21X Instruction Set Options

OSX-0.1, -1.1, and -2.1

The customer selects one of three OSX PROM options (OSX-0.1, OSX-1.1, or OSX-2.1) at no charge; each option contains the standard set of instructions plus additional, optional instructions. Differences in the three options are listed below:

Instructions	OSX-0.1 (default)	OSX-1.1	OSX-2.1
23 Burst Mode		X	X
60 Fast Fourier Transform			X
62 Covariance/Correlation	X		
81 "Rainflow" Histogram		X	
97 Initiate Telecommunications	X		
98 Send Character	X		
101-104 SDM Instructions	X	X	
*C Security	X		

The selected option must be specified at time of purchase; otherwise, the OSX-0.1 (default) PROM is installed. If a subsequent change in the instruction set is desired, the PROMs may be replaced by the user or at the factory.

Instruction 23 - Burst Mode

Burst Mode increases the speed of the 21X sample rate; one channel is sampled at a maximum rate of 1030 Hz (once every 0.97 ms). The number of samples taken is limited by available memory. Instruction 23 makes voltage measurements on a series of single-ended or differential channels, with or without excitation.

Instruction 60 - Fast Fourier Transform (FFT)

The FFT is used to obtain the frequencies, relative magnitudes, and phases of various frequency components in a time varying signal. Instruction 60 performs an FFT on a set of data contained in contiguous Input Storage Locations.

Instruction 62 - Covariance/Correlation

This instruction calculates means, variances, standard deviations, covariances, and correlations for a set of input values and stores the results in Input Storage.

Instruction 81 - "Rainflow" Histogram

The "Rainflow" Histogram uses strain measurements to estimate cumulative fatigue. Output is a histogram in which closed stress/strain hysteresis loops are counted by amplitude ranges.

Instruction 97 - Initiate Telecommunications

Instruction 97 allows the 21X to initiate telecommunications based on user-defined conditions. Consult Campbell Scientific for acceptable telecommunications links.

Instruction 98 - Send Character

Instruction 98 is used to send an ASCII character to the 21X Serial I/O.

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SDM Peripherals

Synchronous Devices for Measurement (SDMs) are a class of measurement/control expansion peripherals that communicate with the 21X through control ports 1-3 and analog channel 1H.

Measurement instructions 101, 102, 103, and 104 allow use of the SDM's.

Instr.	Device	Description
101	SDM-INT8	8 Channel Interval Timer
102	SDM-SW8A	8 Channel Switch Closure Module
103	SDM-AO4	4 Channel Analog Output Module
104	SDM-CD16	16 Channel Control Port Module

*C - Security

Security is a password controlled system that blocks access to the datalogger's program.

Changes and Features

The following were implemented with the .1 PROM release:

Wind Vector

Wind vector now includes the options of sub-interval averaging and calculating the standard deviation of horizontal wind direction using the EPA-recommended Yamartino algorithm.

Arctangent

Computes the arctan of X/Y where X and Y are values stored in Input Locations.

Case Statement

The Case Statement is used to compare a value in an Input Location with a sequence of increasing fixed values. When the value in the Input Location is less than a fixed value, a command is executed and the remaining comparisons are skipped.

SM192 and SM716 Storage Modules

The 21X can automatically load a program from the Storage Module if connected on power-up; *D can be used to save, load or clear programs to/from the Storage Module. Instruction 96 now suspends data transfer if the Storage Module is disconnected. Program-controlled filemarks can be sent to the Storage Module.

Output Year, Previous Day and 2400 Hours at Midnight

Instruction 77 now has the option of outputting year in addition to day, hour:minute, and second. A new output option allows the datalogger to output data tagged with the date before midnight instead of the date after midnight.

Redirect Output To Input Storage

Instruction 80 is used to redirect the results of Output Instructions to Input Storage or to assign IDs to Output Arrays.