Fleet

I/O Interface

User's Guide

90001245_E
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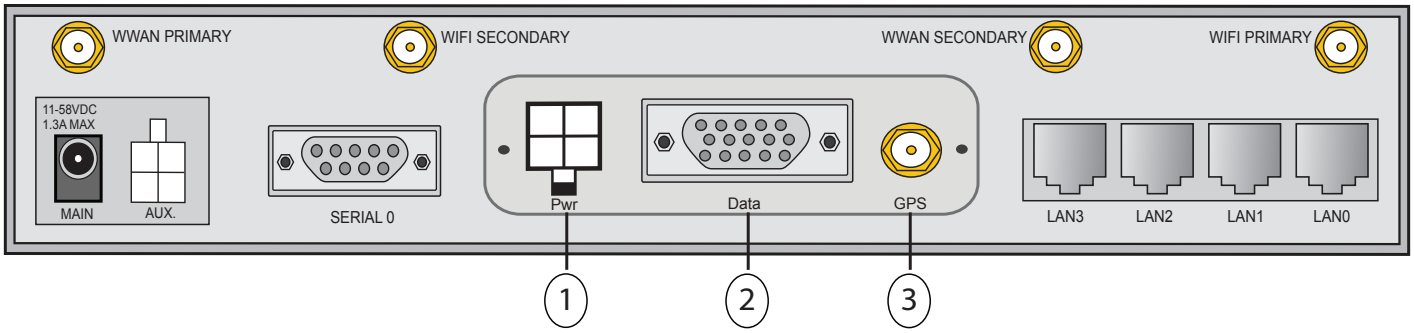
Fleet I/O Interface

The Fleet I/O Interface is a vehicle diagnostics interface for the TransPort WR41, WR44, and WR44 R. Main features are:

- CAN-bus / J1939 bus
- J1708 bus
- GPS
- 3-Axis Accelerometer
- Local Power Control
- 4x non-isolated digital I/O ports
- Ignition Sense Input

1. Features



1. Input Power - This port is used to power the Fleet I/O Interface.
2. Data Port - This port gives access to the Fleet / J1939 interface, J1708, the 4 x Digital I/O ports, and the Ignition Sense input.
3. GPS Port - This SMA connector is used to connect the unit's GPS antenna.

1.1 Accessories

The following accessories are for the Fleet I/O Interface.

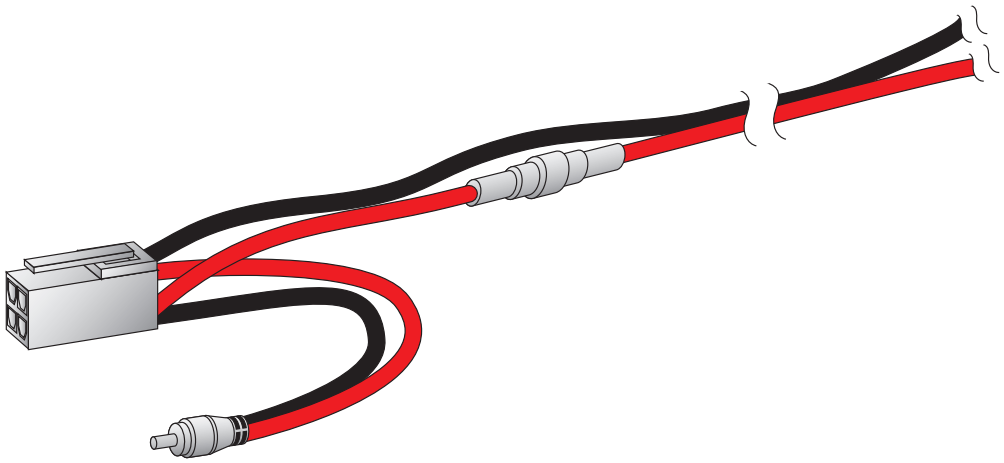
1.1.1 Fleet Power Cord (included)

This power cord is to be used as the unit's primary power source. The 4-pin connector gets connected to the "Pwr" port, and the locking barrel-type connector connects to the "MAIN" port.

Replacement cables can be ordered from Digi using the following part numbers:

76000873 – Fleet Power Cable for TransPort WR44

76000874 – Fleet Power Cable for TransPort WR41

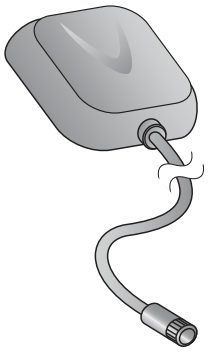


1.1.2 GPS Antenna (included)

The GPS antenna has an SMA connector which is connected to the Fleet I/O Interface.

