

The **Railroad Products RRD-113** breakout box allows EOT service technicians to easily bench test a Wabtec EOT-NG microprocessor board by itself (with the associated equipment listed below), and perform rapid NG electronic assembly tests (microprocessor board., HVM, motion sensor, and radio). Isolating the functions of the microprocessor board from other EOT assemblies greatly improves repair and troubleshooting time. The NG breakout box is compatible with all NG board level versions (23548, 24174, 25349 and many others). Using a known good microprocessor board with the initial box connection will familiarize the technician with future board / component level troubleshooting of defective boards.

#### Optional associated equipment: (for microprocessor board only testing)

- 24 volt DC power source (may use the 24 volt DC power pack included with the Wabtec 24062 kit)
- 12 volt DC power source set to 13.0 volts DC
- **Railroad Products RRD-1140** or Wabtec model 23660 UHF radio unit (RF terminated with load, antenna, or service analyzer)
- Head of Train unit setup and running with 2-way operation.
- PC laptop with a RS-232 communication port (Microsoft HyperTerminal or any terminal emulating software)

#### Connecting to the board:

- Solenoid P15 cable (15 pins), pigtail to pigtail white connector
- Downloader / ECP P6 cable (6 pins), pigtail to pigtail white connector
- Generator voltage P3 cable (3 pins), pigtail to pigtail white connector
- Battery P2 cable (2 pins), pigtail to pigtail white connector
- Test Switch P6 cable (4 pins), pigtail to J6 on microprocessor board, black connector
- Motion cable P2 (2 pins), pigtail to J2 on microprocessor board, black connector
- HVM cable P3 cable (8 pins), pigtail to J3 on microprocessor board, black connector
- GPS/Cell cable P10 (10 pins), pigtail to J10 on microprocessor board, black connector
- Battery Calibrate cable P11 (12 pins), pigtail to J11 on microprocessor board, black connector
- Connect the microprocessor board. radio pigtail cable (J1) to the UHF radio (**Railroad Products RRD-1140** or Wabtec 23660)
- Connect the laptop 9 pin serial cable to the Download / ECP UART1 connector on box
- Leave DC power source cables disconnected for now.

#### Initial Switch and pot Settings:

- Emergency and Release Solenoid switches in 'In' position
- Supply and Exhaust solenoid switches in 'Out' position
- Charge / Service switch in 'service' position
- Battery Charge Test switch in 'float' position and tilt switch to 'no tilt' position
- HVM LED String Disable switch position 'all on'
- Set Transducer Simulator pot for pressure 1 and 2 as follows: 1550 ohms between TP2 (Pres1) and TP11 (ground). Same for TP1 and ground. This should simulate approximately 90 lbs. of air pressure on displays. (Microprocessor board. HTD, PC)

#### Startup HyperTerminal in direct connect mode: Com1 or Com2

- Hang-up phone (disconnect), File, Properties, Configure, 9600 baud, 8 no parity, 1, no flow control.
- File, properties, settings, ASCII setup, check 'echo characters locally'
- Save configuration and connection

#### Power up:

- Apply 24 volts DC to either the 'charger input' connector on box; or the round +24Vdc connector using the **Railroad Products RRP-330** test bench charger and cable.
- Apply 13.0 volts DC to the Battery Test Power connector on the box.

- After a couple of seconds, the microprocessor board display should indicate '111' indicating mode 1 (bootloader), and the HyperTerminal screen will show the bootloader version characters.
- After a couple more seconds, the microprocessor board display should indicate '444' indicating mode 4 (service mode), and the HyperTerminal screen will prompt for 'Radio Test?'
- The following notes should allow the continuation of micro board / assembly service and testing.

#### Wabtec NG Micro Board / Assembly Service and Testing Notes:

- There are many firmware versions that are used for the different railroad NG EOT applications. *[NOTE: Since the service mode menu is dependent upon the microprocessor board's firmware version, step by step instructions of the service mode cannot be included to describe all firmware versions.]*
- The 'Radio Test?' menu on the service menu is standard on most firmware versions and is self-explanatory.
- Do not perform pressure 1 calibration until the 'PRESSURE 1' potentiometer has been calibrated using a with a known good calibrated microprocessor board, to display 90 lbs on the micro board display during operational mode, or displayed on the HyperTerminal screen (P90). Placing narrow marks on the pot and box housing to indicate 90 lbs, 45 lbs, and 0 lbs, will aid in performing air pressure troubleshooting and calibration. Always finalize air pressure calibration test with the mechanical air pressure transducer before releasing the EOT for service.
- Pressure 2 is for units utilizing dual pressure inputs and is setup similar to Pressure 1.
- Entering the railroad's password (1234 or????) and WPN (found on the Wabtec metal tag on EOT housing) allows automatic configuration for a particular railroad's NG EOT usage.
- Entering a WPN of '99999' allows manual configuration of desired settings.
- Battery Calibration should not be performed until calibration method as described in the NG maintenance manual has read. Use **Railroad Products RR-365** battery calibration box for battery calibration. Battery charge calibration should be performed on the same battery installed in the NG unit.
- Battery Calibration is not included on some NG firmware versions.
- Exiting the service mode menu will place the NG microprocessor board into operational mode 1 and allows the RS232 port (HyperTerminal screen) to display EOT component and operational status.
- Operational mode 1 allows a Head of Train unit to be 'armed' to the EOT using the 'EOT test' switch on box.
- Moving the breakout box will induce motion and HVM 'on' status on the HyperTerminal screen and Head of Train's screen. Observe the HVM LED strings while changing the position of the string switches.
- Enabling the 'emergency' mode on the Head Train unit will cause the 'emergency' LED on box to light. Be sure to reduce Pot setting to zero simulated air pressure (and open / close switches) to reset and return to 90 lbs.
- Covering the photo sensor with black tape on the upper left side of the microprocessor board display will enable HVM.
- The Vrad, 3.3M, 3.3V, 5V, +V, and Press1/2 are access points used for micro board component level troubleshooting.
- With 13.0 volt battery input and switch set to float, the current shown on the displays (PC and micro display) should be around zero (I-0). Switching to 'fast' charge should slowly increase current reading to I=+7 (battery fail message may occur on Head of Train display).
- Placing the 'charge / service' switch to *service* and the 'tilt / no tilt' switch to *tilt*, will place the microprocessor board into sleep charge mode.
- The GPS/Cell port is not used unless the NG is equipped with GPS / Cell hardware and firmware.

### NG Battery Box Calibration Adjustment:

NG Battery calibration requires **Railroad Products RR-365** (Wabtec fixture number 827). This fixture requires calibration to insure correct battery calibration as described in the service menu item.

Operating the micro board with DC power supplied to J11 (V+ is pin 2 and pin 11GND) will allow precision battery charge calibrations performed by the microprocessor.

- 1- Set external power supply to 14.5 VDC
- 2- Connect fixture box to power supply (2 pin battery connector to P/S and 12 pin adapter cable to J11)
- 3- Connect Digital Multi-Meter to I(+) & I(-) test points on box.
- 4- Set the switch on box to FN CAL.
- 5- Adjust the 'cal-pot' located in the Cal hole until a measured current of 145mA is obtained
- 6- Test fixture is now calibrated. Set the box switch to 'operate'

The calibrated box and external power supply may now be used to perform battery calibration as described in the service mode 'battery calibration?' menu item.



## RRD-113 Break Out Box

Instructions For

Wabtec NG-EOT

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PRIMUS ELECTRONICS

800.435.1636

815.436.8945

[www.primuselectronics.com](http://www.primuselectronics.com)

[sales@primuselectronics.com](mailto:sales@primuselectronics.com)