NOTES

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INTERNATIONAL
DATA
SCIENCES INC.
WARWICK, RI, USA

MANUAL OF OPERATION
FOR
BLUE BOX MODEL 62
EIA RS-232-C BREAKOUT BOX

Tel: 1-800-IDS-DATA 1-401-737-9900
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HOW TO ORDER

MODEL 62LP Line Powered Breakout Box
Model 62BP Battery Powered Breakout Box
Ten Extra Stacking Jumpers
Carry Case

WARRANTY AND REPAIR SERVICE

The International Data Sciences, Inc., Model 62 comes with a Lifetime Warranty against defects in material and workmanship.

This warranty statement does not apply if the equipment has been damaged by accident, neglect, misuse, causes other than ordinary use, or as a result of service or moditication other than performed or authorized by IDS. All units returned to IDS under this warranty require prepaid transportation charges to IDS. IDS will pay the transportation charges incurred in returning the repaired unit under warranty.

Should your unit require repairs not covered by the original warranty, IDS will perform the repair at an hourly charge plus parts. Normal turn-around time is approximately two weeks.

All out-of-warranty units returned to IDS for repair will be accepted only if transportation charges are prepaid. The purchaser is also responsible for all transportation charges incurred in the return of the repaired unit. Please include a purchase order with units to be repaired. All units repaired by IDS are warranted for 90 days following the repair service.

PRODUCT REPAIR PROCEDURE

Prior to shipping your product to IDS for repair, please follow this simple procedure:

1. Contact IDS at 1-800-IDS-DATA or (401-737-9900) for a Return Material Authorization (RMA) number.
2. Ensure that the RMA number appears on all correspondence and on the shipping container.
3. Describe the problem and enclose the description with the unit.
4. Please specify the name and address of the person to whom the repaired unit should be shipped.

The units for repair should be sent to International Data Sciences, Inc.,
Warwick, RI 02886-1317.

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3) Open the following switches, 2, 3, 4, 5, 6, 8. 15, 17, 20, and 24.

4) Using miniature stacking jumper cables, cross-patch the following pins on the TO DTE side:

Pin #		Pin #
2	to	3
6	to	20

5) Using miniature stacking jumper cables, cross-patch the following pins on the TO DTE side:

Pin #		Pin #
4 & 5	to	8
15 & 17	to	24

6.0 Specifications

Power	62BP: Two 9V alkaline batteries Battery life: 150 hours (typical) 62LP: Each LED monitoring circuit is powered by its input signal, presenting a maximum load of 8 kohms per circuit.
Temperature	Operating: 62BP: 0°C to 50°C (+32°F to 122°F) 62LP: 0°C to 50°C (+32°F to 122°F) Storage: 62BP: -4°C to 100°C (+25°F to 212°F) 62LP: -55°C to 100°C (-67°F to 212°F)
Relative Humidity	90% non-condensing
Housing	High-impact plastic case with an integral living hinge cover.
Dimensions	5.3" H x 4.2" W x 1.9" D (13.5 x 10.7 x 4.8 cm)
Weight	M62BP: 12.5 oz. (354 g) M62LP: 9 oz. (255 g)
Warranty	Lifetime

2) Using the Model 62's ribbon cable (labeled TO DCE) connect the Model 62 to a terminal.

3) Open the following switches: 2, 3, 4, 5, 6, 8, 15, 17, 20, and 24.

4) Using miniature stacking jumper cables, cross-patch the following pins:

TO DTE SIDE		TO DCE SIDE
Pin #		Pin #
2	to	3
3	to	2
6	to	20
20	to	6

5) Using miniature stacking jumper cables, cross-patch the following pins:

TO DTE SIDE		TO DCE SIDE
Pin #		Pin #
4 & 5	to	8
3	to	4 & 5
15 & 24	to	17
17	to	15 & 24

5.4 Self-test (DTE) Loop Around

In this test, the Model 62 allows a self-test to be performed on a DTE with no self-test capability. A clock must be supplied (via pin 24) during synchronous operation.

