RD77 cards.
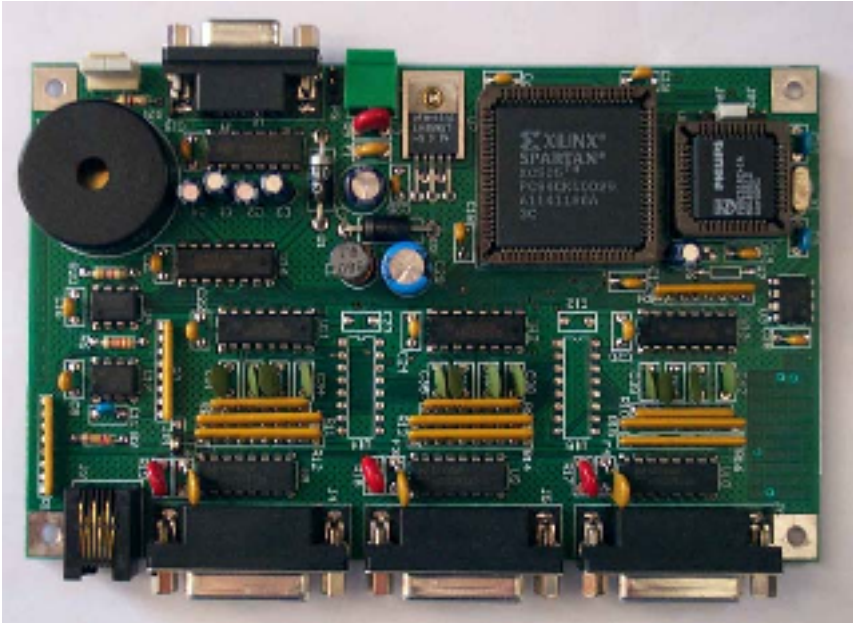

Installation and user manual.

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5) Electrical specifications

1 – General description

The RD77 card manages up to 3 incremental encoders; the encoders' positions can be latched by an external hardware signal. A debounce time on this signal is programmable, to use mechanichal touch trigger probes.

All counters can count up to 32 bits (±2.147.483.648), maximum counter input frequency is 12MHz.

The card is controlled through a standard serial RS232 interface.

3 different kind of encoders are supported:

- 5V differential RS422 (suggested)
- 5V single-ended
- 12V single-ended

To manage 12V encoders, a special version of the card must be requested.

For all cards, the power supply requested is 12Vdc; the card itself provides power for the encoders.

The card can also produce sounds, using an internal or external piezoelectric speaker.

All configuration parameters can be saved in an internal non volatile eeprom memory.

2 – Installation

RD77 card has a standard Eurocard mechanichal format of 160 mm x 100 mm.; can be fixed using 4 holes (3.2mm diameter) in the corners, with pitches of 150mm and 90mm.

Card must be powered with a continuous, stabilized supply of 12V, that can be wired through bipolar screw-plug J3 or through serial connector J1; in this last case you must insert the jumper JP3, (located between J1 and J3): in this way, pin 9 of J1 is connected to +12V.

Screw-plug J3 has 2 wires, Nr.1 (the one toward voltage regulator) is positive, Nr.2 (toward serial connector J1) is negative.

The 3 encoder connectors are 15-ways female sub-D connector; in the 5V-version of the card, they have this pinout:

1	Not connected
2	Not connected
3	Error signal (negative)
4	C-phase or index signal (negative)
5	B-phase (negative)
6	A-phase (negative)
7	+5V encoder supply (out)
8	Not connected
9	0V Gnd
10	Travel limit input (TTL)
11	Error signal (positive)
12	C-phase or index signal (positive)
13	B-phase (positive)
14	A-phase (positive)
15	Not connected

In the 5V-version of the card, they have this pinout:

1	Not connected
2	Not connected
3	Not connected
4	Not connected
5	Not connected
6	Not connected
7	+12V encoder supply (out)
8	Not connected
9	0V Gnd
10	Travel limit input (TTL)
11	Error signal
12	C-Phase or index signal
13	B-Phase
14	A-Phase
15	Not connected

