DYNABYTE

5100
Computer Unit
Technical Manual

5100 COMPUTER

MAINTENANCE

Figure 1-1 — 5100 Computer

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1. GENERAL

1.01 This manual provides a physical and functional description and operating theory necessary for effective field service of the 5100 Computer. Prior to May 1, 1980, the 5100 Computer was designated the DB8/1 Computer and was documented using an eight-digit part number system. This manual uses the current Dynabyte six-digit part number system. Part 7 includes cross-reference tables for referencing old part numbers to current part numbers.

Features

1.02 The 5100 Computer, illustrated in Figure 1-1, is supplied individually or as a system component to a larger Dynabyte computer system: Series 5300, 5600, 5700 and 5900. It is an S-100 Bus computer which includes a central processing unit (CPU), random access memory (RAM) and input and output (I/O) ports. A high degree of flexibility has been designed into the 5100 Computer for field servicing and provision for expansion to the user's computer system. Features of the 5100 include the following:

- Z-80 microprocessor operating at 4 MHz.

- Two serial, software programmable 110 to 76,800 baud ports. Each of the port's data lines may be configured to an RS-232C level or 20 mA current loop data communication line interface.

- One parallel port with full handshaking logic.

- Application of the ac line power causes the 5100 to jump to a switch-optioned starting address in memory. This option is disabled when the 5100 is configured with a 5010 Dual Diskette Storage Unit.

- Ten internal timers.

- Sixteen prioritized vectored interrupts.

- A real time clock.

- Memory is available in 48K or 64K configurations. Additionally, optionally bank switching to 400K bytes can also be provided with multiple memory cards.

- The power supply module features pre-regulation to minimize operational problems from brown outs and line voltage surges.

- Efficient cooling of the 5100 S-100 cards and power supply is assured by a 4-5/8 inch metal axial fan(s) furnishing air through the chassis and exhausted out through the rear panel.

- The backplane is shielded and fully socketed for 12 S-100 card positions.

- Heavy duty metal construction with cast aluminum bezels front and rear is used.

- The front panel switches POWER and RESET-HALT are illuminated.

- A line fuse is provided for ac line protection.

- A switched ac power outlet is provided for auxiliary equipment, e.g., a 5010 Dual Diskette Storage Unit.

- Each internal subassembly is modular and is unit replaceable for ease in servicing.

- A woodgrain veneer enclosure top is provided.

- Each 5100 carries a 180-day warranty on parts and labor from the date of shipment from Dynabyte.

- Each 5100 is burned in for a minimum of 72 hours.

1.03 Dynabyte maintains hardware and software compatibility with Dynabyte S-100 cards used in the Dynabyte S-100 Bus only. S-100 I/O cards, e.g., modems, clocks and parallel ports from other manufacturers will be compatible with the Dynabyte S-100 Bus in most cases. Contact Dynabyte for specific applications.
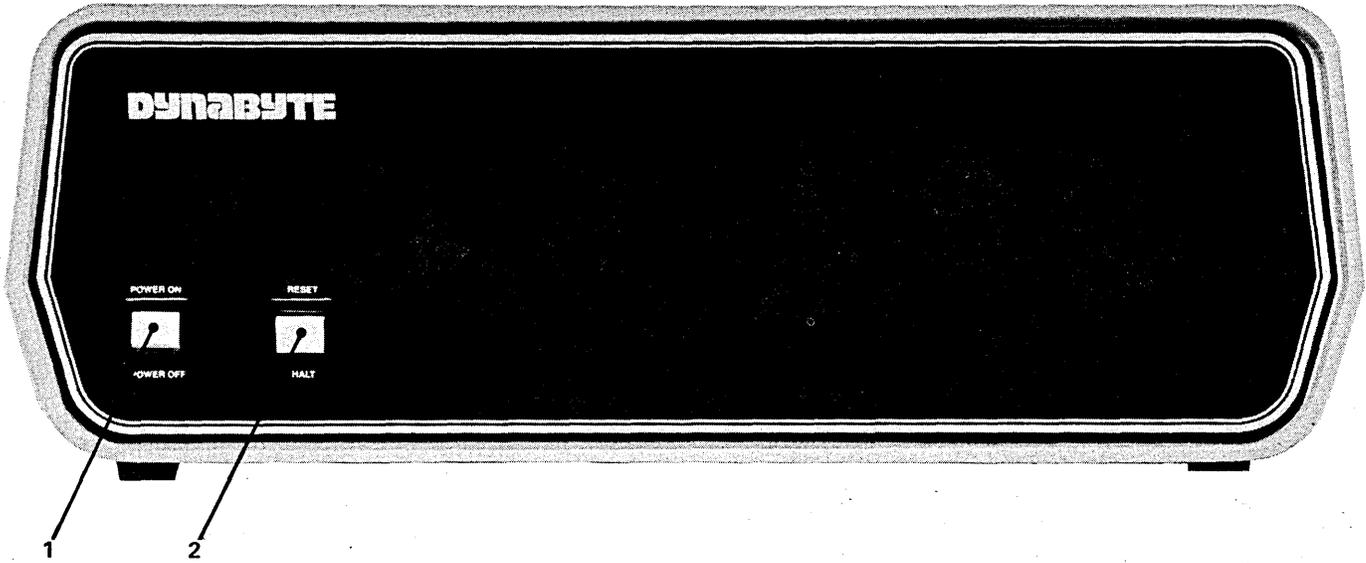
Figure 2-1 — 5100 Computer — Front Panel — 801387

Table 2-1 — 5100 Computer — Front Panel Controls and Indicators

Key	Element	Function
1	POWER ON OFF Switch and Indicator	Applies the ac line to the 5100 Computer and the ac power receptacle on the rear panel. Refer to Figure 2-2, Key 3. The indicator lights when +8 Vdc is available from the power supply.
2	RESET Switch and HALT Indicator	Momentarily grounds the S-100 Reset line generating a Power On Clear (POC) sequence: (1) CPU Program Counter is reset, (2) Disk Controller is reset. When the indicator is lit, the CPU has stopped at a Z-80 HLT (76H) instruction in the program.

2. PHYSICAL DESCRIPTION

2.01   The 5100 Computer illustrated in Figure 1-1 is an integrated piece of electronic equipment incorporating all necessary component assemblies. The principle assemblies are:

(1)   Power Supply Module,

(2)   Central Processing Unit (CPU),

(3)   S-100 Bus Card Cage and Motherboard,

(4)   Random Access Memory (RAM).

Some of the optional assemblies are:

(5)   Quadraport,

(6)   Octaport,

(7)   Disk Controller.

Details on these individual assemblies, as well as their schematic diagrams and replaceable parts lists, are furnished under separate cover as individual technical manuals. These assemblies have been enclosed in an exceptionally compact package measuring 52 cm x 47 cm x 18 cm (20.5 in. x 18.5 in. x 7 in.) weighing 25 kg (about 55 lbs.).

2.02   The 5100 draws nominally 313 VA of 115 Vac, 60 Hz commercial power. It may be factory optioned for operation from a 230 Vac, 50 Hz line.

2.03   The 5100 is designed to operate efficiently in an environment with an ambient temperature range from 10°C to 35°C (50°F to 95°F) and with a relative humidity from 20 to 80 per cent.

2.04   Figures 2-1 through 2-3 provide number key callouts of all components located on the front, rear and interior of the 5100. Associated Tables 2-1 through 2-3 provide a cross reference for each callout, identifying the respective part as to function, description and/or designation.

Front Panel

2.05   Refer to Figure 2-1 for the description which follows. The 5100 Computer Front Panel has only two operating controls with which the user should be concerned.

(1)   The POWER ON OFF Switch turns the computer on and off. The switch also connects the ac line power to a convenience receptacle on the rear panel for powering a mass storage device such as the Dynabyte 5010. The switch also contains an indicator which lights when there is an output from the internal +8 Vdc power supply.

IMPORTANT

The 5100 Computer should never be turned on or off while a diskette is installed in a drive.

(2)   The RESET Switch is used to restart the computer if it should become locked up due to a software or hardware malfunction. Operating the RESET Switch causes the S-100 Reset Line, Pin 75, to be active low. The Reset Line is an input to the Power On Clear (POC) circuits and resets the CPU Program Counter, Disk Controller, etc. Then the CPU initiates a reboot by jumping to a starting address appropriate for the user's system. The switch also contains an indicator, which, when lit, indicates the CPU has read a Halt (HLT) instruction and has stopped.

Rear Panel

2.06   Figure 2-2A and Figure 2-2B illustrate Revision A and Revision B of the 5100 Rear Panel. The 5100 Computers shipped after August 1, 1980, incorporate a Revision B Rear Panel. Table 2-2 tabulates and describes each of the rear panel elements. Ac line and computer Input Output (I/O) connections are through the rear panel. At the right, the ac line is connected through an IEC connector. This permits the 5100 to be connected domestically to 115 Vac, 60 Hz with a National Electrical Manufacturers Association (NEMA) cord set or internationally with a cord set appropriate for that country. A line fuse provides protection for the 5100 and equipment powered from the ac convenience receptacle above.

CAUTION

Power consumption from the ac convenience receptacle is limited to 200 VA.
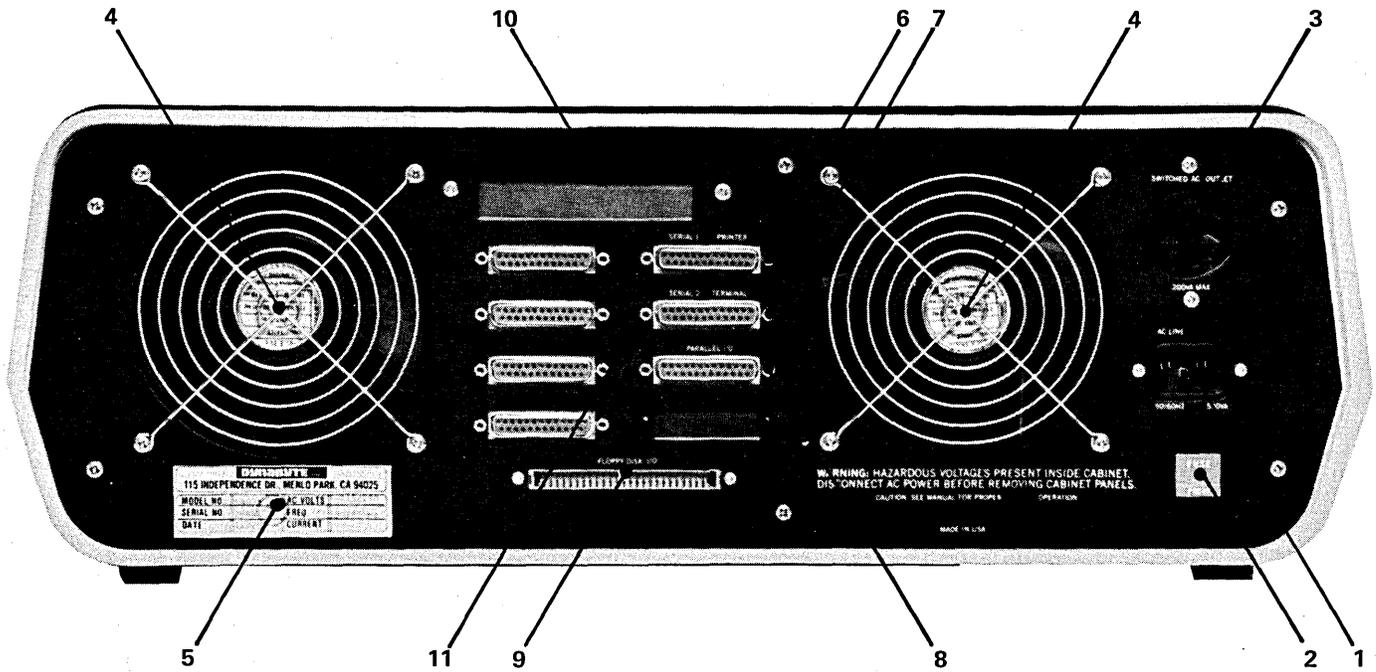
Figure 2-2A — 5100 Computer — Rear Panel — Revision A — 802470
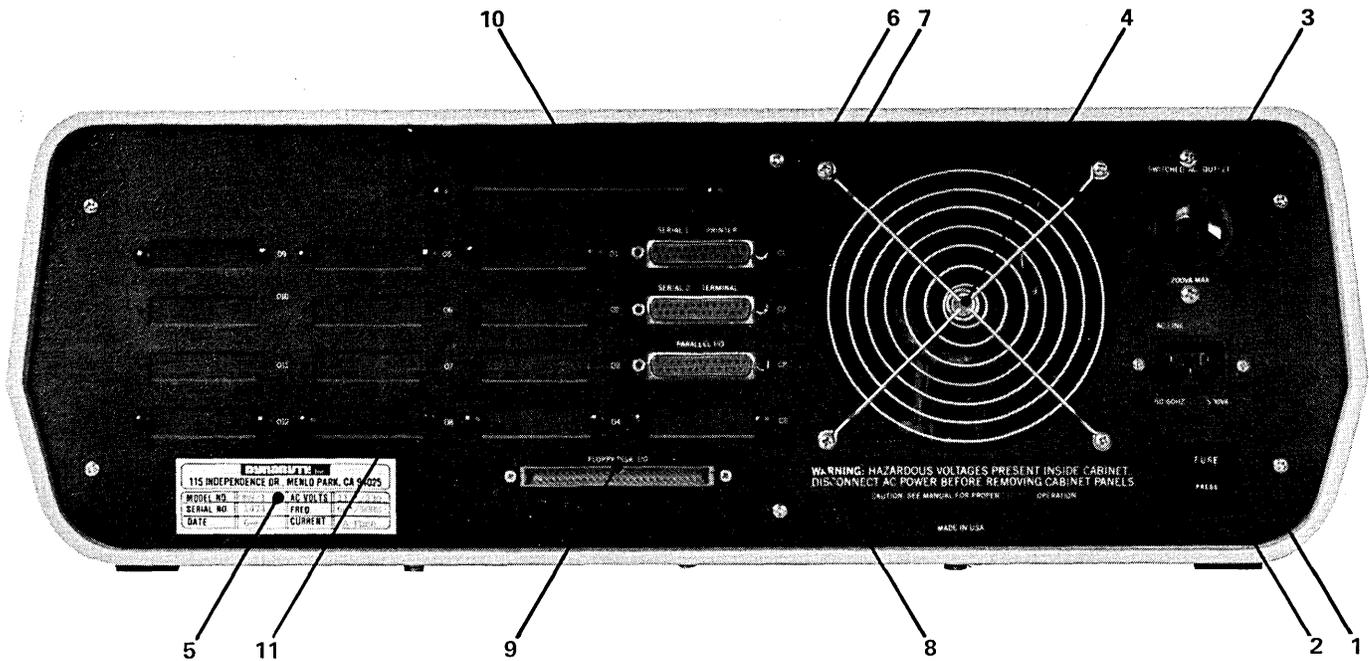
Figure 2-2B — 5100 Computer — Rear Panel — Revision B — 800266

