HydroLynx

5096/A2
Data Transmitter

Operating and Programming Manual

A102687-59

Receiving and Unpacking

Carefully unpack all components and compare to the packing list. Notify HydroLynx Systems immediately concerning any discrepancy. Inspect equipment to detect any damage that may have occurred during shipment. In the event of damage, any claim for loss must be filed immediately with the carrier by the consignee. If the equipment was shipped via Parcel Post or UPS, contact HydroLynx Systems for instructions.

Returns

If equipment is to be returned to the factory for any reason, call HydroLynx between 8:00 a.m. and 4:00 p.m. Pacific Time to request a Return Authorization Number (RA#). Include with the returned equipment a description of the problem and the name, address, and daytime phone number of the sender. Carefully pack the equipment to prevent damage during the return shipment. Call HydroLynx for packing instructions in the case of delicate or sensitive items. If packing facilities are not available, take the equipment to the nearest Post Office, UPS, or other freight service and obtain assistance with packaging. Please write the RA# on the outside of the box.

Warranty

HydroLynx Systems warrants that its products are free from defects in material and workmanship under normal use and service for a period of one year from the date of shipment from the factory. HydroLynx Systems' obligations under this warranty are limited to, at HydroLynx's option: (I) replacing; or (ii) repairing; any product determined to be defective. In no case shall HydroLynx Systems' liability exceed product's original purchase price. This warranty does not apply to any equipment that has been repaired or altered, except by HydroLynx Systems, or that has been subjected to misuse, negligence, or accident. It is expressly agreed that this warranty will be in lieu of all warranties of fitness and in lieu of the warranty of merchantability.

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Table of Contents

1 Introduction
1.1 Organization of the Manual

This manual describes the HydroLynx Systems ALERT Data Transmitter Model 5096/A2. There are six sections of the manual containing information related to a specific function or aspect of the 5096/A2 Data Transmitter:

Introduction

The Introduction describes the manual organization to help the reader in understanding how the information is presented. It also provides a general description of the 5096/A2 Data Transmitter and the data transmitter specifications.

Set Up and Installation

This section contains the information needed for the initial set up of the system software and hardware installation. It provides instructions on how to set up the user's personal computer for use with the 5096/A2 Data Transmitter. Also provided are instructions for the 5096/A2 Data Transmitter software set up, hardware installation, wiring, and power connections.

Hardware Inputs and Outputs

This section describes the sensor inputs, the Data Transmitter board features and Communication outputs.

Programming

This section describes how to program the 5096/A2 Data Transmitter. It also lists the 5096/A2 Data Transmitter software commands and their parameters in detail.

Maintenance, Testing and Troubleshooting

This section provides information to help the user in locating and resolving problems often encountered during initial system start-up. It also provides the maintenance requirements for maximizing the life and operating cycle of the 5096/A2 Data Transmitter.

Appendix

This section provides listings of programming commands, command functional groupings and command parameters. It also provides assembly and wiring diagrams, and reports to help in the installation, use, and repair of the 5096/A2 Data Transmitter.

1.2 Description of the 5096/A2 Data Transmitter

The 5096/A2 Data Transmitter collects, processes, and transmits analog, digital and serial interface sensor data on events and timed intervals. The collection, processing and transmission of sensor data is controlled by parameters that are easily programmed using a terminal or computer with standard communications software. Communications with the 5096/A2 is through an RS232 port.

Real-time data is transmitted by radio using the ALERT2 encoder PCB. The ALERT2 encoder PCB provides GPS time to set the transmitter time. ALERT2 transmissions use TDMA (Time division multiple access) to control when the transmitter can transmit to avoid radio data collision.

The 5096/A2 Data Transmitter features on board data logging capabilities. Data can be down loaded using a portable computer during on-site visits.

1.2.1 Programmable Features

System Commands

- Read the GPS time
- Set the system time
- Set the analog sensor warmup time
- Align sensor sample and transmit timers
- Initialize parameters
- Reset the transmitter

Communication Set Up Commands

- Set the ALERT2 AirLink parameters for radio types
- Set the ALERT2 MANT (network) parameters for repeaters
- Set the ALERT2 TDMA parameters for transmit time slot
- Set the ALERT2 source address (station ID)

Sensor Set Up Commands

- Set the sensor modes
- Set the sample and transmit time intervals
- Set the change required and threshold to transmit events and samples
- Set the calibration coefficients and decimal digits displayed
- Set the ALERT2 sensor ID
- Set the ALERT2 report type (GSR, TBR, MSR, MMR)
- Read and display raw and calibrated sensor values
- Set counter sensor values and reset times

Data Logging Commands

- Enable or disable data logging
- Select logging memory full action
- Display logged data
- Show logging memory usage
- Clear logging memory

Test and Maintenance Commands

- Enable test mode
- Set test mode timer
- Test command to perform level 1 or 2 test
- Read sensor values
- Initiate RF transmission with and without tone
- Control analog power
- Display and clear Reset counter

1.2.2 Other Features

Low Power, Battery Operated

- Uses low power CMOS circuitry
- Power down mode for low power consumption during stand-by
- Solar panel or AC charger to maintain battery voltage

Real-time Data Transmission

- Real-time data is sent to the base station computer for immediate processing
- Transmission can be generated by an event or timed interval
- ALERT2 format supports integer or floating point finished data
- Wind speed and peak wind data computed
- GPS time status transmitted

Data Logging

- Sensor data reports are logged in battery-backed memory
- Logged data can be down loaded into a portable computer on site
- Allows for stand-alone data logging or as a backup for transmitted data
- Up to 4000 event data points or 12000 timed data points are logged

1.3 Specifications for the 9601 Board

The 9601 board is included in both the 5096/A2 and the 5096/A2-N packages.

Environment:

Operating temperature:	-40 to 65 degrees Celsius
Storage temperature:	-60 to 75 degrees Celsius
Operating humidity:	0 to 100 RH, non-condensing

Circuit Board:

Memory size:	96 Kbytes CMOS EPROM - 64 Kbytes CMOS RAM - 32 Kbytes, Battery backed
Manual Controls:	Reset switch Test switch Station ID switches
Diagnostic LEDs:	Test Error LED Power Error LED Sensor Power LED TX-on LED Test LED Run LED
Current draw:	< 300 micro Amps (120 typical)
Supply Voltage:	10.5 to 18.0 Vdc (12.2 to 14.5 Vdc Battery with Radio)
Serial baud rate:	9600
Radio baud rate:	4800
CPU type:	80C196 (5MHz)
Clock:	GPS time synchronized clock

Digital Inputs

2 up/down channels: Up to 100 event triggers/second
2 up only channels: Up to 100 event triggers/second
8 status channels: Binary inputs

Analog Inputs

8 analog channels (10 bit resolution with +/- 0.24% non-linearity error)
7 channels (0-5 VDC)
1 channel (battery voltage)

4 Supply voltages:	Vbatt (12 VDC nominal)	non-switched
	+5 VDC	non-switched
	Vsw (12 VDC nominal)	switched
	Vref (+5 VDC)	switched

GPS Input

1 GPS status	GPS time synchronization status

Input programming

All channels:	ALERT2 sensor ID ALERT2 report format: GSR, TBR, MSR, MMR Transmit time interval, no change required to transmit Sample time interval Change required to transmit an event or sample Threshold required to transmit an event or sample Calibration coefficients Decimal digits displayed
Analog inputs:	Trim calibrated data to be greater or equal to transmit threshold
Up/down, Up only:	Enable/disable event status
Up/down:	Increment/decrement mode Accumulator reset time
Up only:	Wind speed computed Pre-divide counter

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1.4 Specifications for the 5096

The 5096/A2 is housed within an 8 inch diameter aluminum canister and is designed to fit inside HydroLynx Systems stand pipes used on most HydroLynx Systems weather stations. The 5096/A2 is generally equipped with a radio and is primarily used in remote flood warning telemetry applications.

Enclosure:

Type:	Aluminum canister
Size:	8 inch diameter x 23 in high
Weight:	19 lbs (with battery)
Shipping weight:	12 lbs (Battery shipped separately)
Sensor inputs:	Keyed MS Male connectors

Sensor Inputs for Station Packages:

Package	Sensor Inputs
5096/A2-54	1 Precipitation digital input, Battery voltage, GPS time status
5096/A2-90	1 Precipitation digital, 1 Water level digital input, 2 Water level analog inputs, Battery voltage, GPS time status
5096/A2-81	1 Precipitation digital, 1 Water level digital, 1 Wind speed digital, 1 Counter digital, 7 Analog inputs, Battery voltage, GPS time status
5096/A2-ST	8 Digital status inputs (10 pin MS Female connector)

Power:

Battery:	12 Vdc, 9.5 Amp-hour rechargeable gel cell battery, optionally maintained by an AC charger or solar panel.
External connector:	3 pin MS Male Connector

Signal Outputs:

Radio Antenna:	BNC female bulkhead
GPS Antenna:	SMA female bulkhead
Serial Console:	9 pin D-type RS232C Female mounted on circuit board
5096-RS232:	7 pin MS male bulkhead connector (optional)

1.5 Specifications for the 5096/A2-N

The 5096/A2-N is the 5096/A2 circuit board mounted into a NEMA type 4X fiberglass enclosure. The 5096/A2-N is designed for outdoor mounting onto a panel or a mast. The 5096/A2-N can be equipped with a radio and used as part of a telemetry system, or it can be used as a data logger.

Enclosure:

Type:	NEMA type 4X fiberglass
Size:	15 ½" X 13 ½" X 6 ½" NEMA enclosure Type 4X
Weight:	16 lb (with battery)
Shipping weight:	12 lbs (Battery shipped separately)
Sensor inputs:	Case is provided with 7 cable strain reliefs.

Sensor Inputs for Station Package:

Connections:	Screw Terminal Interconnect PCB. MS Connector Package (optional)

Package	Sensor Inputs
5096/A2-N	4 digital, 7 analog, and 8 digital status inputs, Battery voltage, GPS time status

Power:

Battery:	12 Vdc, 7 Amp-hour rechargeable gel cell battery, optionally maintained by an AC charger or solar panel.
External connector:	3 pin MS Male Connector

Signal Outputs:

Radio Antenna:	N-type female lightning arrester
GPS Antenna:	SMA female bulkhead
Serial Console:	9 pin D-type RS232C Female mounted on circuit board
5096-RS232:	7 pin MS male bulkhead connector (optional)

2 Set Up and Installation
2.1 Introduction to Software Set Up

This section describes the initial steps to set up your 5096/A2 Data Transmitter programmable features. This includes console set up and communication verification, station ID set up, ALERT2 parameter setup, system and sensor parameter set up, and data logging set up.

Also included in this section are the commands used after installation for testing and maintenance, and logged data retrieval.

2.1.1 Operator's Console Set Up

The operator's console is the primary means for communicating with the 5096/A2 Data Transmitter. From the console, the operator can display, modify and log to disk all system parameters. Data stored in the 5096/A2 Data Transmitter logging memory can be down loaded, displayed and logged to disk on the console.

The console can be a notebook or desktop computer which uses any terminal emulation software.

The console is connected to the 5096/A2 Data Transmitter console port bracket or top plate RS232 7 pin MS connector.

Connect to the console port bracket with a custom serial cable HydroLynx Systems Model 5071C-5096-1. See the Console RS232 Internal Cable, DB9F to DB9M drawing AC104020 in Section 6.2.

Connect to the top plate RS232 7 pin MS connector with custom serial cable HydroLynx Systems Model 5071C-5096-4. See the Console RS232 External Cable, DB9F to MS7 drawing AC104021 in Section 6.2.

The default baud rate used by the 5096/A2 is 9600. In addition to the baud rate the following RS-232 protocol settings must be used:

No Parity
8 Data bits
1 Stop bit

To start communication with the 5096/A2 Data Transmitter from your computer console:

1. Start the communication software on your console computer.

2. Connect your console computer to the 5096/A2 Data Transmitter RS232 internal or external console port. If the 5096/A2 Data Transmitter is powered up, the RUN LED will turn on.

3. Verify the proper communication baud rate for your communication software.

4. 5096/A2 Data Transmitter power state:
5. 5096/A2 Data Transmitter was off.
   Power-up the 5096/A2 Data Transmitter. The 5096/A2 will follow its power up sequence checks, display the HydroLynx Systems copyright, the firmware part number, version number, release date and then display the **>**prompt.

6. 5096/A2 Data Transmitter was already on.
   Press the [Enter] key and the 5096/A2 should display the **>**prompt.

If you do not get the 5096/A2 **>**prompt:

1. Check all connections. Is your cable connected securely to both the 5096/A2 Data Transmitter RS232 internal or external port and the console serial port?

2. Check for connection to proper console serial port. Is you cable connected to the serial port set for your communication software (COM1, COM2, ...)?

3. Check serial communication parameters. Is your communication software set to 9600 baud, No parity, 8 Data bits, 1 Stop bit?

4. Check your cable. Are you using the correct type of cable? The HydroLynx Systems cable 5071C-5096-1 or 5071C-5096-4 will cause the 5096/A2 to turn on the RUN LED when it is connected to the 5096/A2 RS232 internal or external port regardless of whether or not it is connected to the console correctly. Disconnect the cable from your console and check if the RUN LED comes on. If it does, replace your cable.

5. Check your power, Level 1 test. When you power up the 5096/A2 Data Transmitter it will perform its power up sequence checks which turn on and off LEDs (see Section 5.2.1). If this power up sequence does not occur, check your power.

6. Check your sensors. Damaged or incorrect sensors or sensor connections can effect proper 5096/A2 Data Transmitter performance. Disconnect all sensors and try again.

2.1.2 Station ID Switches

Check to see that the ID switches are set to the correct station ID number. The default ID numbers for sensors are based on the station ID number.

The station ID is set in the ID switches with the least significant digit (ones) in switch ID0 and the highest significant digit (thousands) in switch ID3.

For example, to set a station ID of 1930, set the ID switches to:

ID3	to	1
ID2	to	9
ID1	to	3
ID0	to	0

Note that the ID switches support station ID numbers from 0 – 9999. However, the ALERT2 radio transmission format supports station ID numbers from 1 - 65534. Use the SET-STAID command to use station ID numbers greater than 9999.

2.1.3 Initial Parameter Set Up

There are a number of commands that are used to set up the 5096/A2 Data Transmitter parameters. The 5096/A2 firmware versions have default parameters set for the station package configuration (see Section 1.4 and 1.5). Only the station ID number and ALERT2 TDMA parameters must be set before the unit is installed. Sensor parameters can be changed for the sensors included in the station package. Commands effecting sensors not included in the station package are not available.

The programming sequence recommended to set up the 5069 parameters is provided below. Complete information on commands is provided in Command Descriptions, Section 4.7. Command Parameter Descriptions are provided in Section 4.8.

1. Initial Set Up

INIT	Initial Set Up - Sets all system and sensor parameters to their default values, and clears logging memory. You can hold down the TEST switch and press the RESET switch to execute the INIT command.

2. ALERT2 Set Up

SET-STAID	Set the station ID (ALERT2 source address).
SET-TDMA	Set the ALERT2 TDMA time frame, slot size, slot offset, slot delay, timed report offset.
SET-RF	Set the radio modulation to inverted for Maxon SD125E. Set the FEC type to 0=LDR, 1=MDR, or 2=HDR. Your repeaters and base station receivers must be HDR compatible to use FEC types above 0=LDR.
SET-MANT	Set repeater hop limit.
SET-A2	Send ALERT2 configuration parameters to ALERT2 encoder PCB.

3. System Set Up

SHOWALL	Display current system parameters.
SET-TZ	Set the time zone.
SET-TIME	Set the time in local time zone.
TEST-MODE	Set test mode timer.

4. Sensor Set Up

SET-AN	Program ANALOG sensors.
SET-WARM	Set the ANALOG warm time.
SET-BATT	Program the BATTERY sensor.
SET-EV	Program EVENT sensors.
SET-EVRESET	Program EVENT sensor reset time.
SET-CTR	Program COUNTER sensors.
SET-CTRRESET	Program COUNTER sensor reset time.
SET-WI	Program WIND sensors.
SET-PK	Program PEAK WIND sensors.
SET-ST	Program the STATUS sensor.
SET-GPS	Program GPS time status sensor.
WRITE-EV	Write EVENT sensor values.
WRITE-CTR	Write COUNTER sensor values.

5. Logging Set Up

SET-MEM	Enable data logging and overwriting when full.
CLEAR-MEM	Clear data logging memory.

2.1.4 After Installation Testing and Maintenance

1. Check sensors

READ-AN	Read ANALOG sensor values.
READ-EV	Read EVENT sensor accumulator values.
READ-BATT	Read the BATTERY voltage.
READ-WI	Read the WIND sensor values.
READ-PK	Read the PEAK WIND sensor values.
READ-ST	Read the STATUS sensor values.
READ-GPS	Read the GPS time and status.

2. Check station

READ-TIME	Red the GPS time and status.
RESETCNT	Read number of resets.
TEST	Start test mode and transmit sensor data

3. Down load data

GET-MEM	Down load data to console.
CLEAR-MEM	Clear data logging memory.

2.1.5 Down Load Logged Data

When visiting the site for any reason, make entries in your notebook's Data Sheets describing the purpose of the visit and everything done. An example Maintenance Report is provided in Section 6.2.

Down load data from the 5096/A2 Data Transmitter using the GET-MEM command before clearing the memory, or changing any parameters or replacing the battery (see Section 2.2.5). The READ command will show the current sensor values, not the logged data.

Connect the console to the 5096/A2 and verify communication as described in Section 2.1.1.

1. Verify readings

   READ-... Verify correct calibrated readings for sensors. You may want to adjust the logged data report values for any data reading errors.

2. Start logging

   Start logging on the console using the command sequence required for your software.

   Windows Terminal — On the *Transfer* menu pull-down select *Receive Text File...* and enter a file name.

   HyperTerminal — On the *Transfer* menu pull-down, select *Capture Text...* and enter a file name.

   TeraTerm — On the *File* menu pull-down, select *Log...*, select a folder to *Save in,* enter a file name, and click *Save*.

   PuTTY — Click on the upper left corner icon in the title bar, select *Change Settings…,* under *Session* select *Logging,* click *Printable output*, enter a file name, and click *Apply*.

   Enter a filename in which to store the logged data reports as they are displayed. Use a .txt file extension to simplify viewing the file later under Microsoft Windows. Enter filename that indicates the station and data retrieval time (month). For example at the Bigcreek gauge in April, create a file 'bigcreek-apr.txt'.

3. Down load data
4. Down load all data

   GET-MEM Down load data from the 5096/A2. All logged data reports are logged to the file as they are displayed. Logged data display starts with the oldest report logged.

5. Down load data for a sensor ID

   GET-MEM id — Down load data for one sensor by entering the sensor ID number after the GET-MEM command.

6. Down load data for a time period

   GET-MEM ,h1,.. — Down load data for a time period by entering the start and end time after the GET-MEM command. Enter start time as:

   h1,m1,YYY1,M1,D1,

   and end time as:

   h2,m2,YYY2,M2,D2

   If no sensor ID is entered, all sensor data for the time period is down loaded.

7. Stop logging

   Windows Terminal — On the *Transfer* menu pull-down select *Stop*.

   HyperTerminal — On the *Transfer* menu pull-down, select *Capture Text...* and *Stop*.

   TeraTerm — On the *File* menu pull-down, select *Show Log dialog...* and click *Close*.

   PuTTY — Click on the upper left corner icon in the title bar, select *Change Settings…,* under *Session* select *Logging,* click *None*, and click *Apply.*

8. Review file

   Display the contents of the logging file to verify that data was down loaded correctly. The 5096/A2 logged memory format is:

   # STAID ID YYYY MM DD HH MM SS DATA

   where:

   STAID = station ID
   ID = sensor ID
   YYYY MM DD = data report date
   HH MM SS = data report time
   DATA = data report value with decimal point

9. Clear memory

   CLEAR-MEM — Clear the 5096/A2 logging memory.

10. Change set up

    SET-... — Change sensor parameters if necessary.
    WRITE-... — Set accumulator values to new correct values if necessary.
    CLEAR-MEM — Clear the 5096/A2 logging memory again after aligning parameters.

2.1.6 Sensor Set Up

Version 5.0 and later have default sensor parameters set for standard data collection requirements. However, special data collection requirements or sensor configurations will require sensor parameter changes.

Sensor parameters used by all sensor types can be display by typing the command:

>**SET-AN ?**[Enter]
SET-AN sn,id,rpt,ti,si,cgt,txth,a,b,c,d

Type the command SET-AN 1 to display the current parameters for ANALOG 1. The parameters are displayed as:

ANALOG sn ID	: id
Report Type	: rpt
Transmit Intervl	: ti sec(s)
Sample Interval	: si sec(s)
Change to Txmit	: cgt
Txmit Threshold	: txth
Multiplier	: a
Divisor	: b
Base Value	: c
Display Digits	: d
Trim Enable	: trim

Name	Description	Range
sn	Sensor Number	1 to 8
id	Sensor ID	0 to 254
rpt	Report Type	0=GSR,1=TBR,2=MSR,3=MMR
ti	Transmit Intervl	0 to 2147483647
si	Sample Interval	0 to 2147483647
cgt	Change to Txmit	+XX.XX
txth	Txmit Threshold	+/-XX.XX
a	Multiplier	+/-XX.XX
b	Divider	+/-XX.XX
c	Adder	+/-XX.XX
d	Decimal Digits	0 to 9
trim	Trim Enable	0 to 1

Default parameter values depend on the sensor number and transmitter package type.

Sensor ID

The ALERT2 sensor ***id*** parameter identifies the sensor in the ALERT2 reports. The sensor ID range is 0 – 254. ID numbers 0 – 8 are reserved for the following sensor types:

ID	Sensor description	Type	Number
0	Rain gauge	EVENT	2
1	Air temperature	ANALOG	2
2	Relative humidity	ANALOG	1
3	Barometric pressure	ANALOG	4
4	Wind speed	WIND	1
5	Wind direction	ANALOG	7
6	Wind peak	PEAK	1
7	Water level	ANALOG	3
8	Battery	ANALOG	8

An additional to the reserved ID numbers, the following default ID numbers are used:

ID	Sensor description	Type	Number
9	Digital status	STATUS	1 to 8
10	GPS time sync	GPS	1
13	Second barometric pressure	ANALOG	4
14	Second wind speed	WIND	2
16	Second wind peak	PEAK	2
17	Second water level	ANALOG	5
27	Third water level	EVENT	1

ALERT2 Report Type

The ALERT2 report type used to encode data is set by the ***rpt*** parameter.

The GSR report type can be used by all sensors and does not limit the display digits.

The TBR report type can only be used by the tipping bucket sensor connect to EVENT 1 or 2. Tipping bucket tip time offsets are assembled in this special report type and are transmitted at the TDMA time slot. Only event reports use the TBR report type. Timed reports use the GSR report type to minimize the radio packet size.

The MSR and MMR report types can only be used by sensors with ID numbers from 1 to 8. The ID number determines the sensor type. MSR assumes English sensor units. MMR assumes metric sensor units. These report types compress the data transmitted but limit the data decimal digits.

rpt	Report type	Description
0	GSR	General sensor report
1	TBR	Tipping bucket report
2	MSR	English units multiple sensor report
3	MMR	Metric units multiple sensor report

MSR sensor IDs, description, transmit bytes, format, resolution and units are:

ID	Sensor description	Bytes	Format	Resolution	Units
1	Air temperature	2	Signed Integer	0.1	deg F
2	Relative humidity	1	Unsigned Integer	1	%
3	Barometric pressure	2	Unsigned Integer	0.1	hPa
4	Wind speed	1	Unsigned Integer	1	mph
5	Wind direction	2	Unsigned Integer	1	deg
6	Wind peak	1	Unsigned Integer	1	mph
7	Water level	2	Signed Integer	0.01	ft
8	Battery	1	Unsigned Integer	0.1	V

MMR sensor IDs, description, transmit bytes, format, resolution and units are:

ID	Sensor description	Bytes	Format	Resolution	Units
1	Air temperature	2	Signed Integer	0.1	deg C
2	Relative humidity	1	Unsigned Integer	1	%
3	Barometric pressure	2	Unsigned Integer	0.1	hPa
4	Wind speed	2	Unsigned Integer	1	kph
5	Wind direction	2	Unsigned Integer	1	deg
6	Wind peak	2	Unsigned Integer	1	kph
7	Water level	3	Signed Integer	0.001	m
8	Battery	1	Unsigned Integer	0.1	V

The following sensors have the default ***rpt*** parameter not set to 0 (GSR):

ID	*rpt*	Sensor description	Type	Number
0	1	Rain gauge	EVENT	2
1	2	Air temperature	ANALOG	2
2	2	Relative humidity	ANALOG	1
3	2	Barometric pressure	ANALOG	4
4	2	Wind speed	WIND	1
5	2	Wind direction	ANALOG	7
6	2	Wind peak	PEAK	1
7	2	Water level	ANALOG	3
8	2	Battery	ANALOG	8

Transmit Interval

On a timed interval the sensor **RAW** data is read, the **CAL** data is computed, and the data report transmitted regardless of any change in **CAL** data. The Txmit Threshold and **Change to Txmit** limits are ignored. The default transmit interval parameters, ***ti***, depend on the sensor and transmitter package type.

Type	Number	5096/A2-54	5096/A2-81	5096/A2-90	5096/A2-N
ANALOG	1	0	3600	0	0
ANALOG	2	0	3600	0	0
ANALOG	3	0	0	3600	0
ANALOG	4	0	3600	0	0

ANALOG	5	0	0	0	0
ANALOG	6	0	0	0	0
ANALOG	7	0	3600	0	0
ANALOG	8	3600	3600	3600	3600
EVENT	1	0	0	0	0
EVENT	2	3600	3600	3600	3600
PEAK	1	0	3600	0	0
PEAK	2	0	0	0	0
WIND	1	0	3600	0	0
WIND	2	0	0	0	0
STATUS	1 to 8	0	0	0	0
GPS	1	3600	3600	3600	3600

Sample Interval

On a sample interval the sensor **RAW** data is read, the **CAL** data is computed, and the data report transmitted if the **CAL** data is equal to or greater than the Txmit Threshold and has changed by the Change to Txmit limit since the last transmission. WIND and PEAK wind sensors do not transmit on the sample interval. Instead the sample **CAL** data is used to compute the average (WIND) or maximum (PEAK) wind speed over the transmit interval. The default sample interval parameters, ***si***, depend on the sensor and transmitter package type.

Type	**Number**	**5096/A2-54**	**5096/A2-81**	**5096/A2-90**	**5096/A2-N**
ANALOG	1	0	300	0	0
ANALOG	2	0	300	0	0
ANALOG	3	0	0	300	0
ANALOG	4	0	300	0	0
ANALOG	5	0	0	0	0
ANALOG	6	0	0	0	0
ANALOG	7	0	300	0	0
ANALOG	8	300	300	300	300
EVENT	1	0	0	0	0
EVENT	2	300	300	300	300
PEAK	1	0	10	0	0
PEAK	2	0	0	0	0
WIND	1	0	10	0	0
WIND	2	0	0	0	0
STATUS	1 to 8	0	0	0	0
GPS	1	300	300	300	300

Change to Transmit
Transmit Threshold

On an event or sample interval the sensor **RAW** data is read, the **CAL** data is computed, and the data report transmitted if the **CAL** data is equal to or greater than the Txmit Threshold, ***txth***, and has changed by the Change to Txmit, cgt, limit since the last

transmission. The **Txmit Threshold** only applies to ANALOG, STATUS, and GPS sensor types.

For ANALOG sensors, if the ***trim*** option is enabled, the **CAL** data is set to the Txmit Threshold, ***txth,*** if it is less than the threshold.

The default transmit limit parameters, ***cgt*** and ***txth***, depend on the sensor type.

Type	**Number**	***cgt***	***txth***
ANALOG	1	5	0
ANALOG	2	3	-40
ANALOG	3	.05	0
ANALOG	4	5	0
ANALOG	5	1	0
ANALOG	6	1	0
ANALOG	7	1	0
ANALOG	8	.50	0
EVENT	1	1	0
EVENT	2	1	0
PEAK	1	0	0
PEAK	2	0	0
WIND	1	0	0
WIND	2	0	0
STATUS	1 to 8	1	0
GPS	1	1	0

Calibration

The 5096/A2 Data Transmitter reads raw (RAW) sensor values, calibrates the values using sensor calibration coefficients and transmits the calculated (CAL) data to the base station. Sensor calibration coefficients can be used to calculate CAL data in engineering units. The calibration equation is:

CAL = RAW * *a* / *b* + *c*

Where ***a*** is the **Multiplier**, ***b*** the **Divider**, and ***c*** the ***Base Value***. The **Display Digits**, ***d***, parameter sets the number of decimal digits displayed for the **CAL** data and encoded in the ALERT2 report for transmission to the base station. Zero (0) decimal digits encodes integer data. One (1) or more decimal digits encodes floating point data.

For ANALOG sensors, if the ***trim*** option is enabled, the **CAL** data is set to the Txmit Threshold, ***txth,*** if it is less than the threshold.

The default calibration parameters, ***a, b, c,*** and ***d*** and sensor data units depend on the sensor type.

Type	**Number**	***a***	***b***	***c***	***d***	**Units**
ANALOG	1	100	1023	0	0	percent
ANALOG	2	180	1023	-40	1	degrees F
ANALOG	3	25.5	1023	0	2	feet
ANALOG	4	100	1023	937	1	millibars
ANALOG	5	1	1	0	0	
ANALOG	6	1	1	0	0	
ANALOG	7	359	1023	0	0	degrees
ANALOG	8	156.77	10000	0	2	volts
EVENT	1	1	0	0	2	feet
EVENT	2	1	0	0	0	millimeters
PEAK	1	360	2094	0	0	miles/hour
PEAK	2	1	1	0	0	
WIND	1	360	2094	0	0	miles/hour
WIND	2	1	1	0	0	
STATUS	1 to 8	1	1	0	0	
GPS	1	1	1	0	0	status

Before changing station or sensor parameters, record the current parameters. Use the SHOWALL command to display all parameters and the console software to log to a disk file. Refer to Section 2.1.5 for information on logging to disk files.

