1604 Remote Control Commands and Logging Data Format - V.1 23.04.98

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The simple implementation of RS232 on the 1604 results in a low speed link primarily intended for data-logging. Remote control is possible by sending ASCII characters representing keys on the front panel but response must be monitored to ensure that the command has been received and resent if it hasn't; as a result response is slow, typically
1 - 2 seconds.

Cable connection details are provided in the 1604's manual. The interface is fully opto-isolated from the measurement system; the host computer provides power (via the DTR and RTS lines) to the TXD opto output and drives the RXD opto input directly. The 9-way D-type on the meter must be connected to the 9-way D-type of the PC's serial port via a 9-way cable (all connections made); the PC is nulled out at the multimeter interface as shown below:

Pin	Name	Description
1	DCD	Linked to DTR
2	TXD	Transmitted data from instrument
3	RXD	Received data to instrument
4	DTR	DTR from host PC must be set to +9V (logic 0)
5	GND	Signal ground
6	DSR	Linked to DTR
7	RTS	RTS from host PC must be set to -9V (logic 1)
8	CTS	Linked to RTS
9	GND	Signal ground

Signal grounds are connected to instrument safety ground.
To ensure compliance with EMC legislation use only screened cable assemblies with screened connectors when connecting to other equipment.

9600 Baud 1 Start, 1 Stop, 8 Data Bits, Handshake DTR/DSR, Timeout 500ms

Remote Control

Each command is sent to the 1604 as an ASCII character; commands are acknowledged by the command being echoed back. If a response is not seen within 300ms then the command must be resent.

Remote control commands are:

Key Up	= 'a'
Key Down	= 'b'
Key Auto	= 'c'
Key A	= 'd'
Key mA	= 'e'
Key V	= 'f'
Key Operate	= 'g'
Key Ω	= 'i'
Key Hz	= 'j'
Key Shift	= 'k'
Key AC	= 'l'
Key DC	= 'm'
Key mV	= 'n'
Set remote mode	= 'u'
Set local mode	= 'v'

Data Output Format in Remote Mode

Whilst in remote mode the 1604 will send a 10 character string after every measurement. This string is null-terminated (0-9 + NULL)

Char(0) CR (#13)

Char(1) Range information

Bits 0-2 inclusive are treated as a hex word; the values mean the following:

1:	Units	= 'mV'
2:	Units	= 'V'
3:	Units	= 'mA'
4:	Units	= 'A'
5:	Units	= 'Ω'
6:	Units	= 'Continuity'
7:	Units	= 'Diode Test'

Bit 3 set = AC
Bit 3 clear = DC

Bits 4-6 inclusive are treated as a hex word; the values mean the following:

0: Range = 400 Ω
1: Range = 4 kΩ / 4 V_{AC} / 4 V_{DC} / 4 mA_{DC} / 1 mA_{AC}
2: Range = 40 kΩ / 40V_{AC} / 40V_{DC} / 10 A_{AC} / 10 A_{DC}
3: Range = 400 kΩ / 400V_{AC} / 400V_{DC} / 400mA_{DC} / 100 mA_{AC} / 400 mV_{DC} / 400 mV_{AC}
4: Range = 4 MΩ / 750 VAC / 1000 VDC
5: Range = 40 MΩ

Bit 7 not used

Char(2) Function information

Bit 1 = THOLD
Bit 2 = MINMAX
Bit 4 = HERTZ
Bit 5 = NULL
Bit 6 = AUTO

Char(3) bit 1 = MINUS SIGN

Char(4),Char(5),Char(6),Char(7),Char(8) are the display digits and are translated as follows:

Ch=#252 then Ch = ‘0’
Ch=#96 then Ch = '1'
Ch=#218 then Ch = '2'
Ch=#242 then Ch = '3'
Ch=#102 then Ch = '4'
Ch=#182 then Ch = '5'
Ch=#190 then Ch = '6'
Ch=#224 then Ch = '7'
Ch=#254 then Ch = '8'
Ch=#230 then Ch = '9'
Ch=#238 then Ch = 'A'
Ch=#156 then Ch = 'C'
Ch=#122 then Ch = 'D'
Ch=#158 then Ch = 'E'
Ch=#142 then Ch = 'F'

Ch=#140 then Ch = 'R'
Ch=#30 then Ch = 'T'
Ch=#124 then Ch = 'U'
Ch=#28 then Ch = 'L'
Ch=#0 then Ch = ' '
Ch=#2 then Ch =' '

The position of the decimal point is defined by increasing the value of the character which is to the left of the decimal point by 1. For example, if the display reads 12·345, characters 4 through 8 will be:

96 **219** 242 102 182

Char(9) Function Status information

Bit 0 DOUBLE BEEP
Bit 1 AUTO RANGE SET
Bit 3 CONT BUZZ
Bit 4 DISP MIN
Bit 5 DISP MAX
Bit 6 DISP HOLD
Bit 7 GATE 10SEC