

Brookhouse iMux Mk3

Installation and operating instructions

Standard model and model ST (Seataalk)

Introduction

The Brookhouse iMux is based on Brookhouse NMEA 0183 multiplexer model AIS, with Wifi capability to communicate with an Apple iPad/iPhone/iPod touch or any other wifi-capable device, including Windows and Mac computers and Androids. Combined data from AIS, GPS and other NMEA 0183 data from equipment connected to the iMux input ports is transmitted as a single data stream.

The Mk3 version of the iMux supports infrastructure networking with up to 16 TCP/IP sessions for simultaneous connection of multiple devices. WPA2 security is available with a preset key.

The iMux also accepts data received back via Wifi from an iPad with iNavX or a computer and outputs this data from a 4800 baud NMEA Out port. This output data is typically used for controlling an auto pilot and/or as input for a repeater instrument.

A serial output port is available for a hard-wired connection of a chart plotter and/or computer. This 38400 baud port outputs the same data as transmitted via Wifi.

Brookhouse multiplexer model AIS has a number of very useful menu-selectable features that have proved to be invaluable for efficient marine electronics integration including AIS. With the iMux we have aimed at very straight forward “out of the box” installation without the need for setup or configuration. To offer the benefits of a number of the strong features of model AIS in the iMux, each iMux is pre-configured to make some of these features available.

The activated special features are:

1. AIS transponder GPS as backup for main GPS

An increasing number of vessels are equipped with class B AIS transponders. Transponders not only output AIS NMEA sentences for targets (the !AIVDM sentence), but also GPS data (\$GPRMC sentence) of the built-in GPS. This GPS data can be put to good use as backup for the main GPS, or even as the primary GPS for iNavX.

The iMux is configured to suppress GPS data from the AIS transponder, connected to input port #4 if a primary GPS is active on input #1 (or Seataalk for iMux-ST), to avoid multiple GPS sources.

If the primary GPS ceases to send fixes or is not present, the iMux uses the AIS transponder GPS for transmission to the iDevice via Wifi, after a 10sec. time-out.

Input #4 can of course also be used for connection of an AIS receiver only.

2. **Filtering of redundant AIS transponder data.**

The iMux is pre-configured to suppress the !AIVDO sentence (own AIS data) which has no significance for the iPad or most chart plotters. Proprietary NMEA sentences are also filtered out.

3. **Auto Pilot input switching**

Most auto pilots have a single NMEA input port. This port can be connected to the iMux NMEA OUT port for reception of NMEA sentences from iNavX for steering to a waypoint in “track mode”, aka “GPS mode”. The auto pilot also relies on this port for receiving other GPS data, such as SOG (speed over ground). If the iPad is switched off, it is still important that this data is received, because it is also used for other steering modes. The iMux has been pre-configured to send the GPS data of input #1 directly to the auto pilot, if iNavX ceases to transmit data via the Wifi link. Steering data from the GPS or chart plotter and/or Wind data for “vane mode” can also be received via this path.

For iMux model ST, the Raymarine ST60 GPS and instrument data is directly sent to the iMux NMEA OUT port if no data is received from iNavX.

4. **DSC VHF radio output conversion to waypoint**

DSC VHF radios output the NMEA sequence DSC/DSE if a distress message, a position report or a response to a position request message is received. This sequence contains the MMSI number and position of the other vessel, plus the time sent. This DSC/DSE data is not processed by iNavX. However, iNavX can accept external waypoint data in \$GPWPL sentences.

The iMux has been pre-configured to generate a \$GPWPL sentence from the DSC/DSE sequence, if received via input #2. The position of the other vessel is now automatically plotted in the chart in iNavX as a waypoint. The name of the waypoint is composed from the vessels’ MMSI number and the time (UTC) the position was received. The user is alerted by the VHF audible alarm. The original DSC/DSE sequence is also transmitted in case a chart plotter is connected that supports these sentences.

Note 1: By connecting NMEA equipment to different iMux input ports than the designated ports for the special features described above, these special features have no effect.

