

1) Phoenix UAS mRID Operating Manual

2) Disclaimer:

- a) Operator responsibilities:
 - i) Airspace: It is the UAS operator to ensure they are following all applicable law and regulations at the intended flying site. The use of a broadcast module will not make you legal to fly anywhere or in any airspace.
 - ii) Wiring: It is the operator to ensure that the wiring is correct and no more than 5vdc is applied to the module.
 - iii) GPS data over MSP: It is the UAS operator to verify that data sent to their FC from the mRID over MSP is accurate and the FC is setup correctly. It is prudent to full test OSD elements and automated flight functions prior to depending on them in the field.
 - iv) Function: It is the UAS operators' responsibility to ensure their RID unit is properly functioning and transmitting. Use of mRID GPSL (GPS Lock) indication in conjunction with a mobile app will give conformation of proper unit operation.
 - v) MSP GPS Data: to use GPS data over MSP update to BF 4.5 RC2 or latter and update the mRID firmware to the newest version.
- b) Unit limitations:
 - i) Power:
 - (1) 3.3vdc – 5vdc DC only
 - (2) via USB 5v
 - (3) Current Draw < 160mA
 - (4) The mRID will passthrough I²C data from an equipped GPS to the FC if the SCL and SDA wires are connected.
 - ii) Transmits RID messages only on BT 4 & 5
 - iii) **Requires the use of an external M10 GPS**
 - iv) MSP GPS data to FC is currently available in BetaFlight 4.5 RC2 and will work with the mRID after FW is updated to version 1.0.1
 - (1) There is a math error in BF 4.4.3, and 4.5 RC1 that prevents proper operation of GPS rescue when using MSP GPS DATA.
 - (2) The newest mRID firmware and installer can be found on our support page: <https://www.phoenixuas.us/support>
 - (3) **Verify proper operation of GPS enabled functions prior to relying on them to save your aircraft.**
 - v) MSP GPS data to FC is currently available for iNav.
 - (1) **Verify proper operation of GPS enabled functions prior to relying on them to save your aircraft.**
 - vi) Compatibility with Ardupilot and KISS is in development.

3) Included in packaging:

- a) Phoenix mRID (x1)
- b) SH1.0 6P connectors (x3)
- c) SH1.0 cable pre-terminated (x6)

4) Functional description:

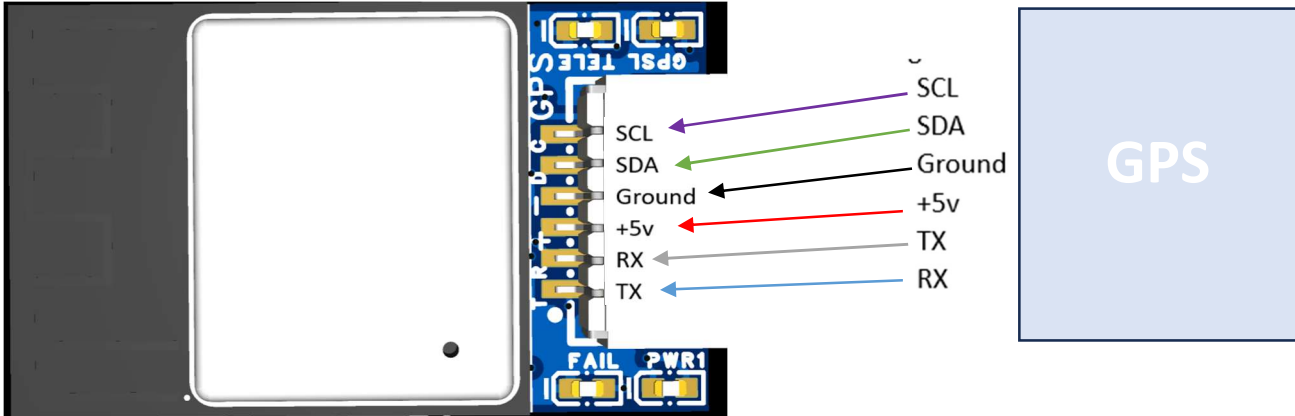
- a) The Phoenix mRID is designed to meet the FAA requirements for a Remote Identification Broadcast Module. It is **NOT** designed to meet requirements of standard remote identification. The module is wired to a M10 GPS and receives power from the UAS's flight controller (FC), a 1s battery, or via the micro-USB port.
 - i) LEDs:
 - (1) Power (blue),
 - (a) On/Solid — Indicates the mRID's power regulator is functioning
 - (2) GPS lock (green),
 - (a) On/Solid — Indicates the mRID has a sufficient GPS Satellite lock to function properly
 - (3) TELE (MSP & GPS heartbeat) (green/flashing),
 - (a) On/Flashing — Indicates the GPS and mRID are communicating and the mRID is sending MSP data on the FC RX and TX lines.
 - (4) System fault (red).
 - (a) On/Solid — Indicates the mRID can not communicate with the GPS or has some other fault preventing proper operation. **** NOTE this LED may come on during initial power up while communication is established with the GPS, if the LED is not extinguished after about 30seconds see the troubleshooting guide in section 10 of this manual. ****