Table 2-2 — 5100 Computer — Rear Panel Controls and Connectors

Key	Element	Function
1	Ac Line Receptacle (J6)	IEC standard three-wire male receptacle. Provides for ac line, neutral and a third wire bonded to the chassis frame. Mates with Belden P-2392 ac cord set for U.S. domestic use or the appropriate cord set for the export country.
2	Ac Line Fuse (F1)	Provides ac line overcurrent protection: (1) 115 Vac — 6 A. (2) 230 Vac — 3 A. Early serial number units are provided with a circuit breaker in this position.
3	SWITCHED AC OUTLET Receptacle (J7)	NEMA three-wire female receptacle provides for the ac line, neutral and third wire bonded to the chassis frame. This receptacle is switched by the POWER ON Switch on the front panel, refer to Figure 2-1, Key 1, and is protected by fuse, Key 2, above. This outlet normally supplies power to a 5010 Dual Diskette Storage Unit, 200 VA maximum.
4	Axial Fan(s)	Provides for drawing heat from the power supply module and internal heat dissipating pc assemblies.
5	Dynabyte Identification Plate	Furnishes the model and serial number necessary for warranty service. Refer to Figure 6-1.
6	SERIAL 1 PRINTER Port Receptacle	DB-25-S connector. Optionally EIA RS-232C or 20 mA current interface. Connection point for the EIA cable to the Serial Printer.
7	SERIAL 2 TERMINAL Port Receptacle	DB-25-S connector. Optionally EIA RS-232C or 20 mA current interface. Connection point for the EIA cable to the Video Terminal.
8	PARALLEL I/O Port Receptacle	DB-25-S connector. Eight-bit parallel I/O connection point to 25-conductor cable to a parallel printer.
9	FLOPPY DISK I/O Receptacle	50-conductor ribbon connector. Provides a connection point for the cable to the Dynabyte 5010 Dual Diskette Storage for I/O data, control and status lines.
10	Hard Disk I/O Access Hole and Clamp	Furnishes a hole and clamp for the cable to the Dynabyte 5012 Cartridge Module Drive.
11	I/O Port Connector Area	Provides positions for DB-25-S connectors. Figure 2-2 illustrates connectors for: (1) Three ports from the CPU, (2) Up to 16 ports from the Octaport.

2.07 A four-inch fan(s) draws heat dissipated internally out the rear panel. Air is drawn into the 5100 cabinet through louvers provided in the bottom of the cabinet. Refer to Figure 2-3.

IMPORTANT

> *Install the 5100 Computer so as not to obstruct the air flow through the louvers in the bottom of the cabinet and allow a three-inch clearance from the rear of the fan.*

Desk-type system cabinets supplied from Dynabyte are designed to assure constant air flow through the computer.

2.08 Several mass storage devices can be used with the 5100. The rear panel furnishes connector access for these devices.

(1) A fifty-pin ribbon cable connector provides for disk I/O signals, control signals and status signals to a Dynabyte 5010 Dual Diskette Storage Unit.

(2) A rectangular hole provides access for a multi-wire ribbon cable for disk I/O signals, control and status to a Dynabyte 5012 Cartridge Module Drive.

2.09 Eight (sixteen) positions are provided on the rear panel for DB-25-S connectors and are used for I/O signals to the system peripheral devices such as:

(1) Serial Printers,

(2) Video Terminals,

(3) Parallel I/O Printers,

(4) Acoustical Coupler or Modems,

(5) Plotting Terminals.

Each installation will vary depending upon the selection of peripheral devices and the applications programs in use. Three I/O ports are furnished as part of the CPU. These are shown connected to the rear panel illustrated in Figure 2-2 and 2-3. In applications requiring additional ports, a Quadraport or an Octaport may be installed

into the S-100 Bus and interconnected to the rear panel. Both the front and rear panels are secured to their respective bezel by 6-32 Kep nuts. Each bezel is secured to the base plate by 6-32 screws. Both panel and bezel may be easily removed for servicing or installation of additional I/O ports in the field.

Card Cage — S-100 Bus

2.10 Refer to Figure 2-3 for the description which follows. The card cage furnishes a rigid support structure for the S-100 Bus cards when they are inserted into the S-100 Bus. The Motherboard PC Assembly contains 12 S-100 Bus receptacles or jacks, J1 through J12. Each jack has 100 separate pins. The actual bus consists of 100 parallel traces on the pc board connecting the same pin on each jack. Each line has a ground trace between it and the adjacent line to minimize coupling between signal lines.

2.11 The S-100 Bus lines are described by function in Part 3 of this manual. Physically they make up five groups:

(1) Power and common lines. These are connected to the power supply module discussed in 2.17. Six lines.

(2) Address lines. Six lines.

(3) Data In and Out lines. 16 lines.

(4) Control Signal lines. 40 lines.

(5) Dynabyte Reserved lines. 22 lines.

The Motherboard PC Assembly also contains a few descrete components which make up the Halt Detector. The Halt Detector and Reset line are connected to the front panel by a four-conductor receptacle, J13, connected to plug, P13, mounted at the front edge of the Motherboard PC Assembly.

S-100 Bus Cards

2.12 Dynabyte S-100 Bus cards are pc assemblies normally measuring 5 x 10 inches. A 100-pin edge connector mates with the S-100 Bus connector on the motherboard. This connector is offset by 5/8 inch from the card centerline, i.e., an S-100 Bus card cannot be inserted into a jack backwards.

2.13 Dynabyte S-100 Bus cards may have one or more on-board regulators for regulating and distributing the dc power supply voltages from the bus to the logical elements on the card.

NOTE

An S-100 Bus card should never be inserted or removed from the bus when the ac line power is on.

2.14 A solder mask is applied to the component and non-component sides of the pc boards when it is manufactured and before it is loaded with components. This mask covers all surfaces except:

(1) The 100 gold-plated fingers of the edge connectors,

(2) Each of the plated-through holes.

The solder mask assures there will be no bridges between traces. The soldering operation can then only take place at a hole where normally solder joins a component lead and a pad.

2.15 Dynabyte S-100 Bus cards usually provide sockets for most multi-lead active devices to facilitate fault location and servicing.

2.16 Options for Dynabyte S-100 cards are provided by three methods:

(1) Dual-In-Line packaged (DIP) switches of one to nine poles, SPST, are normally used in functions which may have to be set to the user's individual installation.

IMPORTANT

Never change the settings of an Option Switch without referring to the Option Switch Tables in the individual Dynabyte S-100 Bus Card Technical Manual.

(2) Bare wire straps are soldered into the pc board for options which are installed at the factory. These are not to be changed in the field except by instructions from Dynabyte Customer Support or when specified in the individual Dynabyte S-100 Bus Card Technical Manual.

(3) Instructions are written into a programmable read-only memory (PROM) at the Dynabyte factory resulting in a read-only memory (ROM). In some applications a ROM can be *phantomed* into a desired range of addressed RAM. Phantoming means a memory segment can replace another under program control. In the 5100/5010 configuration, when the 5100 is set to POWER ON or RESET is operated, the CPU jumps to the starting address of the disk controller ROM. The ROM boot instructions are overlaid at the common address location. These instructions are for the CPU to read Track 0, Sector 1 from Drive A. This particular operation is called the *ROM Boot*. Track 0, Sector 1 contains additional instructions which are loaded into RAM and executed. These instructions cause the CPU to read the Dynabyte Disk Operating System from the diskette or disk. This second operation is called the *Disk Boot*. The ROM is then switched out.

NOTE

Dynabyte ROMs are individually marked with a Dynabyte part number. The part number represents an individual program for a specific equipment configuration. The ROM part numbers are tabulated for various equipment configurations in the specific S-100 Bus Card Technical Manual.

Changes in options of this type are made by exchanging the particular ROM. ROMs are only available from Dynabyte.

2.17 Dynabyte S-100 Bus cards carry a distinctive white silkscreened marking on the component side of the pc assembly.

(1) The card name and part number. This facilitates board identification and referencing for reordering, servicing and referencing the appropriate Dynabyte S-100 Card Technical Manual, schematic or replaceable parts list.

(2) Component reference designators are marked when practical. They facilitate locating the individual part on a schematic or parts list.
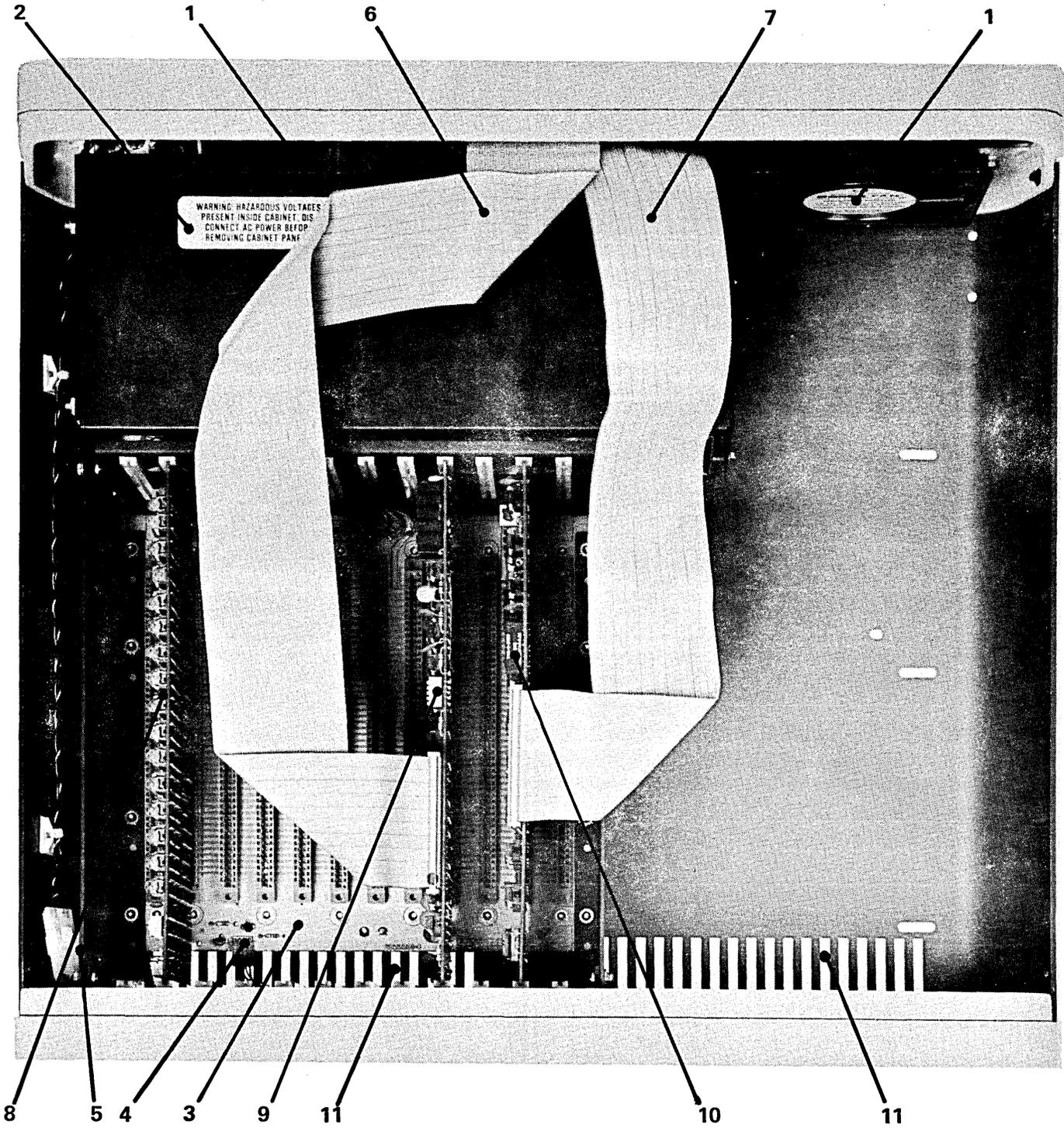
Figure 2-3 — 5100 Computer — Interior

