximum Configuration:

- 486 DX4 100 MHz CPU (FS-120 system)
- 128 MB memory
- 64 terminals
- 240 partitions
- 8 system printers
- 2 VL Fast SCSI plus 1 ISA Fast SCSI controller
- 4 hard disk drives
- 2 floppies (1 3.5" and 1 5.25")

FS-210/220

Minimum Configuration

- 486 DX2 66 MHz CPU (FS-210 system)

All above features plus:

- 486 based intelligent caching Fast SCSI disk subsystem for heavy disk I/O environments and disk mirroring.

Maximum Configuration:

- 486 DX4 100 MHz CPU (FS-220 system)

All above features plus:

- 486 based intelligent caching Fast SCSI disk subsystem for heavy disk I/O environments and disk mirroring.

FS-100/200 Series

The **FS-1000** series are the top performance *FASSTCOM* systems. They come in a desktide full tower case. The 12-slot motherboard includes a 486 DX2-66 MHz or DX\$ 100 MHz CPU and 128KB cache.

FS-1210/1220

Minimum Configuration

- 486 DX2 66 MHz CPU (FS-110 system)
- 4 MB memory
- 8 terminals
- 240 partitions
- 4 system printers
- 1 VL Fast SCSI controller
- 1 hard disk drive

Maximum Configuration:

- 486 DX4 100 MHz CPU (FS-120 system)
- 128 MB memory
- 224 terminals
- 240 partitions
- 8 system printers
- 2 VL Fast SCSI plus 1 ISA Fast SCSI controller
- 4 hard disk drives
- 2 floppies (1 3.5" and 1 5.25")

FS-1510/1520

Minimum Configuration

- 486 DX2 66 MHz CPU (FS-210 system)
- All above features plus:
- 486 based intelligent caching Fast SCSI disk subsystem for heavy disk I/O environments and disk mirroring.

Maximum Configuration:

- 486 DX4 100 MHz CPU (FS-220 system)
- All above features plus:
- 486 based intelligent caching Fast SCSI disk subsystem for heavy disk I/O environments and disk mirroring.

Error Messages

Memory Errors:

A01 Not Enough Memory

Not enough free space remains in memory to enter the program line or to accommodate the defined variable. You can still execute system commands (ex. **SAVE**) and some immediate mode statements. To make memory space available, enter a **CLEAR P**, **CLEAR N**, or **CLEAR V** command to shorten the program or reduce the number of variables defined.

A02 Not Enough Memory

Not enough free space remains in memory to execute the program or immediate mode statement. You can still execute system commands (ex. **SAVE**) and some immediate mode statements. To make memory space available, enter a **CLEAR P**, **CLEAR N**, **CLEAR V** command to shorten the program or reduce the number of variables defined.

A03 Not Enough Memory

Not enough free space remains in memory to accommodate the program text. To make memory space available, enter a **CLEAR P**, **CLEAR N** or **CLEAR V** command to shorten the program or reduce the number of variables defined.

A04 Operator Stack Overflow

FOR/NEXT loops, subroutines, or expressions are nested too deeply. Often this error occurs because the program repeatedly branches out of subroutines or loops without executing a terminating **RETURN** or **NEXT** statement. Correct the program, possibly by using a **RETURN CLEAR** statement to clear subroutine or loop information.

A05 Line Too Long

The program line being entered cannot be saved in one disk sector because its length exceeds 253 bytes. The line can be executed, but it cannot be saved to disk. Shorten the line by breaking it up into two or more smaller lines.

A06 Program Protected

The program line being entered cannot be listed, saved, or modified, except with a **LOAD RUN** or **CLEAR** command. A **LOAD RUN** or **CLEAR** command deactivates protect mode, but it also clears program text from memory.

A07 Illegal in Immediate Mode

The statement cannot be executed in Immediate mode.

A08 Statement Illegal Here

The indicated statement cannot be used in the current context.

A09 Program Not Resolved

The system cannot execute an unresolved program. Resolved the program by executing a **RUN** command.

Syntax Errors:

- S10 Missing "("**
FICE syntax requires a left parenthesis
- S11 Missing ")"**
FICE syntax requires a right parenthesis
- S12 Missing "="**
FICE syntax requires an equal sign (=).
- S13 Missing ","**
FICE syntax requires a comma (,).
- S14 Missing "*"**
FICE syntax requires an asterisk (*) in the statement.
- S15 Missing ">"**
FICE syntax requires the (>) character.
- S16 Missing Letter**
FICE syntax requires a letter.
- S17 Missing Hex Digit**
FICE syntax requires a hex digit (digit from 0 to 9 or letter from A to F).
- S18 Missing Relational Operator**
FICE syntax requires a relational operator (<, =, >, <=, >=, <>).
- S19 Missing Word**
FICE syntax requires a required word (such as **THEN** or **STEP**).
- S20 End of Valid Syntax**
Although syntax is correct up to the point of the error message, the system cannot comprehend the remainder of the statement.
- S21 Missing line Number**
FICE syntax requires a line number.
- S22 Illegal PLOT argument**
An argument in the **PLOT** statement is illegal.
- S23 Invalid Literal**
The syntax or length of the literal is invalid. A literal string must be 1 to 255 characters in length.