Setup (For full-duplex systems only):

1) Disconnect the interface cable from the modem and plug it into the Model 62's TO DTE connector.

2) If necessary, connect the Model 62's ribbon cable (labeled TO DCE) to the modem.

1.0 INTRODUCTION

The Model 62 Blue Box RS-232-C Breakout Box is a portable, hand-held test set designed to access and monitor all 25 conductors of the EIA RS-232-C and CCITT V.24 interfaces between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE). The Model 62 is available as a Line-powered RS-232-C Breakout Box, Model 62LP, or as a Battery-powered RS-232-C Breakout Box, Model 62BP.

Red and Green LED pairs are used for monitoring each of the 11 most used interface signals. One spare monitoring circuit with a pair of LEDs is provided for monitoring any other desired signal. Three pins are also provided for adding additional RS-232-C loads to any desired signal(s). For the Model 62BP, voltages of -9V and +9V are provided for setting any undriven signal to a high or low level. For the Model 62LP, a ground input pin is provided for connecting the RS-232-C LOADS and SPARE LEDs common to the desired DTE or DCE grounds.

Twenty-five miniature rocker switches allow all of the interface conductors to be individually connected (CLOSE) between the DTE and DCE, or opened (OPEN) for isolated testing. Two additional rocker switches (NORMAL 2 & 3 and CROSS 2 & 3) allow the crossing of pins 2 (TD) and 3 (RD) between the "TO DTE" and the "TO DCE" connectors.

1.1 Accessories

Five blue miniature stacking jumper cables are included with the Model 62 to be used for cross-patching and connecting.

Both versions come with an EIA RS-232-C/CCITT V.24 Interface Card. This card includes a brief description of the EIA RS-232-C/CCITT V.24 DTE-DCE interface as well as a description of the four different LED pair states.

1.2 Unpacking and Inspection

Before unpacking the Model 62, inspect the packing container for any unusual damage. Unpack the unit and inspect it for external damage such as scratches, dents, or damaged switches. If physical damage is present, retain the packing material and contact the carrier immediately. Each unit has been thoroughly inspected and approved by trained IDS personnel prior to shipping.

2.0 FRONT PANEL DESCRIPTION

The following general description refers to the line diagrams of the Model 62BP and 62LP shown in Figures 2.1 and 2.2.

2.1 Model 62BP

1) A Velcro strap holds the five jumper cables provided with the Model 62.

2) Two 9V alkaline batteries are located under the cover.

3) EIA RS-232-C/CCITT V.24 Interface Label lists the pin number, common mnemonic name and source of the EIA RS-232-C/CCITT V.24 signals.

4) TO DTE – This PC-mounted, 25-pin, D-type, female connector is used for connecting the 62BP to Data Terminal Equipment.

5) One SPARE INPUT LED pair allows monitoring any other desired signal.

6) Both -9V and +9V Outputs are provided for setting any undriven signals to a desired level. Each output is capable of driving two RS-232-C loads.

7) Two Independent Pulse Traps can capture RS-232-C compatible pulses as short as 2 microseconds. The + input detects negative-to-positive transitions. A green LED lights when a transition is detected. The - input detects positive-to-negative transitions. A red LED lights when a transition is detected. The RESET push-button turns off the LEDs. Both pulse trap circuits can be disabled by placing the PULSE TRAP slide switch in the OFF position.

8) Three 3 kohms resistors (tied to ground) are provided as RS-232-C loads. They can be used as additional loads to test for any marginal signals or to provide termination where it is required.

9) TO DCE – This 25-pin, D-type, male connector on the end of an 8" ribbon cable is used for connecting the 62BP to Data Circuit-terminating Equipment.

