

RS-232C Line Driver



User Manual

Read this manual thoroughly and follow the installation procedures carefully to prevent any damage to the IC-150 and/or the devices it connects to.

All brand names and trademarks are the registered property of their respective owners.

Packing Checklist

- 1 x IC-150 Line Driver
- 1 x User's Manual

If anything is damaged or missing, contact your dealer.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Overview

The non powered IC-150 Line Driver facilitates efficient transmission and reception of serial data without requiring an external power source. The unit drives your data at various speeds up to 19,200 bps over distances up to 0.5 miles using 24-gauge wire (transmitting at 110 bps over distances up to 6.3 miles). Note that the slower the speed, the greater the distance, and transmission performance may vary depending on operating conditions and wire gauge.

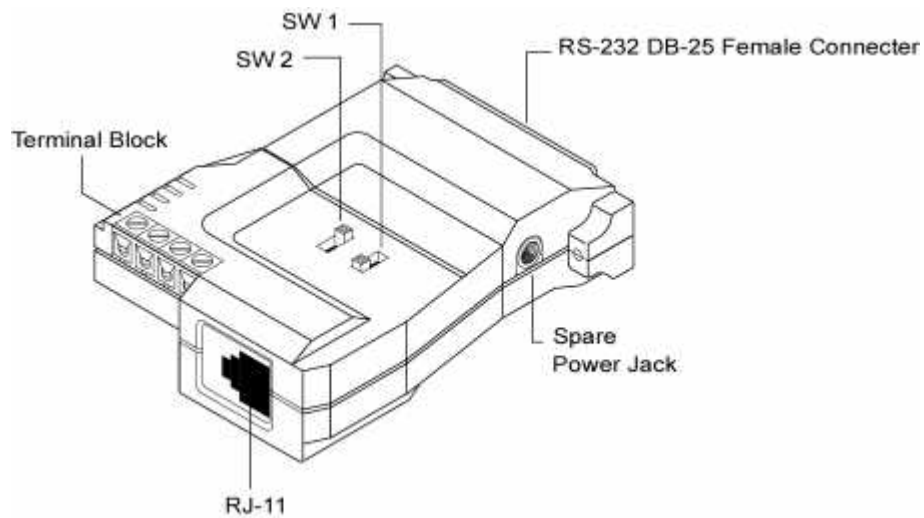
The IC-150 provides 1,500VAC lightning surge protection and excellent noise rejection through the use of differential circuitry. The unit is switch-selectable for DCE/DTE. It provides asynchronous transmission and operates full-duplex over four wires.

This compact unit plugs directly into the back of your asynchronous terminal, which saves the space that a standalone unit would use, and also eliminates the bulk and cost of a separate RS-232 interface (which requires a +12V DC source). Therefore, the IC-150 does not need a separate outlet or power supply.

Features

- DCE / DTE selectable
 - External Power Not Required - Power supplied by the RS-232 interface
 - Compact size
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Switch Configuration



The IC-150 is configured by setting two slide switches. SW1 is used to select the *Device Mode*; SW2 is used to select the *Transmission Mode*, as shown in the table below:

Position	SW1	SW2
1	DCE	Full Duplex
2	DTE	DCE, Tx or DTE, Rx
3	Loop Back	DCE, Rx, or DTE, Tx

Note: DCE means Date Communication Equipment; DTE means Date Terminal Equipment.

Device Mode Selection

The Device Mode is selected with SW1, as shown in the table, below:

SW1 Position	Operating Mode	Meaning
1	DCE	The IC-150 is set to DCE mode and must be connected to a DTE device.
2	DTE	The IC-150 is set to DTE mode and must be connected to a DCE device.
3	Loop Back	The IC-150 is set to Monitor mode and monitors the phone line signals.

Transmission Mode Selection

The Transmission Mode is selected with a combination of SW1 and SW2. Choices are *Full Duplex*, or *Simplex* (Tx Only or Rx Only), as shown in the table, below:

SW2 Position	Operating Mode
1	Full Duplex. The IC-150 transmits and receives simultaneously. With this mode, it doesn't matter what SW1 is set to.
2	DCE Tx / DTE Rx: if SW1 is set to DCE (SW1 pos. 1), the IC-150 only transmits; if SW1 is set to DTE (SW1 pos. 2), the IC-150 only receives.
3	DCE Rx / DTE Tx: if SW1 is set to DCE (SW1 pos. 1), the IC-150 only receives; if SW1 is set to DTE (SW1 pos. 2), the IC-150 only transmits.

