

NM-251A NMEA-0183 Multiplier

User Guide

V1.01



Introduction

The NM-251A is a two channel NMEA-0183 input / four or five channels NMEA-0183 output multiplier. It enables data distribution from two NM-0183 sources (primary and secondary with priority encoding) to all NMEA-0183 instruments through four or five talker ports and PC connection through RS-232. Data from PC's charting system can be delivered back to the autopilot from the same RS-232 port which acts bidirectional (talker and listener).

Operation

The NM-251A acquires NMEA-0183 sentences from the most significant input and immediately sends them to the general purpose outputs and the RS-232 output. A watchdog timer routine supervises if the NMEA signals are correctly applied in the primary input and switches to the secondary input whenever there is no NMEA sentence for at least eight seconds. In this case the secondary input starts receiving data if there is an instrument attached. If not, the device automatically returns to the primary input after eight seconds. When the secondary input is already in receiving mode and an NMEA signal is applied to the primary port, the device immediately switches to the primary input. In the case that no signal is applied to any input, the device "circles" around sampling the two listener ports every eight seconds until an NMEA-0183 signal appears to any of the two listener ports.

In addition the NM-251A can deliver at the same time different NMEA signals connected to Ina and Inb to output ports Out1/2 and Out3/4 respectively. To select this function user should turn the SW-1 to ON position at the dip switch array SW1 (see figure 4) located inside the NM-251A. In this mode the user can select from which input port signals will be delivered to RS232 interface by setting SW-2 to "OFF" position for Ina or "ON" for Inb.

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Input Ports (listeners)

The NM-251A has two input ports that can be connected to any instrument indented for marine use that can output NMEA-0183 signals. Each one of the two listener ports is optoisolated as specified in NMEA-0183 protocol, thus data(-) pole should never been connected to NM-251A ground. If the instrument's talker port is single ended, connect that terminal to the Ina(+) or Inb(+) input and tide the Ina(-) or Inb(-) to instrument's ground. If a RS-232 signal level is connected the ground pole (GND) should be connected to Ina(+) or Inb(+) and the data pole (TXD) to Ina(-) or Inb(-) respectively.

The two listener ports can acquire NMEA sentences carried in TTL, RS-232 and RS-485/422 signal levels.

Output Ports (Talkers)

Each of the four general purpose talker ports produce 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. Current drawn from every port can be up to 20mA, efficient enough to drive any NMEA compatible instrument.

The RS-232 port can deliver NMEA sentences to any modern computer running the appropriate software on Windows 98 and above provided that serial communication follows the 4.800/8/N/1. This port is not optically isolated and should be used for testing purposes only to avoid DC leakage. It can be used though to interface a computer system if proper isolation is achieved or if the computer is supplied from an isolated power supply.

The Out5 port has two functionality modes that can be selected via jumper J6 located inside NM-251A (see figure 4). By shorting poles 1-2 on J6, Out5 converts signals received from computer to RS-422 signal level. This functionality is independent from the rest of the NM-251A circuits and is intended to be used for interfacing Electronic Charting Systems (ECS) with autopilot systems. By shorting poles 1-3 on J6, Out5 is configured as a fifth output of the NM-251A. Further details on how to configure the functions of the NM-251A are shown on table 1.

The NM-251A can be connected as shown in figures 1,2 and 3 using all RS-422 outputs (figure 1), all TTL outputs (figure 2) or using either the RS-422 or TTL output of each port taking care not to connect the same port for both signal level outputting.