Complete descriptions of commands and parameters is provided in Sections 4.7 and 4.8.

2.1.7 Sensor Set Up Examples

Sensor Set Up: EVENT Sensors

When an EVENT sensor triggers an event its RAW accumulator is incremented or decremented. CAL data is calculated from the RAW accumulator using sensor calibration coefficients. An event data report is transmitted when the Event Detection flag is **ENABLED** and change criteria is met.

5050P, 5050P-MS Tipping Bucket

The 5050P and 5050P-MS Tipping Bucket sensors are connected to the non-rotated 5 pin top plate connector labeled PRECIPITATION which is connected to EVENT 2 input. Type the command SET-EV 2 to display the current parameters for EVENT 2. The default parameters for EVENT 2 are:

>**SET-EV 2**[Enter]
EVENT 2 ID : 0
Report Type : TBR
Transmit Intervl : 3600 sec(s)
Sample Interval : 300 sec(s)

Change to Txmit : 1
Txmit Threshold : 0
Multiplier : 1
Divisor : 1
Base Value : 0
Display Digits : 0
Event Detection : Enabled
Event Mode : 6

The 5050P is calibrated to tip after it accumulates 1 millimeter (0.03937 inches) of rainfall. With the a, b, and c parameters set at **1**, **1**, and **0** respectively, the CAL data and RAW accumulator values are equal. Therefore, the CAL data transmitted to the base station is an accumulated rainfall count in millimeters (mm). The base station computer software converts the data into engineering units (inches or millimeters).

The 5050P-MS is also calibrated to tip after it accumulates 1 millimeter (0.03937 inches) of rainfall. However, its read switch is rotated so the magnet does not stay over the switch after the bucket tips. This modification is done to eliminate the possibility of false counts due to static discharge on poorly grounded gauges. With the reed switch rotated, a 5050P-MS bucket tip sends a momentary pulse which causes two trigger line state changes in the 5096/A2 Data Transmitter. **Event Mode** 6 instructs the 5096/A2 Data Transmitter to only increment the accumulator once when two trigger line state changes are less than 200 milliseconds apart.

A Change to Txmit of **1** transmits the CAL data for each tip. A Transmit Intervl of **3600** transmits the tipping bucket CAL data every 1 hour.

For standard data collection applications, the default settings need not be changed.

2500, 2501 Two Wire Precipitation Gage

The 2500 and 2501 are connected to the non-rotated 5 pin top plate connector labeled PRECIPITATION which is connected to EVENT 2 input. Use the default Event Mode 6 for these sensor types.

>**SET-EV 2**[Enter]
EVENT 2 ID : 0
Report Type : TBR
Transmit Intervl : 3600 sec(s)
Sample Interval : 300 sec(s)
Change to Txmit : 1
Txmit Threshold : 0
Multiplier : 1
Divisor : 1
Base Value : 0
Display Digits : 0
Event Detection : Enabled
Event Mode : 6

The 2500 and 2501 are calibrated to increment the EVENT 2 accumulator for each .01 inches or rainfall. The 2500M and 2501M are calibrated to increment the EVENT 2 accumulator for each millimeter of rainfall. For standard data collection applications, no other parameter changes are required.

5096SE-107 Shaft Encoder Sensor

The 5096SE-107 Shaft Encoder Sensor connected to the rotated 5 pin top plate connector labeled DIGITAL which is connected to EVENT 1 input. Type the command SET-EV 1 to display the current parameters for EVENT 1.

>**SET-EV 1**[Enter]
EVENT 1 ID : 27
Report Type : GSR
Transmit Intervl : 0 sec(s)
Sample Interval : 0 sec(s)
Change to Txmit : 0.01
Txmit Threshold : 0.00
Multiplier : 0.01
Divisor : 1
Base Value : 0.00
Display Digits : 2
Event Detection : Disabled
Event Mode : 4

Changes to the EVENT 1 parameters are made with the SET-EV command. First type the command SET-EV with a question mark to get the command parameter list:

>**SET-EV ?**[Enter]
SET-EV sn,id,rpt,ti,si,cgt,txth,a,b,c,d,ev,mode

This sensor is disabled by default and must be enabled by setting the timed interval, ***ti***, and event detection, ***ev***. Count the commas between sn and the ti parameter, there are 3 commas. Count the commas between ti and the ev parameters, there are 8 commas. Type the following command to set these parameters and you will get the response:

>**SET-EV 1,,,3600,,,,,,,1**[Enter]
EVENT 1 ID : 27
Report Type : GSR
Transmit Intervl : 3600 sec(s)
Sample Interval : 0 sec(s)
Change to Txmit : 0.01
Txmit Threshold : 0.00
Multiplier : 0.01
Divisor : 1
Base Value : 0.00
Display Digits : 2

Event Detection : Enabled
Event Mode : 4

The standard 5096SE-107 has 100 increments per rotation and a 1 foot pulley circumference making each increment or decrement 0.01 foot change in level.

A Change to Txmit of **0.01** transmits the CAL data for each increment or decrement in level count. If wave action frequently causes the level to change by one or more counts, a Change to Txmit of **0.01** will transmit many meaningless reports. Decrease the sensitivity (therefore the number of reports transmitted) by increasing the Change to Txmit parameter. For example, set the Change to Txmit parameter, cgt, to **0.05.** The sensor will still measure water level in 0.01 foot increments. However, it only transmits reports when the CAL level data changes by 0.05 feet since the last transmitted value.

Count the commas between sn and the cgt parameter. There are 5 commas. Type the following command to set this parameter and you will get the response:

>**SET-EV 1,,,,,0.05**[Enter]
EVENT 1 ID : 27
Report Type : GSR
Transmit Intervl : 3600 sec(s)
Sample Interval : 0 sec(s)
Change to Txmit : 0.05
Txmit Threshold : 0.00
Multiplier : 0.01
Divisor : 1
Base Value : 0.00
Display Digits : 2
Event Detection : Enabled
Event Mode : 4

To calibrate the shaft encoder data you can set the **Base Value**, ***c***, parameter or write the **RAW** data value equivalent of the observed water level value. For example, if the observed water level is 1.35 feet then divide 1.35 feet by the **Multiplier** 0.01 to get the **RAW** data value 135. The set the **RAW** data value with the following command:

>**WRITE-EV 1,135**[Enter]
EVENT 1 ID : 27
Raw Reading : 135
Cal Reading : 1.35

Sensor Set Up: ANALOG Sensors

Relative humidity, air temperature, pressure transducers, barometric pressure, wind direction and battery voltages are ANALOG sensors.

Standard ANALOG sensors are calibrated at the factory for a 0 to 5 Vdc analog output over the measured range. The relationship between the sensor's range and 0 to 5 Vdc analog signal is linear.

The 5096/A2 Data Transmitter has a 10 bit (0-1023) resolution analog to digital converter (ADC). This means that there are 1024 possible values when converting an analog signal into a digital value. The relationship between the analog signal (0 - 5Vdc) and the digital value (0 - 1023) is linear.

Since the sensor's measured range is linear to the analog output and the analog output is linear to the ADC converted digital value, any point along the sensor's measured range can be expressed as a digital value. For example, if a Relative Humidity (RH) Sensor with a measured range of 0 to 100%RH measures 80%RH, the analog signal would be 4.0Vdc. The ADC converts the 4.0Vdc to a digital value of 818.

On the time intervals set in the Sample Interval and Transmit Intervl parameters the 5096/A2 Data Transmitter reads an ANALOG sensor analog signal, converts the signal with the ADC, computes a RAW digital value and calculates the CAL data using sensor calibration coefficients. The Sample Interval and Transmit Intervl parameter units are in seconds. To disable an ANALOG sensor, set both the Transmit Intervl and Sample Interval to **0.**

If the ***trim*** option is enabled, the **CAL** data is set to the Txmit Threshold, ***txth,*** if it is less than the threshold.

On sample intervals, if the CAL data is equal to or greater than the Txmit Threshold and the difference between the newly calculated CAL data and the last transmitted CAL data is equal to or greater than the Change to Txmit parameter the sensor CAL data is transmitted.

On transmit intervals, the CAL data is transmitted regardless of the CAL data value or any change in the CAL data value.

2048RH/T Relative Humidity and Air Temperature

The 2048RH/T Relative Humidity and Air Temperature sensors are connected to the rotated 6 pin top plate connector labeled TEMPERATURE & HUMIDITY. The relative humidity sensor is connected to ANALOG 1 and the air temperature sensor is connected to ANALOG 2. The standard range for the relative humidity sensor is 0 to 100%RH. The standard range for the air temperature sensor is -40 to 140 degrees Fahrenheit (°F).

Type the command SET-AN 1 to display the current parameters for ANALOG 1. The default parameters for ANALOG 1 are:

	5096/A2-81	5096/A2-N
>**SET-AN 1**[Enter]		
ANALOG 1 ID	: 2	
Report Type	: MSR	
Transmit Intervl	: 3600 sec(s)	0 sec(s)
Sample Interval	: 300 sec(s)	0 sec(s)
Change to Txmit	: 5	
Txmit Threshold	: 0	
Multiplier	: 100	
Divisor	: 1023	
Base Value	: 0	
Display Digits	: 0	
Trim Enable	: Disabled	

Type the command SET-AN 2 to display the current parameters for ANALOG 2. The default parameters for ANALOG 2 are:

	5096/A2-81	5096/A2-N
>**SET-AN 2**[Enter]		
ANALOG 2 ID	: 1	
Report Type	: MSR	
Transmit Intervl	: 3600 sec(s)	0 sec(s)
Sample Interval	: 300 sec(s)	0 sec(s)
Change to Txmit	: 3.0	
Txmit Threshold	: -40.0	
Multiplier	: 180.0	
Divisor	: 1023	
Base Value	: -40.0	
Display Digits	: 1	
Trim Enable	: Disabled	

A Transmit Intervl of **3600** transmits the CAL data every 1 hour regardless of value or change. The ANALOG sensors are read and the CAL data is calculated on a Sample Interval of **300** (5 minutes).

The relative humidity sensor a, b and c calibration parameters of **100**, **1023,** and **0** compute the CAL data range of 0 – 100 %. **CAL** data is displayed and transmitted with no decimal digits on sample intervals with a change of 5 % when at or above 0 %.

The air temperature sensor a, b and c calibration parameters of **180.00**, **1023,** and **-40.0** compute the CAL data range of -40.0 – 140.0 °F. **CAL** data is displayed and transmitted with one (1) decimal digit on sample intervals with a change 3 °F when at or above -40.0 °F

For standard data collection applications the default settings need not be changed. Changes to the ANALOG sensor parameters are made with the SET-AN command. First type the command SET-AN with a question mark to get the command parameter list:

>**SET-AN ?**[Enter]
SET-AN sn,id,rpt,ti,si,cgt,txth,a,b,c,d,trim

To program the 5096/A2 Data Transmitter to read the relative humidity sensor and calculate the CAL data every 15 minutes, set the Sample Interval parameter to **900**. To transmit the sensor data value every day regardless of any CAL data change, set the Transmit Intervl, ti, parameter to **86400** (24 hours). Count the commas between sn and the ti parameter. There are 2 commas. Type the following command to set these parameters and you will get the response:

>**SET-AN 1,,,86400,900**[Enter]
ANALOG 1 ID : 2
Report Type : MSR
Transmit Intervl : 86400 sec(s)
Sample Interval : 900 sec(s)
Change to Txmit : 5
Txmit Threshold : 0
Multiplier : 100
Divisor : 1023
Base Value : 0
Display Digits : 0
Trim Enable : Disabled

To increase the sensitivity of the sample time reporting criteria, decrease the Change to Txmit, cgt, parameter. For example, to transmit changes in relative humidity of 1%RH set this parameter to **1**. Count the commas between sn and the cgt parameter. There are 5 commas. Type the following command to set this parameter and you will get the response:

>**SET-AN 1,,,,,1**[Enter]
ANALOG 1 ID : 2
Report Type : MSR
Transmit Intervl : 86400 sec(s)
Sample Interval : 900 sec(s)
Change to Txmit : 1
Txmit Threshold : 0
Multiplier : 100
Divisor : 1023
Base Value : 0
Display Digits : 0
Trim Enable : Disabled

5050LLPTK Pressure Transducer

The 5050LLPTK sensor is connected to the rotated 4 pin rotated top plate connector labeled ANALOG. The pressure transducer sensor is connected to ANALOG 3. The pressure transducer calibrated range can be ordered from the factory. A standard calibrated range for pressure transducers is 25.5 feet (ft).

Type the command SET-AN 3 to display the current parameters for ANALOG 3. The default parameters for ANALOG 3 are:

	5096/A2-81, 90	5096/A2-N
>**SET-AN 3**[Enter]		
ANALOG 3 ID	: 7	
Report Type	: MSR	
Transmit Intervl	: 3600 sec(s)	0 sec(s)
Sample Interval	: 300 sec(s)	0 sec(s)
Change to Txmit	: 0.05	
Txmit Threshold	: 0.00	
Multiplier	: 25.50	
Divisor	: 1023	
Base Value	: 0.00	
Display Digits	: 2	
Trim Enable	: Disabled	

A Transmit Intervl of **3600** transmits the CAL data every 1 hour regardless of value or change. The ANALOG sensor is read and the CAL data is calculated on a Sample Interval of **300** (5 minutes).

The pressure transducer sensor a, b and c calibration parameters of **25.50**, **1023,** and **0.00** compute the CAL data range of 0 – 25.50 feet. **CAL** data is displayed and transmitted with two (2) decimal digits on sample intervals with a change of 0.05 feet when at or above 0.00 feet.

For standard data collection applications the default settings need not be changed.

Changes to the ANALOG sensor parameters are made with the SET-AN command. First type the command SET-AN with a question mark to get the command parameter list:

>**SET-AN ?**[Enter]
SET-AN sn,id,rpt,ti,si,cgt,txth,a,b,c,d,trim

The default ALERT2 sensor ***id*** for the analog water level is 7. The data is transmitted in the MSR report which has 2 decimal digits and a range of -327.67 to 327.67. To change the sensor ***id*** to 17 and the report type to GSR, set ***rpt*** to 0. Type the following command to set these parameters and you will get the response:

>**SET-AN 3,17,0**[Enter]
ANALOG 3 ID : 17

```
Report Type       : GSR
Transmit Intervl  : 3600 sec(s)
Sample Interval   : 300 sec(s)
 Change to Txmit  : 0.05
Txmit Threshold   : 0.00
Multiplier        : 25.50
Divisor           : 1023
Base Value        : 0.00
Display Digits    : 2
Trim Enable       : Disabled
```

To program the 5096/A2 Data Transmitter to read the pressure transducer sensor and calculate the CAL data every minute, set the Sample Interval, si, parameter to **60**. To transmit the sensor data value every 15 minutes regardless of any CAL data change, set the Transmit Intervl, ti, parameter to **900** (15 minutes). Count the commas between sn and the ti parameter. There are 3 commas. Type the following command to set these parameters and you will get the response:

```
>SET-AN 3,,,900,60[Enter]
ANALOG 3 ID       : 7
Report Type       : MSR
Transmit Intervl  : 900 sec(s)
Sample Interval   : 60 sec(s)
Change to Txmit   : 0.05
Txmit Threshold   : 0.00
Multiplier        : 25.50
Divisor           : 1023
Base Value        : 0.00
Display Digits    : 2
Trim Enable       : Disabled
```

The calibration coefficients for an ANALOG sensor can be changed for a sensor with a different measured range. For example, if a pressure transducer has a calibrated range of 10ft and a measurement precision of 0.01ft is desired set the a parameter to the CAL data range (10ft - 0ft = 10.00). Do not change the b parameter for the RAW digital value range (1023 - 0 = 1023).

Count the commas between sn and the a parameter. There are 7 commas. Type the following command to set these parameters and you will get the response:

```
>SET-AN 3,,,,,,,10.00[Enter]
ANALOG 3 ID       : 7
Report Type       : MSR
Transmit Intervl  : 900 sec(s)
Sample Interval   : 60 sec(s)
Change to Txmit   : 0.05
Txmit Threshold   : 0.00
Multiplier        : 10.00
Divisor           : 1023
```

Base Value : 0.00
Display Digits : 2
Trim Enable : Disabled

Due to calibration and sealing procedures at the factory, a pressure transducer RAW digital value may not read 0 when the pressure transducer is not submerged. This zero offset can be eliminated by setting the c parameter to a negative number adjusting the CAL data to zero.

To compute the c parameter after setting the a and b parameters, take a reading for the pressure transducer when it is not submerged. Type the following command to read the pressure transducer on ANALOG 3 and you will get the response:

>**READ-AN 3**[Enter]
ANALOG 3 ID : 7
Raw Reading : 3
Cal Reading : 0.02

Set the c parameter to the negative Cal Reading displayed, **-0.02**. Count the commas between sn and the c parameter. There are 9 commas. Type the following command to set this parameter and you will get the response:

>**SET-AN 3,,,,,,,,,-0.02**[Enter]
ANALOG 3 ID : 7
Report Type : MSR
Transmit Intervl : 900 sec(s)
Sample Interval : 60 sec(s)
Change to Txmit : 0.05
Txmit Threshold : 0.00
Multiplier : 10.00
Divisor : 1023
Base Value : -0.02
Display Digits : 2
Trim Enable : Disabled

If wave action frequently causes the level to change by three or more counts, a Change to Txmit of **0.05** may transmit many meaningless reports. To decrease the sensitivity (therefore the number of reports transmitted) increase the Change to Txmit parameter. For example, set the Change to Txmit parameter, cgt, to **0.10** to transmit when the CAL data changes by 0.10ft. Count the commas between sn and the cgt parameter. There are 5 commas. Type the following command to set these parameters and you will get the response:

>**SET-AN 3,,,,,0.10**[Enter]
ANALOG 3 ID : 7
Report Type : MSR
Transmit Intervl : 900 sec(s)
Sample Interval : 60 sec(s)
Change to Txmit : 0.10

```
Txmit Threshold    : 0.00
Multiplier         : 10.00
Divisor            : 1023
Base Value         : -0.02
Display Digits     : 2
Trim Enable        : Disabled
```

To prevent meaningless reports from being transmitted due to temperature fluctuations when the sensor is not submerged, set the Txmit Threshold parameter, txth, to the calibrated value which is reached when water covers the sensor. For example, prevent sample readings from transmitting for a 10 foot range pressure transducer when the water value drops below 0.05ft. Count the commas between sn and the txth parameter. There are 6 commas. Type the following command to set this parameter and you will get the response:

```
>SET-AN 3,,,,,,0.05[Enter]
ANALOG 3 ID        : 7
Report Type        : MSR
Transmit Intervl   : 900 sec(s)
Sample Interval    : 60 sec(s)
Change to Txmit    : 0.10
Txmit Threshold    : 0.05
Multiplier         : 10.00
Divisor            : 1023
Base Value         : -0.02
Display Digits     : 2
Trim Enable        : Disabled
```

1522 Barometric Pressure

The 1522 Barometric Pressure sensor is connected to the rotated 4 pin top plate connector labeled BAROMETRIC PRESSURE. The barometric pressure sensor is connected to ANALOG 4. A standard calibrated range for barometric pressure sensors is 100 millibars (mb) offset according to the station elevation.

Type the command SET-AN 4 to display the current parameters for ANALOG 4. The default parameters for ANALOG 4 are:

```
                   5096/A2-81          5096/A2-N
>SET-AN 4[Enter]
ANALOG 4 ID        : 3
Report Type        : MSR
Transmit Intervl   : 3600 sec(s)       0 sec(s)
Sample Interval    : 300 sec(s)        0 sec(s)
Change to Txmit    : 5.0
Txmit Threshold    : 0.0
Multiplier         : 100.0
Divisor            : 1023
Base Value         : 937.0
```

Display Digits : 1
Trim Enable : Disabled

A Transmit Intervl of **3600** transmits the CAL data every 1 hour regardless of value or change. The ANALOG sensor is read and the CAL data is calculated on a Sample Interval of **300** (5 minutes).

The barometric transducer sensor a, b and c calibration parameters of **100.0**, **1023,** and **937.0** compute the CAL data range of 937.0 – 1037.0 millibars. **CAL** data is displayed and transmitted with one (1) decimal digit on sample intervals with a change of 5.0 millibars when at or above 0.0 millibars.

For standard data collection applications the default settings need not be changed.

Changes to the ANALOG sensor parameters are made with the SET-AN command. First type the command SET-AN with a question mark to get the command parameter list:

>**SET-AN ?**[Enter]
SET-AN sn,id,rpt,ti,si,cgt,txth,a,b,c,d,trim

To program the 5096/A2 Data Transmitter to read the barometric pressure sensor and calculate the CAL data every 15 minutes, set the Sample Interval, si, parameter to **900**. To transmit the sensor data value every 6 hours regardless of any CAL data change, set the Transmit Intervl, ti, parameter to **21600**. Count the commas between sn and the ti parameter. There are 3 commas. Type the following command to set these parameters and you will get the response:

>**SET-AN 4,,,21600,900**[Enter]
ANALOG 4 ID : 3
Report Type : MSR
Transmit Intervl : 21600 sec(s)
Sample Interval : 900 sec(s)
Change to Txmit : 5.0
Txmit Threshold : 0.0
Multiplier : 100.0
Divisor : 1023
Base Value : 937.0
Display Digits : 1
Trim Enable : Disabled

The calibration coefficients of an ANALOG sensor are set to display and transmit CAL data in engineering units. To change the barometric pressure sensor calibration for a measured range of 930mb to 1030mb set the c parameter to 930.0. Do not change the ***a*** and ***b*** parameters. Count the commas between sn and the c parameter. There are 9 commas. Type the following command to set these parameters and you will get the response:

>**SET-AN 4,,,,,,,,,930**[Enter]
ANALOG 4 ID : 3

Report Type	: MSR
Transmit Intervl	: 21600 sec(s)
Sample Interval	: 900 sec(s)
Change to Txmit	: 5.0
Txmit Threshold	: 0.0
Multiplier	: 100.0
Divisor	: 1023
Base Value	: 930.0
Display Digits	: 1
Trim Enable	: Disabled

4015 Solar Radiation

The 4015 Solar radiation sensor can be connect to the 4 pin top plate connector labeled ANALOG or to the rotated 4 pin top plate connector labeled BAROMETRIC PRESSURE. A standard calibrated range for solar radiation sensors is 1400 Watts per square centimeter.

If no pressure transducer sensor is connected to the transmitter, the solar radiation sensor on pin A can be set up and ANALOG 3. If the solar radiation sensor on pin B shares the ANALOG connector with a pressure transducer sensor on pin A, the solar radiation sensor is set up as ANALOG 5.

If no barometric pressure sensor is connected to the transmitter, the solar radiation sensor on pin A can be set up and ANALOG 4. If the solar radiation sensor on pin B shares the BAROMETRIC PRESSURE connector with a barometric pressure sensor on pin A, the solar radiation sensor is set up as ANALOG 6.

To connect the solar radiation sensor to the ANALOG connector pin B, type the command SET-AN 5 to display the current parameters for ANALOG 5. The default parameters for ANALOG 5 are:

>**SET-AN 5**[Enter]
ANALOG 5 ID : 17
Report Type : GSR
Transmit Intervl : 0 sec(s)
Sample Interval : 0 sec(s)
Change to Txmit : 1
Txmit Threshold : 0
Multiplier : 1
Divisor : 1
Base Value : 0
Display Digits : 0
Trim Enable : Disabled

Changes to the ANALOG sensor parameters are made with the SET-AN command. First type the command SET-AN with a question mark to get the command parameter list:

>**SET-AN ?**[Enter]
SET-AN sn,id,rpt,ti,si,cgt,txth,a,b,c,d,trim

Since the solar radiation sensor is not one of the pre-assigned ALERT2 sensor types, you cannot use it in a multi-sensor report so set the ***rpt*** parameter to 0 (GSR). Consult with your base station manager for the sensor ID number, ***id***, to use. For example, sensor ID number 11 is available.

To program the 5096/A2 Data Transmitter to read the solar radiation pressure sensor and calculate the CAL data every 15 minutes, set the Sample Interval, si, parameter to **900**. A Change to Txmit, cgt, of **100** and a Txmit Threshold, ***txth***, of 0 transmits the CAL data when it is 0 or above and has changed by 100 Watts per square centimeter since the last

CAL data transmitted. To transmit the sensor data value every 1 hour regardless of any CAL data change, set the Transmit Intervl, ti, parameter to **3600**.

Set the solar radiation sensor a, b, c and d calibration parameters to **1400**, **1023, 0,** and **0** to compute the CAL data range of 0 – 1400 Watts per square centimeters. **CAL** data is displayed and transmitted with zero (0) decimal digits on sample intervals with a change of 100 Watts per square centimeter when at or above 0 Watts per square centimeter

Type the following command to set these parameters and you will get the response:

>**SET-AN 5,11,0,3600,900,100,0,1400,1023,0,0**[Enter]
ANALOG 5 ID : 11
Report Type : GSR
Transmit Intervl : 3600 sec(s)
Sample Interval : 900 sec(s)
Change to Txmit : 100
Txmit Threshold : 0
Multiplier : 1400
Divisor : 1023
Base Value : 0
Display Digits : 0
Trim Enable : Disabled

Battery Sensor

The 5096/A2 Data Transmitter has an internal BATTERY sensor that measures the internal battery voltage in hundredths of volts (Vdc). Type the command SET-BATT to display the current parameters for the BATTERY sensor. The default parameters for the BATTERY sensor are:

All types
>**SET-BATT**[Enter]
ANALOG 8 ID : 8
Report Type : MSR
Transmit Intervl : 3600 sec(s)
Sample Interval : 300 sec(s)
Change to Txmit : 0.50
Txmit Threshold : 0.00
Multiplier : 156.77
Divisor : 10000
Base Value : 0.00
Display Digits : 2
Trim Enable : Disabled

The BATTERY sensor is enabled by default. The calibration coefficients are factory set to display battery voltage in hundredths of volts (Vdc).

Changes to the BATTERY sensor parameters are made with the SET-BATT or SET-AN 8 command. First type the command SET-BATT with a question mark to get the command

parameter list:

>**SET-BATT ?**[Enter]
SET-BATT sn,id,rpt,ti,si,cgt,txth,a,b,c,d,trim

To program the 5096/A2 Data Transmitter to read the BATTERY sensor and calculate the CAL data every 15 minutes, set the Sample Interval, si, parameter to **900**. A Change to Txmit of **0.50** transmits the CAL data when it has changed by 0.50Vdc since the last CAL data transmitted. To transmit the sensor data value every 3 hours regardless of any CAL data change, set the Transmit Intervl, ti, parameter to **10800**. Type the following command to set these parameters and you will get the response:

>**SET-BATT 8,,,10800,900**[Enter]
ANALOG 8 ID : 8
Report Type : MSR
Transmit Intervl : 10800 sec(s)
Sample Interval : 900 sec(s)
Change to Txmit : 0.50
Txmit Threshold : 0.00
Multiplier : 156.77
Divisor : 10000
Base Value : 0.00
Display Digits : 2
Trim Enable : Disabled

The MSR report type will only transmit 0.1 Volt resolution data for the BATTERY sensor, even if the display digits, ***d***, are 2. To transmit 0.01 Volt resolution data you must change the report type, ***rpt***, parameter to 0 (GSR). Type the following command to set this parameter and you will get the response:

>**SET-BATT 8,,0**[Enter]
ANALOG 8 ID : 8
Report Type : GSR
Transmit Intervl : 10800 sec(s)
Sample Interval : 900 sec(s)
Change to Txmit : 0.50
Txmit Threshold : 0.00
Multiplier : 156.77
Divisor : 10000
Base Value : 0.00
Display Digits : 2
Trim Enable : Disabled

Sensor Set Up: WIND Sensors

WIND sensors work on an event basis just like EVENT sensors; however, they provide high speed signal input. To prevent the 5096/A2 Data Transmitter from being triggered on each pulse, a pre-divide counter is used. The pre-divide counter requires a programmed number of pulses before it increments the WIND sensor RAW accumulator. CAL data is calculated from the RAW accumulator using sensor calibration coefficients.

WIND sensors can compute average wind speed, event wind run, counter data. The default is average wind speed. The Wind Speed Enable parameter, ***we***, is used to select average wind speed data reporting. The **Event Detection** parameter, ***ev***, is used to enable event wind run reporting (This method is obsolete for ALERT2 data reporting). Disable both of these parameters to report counter data.

To compute average wind speed a WIND sensor pulse count is read every Sample Interval and the sensor calibration coefficients are used to compute wind speed in units/hour. The Sample Interval wind speed computations are averaged over the Transmit Interval to display and transmit average wind speed. The Change to Txmit and **Txmit Threshold** parameters are ignored.

5050WS Wind Speed

The 5050WS/WD Wind Speed and Direction sensors are connected to the 6 pin top plate connector labeled WIND. The wind speed sensor is connected to WIND 1. The wind direction sensor is connected to ANALOG 7. The wind speed sensor pulses 1308 times for each kilometer or 2094 times for each mile of wind run. WIND sensor data can be transmitted as wind run or wind speed.