10) Eleven pairs of Green and Red LEDs are used to monitor the states of the most used interface signals: TD, RTS, DTR, and TCE (DTE SOURCE); RD, CTS, DSR, DCD, TC, RC, and RI (DCE SOURCE). Each monitor circuit's input has an impedance of greater than 30 kohms and is connected to the signal source side of the 62BP, which is also where the LED pairs are located.

11) Test Points – Test points on either side of the pin 1 to pin 25 switches allow monitoring and cross-patching of all the interface signals.

12) Miniature Rocker Switches – Twenty-five miniature rocker switches allow all of the interface conductors to be individually connected (CLOSE) between the DTE or DCE or opened (OPEN) for isolated testing. Two additional rocker switches are provided to allow the crossing of pins 2(TD) and 3(RD) between the TO DTE and TO DCE connectors.

Pin #		Pin #
2	to	3
4 & 6	to	20
17	to	24*

*For synchronous only, and the modem must be strapped for external clock.

5.3 Simulating a Modem Eliminator

The Model 62 can simulate a modem eliminator thus allowing for the interconnection of data terminal equipment (DTE) without modems. A clock must be supplied (on Pin 24) during synchronous operation. Figure 5.2 illustrates a normal datacomm network connecting a CPU to a remote terminal. Figure 5.3 illustrates a datacomm network with the IDS Model 62 set up to simulate a modem eliminator.

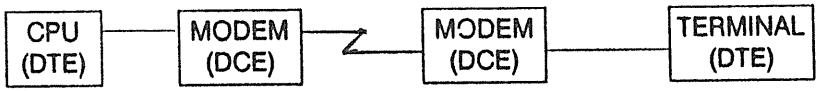


Figure 5.2.

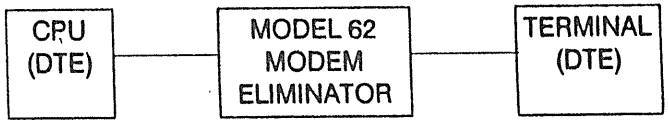


Figure 5.2.

Setup:

1) Disconnect the interface cable from the modem and plug it into the TO DTE connector on the Model 62.

Setup: See Figure 5.1.

1) Disconnect the interface cable from the modem and plug it into the TO DTE connector on the Model 62.

2) Using the Model 62's ribbon cable (labeled TO DCE), connect the Model 62 to the modem.

3) Switch all of the Model 62's rocker switches to the CLOSE position. The top two switches must be in the NORMAL 2 & 3 position.

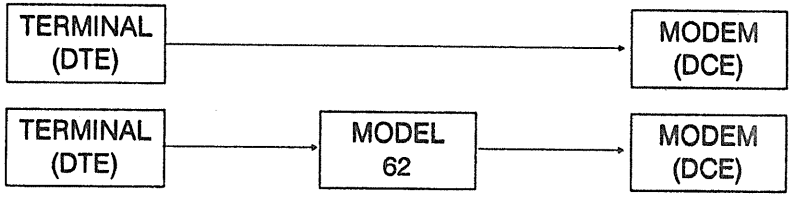


Figure 5.1

5.2 Modem Digital Loop-back Test

During asynchronous operation, Transmit Data is looped into Receive Data at the digital side of the modem, allowing a loop-back test to be performed on modems with no loop-back capability.

Setup (For full-duplex systems only):

1) If necessary, connect the modem interface cable to the Model 62 via the TO DTE connector.

2) Using the Model 62's ribbon cable, labeled TO DCE, connect the Model 62 to the modem.

3) Open the following switches: 2, 3, 4, 5, 8. 15, 17, 20, and 24.