5) Wiring:

- a) NOTE: if your GPS is not equipped with a magnetometer/compass the SCL and SDA cables are not required.
- b) GPS to mRID:

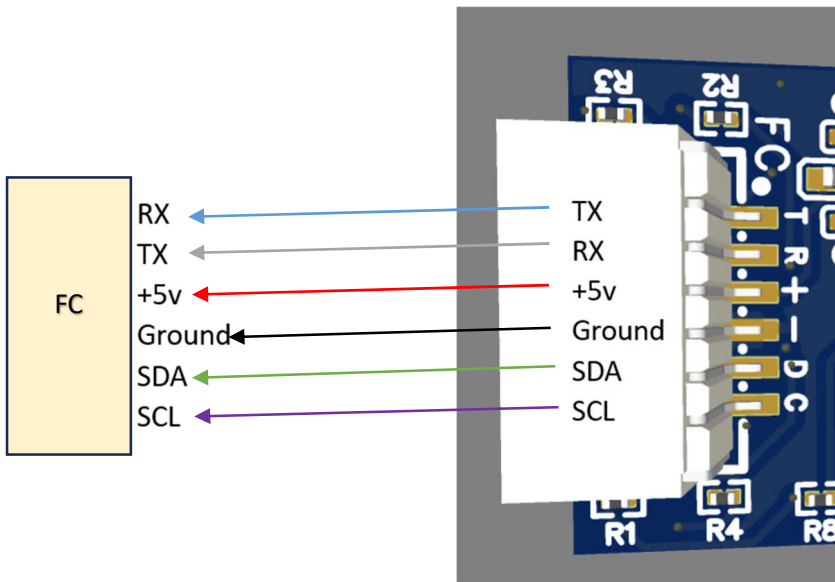
i) From mRID "GPS" plug to GPS:

- (1) SCL → SCL
- (2) SDA → SDA
- (3) Ground → Ground
- (4) +5v → +5v
- (5) RX → TX
- (6) TX → RX



c) From FC to mRID GPS "FC" plug

- (1) RX → TX
- (2) TX → RX
- (3) +5v → +5v
- (4) Ground → Ground
- (5) SDA → SDA
- (6) SCL → SCL



6) Quick start guide:

- a) Wire mRID as described in section 5.
- b) Power the mRID, verify the Blue "PWR1" LED is on and the Green "TELE" led will blink to indicate MSP data TX heartbeat.
- c) When the GPS indicates it has a GPS lock (see user's GPS documentation), the mRID Green "GPSL" LED will light up and stay solid, and the Green "TELE" led will blink to indicate MSP data TX heartbeat.
- d) If the Red "FAIL" LED is illuminated for more than 20 sec, or the "GPSL" LED fails to illuminate see troubleshooting guide in section 12.
- e) Verify mRID is transmitting by checking with one of the available RID apps.

7) GPS & mRID mounting recommendations:

- The mRID has been tested with most of the M10 GPS units on the market.
- Place the GPS on the top of the aircraft with the antenna facing the sky.
- Verify the GPS is as far away from other electrical interference as possible.
- Mount the mRID on the aircraft where the PCB antenna will not be obstructed.

