

NM-541-MUX

Five Inputs NMEA Multiplexer

User Guide

V1.00



Introduction

NM-541 is a four or five input channel multiplexer with five output channels NMEA-0183 data multiplier. It enables combining and multiplying of all NM-0183 sources to the navigational instruments through five talker ports and PC connection through RS-232, USB and an optional Ethernet interface.

Operation

NM-541 acquires the NM-0183 signals from the four optically isolated inputs and the RS-422 (Ine) or USB or the RS232 or Ethernet input port, combines the data and outputs them to the five general output ports (RS485 and Out1-Out4), the RS-232 the USB and the Ethernet (optional) output ports.

The NM-541 has the following features:

1. Configurable input reception speed for Input ports: The speed for the received data in the input ports Ind and Ine can be configured via the dip switch array according to table 1. The speed for the input ports Ina to Inc is fixed to 4.800 bps.
2. Configurable output transmission speed: The output speed for the combined data stream of the five input ports (Ina-Ind and Ine or RS232 or USB or Ethernet) is user selectable via dip-switches and can be set to 4.800, 9.600, 19.200, 38.400, 57.600 and 115.200 baud.
3. Input Autosense: The NM-541 senses a correct NMEA signal application to any of the four inputs (Ina-Ind) and flashes the RXD LED. If no or incorrect signal is applied to all four inputs the RXD LED remains in the OFF condition. The existence of an input signal in the port Ine or RS232 or USB or Ethernet is indicated from the INE LED status. The flashing of INE LED although does not indicate a correctly applied signal.
4. Data overflow indication: The NM-541 has an overflow indication via the OVF LED. When an overflow occurs some of the last inputted data will not be transmitted. This is normal when connecting to instruments transmitting great amounts of data, and can be fully resolved if the output transmission speed is configured to a higher value.
5. Watchdog: The integrated watchdog reset feature will bring NM-541 back from any unresponsive state into normal operation.

Input Ports (listeners)

The NM541 has five input ports. The Input ports Ina-Ind are optically isolated and can be connected to any instrument intended for marine use that can output NMEA-0183 signals following the 4.800/8/N/1 serial protocol and carried in a TTL, RS232 or RS485/RS422 electrical levels.