S24 Invalid Expression or Missing Variable

The expression syntax is illegal or a variable is missing.

S25 Missing Numeric Scalar Variable

FICE syntax requires a numeric-scalar-variable.

S26 Missing Array Variable

FICE Syntax requires an array-variable.

S27 Missing Numeric Array

FICE syntax requires a numeric-array.

S28 Missing Alpha Array

FICE syntax requires an Alpha Array.

S29 Missing Alpha Variable

FICE syntax requires an alpha-variable.

Program Errors:

P31 Do not match with ENDDO

DO and ENDDO statements are not properly matched.

P32 Start > End

The starting value exceeds the ending value.

P33 Line Number Conflict

The system cannot execute the **RENUMBER** command because the renumbered program text cannot fit between existing program lines. Adjust the **RENUMBER** command parameters.

P34 Illegal Value

The value exceeds the allowed limit.

P35 No Program

Memory contains no program statements. Prior to issuing a **RUN** command, enter program statements or load a program.

P36 Undefine Line Number or CONTINUE Illegal

If the program references a line number that does not exist, ensure that all referenced lines exist.

If the system aborts a **CONTINUE** command, rerun the program using a **RUN** command. The following circumstances prevent continuation of terminated program execution:

The occurrences of a stack or memory overflow.

The entry of a new variable, the execution of a **CLEAR** command.

The modification of program text, or a rest operation.

- P38 Undefined DEFFN' Subroutine**
The program references a nonexistent **DEFFN'** subroutine.
- P39 FN's Nested Too Deeply**
The system encountered more than five levels of nesting when evaluating an **FN** function.
- P40 NEXT without FOR**
The program contains a **NEXT** statement without a companion **FOR** statement or it branches into the middle of a **FOR/NEXT** loop.
- P41 RETURN without GOSUB**
The program executes a **RETURN** statement without first executing a **GOSUB** or **GOSUB'** statement. Either a companion **GOSUB** or **GOSUB'** does not exist, or the program branches into the middle of a subroutine.
- P42 Illegal Image**
The indicated image is illegal in the current context. For example, a **PRINT USING** statement refers to an image that does not contain a format specification.
- P43 Illegal Matrix Operand**
The same array name appears on both sides of the equation in a **MAT** multiplication or **MAT** transposition statement.
- P44 Matrix Not Square**
The dimensions of a **MAT** inversion or identity operand are not equal.
- P45 Incompatible Operand Dimensions**
The dimensions of the operands in a **MAT** statement are not compatible.
- P46 Illegal Microcommand**
A microcommand in the specified **\$GIO** sequence is illegal or undefined. An illegal escape sequence was sent to the Generalized Printer Driver.
- P47 Missing Buffer Variable**
A data input, output, or verify microcommand omits a **\$GIO** statement buffer. Include a buffer in the **\$GIO** statement.
- P48 Illegal Device Specification**
The statement refers to an undefined file number or device address not entered into the Master Device Table. Execute a **SELECT** statement defining the file number, or correct the device address. This error occurs when the system tries to communicate with the device, not when the device is selected. P48 is a recoverable error.
- P49 Interrupt Table Full**
The program can define interrupts for a maximum of eight device.

- P50 Illegal Array Dimensions or Variable length**
The array dimension or alpha-variable length exceeds the legal limits.
- P51 Variable or Value Too Short**
The length of the indicated variable or value is too short for the specified operation.
- P52 Variable or Value Too Long**
The length of the indicated variable or value is too long for the specified operation.
- P53 Noncommon Variables Already Defined**
Noncommon variables cannot be defined in a program before a **COM** statement. Either move all **COM** statements to the beginning of the program, or clear noncommon variables with a **CLEAR N** command.
- P54 Common Variable Required**
A multiple-file **LOAD** command requires a common variable.
- P55 Undefined Variable**
The indicated variable is not defined elsewhere in the program. This error usually results because a referenced array in a **DIM** or **COM** statement is improperly defined.
- P56 Subscript Out of Range**
The variable subscripts exceed the defined array dimensions, or the number of subscripts does not agree with the array dimensions.
- P57 Illegal STR Argument**
The **STR** function arguments exceed the maximum defined length of the alpha-variable. Correct the **STR** function arguments, or redefine the alpha-variable.
- P58 Illegal Field/Delimiter Specification**
The **\$PACK** or **\$UNPACK** statement specifies an illegal field or delimiter specification.
- P59 Illegal Redimension**
The space required for redimensioning the array exceeds the space initially reserved for the array. Redimension the array to fit in the required space, or adjust the **DIM** or **COM** statement to reserve additional space.