Wind run data is computed by incrementing the **RAW** data value when the WIND sensor pulse count reaches the pre-divide counter, **Pre-Divide Ctr,** parameter value**.** The **CAL** data wind run is computed from the calibration coefficients and transmitted for the event if **Event Detection** is **Enabled** and the data value changes by at least the **Change to Txmit** parameter limit. The **CAL** data is always transmitted on the Transmit Intervl. The Sample Interval and **Txmit Threshold** parameters are ignored for wind run computations.

WIND speed data is computed by counting the number of WIND sensor pulses over the time interval set in the Sample Interval parameter. The pulses per wind run units is set in the pre-divide counter, **Pre-Divide Ctr,** parameter**.** The **CAL** data wind speed is computed using sensor calibration coefficients. The Sample Interval wind speed data values are averaged over the **Transmit Intervl** and transmitted. The Change to Txmit and Txmit Threshold parameters are ignored for the wind speed computations. To correctly compute the wind speed data the calibration coefficients and pre-divide counter must be set as follows:

Multiplier	**:** 3600 / sample interval
Divisor	**:** pulses per wind run units
Base Value	: 0
Pre-Divide Ctr	**:** pulses per wind run units

Type the command SET-WI 1 to display the current parameters for WIND 1. The default parameters for WIND 1 are:

	5096/A2-81	5096/A2-N
>**SET-WI 1**[Enter]		
WIND 1 ID	: 4	
Report Type	: MSR	
Transmit Intervl	: 3600 sec(s)	0 sec(s)
Sample Interval	: 10 sec(s)	0 sec(s)
Change to Txmit	: 0	
Txmit Threshold	: 0	
Multiplier	: 360	
Divisor	: 2094	
Base Value	: 0	
Display Digits	: 0	
Event Detection	: Disabled	
Wind Speed	: Enabled	
Pre-Divide Ctr	: 2094	

A Transmit Intervl of **3600** transmits the CAL data every 1 hour regardless of value or change. The WIND sensor is read and the CAL data is calculated on a Sample Interval of **10** (10 seconds). The WIND sensor a, b and c calibration parameters compute the CAL data in miles per hour. Set the ***a*** parameter to the number of seconds per hour (3600) divided by the Sample Interval (10): 3600 / 10 = 360. Set the ***b*** parameter to the pulses per mile = 2094. The **Base Value**, ***c***, parameter and **Display Digits**, ***d***, parameter are 0.

Event Detection is **Disabled** to prevent event transmissions.

The **Wind Speed** computation flag is **Enabled** to compute and transmit the wind speed.

A Pre-divide Ctr of **2094** sets the pulses per wind run mile so the wind speed data units will be miles per hour.

For standard data collection applications, the default settings need not be changed.

200-05103 R.M. Young Wind Sensor

The 200-05103 R.M. Young Wind Sensor is connected to the 6 pin top plate connector labeled WIND. The wind speed sensor is connected to WIND 1. The wind direction sensor is connected to ANALOG 7. The wind speed sensor pulses 10204 times for each kilometer or 16327 times for each mile of wind run.

Changes to the WIND sensor parameters are made with the SET-WI command. First type the command SET-WI with a question mark to get the command parameter list:

>**SET-WI ?**[Enter]
SET-WI sn,id,rpt,ti,si,cgt,txth,a,b,c,d,ev,we,pdc

Change the WIND sensor divisor, ***b***, and pre-divide counter, ***pdc***, to 16327 to compute

wind speed in miles per hour. Count the commas between sn and the b parameters. There are 8 commas. Count the commas between b and the pdc parameters. There are 5 commas. Type the following command to set the parameters and you will get the response:

>**SET-WI 1,,,,,,,,16327,,,,,16327**[Enter]
WIND 1 ID : 4
Report Type : MSR
Transmit Intervl : 3600 sec(s)
Sample Interval : 10 sec(s)
Change to Txmit : 0
Txmit Threshold : 0
Multiplier : 360
Divisor : 16327
Base Value : 0
Display Digits : 0
Event Detection : Disabled
Wind Speed : Enabled
Pre-Divide Ctr : 16327

The MSR report type will only transmit 1 mph resolution data for the wind speed sensor, even if the display digits, ***d***, are 1. To transmit 0.1 mph resolution data you must change the report type, ***rpt***, parameter to 0 (GSR), and display digits, ***d***, to 1. When changing the display digits, you must enter on four calibration parameters: ***a***, ***b***, ***c***, ***d***. Type the following command to set this parameter and you will get the response:

>**SET-WI 1,,0,,,,,360,16327,0,1**[Enter]
WIND 1 ID : 4
Report Type : GSR
Transmit Intervl : 3600 sec(s)
Sample Interval : 10 sec(s)
Change to Txmit : 0
Txmit Threshold : 0
Multiplier : 360.0
Divisor : 16327
Base Value : 0.0
Display Digits : 1
Event Detection : Disabled
Wind Speed : Enabled
Pre-Divide Ctr : 16327

Sensor Set Up: PEAK WIND Sensors

5050WS Wind Speed

PEAK WIND speed data is computed by counting the number of WIND sensor pulses over the time interval set in the Sample Interval parameter. The **CAL** data wind speed is computed using sensor calibration coefficients. The maximum Sample Interval wind

speed is transmitted on the Transmit Interval. The Change to Txmit and Txmit Threshold parameters are ignored for the peak wind speed computations. To correctly compute the peak wind speed data the calibration coefficients must be set as follows:

Multiplier	: 3600 / sample interval
Divisor	: pulses per wind run units
Base Value	: 0

Type the command SET-PK 1 to display the current parameters for PEAK WIND 1. The default parameters for PEAK WIND 1 are:

	5096/A2-81	5096/A2-N
>**SET-PK 1**[Enter]		
PEAK WIND 1 ID	: 6	
Report Type	: MSR	
Transmit Intervl	: 3600 sec(s)	0 sec(s)
Sample Interval	: 10 sec(s)	0 sec(s)
Change to Txmit	: 0	
Txmit Threshold	: 0	
Multiplier	: 360	
Divisor	: 2094	
Base Value	: 0	
Display Digits	: 0	

A Transmit Intervl of **3600** transmits the CAL data every 1 hour regardless of value or change. The WIND sensor is read and the CAL data is calculated on a Sample Interval of **10** (10 seconds). The PEAK WIND sensor a, b and c calibration parameters compute the CAL data in miles per hour. Set the ***a*** parameter to the number of seconds per hour (3600) divided by the Sample Interval (10): 3600 / 10 = 360. Set the ***b*** parameter to the pulses per mile = 2094. The **Base Value**, ***c***, parameter and **Display Digits**, ***d***, parameter are 0.

For standard data collection applications, the default settings need not be changed.

200-05103 R.M. Young Wind Sensor

The 200-05103 R.M. Young Wind Sensor is connected to the 6 pin top plate connector labeled WIND. The wind speed sensor is connected to WIND 1. The wind direction sensor is connected to ANALOG 7. The wind speed sensor pulses 10204 times for each kilometer or 16327 times for each mile of wind run.

Changes to the PEAK WIND sensor parameters are made with the SET-PK command. First type the command SET-PK with a question mark to get the command parameter list:

>**SET-PK ?**[Enter]
SET-PK sn,id,rpt,ti,si,cgt,txth,a,b,c,d

Change the PEAK WIND sensor divisor, ***b***, to 16327 to compute peak wind speed in miles per hour. Count the commas between sn and the b parameters. There are 8 commas.

Type the following command to set the parameter and you will get the response:

>**SET-PK 1,,,,,,,,16327**[Enter]
PEAK WIND 1 ID : 6
Report Type : MSR
Transmit Intervl : 3600 sec(s)
Sample Interval : 10 sec(s)
Change to Txmit : 0
Txmit Threshold : 0
Multiplier : 360
Divisor : 16327
Base Value : 0
Display Digits : 0

The MSR report type will only transmit 1 mph resolution data for the peak wind sensor, even if the display digits, ***d***, are 1. To transmit 0.1 mph resolution data you must change the report type, ***rpt***, parameter to 0 (GSR), and display digits, ***d***, to 1. When changing the display digits, you must enter on four calibration parameters: ***a***, ***b***, ***c***, ***d***. Type the following command to set this parameter and you will get the response:

>**SET-PK 1,,0,,,,,360,16327,0,1**[Enter]
PEAK WIND 1 ID : 6
Report Type : GSR
Transmit Intervl : 3600 sec(s)
Sample Interval : 10 sec(s)
Change to Txmit : 0
Txmit Threshold : 0
Multiplier : 360.0
Divisor : 16327
Base Value : 0.0
Display Digits : 1

5050WD Wind Direction
200-05103 R.M. Young Wind Sensor Direction

The 5050WS/WD Wind Speed and Direction sensors and the 200-05103 R.M. Young Wind Sensor are connected to the 6 pin top plate connector labeled WIND. The wind direction sensor is connected to ANALOG 7. The calibrated range for the wind direction sensor is 360 degrees with north usually set to 0 degrees.

Type the command SET-AN 7 to display the current parameters for ANALOG 7. The default parameters for ANALOG 7 are:

	5096/A2-81	5096/A2-N
>**SET-AN 7**[Enter]		
ANALOG 7 ID	: 5	
Report Type	: MSR	
Transmit Intervl	: 3600 sec(s)	0 sec(s)
Sample Interval	: 300 sec(s)	0 sec(s)

Change to Txmit	: 1
Txmit Threshold	: 0
Multiplier	: 359
Divisor	: 1023
Base Value	: 0
Display Digits	: 0

The wind direction ANALOG sensor is read and the CAL data is calculated on a Sample Interval of **300** (5 minutes). The wind direction a, b and c calibration parameters of **359**, **1023,** and **0** compute the CAL data range of 0 – 359 degrees. **CAL** data is displayed and transmitted with zero (0) decimal digits on sample intervals with a change of 1 degree when at or above 0 degrees.

For standard data collection applications, the default settings need not be changed.

Sensor Set Up: STATUS Sensor

The STATUS sensor can monitor up to 8 digital status inputs. The status line states can be either open (1) or closed (0). When a status line changes state a data report can be transmitted.

Each status input can be transmitted as a unique ALERT2 sensor **ID**. Status inputs can also be combined into a single ALERT2 sensor **ID** value by using the same ALERT2 sensor **ID**. When combined the data becomes 8 bit value with the **CAL** data for status input 1 stored in bit 1, status input 2 in bit 2, and so on up to status input 8 in bit 8.

The STATUS sensor must be read at regular time intervals to check for changes in state since status line state changes do not trigger events. On the Sample Interval the status line states are read and stored as RAW data. The **CAL** data value is computed using the calibration coefficients. If the **CAL** data value meets the **Txmit Threshold** and changes by the **Change to Txmit** limit the data is transmitted. The **CAL** data value is always transmitted on the **Transmit Intervl**.

5096ES Emergency Status Sensor

The Emergency Status Sensor is connected to the 5096/A2 Data Transmitter STATUS sensor to transmit data reports when critical water levels are reached. This sensor is set up as a normally closed switch. When the water rises to the critical level, a float opens the switch and the 5096/A2 transmits a report to the base station. If the sensor is washed away and the cable breaks, an open switch condition also occurs and is detected by the 5096/A2.

The Emergency Status Sensor is connected to the optional 10 pin top plate connector labeled STATUS which is connected to the STATUS input. Pins A - H connect to status lines 1 - 8 and pins I and J are ground.

Type the command SET-ST 1 to display the current parameters for the STATUS 1 sensor. The default parameters for STATUS sensor are:

```
                        5096/A2-81, N
>SET-ST 1[Enter]
STATUS 1 ID         : 9
Report Type         : GSR
Transmit Intervl    : 0 sec(s)
Sample Interval     : 0 sec(s)
Change to Txmit     : 1
Txmit Threshold     : 0
Multiplier          : 1
Divisor             : 1
Base Value          : 0
Display Digits      : 0
```

The default parameters disable the STATUS sensor.

Changes to the STATUS sensor parameters are made with the SET-ST command. First type the command SET-ST with a question mark to get the command parameter list:

>**SET-ST ?**[Enter]
SET-ST sn,id,rpt,ti,si,cgt,txth,a,b,c,d

For example, to program the 5096/A2 Data Transmitter to transmit STATUS 1 sensor data every hour regardless of status states, but also every minute when a status line state becomes open (1) set the Sample Interval parameter, si, to **60**, the Txmit Threshold parameter, ***txth***, to 1, and the Change to Txmit parameter, cgt, to 0. Count the commas between sn and the ti parameter. There are 2 commas.

>**SET-ST 1,,3600,60,0,1**[Enter]
STATUS 1 ID : 9
Report Type : GSR
Transmit Intervl : 3600 sec(s)
Sample Interval : 60 sec(s)
Change to Txmit : 0
Txmit Threshold : 1
Multiplier : 1
Divisor : 1
Base Value : 0
Display Digits : 0

To add a second status sensor, program the STATUS 2 sensor data the same as STATUS 1 above. Use the same ALERT sensor **ID** to combine the status data into one data value.

>**SET-ST 2,,3600,60,0,1**[Enter]
STATUS 2 ID : 9
Report Type : GSR
Transmit Intervl : 3600 sec(s)
Sample Interval : 60 sec(s)
Change to Txmit : 0
Txmit Threshold : 1
Multiplier : 1
Divisor : 1
Base Value : 0
Display Digits : 0

When multiple status sensors are combined into one data value, each status sensor **CAL** data value is set in its corresponding bit position. The STATUS 1 **CAL** data value is set in bit 0, STATUS 2 **CAL** data value is set in bit 1, and so on. For example, if STATUS 1 **CAL** data value is 1 and STATUS 2 **CAL** data value is 0, the combined data value is 1. If STATUS 1 **CAL** data value is 0 and STATUS 2 **CAL** data value is 1, the combined data value is 2. If STATUS 1 **CAL** data value is 1 and STATUS 2 **CAL** data value is 1, the combined data value is 3.

Sensor Set Up: GPS Sensor

The GPS sensor reads and transmits the ALERT2 GPS time status. The time status are:

Data	State	Description	Transmit Action
0	Locked	Transmitter time is synchronized with GPS time.	Data transmitted at TDMA slot time.
2	Drifted	GPS time synchronization lost and transmitter time has drifted.	Timed data transmitted randomly in TDMA frame one frame interval after timed interval.
3	No GPS lock	GPS time not obtained (startup state).	Data not transmitted unless in test mode.

The GPS sensor must read the GPS time and status at regular time intervals to check for changes in state. On the Sample Interval the GPS time status is read stored as RAW data. The **CAL** data value is computed using the calibration coefficients. If the **CAL** data value meets the **Txmit Threshold** and changes by the **Change to Txmit** limit the data is transmitted. The **CAL** data value is always transmitted on the **Transmit Intervl**.

The GPS time and status are read 5 seconds before the sample or transmit interval. For example if the sample interval is 5 minutes, the GPS time and status are read at 00:04:55, 00:09:55, and so on up to 23:59:55. This allows time for the transmitter to adjust its timers for any time drift detected. The GPS sensor data is transmitted on the sample or transmit interval.

Type the command SET-GPS 1 to display the current parameters for the GPS 1 sensor. The default parameters for GPS 1 sensor are:

```
                    All types
>SET-GPS 1[Enter]
GPS 1 ID            : 10
Report Type         : GSR
Transmit Intervl    : 3600 sec(s)
Sample Interval     : 300 sec(s)
Change to Txmit     : 1
Txmit Threshold     : 0
Multiplier          : 1
Divisor             : 1
Base Value          : 0
Display Digits      : 0
```

The GPS 1 sensor is enabled by default to read the GPS time and status every 5 minutes (300 seconds). On the sample interval the status is transmitted on any change of state. The GPS sensor is transmitted every 1 hour (3600 seconds) regardless of change.

Changes to the GPS 1 sensor parameters are made with the SET-GPS 1 command. First type the command SET-GPS with a question mark to get the command parameter list:

>**SET-GPS ?**[Enter]
SET-GPS sn,id,rpt,ti,si,cgt,txth,a,b,c,d

To program the 5096/A2 Data Transmitter to read the GPS sensor and calculate the CAL data every 1 minute, set the Sample Interval, si, parameter to **60**. Count the commas between sn and the si parameter. There are 4 commas. Type the following command to set these parameters and you will get the response:

>**SET-GPS 1,,,,60**[Enter]
GPS 1 ID : 10
Report Type : GSR
Transmit Intervl : 3600 sec(s)
Sample Interval : 60 sec(s)
Change to Txmit : 1
Txmit Threshold : 0
Multiplier : 1
Divisor : 1
Base Value : 0
Display Digits : 0

2.2 Hardware Installation

After unpacking the 5096/A2 Data Transmitter check that it has not been damaged in shipment. Set it up on a work bench and identify the different components. This gives you the opportunity to familiarize yourself with the 5096/A2 and to check that it is functioning properly. Changes to any of the default parameter settings can also be done at this time. A terminal or computer with terminal emulation software is used as the console to program and test the 5096/A2.

Check that a base station computer or 5462 ALERT2 Field Decoder is set up to receive and verify radio transmitter signals from the 5096/A2 Data Transmitter.

The hardware installation may vary depending on the type of transmitter enclosure. Differences in installation are noted by the transmitter enclosure type. For example:

5096/A2 The 5096/A2 Data Transmitter is enclosed in an 8 inch diameter aluminum canister.

5096/A2-N The 5096/A2-N Data Transmitter is enclosed in a NEMA 4X fiberglass enclosure.

2.2.1 Console Cable Connection

Connect the console to the 5096/A2 using the 5071C-5096-1 cable to the internal DB9F console connector or using the 5071C-5096-4 cable to the external MS-7 RS232 connector as described in Section 2.1.1.

2.2.2 Radio Transmitter Check

Radio transmitter **Frequency error**, **Deviation** and **Power output** are factory tested and recorded on the Test Result Report (see Section 6.2, Document Number A101018-4) provided with each 5096/A2 Data Transmitter. The FCC requires that these tests be performed at time of installation and every year thereafter. Should any adjustments be necessary, they should be performed by a qualified technician using the proper test equipment.

For optional dual frequency radios check that the switch on the 5096/A2 Data Transmitter chassis is set to the proper frequency.

2.2.3 Radio Antenna Connection

5096/A2 The antenna is connected to the female BNC connector on the top plate.

5096/A2-N The antenna is connected to the female N-type connector on the enclosure.

2.2.4 GPS Antenna Connection

5096/A2 The antenna is connected to the female SMA connector on the top plate.

5096/A2-N The antenna is connected to the female SMA connector on the enclosure.

2.2.5 Battery Connection

5096/A2 To connect the battery place the battery bracket over the battery with the red and black tapes aligned. Connect the red wire to the positive terminal then connect the black wire to the negative terminal.

Carefully lower the battery on end into the canister. Check that there is a silica gel absorbent pack (Desiccant bag) in the canister. Place the 5096/A2 Data Transmitter into the canister and rotate to align the two holes over the latch screws and put the knobs on.

5096/A2-N Turn off the **POWER** switch on the Screw Terminal Panel. Install the battery with the terminals on the top left and screw the battery bracket into place. Connect the red wire to the positive terminal, marked with red tape and connect the black wire to the negative terminal marked with black tape.

WARNING: Failure to correctly connect the battery can cause extensive DAMAGE to the 5096/A2 Data Transmitter.

2.2.6 Solar Panel or AC Charger Connection

5096/A2 Connect the solar panel or AC charger to the 3 pin MS male connector labeled **12 VDC IN**.

5096/A2-N Connect the solar panel or AC charger to the 3 pin MS male connector. Turn on the **POWER** switch on the Screw Terminal Panel.

WARNING: Connect the battery before connecting the solar panel or AC charger. Never operate the 5096/A2 Data Transmitter without a battery connected.

2.2.7 Sensor Connectors

5096/A2 Sensors are connected to the MS bulkhead connectors on the top plate.

The number of pins and rotation of each connector is unique for each sensor input which prevents incorrect installation. See Section 6.2 Drawing AC104180.

5096/A2-N Sensors are connected to the Screw Terminal Panel. Sensor cables enter the enclosure through the cable strain reliefs. A wiring diagram for typical sensors to the 5096/A2-N is provided in Section 6.2 Drawing AC107911.

Warning: Label sensor cables to prevent damage to the sensors or the 9601 board due to incorrect wiring on the Screw Terminal Panel.

2.2.8 Data Transmitter Installation

5096/A2 The design of the 5096/A2 Data Transmitter allows it to be installed in a standpipe by lowering it from the top of the standpipe or through an optional door. When lowering from the top of the standpipe, attach a 'lifting rope' to the top plate handle and tie off the other end of the rope to the bracket near the top of the standpipe. The cables for the antenna, solar panel and sensor inputs are connected before lowering the transmitter into the standpipe. Carefully lower the transmitter to the bottom of the standpipe.

5096/A2-N The 5096/A2-N in the NEMA type 4X enclosure is designed to be mounted either on a pole or on a backboard. If the unit is exposed to direct sunlight, a sun shield should be used to protect the unit from excessive heat. After the enclosure is mounted, cut excessively long cables (cable that needs to be coiled is excessive) before connecting the antenna, solar panel and sensor inputs to the transmitter. Check that there is a silica gel absorbent pack (desiccant bag) in the enclosure.

3 Hardware Inputs and Outputs
3.1 Hardware Introduction

The 5096/A2 Data Transmitter has the following inputs, outputs and board features:

Sensor Inputs

- Digital inputs
  2 EVENT inputs
  2 COUNTER/WIND inputs
  8 STATUS inputs

- Analog inputs
  7 external ANALOG inputs
  1 internal BATTERY voltage input

- Virtual inputs
  2 virtual PEAK WIND inputs computed from WIND input values

- Serial inputs
  1 serial input set to the GPS time status.

Board Features

- Switches
  RESET, TEST and Station ID number

- LEDs for monitoring board activity and test results
  RUN, TEST ERR, SENS PWR, PWR ERR, TX ON and TEST

- Test points for board level testing and troubleshooting
  TP1(TxData), TP2(Battery), +5V SENS(VREF), CLOCK, GND, +5V(Vcc)

- On board battery with disconnect jumper to reset battery-backed parameters
-
- ALERT2 encoder LEDs
  Green: SERIAL 1, SERIAL 0, GPS LK, RADIO ON. Red: GPS ON, RADIO TX

Communication Outputs

- ALERT2 encoder PCB serial interface

- Console interface for programming and monitoring the 5096/A2 Data Transmitter

3.2 Sensor Inputs

The 5096/A2 Data Transmitter design supports connections to a variety of digital and analog inputs. Some of the standard sensor configurations used with the 5096/A2 Data Transmitter are covered in Section 2.1.6. See Drawings AC104180 and AC107911 in Section 6.2.

3.2.1 Digital Inputs

The 5096/A2 Data Transmitter supports three types of digital inputs: EVENT, COUNTER/WIND, and STATUS. Each digital input type has a unique characteristic suited to a particular application as defined below.

EVENT inputs: (2 provided)

- Each digital input has two input trigger lines and a status line that can increment or decrement the input's accumulator value, depending on the mode selected by programming. The accumulator value range is -2147483648 to 2147483648. When the value is at either limit it rolls over to the other limit, for example from 2147483648 to -2147483648.
-
- The input is capable of continuous counting rates of 60Hz and burst counting rates of as high as 100Hz for several seconds.

- Transmissions can be initiated when an event occurs or on a programmable time interval or both.

COUNTER / WIND inputs: (2 provided)

- Each input has a single trigger line that will increment the input's accumulator value when its counter reaches the programmed pre-divide value. For example, if the pre-divide value is 12, the accumulator will increment by one, each time that 12 signals are counted on the trigger line. When the count is incremented beyond the accumulator's maximum value, the accumulator is reset to zero.

- The pre-divide counter allows continuous input frequencies of up to 600 KHz and burst rates of up to 3 MHz for several seconds.

- Transmissions can be initiated when an event occurs or on a programmable time interval with the wind speed computed.

- The standard configuration for WIND 1 is set up for the Model 5050WS wind speed sensor's signal (AC sine wave). However, it can be reprogrammed as a general purpose up-counter COUNTER 1.

- The standard configuration for COUNTER 2 is set up as a general purpose up-counter. COUNTER 2 accepts momentary contact closures as its signals. This counter can also be programmed as WIND 2

STATUS inputs: (8 provided)

- Each bit in the 8-bit status value represents the status of a single contact closure input line.
- The 8 inputs can be transmitted individually or together as a single STATUS sensor value.
- The STATUS inputs generate transmissions on a timed interval. A sample interval is defined to check for changes in the status line states. Transmissions can be sent for status line changes. A transmit interval is defined to transmit the STATUS value regularly regardless of any status line state changes.

3.2.2 Analog Inputs

ANALOG inputs: (7 provided)

- Each ANALOG input has an input range of 0 to 5 volts.
- The 5096/A2 Data Transmitter has a 10 bit A/D converter, which provides an accuracy of ± 0.2% (± 10 millivolts).
- Transmissions can be initiated on a specified change in the input voltage level (defined as an event) or on a programmable time interval or both.

BATTERY Sensor input: (1 provided)

- The BATTERY sensor input is part of the 5096/A2 Data Transmitter's internal design, no external connector is required.
- The BATTERY sensor input reports the battery voltage within ± .02 volt.
- Transmissions can be initiated on a specified change in battery voltage or on a programmable time interval or both.

3.2.3 Virtual Inputs

PEAK WIND inputs: (2 provided)

- On every sample interval, the wind sensor input count is compared to the current count for the PEAK WIND sensor and the maximum count is saved. The count from WIND 1 is used for PEAK WIND 1 and the count from WIND 2 is used for PEAK WIND 2.

- Transmissions of the maximum value are sent on a programmable time interval.

3.2.4 Serial Sensor Interface

GPS time status: (1 provided)

- The GPS 1 sensor is set to the GPS time status.
-
- Transmissions are made on a specified change for the sample interval or regardless of change for a programmable transmit interval.

3.3 Board Features

The 9601 board features switches for transmitter RESET, TEST and Station ID select, LEDs for monitoring board activity and testing, test points for board level testing and troubleshooting, and an internal battery jumper to allow battery-backed parameters to be reset to default values and erase data logging memory.

3.3.1 Switches

No.	Name	Type	Function
1	RESET	Momentary Push Button	Performs a system reset. The system reset is functionally equivalent to a power-up reset.
2	TEST	Momentary Push Button	Turn test mode on or off. When test mode on, turn on TEST LED, start test mode timer to turn off, send test transmission. When test mode off, turn off TEST LED.
3-6	ID Select	10 Pos. Rotary Switch	Set the Station ID number.

To locate the switches, refer to the M9601 PCB assembly diagram in Section 6.2.

RESET Switch (SW1)

RESET is a push button switch located on the right-hand edge of the 9601 board and is marked **RESET**.

When the RESET switch is pressed and released, the 5096/A2 Data Transmitter restarts its program, and displays on the console:

HydroLynx Systems, Inc. - 5096 ALERT 2 Data Transmitter
Copyright *Year*. All Rights Reserved.
P9601-01-pn Version verR Month Day, Year
Station ID : staid

where pn is the firmware part number suffix, ver is the firmware version number, R is the radio type, ***Month Day, Year*** is the month, day, and year of version release date and staid is the Station ID.

If the **TEST** switch is held down and the **RESET** switch is pressed when the RESETINIT feature is enabled, the 5096/A2 Data Transmitter will execute the command to reset all battery-backed-up parameters to default values and clear logging memory. The 5096/A2 will display on the console:

Battery Backed Up Parameters Initialized
Data Logging Memory Cleared

When the 5096/A2 Data Transmitter program starts, it compares the contents of a RAM memory location with a number stored in the EPROM program. If the two numbers do not match, the 5096/A2 assumes the EPROM program has been changed or that RAM corruption has occurred. In either case, the 5096/A2 executes an INIT command to reset all battery-backed parameters to their default values and displays on the console:

```
Battery Backed Up Parameters Initialized
Data Logging Memory Cleared
```

Then the 5096/A2 Data Transmitter programs the ALERT2 encoder PCB. While waiting for the ALERT2 modem board to restart, the wakeup command is sent.

```
Wakeup ALERT2 encoder
ALERT2…
Timeout
Wakeup ALERT2 encoder
ALERT2…
Timeout
```

When the ALERT2 encoder PCB responds to the wakeup command, the ALERT2 configuration parameters are sent to the ALERT2 encoder:

```
Set Station ID
ALERT2…
Set AirLink parameters
ALERT2…
Set MANT parameters
ALERT2…
Set TDMA parameters
ALERT2…
Save configuration
ALERT2…
Read GPS Time
ALERT2…
GPS Time          : 01/01/2011 00:00:11 UTZ
Local Time        : 01/01/2011 00:00:11 UTZ
GPS Time Status   : No GPS lock
```

On power up it can take up to 13 minutes for the GPS time to be locked. The GPS time and status are read every minute until the GPS time is locked:

```
Read GPS Time
ALERT2…
GPS Time          : 11/05/2014 00:34:56 UTZ
Local Time        : 11/04/2014 16:36:48 PST
GPS Time Status   : Locked
Timers aligned
>
```

The 5096/A2 Data Transmitter is ready to transmit data when the GPS time status is locked. Before the time is locked no transmissions are made unless the transmitter if put in test mode.

TEST Switch (SW2)

TEST is a push button switch located at the bottom left corner of the 9601 board and is marked **TEST**.

When the TEST switch is pressed, the transmitter enters test mode. The TEST LED is turn on. A timer is started to turn off test mode. The default timer is 1 hour. The current data values of all active sensors are transmitted as a Level 1 test is executed. See Section 5.2.2 and 5.2.3 for the actions performed by the TEST switch.

When the TEST switch is pressed a second time, the transmitter leaves test mode. The test mode timer is cancelled, and the TEST LED is turned off.

Pressing the TEST switch usually has no effect on either the battery-backed parameters or the data logging memory. The one exception is when the 5096/A2 Data Transmitter is reset while the TEST switch is pressed and held down. In this case the 5096/A2 Data Transmitter will execute the INIT command to reset all battery-backed-up parameters to default values and clear logging memory.