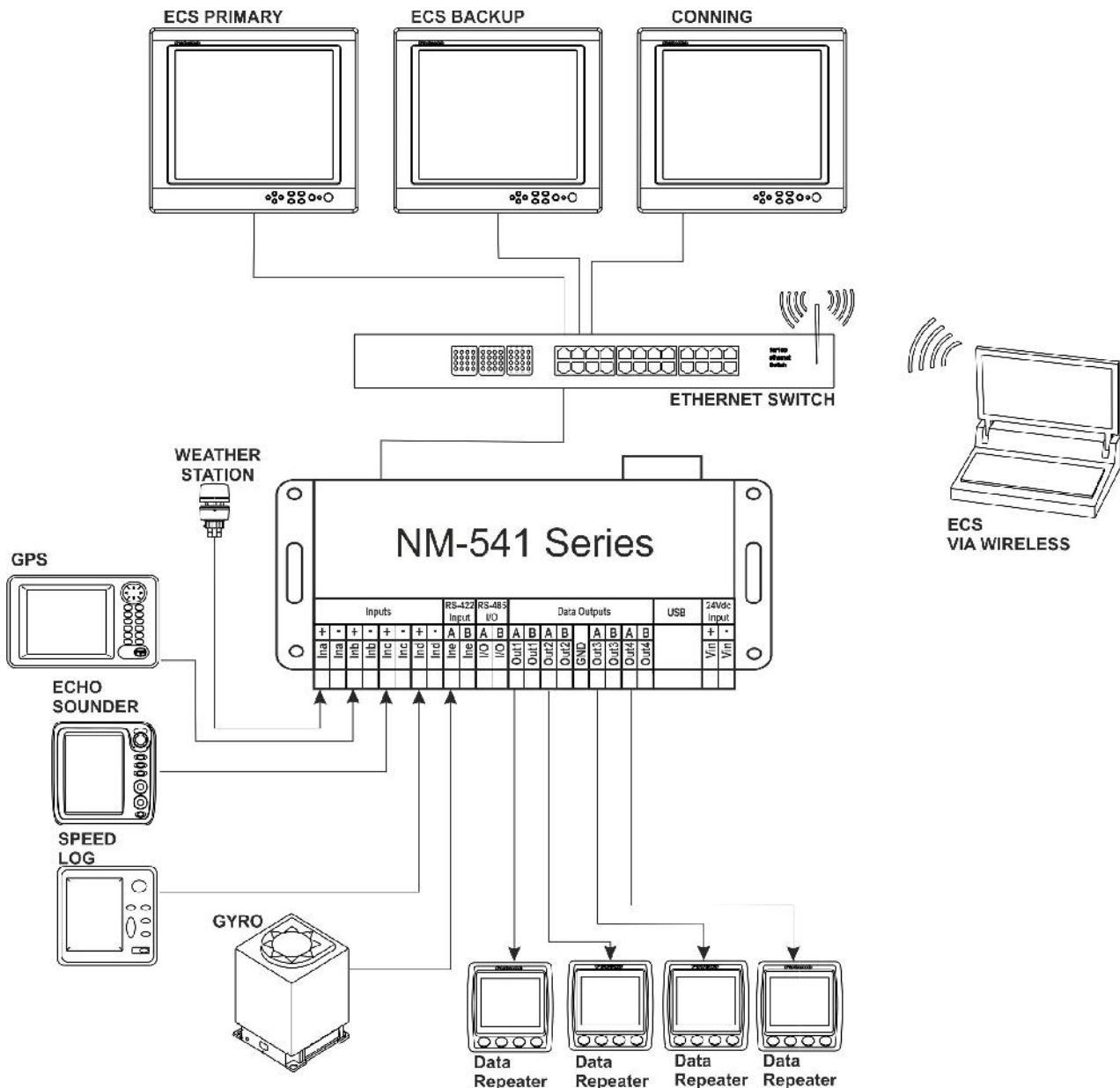
The fifth input port can be one of the Ine (RS422 input) or the RXD channel of the RS232, USB or Ethernet (optional) port. The routing of the input data in any of these ports is achieved automatically. Only one of the Ine, RS232, USB and Ethernet receiving channel should be connected as the fifth input port of the NM541 else the data will be corrupted and filtered out of the combined stream. The baud rate of the signals in the fifth port follows the selection of the speed of the output ports. This feature allows connection of the NM-541 to Automatic Identification Systems (AIS) at 38.400 baud or to another NM541 in cascaded topology.

Output Ports (Talkers)

Each of the five general purpose talker ports transmit NMEA sentences in both RS422 and TTL signal levels, depending on the connection topology chosen (see figure 1, 2 and 3), and can fan out one instrument.

The RS-232, USB and Ethernet ports can deliver NMEA sentences to any modern computer running the appropriate software on Windows 2000 or later provided that serial communication follows the 4.800, 9.600, 19.200, 38.400, 57600 or 115.200/8/N/1 standard. These ports are not optically isolated and should be used when proper isolation is achieved or if the computer is supplied from an isolated power supply in order to avoid current leakage.

Typical Application



Power Supply

The NM-541 mux can be powered within the range of 10-35 VDC. The nominal voltage of 24 Vdc is advised for powering the device in normal operation.

Power input port has a protection from short circuit and incorrect polarity connection of the supplying voltage.

LED Indicator sequence

INE	OFF: No input signal on Ine, RS232 or USB or Ethernet port Flashing: Signal applied on Ine or RS232 or USB or Ethernet port
RXD	OFF: No input or incorrect polarity of signal connected in any of the Ina-Ind input ports Flashing: Signal correctly applied in one of the Ina-Ind ports
OVF	Data overflow. Data lost of one or more data inputs
TXD	OFF: No data transmission Flashing: Transmission of the combined data stream to RS485, Out1-Out5, Serial and USB port
PWR	OFF: Device is powered OFF ON: Device is powered ON