8) Installation and Operations

a) Power Requirements:

- 3.3vdc – 5vdc DC only through the “FC” plug.
- via USB 5v

b) Installation options:

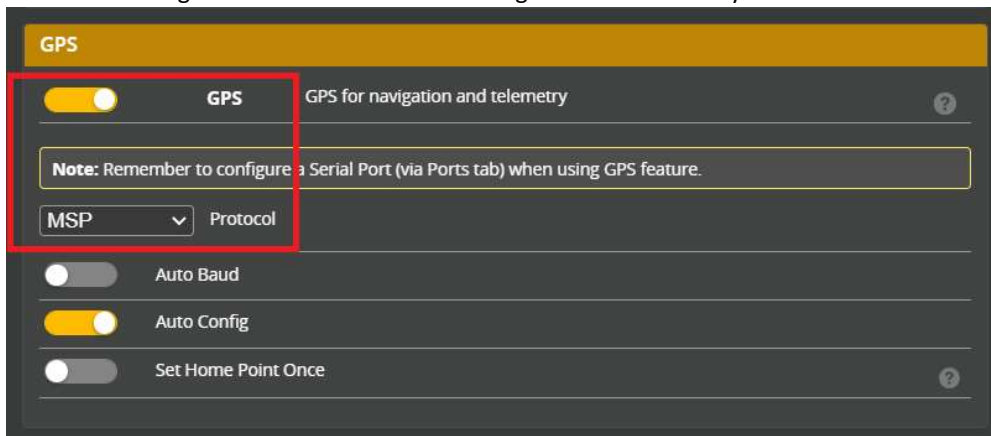
- FC power
- Flight battery power (**5v MAX**)
- External power
 - USB
 - Non-flight battery **1S MAX** or run off 5vdc regulator.

c) BetaFlight GPS MSP Passthrough:

- Wire mRID and m10 GPS module as shown in section 5.
- Update BetaFlight to the most recent built (BF 4.5 RC2 fixed MSP GPS rescue behavior)
- Under the ports tab enable MSP the UART that your mRID is connected to and set the BAUD rate to **57600**, and SAVE.

Identifier	Configuration/MSP	Serial Rx
USB VCP	<input checked="" type="checkbox"/> 115200	<input type="checkbox"/>
UART1	<input type="checkbox"/> 115200	<input type="checkbox"/>
UART2	<input type="checkbox"/> 115200	<input type="checkbox"/>
UART3	<input type="checkbox"/> 115200	<input type="checkbox"/>
UART4	<input type="checkbox"/> 115200	<input type="checkbox"/>
UART5	<input type="checkbox"/> 115200	<input type="checkbox"/>
UART6	<input checked="" type="checkbox"/> 57600	<input type="checkbox"/>
UART7	<input type="checkbox"/> 115200	<input type="checkbox"/>

- Under the Configuration tab select GPS for navigation and telemetry and MSP as the Protocol and SAVE.



- Verify proper operation of GPS enabled functions prior to relying on them to save your aircraft.**

d) iNav GPS MSP Passthrough:

- Wire mRID and m10 GPS module as shown in section 5.

- ii) Under the ports tab enable MSP the UART that your mRID is connected to and set the BAUD rate to **57600**, and SAVE.
- iii) Under the Configuration tab select GPS for navigation and telemetry and MSP as the Protocol and SAVE.

Identifier	Data	Telemetry	RX
USB VCP	<input checked="" type="checkbox"/> MSP 115200 ▾	Disabled ▾ AUTO ▾	<input type="checkbox"/>
UART1	<input checked="" type="checkbox"/> MSP 115200 ▾	Disabled ▾ AUTO ▾	<input type="checkbox"/>
UART2	<input type="checkbox"/> MSP 115200 ▾	Disabled ▾ AUTO ▾	<input type="checkbox"/>
UART3	<input type="checkbox"/> MSP 115200 ▾	Disabled ▾ AUTO ▾	<input type="checkbox"/>
UART4	<input type="checkbox"/> MSP 115200 ▾	Disabled ▾ AUTO ▾	<input type="checkbox"/>
UART5	<input type="checkbox"/> MSP 115200 ▾	Disabled ▾ AUTO ▾	<input type="checkbox"/>
UART6	<input checked="" type="checkbox"/> MSP 57600 ▾	Disabled ▾ AUTO ▾	<input type="checkbox"/>

Configuration

Note: Remember to configure a Serial Port (via Ports tab) when using GPS feature.

GPS for navigation and telemetry ?

MSP ▾

 Protocol

Autodetect ▾

 Ground Assistance Type

Gps use Galileo Satellites

00:00

hh:mm Timezone Offset ?

USA ▾

 Automatic Daylight Savings Time ?

