

REV.	REVISIONS				
	SYM.	SHEET	DESCRIPTION	APPROV.	DATE
02174 1 OF 20 SHEET	A		Released to Production	RK	27 Oct 81

DRAWN VSS	DATE 10-5-81	TITLE PRODUCT SPECIFICATION BS-101/102 BULK SEMI CHASSIS	 DATARAM CORPORATION CRANBURY NEW JERSEY	DWG. NO. 02174	REV. A
CHECKED RK	DATE 27 Oct 81			SHEET 1 OF 20	
ENGR. RK	DATE 27 Oct 81				
APPROVED BAT	DATE 10/29/81				

1.0 SYSTEM DESCRIPTION

The BS-101/102 is a 19-inch rack mountable chassis designed to accommodate the DR-129/229S BULK SEMI memory system and up to three bulk interface cards. There is a 7-inch and 15-3/4 inch version of the chassis. Each chassis contains an integral power supply to support the memory and interface cards. The interface cards communicate between the memory system and the I/O connectors at the rear of the chassis. A buffer interface card and universal wire wrap cards are available from Dataram.

The BS-101/102 may be configured as an 18-bit system or as a 36-bit system by jumpering the DR-129/229S BULK SEMI Controller module (BSC). The chassis itself does not change. The BS-101 designates a chassis containing a BULK SEMI Controller (BSC) jumpered for 18 bits while the BS-102 designates a chassis containing a BULK SEMI Controller (BSC) jumpered for 36 bits.

The BS-101/102 chassis contains a connector at the rear to accommodate a battery backup unit to support the semiconductor memory in the event of power failure.

The DR-129S memory system uses 16K RAM storage devices while the DR-229S uses 64K RAM devices. With the DR-129S BULK SEMI memory the 15-3/4 BS-101/102 maximum capacity is 8 megabytes and the 7-inch BS-101/102 maximum capacity is 2 megabytes. With the DR-229S BULK SEMI memory, the 15-3/4 inch BS-101/102 maximum capacity is 32 megabytes and the 7-inch BS-101/102 maximum capacity is 8 megabytes. The BS-101/102 chassis may be daisy chained to take advantage of the DR-129/229S 25-bit address capability.



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1.1 System Components

1.1.1 BS-101/102 15-3/4 Inch Chassis

The 15-3/4 inch chassis is 19 inches wide and requires 23-1/2 inches of depth to allow clearance for the AC power cord, Input/Output cables and the terminator set. See Figure 1-1. The DR-129/229S memory system cards and the Bulk Interface cards are plugged vertically downward into the chassis. The power supply is located in the rear, and a fan assembly (located between the memory cards and power supply) provides system cooling. Air flow is from front to back.

A .090" PC Backplane forms the base of the chassis and provides all the necessary module-to-module connections. See Figure 1-2. The chassis contains 20 card slots designated BI0 thru 2, BSC, and BSA0 thru 15. Each slot has two printed circuit connectors identified as J9 and J10. The DR-129/229S BULK SEMI Controller in the BSC slot communicates with the BULK SEMI Arrays in slots BSA0 thru 15 via connector J10 and communicates with the Bulk Interface slots via J9. The J9 connectors in the BSC and BI slots are wired in parallel. The J10 connector in each BI slot is independent. The connectors, BI0 J10 and BI2 J10, are each wired to two pairs of 40-pin and two pairs of 50-pin ribbon cable connectors at the chassis backpanel. The even numbered pins on the connector pairs are used to carry data, address or control signals while the odd numbered pins are dedicated to signal returns. This results in an arrangement such that alternate conductors about an interface signal are at signal ground potential. The second connector in each pair is wired in parallel with the first so that it may be used for termination or for daisy chaining chassis. The I/O connectors at the backpanel are labeled A, B, C and D for BI0 and L, M, N and P for BI2. Table 1-1 lists the connections between the BI connectors at J10 and the I/O backpanel connectors. Table 1-2 lists the memory signals at J9 of the BI slots.

1.1.2 BS-101/102 7-Inch Chassis

The 7-inch chassis is also 19 inches wide and requires 23-1/2 inches of depth for cable and terminator clearance. See Figure 1-3. The memory system cards and the Bulk Interface card plug horizontally into the front of the chassis. The power supply is located in the rear of the chassis. Cooling fans along the left side of the chassis provide right-to-left cooling circulation.



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The chassis contains 6 slots designated BI0, BSC, and BSA0 thru 3. There is only one Bulk Interface slot BI0 which is wired exactly as the BI0 slot on the 15-3/4 inch chassis. The I/O connector pairs on the chassis backpanel are labeled A, B, C and D.

1.1.3 DR-129/229S BULK SEMI Memory

The DR-129/229S consists of a Bulk Semiconductor Control (BSC) board and from 1 to 16 Bulk Semiconductor Array (BSA) boards.

The DR-129S uses 16K RAM storage devices while the DR-229S uses 64K RAM devices. Each DR-129S Bulk Semiconductor Array (BSA) board contains 512K bytes of storage using 16K NMOS semiconductor memory chips. The maximum system capacity is 8 megabytes (16 BSA boards). Each DR-229S BSA board contains 2048K bytes of storage using 64K NMOS semiconductor memory chips. The maximum system capacity is 32 megabytes (16 BSA boards). Multiple systems may be paralleled up to the 25 bit maximum address capability of the DR-129/229S.