Table 2-3 — 5100 Computer — Interior Major Assemblies

Key	Element	Function
1	Axial Fan(s)	Provides forced air cooling to the power supply module and internal heat dissipating pc assemblies.
2	Power Supply Module 800057	Accepts 115 or 230 Vac, 50-60 Hz and supplies the following preregulated voltages to the S-100 Bus and other assemblies: (1) +16 Vdc, (2) +8 Vdc, (3) Power Supply common, (4) −16 Vdc.
3	Card Cage and Motherboard PC Assembly 800038	Provides 12 pc assembly positions. Power and signal busses are tabulated by function in Table 7-1.
4	Front Panel Indicator Connector J13	A four-position connector which provides a connection point for the cable to the POWER ON, HALT indicators and the RESET switch on the front panel.
5	Front Panel Power Connector	A two-position connector which provides a connection point for the cable to the POWER ON switch on the front panel.
6	CPU I/O Cable 800285	Provides for the interconnection of data, status and control between the CPU PC Assembly and the rear panel I/O ports. Refer to Figure 2-2, Key 6, 7 and 8.
7	Disk Interface I/O Cable 800228	Provides for the interconnection of data, status and control between the Controller PC Assembly and the Rear Panel Disk I/O receptacle. Refer to Figure 2-2, Key 9.
8	Random Access Memory PC Assembly 800589	Provides storage for the Operating System, Application Program and variables during program execution.
9	CPU PC Assembly 803439	Provides a central processor, interrupt logic, two serial I/O ports and one parallel I/O port.
10	Main Disk Controller PC Assembly 800741	Provides the logic, status registers and ROM bootstrap to support the Dynabyte diskette drives. A Controller is normally supplied with the diskette storage unit and is shown in Figure 2-3 for reference only.
11	Cabinet Louvers	Provides air inlets for drawing air into the cabinet for ventilation.

Most Dynabyte pc assemblies derive the major component reference designators from a row-column matrix silkscreened onto the pc board. For example, rows are A to D and columns are 1 to 18 on the 64K RAM card. An integrated circuit located in the upper left corner is A1 and the one located in the lower right corner is D18.

2.18 Input/Output (I/O) Signals not affecting the S-100 Bus are transferred over special multi-pin connectors normally located at the top of the pc assembly. Cable harnesses which mate with these connectors are normally made up of flat multi-pair or flat twisted multi-pair cable. Figure 2-3, Keys 6 and 7, show typical flat I/O cables.

Power Supply Module

2.19 The power supply module is located at the rear of the 5100 cabinet between the card cage and the rear panel. The power supply operates on 115 or 230 Vac, 50 or 60 Hz line, optioned internally by straps. It utilizes a phase-controlled regulator to provide ac line and load regulation. The supply operates at relatively high efficiency and utilizes a minimum of components resulting in high reliability. The ac chassis wiring to the power supply module includes an EMI filter to minimize radiation of power supply switching transients over the ac line.

3. FUNCTIONAL DESCRIPTION

3.01 Part 3 will furnish the user with an overview of the 5100 Computer and the S-100 Bus. Detailed information on individual Dynabyte S-100 cards is provided in its technical manual.

NOTE

> *An * suffix to a signal name indicates logical NOT and active low.*

3.02 Figure 3-1 illustrates the 5100 Computer in block diagram. It should be used in conjunction with the schematic diagrams in Part 7 to familiarize the user with the circuits. The 5100 Computer chassis can be divided into three logical sections:

(1) Operational Controls,

(2) Power Supply Module,

(3) S-100 Bus.

3.03 Two *operation controls* are provided on the 5100 Computer.

(1) The POWER switch applies ac line voltage to the fans, ac convenience receptacle and power supply module. The POWER ON indicator is lit when the power supply module outputs nominally +8 Vdc.

(2) The RESET switch pulls the Reset line, Pin 75, of the S-100 Bus low to initiate a restart of the CPU, etc. The reset switch housing contains a lamp and indicates a halt when lit. A Halt Detector is part of the S-100 Motherboard PC Assembly. This detector monitors the HLTA line, Pin 48. When this status line goes high, a HLT instruction has been executed. The HALT indicator is lit.

3.04 The *Power Supply Module* converts ac line voltage to low dc voltages for the S-100 Bus and monitoring circuits. It provides regulation against ac line fluctuations and load variations of the S-100 Bus. The output voltages are nominally:

(1) +16 Vdc,

(2) +8 Vdc,

(3) −16 Vdc.

One adjustment, R2 on the Modulator PC Assembly and part of the power supply module, is used to set the +8 Vdc supply output voltage. The other voltages are nominal and track the +8 Vdc. Refer to Figure 6-2 for the tolerance range.

3.05 Regulation is provided by a triac modulating the ac line applied to the low voltage power transformer. The +8 Vdc output line is monitored and a feedback loop is used to control the conduction of the triac resulting in phase-controlled regulation.

3.06 All power supply output voltages are passively filtered. Ripple on the +8 Vdc line is 0.3 to 1 Volt.

3.07 The *S-100 Bus* system consists of a set of signal lines used to carry all information, interface messages and device-dependent messages among interconnected devices.

3.08 The bus structure is organized into seven sets of signal lines:

(1) Data Lines,

(2) Address Lines,

(3) Status Bus,

(4) Control Output,

(5) Control Input Bus,

(6) Vectored Interrupt Bus,

(7) Utility Bus.

Refer to Table 7-1 for the description which follows.

NOTE

> *In and Out References are in respect to the CPU.*
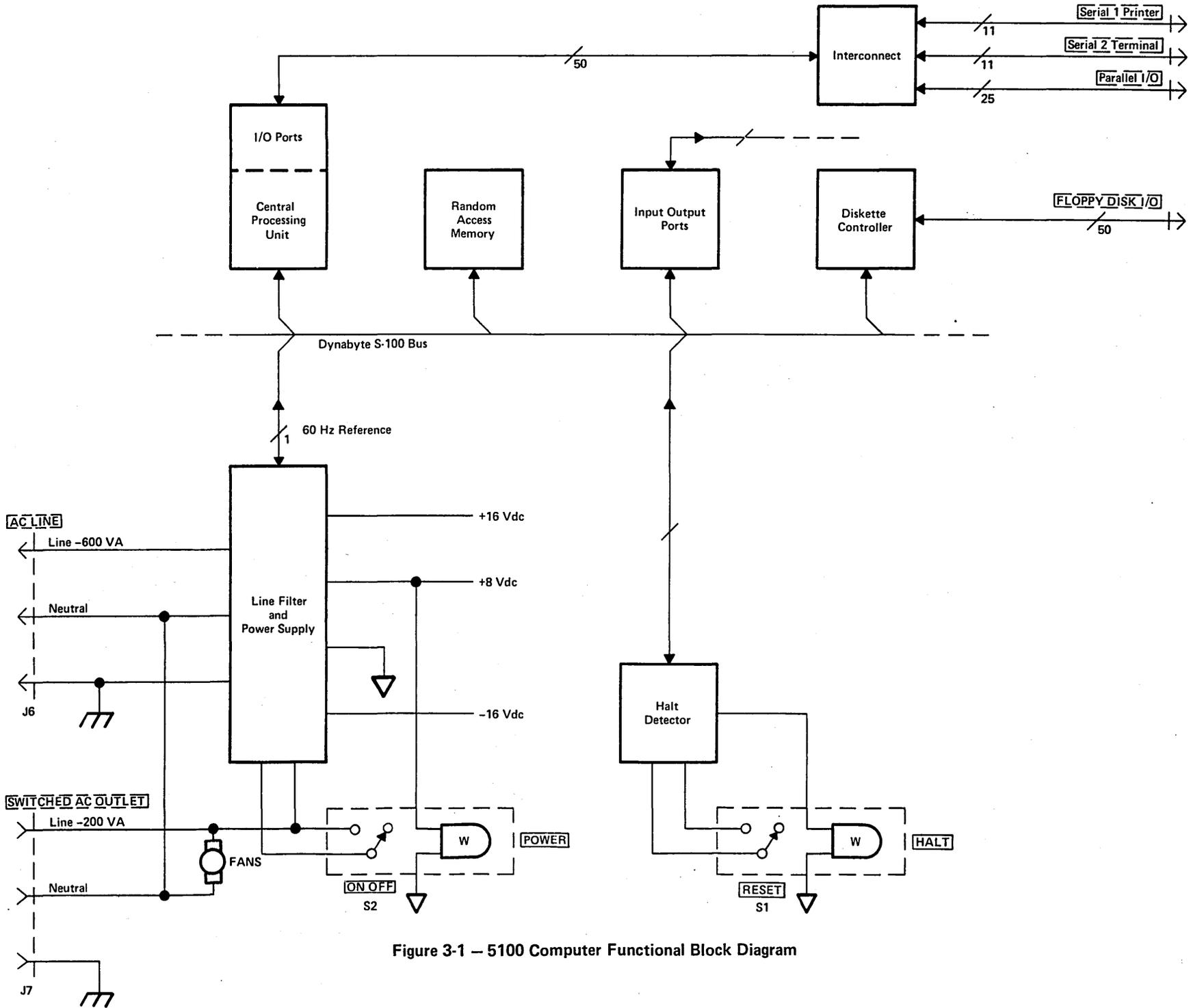
Figure 3-1 — 5100 Computer Functional Block Diagram

3.09 The data bus consists of 16 lines grouped as two unidirectional 8-bit busses for byte operations.

(1) Data output appears on the data output bus DO0 — DO7. DO7 is the most significant bit.

(2) Data input appears on the data input bus DI0 — DI7. DI7 is the most significant bit.

3.10 The address bus consists of 16 signal lines used to select a specific location in memory or a specific input/output device for communications during the current bus cycle. The memory address bus consists of 16 lines specifying 1 of 64K memory locations. These 16 lines are named A0 through A15, where A15 is the most significant bit. The I/O device address bus consists of lines, A0 through A7, specifying 1 of 256 I/O devices, with A7 used as the most significant bit. Address lines A15 — A8 are used as an I/O address modifier in specific cases, i.e., the Octaport.

3.11 The status bus consists of nine lines that identify the nature of the bus cycle in progress and qualify the nature of the address on the address bus. The mnemonics for status lines always begin with a lower case s and consist of:

(1) Memory Read — sMEMR

(2) Op-Code Fetch — sM1

(3) Input — sINP

(4) Output — sOUT

(5) Write Cycle — sWO*

(6) Interrupt Acknowledge — sINTA

(7) Halt Acknowledge — sHLTA

(8) Memory Request — sMREQ*

(9) Memory Refresh — sRFSH*

3.12 The lines of the control output bus determine the timing and movement of data during any bus cycle. The mnemonics for the control output lines always begin with a lower case p. The four lines are:

(1) pSYNC*, which indicates the start of a new bus cycle.

(2) pDBIN, a generalized read strobe that gates data from an addressed slave onto the data bus.

(3) pWR*, a generalized write strobe that writes data from the data bus into an addressed slave.

(4) pHLDA, the hold acknowledge signal that indicates to the highest priority temporary master that the permanent master is relinquishing control of the bus.

3.13 The five lines of the control input bus allow bus slaves to synchronize the operations of bus masters with conditions internal to the bus slave, e.g., data not ready, and to request operations of the permanent master, e.g., interrupt or hold. The five control input lines are:

(1) RDY

(2) XRDY

(3) INT*

(4) NMI*

(5) HOLD*

The ready lines are used by bus slaves to synchronize bus masters to the response speed of the slave. Thus cycles are suspended and wait states inserted until both ready lines are asserted. The RDY line is the general ready line for bus slaves. It is specified as an open collector line. The XRDY line is a special ready line used by test devices to stop and single-step bus masters. It is not specified as an open collector line and should not be used by other bus slaves since a bus conflict may exist.

3.14 The two interrupt lines INT* and NMI* are used to request service from the permanent bus master. The INT* line may be masked off by the bus master, usually via an internal software generation. If the bus master accepts the interrupt request on the INT* line, it may respond with an interrupt acknowledge bus cycle accepting vectoring information from the data bus.

3.15 The NMI* line is a nonmaskable interrupt request line, that is, it may not be masked off by the bus master. Accepting an interrupt on the NMI* line will not generate an interrupt acknowledge bus cycle. An interrupt request on the INT* line is asserted as a level, that is, the line is asserted until interrupt service is received. An interrupt request on the NMI* line, on the other hand, is asserted as a negative-going edge, since no interrupt acknowledge cycle will be generated. Both lines are specified as open-collector lines.