4) Using miniature stacking jumper cables, jumper the following pins on the TO DCE side of the switches:

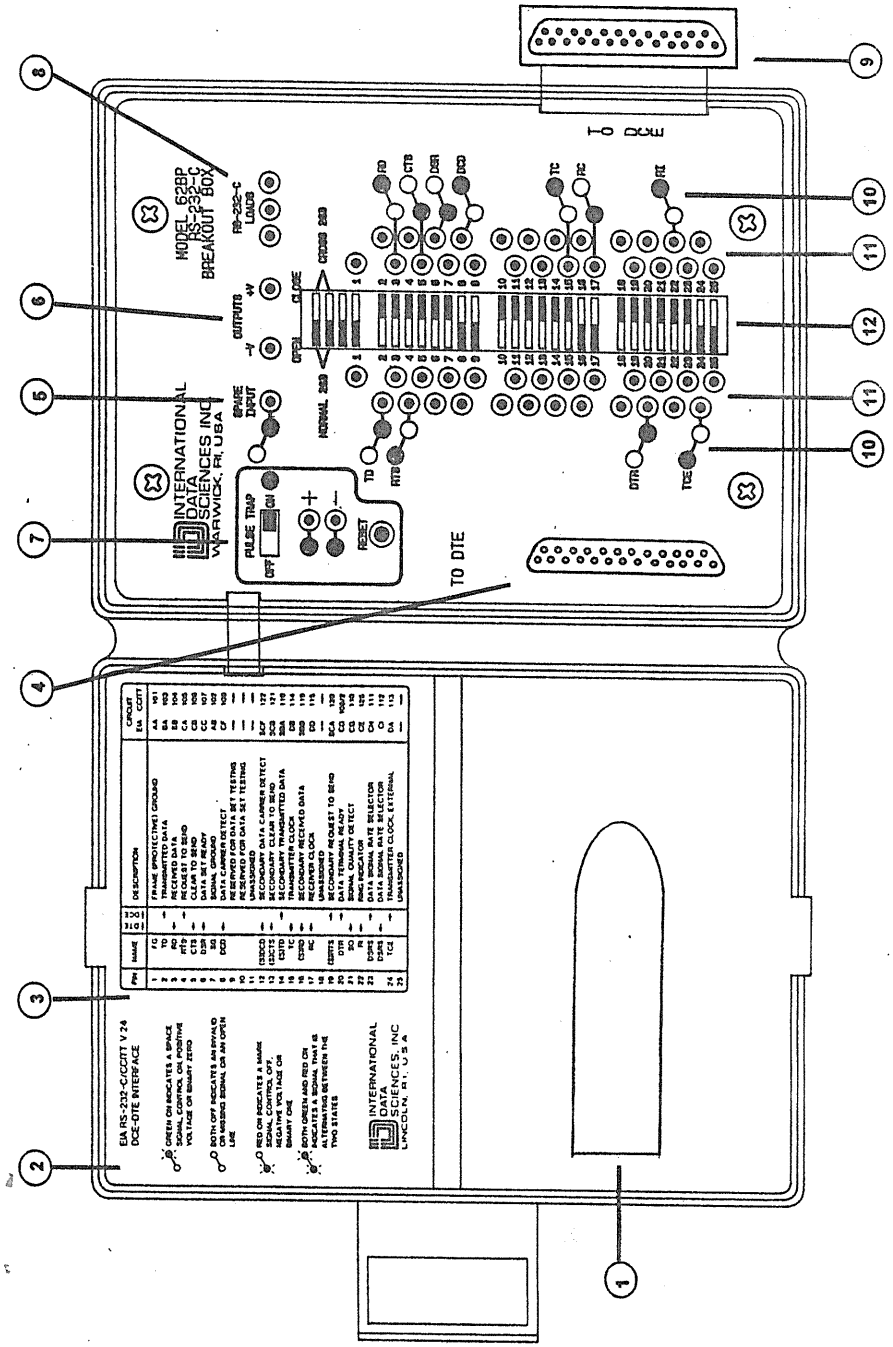


Figure 2.1 Line Drawing of the Model 62BP Front Panel

2.2 Model 62LP

1) A Velcro strap holds the five jumper cables provided with the Model 62.