Connector J1 has the standard serial RS232 9-way pinout, with the exception that, if you insert the jumper JP3, pin 9 is connected to +12V, to power and communicate with the card using only 1 connector, J1.
The pinout of J1 is:

1	CD (interrnally connected to DTR & DSR)
2	RXD (from card to PC)
3	TXD (from PC to card)
4	DTR (interrnally connected to CD & DSR)
5	0V
6	DSR (interrnally connected to CD & DTR)
7	RTS (interrnally connected to CTS)
8	CTS (interrnally connected to RTS)
9	RI, not connected or connected to +12V with JP3.

The connector J2 is a 6 way standard phone connector, and constains the signal for the external latch. The pinout is:

1	Not connected.
2	Latch input signal, normally closet (pullupped internally with a 22KΩ resistor to +12V).
3	0V Gnd
4	Probe led's anode, (235Ω pullup resistor to +5V).
5	0V Gnd
6	Probe led's cathode (NPN open-collector output).

Externa latch signal must be provided with an external normally closet contact, wired between pins 2 and 3 of J2.

Connector J7 is provided to connect external piezoelectric speakers. On pins 1 – 4 there is the speaker command signal, and the internal speaker is wired to pin 2 – 3. Connecting with 2 jumpers the pins 1 to 2 and 3 to 4, internal speaker is used (factory setting).

By removing the jumpers and using a connector it's possible to use an external speaker; if the jumpers' connections are mantained, is also possible to use internal and external speakers together.

3 - Configuration

2 versions of the card are available, one for 5V encoders and one for 12V encoders. No user settings are required, the 2 versions are quite different and hard-wired to proper configuration.

Jumpers JP1, JP2 e JP4 are only for testing, they must not be changed.

The only allowed hardware configuration is the jumper JP3, located between power supply connector J3 and serial connector J1.

By inserting it, pin 9 of J1 is connected to +12V, to power the card using only J1.

4 - Programming

All communication is performed using the RS232 serial line.

Data format is fixed: 19200 baud, even parity, 7 data bit, 1 stop bit.

The communication is performed with packets and answer characters (ACK & NAK).

Every packet is formed by these consecutive parts:
- One start identifier SOH.
- One or more data byte, in the range 0x20 to 0x7F.
- One checksum byte, calculated as logical XOR of all data bytes.
- One end identifier EOH.

If the card receives a valid packet, it answers with the single byte ACK or with an answer packet; if the card recognizes any communication error, it can answers with single byte NACK.

Checksum byte cannot be < 0x20. In this case, an additional space character (0x20) is added to the data bytes, to transform checksum in the correct range.

The card can generate an asynchronous event, sending anytime the character ENQ. The event can be then recognized by requesting the status word.

For a detailed protocol's description, please read the include file RD77_ENG.H.

With the card is provided a test program for operatine systems Windows 95, 98, NT and 2000, that can be used to test all the card's functions.

5 – **Electrical specifications**

Maximum input frequency	3 MHz
Maximum counting speed	12 MHz
Counter's width	32 bit
Load resistance (5V cards)	2.35 KΩ
Dynamic terminator resistance (5V cards)	120 Ω
Load resistance (12V cards)	4.7 KΩ
Differential hysteresis (5V cards)	100 mV
Unipolar trigger voltage (5V cards)	2.5 V
Unipolar trigger voltage (12V cards)	6 V
12V Power supply current[*]	160 mA
Maximum encoder supply output current	500 mA
Piezoelectric speaker driving voltage	20 Vpp
Operatine temperature	from 0 to 70°C

All encoders' signals are ESD protected up to 4KV (direct, IEC1000-4-2), up to 15KV (air-gap, IEC1000-4-2), and up to 3A pulses (IEC1000-4-5); RS232 signals are ESD protected up to 15KV (direct, IEC1000-4-2); encoders' output power supplies are protected with self-recovering fuses at 500mA.

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[*] Doesn't include encoders' supply