Each BSA board contains error correcting code (ECC) storage and the BSC board contains ECC circuitry to correct all single bit errors and detect all double bit errors which may occur during operation of the system. In addition, error logging circuitry to record up to 64 memory error locations is contained on the BSC board. The error log may be directly examined from the memory bus and when used with the BS-101/102 chassis provides information for an error log display.

The DR-129/229S may be configured as either an 18-bit word or 36-bit word memory system by installation of wirewrap jumpers on the BSC board.

The DR-129/229S memory system is electrically compatible to the Dataram BULK CORE (DR-128) memory system and will work with all Dataram Bulk Interface (BI) modules. The DR-129/229S interface is via a handshake asynchronous bus through an exchange of request and status signals. This allows convenient access to the memory for a variety of users, both fast and slow. A more comprehensive description of the DR-129/229S is available in the Dataram Product Specification 02126.



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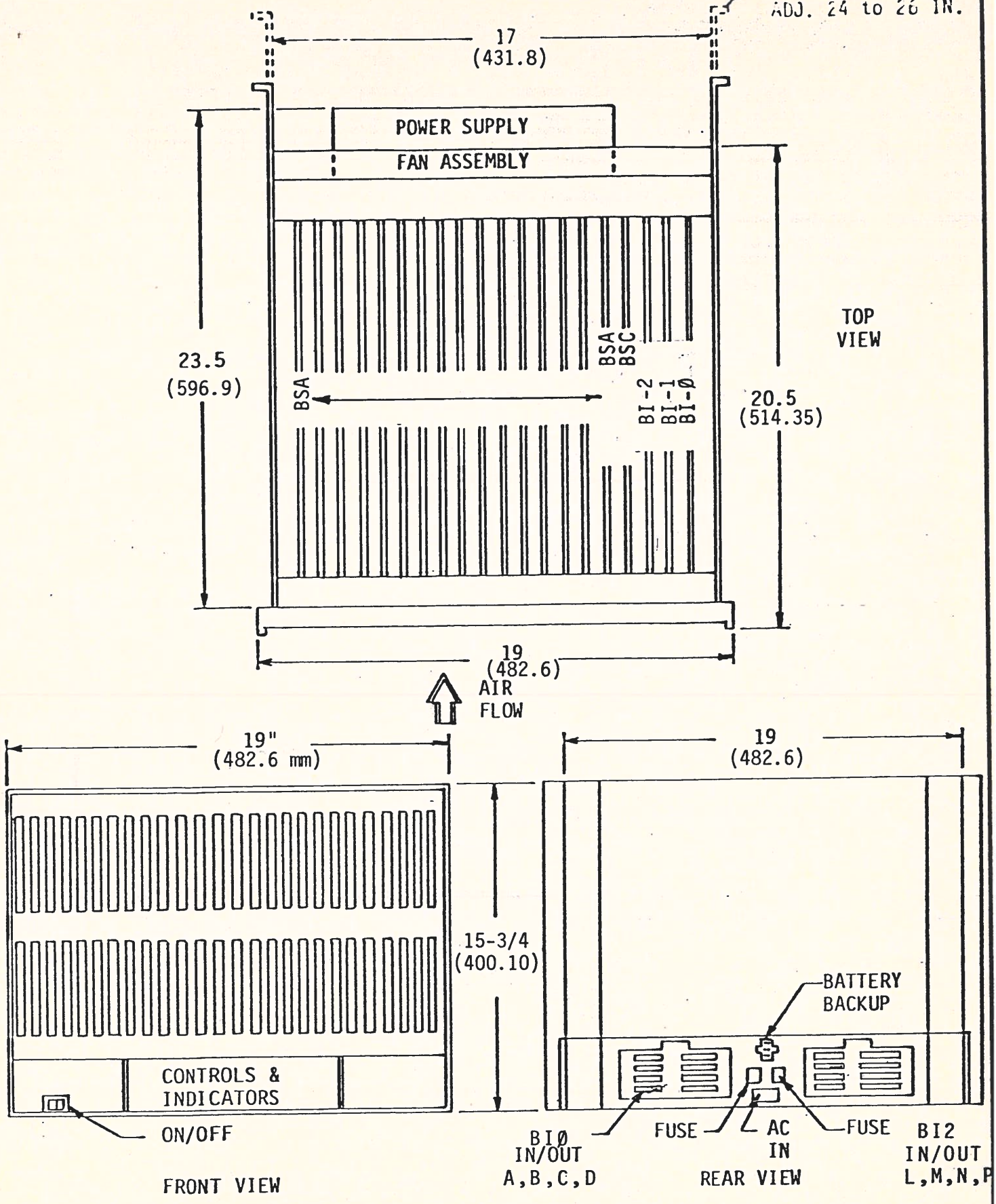