2) EIA RS-232-C/CCITT V.24 Interface Label lists the pin number, common mnemonic name and source of the EIA RS-232-C/CCITT V.24 signals.

3) TO DTE – This PC-mounted, 25-pin, D-type, female connector is used for connecting the 62BP to Data Terminal Equipment.

4) SPARE INPUT – One SPARE INPUT LED circuit is provided for monitoring any other desired signal.

5) Ground Input – This pin is used for connecting to the common lead of the SPARE INPUT and RS-232-C LOADS circuits. If the rocker switch for pin 7 is in the OPEN position, then this must be connected to the pin 7 (SIGNAL GROUND) test point that corresponds to the source of the circuit inputs, TO DTE or TO DCE. If the switch is in the CLOSE position, then it can be connected to either pin 7 test point.

6) RS-232-C LOADS – Three 3 kohms resistors to ground are provided as RS-232-C loads. They can be used as additional loads to test for any marginal signals or to provide termination where it is required.

7) TO DCE – This 25-pin, D-type, male connector on the end of an 8" ribbon cable is used for connecting the 62BP to Data Circuit-terminating Equipment.

8) LEDs – Eleven pairs of Green and Red LEDs are used to monitor the states of the most used interface signals: TD, RTS, DTR, and TCE (DTE SOURCE); RD, CTS, DSR, DCD, TC, RC, and RI (DCE SOURCE). Each monitor circuit is powered by the input signal itself and has an impedance of greater than 8 kohms. The circuits and LEDs are located on the signal source side of the 62LP.

9) Test Points – Test points on either side of the pin 1 to pin 25 switches allow monitoring and cross-patching of all the interface signals.

10) Miniature Rocker Switches – Twenty-five miniature rocker switches allow all of the interface conductors to be individually connected (CLOSE) between the DTE or DCE or opened (OPEN) for isolated testing. Two additional rocker switches are provided to allow the crossing of pins 2(TD) and 3(RD) between the TO DTE and TO DCE connectors.