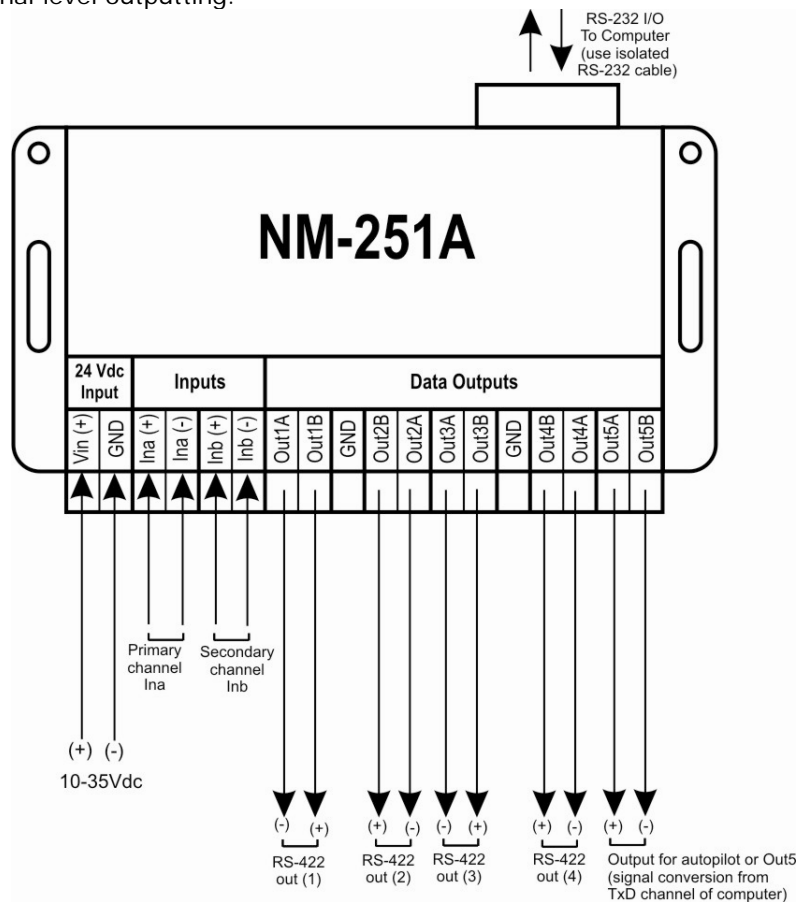


Figure 1: Connection to RS-422 Outputs

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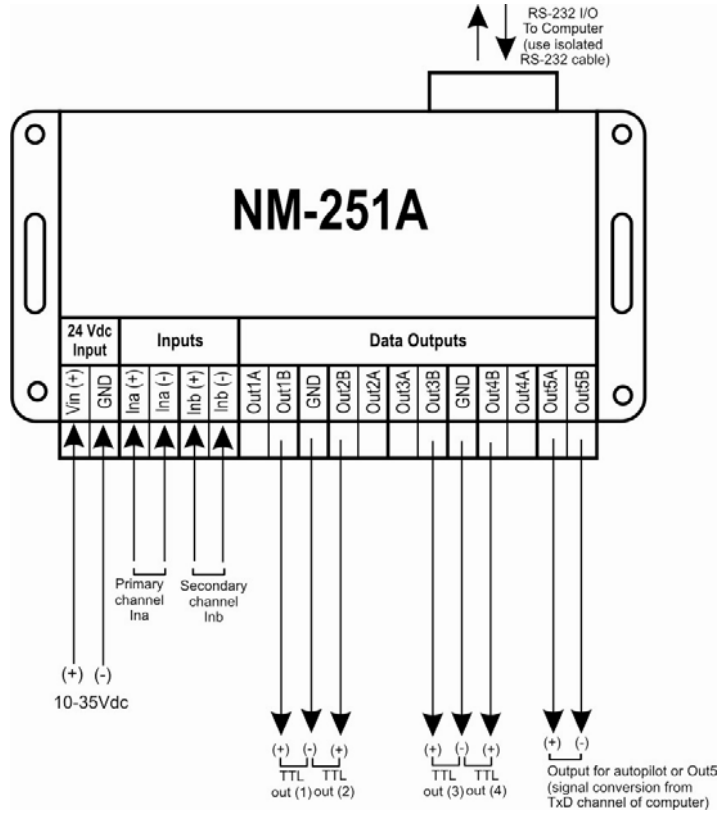