3.16 The hold request line, HOLD*, is used by temporary bus masters to request control of the bus from the permanent bus master to prevent temporary masters from gaining bus control. The HOLD* line is specified as an open collector line and may only be asserted at certain times.

3.17 The eight lines of the vectored interrupt bus are used in conjunction with the generalized vectored interrupt request, INT*, to arbitrate among eight levels of interrupt request priorities. The eight lines of the vectored interrupt bus are VI0* through VI7*, where VI0* is considered the highest priority interrupt. The vectored interrupt lines should be implemented as levels; that is, they should be held active until service is received.

3.18 Power in the Dynabyte S-100 Bus systems is distributed to bus devices as unregulated voltages. A total of six bus lines are used:

(1) +8 Volts, 2 lines,

(2) +16 Volts, 1 line,

(3) –16 Volts, 1 line,

(4) Power supply common, 2 lines.

3.19 The system clock, 4 MHZ PHASE 2, is generated by the CPU. The control timing for all bus cycles must be derived from this clock. This signal is never transferred during a bus exchange operation.

3.20 Another line, called CLOCK, is specified as a 2 MHz, 0.5 percent tolerance, signal with no relationship to any other bus signal. It is used by counters, timers, baud-rate generators, etc.

3.21 System reset functions are divided into two lines:

(1) RESET*, is an open collector input line that requests a Power On Clear (POC).

(2) POC*, power on clear is active on power on and when requested by RESET*, is specified as having a minimum active period of 10 ms.

3.22 The memory write strobe, MWRT, is generated by the permanent bus master and is defined as:

$$MWRT = pWR \bullet sOUT* \text{ (logic equation)}$$

3.23 Another line, PHANTOM*, is provided for overlaying bus slaves at a common address location. When this line is activated, phantom bus slaves are enabled and normal bus slaves are disabled. This line is specified as an open-collector line.

3.24 The remaining lines are designated as Dynabyte reserved and for use in future S-100 card and system designs.

4. SPECIFICATIONS

4.01 Part 4 furnishes the user with information for shipping and installation and should be used to establish acceptance tests if they are performed. Minor deviations from the specifications tabulated in Tables 4-1 and 4-2 which do not affect the 5100 Computer are excluded from the Dynabyte Warranty.

4.02 The functional specifications of the 5100 Computer are determined by:

(1) The Dynabyte Disk Operating System and the particular application program running, i.e., the software.

(2) The specific Dynabyte S-100 cards installed in the bus, i.e., the hardware.

4.03 Table 4-1 summarizes the 5100 Computer Functional Specifications with the following hardware:

(1) Central Processing Unit,

(2) 64K Random Access Memory.

For other hardware configurations the user should refer to the individual Dynabyte S-100 Card Technical Manual Specifications.

Table 4-1 — 5100 Computer Functional Specifications

Parameter	Characteristics
Front Panel Section	
Power Switch	Alternate action. Lit in POWER ON condition.
Reset Switch	Momentary action. Lit when the CPU is in the Halt condition.
Card Cage Section	
System	Dynabyte S-100 Bus
Capacity	12 positions
EMI	Fully shielded backplane
Processor Section	
Type	Z-80A
Clock Rate	4 MHz
Instruction Set	158

Interval Timer
        Number
        Time Unit
        Range
        Interrupt
	
	10
	64 μs per count
	1 to 255 units (64 μs − 16.32 ms)
	Interrupts on 0 count under program control

Real Time Clock
        Frequency
        Indication
	
	Ac line synchronous
	Sets status bit or causes interrupt

Table 4-1 — 5100 Computer Functional Specifications (Continued)

Parameter	Characteristics

Interrupts
  Number
  Priority, Highest
	16
	Timer 6
	Timer 7
	Port Interrupt
	Timer 8
	Serial 2 Receive Data Available
	Serial 2 Transmit Data Available
	Timer 9
	Timer 10 or Parallel Port Input Bit 7
	Timer 1
	Timer 2
	Real Time Clock
	Timer 3
	Serial 1 Receive Data Available
	Serial 1 Transmit Buffer Empty
	Timer 4

Priority, Lowest	Timer 5

Levels of Interrupt
  Masking
    Level 1
    Level 2
	2
	
	Masks all interrupts
	Individual masking of interrupts

Off Card Interrupts	One maskable One unmaskable
Input/Output Section	
Serial Ports Rates	2 110, 150, 300, 880, 1200, 2400, 4800, 9600, 19,200, 38,400, 76,800 baud

Rate Selection
  Connector
    Data In
    Data Out
    Signal Common
    Data In
    Data Out
	Software control
	DB-25-S
	EIA RS-232C
	EIA RS-232C
	EIA RS-232C
	20 ma current loop
	20 ma current loop

Parallel Port
  Input
  Input Ready Flag
  Input Sense
  Output
  Output Strobe
  Output Flags
  Connector
	1
	8 bits
	Edge triggered
	1 bit
	8 bits
	1 bit
	2
	DB-25-S

Table 4-1 — 5100 Computer Functional Specifications (Continued)

Parameter	Characteristics
Memory Section	
Random Access	
Address	16 bit
Size	65,536 bytes (64K)
Type	Dynamic
Cycle Time	400 ns
Optional	Bank switching
Size	400K bytes maximum
Power Supply Section	
Type	Phase-controlled regulator
Voltages	±16 Vdc at 6 A
	+8 Vdc at 20 A
Adjustment	1
Rear Panel Section	
DB-25-S Connector Positions	8 or 16
Diskette Storage Connector	50-conductor ribbon
Convenience Receptacle	Two-wire and grounded NEMA 200 VA maximum

Table 4-2 — 5100 Computer Physical Specifications

Parameter	Characteristics
Cooling, Revision A Revision B	140 CFM, two 4-5/8 inch axial fans 70 CFM, one 4-5/8 inch axial fan
Operating temperature	10° to 35°C (50° to 95°F)
Relative humidity	20% to 80%

Line Voltage, standard
        optional
        power
	115 ±10% Vac, 60 Hz
	230 ±10% Vac, 50 Hz
	313 VA

Dimension, width
        depth
        height
        weight
	52.1 cm (20.5 inches)
	47.0 cm (18.5 inches)
	17.8 cm (7.0 inches)
	25.0 kg (55 lbs.)

5. OPERATION AND INSTALLATION

Unpacking

5.01 After the 5100 Computer arrives, the shipping cartons should be examined for visible loss or damage.

IMPORTANT

> *Each unit's shipping carton should be retained for the warranty period and used for the return of equipment to Dynabyte if it is necessary.*

Since the 5100 can be ordered in several optional configurations:

(1) Random access memory size,

(2) RAM bank switching,

(3) Number of I/O ports,

(4) Type of mass storage,

(5) Slave CPUs,

check to make certain the packing slip agrees with the Purchase Order. *Do not apply power to any unit.*

5.02 Next, check each unit for concealed loss, damage or omissions in shipment. The laminated wood cover is secured to the chassis by six 3/32 hex head 6-32 x 1/2 screws. A hex head wrench is supplied with the 5100 Computer.

IMPORTANT

> *Remove only the three center hex head screws from each side of the cover.*

Figure 2-3 illustrates the 5100 interior. The Dynabyte S-100 Bus structure allows any Dynabyte S-100 card to be installed into any vacant card position, but as a matter of practical cabling convenience, the order shown in Figure 2-3 is recommended.

Step	Procedure
1	If a Dynabyte mass storage, e.g., 5010 or 5012 was ordered, install the Controller PC Assembly and connect its 5100 Disk I/O Cable to the rear panel of the computer.
2	If additional I/O Ports were optioned, confirm that the Octaport PC Assembly is installed and its Port I/O Cable is connected to the rear panel.
3	Check the interior for loss or damage during shipment. (1) Loose screws, nuts or washers, (2) Broken wires or loose components, (3) Major assemblies broken at mountings.

IMPORTANT

> *The equipment is thoroughly tested, inspected and carefully packed before leaving the Dynabyte factory. Claims for loss or damage should be made upon the carrier, NOT TO Dynabyte, as follows:*
>
> *(1) Visible Loss or Damage – must be noted on the freight bill or express delivery sheet. The form required to file such a claim will be supplied by the carrier.*
>
> *(2) Concealed Loss or Damage – means loss or damage which does not become apparent until the equipment has been unpacked and placed in service. When the damage is discovered upon unpacking, make a written request for an inspection by the carrier's agent within fifteen days of the delivery date. Then file a claim with the carrier.*
>
> *Obvious workmanship problems or incomplete shipments should be reported immediately to Dynabyte.*
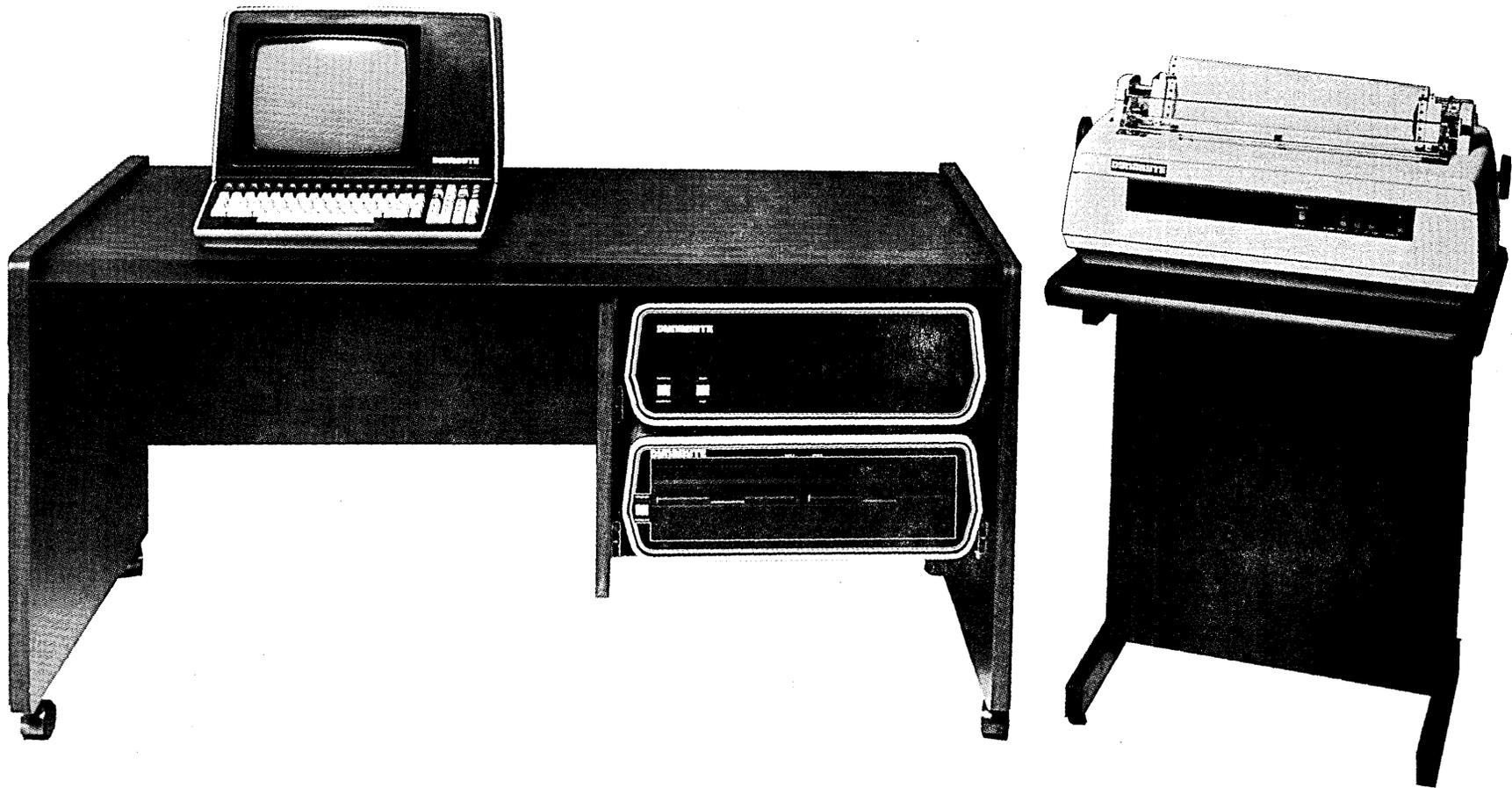
Figure 5-1 — 5100 Computer Installed In A Dynabyte Desk Enclosure

Ac Line

5.03   The 5100 Computer is normally wired and shipped from the factory for operation from a 115 Vac, 60 Hz single ac line. The ac line receptacle, J6, is provided with a third wire bonded to the chassis.

IMPORTANT

> *Safe operation of Dynabyte equipment depends upon the user providing a two-wire, grounded, 115 Vac, 15 Amp service wall receptacle.*

Select a wall receptacle which is not switched except for a circuit breaker. Ideally no other equipment should be connected to the branch circuit.

Options

5.04   The user should refer to the Dynabyte S-100 Card Technical Manual for detailed information for options to individual S-100 cards and system components. Figures 5-2 through 5-4 will furnish the 5100 user with option settings necessary for a 5100 system to run diagnostic programs.