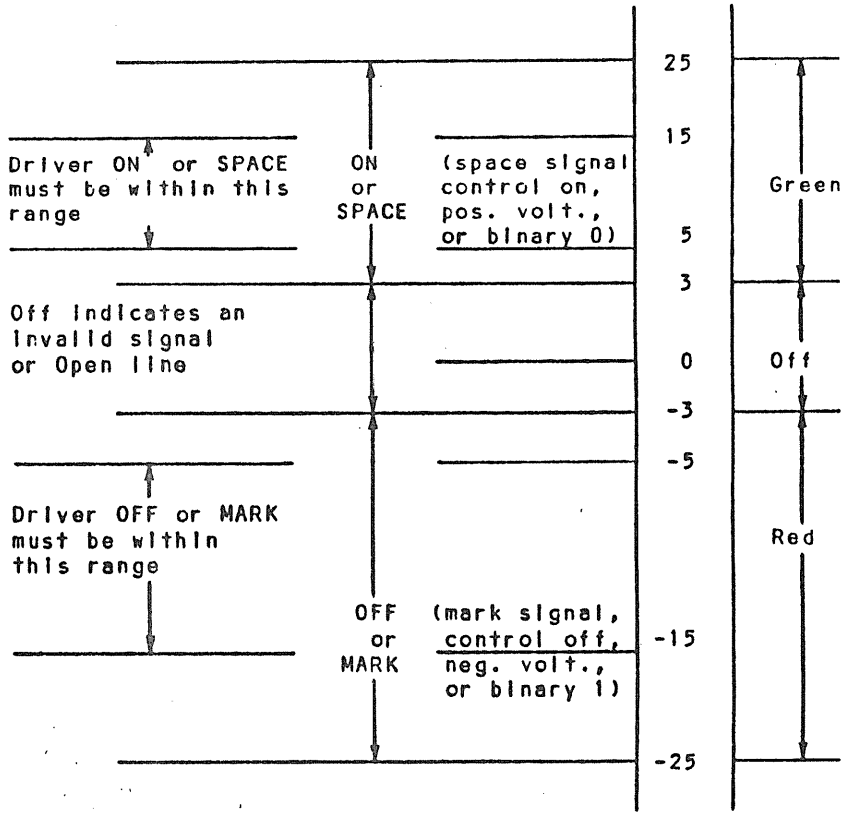


Figure 4.0-1 Voltage Thresholds

5.0 Applications

The purpose of the Model 62 is to provide the user with a self-contained, pocket-size monitor and breakout panel in order to isolate and solve modem-terminal problems at the EIA RS-232 and CCITT V.24 interface. The Model 62 may also be very useful for many applications in digital work. Several applications using the Model 62 are described in the following sections.

5.1 Monitoring the Modem-Terminal Interface

The Model 62 is transparent to the interface while it allows the operator to monitor and breakout the entire 25-wire EIA RS-232 interface.

PIN #	MNEMONIC NAME	DIRECTION		DESCRIPTION	CIRCUIT	
		TO DTE	TO DCE		EIA	CCITT
1	FG			FRAME (PROTECTIVE) GROUND	AA	101
2	TD		⇨	TRANSMITTED DATA	BA	103
3	RD	⇦		RECEIVED DATA	BB	104
4	RTS		⇨	REQUEST TO SEND	CA	105
5	CTS	⇦		CLEAR TO SEND	CB	106
6	DSR	⇦		DATA SET READY	CC	107
7	SG			SIGNAL GROUND	AB	102
8	DCD	⇦		DATA CARRIER DETECT	CF	109
9				RESERVED FOR DATA SET TESTING	–	–
10				RESERVED FOR DATA SET TESTING	–	–
11				UNASSIGNED	–	–
12	(S)DCD	⇦		SECONDARY DATA CARRIER DETECT	SCF	122
13	(S)CTS	⇦		SECONDARY CLEAR TO SEND	SCB	121
14	(S)TD		⇨	SECONDARY TRANSMITTED DATA	SBA	118
15	TC	⇦		TRANSMITTER CLOCK	DB	114
16	(S)RD	⇦		SECONDARY RECEIVEDADATA	SBB	119
17	RC	⇦		RECIEVER CLOCK	DD	115
18				UNASSIGNED	–	–
19	(S)RTS		⇨	SECONDARY REQUEST TO SEND	SCA	120
20	DTR		⇨	DATA TERMINAL READY	CD	108/2
21	SQ	⇦		SIGNAL QUALITY DETECT	CG	110
22	RI	⇦		RING INDICATOR	CE	125
23	DSRS		⇨	DATA SIGNAL RATE SELECTOR	CH	111
		⇦			CI	112
24	TCE		⇨	TRANSMITTER CLOCK, EXTERNAL	DA	113
25				UNASSIGNED	–	–

