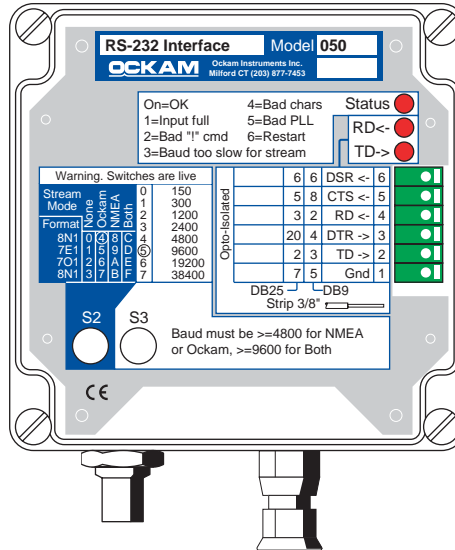




050 RS-232 Interface



The 050D RS232 interface links the Ockam System to a computer. This link provides access to the system's display and keyboard channels, allowing the computer to read display and polar curve data, control certain aspects of the CPU's operation, control operation of the 044 Magnum indicators and certain other devices, and display calculated functions on the system's indicators. The 050D can also connect to Ockam's NMEA channel, which in conjunction with the 041 GPS interface, provides complete bidirectional access to the GPS by the computer.

Specifications

- Dimensions: 4-3/4" W x 4-3/4" H x 2" D
- Mounting: Velcro™ or 10-24 x 5/8" on 4-5/16" x 3-1/2" Ctrs
- Weight: 1 Lb.
- Orientation: Any
- Accessories: 10 Display Cards
- Power Requirements: 45ma
- Fuse: 250ma Picofuse (back board)
- Mating Connector: BUS: BNC Female (UG-89/U)
RS232: Terminal strip (DB9 & DB25 pigtails available)
- Compatible Devices: Any Computer with RS232 I/O



The 050 RS-232 Interface complies with relevant sections of EU EN60945:1997 and EMC Directive 89/336/EEC.

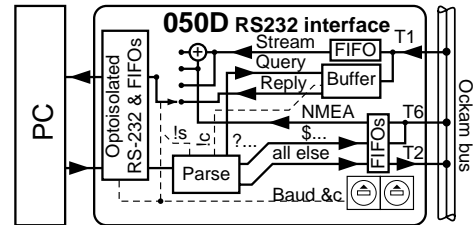
A computer coupled to an Ockam System is a very powerful tool, because it allows you do things with your instruments that simply can not be done any other way. The most important use for the RS232 interface is as a source of data for OckamSoft™ or other graphical display and control programs. These programs provide information in graphic form such as racecourses, maps, stripcharts, polars, sail selection etc. They also derive important variables using data which the instrument system does not have, such as time to the starting line and waypoint data from data stored in the computer.

All systems designers make assumptions about what type of boat their equipment is going to be used on. The way the system responds to the environment is based on these assumptions. Your

requirements may be entirely different, and the RS232 interface allows you to adjust averaging, enter waypoints and current, to make the system behave the way that is best for you.

Theory of Operation

The RS232 interface connects your computer to the Ockam system. Its job is to supply your computer with instrument information (e.g. Boatspeed, True wind Direction, etc.), and send your instructions to the OCKAM system (for changing averages, controlling functions, etc.).



Input to your computer

The interface sends information to your computer in one of four ways as specified by interface switch S2 on power-up or by subsequent "!" command lines from the computer;

- Protocol mode causes the interface to output data only when asked. The interface waits for your computer to ask for specific data, then returns the value(s). The 050D interface buffers data internally, minimizing response time.

The advantage of this type of output is that your computer does not have to weed through a bunch of (at the moment) irrelevant data to find what it wants. The disadvantage is that there is a turn-around time involved, and the requesting software can sometimes hang because the interface and computer can both think it is the other's turn to say something.

- Ockam stream output causes all Ockam display data to continuously flow to the computer. It sends your computer EVERYTHING that comes out of the OCKAM system (about 400 characters per second). This type of output is generally input to an Ockam driver that separates the data and stores it in an array inside the computer, so it is instantly available to any program.

