PROGRAMS CONTAINED IN THE STANDARD CR21 APPLICATIONS PROM

The input and output processing capabilities of the CR21 are determined by the programs contained in the Applications Programmable Read Only Memory (PROM). The following is a brief description of the programs contained in the standard applications PROM (# 266).

INPUT PROGRAMS

PGM. NO.	DESCRIPTION
1	Volt Range DC Input
2	Millivolt Range DC Input
3	Volt Range DC Input with 2 Volt DC Excitation
4	Millivolt Range DC Input with 2 Volt DC Excitation
5	Volt Range with AC EXcitation and Demodulation on Channels 5, 6 and 7 for AC Resistance Measurements
6	Pulse Counting for Channels 8 and 9
7	101 Probe Temperature for -35 to +50 Deg. C range
8	201 Probe Relative Humidity with Compensation Temperature measured on Channel 4 only
9	201 Probe Relative Hunidity with Compensation Temperature measured on Channel 2, 3 or 4
10	102 Probe Temperature for 5 to 95 Deg. C range

OUTPUT PROGRAMS

PGM. NO.	DESCRIPTION
50	SAMPLE: Outputs the sensor reading taken at the end of the output interval.
51	AVERAGE: Outputs the average of the sensor readings taken during the output interval.
52	TOTALIZE: Outputs the sum of the sensor readings taken during the output interval.
53	MAXIMIZE, TIME OF MAX: Outputs the highest sensor reading taken during the output interval and, optionally, the time of occurrence.
54	MINIMIZE, TIME OF MIN: Outputs the lowest sensor reading taken during the output interval and, optionally, the time of occurrence.
55	HISTOGRAM: Outputs the fraction of the output interval that the sensor reading was within each of a specified number of contiguous sub-ranges. An option allows weighting of each output by any reading from a second sensor which occurs when the range sensor is within the corresponding sub-range, e.g., wind direction histogram weighted by wind speed to obtain a wind rose.
56	WIND VECTOR: Uses data from a wind speed channel and a wind direction channel (0 to 360 deg.) to compute and output average wind speed, mean wind vector magnitude, mean wind vector direction, and standard deviation of direction.
57	EVENT COUNTER: This is a conditional output for channel 8 or 9 that records the time and number of counts occurring over a user selected time interval. If no counts occur, no output is generated.
58 & 59	SET POINT CONTROLLER: Sets an output port high when the reading from a channel reaches or exceeds the user entered upper limit and resets it to a low state when the reading is below the user entered lower limit.
60	TIMED PORT TURN ON: Sets an output port high when the time until the next output is less than the user entered time interval. Generally used for sensor warm–up before sampling.
61	STANDARD DEVIATION: Outputs the standard deviation of the sensor readings taken during the output interval.
62	FIXED DATA: Outputs the user entered number at each output time. Normally used for station ID.
63	TIME OF INPUT PORT CHANGE: Outputs the status and the time when an input port changes state.
64	FAST OUTPUT (10, 20 or 30 Sec.): Used only with CR21's capable of 10 second input scan intervals to allow outputs more frequent than once per minute.
65	CONDITIONAL OUTPUT: Causes outputs from all remaining programs in a given output table to be generated at a faster (user entered) rage only when input port 1 is high.
66	INTERMEDIATE X – Y: Outputs the average of X – Y where X and Y are input channels. As an option, either X or Y can be an integer constant. If X – Y is negative, 0 is used for the value to be averaged. Also, the result of X – Y is left in channel 11†.
67	INTERMEDIATE PORT STATUS: Outputs the fraction of the output interval that an input port was high. Also leaves a 1 (input port high) or 0 (input port low) in channel 10†.
68	INTERMEDIATE X * Y: Outputs the average of X times Y where X and Y are input channels. Also, leaves the result in channel 10†.
69	INTERMEDIATE X/Y: Outputs the average of X divided by Y where X and Y are input scan values. Also, leaves the result in channel 11†.
70	AVERAGE CUBED WIND: Outputs the average of the cube of the wind speed samples.
71	VAPOR PRESSURE/VAPOR PRESSURE DEFICIT: Outputs average vapor pressure and/or deficit in kilo pascals derived from instantaneously read values of air temperature and percent relative humidity.
72 & 73	GROWING DEGREE DAYS: Outputs growing degree days based on proportional contribution above a lower threshold and a fixed contribution above an upper threshold. Thresholds are user selected.
*D	MANUAL SCAN: Outputs a user entered ID number, time, and sampled data from the 7 analog channels upon keyboard command.

†Internal storage locations which can be viewed as input channels to be processed by subesquent output programs.

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CAMPBELL SCIENTIFIC, INC.
P.O. Box 551 • Logan, Utah 84321 • (801) 753-2342 • TLX 453058

CR21 CASSETTE TAPE FORMAT OPTIONS

The CR21 and CR21L Microloggers write data to tape in either Format I or Format II. At time of purchase, it is IMPERATIVE that the user specify which format is desired.

FORMAT I data is written to tape in an ASCII format and up to 8,000 data points can be stored on one side of a 60 minute cassette tape. *FORMAT II* utilizes a BINARY format and up to 180,000 data points can be stored on one side of a 60 minute tape.

A cassette-computer interface is required for tape playback and transfer of data to a computer file. CSI currently produces the C20 Cassette Interface which is capable of reading either Format I or II. Moreover, the C20 uses a sophisticated error detection and correction technique while reading tapes generated in Format II. The old A235 Interface, which CSI no longer makes, will read Format I only. Thus, if users already have an A235 and want to purchase additional CR21's, they must specify the Format I tape option to maintain compatibility. Alternatively, A235 owners may elect to purchase a C20 and return the older version Format I CR21 dataloggers to the Factory for conversion to Format II at a nominal charge.

If no format option is specified, the user will automatically receive Format II.

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