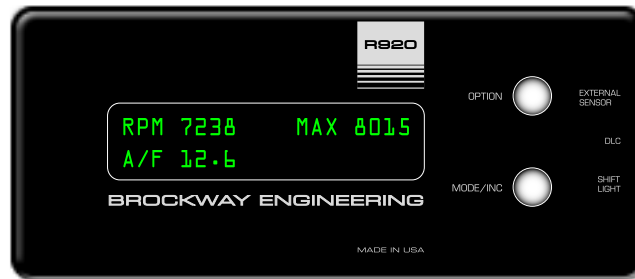


## R920 User Manual

**v2.3.3**



### Installation

The R920 only requires one cable. Connect the 4-pin connector to the middle header on the R920 labeled "DLC". The other end of the cable connects to the vehicle Data Link Connector. This is usually located under the dash on the drivers side of the vehicle.

The R920 should power up immediately. If the vehicle ignition is not on, then the R920 will go to sleep after about 5 seconds. After the ignition is turned on and the R920 starts communicating with the ECU, then it will initialize and start retrieving sensor data.

### Operation

To change the screen display mode, press the MODE/INC button. The display will increment to the next screen mode. Here is a list of the available screen modes.

MODE 1 - Any, Any (custom screen mode)

MODE 2 - RPM, VSS and RPM MAX Hold (displays peak RPM for about 5 seconds)

MODE 3 - ECT, IAT

MODE 4 - RPM, O2 (voltage or A/F ratio)

MODE 5 - RPM and RPM Bar Meter

MODE 6 - RPM, MAP/MAF (boost pressure available on vehicles with a MAP sensor or with AP1)

MODE 7 - VSS and Fuel Economy

MODE 8 - FR and MAX FR (Fuel Rate)

MODE 9 - VSS and Acceleration Timer (only available if AM1 is installed)

Note: The R920 will display either the MAP or the MAF but not both. If the vehicle has a MAF sensor, then it will be displayed. Otherwise the R920 will default to MAP. If the vehicle has both a MAP and a MAF sensor, then you can choose which one to be displayed in the option menu. If a MAP sensor is present, then you can select either kPa or psi to be displayed.

## Sensor Description

RPM - Engine RPM.

TPS - Throttle Position Sensor. Displayed in %. Most vehicles read around 8% at closed throttle and around 90% at full throttle. This is perfectly normal and actually recommended in the OBD-II specification.

MAP - Manifold Absolute Pressure. Displayed in kPa (kiloPascals) or psi.

MAF - Mass Air Flow. Displayed in g/s (grams per second).

IGN - Ignition timing advance. Displayed in degrees.

ECT - Engine Coolant Temperature. Displayed in degrees (Celsius or Fahrenheit).

IAT - Intake Air Temperature. Displayed in degrees (Celsius or Fahrenheit).

O2 - Oxygen Sensor. Displayed in volts or A/F ratio. There is also a A/F ratio conversion available for Honda/Acura vehicles with K-series engines. Vehicles factory equipped with wideband O2 sensors will always display A/F ratio.

A/F ratio will be displayed when using an Innovate! LC-1.

VSS - Vehicle Speed Sensor. Displayed in mph or km/h.

STFT - Short Term Fuel Trim.

CLV - Calculated Load Value.

EGT - Exhaust Gas Temperature (only available if the EGT1 is connected).

## Option Menu

To select an option, press the OPTION button. The display will increment through the options and then return back to the previous screen mode. To change an option value, press the MODE/INC button.

## Available Options

Metric/English Units - Metric or English. This option effects VSS, ECT and IAT.

Mode 1 Line 1 sensor selection.

Mode 1 Line 2 sensor selection.

Shift Light Output type - Shift Light (On/Off signal) or Auto Timer - 1 minute to 9 minutes.

Shift Light RPM setting - increments by 100 rpm from 3,000 to 9,900 (this menu option is skipped over if the Auto Timer function is selected).

Vehicle Speed Correction - 75% to 150%.

External Sensor - None, LC-1, AP1 or EGT1

O2 Sensor Display - Voltage or A/F ratio (Honda LEV-II or Innovate! LC-1)

LC-1 Calibration (this option is only available if the External Sensor is set to "LC-1").

MAP/MAF sensor display - MAP or MAF (if only one sensor type is present, then you cannot change this selection).

MAP Units - kPa or psi (only available if "MAP" is selected in previous menu).

ECT Alarm - 70C to 125C in 5C increments (value shown is converted to F when "English Units" is selected in the first menu option).

Engine Size - Liters (only available if "MAP" is selected in previous menu).

Fuel Rate - lbs/hr or cc/min

Fuel Weight

LT AVG (Long Term Average)

Stored DTCs

DTC status (this menu option is skipped over if no DTCs are found).

## Shift Light

The shift light illuminates whenever the engine rpm is above the RPM setting. The R920 must be in a screen mode with RPM in order for this option to work. The shift light output is intended to be used with the SL1 or SL3 LED shift light or AT1 Auto Timer.