ID Switches

The 9601 board has a set of four rotary switches, each with ten numbered positions. These switches can be used to set the Station ID number. The Station ID number can also be set with the SET-STAID command.

When a 5096/A2 Data Transmitter transmits sensor data values, it sends the Station ID number and the ALERT2 Sensor ID number. The Station ID and Sensor ID numbers are used by the base station computer software for data storage in its database.

The ID switches (SW3 through SW6 on the schematic drawing) are located on the left-hand edge of the board and are labeled ID0, ID1, ID2, ID3.

The number set by ID3 is the thousands digit. ID2 is the hundreds digit. ID1 is the tens digit, and ID 0 is the ones digit. For example, a Station ID of 1930 would be set by placing the switches into the following positions:

ID3 = 1
ID2 = 9
ID1 = 3
ID0 = 0

3.3.2 9601 LEDS

6 LEDs are provided on the 9601 board to aid in monitoring Data Transmitter activity and to help in testing and troubleshooting.

To conserve power, the LEDs are normally all off. When a 5071C-5096/A2 cable is connected to the console port the RUN LED stays on.

The LED numbers, their color, names and functions are:

No.	Color	Name	Function
1	Green	RUN	On while microprocessor is active, or the console is plugged in. Flashes each clock tick (default=10 sec.) when in power saving mode.
2	Red	ERR	Flashes 4 times when a Level 1 Test detects errors.
3	Yellow	SENS PWR	On when switched ANALOG power is on.
4	Red	PWR ERR	On for errors in the 5 volt Reference power supply (VREF).
5	Red	Tx ON	No longer used.
6	Yellow	TEST	On during a test sequence.

3.3.3 ALERT2 Encoder LEDS

The ALERT2 encoder PCB has 6 LEDs. The LED numbers, their color, names and functions are:

No.	Color	Name	Function
D2	Green	SERIAL 1	Reserved for future use.
D5	Green	SERIAL 0	On when data buffered from 5096/A2.
D3	Red	GPS ON	On GPS power on.
D6	Green	GPS LK	On GPS time locked.
D4	Red	RADIO TX	On when radio transmit on.
D7	Green	RADIO ON	On when radio power on.

3.3.4 Test Points

Test points are provided on the 9601 board to aid in testing and troubleshooting Data Transmitter performance.

The test point numbers, names, labels and descriptions are:

No.	Name	Label	Description
1	Battery	TP2	Battery voltage should be 12.5 - 14.0 Vdc
2	VREF	+5V SENS	Switched reference voltage should read 5.000 ± 0.005 Vdc when an analog sensor is being read or the analog power has been turned on.
3	Clock	CLOCK	Internal system clock; requires a frequency counter or an oscilloscope.
4	Ground	GND	Ground reference point.
5	Vcc	+5V	+5 Vdc power for the logic circuits; should read 5.00 ± 0.25 Vdc at all times.

3.3.5 Internal Battery Jumper

A shorting-block connector for disconnecting the internal back-up battery is located at JB2 on the right side of the board. To reset all battery-backed parameters to their default values and clear data logging memory, disconnect the external main battery and remove the internal battery jumper at JB2.

WARNING: Removing the internal battery jumper and disconnecting the external battery will reset all battery-backed parameters to default values and erase all data stored in logging memory.

Disconnect the internal battery jumper, JB2, and the main battery, then wait approximately 60 seconds. Reconnect the battery jumper and connect the main battery. When the 5096/A2 Data Transmitter program starts it compares a RAM memory value to a value stored in the EPROM program. If the two values do not match, the program will execute the INIT command. On the console, the 5096/A2 will display its power up message followed by:

Battery Backed Up Parameters Initialized
Data Logging Memory Cleared

3.4 Communications

The 5096/A2 Data Transmitter provides a radio telemetry interface that allows it to report sensor data values to the base station software system. It also provides a console interface that allows a console terminal to program and monitor Data Transmitter activity.

3.4.1 Telemetry Interface

The 5096/A2 telemetry interface allows the 5096/A2 Data Transmitter to be connected to the ALERT2 encoder PCB. This interface shares the RS232 port J5 on the 9601 board.

The supported ALERT2 format is IND API version 0.

3.4.2 Console Interface

The console interface is used to connect the 5096/A2 Data Transmitter to a console for programming and monitoring purposes.

The console interface is an RS232 serial port configured as a DTE. The RS232 serial port is a 9 pin female 'D' connector located on the upper right corner of the 9601 board at J5.

The fact that this interface port is configured as a DTE means that you must use a NULL Modem cable to communicate with the 5096/A2 Data Transmitter from a computer serial port.

An additional feature of the 5096/A2 Data Transmitter is that it enters a power-down mode 20 seconds after the last command entered. After the 5096/A2 enters power-down mode, it takes one keystroke to wake it up. Unfortunately, the keystroke is lost.

To prevent the 5096/A2 Data Transmitter from entering power-down mode, connect DTR and DSR pins (4 and 6) on the console serial port. As long as these pins are connected, the 5096/A2 will stay in RUN mode and never enter power-down mode.

The pin-out for the serial port is:

Pin	Name	Description
1	CD	Carrier Detect (Not used)
2	RXD	Receive Data, serial in
3	TXD	Transmit Data, serial out
4	DTR	Data Terminal Ready
5	GND	Signal Ground
6	DSR	Data Set Ready
7	RTS	Request to Send (Not used)
8	CTS	Clear to Send
9	RI	Ring Indicator (Not used)

4 Programming
4.1 Introduction

This section describes the commands used to program the 5096/A2 Data Transmitter. A personal computer is typically used as the operator's programming console. The personal computer may be a notebook or portable style for use at the remote station. The personal computer is connected into the 5096/A2 through the RS232 port with a 5071C-5096-1 internal cable or 5071C-5096-4 external cable. The software used to program and operate the 5096/A2 can be Microsoft Windows Terminal software, Microsoft HyperTerminal software, or any other terminal emulation software.

4.2 Firmware Version

9601-01 version 5.2 is the current version of HydroLynx Systems firmware release for the 5096/A2 Data Transmitter. Descriptions of both the system commands and the default parameters for version 5.2 are provided within this manual.

HydroLynx Systems invites customer comments and suggestions for future firmware improvements and features. Whenever new firmware versions are released, updates to this manual will also be released. Version 5.2 commands and default parameters will remain in effect unless specifically changed by an addendum to the manual. Always check for the latest firmware version and related documentation whenever the 5096/A2 Data Transmitter is to be programmed.

4.3 Rules for Entering Commands

Most of the 5096/A2 Data Transmitter commands have one or more associated parameters. Some of the commands require specific parameters, while other commands may have parameters that are optional. The rules for entering commands and parameters are:

- Commands may be typed in either upper or lower case after the 5096/A2 Data Transmitter command prompt, **>**. Commands are executed when **[Enter]** is pressed.
- When a command has parameters associated with it, the first parameter must be separated from the command by one or more spaces.
- When two or more parameters are specified, the parameters must be separated by a field delimiter. A field delimiters can be a space, comma (**,**), colon (**:**), or forward slash (**/**).
- If one or more parameters are omitted between two that are specified, non-space field delimiters must still be typed to mark the omitted parameters.
- If all parameters are omitted after a given point, then the field delimiter for those parameters need not be typed.
- All parameters must be typed in the range and format specified in the command description.
- A period (**.**) will repeat the last command.
- ^C (**[Ctrl]C**) will break out of the last command.
- ^S (**[Ctrl]S**) will pause the display during command execution.

NOTE: **To simplify the command descriptions that follow, the field delimiter is shown as a comma. A space, colon, or forward slash can be substituted for the comma.**

4.4 Battery Protected Parameters

The main battery powers the 9601 board, ALERT2 encoder PCB, radio, and ANALOG sensors. Additionally, the 5096/A2 Data Transmitter has an independent, small, long-life battery that maintains the values stored in the system's memory. These values are referred to as "battery-backed-up" or battery protected parameters. Battery protected values are maintained in the 5096/A2 memory independent of whether or not the main battery is connected or the condition of the battery's state of charge.

The parameters may be changed by command. The new values are retained until both batteries are disconnected or until the INIT command is given.

4.5 Command Help Facilities

The 5096/A2 Data Transmitter can help the operator to enter commands correctly. Each command has zero or more parameters which can be listed on the console either by typing the command followed by a space and a question mark (**?**) or by typing the word HELP followed by a space and the command. For example type either of these commands and you will get the response:

>**SET-AN ?**[Enter]
or
>**HELP SET-AN**[Enter]
SET-AN sn,id,rpt,ti,si,cgt,txth,a,b,c,d,trim

HELP, entered by itself, lists all commands, and HELP followed by a partial command will list all commands that are similar or close to that entry.

If a command cannot be interpreted, an error message will be displayed. Refer to Section 4.9 for a complete list of error messages.

4.6 Command Examples

The following examples show how the SET-AN command can be used to set and view the parameters associated with it. The rules demonstrated in this example apply to all commands. To set the following parameters:

sn	***id***	***rpt***	***ti***	***si***	***cgt***	***txth***	***a***	***b***	***c***	***d***
1	2	2	3600	300	5	0	100	1023	0	0

Type the following command after the **>**prompt:

>**SET-AN 1,2,2,3600,300,5,0,100,1023,0,0**[Enter]
or
>**SET-AN 1 2 2 3600 300 5 0 100 1023 0 0**[Enter]

If a parameter is not going to be changed, it may be omitted by using consecutive non-space delimiters: comma, slash, colon (**,** */* **:**). For example, to change only txth, cgt, and a (but NOT change ***id, rpt,*** ti***,*** si***, b,*** c, and d):

sn	***id***	***rpt***	***ti***	***si***	***cgt***	***txth***	***a***	***b***	***c***	***d***
1	---	---	---	---	6	2	255	---	---	---

type the following command after the **>**prompt:

>**SET-AN 1,,,,,6,2,255**[Enter]

Note that spaces will NOT serve to delimit an omitted parameter.

To display the current parameters values for ANALOG 1 type the command after the **>**prompt and you will get the response:

>**SET-AN 1**[Enter]
ANALOG 1 ID : 2
Report Type : MSR
Transmit Intervl : 3600 sec(s)
Sample Interval : 300 sec(s)
Change to Txmit : 6
Txmit Threshold : 2
Multiplier : 255
Divisor : 1023
Base Value : 0
Display Digits : 0
Trim Enable : Disabled

4.7 Command Descriptions

A description of all 5096/A2 Data Transmitter commands follows, in alphabetical order. The formats for input and output, as well as the command's parameters are shown. *Italics* indicate ***optional*** parameters.

The **HEADING** section shows the command's name and function.

The **FORMAT** section shows the command name in **CAPITAL** letters followed by the parameter list. Optional parameters are shown in **italics**. Optional parameters that are not included in a command line are replaced by default values. Choices in optional parameters are separated by a bar, ***choice1* | *choice 2***.

The **OUTPUT** section shows the **console display** after the command has been entered. Parameter names that are replaced by values are displayed in ***italics***. The output parameter names are described in tables with ranges and default values.

The **PARAMETER** section shows each parameter's name, description, range, and default values for 5096/A2-N version 5.0 (See Section 2.1.6 for other package default parameters). All command parameters are described in section 4.8.

The **DESCRIPTION** section describes the actions performed by the command and includes examples. In the examples, commands are typed after the command prompt **>**and are followed on the next line by the command output. For example:

```
>AD-ON[Enter]
Analog Power ON
```

Warnings associated with a command are highlighted with bars. For example:

WARNING: This command will reset all parameters to their default values.

The **SEE** section lists the names of related commands.

AD-OFF Turn off the switched analog power.

FORMAT: **AD-OFF**

OUTPUT: Analog Power OFF
or
Analog Power Remaining On

PARAMETERS: None

DESCRIPTION: The AD-OFF command is used to turn off the switched analog power after it has been turned on by the AD-ON command. The AD-ON and AD-OFF commands must be entered in pairs. For example the sequence:

>**AD-ON**[Enter]
Analog Power ON
>**AD-OFF**[Enter]
Analog Power OFF

turns the analog power on and then off. The sequence:

>**AD-ON**[Enter]
Analog Power ON
>**AD-ON**[Enter]
Analog Power Already On
>**AD-OFF**[Enter]
Analog Power Remaining On

would leave the analog power on. The single AD-OFF command canceled only one of the two AD-ON commands.

VERSION: 5.0

SEE: AD-ON, READ-AN, READ-BATT

AD-ON Turn on the switched analog power.

FORMAT: **AD-ON**

OUTPUT: Analog Power ON
or
Analog Power Already On

PARAMETERS: None

DESCRIPTION: The AD-ON command is used to turn on the switched analog power. It can be turned on to allow the testing of the analog circuitry and the sensor connected to it. The AD-ON and AD-OFF commands must be entered in pairs. For example the sequence:

>**AD-ON**[Enter]
Analog Power ON
>**AD-OFF**[Enter]
Analog Power OFF

turns the analog power on and then off. The sequence:

>**AD-ON**[Enter]
Analog Power ON
>**AD-ON**[Enter]
Analog Power Already On
>**AD-OFF**[Enter]
Analog Power Remaining On

would leave the analog power on. The single AD-OFF command canceled only one of the two AD-ON commands.

VERSION: 5.0

SEE: AD-OFF, READ-AN, READ-BATT

ALIGN Align all system timers to the current time.

FORMAT: **ALIGN**

OUTPUT: Timers aligned

PARAMETERS: None

DESCRIPTION: After the transmitter time is changed, all timers are aligned. The system time is changed by:

Daylight savings time change
GPS time lock
GPS time correction after lock
INIT command
RESET command
SET-TZ time zone set command
SET-TIME manual time set

It is not necessary to align timers when sensor transmit or sample times are set. These times are automatically aligned with the start of the hour.

Use the ALIGN command to force all timers aligned:

>**ALIGN**[Enter]
Timers aligned

VERSION: 5.0

SEE: INIT, SET-TZ

CHK-MEM Display the data logging memory available.

FORMAT: **CHK-MEM**

OUTPUT:

Total Mem Avail : ma bytes
Total Mem Used : mu bytes
Percent Used : pct %

Name	Description	Range	Initial value
ma	Total Memory	0 to 24576	24576
mu	Used Memory	0 to ma	0
pct	Percent Used	mu/ma * 100	0

PARAMETERS: None

DESCRIPTION: This command displays the amount of memory available, the amount of memory used, and the percentage of memory used.

Sensor data reports logged use 8 bytes for all reports.

For example, if the station was logging timed reports every hour for 1 month for 3 sensors (24hours * 31days * 3sensor * 8bytes) and 25 event reports were logged (25event * 8bytes), the CHK-MEM command would display:

>**CHK-MEM**[Enter]
Total Mem Avail : 24576 bytes
Total Mem Used : *18056* bytes
Percent Used : *73.47* %

VERSION: 5.0

SEE: CLEAR-MEM, GET-MEM, SET-MEM

CLEAR-MEM Clear all data from the data logging memory.

FORMAT: **CLEAR-MEM**

OUTPUT: Data Logging Memory Cleared

PARAMETERS: None

DESCRIPTION: With this command you can clear the data-logging memory after retrieving logged data. All data logging tables are freed.

For example:

>**GET-MEM**[Enter]
(Data reports are printed and logged by portable computer)
>**CLEAR-MEM**[Enter]
Data Logging Memory Cleared

Data logging memory and tables are also cleared by an INIT command.

WARNING: Once data logging memory is cleared, logged data reports can no longer be recovered.

VERSION: 5.0

SEE: ALIGN, CHK-MEM, GET-MEM, INIT, SET-MEM

GET-MEM Display logged data reports.

FORMAT: **GET-MEM** id,h1,m1,YYY1,M1,D1,h2,m2,YYY2,M2,D2

OUTPUT: The logged data will be displayed one sensor value per line in the following format:

STAID SID YYYY MM DD hh mm ss VV.VV

Where:

#	ASCII pound sign (character 23H)
STAID	station ID
SID	sensor ID
YYYY	4 digit year
MM	2 digit month (01 = January)
DD	2 digit day
hh	2 digit hour (24 hour clock)
mm	2 digit minute
ss	2 digit second
VV.VV	sensor value

Each line is followed by:

[CR]	ASCII carriage return (character 0DH)
[LF]	ASCII line feed (character 0AH)

All numbers are displayed in decimal with leading zeros to pack the fields. For example, a data value of 12.45 from station 43020, sensor 8, logged at 12:41:00 on May 19, 2014 would be displayed as:

43020 8 2014 05 19 12 41 00 12.45

PARAMETERS:

Name	Description	Range	Default Value
id	Sensor ID	0 to 254	All
h1	Start Hour	0 to 23	0
m1	Start Minute	0 to 59	0
YYY1	Start Year	1970 to 2105	1970
M1	Start Month	1 to 12	1
D1	Start Day	1 to 31	1
h2	End Hour	0 to 23	23
m2	End Minute	0 to 59	59
YYY2	End Year	1970 to 2105	2105
M2	End Month	1 to 12	12
D2	End Day	1 to 31	31

DESCRIPTION: This command will display all data collected between the start and end times for the specified sensor. If no sensor ID is specified, then all sensor values will be displayed.

For example, to display logged data reports for sensor ID 8 since

12:30 P.M. on May 19, 2014, type the command:

>**GET-MEM 8,12,30,2014,05,19**[Enter]
STAID 8 2014 05 19 13 00 00 12.45

STAID is the station ID number. For example, to display logged data reports for all sensors up to midnight on May 31, 2014, type the command:

>**GET-MEM ,,,,,,0,0,2014,6,1**[Enter]
STAID 0 2014 05 19 12 00 00 0
STAID 8 2014 05 19 12 00 00 12.45
STAID 0 2014 05 19 13 00 00 0
STAID 8 2014 05 19 13 00 00 12.45

When the 5096/A2 Data Transmitter is connected to a portable computer loaded with communications software, you can save the data to disk using the command GET-MEM. Section 2.1.5 has detailed instructions on how to download data.

VERSION: 5.0

SEE: CHK-MEM, CLEAR-MEM, SET-MEM

HELP List transmitter commands and their parameters.

FORMAT: **HELP** string

OUTPUT: (*Command synt*ax)

PARAMETERS:

Name	Description	Range	Default Value
string	Search String	8 chars	All commands

DESCRIPTION: The HELP command will display a list of commands and their parameters. If the HELP command is entered alone, all commands will be listed alphabetically. When a string is entered after the command, only commands which start with string will be listed. For example, to display a list of commands that start with SET type the command:

>**HELP SET**[Enter]
SET-A2
SET-AN sn,id,rpt,ti,si,cgt,txth,a,b,c,d,trim
SET-BATT sn,id,rpt,ti,si,cgt,txth,a,b,c,d,trim...

VERSION: 5.0

SEE: See Section 4.5 for more information on help facilities.

INIT Initialize all battery-backed-up parameters.

FORMAT: **INIT**

OUTPUT: Battery Backed Up Parameters Initialized
Data Logging Memory Cleared
Timers aligned

PARAMETERS: None

DESCRIPTION: The parameters set by commands are stored in non-volatile, battery-backed-up RAM. Values are retained even when the 5096/A2 Data Transmitter is disconnected from the main battery. The INIT command resets all battery backed up parameters to their default values and clears data-logging memory. The station ID number is read from the switches and all sensor timers are aligned.

Before programming a transmitter, it is wise to do an INIT command so you are starting with a known set of command parameters. For example:

>**INIT**[Enter]
Battery Backed Up Parameters Initialized
Data Logging Memory Cleared
Timers aligned
>SET-EV 2, ...

WARNING: Using the INIT command will reset ALL programmed parameters to the default settings and will CLEAR ALL data stored in memory. You cannot recover previously set parameters or logged data after performing an INIT command.

VERSION: 5.0

SEE: ALIGN, CLEAR-MEM

READ-AN Read and display ANALOG sensor data values.

FORMAT: **READ-AN** sn

OUTPUT:
ANALOG sn ID : id
Raw Reading : raw
Cal Reading : cal

Name	Description	Range
sn	Sensor Number	1 to 8
id	Sensor ID	0 to 254
raw	Raw Reading	0 to 1023
cal	Cal Reading	+/-XX.XX

PARAMETERS:

Name	Description	Range
sn	Sensor Number	1 to 8

DESCRIPTION: This command turns on analog power, reads the ANALOG sensor value, and displays both the RAW and CAL data values. CAL data decimal digits displayed is set in the sensor calibration.

For example, to read and display data values for ANALOG 4, type the command:

>**READ-AN 4**[Enter]
ANALOG 4 ID : 3
Raw Reading : 512
Cal Reading : 987.0

The data value read by this command is not logged. This command does not interfere with normal data sampling, logging and transmission.

VERSION: 5.0

SEE: AD-ON, AD-OFF, READ_BATT, SET-AN, SET-WARM

READ-BATT Read and display the BATTERY sensor data values.

FORMAT: **READ-BATT**

OUTPUT:
ANALOG 8 ID : id
Raw Reading : raw
Cal Reading : cal

Name	Description	Range
sn	Sensor Number	8
id	Sensor ID	0 to 254
raw	Raw Reading	0 to 1023
cal	Cal Reading	+/-XX.XX

PARAMETERS: None

DESCRIPTION: This command turns on analog power, reads the ANALOG 8 BATTERY sensor value, and displays both the RAW and CAL data values. CAL data decimal digits displayed is set in the sensor calibration.

For example, to read and display the data values for the BATTERY sensor, type the command:

>**READ-BATT**[Enter]
ANALOG 8 ID : 8
Raw Reading : 798
Cal Reading : 12.51

The data value read by this command is not logged. This command does not interfere with normal data sampling, logging and transmission.

VERSION: 5.0

SEE: AD-ON, AD-OFF, READ-AN, SET-BATT, SET-WARM

READ-CTR Read and display COUNTER sensor data values.

FORMAT: **READ-CTR** sn

OUTPUT:
COUNTER sn ID : id
Raw Reading : raw
Cal Reading : cal

Name	Description	Range
sn	Sensor Number	1 to 2
id	Sensor ID	0 to 254
raw	Raw Reading	0 to 65535
cal	Cal Reading	+/-XX.XX

PARAMETERS:

Name	Description	Range
sn	Sensor Number	1 to 2

DESCRIPTION: This command gets the current accumulator value of a COUNTER sensor and displays the RAW and CAL data values. CAL data decimal digits displayed is set in the sensor calibration.

For example, to get and display the data values for COUNTER 2, type the command:

>**READ-CTR 2**[Enter]
COUNTER 2 ID : 1928
Raw Reading : 12
Cal Reading : 12

The data value read by this command is not logged. This command does not interfere with normal data sampling, logging and transmission.

VERSION: 5.0

SEE: READ-WI, SET-CTR, SET-WI, WRITE-CTR

READ-EV Read and display EVENT sensor data values.

FORMAT: **READ-EV** sn

OUTPUT:
EVENT sn ID : id
Raw Reading : raw
Cal Reading : cal

Name	Description	Range
sn	Sensor Number	1 to 2
id	Sensor ID	0 to 254
raw	Raw Reading	0 to 65535
cal	Cal Reading	+/-XX.XX

PARAMETERS:

Name	Description	Range
sn	Sensor Number	1 to 2

DESCRIPTION: This command gets the current accumulator value of an EVENT sensor and displays the RAW and CAL data values. CAL data decimal digits displayed is set in the sensor calibration.

For example, to get and display the data values for EVENT 2, type the command:

>**READ-EV 2**[Enter]
EVENT 2 ID : 1930
Raw Reading : 12
Cal Reading : 12

The data value read by this command is not logged. This command does not interfere with normal data sampling, logging and transmission.

VERSION: 5.0

SEE: SET-EV, WRITE-EV

READ-GPS Read and display GPS time status.

FORMAT: **READ-GPS** sn

OUTPUT:
Read GPS Time
ALERT2…
GPS Time : ***utz_time*** UTZ
Local Time : ***local_time tzname***
GPS Time Status : ***gps_status***
GPS sn ID : id
Raw Reading : raw
Cal Reading : cal

Name	Description	Range
utz_time	GPS time in UTZ	MM/DD/YYYY HH:MM:SS
local_time	GPS time in local time	MM/DD/YYYY HH:MM:SS
tzname	Time zone name	set by SET-TZ command
gps_status	GPS time status	Locked, Drifted, No GPS Lock
sn	Sensor Number	1
id	Sensor ID	0 to 254
raw	Raw Reading	0 to 3
cal	Cal Reading	+/-XX.XX

PARAMETERS:

Name	Description	Range
sn	Sensor Number	1

DESCRIPTION: This command reads the GPS time and status then displays the current time in UTZ and local time zone, GPS time status, RAW and CAL data values. CAL data decimal digits displayed is set in the sensor calibration. GPS time status RAW data value and status are:

RAW	Status
0	Locked
2	Drifted
3	No GPS lock

For example, to read the GPS time status type the command:

```
>READ-GPS 1
Read GPS Time
ALERT2…
GPS Time          : 11/14/2014 00:20:57 UTZ
Local Time        : 11/13/2014 16:20:57 PST
GPS Time Status   : Locked
GPS 1 ID          : 10
Raw Reading       : 0
Cal Reading       : 0
```

If the read GPS time command fails you will see a timeout message:

```
>READ-GPS 1[Enter]
Read GPS Time
ALERT2…
Timeout
```

The data value read by this command is not logged. This command does not interfere with normal data sampling, logging and transmission.

VERSION: 5.0

SEE: READ-TIME, SET-GPS, SET-TZ

READ-IDSW Read and display the Station ID switches.

FORMAT: **READ-IDSW**

OUTPUT: Station ID : staid

Name	Description	Range
staid	Station ID	0 to 9999

PARAMETERS: None

DESCRIPTION: This command reads the Station ID switches, sets and displays the Station ID. If the **Station ID** is changed, the ALERT2 encoder source address is set.

For example, to read, set and display the Station ID from the Station ID switches, type the command:

>**READ-IDSW**[Enter]
Station ID : 5000
Set Station ID
ALERT2…
Save configuration
ALERT2…

WARNING: The Station ID switch range is 0 to 9999 which does not cover the entire ALERT2 source address range of 1 to 65534.

VERSION: 5.0

SEE: SET-STAID

READ-PK Read and display PEAK WIND sensor data values.

FORMAT: **READ-PK** sn

OUTPUT:
PEAK WIND sn ID : id
Raw Reading : raw
Cal Reading : cal

Name	Description	Range
sn	Sensor Number	1 to 2
id	Sensor ID	0 to 254
raw	Raw Reading	0 to 65535
cal	Cal Reading	+/-XX.XX

PARAMETERS:

Name	Description	Range
sn	Sensor Number	1 to 2

DESCRIPTION: This command gets the current peak wind data for a PEAK WIND sensor and displays the RAW and CAL data values. The RAW count is the maximum number of pulses saved and the CAL data value is maximum wind speed saved since the last PEAK WIND sensor transmission. CAL data decimal digits displayed is set in the sensor calibration.

For example, to get and display the data values for PEAK WIND 1, type the command:

>**READ-PK 1**[Enter]
PEAK WIND 1 ID : 6
Raw Reading : 37
Cal Reading : 10

The data value read by this command is not logged. This command does not interfere with normal data sampling, logging and transmission.

VERSION: 5.0

SEE: SET-PK

READ-ST Read and display STATUS sensor data values.

FORMAT: **READ-ST** sn

OUTPUT:
STATUS sn ID : id
Raw Reading : raw
Cal Reading : cal

Name	Description	Range
sn	Sensor Number	1 to 8
id	Sensor ID	0 to 254
raw	Raw Reading	0 to 1
cal	Cal Reading	0 to 1

PARAMETERS:

Name	Description	Range
sn	Sensor Number	1 to 8

DESCRIPTION: This command turns on analog power, reads the STATUS sensor value, and displays both the RAW and CAL data values.

For example, to read and display data values for STATUS 4, type the command:

>**READ-ST 4**[Enter]
STATUS 4 ID : 9
Raw Reading : 1
Cal Reading : 1

The data value read by this command is not logged. This command does not interfere with normal data sampling, logging and transmission.

VERSION: 5.0

SEE: SET-ST

READ-TIME Read and display GPS time.

FORMAT: **READ-TIME**

OUTPUT:
Read GPS Time
ALERT2…
GPS Time : ***utz_time*** UTZ
Local Time : ***local_time tzname***
GPS Time Status : ***gps_status***

Name	Description	Range
utz_time	GPS time in UTZ	MM/DD/YYYY HH:MM:SS
local_time	GPS time in local time	MM/DD/YYYY HH:MM:SS
tzname	Time zone name	set by SET-TZ command
gps_status	GPS time status	Locked, Drifted, No GPS Lock

PARAMETERS: None

DESCRIPTION: This command reads the GPS time and status then displays the current time in UTZ and local time zone, GPS time status. GPS time status RAW data value and status are:

RAW	Status
0	Locked
2	Drifted
3	No GPS lock

For example, to read the GPS time status type the command:

>**READ-TIME**[Enter]
Read GPS Time
ALERT2…
GPS Time : 11/14/2014 00:20:57 UTZ
Local Time : 11/13/2014 16:20:57 PST
GPS Time Status : Locked

If the read GPS time command fails you will see a timeout message:

>**READ-TIME**[Enter]
Read GPS Time
ALERT2…
Timeout

VERSION: 5.0

SEE: SET-TZ

READ-WI Read and display WIND sensor data values.