Figure 1-1. BS-101/102 15 3/4-INCH CHASSIS - OUTLINE DIMENSIONS

J10 SIDE

J9 SIDE

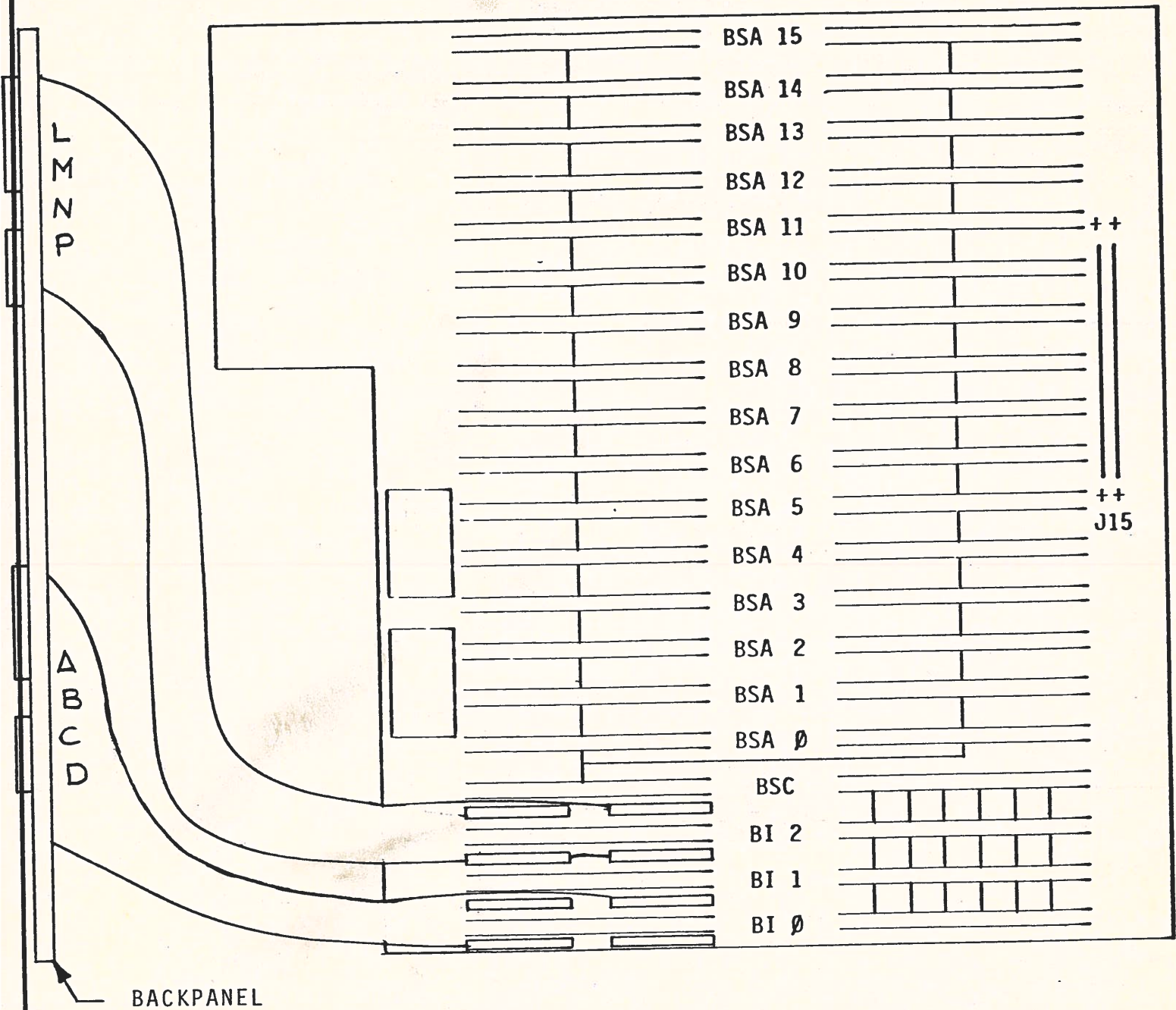


FIGURE 1-2. BS-101/102 15-3/4 INCH CHASSIS BACKPLANE (WIREWRAPE SIDE)