NOTE

> *The 5100 Computer chassis is wired at the factory for either 115 Vac, 60 Hz or 230 Vac, 50 Hz operation. Conversion in the field for operation on the alternate voltage is not recommended.*

5100/5010 Units

5.05   Refer to the following option check procedure when operating the 5100 Computer with one or two 5010 Units.

Step	Procedure
1	For a single 5010 Unit installation, check the Main Disk Controller PC Assembly options: (1) Disk Clock strap to DB8/4 8/2 position, (2) A ROM should be installed appropriate to drive manufacturer and number of surfaces. Refer to Figure 5-4 for the locations of these options.
2	Check the Auxiliary Disk Controller PC Assembly options for a single 5010 Unit installation: (1) Address strap to 1, (2) Terminating resistor pack installed at A3.
3	For a two 5010 Unit installation, check the Main Disk Controller PC Assembly options: (1) Disk Clock strap to DB8/4 position, (2) A ROM should be installed appropriate to drive manufacturer and number of surfaces. Refer to Figure 5-4 for the locations of these options.
4	Check the Auxiliary Disk Controller PC Assembly options for a two 5010 Unit installation. (1) Unit 1 address strap to 0, (2) Unit 2 address strap to 1, (3) Unit 1 A3 vacant, (4) Unit 2 terminating resistor pack at A3.

IMPORTANT

> *Only one Terminating Resistor Pack should be*
> *installed in a Disk Storage System.*
> *The Resistor Pack should only be installed*
> *in the last Auxiliary Controller*
> *in the Disk Storage System.*

Set Up and Turn On

5.06 The following procedure will serve as a useful check list for setting up or resetting up the 5100 Computer. For illustration purposes the system components are:

(1) 5100 Computer, 64K Dynamic RAM.

(2) Serial 1 Port is connected to the Serial Printer, 300 baud, and is the listing device (LST:).

(3) Serial 2 Port is connected to the Video Terminal, 9600 baud, and is the console device (CON:).

(4) 5010 Dual Diskette Storage Unit.

(5) Dynabyte Disk Operating System Diskette.

NOTE

> *Set all ac line power switches to OFF.*

Step	Procedure
1	Install 5100 and 5010 so as not to obstruct the air flow through the louvers in the bottom of the cabinets. Make certain there is a three-inch clearance from the rear of the fans. Dynabyte desk-type cabinets, Figure 5-1, are designed to assure constant air flow through the equipment cabinets.
2	Check the option switch settings: (1) Each S-100 Bus card. Refer to 5.04 above.

Step	Procedure
	(2) Video Terminal. Refer to the Technical Manual. (3) Serial Printer. Refer to the Technical Manual.
3	Connect to computer system cables: (1) EIA cable between Port 1 and the Serial Printer. (2) EIA cable between Port 2 and the Video Terminal. **IMPORTANT** > *Tighten the retaining screws* > *on the DB-25-S connectors.* > *Do not overtighten.* (3) System Disk I/O Cable between the 5100 50-position receptacle and the 5010 50-position receptacle. **NOTE** > *The System Disk I/O Interface* > *Cable is polarized by a ● (dot)* > *marking. Match the painted dot* > *on the cable plug with the dot* > *on the chassis receptacle.*
4	Connect the ac line cords: (1) Video Terminal ac line cord to the wall receptacle, (2) Serial Printer ac line cord to the wall receptacle. (3) 5010 ac line cord to the switch ac receptacle, J7,
5	Open both diskette drive doors.

Step	Procedure
	NOTE
	Always check the drives does not have a diskette installed before installing a diskette into a drive.
6	Turn on the ac power switches: (1) Video Terminal, (2) Serial Printer, (3) 5100 Computer, (4) 5010 Dual Diskette Storage Unit.
7	Verify the following: (1) Power on indicators on all units are lit, (2) Fans in 5100 and 5010 are running, (3) 5010 Disk Drive A select lamp is flashing.
8	Insert the System Diskette into Drive A and close the door.
9	The Video Terminal should present the Dynabyte sign-on message.
10	Refer to the 5100 Computer Operation Manual.
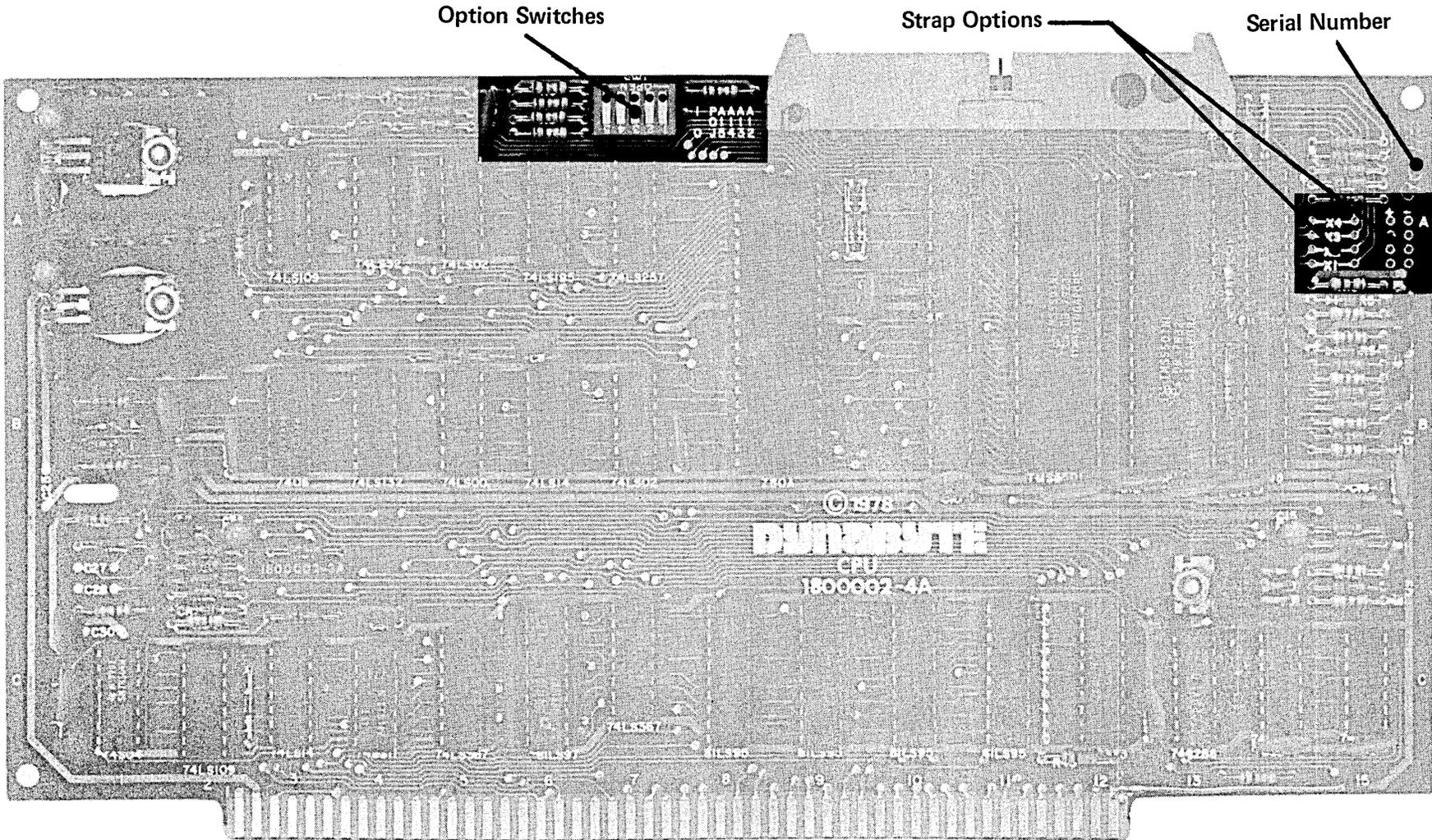
Option Switches

Strap Options

Serial Number

NOTE: The dots on the switches indicate the direction in which the switch should be set for correct operation.

Figure 5-2 — Central Processing Unit — Option Switch Settings
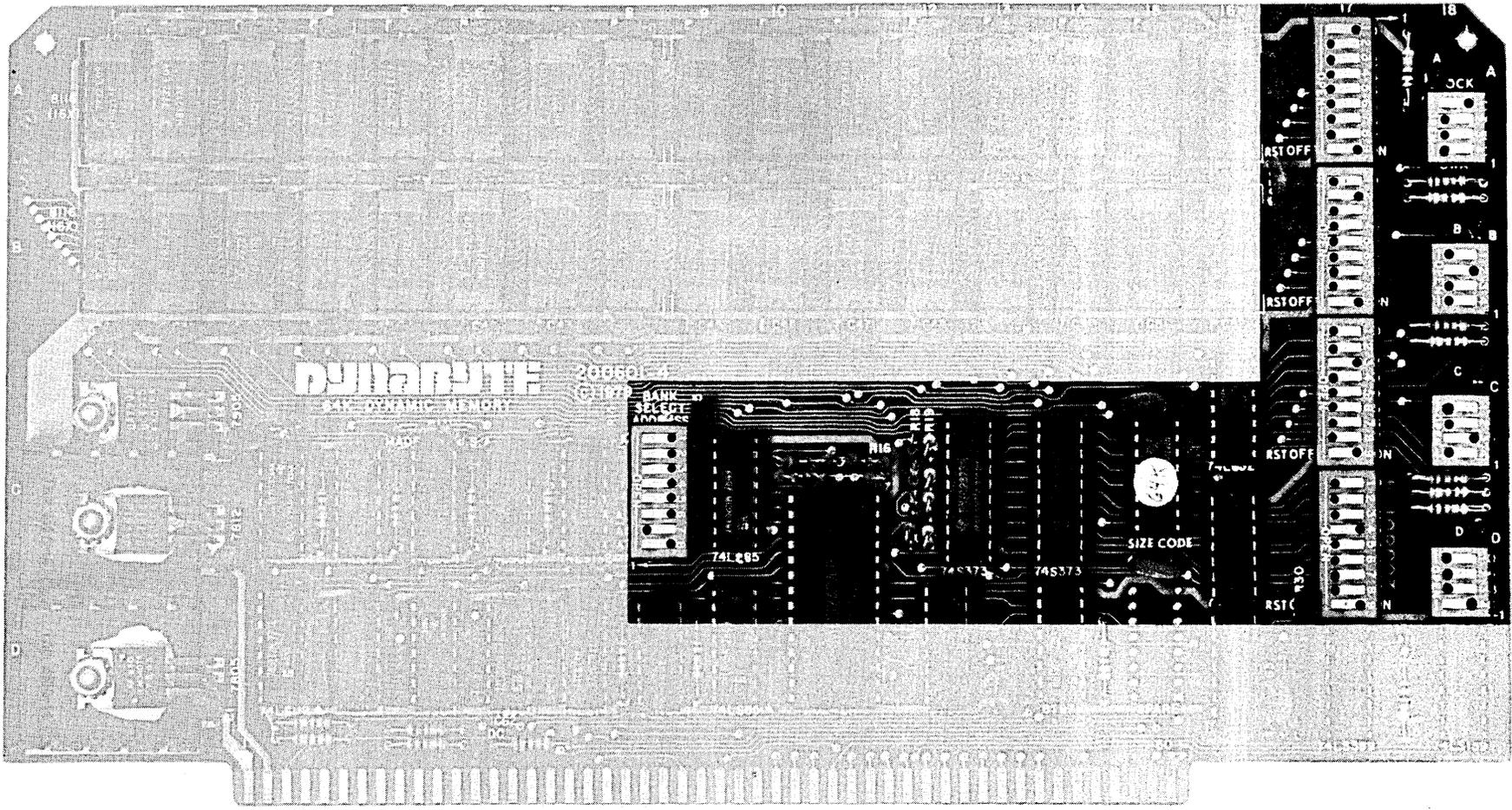
NOTE: The dots on the switches indicate the direction in which the switch should be set for correct operation.