FORMAT: **READ-WI** sn

OUTPUT:
WIND sn ID : id
Raw Reading : raw
Cal Reading : cal

Name	Description	Range
sn	Sensor Number	1 to 2
id	Sensor ID	0 to 254
raw	Raw Reading	0 to 65535
cal	Cal Reading	+/-XX.XX

PARAMETERS:

Name	Description	Range
sn	Sensor Number	1 to 2

DESCRIPTION: This command gets the current wind data for a WIND sensor and displays the RAW and CAL data values. The RAW count is the average number of pulses saved and the CAL data value is average wind speed saved since the last WIND sensor transmission. CAL data decimal digits displayed is set in the sensor calibration.

For example, to get and display the data values for WIND 1, type the command:

>**READ-WI 1**[Enter]
WIND 1 ID : 4
Raw Reading : 37
Cal Reading : 10

The data value read by this command is not logged. This command does not interfere with normal data sampling, logging and transmission.

VERSION: 5.0

SEE: READ-CTR, SET-CTR, SET-WI, WRITE-CTR

RESET Reset the transmitter.

FORMAT: **RESET**

OUTPUT:
HydroLynx Systems, Inc. - 5096-***pn*** ALERT 2 Data Transmitter
Copyright 2014. All Rights Reserved.
P9601-01-***pn*** Version verR ***verDate***
Station ID : ***staid***
Wakeup ALERT2 encoder
ALERT2…
Set Station ID
ALERT2…
Set AirLink parameters
ALERT2…
Set MANT parameters
ALERT2…
Set TDMA parameters
ALERT2…
Save configuration
ALERT2…
Read GPS Time
ALERT2…
GPS Time : ***utz_time*** UTZ
Local Time : ***local_time tzname***
GPS Time Status : ***gps_status***

Name	Description	Range
pn	Sensor input package	54, 81, 90, N
ver	Firmware Version	5.2
R	Radio type	M, ME, R
verDate	Version release date	MMM DD, YYYY
staid	Station ID	1 to 65534
utz_time	GPS time in UTZ	MM/DD/YYYY HH:MM:SS
local_time	GPS time in local time	MM/DD/YYYY HH:MM:SS
tzname	Time zone name	set by SET-TZ command
gps_status	GPS time status	Locked, Drifted, No GPS Lock

PARAMETERS: None

DESCRIPTION: This command causes the same reset action as pressing the **RESET** switch on the 9601 board. The firmware copyright notice, part number, version number and release date are displayed when the firmware program restarts. The transmitter waits for the ALERT2 encoder to wake up and then sends set its parameters.

VERSION: 5.2

SEE: RESETCNT

RESETCNT Display or set the Reset count.

FORMAT: **RESETCNT** rcnt

OUTPUT: Reset count : rcnt

Name	Description	Range
rcnt	Reset Count	0 - 65535

PARAMETERS:

Name	Description	Range	Default value
rcnt	Reset Count	0 - 65535	No change

DESCRIPTION: This command displays the Reset count if no parameter is supplied. If a parameter is supplied with this command, the Reset count is set to the parameter value before it is displayed.

The Reset count is incremented each time the transmitter is powered on, the **RESET** switch is pressed, the Reset command is entered or the micro-processor restarts the firmware program due to a hardware or software fault.

For example, to display the Reset count and then reset it, type the commands:

>**RESETCNT**[Enter]
Reset count : 5
>**RESETCNT 0**[Enter]
Reset count : 0

The RESETCNT command is a good diagnostic command to check if your transmitter is restarting the firmware too often due to hardware or software faults. Keep a record of the Reset count when you service a transmitter. If the count has increased dramatically since your last service visit, you should contact the factory service technician for instructions.

VERSION: 5.2

SEE: RESET

RESETINIT Display or set the Initialize on TEST-RESET parameter.

FORMAT: **RESETINIT** rstate

OUTPUT: TEST RESET Init : rstate

Name	Description	Range
rstate	Init on TEST-RESET	OFF | ON

PARAMETERS:

Name	Description	Range	Default value
rstate	Init on TEST-RESET	OFF | ON	ON

DESCRIPTION: This command displays the Init on TEST-RESET parameter state. If this parameter is ON, holding the **TEST** switch and then pressing the **RESET** switch will cause the transmitter to execute an INIT command. The INIT command initializes all the non-volatile parameters, setting them to their default values.

For example, to display the Init on TEST-RESET state and then turn it off, type the commands:

>**RESETINIT**[Enter]
TEST RESET Init : ON
>RESETINIT 0[Enter]
TEST RESET Init : OFF

The RESETINIT command is ON by default for 5096/A2 Data Transmitter firmware part numbers 54, 81, 90 and N. This lets you quickly change a transmitter's Station ID and set up the default sensor parameters by holding **TEST** and pressing the **RESET** switch.

VERSION: 5.2

SEE: INIT

SET-A2 Send all parameters to ALERT2 encoder.

FORMAT: **SET-A2**

OUTPUT:
Wakeup ALERT2 encoder
ALERT2…
Set Station ID
ALERT2…
Set AirLink parameters
ALERT2…
Set MANT parameters
ALERT2…
Set TDMA parameters
ALERT2…
Save configuration
ALERT2…
Read GPS Time
ALERT2…
GPS Time : ***utz_time*** UTZ
Local Time : ***local_time tzname***
GPS Time Status : ***gps_status***

Name	Description	Range
utz_time	GPS time in UTZ	MM/DD/YYYY HH:MM:SS
local_time	GPS time in local time	MM/DD/YYYY HH:MM:SS
tzname	Time zone name	set by SET-TZ command
gps_status	GPS time status	Locked, Drifted, No GPS Lock

PARAMETERS: None

DESCRIPTION: This command sends all the configuration parameters to the ALERT2 encoder PCB. First it waits for the ALERT2 encoder PCB to wake up after a power up, then it sends the **Station ID** (ALERT2 source address, see SET-STAID command), **AirLink parameters** (see SET-RF command), **MANT parameters** (see SET-MANT command), **TDMA parameters** (see SET-TDMA command). It finishes by sending the **Save configuration** command to write these parameters in the non-volatile memory of the ALERT2 encoder PCB.

VERSION: 5.2

SEE: RESET, SET-MANT, SET-RF, SET-STAID, SET-TDMA

SET-AN Display or set ANALOG sensor parameters.

FORMAT: **SET-AN** sn,id,rpt,ti,si,cgt,txth,a,b,c,d,trim

OUTPUT:

```
ANALOG sn ID      : id
Report Type       : rpt
Transmit Intervl  : ti sec(s)
Sample Interval   : si sec(s)
Change to Txmit   : cgt
Txmit Threshold   : txth
Multiplier        : a
Divisor           : b
Base Value        : c
Display Digits    : d
Trim Enable       : trim
```

PARAMETERS:

Name	Description	Range	Default value
sn	Sensor Number	1 to 8	
id	Sensor ID	0 to 254	see below
rpt	Report Type	0 to 3	see below
ti	Transmit Intervl	0-2147483647	see below
si	Sample Interval	0-2147483647	see below
cgt	Change to Txmit	+/-XX.XX	1
txth	Txmit Threshold	+/-XX.XX	0
a	Multiplier	+/-XX.XX	1
b	Divider	+/-XX.XX	1
c	Adder	+/-XX.XX	0
d	Decimal Digits	0 to 9	0
trim	Trim Enable	0 to 1	0

DESCRIPTION: The 5096/A2 Data Transmitter supports 7 external analog sensors numbered 1 to 7 and an internal BATTERY sensor number 8.

The Sensor ID can be changed to any other ID not currently assigned to another sensor. An ANALOG sensor is disabled when its ti and si are zero. See Section 2.1.6 for package default values.

For example, to set ANALOG 3 to have ti of 1 hour (3600 seconds), si of 1 minute (60 seconds), cgt of 0.10, txth of 0.05, and offset the raw value with parameter c of -.02 type the command:

```
>SET-AN 3,,,3600,60,0.10,0.05,,,-.02[Enter]
ANALOG 3 ID       : 7 ...
```

VERSION: 5.0

SEE: READ-AN

SET-BATT Display or set the BATTERY sensor parameters.

FORMAT: **SET-BATT** sn,id,rpt,ti,si,cgt,txth,a,b,c,d,trim

OUTPUT:
ANALOG sn ID : id
Report Type : rpt
Transmit Intervl : ti sec(s)
Sample Interval : si sec(s)
Change to Txmit : cgt
Txmit Threshold : txth
Multiplier : a
Divisor : b
Base Value : c
Display Digits : d
Trim Enable : trim

PARAMETERS:

Name	Description	Range	Default value
sn	Sensor Number	8	8
id	Sensor ID	0 to 254	8
rpt	Report Type	0 to 3	2
ti	Transmit Intervl	0-2147483647	3600
si	Sample Interval	0-2147483647	300
cgt	Change to Txmit	+/-XX.XX	0.50
txth	Txmit Threshold	+/-XX.XX	0.00
a	Multiplier	+/-XX.XX	156.77
b	Divider	+/-XX.XX	10000
c	Adder	+/-XX.XX	0.00
d	Decimal Digits	0 to 9	2
trim	Trim Enable	0 to 1	0

DESCRIPTION: The eighth analog channel on the 5096/A2 Data Transmitter is connected to an internal battery sensor which reads the battery's voltage in units of hundredths of volts. The BATTERY sensor is disabled when its ti and si are zero.

For example, to set the Battery sensor to have ti of 1 day (86400 seconds), si of 1 minute (60 seconds), type the command:

>**SET-BATT ,,,86400,60**[Enter]
BATTERY 8 ID : 8...

VERSION: 5.0

SEE: READ-BATT

SET-BAUD Display the console baud rate.

FORMAT: **SET-BAUD** baud

OUTPUT: BAUD RATE : baud

PARAMETERS:

Name	Description	Range	Default value
baud	Baud Rate	9600	9600

DESCRIPTION: The default console baud rate is 9600 baud. It cannot be changed. To display the baud rate, type the command:

```
>SET-BAUD[Enter]
BAUD RATE        : 9600
>
```

The SET-BAUD command has no effect on the baud rate used in ALERT2 radio transmissions, which is fixed at 4800 baud.

VERSION: 5.0

SEE: INIT

SET-CTR Display or set COUNTER sensor parameters.

FORMAT: **SET-CTR** sn,id,rpt,ti,si,cgt,txth,a,b,c,d,ev,we,pdc

OUTPUT:

COUNTER sn ID : id
Report Type : rpt
Transmit Intervl : ti sec(s)
Sample Interval : si sec(s)
Change to Txmit : cgt
Txmit Threshold : txth
Multiplier : a
Divisor : b
Base Value : c
Display Digits : d
Event Detection : ***ev***
Wind Speed : we
Pre-Divide Ctr : pdc

PARAMETERS:

Name	Description	Range	Default value
sn	Sensor Number	1 to 2	
id	Sensor ID	0 to 254	1=4, 2=14
rpt	Report Type	0 to 3	1=2, 2=0
ti	Transmit Intervl	0-2147483647	see below
si	Sample Interval	0-2147483647	see below
cgt	Change to Txmit	+/-XX.XX	0
txth	Txmit Threshold	+/-XX.XX	0
a	Multiplier	+/-XX.XX	1=360, 2=1
b	Divider	+/-XX.XX	1=2094, 2=1
c	Adder	+/-XX.XX	0
d	Decimal Digits	0 to 9	0
ev	Event Detection	0 to 1	0
we	Wind Speed	0 to 1	1=1, 2=0
pdc	Pre-Divide Counter	1 to 32767	1=2094, 2=2

DESCRIPTION: The 5096/A2 Data Transmitter supports two counters. WIND 1 is normally a wind sensor. COUNTER 2 can count switch closures (to ground). A COUNTER sensor is disabled when its ev, ti and si are zero. See Section 2.1.6 for package default values.

For example, to set COUNTER 2 to have ti of 1 hour (3600 seconds), si of 5 minutes (300 seconds), cgt of 1, ev enabled, we disabled, andpdc of 1, type the command:

>**SET-CTR 2,,,3600,300,1,,,,,,1,0,1**[Enter]
COUNTER 2 ID : 14 ...

VERSION: 5.0
SEE: READ-CTR, READ-WI, SET-WI, WRITE-CTR

SET-CTRRESET Display or set COUNTER sensor reset time.

FORMAT: **SET_CTRRESET** sn,hh,mm,ss,YYYY,MM,DD

OUTPUT:
COUNTER sn ID : id
Reset Time : hh:mm:ss YYYY/MM/DD

PARAMETERS:

Name	Description	Range	Default value
sn	Sensor Number	1 to 2	
hh	Hour	0 to 23	0 hours
mm	Minute	0 to 59	0 minutes
ss	Second	0 to 59	0 seconds
YYYY	Year	1970 to 2105	1970
MM	Month	1 to 12	1 (January)
DD	Day of Month	1 to 31	1

DESCRIPTION: A COUNTER sensor can be set up to have its accumulator reset to 0 at a future reset time. When the 5096/A2 Data Transmitter time is updated and the current time is equal to or past the reset time, the COUNTER sensor accumulator is reset to 0, the new CAL data value is transmitted and the reset time is incremented by one year.

For example, to set the COUNTER 2 reset time to September 1, 1995 at 06:30 A.M., type the command:

>**SET-CTRRESET 2,06,30,00,1995,09,01**[Enter]
COUNTER 2 ID : 1928
Reset Time : 06:30:00 1995/09/01

To disable a COUNTER sensor reset time, type the COUNTER sensor number follow by a zero alone. For example, to disable the COUNTER 2 reset time, type the command:

>**SET-CTRRESET 2,0**[Enter]
COUNTER 2 ID : 1928
Reset Time : Disabled

VERSION: 5.0

SEE: SET-CTR, SET-TIME

SET-DEBUG Display and set the diagnostic display level.

FORMAT: **SET-DEBUG** level

OUTPUT: DEBUG LEVEL : level

PARAMETERS:

Name	Description	Range	Default value
level	Diagnostic level	0 to 9	0

DESCRIPTION: Set the diagnostic display level to 1 to show the HEX data sent and received from the ALERT2 encoder board.

```
>SET-DEBUG 1[Enter]
DEBUG LEVEL      : 1
>
```

Read the time to see the HEX data sent and received:

```
>READ-TIME[Enter]
Read GPS Time
41 4c 45 52 54 32
06 7c 01 7e 7c 01 7f
ALERT2…
41 4c 45 52 54 32
06 7e 04 09 d6 0b fe
GPS Time          : 03/25/2015 23:38:38 UTZ
Local Time        : 03/25/2015 23:38:38 UTZ
41 4c 45 52 54 32
03 7f 01 00
GPS Time Status   : Locked
>
```

VERSION: 5.0

SEE: INIT

SET-EV Display or set EVENT sensor parameters.

FORMAT: **SET-EV** sn,id,rpt,ti,si,cgt,txth,a,b,c,d,ev,mode

OUTPUT:

```
COUNTER sn ID    : id
Report Type      : rpt
Transmit Intervl : ti sec(s)
Sample Interval  : si sec(s)
Change to Txmit  : cgt
Txmit Threshold  : txth
Multiplier       : a
Divisor          : b
Base Value       : c
Display Digits   : d
Event Detection  : ev
Event mode       : mode
```

PARAMETERS:

Name	Description	Range	Default value
sn	Sensor Number	1 to 2	
id	Sensor ID	0 to 254	1=27, 2=0
rpt	Report Type	0 to 3	1=0, 2=1
ti	Transmit Intervl	0-2147483647	see below
si	Sample Interval	0-2147483647	see below
cgt	Change to Txmit	+/-XX.XX	1
txth	Txmit Threshold	+/-XX.XX	0
a	Multiplier	+/-XX.XX	1
b	Divider	+/-XX.XX	1
c	Adder	+/-XX.XX	0
d	Decimal Digits	0 to 9	0
ev	Event Detection	0 to 1	1=0, 2=1
mode	Event mode	0 to 12	1=4, 2=6

DESCRIPTION: The 5096/A2 Data Transmitter supports two event sensors. EVENT 1 is intended for use with a float and pulley type river-level gauge. EVENT 2 is intended for use with a precipitation gauge. An EVENT sensor is disabled when its ev, ti, and si are zero.

For example, to set EVENT 1 to have ev enabled, mode of 4, ti of 6 hours (21600 seconds), cgt of 1, type the command:

```
>SET-EV 1,,,21600,,1,,,,,,1,4[Enter]
EVENT 1 ID          : 27...
```

VERSION: 5.0

SEE: READ-EV, WRITE-EV

SET-EVRESET Display or set EVENT sensor reset time.

FORMAT: **SET-EVRESET** sn,hh,mm,ss,YYYY,MM,DD

OUTPUT:
EVENT sn ID : id
Reset Time : hh:mm:ss YYYY/MM/DD

PARAMETERS:

Name	Description	Range	Default value
sn	Sensor Number	1 to 2	
hh	Hour	0 to 23	0 hours
mm	Minute	0 to 59	0 minutes
ss	Second	0 to 59	0 seconds
YYYY	Year	1970 to 2105	1970
MM	Month	1 to 12	1 (January)
DD	Day of Month	1 to 31	1

DESCRIPTION: An EVENT sensor can be set up to have its accumulator reset to 0 at a future reset time. When the 5096/A2 Data Transmitter time is updated and the current time is equal to or past the reset time, the EVENT sensor accumulator is reset to 0, the new CAL data value is transmitted and the reset time is incremented by one year.

For example, to set the EVENT 2 reset time to September 1, 1995 at 06:30 A.M., type the command:

>**SET-EVRESET 2,08,00,00,1995,09,01**[Enter]
EVENT 2 ID : 1930
Reset Time : 06:30:00 1995/09/01

To disable an EVENT sensor reset time, type the EVENT sensor number follow by a zero alone. For example, to disable the EVENT 2 reset time, type the command:

>**SET-EVRESET 2,0**[Enter]
EVENT 2 ID : 1930
Reset Time : Disabled

VERSION: 5.0

SEE: SET-EV, SET-TIME

SET-GPS Display or set GPS sensor parameters.

FORMAT: **SET-GPS** sn,id,rpt,ti,si,cgt,txth,a,b,c,d

OUTPUT:

GPS sn ID	: id
Report Type	: rpt
Transmit Intervl	: ti sec(s)
Sample Interval	: si sec(s)
Change to Txmit	: cgt
Txmit Threshold	: txth
Multiplier	: a
Divisor	: b
Base Value	: c
Display Digits	: d

PARAMETERS:

Name	Description	Range	Default value
sn	Sensor Number	1	1
id	Sensor ID	0 to 254	10
rpt	Report Type	0 to 3	0
ti	Transmit Intervl	0-2147483647	see below
si	Sample Interval	0-2147483647	see below
cgt	Change to Txmit	+/-XX.XX	1
txth	Txmit Threshold	+/-XX.XX	0
a	Multiplier	+/-XX.XX	1
b	Divider	+/-XX.XX	1
c	Adder	+/-XX.XX	0
d	Decimal Digits	0 to 9	0

DESCRIPTION: The 5096/A2 Data Transmitter supports 1 GPS sensor numbered 1.

The Sensor ID can be changed to any other ID not currently assigned to another sensor. A GPS sensor is disabled when its ti and si are zero. See Section 2.1.6 for package default values.

For example, to set GPS 1 to have ti of 1 hour (3600 seconds), si of 1 minute (60 seconds) type the command:

>**SET-GPS 1,,,3600,60**[Enter]
GPS 1 ID : 10 ...

VERSION: 5.0

SEE: READ-GPS

SET-MANT Display or set ALERT2 MANT parameters.

FORMAT: **SET-MANT** hoplimit,addpath,adddest,destid,indts

OUTPUT:
Hop Limit : hoplimit
Add Path Service : addpath
Add Dest Path : adddest
Destination ID : destid
IND Timestamp : indts

PARAMETERS:

Name	Description	Range	Default value
hoplimit	Hop Limit	0 to 7	7 (disabled)
addpath	Add Paths	0 to 1	1 (enabled)
adddest	Add Destination	0 to 1	0 (disabled)
destid	Destination ID	1 to 65534	9999
indts	IND Timestamp	0 to 1	0 (disabled)

DESCRIPTION: This command sets what happens when a packet from this station passes through ALERT2 equipment.

The hoplimit sets the number of times a packet can be repeated. Use 0 for none, 1 to 6 for one to six repeats. Use 7 for disabled which allows unlimited repeats.

When enabled (0 = disabled, 1 = enabled) addpath appends a repeater source address to the packet for each repeater the packet passes through.

When enabled (0 = disabled, 1 = enabled) adddest appends the destination source address to the packet header.

Destination ID, destid, is the destination source address appended to the packet header when adddest is enabled.

When enabled (0 = disabled, 1 = enabled) indts inserts the time a packet is received for transmission. **Do not use this feature since the 5096/A2 has already inserted a time stamp at the start of a data packet.**

For example, to change the hoplimit to 1, type the command:

>**SET-MANT 1**[Enter]
Hop Limit : 1

VERSION: 5.0

SEE: SET-A2

SET-MEM Display or set the data logging parameters.

FORMAT: **SET-MEM** en,of

OUTPUT:
Data logging : en
Data overwrite : of

PARAMETERS:

Name	Description	Range	Default value
en	Data logging	0 to 1	1 (enabled)
of	Data overwrite	0 to 1	1 (enabled)

DESCRIPTION: In addition to transmitting the data that it collects, the 5096/A2 Data Transmitter has the ability to log sensor values in memory. With data logging enabled (0 = disabled, 1 = enabled), each value transmitted is also stored in battery-backed-up RAM (along with the time that the sample was taken). Thus, the 5096/A2 can still collect data without a radio path or even without a radio.

The overflow flag (0 = disabled, 1 = enabled) controls what the 5096/A2 does when its logging memory gets full. To make room for new data by discarding older data, set the flag to 1. Otherwise data logging will stop will logging memory gets full.

For example, to enable data logging and data overwriting when full, type the command:

>**SET-MEM 1,1**[Enter]
Data logging : Enabled
Data overwrite : Enabled

VERSION: 5.0

SEE: CHK-MEM, CLEAR-MEM, GET-MEM, INIT

SET-PK Display or set PEAK WIND sensor parameters.

FORMAT: **SET-PK** sn,id,rpt,ti,si,cgt,txth,a,b,c,d

OUTPUT:
PEAK WIND sn ID : id
Report Type : rpt
Transmit Intervl : ti sec(s)
Sample Interval : si sec(s)
Change to Txmit : cgt
Txmit Threshold : txth
Multiplier : a
Divisor : b
Base Value : c
Display Digits : d

PARAMETERS:

Name	Description	Range	Default value
sn	Sensor Number	1 to 2	
id	Sensor ID	0 to 254	1=6, 2=16
rpt	Report Type	0 to 3	1=2, 2=0
ti	Transmit Intervl	0-2147483647	see below
si	Sample Interval	0-2147483647	see below
cgt	Change to Txmit	+/-XX.XX	1
txth	Txmit Threshold	+/-XX.XX	0
a	Multiplier	+/-XX.XX	1=360, 2=1
b	Divider	+/-XX.XX	1=2094, 2=1
c	Adder	+/-XX.XX	0
d	Decimal Digits	0 to 9	0

DESCRIPTION: The 5096/A2 Data Transmitter supports two PEAK WIND sensors. A PEAK WIND sensor is a virtual sensor in that it derives its value from the WIND sensor with the same ***sn*** sensor number. The wind sensor pulses are read over the sample period, wind speed is computed using the calibration parameters, and the maximum computed wind speed for the sample intervals is transmitted on the transmit interval. A PEAK WIND sensor is disabled when its si and tx are zero.

The PEAK WIND raw count is the maximum number of WIND sensor pre-divide counts, pdc, in a sample interval. To convert to mph, set the a parameter to 3600 / si and the b parameter to the pdc per mile. For example, to set PEAK WIND 1 to have si of 10 seconds, tx of 1 hour (3600 seconds), type the command:

>**SET-PK 1,,,3600,10**[Enter]
PEAK WIND 1 ID : 6…

VERSION: 5.0

SEE: READ-PK, SET-WI

SET-RF Display or set the ALERT2 AirLink parameters

FORMAT: **SET-RF *pwr,car,agc,tail,mod,fec,pre***

OUTPUT:
RF Power Up : ***pwr*** msec
RF Carrier Only : ***car*** msec
RF AGC : ***agc*** msec
RF Tail : ***tail*** msec
RF Mod Invert : ***mod***
RF FEC Type : ***fec***
RF Audio Preload : ***pre*** msec

PARAMETERS:

Name	Description	Range	Default value
pwr	RF Power Up	0 to 2000	750 msecs
car	RF Carrier Only	5 to 255	5 msecs
agc	RF AGC	5 to 255	30 msecs
tail	RF Tail	0 to 255	5 msecs
mod	RF Modulation	0 to 1	0 (normal)
fec	RF FEC Type	0 to 2	0 (LDR)
pre	RF Audio Preload	0 to ***pwr***	100 msecs

DESCRIPTION: The ***pwr*** parameter sets the radio power up time in milliseconds before transmission. The ***car*** parameter sets the transmit carrier only time in milliseconds. The ***agc*** parameter sets the automatic gain control (preamble) in milliseconds. The ***tail*** parameter sets the transmit time in milliseconds at end of transmission frame. The ***mod*** parameter sets the modulation type: 0=normal, 1=inverted. The ***fec*** parameter sets the Forward Error Control (FEC) type: 0=LDR, 1=MDR, 2=HDR. The ***pre*** parameter sets the audio preload time in milliseconds before transmitter key on.

The default parameter values work well with all ALERT2 radios tested except for one exception. Set the ***mod*** parameter to 1 (inverted) for the Maxon SD125VE radio. For example, to set the ***mod*** parameter to 1 (inverted), type the command:

>**SET-RF ,,,,1**[Enter]
RF Power Up : 750 msec
RF Carrier Only : 5 msec
RF AGC : 30 msec
RF Tail : 5 msec
RF Mod Invert : inverted
RF FEC Type : LDR
RF Audio Preload : 100 msec

VERSION: 5.0

SEE: SET-A2

SET-ST Display or set STATUS sensor parameters.

FORMAT: **SET-ST** sn,id,rpt,ti,si,cgt,txth,a,b,c,d

OUTPUT:
```
STATUS sn ID      : id
Report Type       : rpt
Transmit Intervl  : ti sec(s)
Sample Interval   : si sec(s)
Change to Txmit   : cgt
Txmit Threshold   : txth
Multiplier        : a
Divisor           : b
Base Value        : c
Display Digits    : d
```

PARAMETERS:

Name	Description	Range	Default value
sn	Sensor Number	1 to 8	
id	Sensor ID	0 to 254	9
rpt	Report Type	0 to 3	0
ti	Transmit Intervl	0-2147483647	0
si	Sample Interval	0-2147483647	0
cgt	Change to Txmit	+/-XX.XX	1
txth	Txmit Threshold	+/-XX.XX	0
a	Multiplier	+/-XX.XX	1
b	Divider	+/-XX.XX	1
c	Adder	+/-XX.XX	0
d	Decimal Digits	0 to 9	0

DESCRIPTION: The 5096/A2 Data Transmitter supports 8 digital status sensors numbered 1 to 8.

The Sensor ID can be changed to any other ID not currently assigned to another sensor type. A STATUS sensor is disabled when its ti and si are zero. When multiple status sensors are combined into one data value, each status sensor **CAL** data value is set in its corresponding bit position.

For example, to set STATUS 1 to have ti of 1 hour (3600 seconds), si of 1 minute (60 seconds), type the command:

```
>SET-ST 1,,,3600,60[Enter]
STATUS 1 ID       : 9 ...
```

VERSION: 5.0

SEE: READ-ST

SET-STAID Display or set the Station ID number.

FORMAT: **SET-STAID** staid

OUTPUT: Station ID : staid

PARAMETERS:

Name	Description	Range	Default value
staid	Station ID	1 to 65534	ID switches

DESCRIPTION: The Station ID is the ALERT2 source address transmitted in the radio data packets. It is also displayed by the display logged data reports command.

For example, to set the Station ID to 41201, type the command:

>**SET-STAID 41201**[Enter]
Station ID : 41201

VERSION: 5.0

SEE: GET-MEM, READ-IDSW, SET-A2

SET-TDMA Display or set ALERT2 TDMA parameters.

FORMAT: **SET-TDMA** en,frame,len,off,del,ctr,toff

OUTPUT:
```
TDMA Use          : en
TDMA FrameLength: frame msec
TDMA Slot Length  : len msec
TDMA Slot Offset  : off msec
TDMA Slot Delay   : del msec
TDMA Slot Center  : ctr
TDMA TimedOffset : 0 secs
```

PARAMETERS:

Name	Description	Range	Default value
en	TDMA Use	0 to 1	1 (enabled)
frame	Frame Length	5000–3600000	60000
len	Slot Length	250 – 10000	500
off	Slot Offset	0 - (***frame-len***)	0
del	Slot Delay	12 – 250	25
ctr	Slot Center	0 to 1	0 (disabled)
toff	Timed Offset	0 to 432001	0

DESCRIPTION: Set en to 1 to enable TDMA (Time division multiple access) for ALERT2 transmissions. The frame sets how often a station can transmit and limits the number of stations that can transmit in this frame. If all stations use 500 millisecond slot lengths and the frame is 60,000 milliseconds, 120 stations can transmit in the frame.

The Slot Length, len, parameter sets the transmission length. Most 5096/A2 stations can transmit in a 500 millisecond time slot. If the RF FEC Type is set to 1=MDR or 2=HDR, then a 250 millisecond time slot can be used.

Each ALERT2 station is assigned a unique time slot that starts at the Slot Offset, off. The Slot Offset must be a multiple of 500 milliseconds for RF FEC Type 0=LDR, or a multiple of 250 milliseconds for RF FEC Types 1=MDR or 2=HDR.

The Slot Delay, del, prevents collision with an ALERT2 station transmitting in the previous time slot. Use the default slot delay of 25 milliseconds for RF FEC Types 0=LDR and 1=MDR. Use a slot delay of 12 milliseconds for RF FEC Type 2=HDR.