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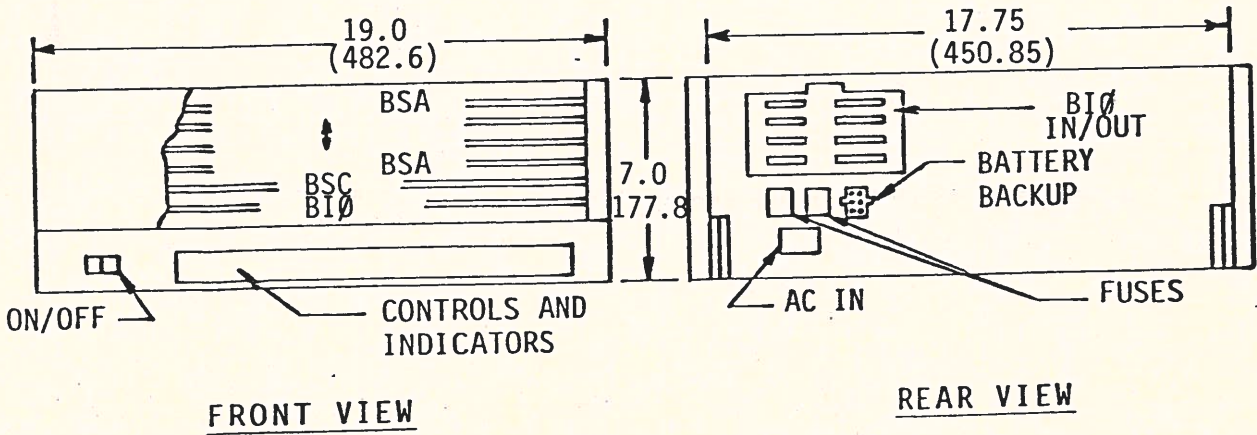
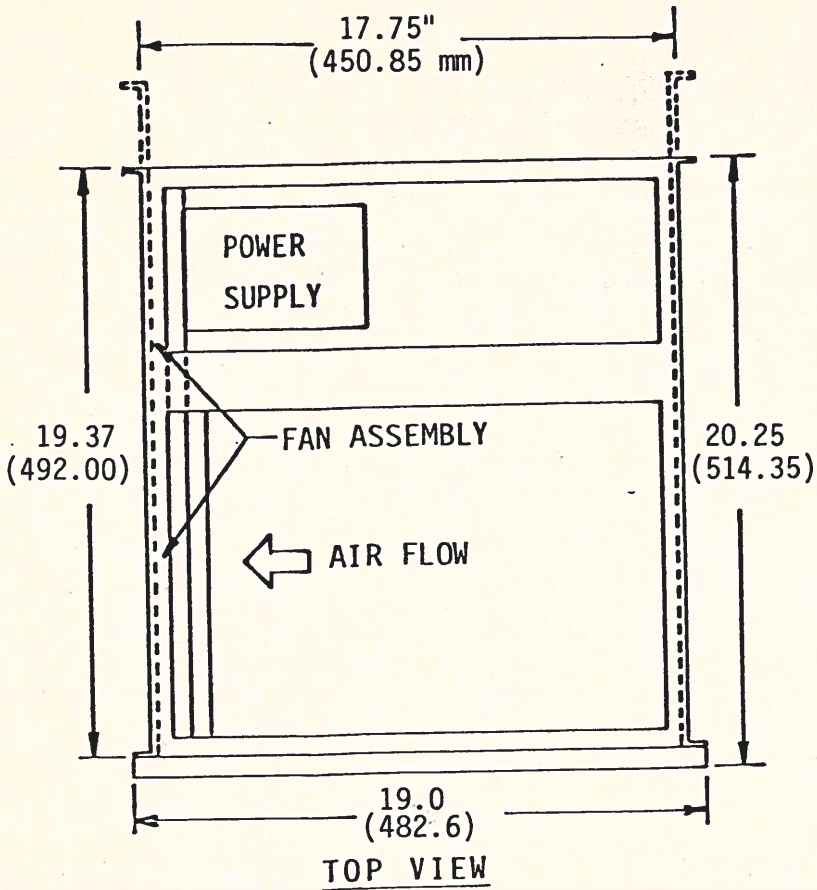


FIGURE 1-3. BS-101/102 INCH CHASSIS - OUTLINE DIMENSIONS

INPUT/OUTPUT CONNECTOR J10

Odd Pins - Component Side

Even Pins - Solder (Wirewrap) Side

<u>Pin</u>	<u>Signal</u>	<u>Pin</u>	<u>Signal</u>
1	GND	2	GND
3	+5 VOLTS	4	+5 VOLTS
5	SIG RTN CONN A	6	SIG RTN CONN B
7	SIG RTN CONN A	8	SIG RTN CONN B
9	CONN A OR L PIN 40	10	CONN B OR M PIN 2
11	CONN A OR L PIN 38	12	CONN B OR M PIN 4
13	CONN A OR L PIN 36	14	CONN B OR M PIN 6
15	CONN A OR L PIN 34	16	CONN B OR M PIN 8
17	CONN A OR L PIN 32	18	CONN B OR M PIN 10
19	CONN A OR L PIN 30	20	CONN B OR M PIN 12
21	CONN A OR L PIN 28	22	CONN B OR M PIN 14
23	CONN A OR L PIN 26	24	CONN B OR M PIN 16
25	CONN A OR L PIN 24	26	CONN B OR M PIN 18
27	CONN A OR L PIN 22	28	CONN B OR M PIN 20
29	CONN A OR L PIN 20	30	CONN B OR M PIN 22
31	CONN A OR L PIN 18	32	CONN B OR M PIN 24
33	CONN A OR L PIN 16	34	CONN B OR M PIN 26
35	CONN A OR L PIN 14	36	CONN B OR M PIN 28
37	CONN A OR L PIN 12	38	CONN B OR M PIN 30
39	CONN A OR L PIN 10	40	CONN B OR M PIN 32
41	CONN A OR L PIN 8	42	CONN B OR M PIN 34
43	CONN A OR L PIN 6	44	CONN B OR M PIN 36
45	CONN A OR L PIN 4	46	CONN B OR M PIN 38
47	CONN A OR L PIN 2	48	CONN B OR M PIN 40
49	SIG RTN CONN A	50	SIG RTN CONN B
51	SIG RTN CONN A	52	SIG RTN CONN B
53	SIG RTN CONN A	54	SIG RTN CONN B
55	SIG RTN CONN C	56	SIG RTN CONN D
57	SIG RTN CONN C	58	SIG RTN CONN D
59	SIG RTN CONN C	60	SIG RTN CONN D
61	CONN C OR H PIN 50	62	CONN D OR R PIN 2
63	CONN C OR H PIN 48	64	CONN D OR R PIN 4
65	CONN C OR H PIN 46	66	CONN D OR R PIN 6
67	CONN C OR H PIN 44	68	CONN D OR R PIN 8
69	CONN C OR H PIN 42	70	CONN D OR R PIN 10
71	CONN C OR H PIN 40	72	CONN D OR R PIN 12
73	CONN C OR H PIN 38	74	CONN D OR R PIN 14
75	CONN C OR H PIN 36	76	CONN D OR R PIN 16
77	CONN C OR H PIN 34	78	CONN D OR R PIN 18
79	CONN C OR H PIN 32	80	CONN D OR R PIN 20
81	CONN C OR H PIN 30	82	CONN D OR R PIN 22
83	CONN C OR H PIN 28	84	CONN D OR R PIN 24
85	CONN C OR H PIN 26	86	CONN D OR R PIN 26
87	CONN C OR H PIN 24	88	CONN D OR R PIN 28
89	CONN C OR H PIN 22	90	CONN D OR R PIN 30