Figure 5-3 — 64K Random Access Memory — Option Switch Settings

Serial Number Disk Clock Option Strap Option Switch
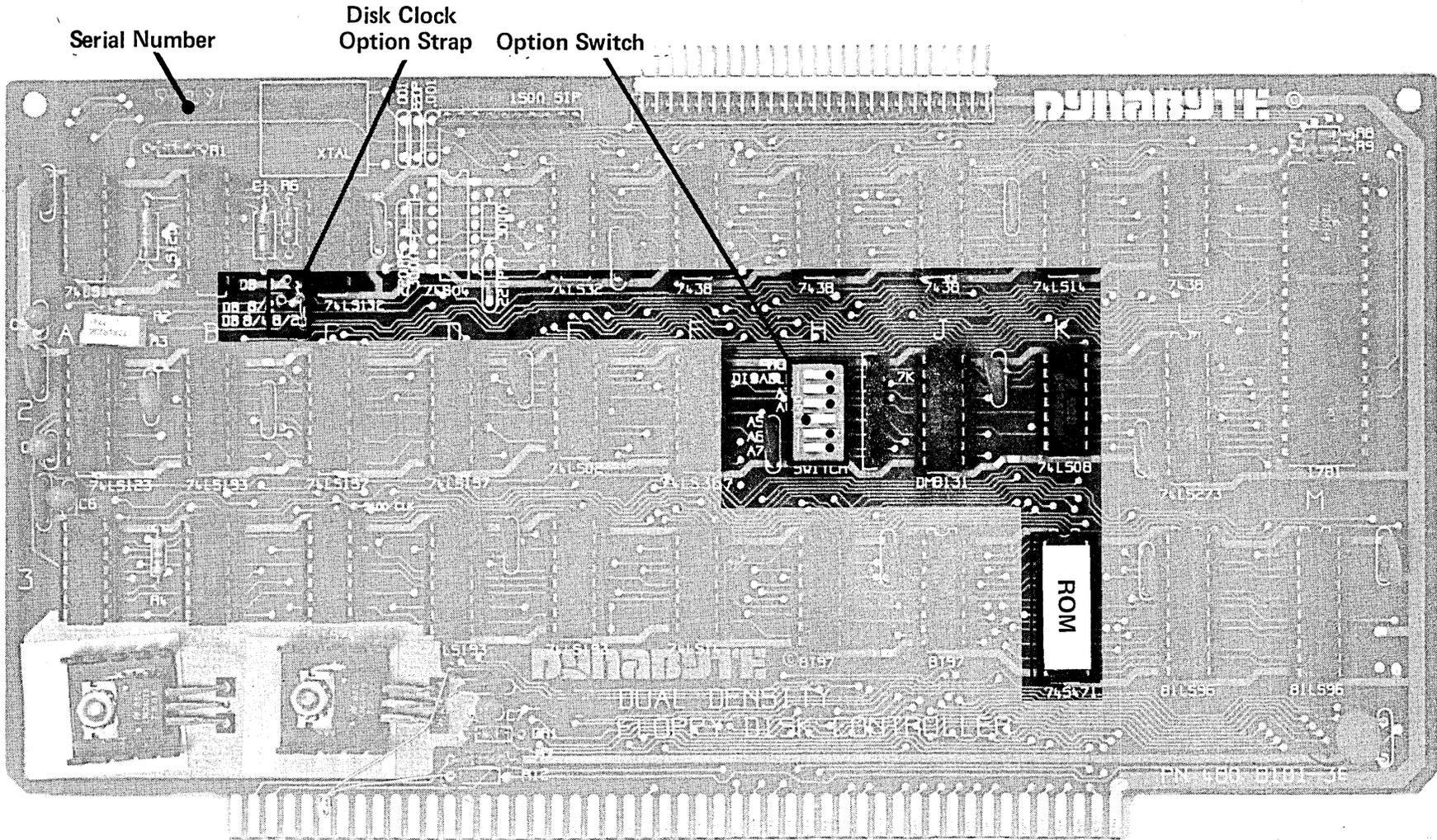
NOTE: 1. The dots on the switches indicate the direction in which the switch should be set for correct operation.

ROM Option Selection

Dynabyte Part Number	Mnemonic	Dynabyte Equipment
803952	RBOOT1A	5100 and 5010 Shugart 1D Drives, 5200 and 5010 Shugart 1D Drives, 5200 alone
802033	RBOOT2	5100 and 5010 Remex 1D Drives, 5200 and 5010 Remex 1D Drives, 5200 alone
802052	RBOOT3	5200 and 5010 Remex 2D Drives, 5200 and 5010 Remex 2D Drives, 5200 alone
803971	RBOOT4A	5100 and two 5010s 2D Drives
804741	RBOOT5	5100 and two 5010s 1D Drives

NOTE: 1D is a single-surface diskette. 2D is a double-surface diskette.

Figure 5-4 — Disk Controller — Option Switch Settings

6. MAINTENANCE

6.01 The 5100 Computer is a result of several years of design, development and modern electronic manufacturing. The units are designed around the latest semiconductors and integrated circuits. They operate at relatively low power levels with adequate cooling. Each 5100 Computer is operated under power and functionally tested in the Dynabyte factory for a minimum of 72 hours before shipment. The 5100 Computer can be expected to operate at peak performance for long intervals. No routine maintenance is required except occasional dusting and cleaning of the painted surfaces with a good all-purpose cleaner which does not attack or scratch painted surfaces or plastic.

(1) Formula 409 All Purpose Cleaner
Distributed by Clorox Company
Oakland, Ca. 94612

available from most supermarkets is well suited for this application.

Customer Support Service

6.02 Maintenance and procedures described in this manual should be performed in accordance with local instructions and the individual user's maintenance plan. Maintenance and repair of the 5100 Computer during the warranty period should be limited to:

(1) returning the 5100 Computer,

(2) isolation of a fault to a specific pc assembly or unit,

(3) replacement of the ac line fuse once.

NOTE

Dynabyte Authorized Service Centers (ASC) are staffed with factory-trained technicians that are supplied with technical manuals and routinely receive service bulletins and design change information on Dynabyte equipment.

Repacking and Returning Material

6.03 The Dynabyte Customer Support staff is available by telephone for assistance in troubleshooting and recommendations for repairs. If equipment is to be returned for repair or replacement, the following procedure will expedite repair and return of the equipment. All communications and material should be directed to:

Dynabyte, Inc.
Customer Support
521 Cottonwood Drive
Milpitas, CA 95035
(408) 263-1221
Telex 346-359

Step	Procedure
1	Call Dynabyte Customer Support by telephone and provide the following information: (1) The nearest Dynabyte Authorized Service Center name and number if known. (2) The Dynabyte Model Number and Serial Number of the equipment. Figure 6-1 illustrates the Dynabyte Identification Plate for equipment. Normally this is located at the rear of the equipment.
2	If the fault has been traced to a specific subassembly, e.g., an S-100 Bus card, furnish the type, part number and serial number. This information is marked on the component side of the pc assembly. (1) Subassembly replaced into the failed equipment if one was available. (2) Subassembly to be returned to Dynabyte.

Step	Procedure
3	Furnish a brief statement of the problem.
4	Customer Support will issue a Return Material Authorization Number (RMA Number). (1) The RMA permits the Dynabyte Customer Support staff to provide better coordination of returned material. (2) The RMA permits the Dynabyte customer to easily reference material returned to Dynabyte. **NOTE** *Material returned to Dynabyte without a Return Material Authorization for repair will be refused by Dynabyte and returned to the sender.*
5	Package equipment in the Dynabyte packing carton in which the equipment was received. If the original packing material is not available, Dynabyte Customer Support will provide information and recommendations or material to be used.
6	Fill out and enclose a Dynabyte Repair Service Report with the equipment or provide the following information in writing: (1) The RMA number furnished by Dynabyte. (2) The nearest Dynabyte Authorized Service Center. (3) Model number and serial number of equipment. Refer to Step 1 above. (4) A brief statement of the problem.
7	Ship the equipment to Dynabyte, shipment prepaid.

Key	Function
1	Dynabyte Model Number.
2	Dynabyte Chassis Serial Number.
3	Dynabyte date of manufacture.
4	Ac line voltage which the chassis is wired for operation.
5	Ac line frequency which the chassis will operate.
6	Power dissipation of chassis.
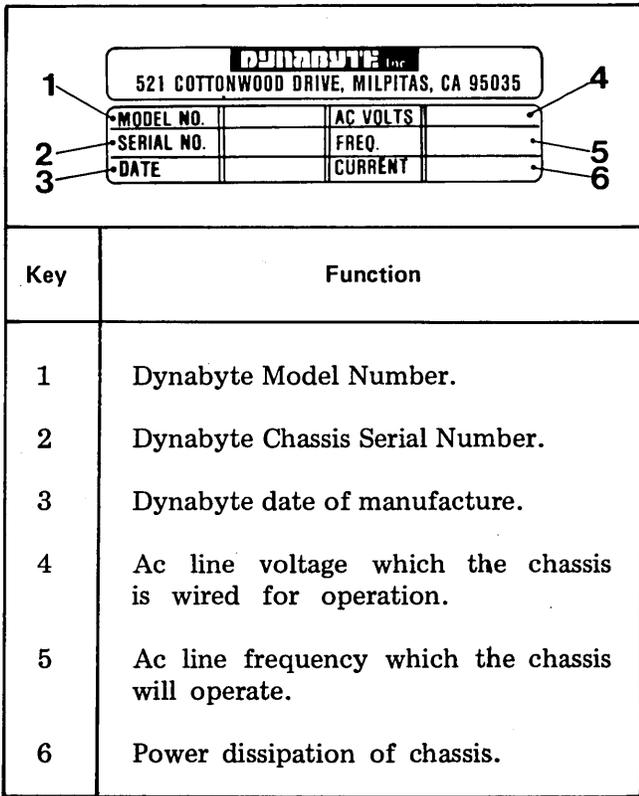
Figure 6-1 — Dynabyte Identification Plate

Diagnostics

6.04 A diagnostic program supplied on a diskette is available for the 5100 Computer, and is intended for use with a 5010 Dual Diskette Storage Unit and by a Dynabyte Authorized Service Center. The program performs a three-minute test to verify the 5100/5010 works in general and the diskette drives are functioning properly. The program diskette is supplied with a Dynabyte Technical Manual describing the program operation in detail.

Fault Location

6.05 A troubleshooting chart has been included in this manual to assist the user in isolating a fault location to one of three areas. Refer to Table 6-1.

(1) The fault symptom resulted from incorrect user operation of the 5100 Computer.

(2) The fault symptom resulted from some other piece of equipment, e.g., cable, diskette storage, diskette or terminal.

(3) The fault symptom resulted from a 5100 S-100 card or power supply module.

Table 6-1 does not tabulate all the possible symptoms, only those Dynabyte Customer Support has found most likely to occur. The QUICK TEST diagnostic programs, refer to 6.04 above, will also provide pointers for troubleshooting hardware malfunctions.

Power Supply Module Voltages and Adjustment

6.06 The procedure which follows will assist the user in checking and adjusting the power supply should it be necessary. The user will need a digital multimeter (DMM), e.g., Fluke 8020A or equal. Refer to Figure 6-2.

Terminal	Voltage	Tolerance
Ac Line	115 Vac	±10%
6	+16 Vdc	17 +3/−2 Vdc
4	+ 8 Vdc	9 ±0.5 Vdc
1	0 Vdc	PS Common Reference
3	−16 Vdc	−17 −3/+2 Vdc
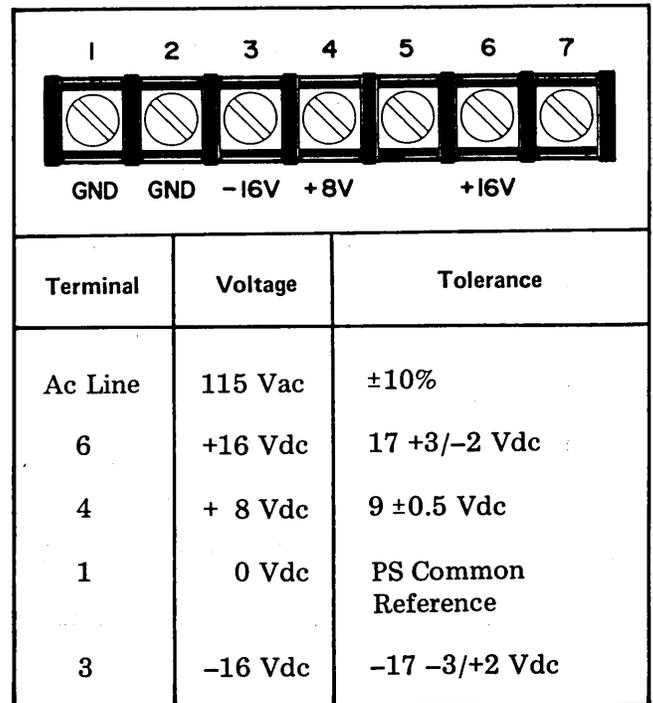
Figure 6-2 — Power Supply Module Voltage Test Points — BS1

Step	Procedure
1	Remove the top cover. Refer to 6.08 below.
2	Remove the power supply cover. Refer to 6.09, Steps 1 through 3.
3	The power supply voltages are distributed from barrier strip, BS1.
4	Connect the DMM (–) lead to Terminal 1 and the (+) lead to Terminal 7. The voltage should be: 9 ± 0.5 Vdc
5	If it is necessary to adjust the +8 Vdc supply to bring this into tolerance, adjust R2 on the Modulator PC Assembly.
6	Check each of the other voltages tabulated in Figure 6-2 are in tolerance.

Removing Assemblies

6.07   The user will need the following hand tools to remove the major assemblies from the 5100 Computer chassis:

(1) 3/32 hex Allen wrench,

(2) 11/32 socket wrench,

(3) 1/4 socket wrench,

(4) No. 2 Phillips head screwdriver,

(5) No. 3 Phillips head screwdriver.

6.08   *Top Cover* – The descriptions which follow view the 5100 Computer from the front. Perform the following:

Step	Procedure
	WARNING *Hazardous voltages are present inside the cabinet. Disconnect ac power before removing the cabinet cover or assemblies.*
1	Remove the *center* three 3/32 hex head screws from each side of the top cover.
2	Remove the cover and place it in position so the woodgrain surface will not be marred during servicing.

