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CR10X Data Collection Program
Version 530.02
9/10/2005

CR10X data collection program version 530.02 is a Starband telemetry Wind Station data collection system, using a RM Young 05103 wind sensor, storage precipitation, YSI 44211 air temperature, solar radiation and barometric pressure.

This program has a normal sensor update rate of 10 seconds, and produces a quarter-hourly data table, and an hourly data table. This program will only run on the CR10X with Table Data operating system. Data is retrieved with LoggerNet, over the Starband data network.

Special Features

This program has several special features which will allow it to be used in multiple data sites without revision. These features, however, require some attention and manipulation by the installation and service technicians.

❑ A multiplier and offset may be applied to the storage precipitation sensor, allowing several different sensor types to be utilized.
❑ A numeric value may entered which will serve as a site identifier. This will help to ensure that data records are never transposed among the various sites.

Site and sensor variables are initialized to default values when the program first loaded into the CR10X, and whenever a new program (DLD file) is sent to the CR10X. The technician should always verify that the variables are acceptable before leaving the site.

All variables are simply CR10X Input locations, which may be modified by right clicking, then editing each variable on the NUMERIC DISPLAY in LoggerNet.

Sensor Configuration

This version expects the following sensor configuration:

SENSOR	INPUT	EXITATION	XTROL	SENSOR MODEL
Storage precipitation	SE4	Sw12V	C1	transducer
Solar Radiation	DIFF4			LI1200X
Air Temperature	SE2	E2		YSI 44211
Wind Speed	P1			RM Young 05103
Wind Direction	SE1	E1		
Barometric Pressure	SE3		C7	Vaisala

Control Port Usage

CONTROL	FUNCTION
C1	Connected to SW12V Ctrl to turn on the sensors
C7	Barometer control

Data Tables

Querter-hourly data table   Label: quarterHour
This table is posted every 15 minutes, and is intended to populate the UAF data archive.

Field	Parameter
1	Site battery, current value in Volts
2	Storage Precipitation, quarter-hour average value in inches
3	Air Temperature, current value in degrees F
4	Barometric Pressure, current value in millibars
5	Solar Radiation, quarter-hour average
6	Wind Speed, quarter-hour maximum in MPH
7	Wind Speed, quarter-hour average in MPH
8	Wind Direction, quarter-hour average, degrees North
9	Wind Direction, quarter-hour standard deviation in degrees

Hourly data table   Label: Hourly
This table is posted at the end of each hour, and is used to populate the AKSNOW database

Field	Parameter
1	Site ID
2	Program ID – 530.02 for this revision
3	Precip Mulitplier
4	Precip Offset
5	Battery
6	Storage precip hourly average
7	Current Air Temp
8	Current Barometric Pressure in millibars
9	Solar Radiation hourly average in watts per sq meter
10	Wind Speed hourly maximum
11	Wind Speed hourly average
12	Wind Direction hourly average
13	Wind Direction hourly std deviation
14	Max Air Temp from previous 24 hours
15	Min Air Temp from previous 24 hours
16	Avg Air temp from previous 24 hours
17	Max Solar Radiation from previus 24 hours
18	Max Wind speed from previous 24 hours
19	Wind Speed average from previous 24 hours
20	Wind Direction average from previous 24 hours
21	Wind Direction std deviation from previous 24 hours

Setting the Site ID Variable

This program saves an Input Storage Location variable called **SiteID** in the data summaries to help eliminate the possibility of confusing data records among the various data sites.   To adjust the SiteID, simply **right click** then edit the location on the Numeric Display. The new SiteID will then be included in all subsequent data summaries.

Setting Snow and Precip Parameters

The Snow and Precip transducer sensors may be one of several types. When installing a new sensor, first verify that the sensor you are installing is compatible with the existing wiring scheme in use at the site. A couple of things to consider:

- What is the sensor's output? If the sensor's output is 0-5VDC, then a 2:1 voltage divider should be used, or the multiplier and offset should be calculated accordingly. Better resolution may be obtained if the sensor can be used without a voltage divider. If the sensor's output is 4-20ma, then a termination resistor should be used at the CR10X.
- What is the sensor's excitation requirement? If the sensor requires an excitation voltage other than 12VDC or 0-2500mv, some voltage conversion method should be used.

When changing a sensor, you must edit two input locations. For snow water, the locations are named SnowMult and SnowOff. For storage precip, the locations are named PrecMult and PrecOff. Edit the locations according to this table:

Sensor	Mult	Offset	Comment
0-50" Sensotech or Halpern	0.02	0.0	
0-100" Sensotech or Halpern	0.04	0.0	
0-200" Sensotech or Halpern	0.08	0.0	
100" Druck PMP 317 used with 2:1 divider	0.04	-1.0	Range is 0-100'
100" Druck PMP 317 used w/o 2:1 divider	0.02	-1.0	Range is 0-50"
200" Druck PMP 317 used with 2:1 divider	0.08	-2.0	Range is 0-200"
200" Druck PMP 317 used w/o 2:1 divider	0.04	-2.0	Range is 0-100"
0-69" Druck	0.0308	-7.7	

Note: The Druck PMP317 transducers are calibrated by NWCC personnel. The table above assumes 0" equals 50 millivolts, and full scale equals 5050 millivolts. If this is not the case for your transducer, you may have to calculate the multiplier and offset. Use the following general formulae:

$$\text{Mult} = fs / 5000$$

Where fs is full scale value in inches ie: 100", 200"

$$\text{Offset} = 50 * \text{mult}$$

If these variables are set correctly, the Numeric Display tab should display the actual head on the transducers at the following Input Storage Locations:

SnowWater for the snow water sensor
StgPrecip for the storage precip sensor

Note: If either the snow or precipitation sensor is not used, set its multiplier to 0, and its offset to –99.9. This will force the CR10X to record –99.9 values for the non-existent sensor.

Sensor Sanity Check

The following Input Storage Location variables represent what should be reasonable sensor values. The technician should verify that these sensor values makes sense before departing the site.

V_battery	The site's 12V battery supply
StgPrecip	The inches of head above the precip transducer.
AirTemp	The current air temperature
SolRad	The current Solar radiation value.
WindSp	The current Wind Speed (mph)
WindDir	The current wind direction (deg North)
P_mb	The current barometric pressure in millibars

Important: If these or other Input Storage Location variables are not displayed on the Numeric Display tab, they may be added to the Numeric display by clicking the **Add** button, then dragging them from the **Inloc List** window to the Numeric Display.

Other Important Input Locations

This program uses a number of CR10X Input Locations as temporary storage locations when calculating daily summary values All of these Input Locations are separated by function in memory, and each functional grouping is preceded by a single, unused location, which is named for the group functionality. You may observe these locations with LoggerNet, by adding the locations from the **InLoc List** window. Groupings are as follows:

Group Name	**Functional Description**
CurrentValues	Current sensor values – updated each time sensors are read
DailyValues	Daily calculated values – updated at midnight each day.
ProgInit	Program setup locations. – Edited by operator during initial setup. These locations are tuned to the individual site.