Note 2: Units shipped after July 28th 2011 can be re-configured in the field. This only applies to the multiplexer parameters, not to Wifi settings. In the majority of cases, the iMux can be installed without re-configuration, “out of the box”. Please contact Brookhouse support if re-configuration seems necessary, i.e. if the special features described above need to be disabled or changed or if additional special features need to be enabled. Examples: filtering of additional redundant NMEA sentences, changing input # for auto pilot switching, changing input # 1 from Seatalk to NMEA (iMux –ST only).

Installation

Installation of the iMux is straight forward:

1. Choose a dry, protected location for the iMux that is convenient for connection of power and the NMEA devices..
2. Connect 12 or 24V DC power. A 1 Amp fuse or circuit braker is recommended. In Raymarine installations, power can be supplied via the Seataalk connection.
3. Switch power on, as a preliminary check to see if the iPad recognizes the iMux via Wifi. On the iPad, under Settings – Wifi check if “Brookhouse_iMux” is displayed as one of the available networks. Switch power off.
4. **Standard model iMux:** Connect an NMEA GPS to iMux input #1. Observe polarity. If the GPS has a single NMEA OUT wire (e.g. Garmin GPS), connect this wire to NMEA IN A and Ground to NMEA IN B. The GPS baudrate has to be set to 4800. **Note:** Ignore Seataalk print on label if standard model. The same label is used for the 2 iMux models. The Seataalk model has the letters ST behind the word iMux at the top.
Imux model ST (Seataalk): Connect the Seataalk bus to the top 3 terminals as indicated on the label. Leave NMEA CH1 open.
5. Apply power and set up the iDevice for communication with the iMux, as explained separately further in the instructions under “Operation”. Check if GPS data is being received by iNavX or other app. If all looks fine, the present location of the iMux is acceptable and installation can continue. If reception of GPS data is slow or irregular, repositioning of the iMux may be necessary to improve Wifi communication.
6. Connect NMEA output of instruments or other NMEA talkers to iMux NMEA inputs #2 and #3.
If a DSC radio is part of the configuration, connect NMEA OUT of the radio to input #2. If there is only a single NMEA OUT wire, connect this to the NMEA IN A terminal and Ground to the B-terminal.
7. Connect NMEA 0183 output of instruments or an instrument network to iMux input #3.
8. Connect NMEA output of an AIS receiver or transponder to iMux input #4 (38400 baud). All NMEA input ports of the iMux are opto-isolated, as recommended by the NMEA 0183 standard. The opto-isolation requires that the output signal level of the connected device is within a narrower acceptable range than e.g. a computer COM port, especially at the higher baudrate of 38400. Due to variation in signal levels, output by different AIS receivers and transponders, which are often not within the NMEA 0183 specification, it may be necessary to adapt the impedance of input #4 for a specific receiver or transponder. A **white adaptation wire** (pigtail) can be found, protruding from the iMux enclosure under the large green terminal block. For installation of **AIS class B transponders**, remove the heatshrink insulation from this white wire and combine with the transponder’s NMEA OUT + signal wire in the iMux NMEA CH4 In A terminal. For class A transponders such as Nauticast and Furuno, and the Standard Horizon GX2100 VHF radio with built-in AIS receiver, the white adaptation wire should not be used. For RS232 signal levels, e.g. output by the popular **SR161 receiver**, the adaptation wire should also not be used.

In case of single-ended AIS output signal, connect the signal wire to NMEA CH4 In A and Ground to the B-terminal.

9. Connect Auto Pilot NMEA IN to the iMux NMEA differential (RS422) port. Data received via Wifi is output from this port for steering to a waypoint or along a route, if the waypoint/route is activated. If no data is received from the iPad for 10 seconds, the iMux automatically routes the data stream received from input #1 or Seataalk to this output port.

Note: Data received back from an iOS device, computer or Android via wifi is fed into the iMux RS232 RxD port via the short yellow pigtail that is connected to RS232 RxD. The baudrate is 38400. Any data received on RS232 RxD at 38400 baud is output from the RS422 port at 4800 baud, so via this connection "baudrate conversion" is provided to feed an auto pilot or other NMEA listener with standard baudrate 4800..