Figure 2: Connection to TTL outputs

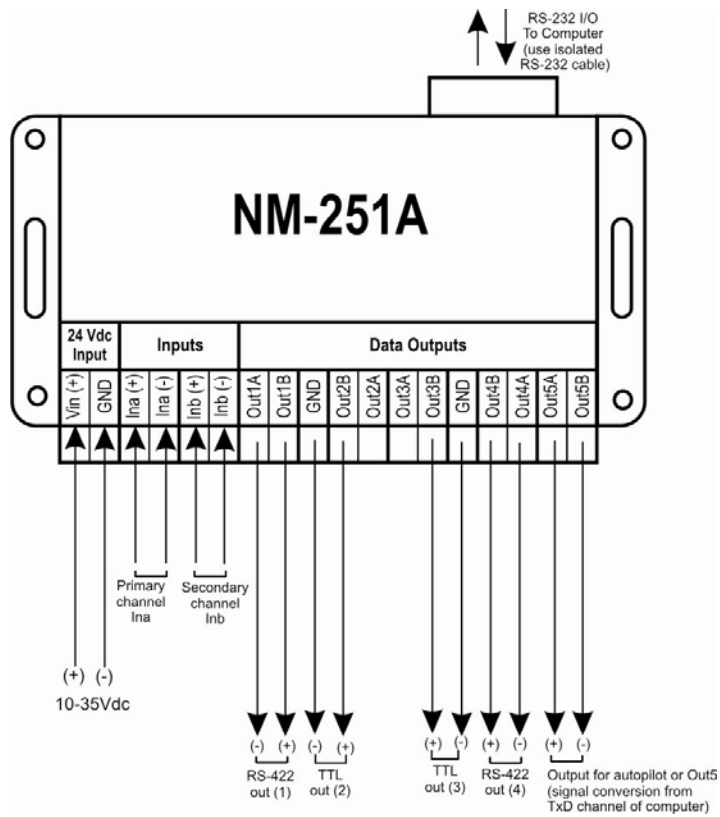


Figure 3: Combined use of TTL and RS-422 outputs

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Power Supply

The NM-251A 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 for incorrect polarity connection of the supplying voltage.

LED Indicator sequence

Inb LED	ON: Currently sampling from secondary port Inb
Ina LED	ON: Currently sampling from primary port Ina
Out 3/4 LED	Flashing indicates data transmission to output port 3 and 4
Out 1/2 LED	Flashing indicates data transmission to output port 1 and 2
Out5 LED	Flashing indicates reception from RS-232 port and transmission to Out5 port

Dip Switch Settings

Configuration						Input – Output routing				Functionality Description
SW-1	SW-2	SW-3*	SW-4*	J5	J6	Out 1/2	Out 3/4	RS 232	Out 5	
OFF	X	OFF	OFF	1-2	1-2	Ina or Inb		RS 232 RXD		Selects input priority encoding mode. Ina or Inb is transmitted to Out 1-4 and RS232. Out5 is converting RXD channel from RS232. Baud rate at 4.800 bps
OFF	X	OFF	OFF	1-2	1-3	Ina or Inb				Selects input priority encoding mode. Ina or Inb is transmitted to Out 1-5 and RS232. Baud rate at 4.800 bps (default).
OFF	X	OFF	OFF	1-3	1-2	Ina or Inb		RS 232 RXD		Selects input priority encoding mode. Ina or Inb is transmitted to Out 1-4 and RS232. Out5 is converting RXD channel from RS232. Baud rate is free up to 19.200 bps. CPU does not process the input signals.
OFF	X	OFF	OFF	1-3	1-3	Ina or Inb				Selects input priority encoding mode. Ina or Inb is transmitted to Out 1-5 and RS232. Baud rate is free up to 19.200 bps. CPU does not process the input signals.
ON	OFF	OFF	OFF	1-2	1-2	Ina	Inb	Ina	RS 232 RXD	Selects transmission from Ina to Out1/2 and RS232 and from Inb to Out 3/4. Out5 is converting RXD channel from RS232. Baud rate at 4.800 bps.
ON	OFF	OFF	OFF	1-2	1-3	Ina	Inb	Ina	Ina	Selects transmission from Ina to Out1/2, RS232 and Out5 and from Inb to Out 3/4. Baud rate at 4.800 bps.
ON	OFF	OFF	OFF	1-3	1-2					Not Applicable
ON	OFF	OFF	OFF	1-3	1-3					Not Applicable
ON	ON	OFF	OFF	1-2	1-2	Ina	Inb	Inb	RS 232 RXD	Selects transmission from Ina to Out1/2 and from Inb to Out3/4 and the RS232. Out5 is converting RXD channel from RS232. Baud rate at 4.800 bps.
ON	ON	OFF	OFF	1-2	1-3	Ina	Inb	Inb	Inb	Selects transmission from Ina to Out1/2, and from Inb to Out3/4 and Out5 and RS232. Baud rate at 4.800 bps.
ON	ON	OFF	OFF	1-3	1-2					Not Applicable
ON	ON	OFF	OFF	1-3	1-3					Not Applicable

*Note: SW-3 and SW-4 are intended for future use and should not be configured

Table 1: NM-251A Configuration

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Printed Circuit Board composite layout