6.09 *Power Supply Module* — is located between
the card cage and the rear panel. Perform
the following:

Step	Procedure
	NOTE
	Handle I/O cables with care as they can be easily damaged.
1	Disconnect the following cables: (1) Port I/O Cable from the CPU. (2) Disk Interface I/O Cable from the Controller. Dress cables back over the rear panel.
2	Remove the two 6-32 Kep nuts and flat washers from the left side of the black anodized power supply cover.
3	Remove the two 4-40 Kep nuts and flat washers from the right side of the power supply cover.
4	Remove the power supply cover.
5	Disconnect the Motherboard Power Cable. (1) BS1 — 1 BLK (1) — 2 BLK (1) — 3 VIO/WHT (1) — 4 ORG/WHT (2) — 5 Vacant — 6 RED/WHT (1) — 7 Vacant (2) BS2 — 5 YEL (1)
6	Remove the four Phillips head 10-32 screws, star washers and flat washer which secure the Power Supply Module to the cabinet base.
7	Shift the Power Supply Module slightly to gain access to the rear interior. Disconnect the ac line. This is two push-on connectors on the EMI line filter.
8	Remove the Power Supply Module from the 5100.

6.10 *Card Cage — S-100 Bus Motherboard —* is located directly behind the front panel. The Motherboard Power Cable must be disconnected first. Repeat 6.09, Steps 1 through 5. Then, perform the following:

Step	Procedure
1	Remove all the S-100 cards installed in the card cage.
2	Disconnect the front panel cable connector from J14, the four-conductor pc-mounted receptacle.
3	Remove the fourteen 6-32 x 3/8 Phillips head screws and star washers which secure the S-100 Motherboard PC Assembly to the cabinet base.
4	Remove the card cage from the 5100 Computer.
5	Remove the eight 6-32 x 3/8 Phillips head screws and star washers which secure the S-100 Bus Motherboard PC Assembly to the card cage.

6.11 *Front or Rear Panel —* Both panels are secured to the respective cabinet bezel by five 6-32 Kep nuts. It is more convenient to remove the entire bezel. Perform the following:

Step	Procedure
1	Remove the two 3/32 hex head screws from each side.
2	Remove the five 8-32 x 3/4 Phillips head screws and star washers which secure the bezel to the cabinet base. Two of these screws also secure rubber bumpers.
3	Disconnect the electrical connections from the respective panel. (1) Front Panel — Disconnect the ac line cable from the rear panel and the front panel cable connector from J14, the four-conductor pc mounted receptacle. (2) Rear Panel — Disconnect the ac line cable to the front panel and the ac line cable to the power supply. This consists of two push-on connectors on the EMI line filter.
4	Remove the panel.

Table 6-1 — Troubleshooting Chart

No.	Symptom	Probable Cause	Remedy
1	POWER ON indicator does not light and fans are not running.	1. Power cord is not connected to the ac line. 2. The ac line fuse is blown. 3. The power supply module is defective.	1. Connect to the ac line. 2. Replace the fuse one time only. Then check the ac chassis wiring. 3. Replace or repair. Refer to Trouble 2 below.
2	POWER ON indicator flickers.	1. The power supply module is defective. 2. One of the S-100 Bus cards is defective.	1. Check all output voltages. Refer to Figure 6-2. Replace or repair. 2. Remove one card at a time from the bus. Monitor the power supply output until the trouble clears. Replace or repair the card.
3	POWER ON indicator is lit. RESET is pressed. The sign on message is not presented on the console. Drive A Select indicator does not light.	1. System cables or options are incorrect for the installation. 2. Power Supply module is defective.	1. Check cables and options. 2. Refer to Trouble 2 above.
4	POWER ON indicator is lit. RESET is pressed. The sign on message is not presented on the console. Drive A Select indicator lights and heads load several times.	1. System diskette is inserted incorrectly or is missing. 2. System diskette is defective or has incorrect operating system for the installation. 3. Chassis connectors or wiring is defective. 4. Power Supply module is defective. 5. Controller is defective. 6. Aux Controller is defective. 7. Drive A is defective.	1. Insert system diskette. Press RESET. 2. Insert a new system diskette. 3. Check. Refer to Part 7 for diagram. 4. Replace or repair. Refer to Trouble 2 above. 5. Replace or repair. 6. Replace or repair. 7. Refer to Trouble 7 below.

Table 6-1 — Troubleshooting Chart (Continued)

No.	Symptom	Probable Cause	Remedy
5	RESET button pressed. No sign on message is presented on the console. Drive A Select indicator lights and the head loads once.	1. Console is not configured to the system. 2. System diskette has a defective operating system. 3. CPU is defective.	1. Check console cabling to port, data communication controls, e.g., baud rate, parity, etc. 2. Insert a new system diskette. 3. Replace or repair.
6	RESET is pressed. HALT indicator remains lit.	1. CPU is defective. 2. The phantom bootstrapping option jumper is not installed in the lowest addressed RAM. This is appropriate to: 16K Dynamic 16K Static 32K Static 3. RAM is defective.	1. Replace or repair. 2. Install jumper. Refer to the Technical Manual. 3. Replace or repair.
7	Diskette drive is defective. The spindle is turning.	1. Motor pulley is the wrong size. 2. Internal drive troubles.	1. Replace. 2. Refer to the Technical Manual for the drive.
8	Diskette drive is defective. The spindle is not turning. The drive motor is running.	1. Drive belt motor is off or broken. 2. Drive motor belt pulley is loose.	1. Reinstall or replace the belt. 2. Tighten.
9	Diskette drive is defective.	1. No power to the drive motor. Power Supply module is defective. 2. Drive motor is defective.	1. Refer to Trouble 2 above. 2. Replace or repair.

7. REFERENCE

S-100 Bus

7.01 Shortly after the introduction of the 8080, 8080A and Z-80 Microprocessor integrated circuits, several high-technology companies developed the S-100 Bus structure for use in personal and business computer systems. The S-100 Bus has been adapted by over 50 other manufacturers who also offer products that connect to the bus. Table 7-1 tabulates the Dynabyte S-100 Bus pins by assignment and function in the 5100 Computer.

Schematics and Replaceable Parts

7.02 Figure 7-1 furnishes the chassis wiring for the 5100 chassis. Table 7-2 tabulates replaceable parts for the 5100 Computer chassis covering:

(1) Front panel assembly,

(2) Rear panel assembly,

(3) Frame assembly.

Schematics and replaceable parts lists for all other assemblies, modules and pc assemblies or S-100 cards are covered in the individual Dynabyte Technical Manual.

7.03 On May 1, 1980, Dynabyte changed its part number system.

(1) The old part number system used an eight-digit part number with a letter suffix indicating the revision level.

    Format: •   NNNNNNN-NL

    Example: 1800002-4A

(2) The current system uses a six-digit part number.

    Format: NNNNNN

    Example: 803439

All references in this manual reference the current six-digit part numbering system. Tables 7-3 and 7-4 furnish the user with a cross reference for parts and assemblies discussed in this manual.

7.04 Table 7-5 tabulates the rear panel DB-25-S receptacle pin assignments when the three I/O ports from the CPU are used.

Technical Manual Revisions

7.05 The following summarizes the change history for this technical manual.

(1) Revision A — The initial release — August, 1980.

(2) Revision B — Removed minor typographical errors and added Disk Controller Options Procedure in Part 5 — June, 1981.

Table 7-1 — Dynabyte S-100 Bus Pin Assignments

Pin No.	Signal — Type	Active Level	Description
1	+8 Volts (B)		Instantaneous minimum greater than 7 Volts, instantaneous maximum less than 25 Volts, average maximum less than 11 Volts.
2	+16 Volts (B)		Instantaneous minimum greater than 14.5 Volts, instantaneous maximum less than 35 Volts, average maximum less than 21.5 Volts.
3	XRDY (S)	H	One of two ready inputs to the current bus master. The bus is ready when both these ready inputs are true. See pin 72.
4	VI0* (S)	L OC	Vectored interrupt line 0.
5	VI1* (S)	L OC	Vectored interrupt line 1.
6	VI2* (S)	L OC	Vectored interrupt line 2.
7	VI3* (S)	L OC	Vectored interrupt line 3.
8	VI4* (S)	L OC	Vectored interrupt line 4.
9	VI5* (S)	L OC	Vectored interrupt line 5.
10	VI6* (S)	L OC	Vectored interrupt line 6.
11	VI7* (S)	L OC	Vectored interrupt line 7.
12	NMI* (S)	L OC	Nonmaskable interrupt.
13	Dynabyte Reserved		
14	Dynabyte Reserved		
15	Dynabyte Reserved		
16	Dynabyte Reserved		
17	Dynabyte Reserved		
18	SDSB* (M)	L OC	The control signal to disable the 8 status signals.
19	CDSB* (M)	L OC	The control signal to disable the 5 control output signals.
20	Dynabyte Reserved		
21	Dynabyte Reserved		

Table 7-1 — Dynabyte S-100 Bus Pin Assignments (Continued)

Pin No.	Signal — Type	Active Level	Description
22	ADSB* (M)	L OC	The control signal to disable the 16 address signals.
23	DODSB* (M)	L OC	The control signal to disable the 16 address signals.
24	4 MHz Phase 2 (B)		The master timing signal for the bus.
25	Dynabyte Reserved		
26	pHLDA (M)	H	A control signal used in conjunction with HOLD* to coordinate bus master transfer operations.
27	Dynabyte Reserved		
28	Dynabyte Reserved		
29	A5 (M)	H	Address bit 5.
30	A4 (M)	H	Address bit 4.
31	A3 (M)	H	Address bit 3.
32	A15 (M)	H	Address bit 15 (most significant).
33	A12 (M)	H	Address bit 12.
34	A9 (M)	H	Address bit 9.
35	DO1 (M)	H	Data out bit 1.
36	DO0 (M)	H	Data out bit 0.
37	A10 (M)	H	Address bit 10.
38	DO4 (M)	H	Data out bit 4.
39	DO5 (M)	H	Data out bit 5.
40	DO6 (M)	H	Data out bit 6.
41	DI2 (S)	H	Data in bit 2.
42	DI3 (S)	H	Data in bit 3.
43	DI7 (S)	H	Data in bit 7.
44	sM1 (M)	H	The status signal which indicates that the current cycle is an op-code fetch.

Table 7-1 — Dynabyte S-100 Pin Assignments (Continued)

Pin No.	Signal — Type	Active Level	Description
45	sOUT (M)	H	The status signal identifying the data transfer bus cycle to an output device.
46	sINP (M)	H	The status signal identifying the data transfer bus cycle from an input device.
47	sMEMR (M)	H	The status signal identifying bus cycles which transfer data from memory to a bus master, which are not interrupt acknowledge instruction fetch cycle(s).
48	sHLTA (M)	H	The status signal which acknowledges that a HLT instruction has been executed.
49	CLOCK (B)		2 MHz (0.5%) 40 - 60% duty cycle. Not required to be synchronous with any other bus signal.
50	GND (B)		Common with pin 100.
51	+8 Volts (B)		Common with pin 1.
52	−16 Volts (B)		Instantaneous maximum less than −14.5 Volts, instantaneous minimum greater than −35 Volts, average minimum greater than −21.5 Volts.
53	Dynabyte Reserved		
54	Dynabyte Reserved		
55	Dynabyte Reserved		
56	Dynabyte Reserved		
57	Dynabyte Reserved		
58	Dynabyte Reserved		
59	Dynabyte Reserved		
60	Dynabyte Reserved		
61	Dynabyte Reserved		
62	Dynabyte Reserved		
63	Dynabyte Reserved		
64	Dynabyte Reserved		

Table 7-1 — Dynabyte S-100 Pin Assignments (Continued)

Pin No.	Signal — Type	Active Level	Description
65	sMREQ* (M)	L	The status signal identifying bus cycles which reference memory read, write or refresh.
66	sRFSH* (M)	L	The status signal identifying the current address on A0 - A6 is a dynamic memory refresh address.
67	PHANTOM*	L OC	A bus signal which disables memory during disk controller ROM access.
68	MWRT (B)	H	A bus memory write signal. pWR•sOUT* (logic equation). This signal must follow pWR* by not more than 30 ns.
69	Dynabyte Reserved		
70	Dynabyte Reserved		
71	Dynabyte Reserved		
72	RDY (S)	H OC	See comments for pin 3.
73	INT* (S)	L OC	The primary interrupt request bus signal.
74	HOLD* (M)	L OC	The control signal used in conjunction with pHLDA to coordinate bus master transfer operations.
75	RESET* (B)	L OC	Requests the reset of all bus master devices. Connects to the Front Panel Reset Switch and activates POC*.
76	pSYNC (M)	H	The control signal identifying the beginning of a processor cycle.
77	pWR* (M)	L	The control signal signifying the presence of valid data on DO bus.
78	pDBIN (M)	H	The control signal that requests data on the DI bus.
79	A0 (M)	H	Address bit 0 (least significant).
80	A1 (M)	H	Address bit 1.
81	A2 (M)	H	Address bit 2.
82	A6 (M)	H	Address bit 6.
83	A7 (M)	H	Address bit 7.
84	A8 (M)	H	Address bit 8.