If the Slot Center, ctr, is enabled, the ALERT2 encoder delays a packet transmission so the packet data is centered in the slot which helps to prevent collisions with ALERT2 in the preceding and following time slot.

For example, to set the Frame Length, frame, to 120,000 milliseconds (2 minutes) and Slot Offset, off, to 11,000 milliseconds

(11 seconds), type the command:

>**SET-TDMA ,120000,,11000,,1**[Enter]
TDMA Use : Enabled
TDMA FrameLength : 120000 msec
TDMA Slot Length : 500 msec
TDMA Slot Offset : 11000 msec
TDMA Slot Delay : 25 msec
TDMA Slot Center : Disabled
TDMA TimedOffset : 0 secs

Use the TDMA timed offset to delay a timed report on the transmit interval, ti, by the number of seconds entered. This allows the distribution of station reports throughout the transmit interval rather than having all stations transmit on the hour. The transmission is always at the next TDMA time slot following the delay.

For example, if the transmit interval, ti, is 3600 (1 hour) and the timed offset, toff, is 240 seconds (4 minutes), then the timed report on the hour will transmit at the next TDMA slot following 4 minutes after the hour. Using the frame length of 120,000 milliseconds and slot offset of 11,000 milliseconds a timed report at 14:00:00 would transmit at 14:04:11. To set the TDMA transmit offset, type the command:

>**SET-TDMA ,,,,,,240**[Enter]
TDMA Use : Enabled
TDMA FrameLength : 120000 msec
TDMA Slot Length : 500 msec
TDMA Slot Offset : 11000 msec
TDMA Slot Delay : 25 msec
TDMA Slot Center : Disabled
TDMA TimedOffset : 240 secs

VERSION: 5.0

SEE: SET-A2

SET-TIME Display or set the transmitter clock time.

FORMAT: SET-TIME hh,mm,ss,YYYY,MM,DD

OUTPUT: Local Time : *Current time* ***tzname***
GPS Time Status : ***gps_status***

PARAMETERS:

Name	Description	Range	Default value
hh	Hour	0 to 23	0 hours
mm	Minute	0 to 59	0 minutes
ss	Second	0 to 59	0 seconds
YYYY	Year	1970 to 2105	1970
MM	Month	1 to 12	1 (January)
DD	Day of Month	1 to 31	1

DESCRIPTION: The real time clock continuously increments the time every one second clock tick as long as the 5096/A2 Data Transmitter is powered. The clock time is not reset when the main battery power is disconnected but the time will no longer increment.

The real time clock is set when the ALERT2 encoder GPS time is read.

For example, to set the time to April 9, 2015 at 12:41 P.M., type the command:

```
>SET-TIME 12,41,00,2015,04,09[Enter]
Local Time       : 04/09/2015 12:41:00 PDT
GPS Time Status  : Locked
Timers aligned
```

VERSION: 5.0

SEE: READ-TIME, SET-TZ

SET-TZ Display or set the time zone

FORMAT: **SET-TZ** tzname,tzoffset,dstname,dsten

OUTPUT: Time zone : tzname tzoffset dstname dsten
Local Time : *Current time* tzname

PARAMETERS:

Name	Description	Range	Default value
tzname	Time zone name	3 chars	UTZ
tzoffset	Time zone offset	-11 to 11	0
dstname	Daylight savings name	3 chars	
dsten	Daylight savings enable	0 to 1	0 (disable)

DESCRIPTION: The ALERT2 encoder provides GPS time in UTZ. Set the time zone parameters to display time in the local time zone.

The time zone name, tzname, is displayed after the local time. The time zone offset, tzoffset, is subtracted from the UTZ time to compute local time. When daylight savings time is active, the daylight savings name, dstname, is displayed after the local time. Set dsten to 1 to enable daylight savings time.

The time zone parameters affect the time displayed when programming the 5096/A2 and displaying logged data. It does not affect the time transmitted in the ALERT2 data packets. The ALERT2 time is always in UTZ.

For example, to set the time zone name, tzname, to PST, the time zone offset, tzoffset, to 8, the daylight savings name, dstname, to PDT, and enable daylight savings time, dsten, type the command:

>**SET-TZ PST,8,PDT,1**[Enter]
Time zone : PST 8 PDT 1
Local Time : 04/09/2015 13:59:45 PDT

VERSION: 5.0

SEE: GET-MEM, READ-TIME, SET-TIME

SET-WARM Display or set the ANALOG sensor warm time

FORMAT: SET-WARM wa

OUTPUT: Analog Warm Time: wa msec

PARAMETERS:

Name	Description	Range	Default value
wa	Analog Warm Time	0 to 65535	100

DESCRIPTION: The 5096/A2 Data Transmitter reads an ANALOG or STATUS sensor by first switching on the analog power supply. For all ANALOG sensors except the wind direction (ANALOG 7) and battery (ANALOG 8), it waits the Analog Warm Time then takes sensor readings. This wa interval is required by most analog sensors to have a stable output.

Enter the warm time in milliseconds. For example, to set wa to 10,000 milliseconds, type the command:

```
>SET-WARM 10000[Enter]
Analog Warm Time: 10000 msec
```

VERSION: 5.0

SEE: READ-AN

SET-WI Display or set WIND sensor parameters.

FORMAT: SET-WI sn,id,rpt,ti,si,cgt,txth,a,b,c,d,ev,we,pdc

OUTPUT:

```
WIND sn ID        : id
Report Type       : rpt
Transmit Intervl  : ti sec(s)
Sample Interval   : si sec(s)
Change to Txmit   : cgt
Txmit Threshold   : txth
Multiplier        : a
Divisor           : b
Base Value        : c
Display Digits    : d
Event Detection   : ev
Wind Speed        : we
Pre-Divide Ctr    : pdc
```

PARAMETERS:

Name	Description	Range	Default value
sn	Sensor Number	1 to 2	
id	Sensor ID	0 to 254	1=4, 2=14
rpt	Report Type	0 to 3	1=2, 2=0
ti	Transmit Intervl	0-2147483647	see below
si	Sample Interval	0-2147483647	see below
cgt	Change to Txmit	+/-XX.XX	0
txth	Txmit Threshold	+/-XX.XX	0
a	Multiplier	+/-XX.XX	1=360, 2=1
b	Divider	+/-XX.XX	1=2094, 2=1
c	Adder	+/-XX.XX	0
d	Decimal Digits	0 to 9	0
ev	Event Detection	0 to 1	0 (disabled)
we	Wind Speed	0 to 1	1=1, 2=0
pdc	Pre-Divide Counter	1 to 32767	1=2094, 2=2

DESCRIPTION: The 5096/A2 Data Transmitter supports two counters. WIND 1 is normally a wind sensor. COUNTER 2 can count switch closures (to ground). A WIND sensor is disabled when its ev, ti and si are zero. See Section 2.1.6 for package default values.

For example, to set WIND 1 to have a pdc of 16327 (you must also set the divisor, ***b***), type the command:

```
>SET-WI 1,,,,,,,,16327,,,,,16327[Enter]
WIND 1 ID    : 4 ...
```

VERSION: 5.0

SEE: READ-CTR, READ-WI, SET-CTR, WRITE-CTR

SHOWALL Display all parameters.

FORMAT: SHOWALL all

OUTPUT:
Local Time : *Current time* ***tzname***
GPS Time Status : *UTZ time GPS status*
Time zone : ***tzname tzoffset dstname dsten***
Station ID : ***staid***
ANALOG sn ID : *Analog* sn *ID #* ...

PARAMETERS:

Name	Description	Range	Default value
all	All Sensors	0=NO,1=YES	0

DESCRIPTION: This command displays all sensor parameters, data values and system parameters defined in the transmitter.

By default, only the active sensor parameters and data values are displayed. If the all parameter is set to 1, all sensors, active and inactive have their parameters and data values displayed.

For example to display all active sensor parameters, type the command:

>**SHOWALL**[Enter]
Local Time : 10/07/2016 11:21:07 pdt
GPS Time Status : Locked
Time zone : pst 8 pdt 1
Station ID : 50099
ANALOG 8 ID : 8
Report Type : MSR
Transmit Intervl : 3600 sec(s)
Sample Interval : 300 sec(s)
Change to Txmit : 0.50
Txmit Threshold : 0.00
Multiplier : 156.77
Divisor : 10000
Base Value : 0.00
Display Digits : 2
Trim Enable : Disabled
Raw Reading : 904
Cal Reading : 14.17

VERSION: 5.0

SEE: All other commands

TEST Executes a test of the transmitter.

FORMAT: TEST level

OUTPUT:
```
Test mode          : Enabled
Level 1 test
Transmitting all Active Sensors
# staid id YYYY MM DD hh mm ss cal
…
```

PARAMETERS:

Name	Description	Range	Default value
level	Test level	0 to 2	1

DESCRIPTION: This command sets the test mode and tests the transmitter. When the test mode is enabled, a flag is set in the ALERT2 data packet. The base station ALERT2 receiver software can read this flag and mark data received as test data and disable alarm checking.

Set level to 0 to disable the test mode. Set level to 1 to enable test mode and transmit all active sensors. The sensor data is read, displayed, and then transmitted. Set level to 2 to enable test mode and start a level 2 test of the transmitter. A level 2 test checks the ROM, RAM, battery, and clock.

When test mode is enabled, the TEST LED is turned on. A timer is started to disable test mode. When the timer expires, test mode is disabled and the TEST LED is turned off.

If the TEST switch is pressed, test mode is enabled, the TEST LED turns on, and a level 1 test is started. It the TEST switch is pressed when test mode is enabled, then test mode is disabled and the TEST LED turns off.

For example, to execute a Level 2, type the command:

```
>TEST 2[Enter]
Test mode          : Enabled
Level 2 test
ROM test           : PASSED
RAM test           : PASSED
BATTERY test       : PASSED - Battery Level = 14.0 volts
CLOCK test         : PASSED - drift = 3 secs/day
```

VERSION: 5.0

SEE: TEST-MODE

TEST-MODE Display or set test mode.

FORMAT: TEST-MODE state,reset

OUTPUT:
Test mode : state
Test reset : reset mins

PARAMETERS:

Name	Description	Range	Default value
state	Test state	0 to 1	0
reset	Test mode reset	0 to 1440	60 minutes

DESCRIPTION: This command sets the test mode state and reset timer. When the test mode is enabled, a flag is set in the ALERT2 data packet. The base station ALERT2 receiver software can read this flag and mark data received as test data and disable alarm checking.

When test mode is enabled, the TEST LED is turned on. A timer is started to reset minutes to disable test mode. When the timer expires, test mode is disabled and the TEST LED is turned off.

For example, to enable test mode, state, and set the test mode reset time, reset, to 10 minutes, type the command:

>**TEST-MODE 1,10**[Enter]
Test mode : Enabled
Test reset : 10 mins

VERSION: 5.0

SEE: TEST

TEST-TX Start radio transmitter test.

FORMAT: TEST-TX

OUTPUT: (None to console)
(Test transmission to radio)

PARAMETERS: None

DESCRIPTION: This command starts a 5 second radio transmission test with tone. A watt meter can be used to check radio power output and antenna reflected power.

For example, to test the transmitter radio, type the command:

>**TEST-TX**[Enter]

VERSION: 5.3

SEE: None

WRITE-CTR Set the RAW value of a COUNTER sensor.

FORMAT: WRITE-CTR sn,val

OUTPUT:
COUNTER sn ID : id
Raw Reading : raw
Cal Reading : cal

PARAMETERS:

Name	Description	Range
sn	Sensor Number	1 to 2
val	Value to Set	+/-XX.XX
id	Sensor ID	0 to 254
raw	Raw Reading	0 to 2147483647
cal	Cal Reading	+/-XX.XX

DESCRIPTION: This command will set a COUNTER sensor's accumulator to any value within range. Note that you will be entering the RAW accumulator value.

This command is useful after field maintenance or testing. For example, if a tipping bucket has been tipped by hand (or the INIT command has been used), you can reset the sensor to the correct number of bucket tips.

For example, to zero the COUNTER 2 RAW accumulator, type the command:

>**WRITE-CTR 2,0**[Enter]
COUNTER 2 ID : 14
Raw Reading : 0
Cal Reading : 0

VERSION: 5.0

SEE: INIT, READ-CTR, SET-CTRRESET

WRITE-EV Set the RAW value of an EVENT sensor.

FORMAT: WRITE-EV sn,val

OUTPUT:
EVENT sn ID : id
Raw Reading : raw
Cal Reading : cal

PARAMETERS:

Name	Description	Range
sn	Sensor Number	1 to 2
val	Value to Set	+/-XX.XX
id	Sensor ID	0 to 254
raw	Raw Reading	0 to 2147483647
cal	Cal Reading	+/-XX.XX

DESCRIPTION: This command will set an EVENT sensor's accumulator to any value within range. Note that you will be entering the RAW accumulator value.

This command is useful after field maintenance or testing. For example, if a tipping bucket has been tipped by hand (or the INIT command has been used), you can reset the sensor to the correct number of bucket tips.

For example, to set the EVENT 2 RAW accumulator to 113, type the command:

>**WRITE-EV 2,113**[Enter]
EVENT 2 ID : 0
Raw Reading : 113
Cal Reading : 113

VERSION: 5.0

SEE: INIT, READ-EV, SET-EVRESET

4.8 Parameter Descriptions

a, b, c, d **Calibration Coefficients**

The 5096/A2 Data Transmitter uses four calibration coefficients to scale, offset, and display the RAW value of an ANALOG, EVENT, COUNTER, WIND or PEAK WIND sensor prior to transmission and logging. The Raw Reading is the actual reading obtained from the sensor (the ADC reading for an ANALOG sensor and the accumulator value for an EVENT, COUNTER, WIND or PEAK WIND sensor).

The calibration formula is:

CAL = ((RAW × ***a***)/***b***) + ***c***

with the number of decimal digits displayed set by ***d***.

These parameters should all be entered together. Changing one parameter at a time can have unexpected results. Negative signs and decimal digits are allowed.

All Raw Readings are converted by this formula prior to comparison with the Change to Txmit, cgt, and Txmit threshold, ***txth***, parameters prior to transmission and logging.

Cal Readings computed and displayed with zero decimal digits are transmitted as integers. **Cal Readings** computed and displayed with no-zero decimal digits are transmitted as 4 byte floating point numbers.

adddest **ALERT2 MANT Add Destination**

When enabled (0 = disabled, 1 = enabled) adddest appends the destination source address to the packet header.

addpath **ALERT2 MANT Add Path Service**

When enabled (0 = disabled, 1 = enabled) ***addpath*** appends a repeater source address to the packet for each repeater the packet passes through.

agc **ALERT2 AirLink Automatic Gain Control Time Interval**

The ***agc*** parameter sets the automatic gain control (preamble) in milliseconds. The default value of 30 milliseconds works well with all tested ALERT2 radios. Increasing this parameter will decrease the number of data bytes available in the TDMA slot.

all **All Sensors**

This parameter allows the display of all Active and Inactive sensors when set to one in the SHOWALL command. By default, only Active sensors are displayed. Active sensors are sensors that have a non-zero transmit

interval, ***ti***, or sample interval, ***si***, or event enabled, ***ev***.

baud **Baud Rate**

This parameter sets the console baud rate. The only baud rate is 9600.

cal **Cal Reading**

The 5096/A2 Data Transmitter reads raw (RAW) sensor values, calibrates the values using sensor calibration coefficients and transmits the calculated (**CAL**) data to the base station. Sensor calibration coefficients can be used to calculate **CAL** data in engineering units. **Cal Readings** computed and displayed with zero decimal digits are transmitted as integers. **Cal Readings** computed and displayed with no-zero decimal digits are transmitted as 4 byte floating point numbers.

car **ALERT2 AirLink Carrier Only Time Interval**

The ***car*** parameter sets the transmit carrier only time in milliseconds. The default value of 5 milliseconds works well with all tested ALERT2 radios. Increasing this parameter will decrease the number of data bytes available in the TDMA slot.

cgt **Change to Txmit**

For ANALOG, EVENT, COUNTER, GPS, or STATUS sensors this parameter sets the sensor's CAL value change from its last transmitted value for a transmission on a Sample Interval, si or on event if Event Detection, ***ev***, is enabled.

This parameter does not affect transmissions on the **Timed Interval, *ti***.

ctr **ALERT2 TDMA Slot Center**

The TDMA Slot Center, ***ctr***, delays the start of a transmission in a TDMA slot to center the data transmitted in the middle of the TDMA slot to avoid collision with ALERT2 stations transmitting in the previous or following time slots.

Enabling this parameter disables the TDMA Slot Delay parameter, ***del***.

D1 **Start Day**

Starting day for the GET-MEM command. Values can range from 1 to 31 with a default of 1.

D2 **End Day**

Ending day for the GET-MEM command when the transmitter is in *Real*

Time mode. Values can range from 1 to 31 with a default of 31.

DD **Day of Month**

Transmitter time day number set by the **SET-CTRRESET**, **SET-EVRESET**, and SET-TIME commands. Values can range from 1 to 31. The default is no change.

del **ALERT2 TDMA Slot Delay**

The TDMA Slot Delay, del, delays the start of a transmission in a TDMA slot to avoid collision with an ALERT2 station transmitting in the previous time slot.

The default value of 25 milliseconds is recommended for RF FEC Types 0=LDR and 1=MDR. A slot delay of 12 milliseconds is required for RF FEC Type 2=HDR.

This parameter is ignored if the ALERT2 TDMA Slot Center parameter, ***ctr***, is enabled.

destid **ALERT2 MANT Destination Source Address**

Destination ID, ***destid***, is the destination source address appended to the packet header when ***adddest*** is enabled.

dsten **Daylight Saving Time Enable Flag**

Set ***dsten*** to 1 to enable daylight savings time change.

dstname **Daylight Saving Time Zone Name**

Three letter designator for daylight savings time zone name. For example: PDT. When daylight savings time is active, the daylight savings name, dstname, is displayed after the local time.

en **Enable Flag**

The enable flag is used by many commands. To enable a feature, set this parameter to 1. To disable a feature, set this parameter to 0. The parameter value is displayed as either disabled or enabled.

ev **Event Detection Flag**

This flag for the EVENT, COUNTER and WIND sensors enables (disables) transmission on an event basis. When this flag is enabled and the sensor accumulator is incremented or decremented by an event trigger, the CAL data is checked against the Change to Txmit, cgt, and Txmit threshold, ***txth***,

parameters. If the parameter conditions are met, the sensor data is transmitted and logged.

When this flag is disabled, the sensor reading is still incremented or decremented but the data value is not transmitted or logged until a **Sample Interval**, ***si***, or Transmit Intervl, ti, occurs.

fec **ALERT2 AirLink Forward Error Control (FEC) Type**

The RF FEC Type, ***fec***, parameter sets the Forward Error Control (FEC) type: 0=LDR, 1=MDR, 2=HDR. This parameter determines the minimum slot length and the number of bytes that can be transmitted in the slot length.

fec	**Minimum Slot Length**
0=LDR	500 milliseconds
1=MDR	250 milliseconds
2=HDR	250 milliseconds

The number milliseconds in the slot length available for data bytes is determined by subtracting the AirLink Message Overhead and the AirLink, MANT, and Application Headers.

The AirLink Preamble is the RF Carrier Only, ***car***, and RF AGC, ***agc***, parameters and the non-programmable RF Bit Sync 10 milliseconds, and RF Frame Sync, 6.67 milliseconds.

AirLink Preamble	
RF Carrier Only	5 milliseconds
RF AGC	30 milliseconds
RF Bit Sync	10 milliseconds
RF Frame Sync	6.67 milliseconds
AirLink Preamble	51.67 milliseconds

The AirLink Message Overhead is the AirLink Preamble, the TDMA Slot Delay, ***del***, and RF Tail, ***tail*** parameters.

AirLink Overhead	**FEC Type 0=LDR, 1=MDR**	**FEC Type 2=HDR**
AirLink Preamble	51.67 milliseconds	51.67 milliseconds
TDMA Slot Delay	25 milliseconds	12 milliseconds
RF Tail	5 milliseconds	5 milliseconds
AirLink Overhead	81.67 milliseconds	68.67 milliseconds

The number of AirLink data bytes for the FEC Type and slot length are:

AirLink Data Bytes for Slot Length (milliseconds)			
	Slot Length		
fec	**250**	**500**	**1000**
0=LDR	N/A	75	177

1=MDR	42	104	244
2=HDR	54	131	296

The Application Headers are the AirLink Header, MANT Header, PDU Header, and GSR Header.

Header	Bytes
AirLink Header	2
MANT Header	7
PDU Header	3
GSR Header	2
Header Total	14

The number of sensor data bytes for the FEC Type and slot length are:

Sensor Data Bytes for Slot Length (milliseconds)			
	Slot Length		
fec	**250**	**500**	**1000**
0=LDR	N/A	61	163
1=MDR	30	90	230
2=HDR	40	117	282

An integer sensor with no decimal data requires 4 bytes. A floating point sensor with decimal data requires 6 bytes.

frame **ALERT2 TDMA Frame Length**

The TDMA Frame Length parameter sets how often a station can transmit and limits the number of stations that can transmit in this frame.

If all stations use 500 millisecond slot lengths and the frame is 60,000 milliseconds, 120 stations can transmit in the frame.

If all stations use 500 millisecond slot lengths and the frame is 120,000 milliseconds, 240 stations can transmit in the frame.

If repeaters use 5000 millisecond slot lengths and the frame is 60,000 milliseconds, 12 repeaters can transmit in the frame. If stations use 500 millisecond slot lengths, 4 repeaters and 80 stations can transmit in the frame.

gps_status **GPS Time Status**

ALERT2 Encoder GPS time sync status:

Raw	Status
0	Locked
2	Drifted
3	No GPS lock

h1 **Start Hour**

Starting hour for the GET-MEM command. Values can range from 0 to 23 with a default of 0.

h2 **End Hour**

Ending hour for the GET-MEM command. Values can range from 0 to 23 with a default of 23.

hh **Hour**

Transmitter time hour set by the **SET-CTRRESET**, **SET-EVRESET**, and SET-TIME commands. Values can range from 0 to 23. The default is no change.

hoplimit **ALERT2 MANT Hop Limit**

The hoplimit sets the number of times a packet can be repeated. Use 0 for none, 1 to 6 for one to six repeats. Use 7 for disabled which allows unlimited repeats.

id **Sensor ID**

The sensor ID is a number that uniquely identifies a sensor to the receiving base station. Each data transmission includes the sensor ID. Logged data includes the sensor ID.

The 5096/A2 Data Transmitter provides default sensor IDs that are assigned to the sensor type and number (see Section 2.1.6). The SET... commands can change a sensor's ID to any unused ID.

indts **ALERT2 MANT IND Timestamp**

When enabled (0 = disabled, 1 = enabled) ***indts*** inserts the time a packet is received for transmission. **Do not use this feature since the 5096/A2 has already inserted a time stamp at the start of a data packet.**

len **ALERT2 TDMA Slot Length**

The TDMA Slot Length parameter, ***len***, sets the transmission length reserved for a station. The Slot Length must be a multiple of the minimum slot length. The RF FEC Type, ***fec***, determines the minimum slot length and the number of bytes that can be transmitted in the slot length.

fec	Minimum Slot Length
0=LDR	500 milliseconds
1=MDR	250 milliseconds
2=HDR	250 milliseconds

level **Test level**

Set level to 0 to disable the test mode.

Set level to 1 to enable test mode and transmit all active sensors. The sensor data is read, displayed, and then transmitted.

Set level to 2 to enable test mode and start a level 2 test of the transmitter. A level 2 test checks the ROM, RAM, battery, and clock.

local_time **Time in Local Time Zone**

Time zone offset, ***tzoffset***, is subtracted from time in UTZ to compute local time.

M1 **Start Month**

Starting month for the GET-MEM command. Values can range from 1 to 12 with a default of 1.

M2 **End Month**

Ending month for the GET-MEM command. Values can range from 1 to 12 with a default of 12.

MM **Month**

Time month number set by the **SET-CTRRESET**, **SET-EVRESET**, and SET-TIME commands. Values can range from 1 to 12. The default is no change.

m1 **Start Minute**

Starting minute for the GET-MEM command. Values can range from 0 to 59 with a default of 0.

m2 **End Minute**

Ending minute for the GET-MEM command. Values can range from 0 to 59 with a default of 59.

ma **Total Memory**

The total memory available for data logging is displayed by CHK-MEM. The total memory is measured in bytes.

mm **Minute**

Time minute number set by the **SET-CTRRESET**, **SET-EVRESET**, and SET-TIME commands. Values can range from 0 to 59. The default is no change.

mod **ALERT2 AirLink Modulation Type**

The ***mod*** parameter sets the modulation type: 0=normal, 1=inverted. The default value of 0=normal works well with all ALERT2 radios tested except for one exception. Set the ***mod*** parameter to 1 (inverted) for the Maxon SD125VE radio.

mode **Event Mode**

The **Event Mode** defines how the accumulator value for an EVENT sensor is effected by the trigger and status inputs. Where the table indicates NO for Trig on A or Trig on B, that corresponding trigger input is tied low. Where the table indicate YES for both Trig on A and Trig on B, the sensor is a complementary type (i.e. Trig on A = normally open contact, Trig on B = normally closed contact). INCR indicates that the accumulator will be incremented and DECR indicates that the accumulator will be decremented. Match the mode to the sensor type you will connect to this sensor input.**Event Mode** 6 is the default mode for EV-2. Mode 6 supports both the 5050P and 5050P-MS rain gauges. A 5050P-MS bucket tip sends a momentary pulse which causes two trigger line state changes. Under mode 4, the accumulator is incremented twice. **Event Mode** 6 instructs the 5096/A2 Data Transmitter to only increment the accumulator once when two trigger line state changes are less than 200 milliseconds apart.

WARNING: Before connecting a 5050LLFT liquid level sensor or a 5050TS test switch to the 5096/A2 Data Transmitter, check the wiring of the sensor cable connector. Open the female MS connector at the cable end and cut off any wire that may be attached to pin B. Reassemble the connector when finished.

This action is required to prevent damage to the 5096/A2 Data Transmitter.

MODE TABLE					
	A Trig	Trig on B	On Status	On Status	Sensor
Mode	**Pulse**	**Pulse**	**Low**	**High**	**Type**
0	YES	NO	INCR	DECR	5050OE
1	YES	NO	DECR	INCR	5050OE
2	YES	NO	INCR	INCR	2500

					2501 5050PMS
3	YES	NO	DECR	DECR	
4	YES	YES	INCR	DECR	5050LLFT 5050ELFT 5050EL 5050P
5	YES	YES	DECR	INCR	5050LLFT 5050ELFT
6	YES	YES	INCR	INCR	5050P 5050PMS
7	YES	YES	DECR	DECR	
8	NO	YES	INCR	DECR	
9	NO	YES	DECR	INCR	
10	NO	YES	INCR	INCR	
11	NO	YES	DECR	DECR	

mu **Used Memory**

The memory used for data logging is displayed by CHK-MEM. The used memory is measured in bytes. Sensor data reports logged use 8 bytes for all reports.

For example, if the station was logging timed reports every hour for 1 month for 3 sensors (24hours * 31days * 3sensor * 8bytes) and 25 event reports were logged (25event * 8bytes), the CHK MEM command would display: 24576 bytes used.

of **Overflow Flag**

When enabled with the SET-MEM command, this parameter will cause new data to overwrite the oldest data when logging memory is full. When disabled, data logging stops when logging memory is full. Set this parameter to 1 to enable, 0 to disable overwriting when logging memory if full.

off **ALERT2 TDMA Slot Offset**

Each ALERT2 station is assigned a unique time slot that starts at the TDMA Slot Offset, off. This the amount of time from the start of a frame before the station can transmit. For example if a station has a TDMA Slot Offset of 11000 milliseconds in a 60,000 millisecond frame, it can transmit at 11 seconds every minute.

pct **Percent Used**

The percent of memory used for data logging is displayed by CHK-MEM. The percent of memory is computed from Used Memory / Total Memory * 100.

For example, if the Total Memory available is 24576 bytes, and the Used Memory is 4614 bytes, the Percent Used displays 18.77%

pdc **Pre-Divide Counter**

The number of input pulses required by a COUNTER or WIND sensor to increment the accumulator value by one unit and generate an event trigger interrupt.

pn **Sensor Input Package Part Number**

Part number extensions 54, 81, 90, and N define the sensor input package supported by the 5096/A2 Data Transmitter firmware.

pre **ALERT2 AirLink Audio Preload Time Interval**

The ***pre*** parameter sets the audio preload time in milliseconds before transmitter key on. The default value of 100 milliseconds works well with all tested ALERT2 radios. Changing this parameter will have no effect on the number of data bytes available in the TDMA slot.

pwr **ALERT2 AirLink Power Up Time Interval**

The ***pwr*** parameter sets the radio power up time in milliseconds before transmission. The default value of 750 milliseconds works well with all tested ALERT2 radios. Changing this parameter will have no effect on the number of data bytes available in the TDMA slot.

raw **Raw Reading**

The 5096/A2 Data Transmitter reads raw (**RAW**) sensor values, calibrates the values using sensor calibration coefficients and transmits the calculated (CAL) data to the base station. The **RAW** data value is an integer (no decimal point).

rcnt **Reset Count**

The count of the number of Resets at the station since the count was last initialized.

reset **Test Mode Reset Timer**

Time in minutes for the test mode reset. When test mode is enabled, the TEST LED is turned on. A timer is started to reset minutes to disable test mode. When the timer expires, test mode is disabled and the TEST LED is turned off.