The reason that this connection is made via the yellow pigtail and not internally, is that the pigtail can be disconnected and another 38400 baud source can be connected instead, e.g. a chart plotter with 38400 baud NMEA output.

10. Connect DSC VHF radio NMEA IN (4800 baud).

For this connection there are several options. If an NMEA GPS is connected to iMux input #1, connect the radio NMEA input in parallel with the GPS output in this terminal. This is the simplest solution and ensures that the radio always receives GPS lat/long. In Seataalk systems, with a Seataalk GPS, connect NMEA IN of the radio to the iMux NMEA Out terminals. If no data is received via Wifi, the Seataalk GPS data (converted to NMEA) is automatically sent to this port to feed the DSC radio.

11. For hard-wired connection of a chart plotter or computer at 38400 baud, use the iMux RS232 TxD and Gnd terminals. If the computer only has USB ports, a standard RS232-USB adapter can be installed. Wiring to a COM port or USB adapter is as follows:

iMux RS232 TxD > pin 2, RS232 Gnd > pin 5.

All chart plotter connections (including Raymarine C/E-series):

iMux RS232 TxD > chart plotter NMEA IN +

iMux RS232 Gnd > chart plotter NMEA IN -

The data stream, output from the iMux RS232 TxD port at 38400 baud is identical to the Wifi output data stream.

A yellow wire is connected to iMux terminal RS232 RxD. Do not remove this wire, unless re-configuration of the multiplexer is required. In this case, contact Brookhouse support.

Note:

The 4800 baud NMEA inputs of the iMux accept any kind of NMEA 0183 sentences and other NMEA talkers than GPS and DSC radio can be connected to iMux ports #1 and #2 if required.

Operation

Imux LEDs.

Red – Power.

Green –Status

The green light flashes quickly 3 times after startup.

The green light comes on during transmission of NMEA 0183 sentences. Under normal circumstances, with one or more NMEA devices connected, the green light flashes frequently.

For operation of the iPad/iPhone/iPod touch and the iNavX navigation program, please refer to the documentation of these products.

For establishing the connection between the iMux and iNavX, running on the iDevice, please refer to the following iPad screen shots.

Step 1

Apply power to the iMux, go to Settings, tap **Wi-Fi ON**.

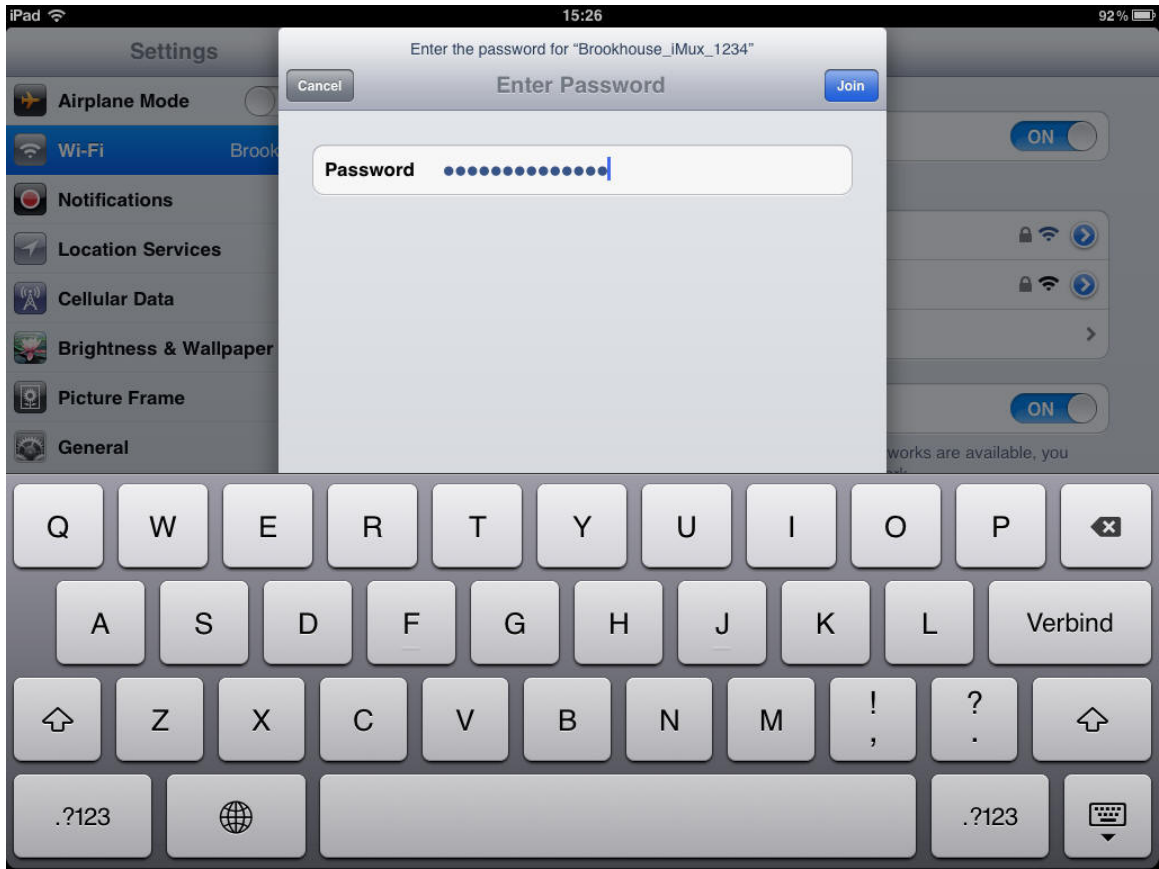
Brookhouse_iMux_xxxx should appear under “Choose a Network”