- iv) **Verify proper operation of GPS enabled functions prior to relying on them to save your aircraft.**

9) Preflight Warmup:

- a) To reduce time to get a GPS lock on the mRID & GPS “warmed up” by powering the GPS through the mRID USB Port or with an external 1s battery.

NOTE: if the FC plug is wired to the FC the USB will power the FC through the 5v regulator. It is recommended to unplug the mRID FC plug prior to powering the unit from the USB on the mRID.

NOTE: on a cold start of a new GPS the red FAIL LED may be lit of up to 30 seconds while the mRID and GPS negotiate baud rates. This is typically less than 5 seconds. Once baud is matched the FAIL LED will extinguish and the TELE LED will begin flashing. Some Matek M10’s do not have flash memory and reset to default settings after a few hours without power.

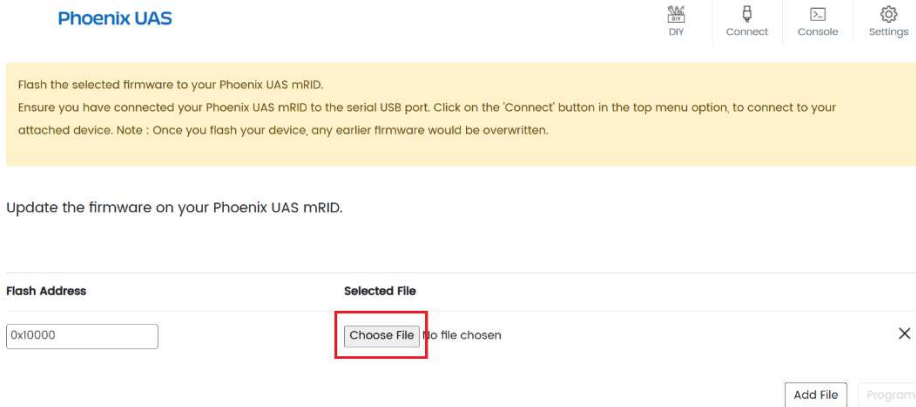
- b) Pre-flight GPS warmup:
 - i) Verify the mRID and GPS wired per section 5.
 - ii) Power the mRID and GPS
 - iii) FAIL LED may light up momentarily (for Matek M10 GPS this maybe as long as 30 seconds)
 - iv) TELE LED will begin blinking
 - v) When GPSL LED is solid verify proper operation with one of the available RID sensing apps.
 - vi) NOTE: A GPS module can take as long as 10 minutes to download the GPS almanac and allow for near future hot starts. Matek M10 GPS (and possibly some others) do not have flash memory and will perform a cold start if their batteries or

capacitors are discharged. It is not necessary to wait for a full almanac download prior to using the mRID. If the mRID GSPL LED is on and solid the unit is ready to fly.