## **Acceleration Timer**

The acceleration timer is active in screen mode 9. This screen mode is only available if the Acceleration Timer module (AM1) is installed. The timer is completely automatic. The timer resets when the vehicle speed is at 0. The vehicle must be stopped for about a second before the timer is ready, at which time an "R" will be displayed in the upper rightmost position of the display. The timer starts as soon as the vehicle starts moving and stops at either 60 mph or 100 km/h. The value is then displayed in seconds and tenths of a second. This value will continue to be displayed until the vehicle comes to a complete stop, at which time it will be reset. The timer is exceptionally accurate and very repeatable (within a tenth of a second), however it's "true" accuracy cannot be guaranteed due to variations in tire diameter and speed sensor gearing.

## **Stored DTC's**

If there are no DTC's stored, then 0 is displayed. If there are DTC's stored in the ECU, then the number of DTC's is displayed on the first line and "Retrieve DTC's?" is displayed on the second line. Pressing the MODE/INC button will retrieve the DTC's and display them. Up to 6 DTC's will be displayed.

## **Clear DTC's**

If there are DTC's stored in the ECU, then pressing the OPTION button will display this screen. "Clear DTC's?" is displayed. Pressing the MODE/INC button will clear the DTC's. After the DTC's have been cleared, then "DTC's Cleared" is displayed. Pressing the OPTION button exits the Option Menu.

## **ECT Alarm**

The ECT Alarm is active whenever the ECT value is displayed. The ECT value will blink whenever the alarm setting is exceeded. The setting is adjusted in 5C increments from 70C to 125C. However, when "English Units" is selected, the actual displayed value is in F, so the value increments from 158F to 257F.

## **Fuel Economy**

The R920 can calculate and display instant economy and average economy. The economy is derived from the engine air flow divided by the A/F ratio. Economy is displayed in screen mode 7. The top line on the LCD display shows the vehicle speed (VSS) and the instant economy (MPG or KPL) and the second line shows average economy (AVG) and long term average (LT AVG). The average is updated approximately every 30 seconds and is a running average. The average value is not updated while the vehicle speed is 0. The long term average is updated approximately every 10 minutes. To reset the Long Term Average, you must enter the Option Menu. Step through the options until "LT AVG" is displayed and press the MODE/INC button. If the R920 is unplugged, both average values will reset to 0. Fuel economy calculations are based on an average fuel weight. This fuel weight will fluctuate based on temperature. The fuel weight that the R920 uses can be adjusted for greater accuracy. To adjust the fuel weight, step through the Option Menu until "Fuel Weight" is displayed. Pressing the MODE/INC button will increment the weight by 1 gram. The range is 2500 to 3100 grams if in English mode or 500 to 1000 grams in Metric mode. This represents either 1 gallon or 1 liter of fuel. Economy is displayed in miles per gallon (MPG) for English mode and kilometers per liter (KPL) for Metric mode. If the vehicle has a standard oxygen sensor, then "E" will precede the "MPG" or "KPL". This is because the A/F ratio is assumed to be 14.7:1, thus resulting in an Estimated fuel economy. If the vehicle has a wideband oxygen sensor, then the "E" will not appear. This means that the calculation is based on the actual A/F ratio and will be extremely accurate... even at wide open throttle. If the Menu Option for engine size appears, then the engine size must be entered in order for the economy calculation to be accurate.

## Fuel Rate

The fuel rate is displayed in screen mode 8. This can be viewed as either lbs/hr or cc/min. This rate is calculated by dividing the engine air flow by the A/F ratio. This value will always be accurate in closed loop driving, however for accuracy in open loop (WOT) then the vehicle must have a wideband oxygen sensor. This value is total consumption, so to figure out how much fuel each injector is flowing, then simply divide the value by the number of injectors.

## Vehicle Speed Correction

The vehicle speed (VSS) can be corrected by entering a percent change. The range is 75% to 150%. If a smaller than stock tire is used then a % less than 100 is needed. If a tire larger than stock is used, then a % greater than 100 is needed. To calculate the tire diameter % difference, used this formula:

$$(\text{new tire diameter}) / (\text{stock tire diameter}) * 100$$

*example:*  $35 / 31 * 100 = 113$  (round to nearest whole number)

To calculate gear ratio % difference, use this formula:

$$(\text{stock gear ratio}) / (\text{new gear ratio}) * 100$$

*example:*  $3.73 / 4.10 * 100 = 91$  (round to nearest whole number)

The speed displayed on the R920 will be corrected, however the vehicle speedo will still be off.

## External Sensor

The R920 has 1 input from an external sensor. The available sensors are LC-1, AP1 and EGT1. To select an external sensor, press the Option button and scroll through the options until you reach the external sensor selection. None, A/F - LC-1, MAP - AP1 or EGT1 can be selected. When the LC-1 is selected, the next menu option allows the LC-1 to be selected for the O2 display. When this is selected, the next menu option allows the "free-air" sensor calibration. This menu option will also report the status of the sensor by illuminating a full block on the display. This block will blink if there is an error with the LC-1. Consult the LC-1 manual for more information. This is an analog input and can also be used with the PLX SM-AFR. When the AP1 is selected, then the MAP/MAF option allows the MAP to be selected if the vehicle only has a MAF sensor. The AP1 will always be the source of MAP data when it is selected as the external sensor. When the EGT1 is selected, the exhaust gas temperature can be monitored. The EGT reading is only available in screen mode 1.

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At it's option, Brockway Engineering, LLC will repair or replace the defective product.