Computational Errors:

- C60 Underflow**
The absolute value of the result was less than 1E-99 but greater than zero. The statement **SELECT ERROR >60** suppresses this error and moves a default value of zero into the result.

C61 Overflow

The absolute value of the result was greater than 9.999999999999E+99. The statement **SELECT ERROR >61** suppresses this error and moves a default value of 9.999999999999E+99 into the result.

C62 Division by Zero

Division by zero is mathematically undefined. The statement **SELECT ERROR >62** suppresses this error and moves a default value of 9.999999999999E+99 into the result.

C63 Zero Divided by Zero or Zero Raised to Zero Power

Zero divided by zero or zero raised to zero power is mathematically undefined. The statement **SELECT ERROR >63** suppresses this error and moves a default value of zero into the result.

C64 Zero Raised to Negative Power

Zero raised to negative power is a mathematically undefined operation. The statement **SELECT ERROR >64** suppresses this error and moves a default value of 9.999999999999E+99 into the result.

C65 Negative Power Raised to Non-Integer Power

Negative power raised to non-integer power is a mathematically undefined operation. The statement **SELECT ERROR >65** suppresses this error and moves a default value of the absolute value of the number raised to the negative power into the result.

C66 Square Root of Negative Value

The square root of a negative value is mathematically undefined. The statement **SELECT ERROR >66** statement suppresses this error and moves a default value of **SQR (ABS(X))**, where X is a the negative value, into the result.

C67 LOG of 0

The LOG of 0 is mathematically undefined. The statement **SELECT ERROR >67** suppresses this error and moves a default value of -9.999999999999E+99 into the result.

C68 LOG of Negative Value

The LOG of a negative value is mathematically undefined. The statement **SELECT ERROR >68** suppresses this error and moves a default value of the LOG of the absolute value of the number into the result.

C69 Argument Too Large

The absolute value of the **SIN**, **COS**, **TAN** function is greater than or equal to 1E+10 and the system cannot evaluate this function; or, the absolute value of the **ARCSIN**, **ARCCOS**, or **ARCTAN** argument is greater than 1.0, and the value of this function is mathematically undefined. The statement **SELECT ERROR >69** suppresses this error and moves a default value of zero into the result.

Execution Errors:

X70 Insufficient Data

The **DATA** statement does not contain enough data values to satisfy **READ** or **RESTORE** statement requirements. Correct the program to supply additional data, or modify the **READ** or **RESTORE** statement.

X71 Value Exceeds Format

The **PACK** or **CONVERT** image does not specify enough integer digits to express the number being packed or converted.

X72 Singular Matrix

A **MAT** inversion operand is singular and cannot be inverted. Include a normalized determinant parameter in the **MAT INV** statement, and check the determinant following the inversion.

X73 Illegal INPUT Data

The value requested by by an **INPUT** statement is in an illegal format. Reenter the data in the correct format, or stop program execution by pressing the **RESET** key and then **RUN** the program again. Alternatly, to avoid the entry of illegal data, substitute a **LINPUT** statement for the **INPUT** statement, and verify operator entered data within the program.

X74 Wrong Variable Type

The variable type (alpha or numeric) and the data type do not correspond. Correct the program or data, or ensure that the proper file is being accessed.

X75 Illegal Number

The format of the indicated number is illegal.

X76 Buffer Exceeded

The buffer variable is too small or too large for the specified operation.

X77 Invalid Partition Reference

The partition referenced by **SELECT @PART** or **\$RELEASE TERMINAL** is not defined or the name specified by **DEFFN @PART** has already been used. Use the proper partition name and wait for the global partition to be defined.

X78 Print Driver Error

An error was detected with the print drivers. The error also results from an invalid driver table name. The error is also returned if you attempt to associate more than 15 device addresses with printer drivertable or when an address associated with the printer driver tables is used more than once. To recover, change the incorrect address parameter.

X79 Invalid Password

? ~~The password entered does not match the password set when the system was configured with the +SYSGEN utility.~~

Disk Errors:

D80 File Not Open

The file operation cannot be performed upon a closed file.

D81 File Full

No more information can be written into the indicated file. Correct the program, or transfer the file to another platter, reserving additional space on the new platter for this file.