Dip Switch Settings

DIP SWITCH SETTINGS (1)				INPUT PORTS					OUTPUT PORTS				
SW4	SW3	SW2	SW1	Ina	Inb	Inc	Ind	Ine (2)	RS485 I/O (3)	Out1 to Out4	USB	RS232	ETHERNET INTERFACE (4)
OFF	OFF	OFF	OFF	4.800	4.800	4.800	4.800	4.800	4.800	4.800	4.800	4.800	4.800
OFF	OFF	OFF	ON	4.800	4.800	4.800	4.800	9.600	9.600	9.600	9.600	9.600	9.600
OFF	OFF	ON	OFF	4.800	4.800	4.800	4.800	19.200	19.200	19.200	19.200	19.200	19.200
OFF	OFF	ON	ON	4.800	4.800	4.800	4.800	38.400	38.400	38.400	38.400	38.400	38.400
OFF	ON	OFF	OFF	4.800	4.800	4.800	4.800	57.600	57.600	57.600	57.600	57.600	57.600
OFF	ON	OFF	ON	4.800	4.800	4.800	4.800	115.200	115.200	115.200	115.200	115.200	115.200
OFF	ON	ON	OFF	4.800	4.800	4.800	9.600	9.600	9.600	9.600	9.600	9.600	9.600
OFF	ON	ON	ON	4.800	4.800	4.800	9.600	19.200	19.200	19.200	19.200	19.200	19.200
ON	OFF	OFF	OFF	4.800	4.800	4.800	9.600	38.400	38.400	38.400	38.400	38.400	38.400
ON	OFF	OFF	ON	4.800	4.800	4.800	9.600	57.600	57.600	57.600	57.600	57.600	57.600
ON	OFF	ON	OFF	4.800	4.800	4.800	9.600	115.200	115.200	115.200	115.200	115.200	115.200
ON	OFF	ON	ON	4.800	4.800	4.800	38.400	38.400	38.400	38.400	38.400	38.400	38.400
ON	ON	OFF	OFF	4.800	4.800	4.800	38.400	57.600	57.600	57.600	57.600	57.600	57.600
ON	ON	OFF	ON	4.800	4.800	4.800	38.400	115.200	115.200	115.200	115.200	115.200	115.200
ON	ON	ON	OFF	NOT APPLICABLE									
ON	ON	ON	ON	RESERVED FOR FUTURE USE									

NOTES:

- (1) To configure the N-M541 a power cycle should be performed after setting the dip-switches
- (2) Ine shares the same input channel with the receiving ports of the USB, RS232 and Ethernet interface. Only one of these inputs must be connected at any time else data corruption will occur
- (3) The RS485 I/O is a bidirectional interface that is configured only as an output. The Input facility is not currently applicable and is intended for future use
- (4) The Ethernet interface is optional. Further programming is required to meet the given baud rates as per appendix in the current manual

