

## **ECM AFRecorder Series (Fast Air-Fuel Ratio Analyzers) Serial Port Programming Interface - Summary**

Model 2000, 2400, and 4800 AFRecorders may be operated under remote control using a standard RS232 serial port. The interface is bi-directional. Using simple commands, the remote computer can individually download all of the AFRecorder setup parameters. Some examples of these setup parameters are the H:C, O:C and N:C ratios of the current fuel, the analog output ranges and the sensor calibration constants. Data retrieval options include two kinds of real-time data upload at programmable intervals.

The interface description is provided free of charge to any owner of an AFRecorder who wishes to integrate the unit into a data acquisition system. In addition, a PC program is included with each AFRecorder which uses the interface to allow downloading of setup parameters and real-time display of AFRecorder measurements.

To initiate remote control of the AFRecorder, a command is issued over the serial port. No operations using the front panel are necessary. The external computer may take control of the AFRecorder at any time.

The AFRecorder stores setup and calibration data either as one byte "selections" or as four byte floating point "constants". An example of a "selection" is the choice of AFR units (1 = AFR, 2 = Phi, 3 = Lambda, 4 = %O<sub>2</sub>). The "constants" are values such as the H:C ratio of the fuel. Changing these parameters using the external computer is equivalent to changing them using the front panel keypad. The new parameter values are retained by the AFRecorder even if the power is turned off. The values may be altered by the external computer, one at a time, using simple command strings along with the new value.

As an example, the command sequence below could be used to set the H:C ratio of the fuel:

<five byte header> <index> <four byte value> <two byte checksum>.

This command consists of a header, an index, the four byte floating point value and a two byte checksum. A total of 12 bytes are sent. A list of the indices and their corresponding parameters is included in the complete interface programming description. The AFRecorder sends acknowledge values indicating success or failure of the transmission based on the checksum.

Real-time data is sent to the PC as <four byte header> <data value(s)> <two byte checksum>. The standard AFRecorder interface code allows continuous (not polled) upload of either averaged or non-averaged data to the PC at a programmable interval, and sends the data to the PC in four byte floating point format. The upload rate can be as fast as 10Hz.

No-charge options are available to allow polled data upload for systems where continuous data upload from the AFRecorder is not desired, and other data upload formats such as scaled integer or string data. This interface has been used successfully by numerous system integrators over the last several years.