A replacement antenna can be ordered from Digi using the following part number:

76000842 – GPS Antenna (Magnet Mount, 1575Mhz, 5m cable)

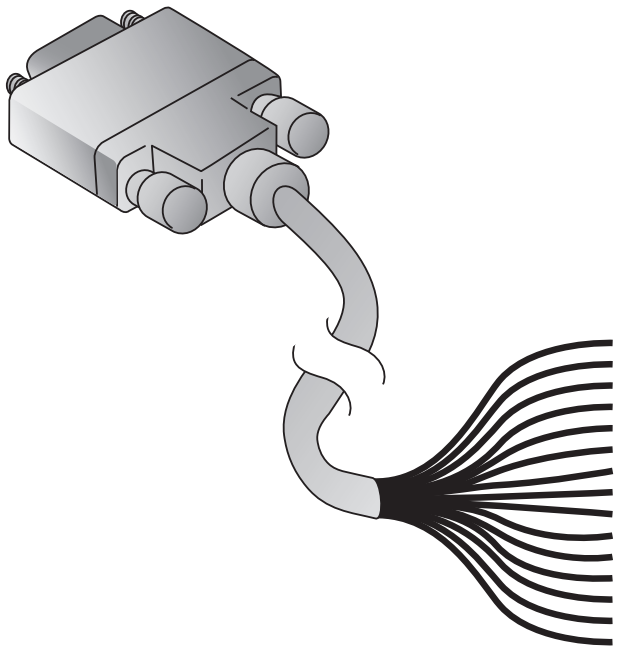


1.1.3 Fleet Telemetry Cable (not included)

The Fleet Telemetry Cable has a D-Sub HD 15-pin connector on one end and 15 bare wires on the other end.

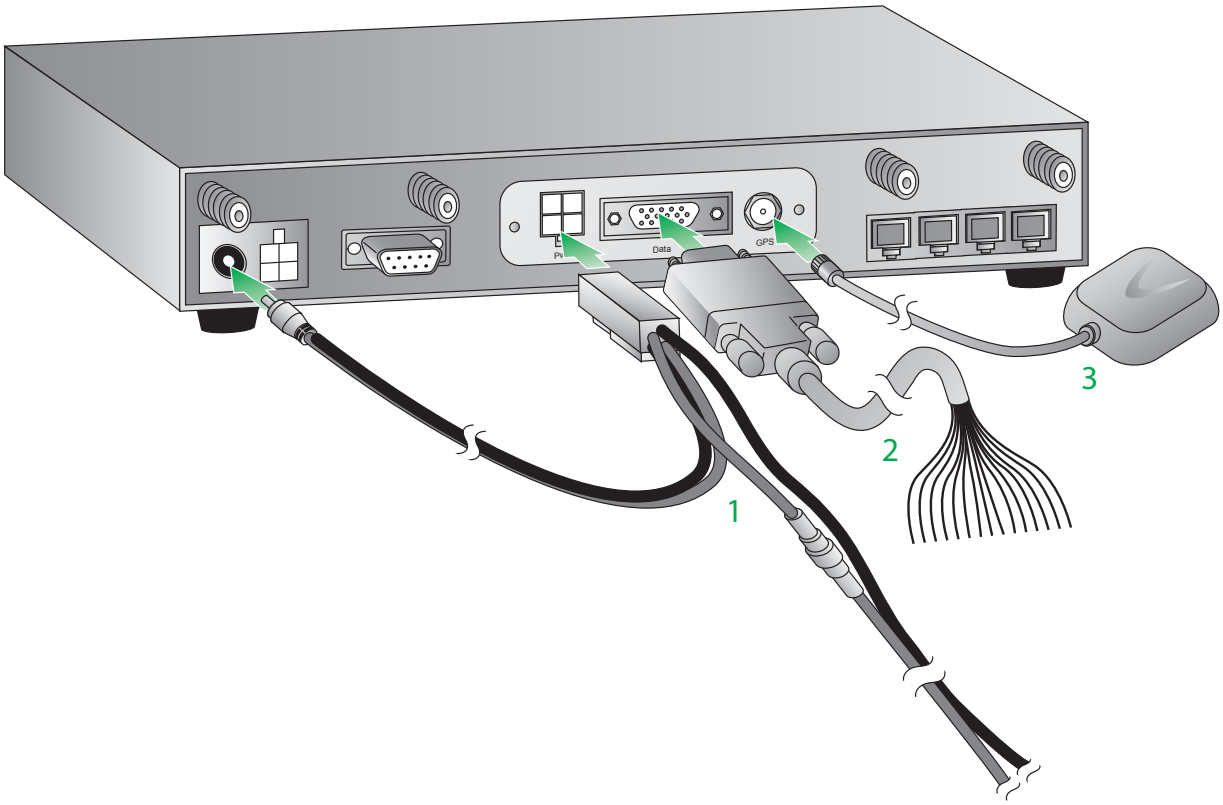
Replacement cables can be ordered from Digi using the following part number:

76000872 – Fleet Telemetry Cable



2. Installation

The following steps must be performed for device installation:



1. Connect the 4-pin connector of the Fleet Power Cord (included) to the 'Pwr' port on the unit. Connect the locking barrel-type connector to the 'Main' port. Connect the bare wire ends to an appropriate power source.

2. Connect the 15-pin connector of the Fleet Telemetry Cable (not included) to the 'Data' port on the unit. Connect the bare wire ends to the respective devices (see the Pin-out Diagram section on page 8 for a pin-out diagram of the cable).

3. Connect the GPS antenna (included) to the device.

3. Hardware

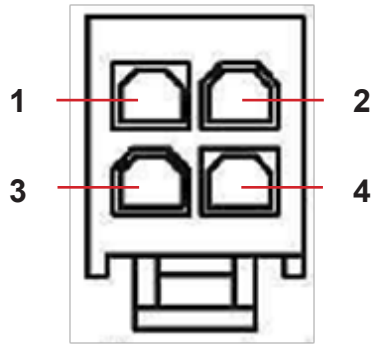
The following section outlines the specifications and configuration of the interface.

3.1 Input Power

The Fleet I/O Interface has the ability to locally control the power to the unit. One use of this feature could be to allow the unit to remain powered up for a configured amount of time after the vehicle ignition is switched off. This allows to it download data before powering down.

3.1.1 Pin-out Diagram

The Pwr port uses a 4-pin Molex connector. The pin-out diagram for this port is as shown below.



Pin	Signal
1	Gnd
2	Gnd
3	DC Out
4	DC In

3.2 Data Port

3.2.1 Pin-out Diagram

The following table illustrates the pin-outs for the data port:

Pin	Signal
1	CAN-bus High
2	CAN-bus Low
3	J1708 Positive
4	J1708 Negative
5	J1708 Ground
6	CAN-bus Ground
7	Ground
8	Ground
9	Ground
10	Ground
11	Ignition Sense
12	Digital IO 0
13	Digital IO 1
14	Digital IO 2
15	Digital IO 3

3.2.2 CAN-bus / J1939 Bus

CAN-bus is a vehicle bus standard that is equipped on most new vehicles and uses a differential pair of signals. The interface supports baud rates of up to 1Mbps and is configured via the CLI and the Digi Python "digicanbus" module.

The interface can send and receive raw CAN messages to and from the vehicle's CAN-bus as well as 1939 messages. The interface uses the Digi Python "digicanbus" module to send and receive the messages.

3.2.2.1 Cable Length

The CAN cable length depends on the bit rate:

Bit Rate	Cable Length
1Mbps	30m
500 kbps	100m (normal for cars)
250 kbps	250m (normal for trucks)

3.2.2.2 ESD protection

CAN bus lines are protected from the damage caused by ElectroStatic Discharge (ESD) and other transients with the following specification:

IEC 61000-4-2 (ESD	Level 4
IEC 61000-4-4 (EFT)	40A – 5/50ns waveform
IEC-61000-4-5 (lightning)	8A – 8/20us waveform

ISO 7637-1	Non-repetitive EMI surge pulse 2, 9.5A (one 50us pulse)
ISO 7637-3	Repetitive Fast Transient 50A (5 x 50us)