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<u>Pin</u>	<u>Signal</u>	<u>Pin</u>	<u>Signal</u>
91	CONN C OR H PIN 20	92	CONN D OR P PIN 32
93	CONN C OR H PIN 18	94	CONN D OR P PIN 34
95	CONN C OR H PIN 16	96	CONN D OR P PIN 36
97	CONN C OR H PIN 14	98	CONN D OR P PIN 38
99	CONN C OR H PIN 12	100	CONN D OR P PIN 40
101	CONN C OR H PIN 10	102	CONN D OR P PIN 42
103	CONN C OR H PIN 8	104	CONN D OR P PIN 44
105	CONN C OR H PIN 6	106	CONN D OR P PIN 46
107	CONN C OR H PIN 4	108	CONN D OR P PIN 48
109	CONN C OR H PIN 2	110	CONN D OR P PIN 50
111	SIG RTN CONN C	112	SIG RTN CONN D
113	SIG RTN CONN C	114	SIG RTN CONN D
115		116	
117	+5 VOLTS	118	+5 VOLTS
119	GND	120	GND

Odd Pins (1-39) on Input/Output Connector A-D and L-P are used for Signal Return.



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TABLE 1-2
J9 MEMORY BUS

Odd Pins - Component Side

Even Pins - Solder (Wirewrap) Side

<u>Pin</u>	<u>Signal</u>	<u>Pin</u>	<u>Signal</u>
1	GND	2	GND
3	+5V	4	+5V
5	DTA15N	6	DTA06N
7	ADRO5N	8	ADRO7N
9	DTA07N	10	
11	ADR14N	12	PWR INTL
13	DTA14N	14	DTA32N
15	ADRO6N	16	DTA24N
17	DTA16N	18	DTA34N
19	ADR13N	20	DTA25N
21	DTA05N	22	DTA23N
23	ADRO3N	24	DTA33N
25	DTA17N	26	DTA35N
27	ADR15N	28	ADR24N
29	DTA13N	30	DTA31N
31	ADR16N	32	STATN
33	DTA04N	34	DTA22N
35	ADR10N	36	STAVN
37	IDACN	38	UCERN
39	ADROON	40	CRERN
41	ODAVN	42	CLRBYN
43	ADRO4N	44	MEMSIZ3
45	ADRACN	46	MEMSIZ4
47	ADR12N	48	MEMSIZ5
49	ADRO8N	50	MEMSIZ6
51	ADRO1N	52	
53	ADRO9N	54	ADR20N
55	ADRO2N	56	ADR21N
57	ADR11N	58	ADR22N
59	GND	60	GND
61	ADRAVN	62	ADR23N
63	GND	64	GND
65	MWRUBN (Upper Byte Lower Word)	66	MWRUBAN (Upper Byte Upper Word)
67	PWRINTN	68	
69	MRDRN (Lower Word)	70	
71	NORMN	72	
73	MWRLBN (Lower Byte Lower Word)	74	MWRLBAN (Lower Byte Upper Word)
75	RADVLDN	76	
77	GND	78	GND
79	ADR17N	80	
81	ADR18N	82	
83	ADR19N	84	
85		86	
87		88	
89		90	



<u>Pin</u>	<u>Signal</u>	<u>Pin</u>	<u>Signal</u>
91	DTA08N	92	DTA26N
93	DTA03N	94	DTA21N
95	DTA12N	96	DTA30N
97	DTA00N	98	DTA18N
99	DTA11N	100	DTA29N
101	MEMSIZ2	102	
103	DTA09N	104	DTA27N
105	MEMSIZ1	106	
107	DTA02N	108	DTA20N
109	DTA10N	110	DTA28N
111	DTA01N	112	DTA19N
113	MEMSIZ0	114	MBYN
115	+5V	116	+5V
117	GND	118	GND
119		120	