Table 4.0-1 EIA RS-232-C/CCITT V.24 INTERFACE

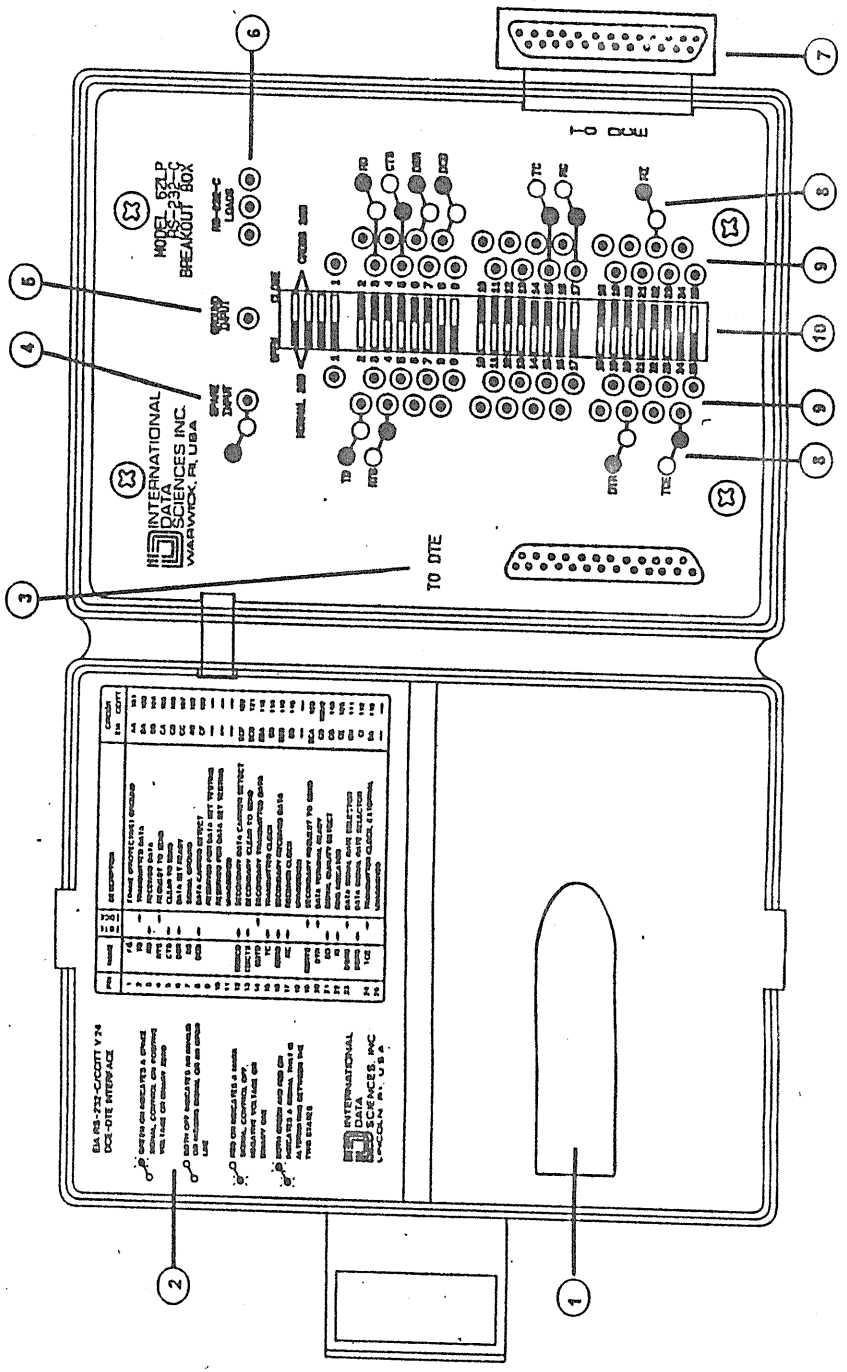


Figure 2.2 Line Drawing of the Model 62LP Front Panel

3.0 OPERATION

In use, the operator unplugs the EIA RS-232 interface cable at the modem and plugs it into the Model 62's 25-pin female connector labeled "TO DTE" (Data Terminal Equipment). The Model 62's male connector, labeled "TO DCE" (Data Circuit-terminating Equipment) and attached to an 8" ribbon cable, is connected directly to the modem. This allows access to all signal conductors of the 25-wire EIA RS-232 Interface.

The Model 62 monitors 11 key interface signals with EIA RS-232 sensing circuits which drive Red and Green LED pairs to indicate the ON or OFF levels. A spare LED pair senses either positive or negative voltage levels between 3V and 25V and may be used to monitor any signal line. Please note that when using any of the signals on the DTE side of the 62BP with the LED monitoring circuits, the -V, +V OUTPUTS or the RS-232-C LOADS, the rocker switch for pin 7, SIGNAL GROUND, must be in the CLOSE position for proper operation. All Model 62 sensing circuits have an input impedance of greater than 30 kohms and will not load lines.