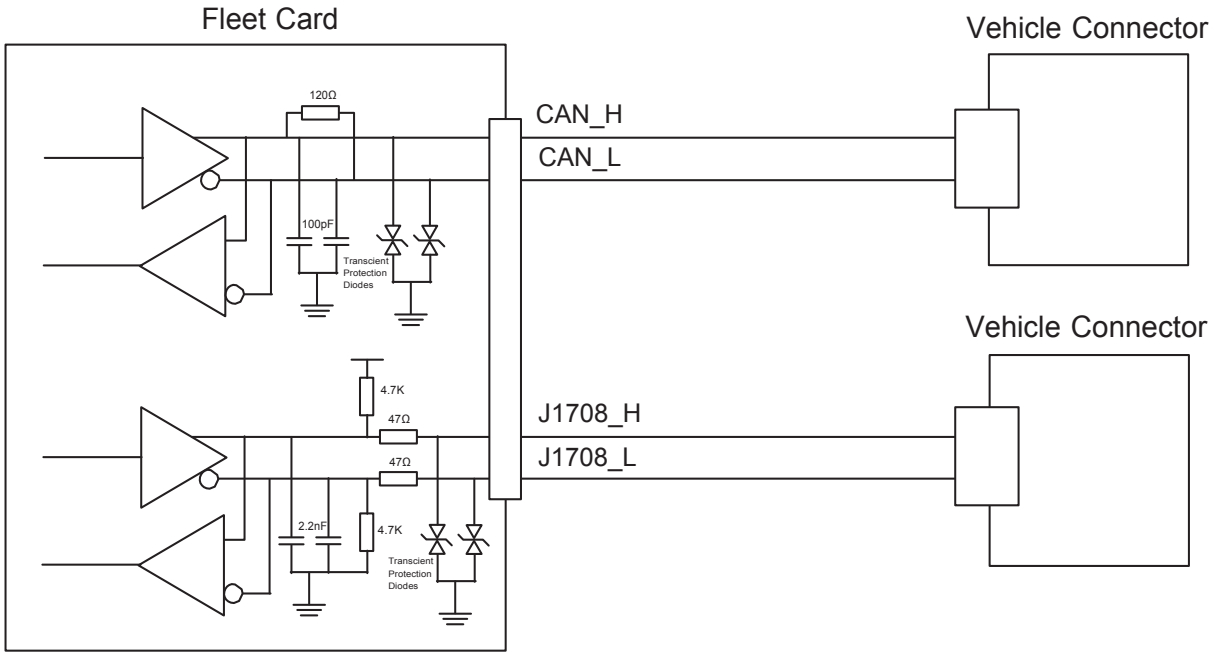
3.2.3 J1708 Bus

J1708 is a vehicle communications standard for heavy duty vehicles. It consists of a 2 wire (18 gauge, twisted pair) interface that operates at 9600 bits per second.

The interface can send and receive J1708 messages to and from the vehicle's bus. The interface uses the Digi Python "digij1708" module to send and receive the messages.

3.2.4 CAN-bus / J1708 Rx/Tx Circuit

The following diagram shows the CAN and J1708 Rx/Tx circuitry on the Fleet Card and the connection to a vehicle bus:



3.2.5 Digital I/O Ports

There are four non-isolated digital I/O ports available. All digital I/O ports share a common ground which is the same as the vehicle's ground. The ports are internally protected against back EMF current flow.

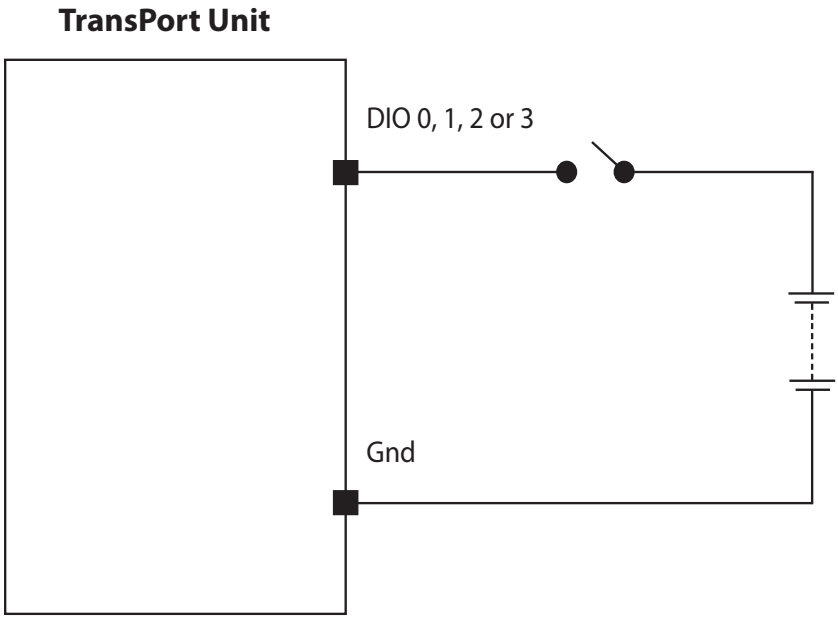
The maximum output current is 50mA.

The ports are configured for input or output mode via software.