Tap **Brookhouse_iMux_xxxx**

If this is the first time the i-device is connected to network Brookhouse_iMux, the password (pass phrase) has to be entered. The unique preset password is the word Brookhouse followed by the serial number that can be found on a label at the back of the iMux, e.g. Brookhouse13070125. Please note that the password is case-sensitive and should not contain any spaces.

The password is automatically saved and does not need to be entered next time. However, if "Forget this network" is tapped, the password will be required again next time connection is attempted.





Wait until the tick before Brookhouse_iMux_xxxx appears.
Tap > at end of line or go straight to step 3.



Step 2

This screen shows the IP address assigned to the i-device by the iMux DHCP server, as well as subnet mask, router and DNS IP addresses. "DHCP" should be highlighted. The actual numbers may differ from the ones in this screen-shot. This is for information only, nothing has to be entered here.



Step 3

Go to the iNavX application.

Tap “**Instruments**” at the bottom of the screen

Tap “**Setup**” in the top-right corner of the Instruments screen

Tap “**TCP/IP**” in top-left corner of Instruments Setup

Enter the iMux IP address **192.168.10.99**.

Enter “**Port**” **10110**

Tap “**Link**” ON

Raw NMEA 0183 data should now appear streaming in the black window.

Tap “**Enable Waypoints ON**” if you want DSC/DSE position plotting and or waypoints transfer.

Tap “**AP Repeat ON**” if you want to control the auto pilot from iNavX.

Tap “**Save**”, tap “**Save**” again in the instrument settings menu.

Tap “**Chart**” or any of the other options at the bottom of the screen.

Important: If multiple iPads and/or computers are connected, only one should be nominated for controlling the auto-pilot, i.e. in iNavX **AP Repeat** should be **OFF** on all iPads except one. iNavX for the iPhone does not have the AP repeat capability, so this only affects iPads and computers.



Plotting the position of another vessel, received via DSC

Please refer to your DSC VHF radio for a description of DSC distress calls, Position Report and response to Position Request.

More information can also be found here:

http://brookhouseonline.com/dsc_conversion.htm

The DSC VHF radio will give an audible alarm when position data is received. At the same time the iMux generates a waypoint in iNavX.

Step 1

When alerted by the audible VHF alarm, tap “**Waypoints**” at the bottom of the screen in iNavX. The most recent waypoint, created by the iMux from the DSC/DSE sequence is at the bottom of the list. The name is composed from the vessel’s MMSI and the time UTC)

Tap the waypoint.

