

Heavy Equipment Unit Installation Instructions

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Special Note:

Airtime invoicing begins on installation or within 14 calendar days of delivery, whichever comes first. Not installing the unit(s) does not prevent airtime fees from being due or starting. Units are "active" on delivery.

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Introduction

Satellites are in a 12-hour orbit at 12,000 miles above the earth. There are 24 satellites in the system and generally there are at least 5 satellites orbiting overhead at any one time. This antenna must be positioned to receive signals from these satellites.

Through formal agreements with cellular carriers throughout North America enabling the wireless transmission of data. This network covers virtually the entire population of the U.S, Canada, and Mexico that is within reach of the cellular network.

1. Safety Statement

This installation manual covers the installation of the Heavy Equipment (HEU). This manual is for the professional and novice installer and should be used to ensure a safe and functional install of the HEU.

***Always a suggested practice to disconnect the heavy equipment battery. There is no on-off switch on the unit. The installed unit operates 24 hours a day and must be energized to log vehicle events or send data as required by anyone using the service.

The HEU is shipped with one in-line 3-amp fuse attached to the power cable. This fuse must be installed as close as possible to the primary power source. The fuse protects the device and power cable should there be a short in the cable between the fuse and the HEU. This fuse must be installed properly. If the fuse is replaced, it should be of the same type as originally supplied from the factory. The original fuse supplied is a 3 amp 125-volt type 3AG (Little Fuse 321 Series).

Failure to use the proper fuse or to install the fuse in the recommended location could cause a fire hazard. The fuse provides overload protection for the power cable and HEU. The wiring installed between the fuse and primary vehicle power is not protected from overheating if a short should occur. Use care when routing the power cable and fuse. Route the cables where they will be protected and use commonly accepted install practices.

There are two acceptable methods of making a wire connection:

- Soldering your connections (recommended)
- Crimp connectors (with the use of the proper crimping tool)

Regardless of the method you choose, ensure that connection is mechanically sound and properly insulated. Use high quality electrical tape or shrink tubing, cheap tape will unravel in hot weather making it a poor insulator.

Not recommended connections:

- T-tap connectors (poor quality mechanical type connection)
- Twist and tape without soldering your connection.

*** Using these connection types could result in numerous start up notifications***

2. Common Tools and Consumables needed for Installation

TOOLS

- Metric and standard socket set
- Screwdriver set
- Side cutter, wire cutter
- Knife or box cutter
- Wire strippers
- Hand crimper for insulated terminals
- Pliers
- Wrenches
- Cordless drill with accessories
- Assorted common bit set
- Digital Multimeter (recommended)
- Solder iron and solder

It is strongly recommended that a Digital Multimeter be used when probing electrical systems.

Consumables

- Electrical Tape / Waterproof tape
- 6" or 8" tie straps
- 1 and or 3 amp fuse with inline water proof fuse holders
- Butt connectors (various sizes)
- Wire 18 gauge
- Ring terminal connectors
- Silicone
- Self tapping screws (various sizes)

3. HEU and Mounting Locations

The HEU may be installed in any type of vehicle. The unit device should be mounted so it will not be exposed to damage from people or objects. When selecting a mounting location, avoid the following hazards, direct exposure to weather, excessive heat, high vibration areas, and corrosive liquids. The HEU has six mounting holes. Normal installation is with these six holes using self tapping screws with lock washers or bolts with lock nuts.



4. Antenna

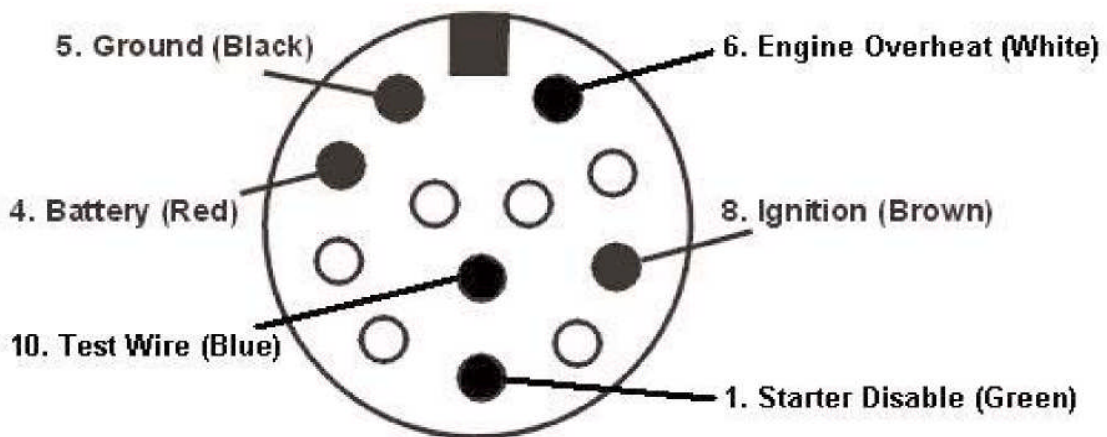
Antenna location is critical to the operation of the system. The Antenna provided is a combined GPS/RF magnetic mount antenna. The Antenna must be mounted on the rooftop of the heavy equipment or any flat surface with direct view of the sky. Any metallic objects between the antenna and the satellites will degrade the signal and reduce the overall performance. The Antenna does not require a ground plane to function properly but is not isolated from ground. The Antenna when in contact with metal does ground through the HEU's main ground wire.