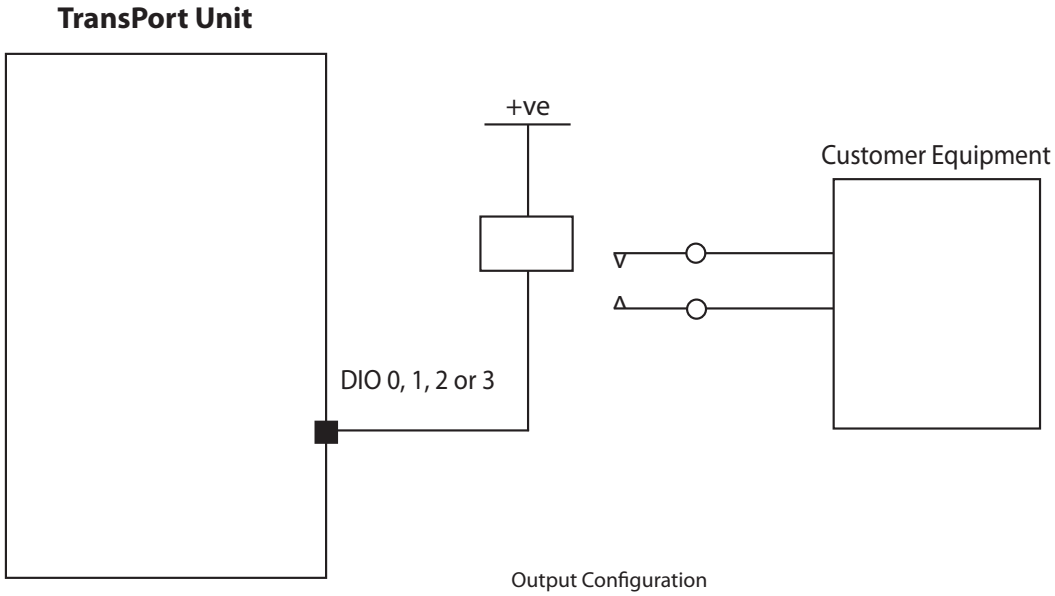
Termination impedance is 100 Ohms.

3.2.5.1 Wiring Configuration

The following figures illustrate typical wiring configurations for both Input and Output applications:



Input Configuration



Output Configuration

3.2.6 Ignition Sense Input

This signal is used to control the power up/down of the Fleet card and may optionally also control the host as required. The purpose of this signal is that it permits the router to be permanently connected to a +12 or +24V vehicle supply, but the time that the router is operational is governed by this input. Assuming the presence of the vehicle supply in the Fleet card's power input, then when power is supplied to this input (typically in the range +12V to +24V with some margin either way) the Fleet card will power up. If the Fleet card power cable's "Host Extension" is looped back into the power socket of the host, the Fleet card will now also power up the host. When the "Ignition" signal is disconnected from the +12V/+24V supply (perhaps because the driver turned off the vehicle engine), a timer on the Fleet card starts a countdown to the time when both the Fleet card and (if powered via the Fleet card) the host too. This countdown period is software configurable. The purpose of this is to allow

the router enough time to transmit journey statistics / present location / etc. before the system shuts down.

It therefore follows that there are two configurations that the user may want to choose from are:

- The Router/Fleet-card is running while the engine is on and will continue to run for a preset time afterwards.
- The Router/Fleet-card is running only when power is applied (i.e. all power control is either manually managed or is controlled by some other system separate from the router.

The best wiring arrangement for these two scenarios is either of the following:

1. Fleet-card controlled power

Wire the power input to the Fleet card directly into a permanent Battery (+12V or +24V) supply. If possible, directly to the battery is best, using thick wire of as short a length that can be used (this is to minimise losses in the cable). Connect the Fleet-card "Ignition" signal to the vehicle "Ignition" (i.e. the second position on most key switches, this should be the position for the engine to be running normally). Connect the power output from the Fleet-card (the "Host Extension") into the power input of the host router. Turn on the vehicle ignition and when the router has booted, configure the "Router Stay Alive" time as required.

2. Externally controlled power

Wire the power to the Fleet card directly to the power source. Wire the Fleet card "Ignition" to the same power source (note: if this step is not done, the Fleet card will not operate). Wire the Host router directly to the same power source (note: do NOT use the "Host Extension" power connection coming out of the Fleet card for this as the direct connection reduces losses in the system).

For further information on power control using the Ignition Sense input and on configuring the Stay-Alive time, refer to the application note AN49.

3.3 GPS Port

The GPS port can be used to provide location information.

This information can be processed locally or forwarded in periodic messages to a remote device via a TCP or UDP connection.

3.4 3-Axis Accelerometer

The 3 axis accelerometer can be used to provide the current forces being experienced on the X, Y, Z axes. Also, using the Digi Python "digihw_accel" module it is possible to set a threshold so that a call-back function is called if the forces on an axis exceed the threshold.

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