Table 1: NM-541 Configuration

Printed Circuit Board composite layout

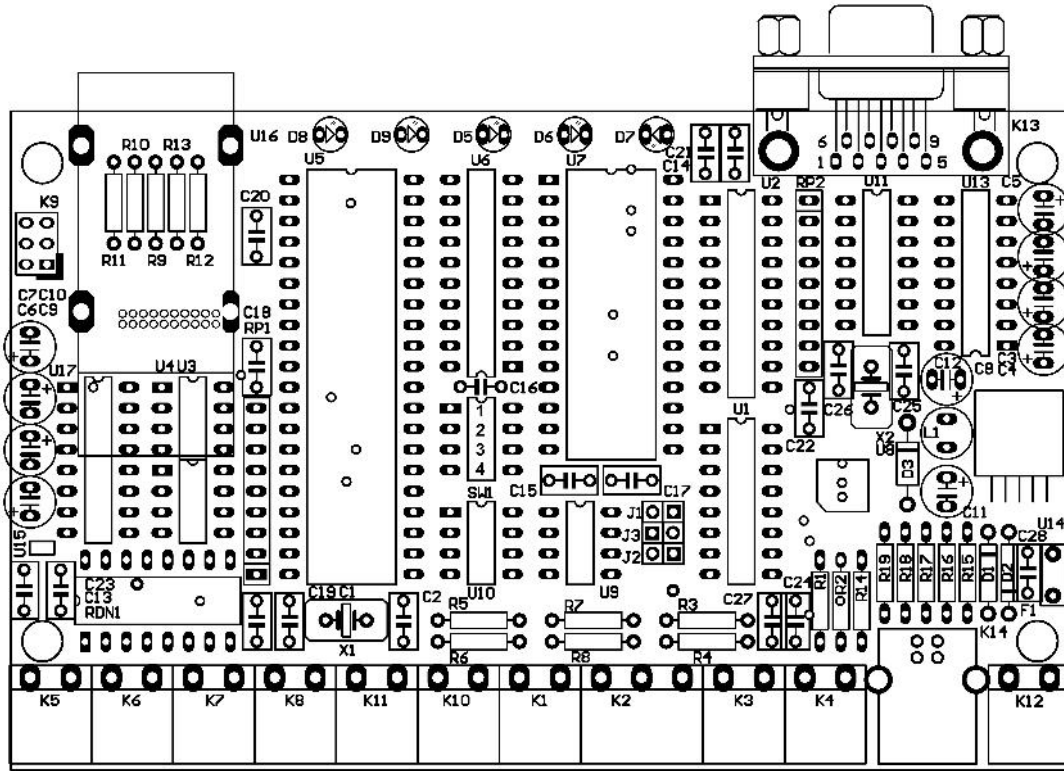


Figure 4: Composite layout of NM-541 printed circuit board

Specifications

Supply Voltage	9 to 35 Vdc
Power Supply Protection	PTC Resetable Fuse Vmax: 60V, Imax: 40A, Ihold: 0,25A (23°C), Itrip: 0,5A (23°C), Max time to trip (23°C): 2,2sec for 1,25A
Current Consumption	50mA in idle state/ 150mA in full output mode
Inputs	4 x NMEA-0183, optically isolated Common Mode Rejection: 10kV/usec, Isolation: 480 Vrms 1 x RS-422, 1 x USB, 1 x RS232, 1 x Ethernet (optional)
Input Resistance	1 KOhm
Outputs	5 x buffered RS-422/TTL (general purpose) 1 x USB, 1 x RS232, 1 x Ethernet (optional)
Output protection	Buffered for all RS-422 outputs
Speed for NMEA inputs	4.800/8/N/1 for inputs Ina-Inc 4.800-9.600-38.400/8/N/1 user selectable for input Ind 4.800-9.60-19.200-38.400-57.600-115.200/8/N/1 user selectable for input Ine
Speed for NMEA outputs	4.800-9.60-19.200-38.400-57.600-115.200/8/N/1 user selectable
Indicators	INE, RXD, OVF, PWR
Dimensions	Width = 150mm/175,30 mm Depth = 80 mm Height = 49,20 mm
Housing	Styrene

Port ID		Wire ID / Color	Cable ID	Signal Description
INPUTS	Ina	+		
	Ina	-		
	Inb	+		
	Inb	-		
	Inc	+		
	Inc	-		
	Ind	+		
	Ind	-		
	Ine	A		
	Ine	B		
OUTPUTS	IO	A		
	IO	B		
	Out1	A		
	Out1	B		
	Out2	A		
	Out2	B		
	GND			
	Out3	A		
	Out3	B		
	Out4	A		
USB	USB	TXD		
	USB	RXD		
24V DC	Vin	+		
	Vin	-		
RS-232	RS232	TXD		
	RS232	RXD		
ETH	Eth/net	TXD		
	Eth/net	RXD		

ETHERNET INTERFACE				SETTINGS			
Ethernet IP address:		UDP Client Settings		Dip Switches		Baud Rate	
	Description	Send to	UDP Port		ON	OFF	Ina-Inc: 4.800 bps
Subnet Mask: 255.255.255.0	.....	. . . . .	.....	1			Ind:
Basic Serial Settings:	.....	. . . . .	.....	2			..... bps
Description:	.....	. . . . .	.....	3			Ine and Outputs:
Baud Rate: bps	.....	. . . . .	.....	4			..... bps