Data Bits 0-7, 17	Upper Byte, Lower Word
Data Bits 8-16	Lower Byte, Lower Word
Data Bits 18-25, 35	Upper Byte, Upper Word
Data Bits 26-34	Lower Byte, Upper Word



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1.1.4 Bulk Interface (BI) Card

The BI card is designed to fit into a BI slot of the BS-101/102 System and the dimensions are given in Figure 1-4. The card contains two 120-pin, .100" center printed circuit fingers (J9 and J10) which mate with card edge connectors.

Any Dataram BI card may be inserted in the interface slot of J9 and J10. There are five universal cards available. These are:

1. BI-508 Universal Logic Card with Rear Entry Connectors
2. BI-507 Universal Logic Card
3. BI-502 Tester
4. BI-506 Buffer Receiver
5. BI-505 Buffer Receiver

The BI-507 and BI-508 Universal Logic Cards provide the user with the facility to create his own interface between the input/output connectors at J10 and the memory interface at J9. The Universal Logic Cards provide locations for various size IC sockets. In addition, the BI-508 provides facilities for four 60-pin and two 50-pin ribbon cable connectors on its rear edge. Table 1-1 indicates the inter-connection between connector J10 and the input/output connectors.

The BI-502 is a Universal Logic Card containing a tester which interfaces with the memory at connector J9. The tester may be used for diagnosing problems occurring in the memory.

The BI-506 Buffer Receiver contains circuitry to connect the memories at J9 with the input/output connectors via J10. The BI-506 also contains circuitry to select between chassis when multiple chassis are daisy-chained. Table 1-3 defines the buffered memory signals as they appear on J10 and the input/output connectors.

The BI-505 Buffer Driver card is used when more than one 15-3/4 Inch BULK SEMI chassis is required and additional chassis are to be driven via the first chassis. The BI-505 transmits address and control from the first chassis to additional chassis and passes data in both directions. The BI-505 and BI-506 use the identical printed circuit board with appropriate strapping and insertion or removal of chips to determine direction of flow of address and control.



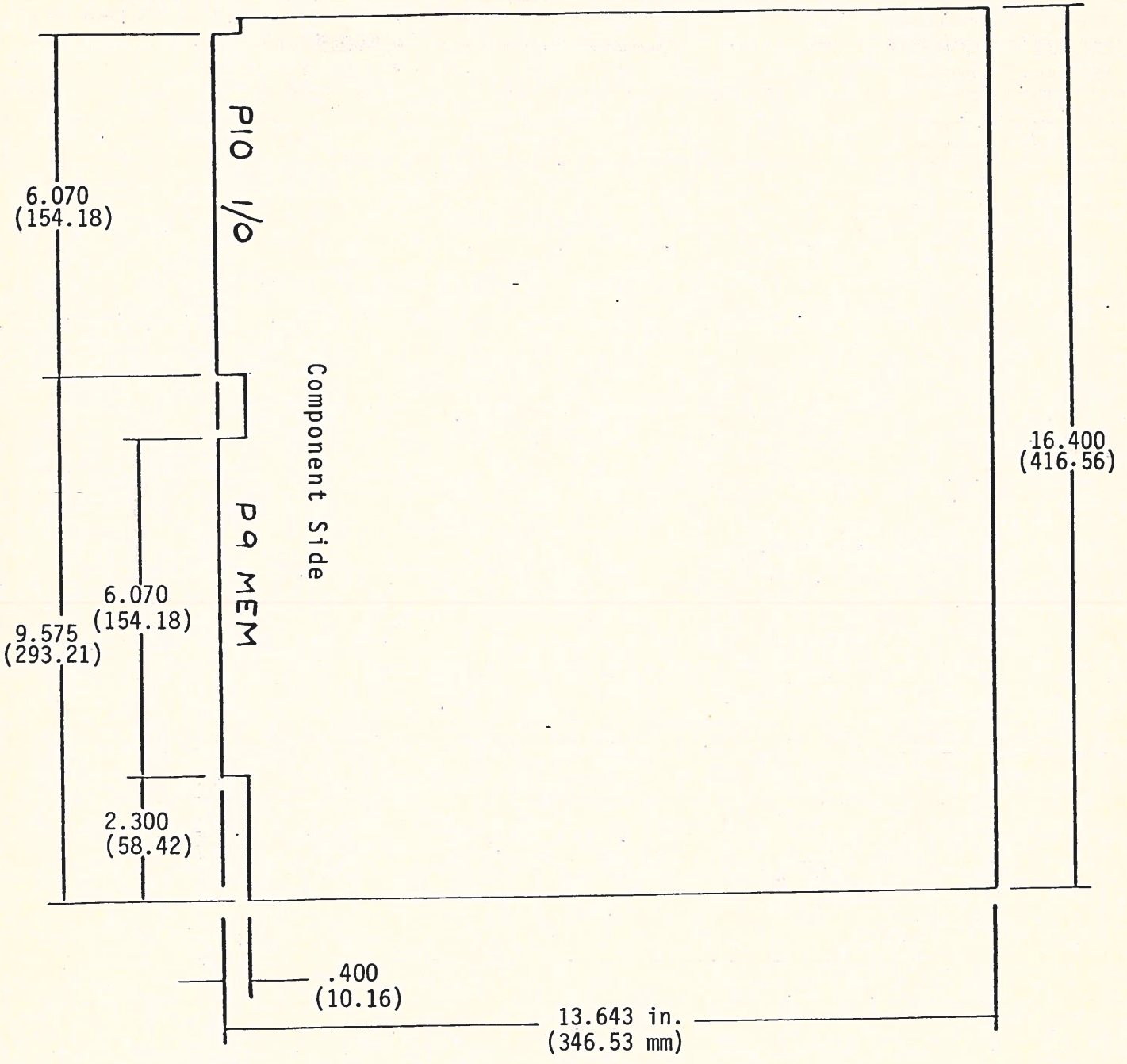
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— BOARD THICKNESS IS .062 NOMINAL —