The four states of each LED pair depend on the voltage level of the signal that is being monitored as follows:

Green LED	Red LED	INPUT SIGNAL VOLTAGE (Vin)	SIGNAL STATE
ON	OFF	+3.0V < Vin ≤ +25.0V	Space, On, 0, +V
OFF	OFF	-3.0V ≤ Vin ≤ +3.0V	Illegal or No Signal, Open Line
OFF	ON	-3.0V > Vin ≥ -25.0V	Mark, Off, 1, -V

The fourth state, both green and red LEDs on, indicates the presence of a signal such as active data or clocks that is alternating between the two legal states.

Twenty-five miniature switches allow all interface conductors to be individually interrupted for isolated testing and observation of terminal and modem signals. Pins on each side of each switch and small jumper cables, which are stored in the cover, allow cross-patching and monitoring of all interface signals. Thus, signals can be rerouted to pins by opening lines utilizing the DIP switches, and cross-patching utilizing the jumpers.

Two additional rocker switches are provided to allow the crossing of pins 2(TD) and 3(RD) between the TO DTE and TO DCE connectors for applications such as using the 62BP to form a null-modem. To use this feature, these two switches must be placed in the CROSS 2 & 3 position and the pin 2 and 3 switches must be placed in the OPEN position. For normal 2 to 2 and 3 to 3 operation, the other two switches must be in the NORMAL 2 & 3 position.

4.0 EIA RS-232-C Interface

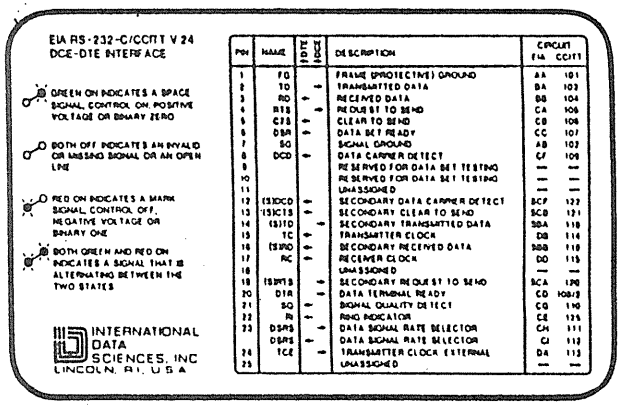
The EIA RS-232-C Interface is the U.S. set of signal protocol standards as specified by the Electronic Industries Association for DCE (Data Circuit-terminating Equipment) - DTE (Data Terminal Equipment) connections. The international standard for the same interface is CCITT V.24.

This discussion will be limited to an interfacing protocol that occurs at a modem's (DCE) connector. A cable is used to connect the terminal (DTE) to the Modem. This cable employs up to 25 signal conductors, with each lead identified by a number. The EIA/CCITT standards define the function for most of the signal conductors or corresponding pins. Table 4.0-1 gives a description of the EIA/CCITT interface. The voltage thresholds for RS-232-C lines id described in Figure 4.0-1.

It would be unusual for a system to use all 25 signal conductors. A typical interface will use approximately one-half of the available functions, based on the designer's application, and the remaining leads would be ignored.

The EIA interface can be divided into three types of functions: control, clocking, and data. Control signals make up the so called "EIA hand-shaking signals" that take place between the modem and terminal; these signals are either "ON" or "OFF." Clocking signals control the speed and synchronization of the data transfer. Data signals represent the actual transmission of information.

This brief introduction to the EIA/CCITT Interface is meant to be helpful in understanding the signal protocols that take place between the modem and terminal so the Model 62 can be used more effectively.



The above label describes the RS 232-C interface and the four possible states of the LED pairs. It is located on the battery cover of the Model 62.