When the transmitter is in test mode, the test flag is set in ALERT2 data packets.

rpt Report Type

The ALERT2 report type used to encode data is set by the ***rpt*** parameter:

rpt	Report type	Description
0	GSR	General sensor report
1	TBR	Tipping bucket report
2	MSR	English units multiple sensor report
3	MMR	Metric units multiple sensor report

The following sensors have ***rpt*** parameter not set to 0 (GSR) by default:

ID	*rpt*	Sensor description	Type	Number
0	1	Rain gauge	EVENT	2
1	2	Air temperature	ANALOG	2
2	2	Relative humidity	ANALOG	1
3	2	Barometric pressure	ANALOG	4
4	2	Wind speed	WIND	1
5	2	Wind direction	ANALOG	7
6	2	Wind peak	PEAK	1
7	2	Water level	ANALOG	3
8	2	Battery	ANALOG	8

rstate Reset Initialize State

Set the Initialize on TEST-RESET parameter state to 0 = Off (Disabled) or 1 = On (Enabled). When the Initialize on TEST-RESET parameter is enabled, the station will execute an INIT command if the **TEST** switch is held down when the **RESET** switch is pressed.

si Sample Interval

This parameter is used to set the interval in seconds between successive reads for the specified sensor. Each sensor has its own sample interval which can be set independently from others.

When ***si*** is set to 0 this feature is disabled. When the sample interval is non-zero the sensor will be read every ***si*** seconds.

For ANALOG, COUNTER, EVENT, GPS, and STATUS sensors, the CAL data value is compared to the Txmit Threshold, txth, and the Change to Txmit, cgt, parameters. If these parameter conditions are met, the sensor data is transmitted and logged.

For WIND sensors, the wind pulse count for the sample interval uses the calibration coefficients to compute the wind speed. The wind speed is averaged over the Transmit Interval, ti, and transmitted.

For PEAK WIND sensors, the wind pulse count for the sample interval uses the calibration coefficients to compute the wind speed. The maximum wind speed is saved over the Transmit Interval, ti, and transmitted.

sn **Sensor Number**

The sensor number parameter is used with the sensor READ..., SET... and WRITE... commands to identify which ANALOG, COUNTER, EVENT, GPS, PEAK WIND, STATUS, or WIND sensor is to be used. The sensor number range varies depending on the sensor type.

The sensor number is NOT the id number.

ss **Second**

Time seconds number set by the **SET-CTRRESET**, **SET-EVRESET**, and SET-TIME commands. Values can range from 0 to 59. The default is no change.

staid **Station ID**

The Station ID is the ALERT2 source address transmitted in the radio data packets. It is also displayed by the display logged data reports command.

The Station ID is set by command. It can also be read from the ID switches by the INIT or READ-IDSW commands.

state **Test Mode State**

Set to 0 to disable, 1 to enable. When test mode is enabled, the TEST LED is turned on. A timer is started to reset minutes to disable test mode. When the timer expires, test mode is disabled and the TEST LED is turned off.

When the transmitter is in test mode, the test flag is set in ALERT2 data packets.

string **Search String**

The HELP command will display the command names and parameter list for commands that start with the search string characters. Up to 8 characters can be entered for the search string. If no string is entered, all commands are displayed.

tail **ALERT2 AirLink Tail Time Interval**

The ***tail*** parameter sets the transmit time in milliseconds at end of transmission frame. The default value of 5 milliseconds works well with all tested ALERT2 radios. Increasing this parameter will decrease the number of data bytes available in the TDMA slot.

ti **Transmit Intervl**

This parameter sets the interval in seconds between transmissions of sensor readings regardless of change or threshold parameters. Each sensor has its own transmit interval which can be set independently from others.

When ***ti*** is set to 0 this feature is disabled. When the Transmit Intervl is non-zero the sensor will be read and its data value will be transmitted and logged every ***ti*** seconds.

toff **TDMA Timed Offset**

Delay the transmission of a timed report on the transmit interval by the timed offsets in seconds. The timed report will transmit on the next TDMA time slot following the delay.

trim **Trim Enable**

For ANALOG sensors, if the trim option is enabled, the **CAL** data is set to the Txmit Threshold, ***txth,*** if it is less than the threshold.

txth **Txmit Threshold**

This parameter sets a minimum CAL data value an ANALOG, COUINTER, EVENT, GPS, or STATUS sensor must reach before readings taken at the Sample Interval, si, meeting the Change to Txmit, cgt, criteria will be transmitted or logged. Readings taken at the Transmit Intervl, ti, are not affected by this parameter.

tzname **Local Time Zone Name**

Three letter designator for local time zone name. For example: PST.

tzoffset **Local Time Zone Offset**

The time zone offset, ***tzoffset***, is subtracted from the UTZ time to compute local time.

utz_time **Time in UTZ**

Time in UTZ read from ALERT2 Encoder GPS. Time zone offset, ***tzoffset***, is subtracted from this time to compute local time.

val **Value to Set**

This is the EVENT or COUNTER sensor accumulator value to set by the

WRITE-EV or WRITE-CTR commands. This is the sensor RAW value. The value range is 0 to 2147483647.

ver **Firmware Version Number**

5096/A2 Data Transmitter firmware version. Always check for the latest firmware version and related documentation whenever the 5096/A2 Data Transmitter is to be programmed.

verDate **Firmware Version Date**

5096/A2 Data Transmitter firmware version date. Always check for the latest firmware version and related documentation whenever the 5096/A2 Data Transmitter is to be programmed.

wa **Analog Warm Time**

This parameter sets the time to wait in milliseconds after turning on the switched analog power before reading ANALOG sensors 1 to 6. The warm time does not affect STATUS, ANALOG 7 (wind direction) or ANALOG 8 (battery voltage).

we **Wind Speed Enable Flag**

This parameter enables a COUNTER sensor to become a WIND sensor. WIND sensors compute wind speed on the sample interval and transmit average wind speed on the transmit interval. A value of 1 enables a WIND sensor. A value of 0 disables a WIND sensor, leaving the input as a COUNTER sensor.

YYY1 **Start Year**

Starting year for the GET-MEM command. Values can range from 1970 to 2105 with a default of 1970.

YYY2 **End Year**

Ending year for the GET-MEM command. Values can range from 1970 to 2105 with a default of 2105.

YYYY **Year**

Transmitter time year number set by the **SET-CTRRESET**, **SET-EVRESET**, and SET-TIME commands. Values can range from 1970 to 2105. The default is no change.

4.9 ERROR Messages

1. No such command.

   The command typed is not supported by the 5096/A2 Data Transmitter. Check your spelling and the firmware version type and number. Use HELP to get the correct command spelling and a list of commands.

2. Parameter out of range

   The value typed for one or more parameters exceeds the limits for the parameter. Consult the manual under the command description. Check your command parameter positioning. Did you type enough commas to separate or skip over parameters?

3. SID already assigned

   The sensor ID number is already assigned to an active sensor. Choose another sensor ID number or de-activate the sensor with this same ID. Sensors are active if they have non-zero transmit, ***ti***, or sample, ***si***, intervals, and have events enabled, ***ev***.

4. Test already in progress

   An attempt to start a test when a test is already active.

5. Timeout

   The ALERT2 Encoder did not respond to a command such as READ-TIME.

6. Wrong number of parameters

   Either a required parameter has been omitted or too many parameters have been typed for the command. Consult the manual under the command description. Check your command parameter positioning. Did you type enough commas to separate or skip over parameters?

5 Maintenance, Testing and Troubleshooting

5.1 Maintenance

The 5096/A2 Data Transmitter is designed for long term use with a minimum of maintenance. HydroLynx Systems recommends that there should be visits to the site at least twice a year to perform routine maintenance and to check the battery. Visits should be scheduled prior to seasonal rainy periods. Whenever a site is to be visited for either service or maintenance, HydroLynx Systems recommends keeping a record describing the purpose of the visit and the maintenance performed. This information can be helpful on future visits. An example of a Maintenance Report form can be found in Section 6.2, Document number A104973.

5.1.1 Station Check

Any visit to the station site should include a visual inspection of all exposed hardware and cables to locate damage or wear due to severe weather conditions. Check all of the cables and connectors to ensure that there has been no damage. Check closely any cables that may have been whipped by the wind, looking for bare wires next to any adjacent structures. Check the connectors for corrosion. Check the forward and reverse power of the antenna and antenna cable by using a wattmeter. If the antenna is a directional antenna, check the mounting to ensure that the antenna is still pointed in the correct direction. Replace any cables and connectors that have been damaged to avoid future system failures.

5.1.2 Battery

Replace the system battery with a freshly charged one, at least once yearly (twice a year for the 7AH battery in the 5096/A2-N). Batteries in rain gauges should be replaced just before the rainy season begins. Always maintain a fully charged battery for immediate placement into the system should the system battery become weak or fail entirely. For systems with multiple stations, several batteries should by available for replacement of system batteries. Ideally, one spare battery per site is desired. A single float charger may be used to periodically charge the spare batteries to maintain full charges.

5.1.3 Silica Gel

Replace the moisture absorbent silica gel packet with a freshly charged packet once a year. Old packets may be recharged by heating them to 250 °F for 16 hours. You may purchase new desiccant packs from HydroLynx Systems.

5.1.4 Sensor Maintenance

Check calibration and perform maintenance as indicated in the sensor manuals. Perform a system operation test, manually operating the sensors to ensure they are still working correctly.

5.1.5 Radio Maintenance

FCC regulations state:

1. The RF power at a radio transmitter shall be no more than that required for satisfactory technical operation considering the area to be covered and local conditions.

2. Frequency and deviation of a transmitter must be checked before it is placed into service and re-checked once each year there after.

Check calibration and perform maintenance as indicate in the radio's manual. Should any adjustments be necessary, they should be performed by a qualified technician using the proper test equipment.

5.2 Testing

The following tests will cause the 5096/A2 Data Transmitter to transmit sensor data reports Check that an antenna or dummy load is connected before starting the test to prevent damage to the transmitter. If you do not want your base station computer to receive the test reports, disconnect the station antenna and connect a 50 Ohm dummy load to the antenna connector.

WARNING: Transmitting without an antenna connected may cause damage to the radio. Use a dummy load in place of an antenna for testing.

5.2.1 Power-up Test

Connect a battery to the 5096/A2 Data Transmitter and watch the LEDs flash during the power-up sequence. Watch carefully, the LEDs flash quickly. If you do not see the entire LED power-up sequence, disconnect the battery power and try again.

5096/A2 PCB			
No.	**LED Color**	**Name**	**Activity**
1	Green	RUN	Turn on and stay on
6	Yellow	TEST	Flash
1	Green	RUN	Stay on 20 seconds, then turn off. If a 5071C-5096/A2 cable is connected, the LED will stay on.

ALERT2 Encoder PCB			
No.	**LED Color**	**Name**	**Activity**
			All LEDs off
D7	Green	RADIO ON	Flash at 40 seconds
D7	Green	RADIO ON	Flash at 60 seconds
D3	Red	GPS ON	On for 13 minutes
D6	Green	GPS LK	On when GPS time locked

5.2.2 Level 1 Test

A Level 1 test is executed by pressing and releasing the **TEST** switch, SW2 or by typing the **TEST** command. When the test is enabled, the transmitter stays in test mode until:

1. **TEST** switch pressed again.
2. Typing the command: **TEST 0**[Enter]
3. Test mode reset timer expires. The test mode reset timer is set by the TEST-MODE command.

The Level 1 test reads and transmits all active sensor data values. If you are connected to the console RS232 port the following should appear on the screen:

Test mode : Enabled
Level 1 test
Transmitting all Active Sensors
 # *staid id YYYY MM DD hh mm ss cal*

Each Active sensor will have its current data value printed with the current time on a line starting with **#**, where the information on the line is:

staid	Station ID number
id	Sensor ID number
YYYY	4 digit year
MM	2 digit month (MM = 01: January)
DD	2 digit day
hh	2 digit hour (24 hour clock)
mm	2 digit minute
ss	2 digit second
cal	Sensor ***CAL*** data value

During the Level 1 test, you should see the following LED sequence:

5096/A2 PCB			
No.	**LED Color**	**Name**	**Activity**
6	Yellow	TEST	Turn on
1	Green	RUN	Turn on and then off unless console connected.
3	Yellow	SENS PWR	On to take Active sensor readings, then off. The time on is set by the SET-WARM command.
6	Yellow	TEST	Turn off after test reset interval or test turned off. The test reset interval is set by the TEST-MODE command (default is 1 hour).

ALERT2 Encoder PCB			
No.	**LED Color**	**Name**	**Activity**
D5	Green	SERIAL 0	On when data buffered from 5096/A2.
D7	Green	RADIO ON	On when radio powered on at TDMA time slot.
D4	Red	RADIO TX	On when radio transmitting.
D4	Red	RADIO TX	Off when radio transmit finished.
D7	Green	RADIO ON	Off when radio transmit finished.
D5	Green	SERIAL 0	Off when no data buffered for transmit.

5.2.3 Level 2 Test

The Level 2 Test checks the 5096/A2 ROM, RAM, battery, and clock drift. It can only be started with the command: **TEST 2**.

The ROM test calculates a CRC value from the code section of the EPROM program and compares it to the CRC value stored as part of the EPROM code. If the CRC values do not match, the test fails. Replace your EPROM if this test fails.

The RAM test does a non-destructive test of logging memory RAM by writing and reading a test pattern. If a RAM read does not match the pattern written, the test fails. Replace your RAM if this test fails.

The BATTERY test turns on the radio power and then reads the BATTERY sensor voltage. If the battery voltage is less than 11 VDC, the test fails. Replace the battery and check battery recharge equipment if this test fails.

The CLOCK test compares the real-time clock interrupts to the internal CPU clock to check for clock drift. If the real-time clock drift is greater than 15 seconds per day, the test fails. Have your 5096/A2 Data Transmitter serviced by the factory if this test fails.

For example, type the command:

```
>TEST 2[Enter]
Test mode          : Enabled
Level 2 test
ROM test           : PASSED
RAM test           : PASSED
BATTERY test       : PASSED - Battery Level = 14.0 volts
CLOCK test         : PASSED - drift = 3 secs/day
```

All tests **Passed** in the example above. If a test fails, **FAILED** will be displayed. During the Level 2 test, you should see the following LED sequence. There is no LED activity on the ALERT2 Encoder PCB for a level 2 test.

5096/A2 PCB			
No.	**LED Color**	**Name**	**Activity**
6	Yellow	TEST	Turn on
3	Yellow	SENS PWR	On to read battery, then off.
6	Yellow	TEST	Turn off after test reset interval or test turned off. The test reset interval is set by the TEST-MODE command (default is 1 hour).

5.2.4 Level 3 Test

Use the test procedure outlined in Section 4.1 Testing in the Basic Gauge manual. This test procedure checks:

Power: Battery and solar panel parameters.
Signal out: Radio transmitter forward and reflected power, frequency error and deviation.
Signal in: Compares transmitter data to sensor input parameters.

5.3 Troubleshooting

If the 5096/A2 Data Transmitter does not perform according to specifications, follow the step by step procedure as outlined in Section 4.1 of the Basic Gauge manual. Before changing station or sensor parameters, record the current parameters. Use the SHOWALL command to display all parameters and the console software to log to a disk file. Refer to Section 2.1.5 for information on logging to disk files. For more information, contact a Customer Service Representative at (916) 374-1800 between 8:00 AM and 4:00 PM Pacific Time.

5.3.1 Battery Failures

One common cause of 5096/A2 Data Transmitter failure is a weak or discharged battery. With low voltage from the battery the transmit signal will be at a lower power level, and may not have the strength to reach the receiving antenna.

The following steps should be used to check for battery problems.

1. Connections Check that the connections on the battery and the 9601 board are secure. These wires can become loose by carelessly opening and closing the transmitter.

WARNING: Incorrect wiring of the battery will damage the 5096/A2 Data Transmitter.

---

2. Test – NoLoad: Use a voltmeter to check the battery voltage without a load. If the voltage is lower than 12VDC, replace the battery. This check can be done using the console with the READ-BATT command.

3. Level 1 Test: Use the **TEST** switch to run the board through a transmit cycle. If the TEST ERR LED comes on, the battery voltage is low.

4. Test – Load: Use a voltmeter to check the battery voltage between TP2 (V+) and TP5 (Gnd). Type the command, TEST-TX, on the console. During transmission the voltage should dip no more than 0.5Vdc. If the voltage does change by more than 0.5Vdc, the battery should be replaced, even if the no load voltage is above 12Vdc. If the battery voltage does not dip at all, the transmitter is probably not keying ON.

The 5096/A2-N has an ON/OFF **POWER** switch located on the Screw Terminal Panel. This switch must be ON to connect power into the 9601 board.

5.3.2 Sensor Failures

Most sensor failures are caused by bad connections. Check all sensor cable connectors. Try disconnecting and then reconnecting the connectors to fix the problem. If this makes the sensor operable, try to make the sensor to fail again by wiggling the points where the cable goes into the connectors. Intermittent operation indicates a loose or broken wire and either the cable or the connector or both should be replaced.

Threaded MS connectors used with the 5096/A2 Data Transmitter are keyed and have a specific number of pins arranged in a pattern to help prevent plugging the cable connectors into the wrong receptacle. Inspect the connectors for the key location and look at the pin arrangement. Make certain that the pin locations match those of the mating connector on the 5096/A2. It is difficult to do, but the connectors can be forced onto the wrong receptacle if enough force is exerted to distort the cable connector. Connecting sensors to the wrong connectors may cause severe damage to the transmitter and to the sensors.

When installing cable connectors be sure to push down firmly on the connector shell for a good connection. With the connector properly seated, the threaded collar should easily thread onto the mating connector shell. If the threads become tight press downward again and continue turning the collar. Do not force the connector threads. If the threading is difficult, pull the connector off and inspect for crossed or damaged threads. Try again taking care to properly fit the threaded pieces together.

Inspect sensor cable connectors to ensure that the rubber boot is correctly installed and forms a water-proof seal at the cable entrance to the connector. This is very important to sensor connectors that are exposed to outdoor weather conditions. A good seal will prevent corrosion from causing problems inside the connectors. Spare and replacement connectors can be obtained from HydroLynx Systems, Inc.

Refer to the appropriate sensor manual for troubleshooting individual sensors.

5.3.3 Transmission Failures

If the 5096/A2 Data Transmitter does not transmit, first check the battery as described in Section 5.3.1. Replace the battery if it is bad and try transmitting again. If the battery is not the cause of the failure, disconnect the antenna and check the cable for shorts and opens. Connect a wattmeter and a dummy load to the antenna connector on the transmitter. Check the output and reflected power. If the problem is in the cables or connectors, replace or repair them. If the 5096/A2 still does not transmit, use a radio receiver tuned to the transmit frequency to listen for the two tone signal when you key the transmitter.

5.4 Troubleshooting with the Console

Through the use of a portable or a lap-top personal computer it is possible to check both the system parameters and the sensor parameters of the 5096/A2 Data Transmitter. If a programming error is causing the 5096/A2 to fail this can be fixed in the field by reprogramming the 5096/A2 option or the sensor input parameters.

The following commands are useful in locating a programming problem.

AD-ON	READ-AN	SET-AN
AD-OFF	READ-BATT	SET-BATT
ALIGN	READ-CTR	SET-BAUD
CLEAR-MEM	READ-PK	SET-CTR
GET-MEM	READ-ST	SET-EV
INIT	READ-WI	SET-PK
RESETCNT	READ-GPS	SET-GPS
SET-WARM	READ_ST	SET-ST
SET-MANT	SET-RF	SET-TDMA
SET-STAID	SET-A2	SHOWALL

5.4.1 TEST Sequence

Push the **TEST** switch first to observe the test sequence. If one of the tests does not pass, the 5096/A2 Data Transmitter needs further troubleshooting, and may need to be returned from the field. See Section 5.2.3 for the **TEST** switch sequence.

All Active sensors are transmitted when the **TEST** switch is pressed. Review the list of sensor ID numbers. If a sensor is missing from the list, it is not programmed properly.

5.4.2 READ-BATT Command

Use the READ-BATT command to check the battery voltage. If the battery voltage is below 12Vdc replace the battery. The 5096/A2-N has an ON/OFF **POWER** switch on the Screw Terminal Panel. This switch must be ON for the 5096/A2 Data Transmitter to work.

5.4.3 READ Commands

The READ command will allow you to check individual sensors. Use this command to read the latest value for the sensor. When used with the ANALOG sensors, the READ command will also turn the analog power on.

5.4.4 GET-MEM and Time of Failure

The GET-MEM command shows all the data collected and is a quick way to check the past performance of the sensors. If a sensor failed, this command helps find the time of failure.

5.4.5 SHOWALL Command

The SHOWALL command displays all station and active sensor parameters. Type the SHOWALL command with the parameter 1 to include non-active sensor parameters.

5.4.6 SET Commands

Use the SET commands to check parameters. Incorrect settings will disable sensors. For example with EVENT sensors, if the ev is set to 0, the sensor will not transmit on events. ANALOG sensors with si set to 0 will not be sampled. Reprogram incorrect sensor parameters and test 5096/A2 Data Transmitter again.

5.4.7 Signal Input Protection

All inputs have Zener diodes for line protection. Disconnect the sensor signal cable and check the Zener diodes with an Ohm meter. If the signal line is shorted to ground, the diode must be replaced.

5.4.8 Tipping Bucket and Transmitter

Use the tipping bucket to check the functioning of the transmitter. Tip the bucket and check that the transmitted report is displayed on the console. At the TDMA time slot for the station the tipping bucket report is sent to the ALERT2 Encoder and the following LED activity will occur:

ALERT2 Encoder PCB			
No.	**LED Color**	**Name**	**Activity**
D5	Green	SERIAL 0	On when data buffered from 5096/A2.
D7	Green	RADIO ON	On when radio powered on at TDMA time slot.
D4	Red	RADIO TX	On when radio transmitting.

If the LED does not flash and there is no message on the monitor, check the cables and the tipping bucket. If they are okay then the problem may be in the board and the 5096/A2 Data Transmitter will need further troubleshooting that may not be possible in the field.

5.4.9 ANALOG Sensors

Use the following set up to troubleshoot the ANALOG sensors. This set up does not require that a sensor be connected to the 5096/A2 Data Transmitter. It checks the circuits

in the board itself, however all of the data will be 0s. To check the analog power use the AD-ON command to turn the analog power on, which makes it easier to troubleshoot the sensors. Use the AD-OFF command to turn the analog power off when you are finished troubleshooting.

First set up an unused analog channel. Sensor 5 is probably an unused channel. Set a zero transmit interval, 30 second sample interval, no change required to generate a transmission, and transmit threshold to 0. Type the command:

>**SET-AN 5,,,0,30,0,0**[Enter]
ANALOG 5 ID : 7
Report Type : Disabled
Transmit Intervl : 0 sec(s)
Sample Interval : 30 sec(s)
Change to Txmit : 0
Txmit Threshold : 0
Multiplier : 1
Divisor : 1
Base Value : 0
Display Digits : 0
Trim Enable : Disabled

With this set up, the 5096/A2 Data Transmitter should transmit a 0 value for ANALOG 5 every 30 seconds. If this test works correctly, then the problem is probably in the sensor or the cables and not in the 5096/A2. Check the cables to ensure that they have not been damaged and that they are correctly connected. Refer to the manual for the specific sensor for further troubleshooting of the ANALOG sensor. If this test does not work, then the problem may be in the board and the 5096/A2 will need further troubleshooting that may not be possible in the field.

5.4.10 SET-WARM and ANALOG Sensors

If SET-WARM is incorrectly set, then the ANALOG sensors may not warm up enough prior to being read, resulting in poor data or zero readings. Use the SET-WARM to check the analog sensor warmup time. The default warmup time is 100 milliseconds, which is adequate for pressure transducer ANALOG sensors but not for weather station sensors. The relative humidity and air temperature sensors require a warmup time of 3 seconds. The barometric pressure sensor requires a warmup time of 10 seconds. For a weather station with a barometric pressure sensor, the parameter ***wa*** should be set to 10000 milliseconds to give the sensor the 10 second warmup time.

5.4.11 RF Modulation and the Transmitter

If the SET-RF modulation parameters does not match the radio type, then an ALERT2 packet will not be decoded by receiving radio DCP. The default setting for RF modulation is normal. This works for all radios except the Maxon SD-125VE. This radio needs the modulation parameter to 1 for inverted. Type the command:

>**SET-RF ,,,,1**[Enter]
RF Power Up : 750 msec
RF Carrier Only : 10 msec
RF AGC : 25 msec
RF Tail : 5 msec
RF Mod Invert : inverted
RF FEC Type : LDR
RF Audio Preload : 100 msec

5.4.12 RF FEC Type

If you use FEC type other than 0=LDR, your repeaters and base station receivers must be HDR (high data rate) compatible. If they are not, then an ALERT2 packet will not be decoded by receiving radio DCP.

The ALERT2 receiver sensitivity is also changed by the FEC Type. If your station radio path is weak, and not all data is received, reduce the FEC Type to 1=MDR or 0=LDR. You may need to increase your TDMA slot length when you decrease the FEC type.

RF FEC Type	RX Sensitivity
0=LDR	0dB
1=MDR	-1.5dB
2=HDR	-2.5dB

Change the RF FEC Type to 0=LDR. Type the command:

>**SET-RF ,,,,,0**[Enter]
RF Power Up : 750 msec
RF Carrier Only : 10 msec
RF AGC : 25 msec
RF Tail : 5 msec
RF Mod Invert : inverted
RF FEC Type : LDR
RF Audio Preload : 100 msec

If the FEC Type was 2=HDR and the slot length was 250 milliseconds, change the TDMA slot length to 500 milliseconds and slot delay to 25 milliseconds. Type the command:

>**SET-TDMA ,,500,,25**[Enter]
TDMA Use : Enabled
TDMA FrameLength : 120000 msec
TDMA Slot Length : 500 msec
TDMA Slot Offset : 11000 msec
TDMA Slot Delay : 25 msec
TDMA Slot Center : Disabled
TDMA TimedOffset : 0 secs

5.4.13 TDMA Slot Offset

If your event and test transmission are received at the base station but the timed reports are not, you may have TDMA collisions between this station and another. Change the TDMA Slot Offset to an unused position in your TDMA plan to correct this problem.

Change your TDMA Slot Offset from 11000 to 50000. Type the command:

>**SET-TDMA ,,,50000**[Enter]
TDMA Use : Enabled
TDMA FrameLength : 120000 msec
TDMA Slot Length : 500 msec
TDMA Slot Offset : 50000 msec
TDMA Slot Delay : 25 msec
TDMA Slot Center : Disabled
TDMA TimedOffset : 0 secs

If this change corrects the timed report receive problem, check your base station ALERT2 receiver logs to find the station report that overruns the previous TDMA Slot Offset. Repair or reprogram this station and test its performance. If the overrun problem is corrected, change the TDMA Slot Offset for this station from the test slot offset back to its TDMA plan slot offset.

5.4.14 RESETCNT Command

The RESETCNT command will display the number of RESETs counted since the count was last initialized. If the Reset Count is large, something is causing the transmitter to RESET too often. During transmissions, power feedback from a bad antenna connection can cause the 5 Volt Reference to change and result in transmitter RESETs. Press the **TEST** switch to force a transmission of all active sensors and check if the 5096/A2 Data Transmitter does a RESET. Correct the antenna problem or consult the factory for an ECO board level repair.

5.4.15 INIT and Default Settings

The INIT command will return all sensor parameters to their default values. Prior to using this command write down the current sensor parameters using the Sensor Set Up Checklist, see Section 6.2 Document number A101229-2. Using the INIT command will also erase all data in logging memory. Use this command in the field if you feel that a programmable parameter is creating the problem with the 5096/A2 Data Transmitter and you cannot reprogram the error.

For a more detailed explanation of each command, refer to Section 4, Programming.

6 Appendix

6.1 Programming summary

A list of programming commands, their functional groupings and parameter descriptions are provided in this section.

6.1.1 Alphabetical List of Commands

Commands used to program the 5096/A2 Data Transmitter are listed alphabetically.

Command	Description
AD-OFF	Turn off the switched analog power.
AD-ON	Turn on the switched analog power.
ALIGN	Align all system timers to the current time.
CHK-MEM	Display the data logging memory available.
CLEAR-MEM	Clear all data from the data logging memory.
GET-MEM	Display logged data reports.
HELP	List transmitter commands and their parameters.
INIT	Initialize all battery-backed-up parameters.
READ-AN	Read and display ANALOG sensor data values.
READ-BATT	Read and display the BATTERY sensor data values.
READ-CTR	Read and display COUNTER sensor data values.
READ-EV	Read and display EVENT sensor data values.
READ-GPS	Read and display GPS time status.
READ-IDSW	Read and display the Station ID switches.
READ-PK	Read and display PEAK WIND sensor data values.
READ-ST	Read and display the STATUS sensor data values.
READ-TIME	Read and display GPS time
READ-WI	Read and display WIND sensor data values.
RESET	Reset the transmitter.
RESETCNT	Set the Reset count.
RESETINIT	Set the Initialize on TEST-RESET parameter.
SET-A2	Send all parameters to ALERT2 encoder.
SET-AN	Display or set ANALOG sensor parameters.
SET-BATT	Display or set the BATTERY sensor parameters.
SET-BAUD	Display the console baud rate.
SET-CTR	Display or set COUNTER sensor parameters.
SET-CTRRESET	Display or set COUNTER sensor reset time.
SET-DEBUG	Display or set the diagnostic display level.
SET-EV	Display or set EVENT sensor parameters.
SET-EVRESET	Display or set EVENT sensor reset time.
SET-GPS	Display or set GPS sensor parameters.
SET-MANT	Display or set ALERT2 MANT parameters.
SET-MEM	Display or set the data logging parameters.
SET-PK	Display or set PEAK WIND sensor parameters.
SET-RF	Display or set ALERT2 AirLink parameters.
SET-ST	Display or set STATUS sensor parameters.