Switch Setup Summary

The above considerations can be summarized in the following table:

IC-150 Operating Mode	SW1	SW2
Full Duplex	X	1
Simplex DCE Transmit	1	2
Simplex DCE Receive	1	3
Simplex DTE Transmit	2	3
Simplex DTE Receive	2	2
Loop Back	3	X

Note: 1. An X in the table means it doesn't matter what the switch is set to.

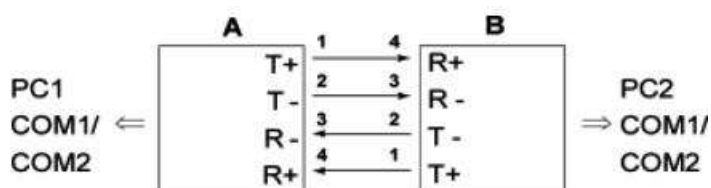
2. If the IC-150 is set as a DCE device, it must connect to a DTE device (and vice versa).

Operation

You should be aware of the following considerations when operating the IC-150:

- The digital interface is RS-232C/CCITT V.24.
- When in Full Duplex, only software handshake (i.e. Xon/Xoff or ETX/ACK) is applicable via TD and RD.
- When in Simplex, only hardware handshake (DTR/DSR) is applicable.
- The unit is powered from host RS-232C interface (MC1488, SN75188 or equivalent ICs).
The interface must provide greater than +9V of power.
- In addition to the TD line, the computer or terminal must at least also support the RTS line; the DTR line; or both.

IC-150 Configuration Table



IC-150 Function Table

IC-150A				IC-150B			
DCE		DTE					
SW1	SW2	SW1	SW2				
2	1	1	1	(1) A	←→	B	
2	3	1	2	(2) A	→	B	
2	2	1	3	(3) A	←	B	
2	1	1	1	(4) A	←	B	
SW1	SW2	SW1	SW2				
1	1	2	1				
1	3	2	2				
1	2	2	3				
x	3	x	3				

Function (1) Full Duplex: A and B may both transmit and receive. They only use software handshake

Function (2) Simplex: A is the transmitter; B is the receiver.

Function (3) Simplex: B is the transmitter; A is the receiver.

Function (4) Loop Back: A monitors the phone line data transmission (for self-test only).

Note: In Simplex Mode, only hardware handshaking (DTR/DSR) applies.

Appendix

RS-232 Pin Outs

▪ DTE Mode:

Pin	Name	Function
1	PG	Protective Ground
2	TD	Transmit Data
3	RD	Receive Data
4	RTS	Request to Send (connected with pin 5)
5	CTS	Clear to Send (connected with pin 4)
6	DSR	Data Set Ready
7	SG	Signal Ground
8	CD	Receive Line Signal Detector
20	DTR	Data Terminal Ready

▪ **DCE Mode:**

Pin	Name	Function
1	PG	Protective Ground
2	RD	Receive Data
3	TD	Transmit Data
4	CTS	Clear to Send (connected with pin 4)
5	RTS	Request to Send (connected with pin 5)
6	DTR	Data Terminal Ready
7	SG	Signal Ground
8	CD	Receive Line Signal Detector
20	DSR	Data Set Ready

Specifications

Function	Specification	
Power Supply	No external power. Power derived from RS-232 interface.	
Data Rate	Up to 19,200 bps under 0.5 miles.	
Connectors	<ul style="list-style-type: none"> 1 x DB-25 female 1 x 4 Post Terminal Block 1 x RJ-11 Socket 	
Function Switches	SW1	DCE / DTE / Loop Back Select
	SW2	Full Duplex / Simplex Select
Housing	Plastic	
Weight	60 g	
Dimensions (L x W x H)	54 x 74.5 x 18.5 mm	

Distance / Data Rate Table

bps	Distance		Wiring
	kms	miles	
110	10	6.3	24 AWG two twisted pairs.
1200	7	4.4	
2400	5	3.1	
4800	3.5	2.2	
9600	2	1.3	
19200	0.8	0.5	

Troubleshooting

Symptom	Action
Data Transmission Failure	Check that the IC-150 units are securely plugged into the computers' serial ports.
	Check that the cables are properly set up and properly connected.
	Check that SW1 and SW2 are set properly.
	Check that a device configured as DCE is connected to one configured as DTE (and vice versa).
Data Loss or Error	Check that pins 4, 5, 6, 8, and 20 carry $\pm 9V$ DC.