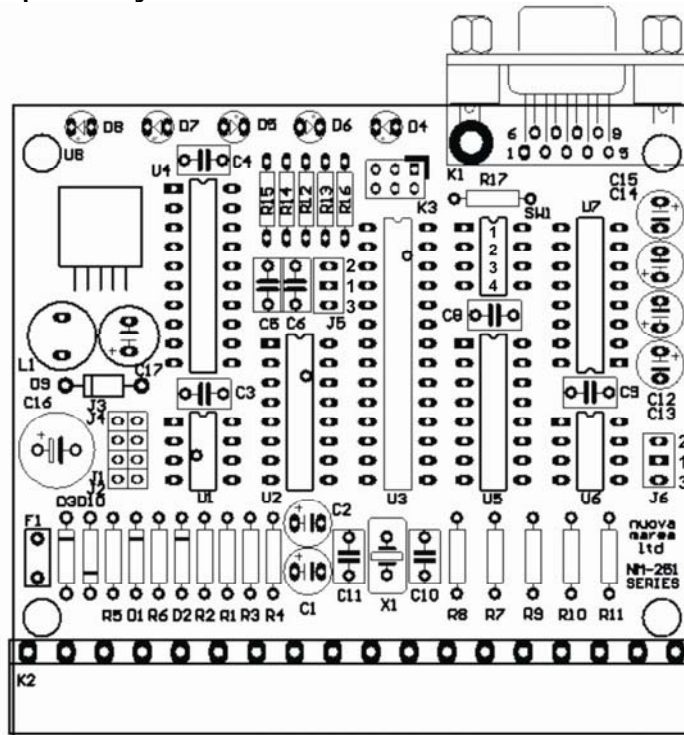


Figure 4: Composite layout of NM-251A printed circuit board

Specifications

Supply Voltage	9 to 35 Vdc
Power Supply Protection	PTC Resetable Fuse
Current Consumption	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
Inputs	2 x NMEA-0183, optically isolated Common Mode Rejection: 10kV/usec, Isolation: 480 Vrms
Input Resistance	1,5 KOhm
Outputs	4 x buffered RS-422/TTL (general purpose) 1 x RS-232 1 x RS-422 signal conversion from RS-232 RXD channel or as fifth output
Output protection	Buffered for all RS-422 outputs
Speed for NMEA inputs	<ul style="list-style-type: none"> • 4.800/8/N/1 when input priority encoding mode is selected • Same as listeners connected to output ports when Ina to Out1/2 and Inb to Out3/4 mode is selected
Speed for NMEA outputs	<ul style="list-style-type: none"> • 4.800/8/N/1 when input priority encoding mode is selected • Same as listeners connected to output ports when Ina to Out 1/2 and Inb to Out 3/4 mode is selected 4.800/8/N/1 for RS-232 or baud rate free user selectable
Indicators	Most Significant Input (Ina) Less Significant Input (Inb) Data transmission from output ports 1 and 2 (Out 1/2 LED) Data transmission from output ports 3 and 4 (Out 3/4 LED) Data reception from RS-232 interface or output 5 port (Out 5 LED)
Dimensions	Width = 110mm/134,80 mm Depth = 82 mm Height = 43 mm
Housing	Styrene

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Port ID	Wire ID / Color	Cable ID	Signal Description
Vin(+)			
GND			
Ina(+)			
Ina(-)			
Inb(+)			
Inb(-)			
Out1A			
Out1B			
GND			
Out2B			
Out2A			
Out3A			
Out3B			
GND			
Out4B			
Out4A			
Out5A			
Out5B			

SETTINGS

J5*

2	1	3

J6*

2	1	3

Dip Switches**

ID	OFF	ON
1		
2		
3		
4		

* Mark the positions that are occupied by the jumper

** Mark the position for every switch

NOTES:

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CERTIFICATE NUMBER

08-PR299432-PDA

DATE

20 March 2008

ABS TECHNICAL OFFICE

Piraeus Engineering Services

CERTIFICATE OF Design Assessment

This is to Certify that a representative of this Bureau did, at the request of
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assess design plans and data for the below listed product. This assessment is a representation by the Bureau as to the degree of compliance the design exhibits with applicable sections of the Rules. This assessment does not waive unit certification or classification procedures required by ABS Rules for products to be installed in ABS classed vessels or facilities. This certificate, by itself, does not reflect that the product is Type Approved. The scope and limitations of this assessment are detailed on the pages attached to this certificate. It will remain valid as noted below or until the Rules or specifications used in the assessment are revised (whichever occurs first).

PRODUCT: Programmable Controller, I/O Units, Operator & Communication Interfaces

MODEL: NM-251 Series

ABS RULE: 2008 Steel Vessel Rules 1-1-4/7.7, 4-8-3/1.7, 4-8-3/1.9 and 4-8-3/Table 2

OTHER STANDARD: IEC 60945 (2002 edition);

AMERICAN BUREAU OF SHIPPING

Ion G. Koumbarelis

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Engineering Type Approval Co-ordinator



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