D82 File Not Found

The file name does not exist, or a data file was loaded as a program file or a program file was loaded as a data file. Ensure that the file name is entered correctly; ensure that the proper disk is mounted; and ensure that the correct disk drive is being accessed.

D83 File Already Exists

The file name already exists in the Catalog Index. Use a different name, or catalog the file on a different platter.

D84 File Not Scratched

A file must be scratched before it can be renamed or written over.

D85 Index Full

The Catalog Index contains no space for new names. Scratch unwanted files and compress the catalog using a **MOVE** statement, or mount a new disk platter and create a new catalog.

D86 Catalog End Error

The defined Catalog Area ends within the Catalog Index or has no more available space to store information. This usually occurs because a **MOVE END** statement tries to move the end of Catalog Area to the area already occupied by cataloged files. Correct the **SCRATCH DISK** or **MOVE END** statement, or increase the size of the Catalog Area by executing a **MOVE END** statement. Alternately, scratch unwanted files and compress the catalog using a **MOVE** statement, or mount a new disk platter and create a new catalog.

D87 No End-of-File

Because neither a **DATASAVE DC END** nor a **DATASAVE DA END** statement record an end-of-file record in the file, the **DSKIP END** statement cannot locate an end-of-file record. Write an end-of-file trailer after the last data record in the file.

D88 Wrong Record Type

The system encountered a program record when a data record was expected or vice versa. Ensure that the proper drive and file is being accessed.

D89 Sector Address Beyond End-of-File

A **DATALOAD DC** or **DATASAVE DC** statement accesses a sector address beyond the end-of-file. This error can be caused by a bad disk platter. Press **RESET** and run the program again. If the error persists, use a different platter or reformat the platter. If the error still exists, inform a Fasstcom service representative.

I/O Errors:

I90 Disk Controller Error

The system aborts the disk operation because the controller responded improperly at the beginning of the operation. Press **RESET** and rerun the program. If the error recurs, make certain that the disk unit is on and all cables are properly connected. If the error persists, contact your Fasstcom Service Representative.

I91 Disk Drive Not Ready

The disk unit is not ready for access. Make certain that the program addresses the correct disk. Also, make sure that the disk unit is on and in run mode, and all cables are properly connected. Press **RESET** and rerun the program. If the error recurs, power the disk unit off and then back on and rerun the program. If the error persists, call a Fasstcom Service Representative.

I92 Timeout Error

A device did not respond to the system. If the device is a disk, the system aborts the disk operation. Press **<RESET>** and run the program again. If the error recurs, ensure that the disk has been formatted. If the error persists, inform a Fasstcom Service Representative.

I93 Format Error

The system detects invalid sector control information of the disk platter. If a disk operation is in progress, the platter may need to be reformatted. If the formatting is in progress, the surface of the platter may be flawed. Reformat the disk platter; If the error recurs, replace the platter. If the error persists, contact a Fasstcom Service Representative. The error can also occur if the user attempts to access a disk formatted for use on a different type of system.

I94 Disk Controller Error

The system aborts the disk operation because the controller did not receive the disk command correctly. Press **<RESET>** and rerun the program. If the error recurs, make certain that the disk unit is on and all cables are properly connected. If the error persists, contact a Fasstcom Service Representative.

I95 Device Error

The disk cannot perform the requested operation. Repeat the operation. If performing a write operation, make certain that the disk is not write protected. If the error recurs, power the disk off and back on, and again perform the operation. If the error persists, contact a Fasstcom Service Representative.

I96 Data Error

For read operations, the checksum calculations (CRC or ECC) indicate that the data read is incorrect. For disk drives that perform ECC, the attempt to correct errors was unsuccessful. Rewrite the data; the read sector may have been written incorrectly. If read errors recur, reformat the platter. For write operations, the LRC calculation indicates that the data sent to the disk is incorrect. The data has not been written. Repeat the write operation. If write errors recur, make certain that all disk cables are properly connected. If either error persists, inform a Fasstcom Service Representative.

I97 LRC Error

A longitudinal redundancy check error occurred while a sector was being written or read. An LRC error usually indicates a transmission error between the disk and the CPU. Press RESET and rerun the program. If the error recurs, rewrite the flawed sector; the sector may have been previously written incorrectly. If the error persists, contact a Fasstcom Service Representative.

I98 Illegal Sector Address or No Platter

The indicated sector is not on the disk platter, or the specified drive contains no platter. Ensure that the correct drive is being accessed. Correct the program statement, or ensure that the diskette is inserted into the drive.

I99 Read-After-Write-Error

The comparison of read-after-write to a disk sector failed, usually indicating a defective platter. Rewrite the information; the data may have been previously written incorrectly. If the error recurs, replace the platter. If the error persists, contact a Fasstcom Service Representative.