5. Wire Harness Pin Configuration

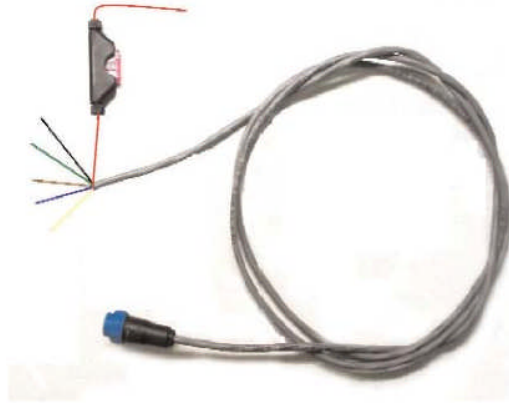
Please refer to your Configuration Sheet to determine if any of the below listed output messages apply to your account.

PIN#	WIRE COLOR	DESCRIPTION	MESSAGE YOU RECEIVE WHEN TRIGGERED
1	GREEN	"Starter Disable" negative constant (Output #2)	Vehicle Disabled (If car is on) Starter Disabled (When car is off) Starter Enabled
4	RED	Primary Power Back-up battery + 5-14VDC or NO Back-up battery + 5-30VDC	
5	BLACK	Primary Ground chassis ground only	
6	WHITE	"Engine Overheat" negative for 2 minutes (Input #3)	Engine Overheat
8	BROWN	Ignition/Run +2-24VDC when engine running to log engine hours (Input #4)	Engine Hours
10	BLUE	Test Wire 15 sec to ground to trigger output and reset engine hour count	



6. The Power Harness


The HEU uses power supplied by the heavy equipment via the Power Harness. This connection provides constant power, ignition and ground to the HEU. The ignition wire is used to count engine hours on the machine.



Connecting the Power Harness

The following requires connection to the heavy equipment.

- **Constant Power Wire (red)**

 **Battery Back-up Option:** This is a 12 VDC option only. Using this in a 24 volt system requires an inverter with an output of 12 volts. If this wire is connected to a 24 volt source, the battery back-up option ***can not*** be used (***glass fuse on device not installed***).

- **Ignition/Run Wire (Engine Hours) (brown)** +2-24 VDC (when the heavy equipment engine is running). An in line fuse (1 amp fuse not supplied) must be added. Ensure the ignition sense wire has 0 volts when the engine is not running.
- **Ground Wire (black)** to a metal surface on the machine frame. (**NOTE:** Do not connect to the negative terminal of the battery).

7. Power Test

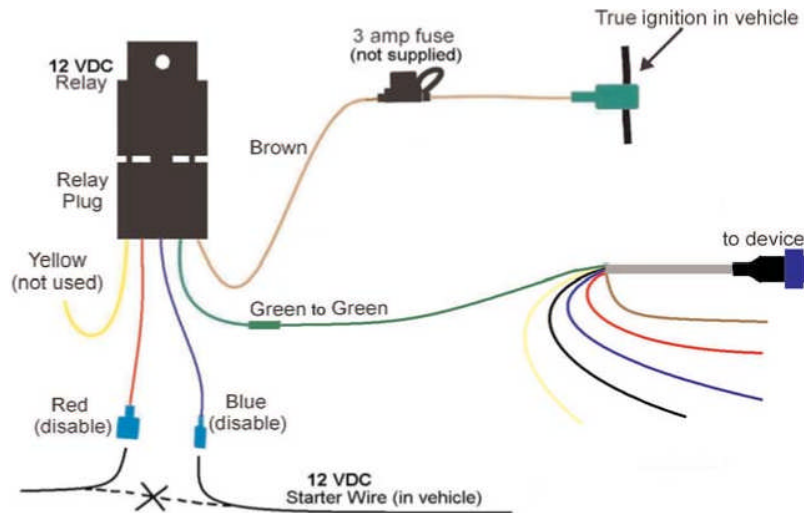
- 1 Ensure the Power Harness has been connected to Ground, Constant and Ignition/Run wire.
- 2 Using a voltmeter verify there is power on pin 4 Constant (red) when the Ignition is turned OFF.
- 3 Using a voltmeter verify there is NO power (0 VDC) on pin 8 Ignition (brown) when the Ignition is turned OFF. Turn the Ignition ON and start the heavy equipment and power should now be present on pin 8.