FIGURE 1-4. BULK INTERFACE CARD

TABLE 1-3
 BI-506 BUFFER RECEIVER
 I/O TERMINAL SIDE

J10 Pin	Signal	Conn A or L	J10 Pin	Signal	Conn B or M
1	GND	<u>Pin</u>	2	GND	<u>Pin</u>
3	+5 VOLTS		4	+5 VOLTS	
5	SIG RTN		6	SIG RTN	
7	SIG RTN		8	SIG RTN	
9	ICRERN	40	10	IDTA18N	2
11	ICLRBYN	38	12	IDTA19N	4
13	IDTA00N	36	14	IDTA20N	6
15	IDTA01N	34	16	IDTA21N	8
17	IDTA02N	32	18	IDTA22N	10
19	IDTA03N	30	20	IDTA23N	12
21	IDTA04N	28	22	IDTA24N	14
23	IDTA05N	26	24	IDTA25N	16
25	IDTA06N	24	26	IDTA26N	18
27	IDTA07N	22	28	IDTA27N	20
29	IDTA08N	20	30	IDTA28N	22
31	IDTA09N	18	32	IDTA29N	24
33	IDTA10N	16	34	IDTA30N	26
35	IDTA11N	14	36	IDTA31N	28
37	IDTA12N	12	38	IDTA32N	30
39	IDTA13N	10	40	IDTA33N	32
41	IDTA14N	8	42	IDTA34N	34
43	IDTA15N	6	44	IDTA35N	36
45	IDTA16N	4	46	--	38
47	IDTA17N	2	48	--	40
49	SIG RTN		50	SIG RTN	
51	SIG RTN	<u>Conn C or N</u>	52	SIG RTN	<u>Conn D or P</u>
53	SIG RTN		54	SIG RTN	
55	SIG RTN	<u>Pin</u>	56	SIG RTN	<u>Pin</u>
57	SIG RTN		58	SIG RTN	
59	SIG RTN		60	SIG RTN	
61	IMBYN	50	62	IADRO0N	2
63	IMEMSIZE6	48	64	IADRO1N	4
65	IMEMSIZE5	46	66	IADRO2N	6
67	IMEMSIZE4	44	68	IADRO3N	8
69	IMEMSIZE3	42	70	IADRO4N	10
71	IADRAVN	40	72	IADRO5N	12
73	IADRACN	38	74	IADRO6N	14
75	ISTATN	36	76	IADRO7N	16
77	ISTAVN	34	78	IADRO8N	18
79	IUCERN	32	80	IADRO9N	20
81	IRADVLDN	30	82	IADR10N	22
83	IMRDRN	28	84	IADR11N	24
85	IMWRLBN	26	86	IADR12N	26
87	IMWRUBN	24	88	IADR13N	28
89	--	22	90	IADR14N	30

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J10 Pin	Signal	Conn C or N Pin	J10 Pin	Signal	Conn D or P Pin
91	IMWRLBAN	20	92	IADR15N	32
93	IMWRUBAN	18	94	IADR16N	34
95	IODAVN	16	96	IADR17N	36
97	IIDACN	14	98	IADR18N	38
99	IMEMSIZE	12	100	IADR19N	40
101	IMEMSIZE1-	10	102	IADR20N	42
103	IMEMSIZE2	8 -	104	IADR21N	44
105	INORMN	6	106	IADR22N	46
107	PWRSVAV	4	108	IADR23N	48
109	IPWRINTE	2	110	IADR24N	50
111	SIG RTN		112	SIG RTN	
113	SIG RTN		114	SIG RTN	
115			116		
117	+5 VOLTS		118	+5 VOLTS	
119	GND		120	GND	

Odd Pins (1-39) on Input/Output Connector A-D and L-P are used for Signal Return.