Tap “**Scroll To**”



Step 2

The position is now shown in the chart as a waypoint.



As the time is used as part of the name, consecutive positions of the same vessel are stored as unique waypoints. This easy to use method is ideal for locating vessels for SAR operations or for locating a 'buddy'. Other uses include keeping track of sailboats during a race or for flotilla sailing. The waypoint list forms an accurate log of the other vessel's movements.



Other applications

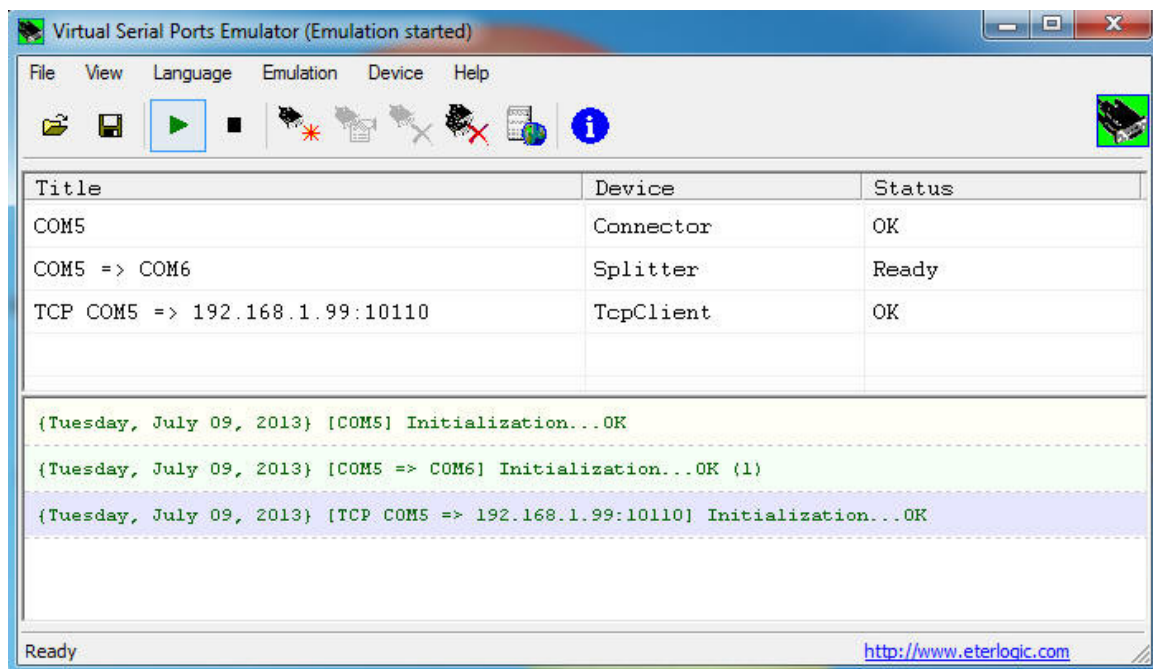
The Brookhouse iMux product can be used with many other apps. Very popular ones are NMEAremote and iRegatta. We cannot give screenshots for each application. However, the general procedure is always the same:

1. In the i-device settings>wifi, connect to network Brookhouse_iMux.
2. In the app, set the host address to 192.168.1.99 and local port to 10110.

Windows software

The iMux can be connected to any computer using a cable connection to a RS232 port, an RS232-USB adapter or via wifi. Navigation software running on windows computers can sometimes receive NMEA 0183 data directly from TCP/IP, but more often a COM-port has to be specified for NMEA input. There are various 3rd party software products available that link the TCP/IP interface to a (virtual) COM-port number, to allow the nav software to receive NMEA data via wifi. One such product is VSPE from Interlogic. The 32-bit version is free.

The following screenshot shows how VSPE can be configured. The splitter device definition allows multiple applications to access the wifi data stream via COM port 6.



Mac software

The iMux serial and wifi communications are Mac compatible. The popular MACENC navigation software can read the iMux NMEA data stream directly via TCP/IP. Please refer to MACENC documentation or contact the developer.

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