Note: The Ignition/Run wire (brown) must have (0 VDC) when the heavy equipment is turned OFF or the engine hours count may report 24hrs a day operation.

Note: There should be no power present on the wiring harness when the battery disconnect switch is engaged.

8. Adding Starter Disable Feature

The Starter Disable feature can only be installed into a 12volt system. The supplied relay is a 12 volt relay. The Starter Disable feature requires true ignition power (**a wire with +12VDC when the engine is cranking and running**) for proper operation. In order to have ignition power the (brown) wire on the relay harness will need to have a fuse installed inline (3 amp max) “not supplied” and connected to true ignition power.



- 1 The Ignition wire (brown) on the relay harness connects through a fuse (3 amp max.) “not supplied” to the true ignition wire of the vehicle.
- 2 Using a butt connector, crimp the green wires from the power harness and the disable relay together.

9. Engine Overheat Feature

The HEU can connect to most heavy equipment electrical system to detect when the engine overheat alarm is triggered. No warranty or guarantees are expressed or implied for safe guarding equipment.

- 1 Connect the Engine Overheat wire (white) to a negative source when the alarm is triggered.

NOTE: If the engine overheat input in the heavy equipment is a positive source a relay may need to be added to invert the polarity from negative to positive.

10. Back-up Battery Feature

The HEU battery back-up is 12 volts. An inverter must be installed when equipping the HEU on a 24 volt asset when incorporating the Battery Back-up solution (inverter sourcing and supply is the responsibility of the client). An inverter is not required on a 12 volt asset. To engage the battery back-up the fuse and plug need to be installed.



11. Powering the HEU

When the HEU is installed it needs to be connected in the following sequence. ***The heavy equipment must be outside when powered for the first time.***

Connection Sequence

1



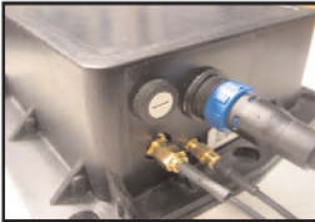
Connect the two coax cables from the combination GPS/RF antenna to the HEU.

2



Plug in the **Power Harness** to the HEU. The device should now be running.

3



Plug in the **Battery Back-up fuse**. This is a 12 VDC option only.

12. Confirming Proper Operation

Start-up Test

The HEU will automatically send this message "Start-up test" the first time it gets a GPS lock after being powered on, or 15 minutes after powering up if it still has not received a GPS lock. This message can only be sent a maximum of three times from the HEU before being "reset". "Reset occurs when the test pin is grounded or re-configured with the configuration utility. If a "Start-up test" is not received a "Location request" should be performed.

Installation Test Mode (test wire blue)

The Test Wire on the HEU can be used to test the Installation of the device and ensure that the inputs and outputs are properly connected. Running tests with this wire grounded will not send data to the call center. The user account does not need to be activated to run the tests.

If the test wire is grounded for ten seconds, the device will enter installation test mode until the ground is removed from the test wire or for a maximum of 4 minutes and 15 seconds (whichever comes first).

On entering test mode, the unit will trip and reset:

- OUTPUT 2 "starter disable" (30 sec) After this, or if test mode is exited prior to the completion of this sequence, any tripped relays will be reset.

Entering Test Mode also resets the hours and mileage counts for all Auto Report and Maintenance messages. It also resets the count of start-up test messages back to 0. Exiting Test Mode causes any triggered outputs to reset.

13. Troubleshooting

1. No "Start-up test":

Possible Cause		Action Required
1	No power to unit.	Ensure the RED constant power wire has power and the BLACK ground wire is connected to a metal surface on the heavy equipment frame. Ensure the battery disconnect is not turned.
2	No GPS Fix.	Ensure the heavy equipment is outside and the antenna has a clear view of the sky.
3	Poor wireless coverage.	If this is the first installation in this area, verify there is wireless service. Installation tests may need to be performed in another location where there is wireless coverage.
4	The HEU should be configured to report a maximum of 3 start-up messages.	The Test Wire can be grounded to reset the message count to 0.

2. No, or 24hrs a day Engine Hours reporting:

Possible Cause		Action Required
1	Ignition/Run wired incorrectly	Ensure the BROWN wire is connected to a true source of ignition power. Ensure there is 0VDC when the heavy equipment is not running and when the kill switch is engaged.

3. When I track my vehicle no map comes up and returns me to the login page:

Possible Cause		Action Required
1	Pop up blocker.	Disable/turn off pop up blocker.
2	Internet Browser.	Do not use AOL browser. Use Internet Explorer 5.0 or higher.

4. I login, but when I try to use anything it takes me back to the login page.

Possible Cause		Action Required
1	Cookies accepted.	Disable/turn off cookies blocker. Delete cookies and temporary internet files.
2	Cookies accepted.	Move vehicle to open area.
3	Not enough power to HEU when ignition is off.	Ensure BROWN wire is connected to ignition. Start vehicle, this should wake unit from power management mode.