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For further information on the BI cards, refer to Dataram Specifications as follows:

02193	BI-508 Universal Logic Card w/Rear Entry Connectors
02166	BI-507 Universal Logic Card
02152	BI-506/505 Receiver Driver Buffer
02086	BI-501/502 Universal Logic Card

1.1.5 I/O Terminator Set

The terminator set consists of four cards containing pull up and pull down resistors which terminate all signals at the I/O ribbon cable connectors at the rear of the chassis. Voltage for the terminators is provided at the backpanel.

1.1.6 Power Supply

Both BS-101/102 chassis have self-contained power supplies. A +5V, +15V source of power supplies the BI module, BSC and memory modules. AC power input to the power supply is made through a 3-pin connector located at the rear of the chassis. The connector is UL, CSA, and VDE approved and meets the specifications of International Standard CEE-22. A 3-conductor AC power cable is provided to mate with this connector. Momentary action switches on the power supply provide margining ($\pm 5\%$ of nominal) to assist in troubleshooting.

1.1.7 Battery Backup Connector

Since MOS memories do not retain data once power is removed, some installations may require that an auxiliary power source (battery backup) be supplied for the MOS memory. A connector is, therefore, provided for adding battery backup capability to the BS-101/102 chassis.

During that time when main power is OFF, the battery backup supplies power only to those circuits required for retaining data in the MOS memory. To save power a separate +5V bus for those devices involved with Refresh and MOS memory power is provided. The +15V power supply, however, is used almost exclusively for the MOS memory itself. Consequently, it does not have a backup bus separate from the standard +15V line.

1.2 System Features

1.2.1 Error Checking and Correction

The DR-129/229S BSC module contains Error Checking and Correcting circuitry that will correct all single-bit errors. Double-bit errors are detected, but are not corrected.

1.2.2 BULK SEMI Error Log

The Error Log is capable of storing up to 64 words of correctable or uncorrectable error information and can be examined and displayed at the front panel of the BULK Semi chassis. The display is a decimal readout and indicates the board, row and bit in error.

1.2.3 User Switch and Display Options

The BS-101/102 display panel provides locations for 8 toggle switches and 10 LED's which may be inserted and wired to BI slots to implement user desired options.



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2.0 SYSTEM SPECIFICATIONS

2.1 Mechanical

2.1.1 15-3/4 Inch BS-101/102 Chassis

Material: 16-gauge steel
Weight: 100 pounds (45.36 kg) with 1 BSA board
Add 3 pounds (1.36 kg) for each additional BSA board.
Dimensions: 15-3/4 inches high by 19 inches wide by 23.5 inches deep.
Mounting Brackets: Ball-bearing slides (suitable for RETMA mounting hardware), adjustable from 24 to 26 inches.

2.1.2 7-Inch BS-101/102 Chassis

Material: 16-gauge steel
Weight: 54 pounds (24.5 kg) with 1 BSA Board
Add 3 pounds (1.36 kg) for each additional BSA board.
Dimensions: 7 inches high by 19 inches wide by 23.5 inches deep.
Mounting Brackets: Ball-bearing slides (suitable for RETMA mounting hardware), adjustable from 20 to 26 inches.

2.2 Electrical

2.2.1 Power Requirements

Voltage: 115/220 VAC, Single-Phase, 47 to 63 Hz
Voltage Changeover: 115 to 220 VAC via internal switch
Current: 8 amps maximum, with full capacity of storage at 115 VAC (4 amps at 220 VAC)

2.2.2 Available Power for I/O

BI Slots

15-3/4 Inch Chassis: 5V \pm 5% 25 Amps
7-Inch Chassis: 5V \pm 5% 11 Amps



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2.3 Controls and Indicators

2.3.1 Front Panel

2.3.1.1 Switches

The following switches are located on the front of the 7- and 15-3/4 inch BS-101/102 Chassis:

AC ON/OFF
Error Log Clear/Begin (CLR/BGN)
Error Log Examine (EXMO)

2.3.1.2 Indicator Lights

The following indicator lights are associated with the DR-129/229S Error Log and are located on the front right indicator panel:

Log Full (LOG FULL)
Error (ERR)
Board, Row, Bit (BOARD, ROW, BIT)

2.4 Environmental

2.4.1 Temperature

2.4.1.1 Operating: 0°C to +55°C

2.4.1.2 Storage: -40°C to +80°C

2.4.2 Humidity

Up to 90% relative humidity without condensation

2.4.3 Altitude

2.4.3.1 Up to 10,000 ft. above mean sea level - operating

2.4.3.2 Up to 40,000 ft. above mean sea level - storage

2.4.4 Vibration

Will withstand normal stresses encountered in transportation.



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3.0 ORDERING INFORMATION

The following Dataram part numbers apply to the BS-101/102:

<u>Part Number</u>	<u>Description</u>
62911	BS-102 15-3/4 Inch BULK SEMI Chassis, 36 bit including BSC, I/O terminator set.
62909	BS-101 15-3/4 Inch BULK SEMI Chassis, 18 bit including BSC, I/O terminator set.
62944	BS-102 7-Inch BULK SEMI Chassis, 36 bit including BSC, I/O Terminator set.
62943	BS-101 7-Inch BULK SEMI Chassis, 18 bit including BSC I/O terminator set.



DATARAM CORPORATION
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