The advantage of this type of output is that the data arriving at your computer is as up-to-date as it can be, and if an Ockam driver is installed, is available without any communication delay. Its disadvantage is that your computer has to handle information at up to 480 characters per second (about 10% of an 8086, much less on an 80X86).

- NMEA stream output causes NMEA data to continuously flow to the computer.
- Interleaved output causes both NMEA and Ockam data to flow to the computer. NMEA sentences are sent imbedded in Ockam tag "\$". Because two streams are melded together within the interface, the data rate can be as high as 960 characters per second.

Output from your computer

Output to the interface is generally in the form of lines, that is, a string of characters terminated with carriage return. The exception is control characters, which are stripped out and sent directly to the Ockam system. Output lines can be;

- `?<tag>[<tag>...]<cr>` is the form for requesting data when the interface is in protocol mode. The interface responds with the value for the specified tag(s), separated by commas and ending with `<cr><lf>` (tags are enumerated in section 4). Tags can be followed by apostrophe ("" meaning the "prime" or alternate value, e.g. the range value for tag R, waypoint range and bearing) or accent grave ("`" meaning both values).

Example:	To interface	Response
Request boatspeed	?B<cr>	6.57<cr><lf>
Request Waypoint range and bearing	?R'R<cr>	14.56,314<cr><lf>
Same thing	?R`<cr>	14.56,314<cr><lf>

- !...<cr> are commands to the interface itself. !S0 switches the interface to Protocol, !S1 to Ockam streamer, !S2 to NMEA streamer and !S3 to Interleaved output. !C<tag> erases the Ockam data buffer associated with Protocol input for <tag>.
- \$...<cr> outputs data to the NMEA channel. This sentence allows the computer to source data for any NMEA devices receiving data from the Ockam bus. Since the 041 GPS interface can also source data on the NMEA channel, you should first disable it before using the \$ command (see [Operation with the 041](#) below).

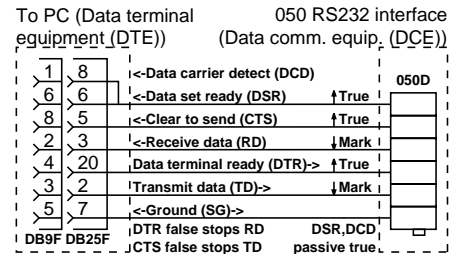
All other lines and most control characters are treated as output to the Ockam keyboard channel. These lines are detailed in section 4 of the manual, and include;

- <Control-char> all control characters except <cr>, <lf>, <null> and <esc> pass to Ockam which uses them to control stopwatch, back range & bearing, trip log and distance lost.
- A<n>=<sec><cr> sets averaging time for Ockam data output.
- C=<speed>[,<direction>]<cr> specifies current set & drift.
- K<n>=<cal><cr> temporarily changes the Ockam calibrations.
- O<n>=<m><cr> controls various options of the instruments including time, stopwatch and polar display format, wind twist, reef and flat, current control, mast height, lighting level for Magnums, VMC and units of measure.
- P=<Bt>[,<Vt>[,<polar#>]]<cr> requests a polar data point.
- T=<time><cr> sets the Ockam clock.
- U<tag>=...<cr> sends data to Ockam displays and control data to Magnum displays and certain interfaces.
- W=<bearing>[,<range>]<cr> specifies the Ockam waypoint.

Installation

The computer connects to the interface by a 6 position terminal strip and pigtail with 9-pin female D connector (25-pin pigtails are available on special order). The diagram shows the connection to a PC.

You need to decide which mode, how many data bits, type of parity and at what baud rate to run. Then set interface switches S1(left) and S2 (right) to the appropriate values.



Settings by application

Application	Settings	S1	S2
OckamSoft 2/MapTech	9600,N,7,1 Ockam Streamer	4	5
Compusail	9600,N,8,1 Ockam Streamer	4	D
NMEA applications	4800,N,8,1 NMEA Streamer	8	C

S2 (Parity & default operating mode)

Mode	No parity	Even parity	Odd parity	High parity
Protocol (No streamer)	0	1	2	3
Ockam Streamer	4	5	6	7
NMEA streamer	8	9	A	B
Interleaved	C	D	E	F

Note: Mode can be changed with the "IS" command, but parity can not.