Table 7-1 — Dynabyte S-100 Pin Assignments (Continued)

Pin No.	Signal — Type	Active Level	Description
85	A13 (M)	H	Address bit 13.
86	A14 (M)	H	Address bit 14.
87	A11 (M)	H	Address bit 11.
88	DO2 (M)	H	Data out bit 2.
89	DO3 (M)	H	Data out bit 3.
90	DO7 (M)	H	Data out bit 7.
91	DI4 (S)	H	Data in bit 4.
92	DI5 (S)	H	Data in bit 5.
93	DI6 (S)	H	Data in bit 6.
94	DI1 (S)	H	Data in bit 1.
95	DI0 (S)	H	Data in bit 0 (least significant for 8-bit data).
96	sINTA (M)	H	The status signal identifying the bus input cycle(s) that may follow an accepted interrupt request presented on INT*.
97	sWO* (M)	L	The status signal identifying a bus cycle which transfers data from a bus master to a slave.
98	Dynabyte Reserved		
99	POC* (B)	L	The Master Reset signal. The Power-On-Clear signal for all devices. When this signal goes low, it must stay low for at least 10 ms.
100	GND (B)		System ground and common to Pin 50.

NOTES:

(1.) Signal Type   (B)   Bus
                     (M)   Bus Master
                     (S)   Bus Slave
                      *   Logical NOT

(2.) Active Level   H   High
                     L   Low
                     OC   Open Collector

C.P.U. PINOUTS

PARALLEL CONNECTOR

CARD J1 PIN NO.	SIGNAL NAME	DB 25 PIN NO.
32	PARALLEL IN φ	1
41	IN 1	2
43	IN 2	3
40	IN 3	4
42	IN 4	5
39	IN 5	6
44	IN 6	7
38	PARALLEL IN 7	8
8	GROUND	9
50	PARALLEL IN READY	10
22	SENSE	11
6	FLAG 1	12
49	INTERRUPT	13
36	PARALLEL OUT φ	14
29	OUT 1	15
37	OUT 2	16
28	OUT 3	17
35	OUT 4	18
27	OUT 5	19
34	OUT 6	20
33	PARALLEL OUT 7	21
10	GROUND	22
24	PARALLEL OUT BSY (IN)	23
14	PARALLEL OUT STB (OUT)	24
4	FLAG 2	25
12	GROUND	—
30	GROUND	—
31	GROUND	—

SERIAL 2 TERMINAL

15	E.I.A. IN	2
19	E I A OUT	3
7	RTS 2 OUT	4
24	CTS 2 (IN EIA)	5
16	DSR 2 (IN)	6
47	GROUND	7
45	+20 MA OUT	11
21	-20 MA OUT	18
5	DTR 2 OUT	20
25	+20 MA IN	21
13	-20 MA IN	25

SERIAL 1 PRINTER

2	EIA IN	2
17	EIA OUT	3
3 ✳	RTS 1 (OUT)	4
26	CTS 1 (IN EIA)	5
18	DSR 1 (IN)	6
48	GROUND	7
46	+20 MA OUT	11
23	-20 MA OUT	18
1 ✳	DTR (OUT)	20
9	+20 MA IN	21
11	-20 MA IN	25

Note. ✳ C.P.U. JUMPER TO ± RS 232

+8V

S2 POWER (FRONT PANEL)

800133 SWITCH & HARNESS ASSY

HALT

RESET
GND

RESET (FRONT PANEL)

MOM. S1

PARALLEL I/O — 803420 REAR PANEL INTERCONNECT (TO C.P.U.)

SERIAL 1 PRINTER

SERIAL 2 TERMINAL

800285 50 COND. FLAT CABLE

803439 C.P.U. P.C.B. ASSY.

CARD EDGE

MOTHERBOARD PCB ASSY 800171

(REF) HARNESS ASSEMBLY 800205

CONNECTOR INTERFACE TO 5010 SYSTEM

800893 SYSTEM INTERCONNECT 50 COND. FLAT CABLE

FLOPPY DISK I/O CONNECTOR

800228 50 COND. FLAT CABLE

DISK CONTROLLER (MAIN) 800741

CARD EDGE

CARD EDGE

64K DYNAMIC MEMORY

800589

804361 - 230 VAC
802470 - 115 VAC
REAR PANEL ASSY

FAN #1

J7 PANEL RECEPTACLE

AC OUTPUT SWITCHED

FILTER P5

J6 PANEL RECEPTACLE & FILTER

AC INPUT 115/230 VAC 50/60 HZ

800114 (2 FAN)
804380 (1 FAN)
REAR PANEL WIRING HARNESS

FILTER P4
FILTER P3

J1 BS-1

1	GND
2	GND
3	-16V
4	+8V
5	+8V
6	+16V
7	+12V

POWER SUPPLY 800057

(REF) 800342 WIRING HARNESS

J2 BS-2

CB1 P1

S2

POWER (FRONT PANEL) 800133

NOTES:
1. POWER SUPPLY JUMPER WIRING: J1 CONNECTOR
   — 115 VAC 50/60 HZ 1 TO 3, 2 TO 4, 5 TO 7, 6 TO 8
   .... 230 VAC 50/60 HZ 2 TO 3, 6 TO 7

2. WIRING INSTRUCTIONS FOR WIRING G.M.E. XFMR'S SEE E.C.N.-182

3. SYSTEM WIRING DIAGRAM FOR (2) FAN REAR PANEL - DRAWING #200288 REAR PANEL ASSY - (2) FANS - ASSY NO.- 803477 (INACTIVE)

Figure 7-1 — 5100 Computer Chassis Wiring Diagram

Table 7-2 — 5100 Computer Replaceable Parts List

| Reference	Description	Manufacturer	Manufacturer's Part Number	Dynabyte Part Number
	ASM: ENCLOSURE	DYNABYTE	800019	800019
	COVER: VENEERED TOP	DYNABYTE	700144	700144
	PANEL: BOTTOM	DYNABYTE	700036	700036
	BEZEL: CABINET	DYNABYTE	700054	700054
	FOOT: RUBBER	DYNABYTE	700216	700216
	ASM: 5100 FRONT PANEL	DYNABYTE	801387	801387
	HARNESS: FRONT PANEL	DYNABYTE	800133	800133
	SWITCH: ALTERNATE ACTION	CK	5101/W/BEZEL	711206
	SWITCH: MOMENTARY ACTION	CK	5108/W/BEZEL	702700
	LAMP: 10V	PRECISION	PL389	702718
	ASM: REAR PANEL REV B	DYNABYTE	802470	802470
	FUSEHOLDER: 3AG	LITTLEFUSE	348-8-7-1	700594
	FUSE: 3AG 3A	LITTLEFUSE	312003	700198
	FUSE: 3AG 6A	LITTLEFUSE	312006	700180
	FAN: 115 VAC	IMC	WS2107F-2	700504
	FAN: 230 VAC	ROTRON	WRA31	714866
	GUARD: FAN	IMC	005-009	700522
	HARNESS: REAR PANEL REV B	DYNABYTE	804380	804380
	CONNECTOR: IEC M 250V 6A	BELDEN	17252	702880
	CONNECTOR: NEMA F 115V 15A	HUBBELL	5256	702862
	FASTENER: DB25 CONNECTOR	AMPHENOL	17893	700630
	MODULE: 5100 POWER SUPPLY	DYNABYTE	800057	800057
	COVER: POWER SUPPLY	DYNABYTE	700108	700108
	ASM: CARD CAGE 12 SLOT	DYNABYTE	800038	800038
	ASM: S-100 CARD RETAINER	DYNABYTE	800152	800152
	PCA: MOTHERBOARD	DYNABYTE	800171	800171
	HARNESS: MOTHERBOARD	DYNABYTE	800209	800209
	5100 CABLE ASSEMBLIES			
	CABLE: CPU I/O	DYNABYTE	800285	800285
	CABLE: 5100 DISK I/O	DYNABYTE	800228	800228

Table 7-2 — 5100 Computer Replaceable Parts List (Continued)

Reference	Description	Manufacturer	Manufacturer's Part Number	Dynabyte Part Number
	CABLE: QUADRAPORT I/O	DYNABYTE	803705	803705
	CABLE: OCTAPORT I/O	DYNABYTE	803515	803515
	CABLE: CDC I/O 26-CONDUCTOR	DYNABYTE	801482	801482
	CABLE: CDC I/O 60-CONDUCTOR	DYNABYTE	801501	801501
	CORD: 115 VAC POWER	BELDEN	17250	700414
	CORD: 230 VAC POWER	STORM	C2123-02M-GY	708100
	5100 S-100 CARDS			
	PCA: CPU	DYNABYTE	803439	803439
	PCA: DISK CONTROLLER	DYNABYTE	800741	800741
	PCA: DYNAMIC RAM 32K	DYNABYTE	800532	800532
	PCA: DYNAMIC RAM 48K	DYNABYTE	800551	800551
	PCA: DYNAMIC RAM 64K	DYNABYTE	800589	800589
	PCA: INTERCONNECT	DYNABYTE	803420	803420
	PCA: KONAN SMC 100	DYNABYTE	803629	803629
	PCA: OCTAPORT	DYNABYTE	801995	801995
	PCA: OCTAPORT WITH TIMERS	DYNABYTE	801957	801957
	PCA: QUADRAPORT	DYNABYTE	802014	802014
	PCA: QUADRAPORT WITH TIMERS	DYNABYTE	801976	801976
	5100 OBSOLETE PARTS			
	ASM: REAR PANEL REV A	DYNABYTE	800266	800266
	HARNESS: REAR PANEL REV A	DYNABYTE	800114	800114
	CIRCUIT BREAKER: 115VAC 5A	EPA	41-06-P30	715360
	FASTENER: 8-32 COVER	TINNERMANN	C1802-832	715342

Table 7-3 — 5100 Computer Assembly/Part Number Cross Reference
Old Part Numbers To Current Part Numbers

Old Part Number	Current Part Number	Description
	802470	ASM: Rear Panel
	800532	PCA: 32K Dynamic RAM
	800551	PCA: 48K Dynamic RAM
	800627	PCA: 16K Dynamic RAM
0200601-4	800589	PCA: 64K Dynamic RAM
1800002-4	803439	PCA: CPU
2801601-4	803857	PCA: 16K Dynamic RAM
2801612-4	803876	PCA: 16K Static RAM
2803202-4	803895	PCA: 32K Static RAM
4808101-4	800741	PCA: Controller
5800003-4	800057	Module: 5100 Power Supply
8800001-4	800171	PCA: Motherboard
8800014-4	803420	PCA: Interconnect
9800024-4	800266	ASM: Rear Panel
9800026-4	800038	ASM: Card Cage

Table 7-4 — 5100 Computer Assembly/Part Number Cross Reference
Current Part Numbers To Old Part Numbers

Current Part Number	Old Part Number	Description
800038	9800026-4	ASM: Card Cage
800057	5800003-4	Module: 5100 Power Supply
800171	8800001-4	PCA: Motherboard
800266	9800024-4	ASM: Rear Panel
800532		PCA: 32K Dynamic RAM
800551		PCA: 48K Dynamic RAM
800589	0200601-4	PCA: 64K Dynamic RAM
800627		PCA: 16K Dynamic RAM
800741	4808101-4	PCA: Controller
802470		ASM: Rear Panel
803420	8800014-4	PCA: Interconnect
803439	1800002-4	PCA: CPU
803856	2801601-4	PCA: 16K Dynamic RAM
803857	2801612-4	PCA: 16K Static RAM
803895	2803202-4	PCA: 32K Static RAM

Table 7-5 — CPU — Serial and Parallel I/O Pin Assignments

Pin	Definitions		
	Serial 1	Serial 2	Parallel I/O
1	Vacant	Vacant	IN 0
2	Data In (EIA)	Data In (EIA)	IN 1
3	Data Out (EIA)	Data Out (EIA)	IN 2
4	Out Port 87 Bit 5	Out Port 87 Bit 7	IN 3
5	Terminal Ready (EIA)	Terminal Ready (EIA)	IN 4
6	In Port 81 Bit 4	In Port 81 Bit 6	IN 5
7	Signal Common	Signal Common	IN 6
8	Vacant	Vacant	IN 7
9	Vacant	Vacant	Signal Common
10	Vacant	Vacant	Ready*
11	Data Out (+20 ma)	Data Out (+20 ma)	Sense
12	Vacant	Vacant	Flag 1 Out*
13	Vacant	Vacant	Port Int*
14	Vacant	Vacant	Out 0
15	Vacant	Vacant	Out 1
16	Vacant	Vacant	Out 2
17	Vacant	Vacant	Out 3
18	Data Out (−20 ma)	Data Out (−20 ma)	Out 4
19	Vacant	Vacant	Out 5
20	Out Port 87 Bit 4	Out Port 87 Bit 6	Out 6
21	Data In (+20 ma)	Data In (+20 ma)	Out 7
22	Vacant	Vacant	Signal Common
23	Vacant	Vacant	Out Busy*
24	Vacant	Vacant	Out Strobe
25	Data In (−20 ma)	Data In (−20 ma)	Flag 2 Out*

NOTES:

(1.)   *   Logical NOT.

DYNABYTE