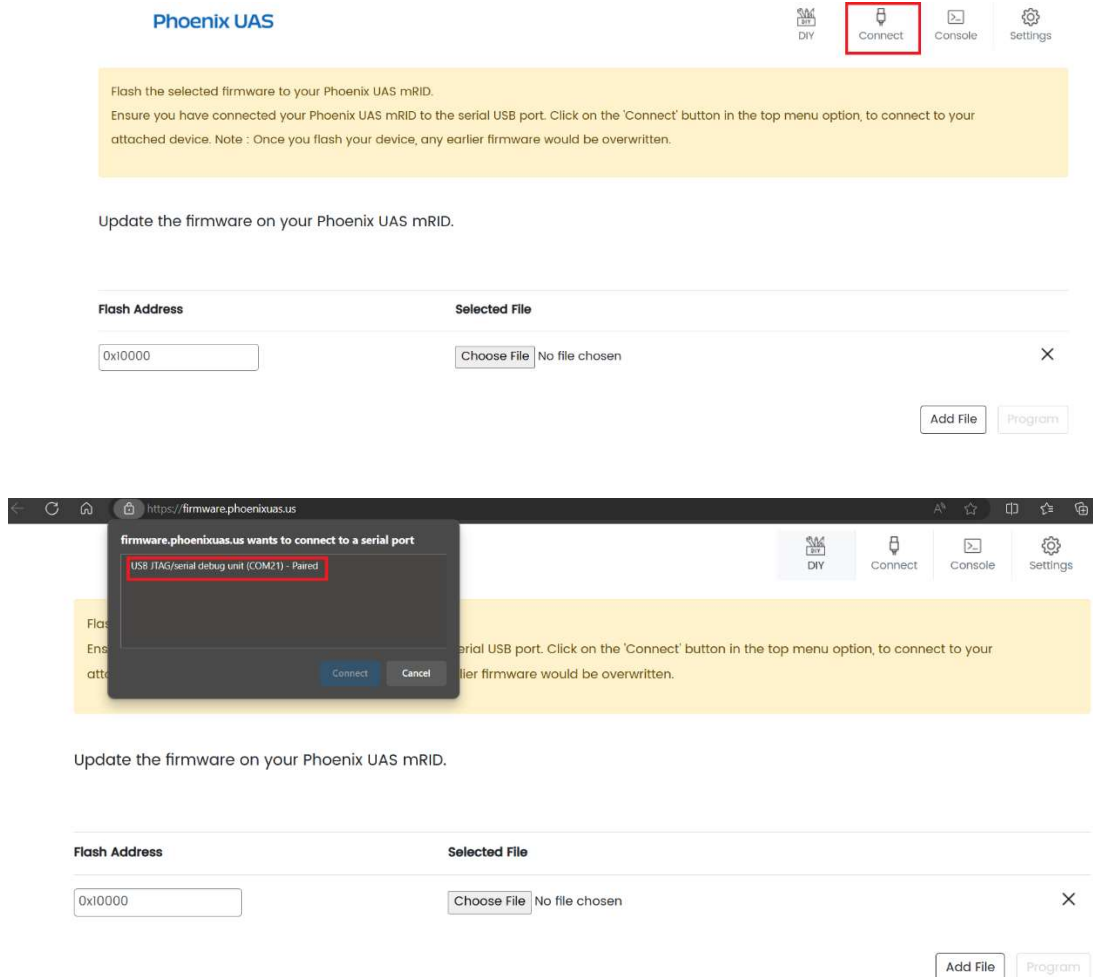
vii) Remove power from the unit

10) Firmware updates:

- a) Firmware and update link can be found on the support page: <https://www.phoenixuas.us/support>
- b) Download the most recent firmware and save to your computer in a convenient place.
- c) Open the firmware flashing tool and connect the mRID to the computer via USB.
- d) Load firmware by clicking on the “choose file” and selecting the downloaded firmware.



e) In the firmware flashing tool, select “Connect” and select the COM port your mRID is connected to.



- f) Click Program. When programming is complete the dialog box will display “leaving”. After this message click “Disconnect” and disconnect the mRID from the USB.

```
Wrote 1037536 bytes (568137 compressed) at 0x10000 in 7.699 seconds.
Leaving...
```

11) Troubleshooting:

Problem Description	Possible Cause	Corrective Action
Blue PWR LED not Lit	Unit is miss wired	-Remove power -Verify wiring -If FC is powered by USB for testing/setup the 5v regulator may require the flight battery to be plugged in.
	Battery power below 3.3v	-Replace or charge battery
	Flight Controller 5v not available	-Verify 5v reg is functioning -Verify if 5v regulator is controlled by FC that it is set up to be on. -If FC is powered by USB for testing/setup the 5v regulator may require the flight battery to be plugged in.
	Inadequate power available from Flight controller 5v regulator	-Ensure FC 5v regulator has sufficient overhead for the additional current draw of the mRID (<160mA)
GPS has no power indication	Unit is miss wired	-Remove power -Verify wiring -Replace GPS
Fail LED Lit	mRID is negotiating Baud rate with GPS	-This should complete in <30 seconds, and is typically <5 seconds for a cold start on a new GPS. Once baud is matched the FAIL LED will extinguish and the TELE LED will begin flashing. -Some Matek M10's do not have flash memory and reset to default settings after a few hours without power.
	Unit is miss wired	-Remove power -Verify wiring
	GPS Unit failure	-Replace GPS
	mRID fault	-Cycle power to the mRID -Reload Firmware -Replace mRID
	GPS is not an M10 GPS	-Replace GPS
	Wiring failure	-Replace affected wiring
GPS indicates lock but mRID GPSSL LED is not Lit	Matek GPS units (and possibly some others) did not sync to original Firmware	Update Firmware IAW section 10 of this manual

	Failure of GPS to sync with mRID during GPS Cold start	-Cycle power to mRID
	GPS and mRID minimum satellite lock for fix mismatch.	-Wait for additional satellites to lock with the GPS. -Cycle power to the mRID