S3 (Baud rate)

S3	Baud	S3	Baud	S3	Baud	S3	Baud
0	150	2	1200	4	4800	6	19200
1	300	3	2400	5	9600	7	38400

Note: Baud rates below 4800 should not be used with Ockam or NMEA streamer modes. Baud rates below 9600 should not be used with Interleaved mode. These settings can not be changed from software.

Operation

Use with the 041 GPS interface

The 041 GPS interface can interact with the 050D interface in two ways: when enabled, it can copy the GPS output to the NMEA channel which can be read by the 050D and sent to the computer in either NMEA streamer (NMEA data only) or Interleaved (both NMEA and Ockam data). The 041 can also receive data from the RS-232 interface and pass it on to the GPS.

When the 041 interface is enabled to copy to the NMEA channel, the 050D should not use its "\$" output mode, because there is no flow control on the NMEA channel, and both sets of data would become mixed together. When contemplating use of "\$" output from the 050D, you should disable the 041 with the GPS interface through its switches or send the "@Sn0" command (see the 041 section).

Sending data to the 041 GPS interface requires it have a non-zero address. The 041 monitors the Ockam display channel for data frames of the form "@SnD...<0>"; "@" is the tag reserved for device control (note that creating tag "@" can be accomplished by sending "U@=..."). "Sn" specifies Serial interface n where n equals the 041 address switch setting, and D specifies that output data follows. All characters following "D" are copied to the GPS with <cr><lf> appended. For example, suppose your GPS accepts remote entry of waypoints with a sentence like

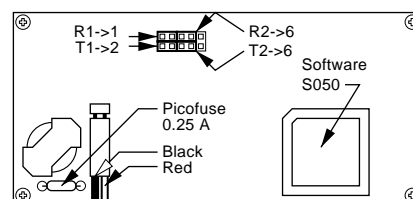
\$IIWPL,IIII.II,N,yyyyy.yy,W,n<cr><lf>

and is attached to GPS interface addressed at 1. You can enter waypoint 98 into your GPS at N41°14.156, W72°1.954 with

U@=S1D\$IIWPL,4114.156,N,07201.954,W,98<cr>

Technical Data

The 050 RS-232D interface uses the A3240 back board and requires 4 jumpers to be set to the correct locations as shown to the left. Also shown is the location for the interface fuse (spares are located inside the CPU box) and the correct polarity for the bus connector.



Settings for old (black) RS-232

The left switch (A) controls the number of data bits (7 or 8), parity (even, odd or none) and number of stop bits (1 or 2). To set this switch, look up the desired options for number of data bits, parity and stop bits, and set switch A appropriately.

Bits	Parity	Stop	Sw A	Bits	Parity	Stop	Sw A
7	None	1	1	8	None	1	9
7	None	2	5	8	None	2	D
7	Even	1	2	8	Even	1	A
7	Even	2	6	8	Even	2	E

7	Odd	1	0	8	Odd	1	8
7	Odd	2	4	8	Odd	2	C

The right switch (B) controls the MODE of the interface (STREAMER or PROTOCOL), and the baud rate. (The mode of operation is described above.) Find the desired combination and set switch B appropriately.

Switch B			Switch B		
Baud rate	Protocol	Streamer	Baud rate	Protocol	Streamer
9600	0	8	1200	3	B•
4800	1	9	300	5	D•
2400	4	C•	150	6	E•
1800	2	A•	110	7	F•

• Settings A thru F are illegal (STREAMER at less than 4800 baud)

Revision History

REV	DATE	CHANGE
A1		SOFTWARE S050A1 (Streamer only)
A2		SOFTWARE S050A2
B1		SOFTWARE S050B1 (Protocol only)
C1		Board E1610B1, S050C1 (Streamer/Protocol)
C2	11/5/84	SOFTWARE S050C2
C3	9/5/85	SOFTWARE S050C3
D1	5/22/95	Board A3850B1, A3240A2, software S050D1. Add NMEA channel functions, buffering, interface control via software.