SET-STAID	Display or set the Station ID number.
SET-TDMA	Display or set ALERT2 TDMA parameters.
SET-TIME	Display or set the transmitter clock time.
SET-TZ	Display or set the time zone.
SET-WARM	Display or set the ANALOG warm time.
SET-WI	Display or set WIND sensor parameters.
SHOWALL	Display all sensor parameters, data values and system parameters.
TEST	Executes a test of the transmitter.
TEST-MODE	Display or set test mode and test mode reset timer.
TEST-TX	Start radio transmitter test.
WRITE-CTR	Set the RAW value of a COUNTER sensor.
WRITE-EV	Set the RAW value of an EVENT sensor.

6.1.2 Functional Grouping of Commands

Commands used to program the 5096/A2 Data Transmitter are listed in functional groups.

System Commands	Sensor Set Up Commands		
ALIGN	SET-AN	SET-BATT	
HELP	SET-CTR	SET-CTRRESET	WRITE-CTR
INIT	SET-EV	SET-EVRESET	WRITE-EV
RESET	SET-GPS	SET-ST	
RESETINIT	SET-PK	SET-WI	
SET-BAUD	SET-WARM	SHOWALL	

Data Logging Commands	Testing and Maintenance Commands		
CHK MEM	AD ON	AD OFF	RESET
CLEAR-MEM	READ-AN	READ-BATT	RESETCNT
GET-MEM	READ-CTR	READ-WI	READ-TIME
SET-MEM	READ-EV	READ-ST	TEST
SET-TIME	READ-PK	READ-WI	TEST-MODE
	READ-GPS	READ-IDSW	TEST-TX

6.1.3 Parameter Descriptions

Command parameters used to program the Model 5096/A2 Data Transmitter are listed alphabetically.

Parameter	Description	Commands
a, b, c, d	Calibration Coefficients	SET-AN, BATT, CTR, EV, GPS, PK, ST, WI
adddest	ALERT2 MANT Add Destination	SET-MANT
addpath	ALERT2 MANT Add Path Service	SET-MANT
agc	ALERT2 AirLink Automatic Gain Control Time Interval	SET-RF
all	All Sensors	SHOWALL

baud	Baud Rate	SET-BAUD
cal	Cal Reading	READ-AN, BATT, CTR, EV, GPS, PK, ST, WI
car	ALERT2 AirLink Carrier Only Time Interval	SET-RF
cgt	Change to Transmit	SET-AN, BATT, CTR, EV, GPS, PK, ST, WI
ctr	ALERT2 TDMA Slot Center	SET-TDMA
D1	Start Day	GET-MEM
D2	End Day	GET-MEM
DD	Day of Month	SET-CTRRESET, SET-EVRESET, SET-TIME
del	ALERT2 TDMA Slot Delay	SET-TDMA
destid	ALERT2 MANT Destination Source Address	SET-MANT
dsten	Daylight Saving Time Enable Flag	SET-TZ
dstname	Daylight Saving Time Zone Name	SET-TZ
en	Enable Flag	SET-MEM, TDMA
ev	Event Detection Flag	SET-EV, WI
fec	ALERT2 AirLink FEC type	SET-RF
frame	ALERT2 TDMA Frame Length	SET-TDMA
h1	Start Hour	GET-MEM
h2	End Hour	GET-MEM
hh	Hour	SET-CTRRESET, SET-EVRESET, SET-TIME
hoplimit	ALERT2 MANT Hop Limit	SET-MANT
id	Sensor ID	SET-AN, BATT, CTR, EV, GPS, PK, ST, WI
indts	ALERT2 MANT IND Timestamp	SET-MANT
len	ALERT2 TDMA Slot Length	SET-TDMA
level	Test or diagnostic level	SET-DEBUG, TEST
M1	Start Month	GET-MEM
M2	End Month	GET-MEM
MM	Month	SET-CTRRESET, SET-EVRESET, SET-TIME
m1	Start Minute	GET-MEM
m2	End Minute	GET-MEM
mm	Minute	SET-CTRRESET, SET-EVRESET, SET-TIME
mod	ALERT2 AirLink Modulation Type	SET-RF
mode	Event Mode	SET-EV
of	Overflow Flag	SET-MEM
off	ALERT2 TDMA Slot Offset	SET-TDMA
pdc	Pre-Divide Counter	SET-WI
pre	ALERT2 AirLink Audio Preload Time Interval	SET-RF
pwr	ALERT2 AirLink Power Up Time Interval	SET-RF

rcnt	Reset Count	RESETCNT
reset	Test Mode Reset Timer	TEST-MODE
rpt	Report Type	SET-AN, BATT, CTR, EV, GPS, PK, ST, WI
rstate	Reset Initialize State	TEST-RESET
si	Sample Interval	SET-AN, BATT, CTR, EV, GPS, PK, ST, WI
sn	Sensor Number	READ-AN, BATT, CTR, EV, GPS, PK, ST, WI, SET-AN, BATT, CTR, EV, GPS, PK, ST, WI WRITE- CTR, EV
ss	Second	SET-CTRRESET, SET-EVRESET, SET-TIME
staid	Station ID	SET-STAID
state	Test Mode State	TEST-MODE
string	Search String	HELP
tail	ALERT2 AirLink Tail Time Interval	SET-RF
ti	Transmit Interval	SET-AN, BATT, CTR, EV, GPS, PK, ST, WI
toff	TDMA Timed Offset	SET-TDMA
trim	Trim Enable	SET-AN
txth	Transmit Threshold	SET-AN, BATT, CTR, EV, GPS, PK, ST, WI
tzname	Local Time Zone Name	SET-TZ
tzoffset	Local Time Zone Offset	SET-TZ
val	Value to Set	WRITE-CTR, EV
wa	Analog Warm Time	SET-WARM
we	Wind Speed Enable Flag	SET-WI
YYY1	Start Year	GET-MEM
YYY2	End Year	GET-MEM
YYYY	Year	SET-CTRRESET, SET-EVRESET, SET-TIME

6.2 Drawings

The following drawings are enclosed to assist in the installation, set up, and trouble-shooting of problems.

WP104973 Maintenance Report is used for recording general site and transmitter information and information taken during the recommended service checks.

WD101229 5096/A2 Set Up Checklist for use when setting up the 5096/A2 Data Transmitter before installation. Keep a copy of the checklist with the unit.

WP101018 Test Results Report is used for writing down information while testing the 5096/A2 Data Transmitter. Use it with tests outlined in Section 5.

AC107908 9601 PCB Assembly Diagram shows the components on the 9601 board.

AC104180 Outline, Pin Outs for Interconnect Circuit Board shows the 5096/A2 Data Transmitter top cover connector pin outs for standard ALERT sensors, solar panels, antennas, and RS232 console cable bulkhead connector.

AC104045 5096/A2 Wire Diagram shows the wiring between the 9601 board and the interconnection board, sensor connectors, radio, solar panel and battery.

AC107911 Wiring Diagram, Typical Sensors to 5096/A2-N shows the sensor connection points for the 5096/A2-N.

AC104020 Console RS232 External Cable, DB9F to DB9M wiring diagram.

AC104021 Console RS232 External Cable, DB9F to MS7 wiring diagram.

AC104076 Cable, RS232 Internal Cable, DB9M to MS7 wiring diagram.

VS108321 5096 COM Port to ALERT2 Encoder Y Cable wiring diagram.

VS108505 ALERT2 Encoder Power Harness Cable wiring diagram.

VS108508 ALERT2 Encoder and Power Amp Power Harness Cable wiring diagram.

VS108504 ALERT2 Encoder to Maxon Radio Cable wiring diagram.

VS108509 Radio Antenna Cable assembly.

VS108503 ALERT2 Encoder GPS Antenna Cable assembly.

Maintenance Report

Document Number WP104973

SITE INFORMATION		
Location:	Gauge type:	ID#:
Purpose/Comments:		
Weather conditions:		

EQUIPMENT INFORMATION			
Equipment	**Model #**	**Asset #**	**Comments**
Data transmitter			
Antenna			
Battery			
Solar panel			
Sensors			

TEST DATA							
POWER							
Battery voltage	w/o load:	Vdc	w/ load:	Vdc	Difference:	Vdc	
Current	Standby:	µA	w/ load:	A			
Solar panel	w/o load:	Vdc	w/ load:	A	Reverse:	mA	
SIGNAL OUT - TX							
Power out:	W	Reverse power:	W	Freq error:	Hz	Dev:	± kHz

SIGNAL IN - SENSOR

Sensor	Measured	Reading	Comments

COMMENTS

HydroLynx Systems, Inc. ● 950 Riverside Pkwy., Suite 10 ● West Sacramento, CA 95605
Phone 916-374-1800 ● Fax 916-374-1877 ● Email hydro@hydrolynx.com

5096/A2 Set Up Checklist

Document Number WD101229-4

ALERT2 Station ID:	Station serial #:	EPROM Version #:	
Location:		By:	Date:

ALERT2 Setup

TDMA							RF		MANT
EN	FRAME	LENGTH	OFFSET	DELAY	CENTER	TOFF	MODULATION	FEC	HOP LIMIT

Analog Sensors

SN	ID	RPT	TI	SI	CGT	TXTH	A	B	C	D	TRIM
1											
2											
3											
4											
5											
6											
7											
8											

Event Sensors

SN	ID	RPT	TI	SI	CGT	TXTH	A	B	C	D	EV	MODE
1												
2												

Wind Sensors

SN	ID	RPT	TI	SI	CGT	TXTH	A	B	C	D	EV	WE	PDC
1													
2													

Peak Sensors

SN	ID	RPT	TI	SI	CGT	TXTH	A	B	C	D
1										
2										

GPS Sensor

SN	ID	RPT	TI	SI	CGT	TXTH	A	B	C	D
1										

Status Sensors

SN	ID	RPT	TI	SI	CGT	TXTH	A	B	C	D
1										
2										
3										
4										
5										
6										
7										
8										

HydroLynx Systems, Inc. • 950 Riverside Pkwy #10 • West Sacramento, CA 95605-1501
Phone 916-374-1800 • Fax 916-374-1877 • Email hydro@hydrolynx.com

5096/5096N TEST RESULTS REPORT

Document Number WP101018-6

Date:	Chassis serial number:
Inspector:	PCB serial number:
Job number:	EPROM version number:
Transmitter frequency: MHz	Transmitter serial number:
Transmitter deviation: ± kHz	Transmitter manufacturer:

PCB CHECK

BY: DATE:

Vcc: Vdc	Test switch: ☐	Reset switch: ☐	Analog on/off test: ☐
Stand-by: µA	ROM: ☐ RAM: ☐	ID switches: ☐	Analog: ☐
RAM Batt: Vdc	Battery test: ☐	Transmit power: ☐	Digital: ☐
Init: ☐	Clock: ☐	LED test: ☐	Status: ☐

UNIT TESTS

BY: DATE:

RAM Battery: JB2 ☐	Cables connections: ☐	Set UID:
RAM Battery: Vdc	ADC Vref check Vdc	☐ Option AC PS Vdc

A-1:	A-2:	A-3:	A-4:	A-5:	A-6:	A-7:	BATT:
EV-1:	EV-2:	WI-1:	CTR-2:	S1...S8:			

RADIO TESTS

BY: DATE:

Frequency error: Hz	Deviation: ± kHz	Power output: W

Data Protocol:	Self-report test: ☐	
Test Data TX: ☐	Burn-in: ☐	

VISUAL INSPECTION

BY: DATE:

Serial number tag: ☐	Wiring/Solder: ☐	Lid/Cover: ☐
Silkscreen: ☐	Fasteners: ☐	Neat/Complete: ☐
Connectors: ☐	Dust covers: ☐	
Strain reliefs: ☐	Desiccant: ☐	
Notes:		

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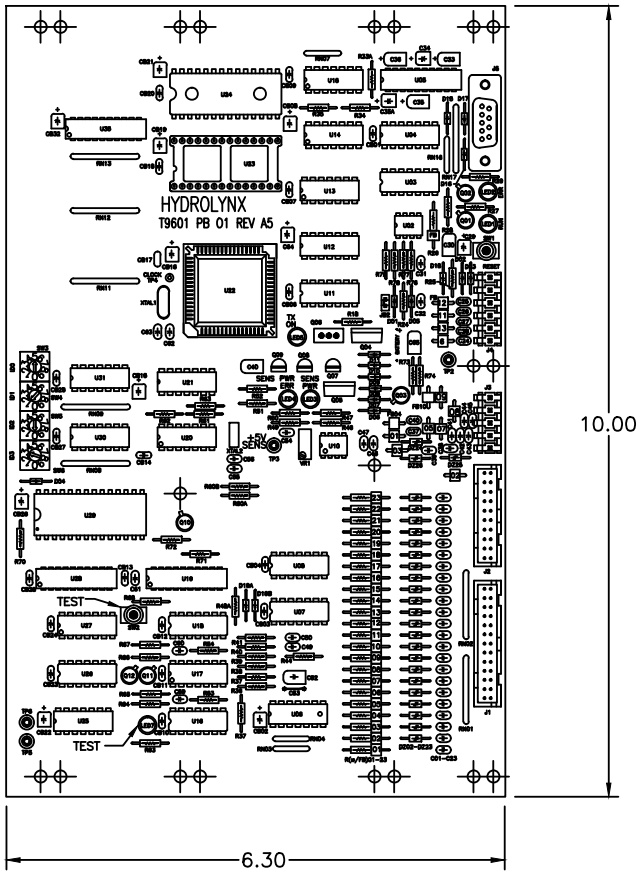
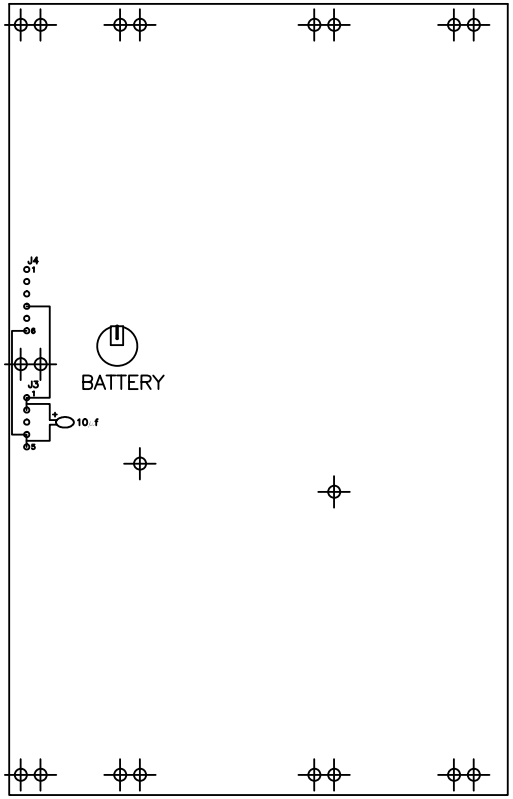
Phone 916-374-1800 ● Fax 916-374-1877 ● Email hydro@hydrolynx.com



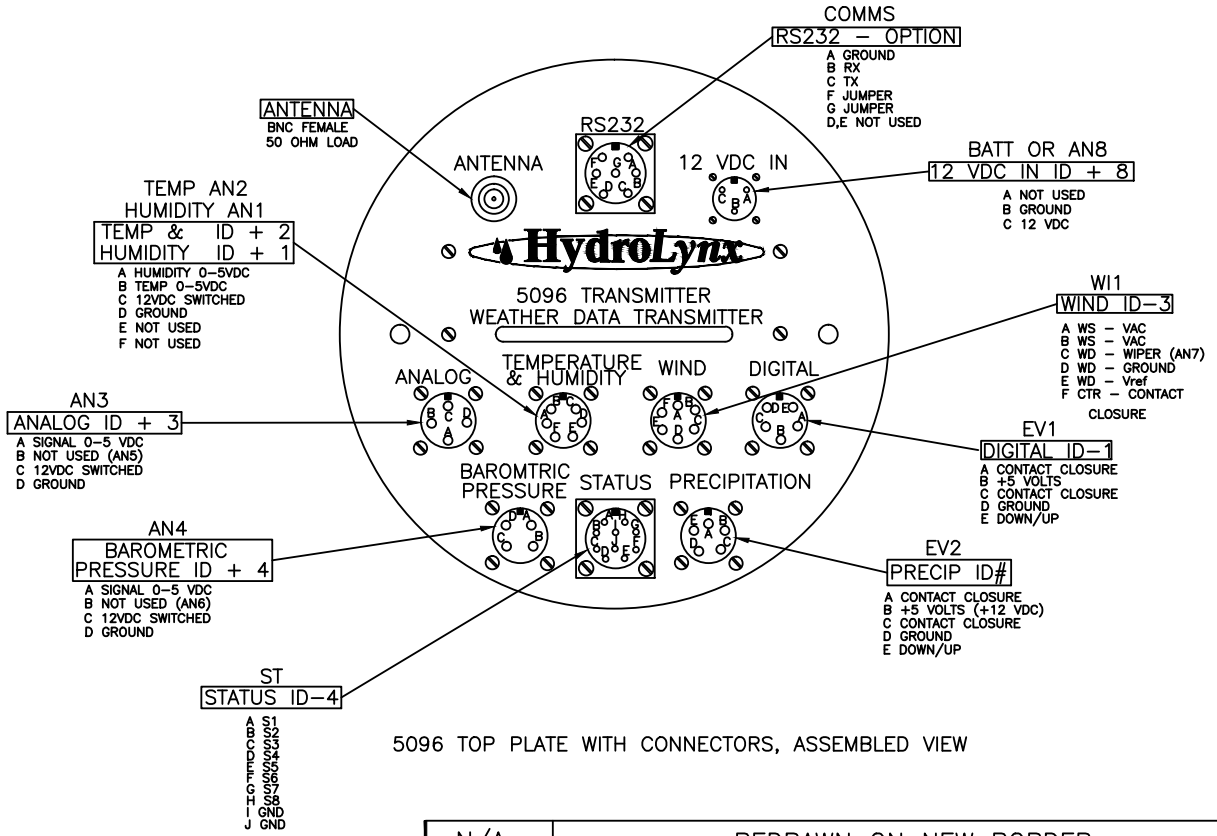
FRONT VIEW
SCALE 2/1



BACK VIEW
SCALE 2/1

ECN#	DESCRIPTION	DATE
N/A	CHANGED PER MARKUP	7/07

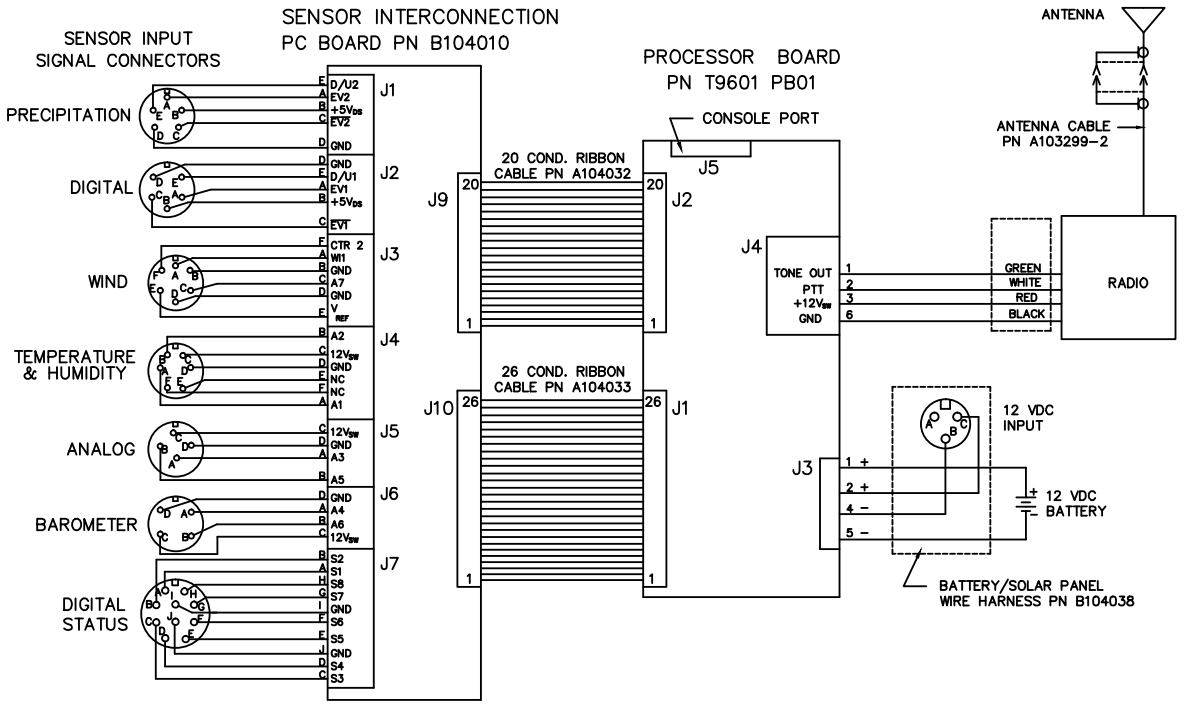
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES	MODEL USAGE		HydroLynx
FRACTIONS = ± N/A			MODEL NO. 5096
.XX = ± .01			TITLE PCB, 9601
.XXX = ± .005			
MAT'L			
FINISH	DRAWN BY K. KOELSCH	DATE 3/4/99	DWG TYPE OUTLINE
TREATMENT	CHECKED BY	DATE	SIZE B / DWG NO. AC107908 / REV B



5096 TOP PLATE WITH CONNECTORS, ASSEMBLED VIEW

ECN#	DESCRIPTION	DATE
N/A	REDRAWN ON NEW BORDER	3/18/99
NL004	ACAD REDRAW	3/9/94

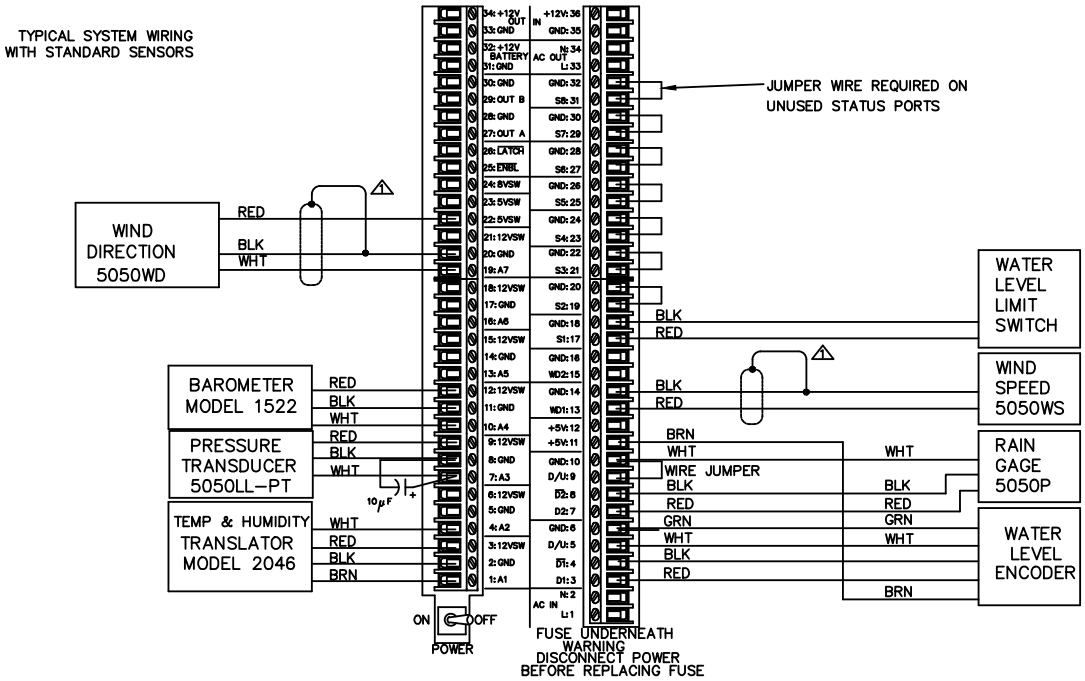
MODEL USAGE		HydroLynx	
		MODEL NO.	5096
		TITLE	PIN OUTS FOR INTERCONNECT CIRCUIT BOARD
DRAWN BY: S.HEINEMANN	DATE: 3–9–94	DWG TYPE	OUTLINE
CHECKED BY	DATE	SIZE: A	DWG NO.: AC104180 / REV: C



ECN#	DESCRIPTION	DATE
N/A	REDRAW ON NEW BORDER	08/14/00

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES	MODEL USAGE		HydroLynx	
FRACTIONS = ± N/A				
.XX = ± N/A			MODEL NO. 5096	
.XXX = ± N/A			TITLE ALERT TRANSMITTER	
MAT'L N/A				
FINISH N/A	DRAWN BY P. COSTA	DATE 08/14/00	DWG TYPE WIRING DIAGRAM	
TREATMENT N/A	CHECKED BY	DATE	SIZE B	DWG NO. AC104045 REV A

TYPICAL SYSTEM WIRING
WITH STANDARD SENSORS



NOTES – 1. CABLE SHIELDS SHOULD BE CONNECTED TO GND TERMINALS.
2. TERMINALS SHOWN WITHOUT PANEL.

ECN#	DESCRIPTION	DATE

MODEL USAGE

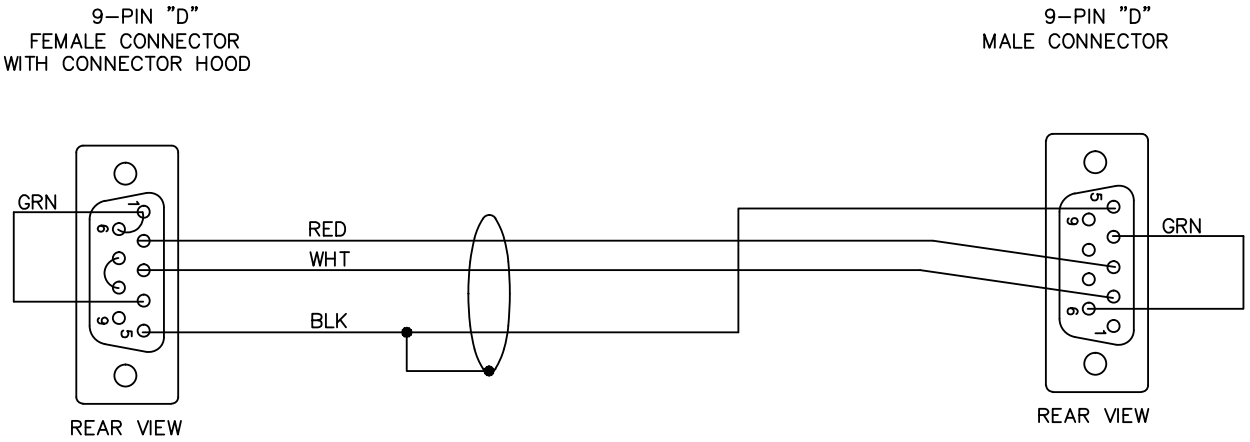
HydroLynx

MODEL NO. 5096N

TITLE
WIRING DIAGRAM
TYPICAL SENSORS TO 5096 N

DRAWN BY	DATE	DWG TYPE		
R. COLBORN	11-2-00	ASSEMBLY		
CHECKED BY	DATE	SIZE	DWG NO.	REV
		B	AC107911	B

NOTES: 1. CABLE IS BELDEN #9533, 3 COND., 24 AWG, SHIELDED.
CABLE LENGTH IS 10 FT.
2. NOTE JUMPER ON MALE CONNECTOR, 4 TO 6.
USE INSULATED GREEN WIRE 24 AWG.
3. NOTE JUMPER ON FEMALE CONNECTOR, 7 TO 8.
USE BARE BUS WIRE, 24 AWG.

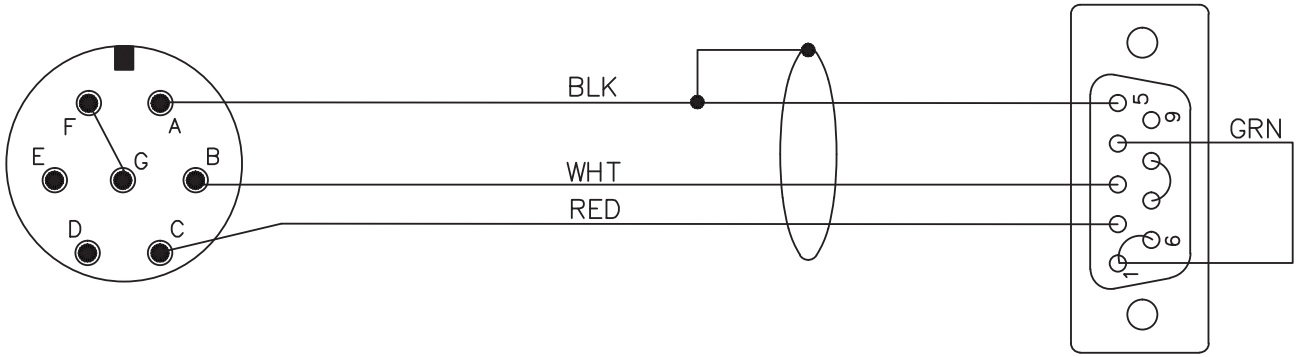


ECN#	DESCRIPTION	DATE
N/A	REDRAWN ON NEW BORDER	12/15/99

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES	MODEL USAGE		HydroLynx	
FRACTIONS = ±				
.XX = ±			MODEL NO. 5071C–5096–1	
.XXX = ±			TITLE CONSOLE CABLE	
MAT'L			RS232	
FINISH	DRAWN BY J. HOPECK	DATE 12/15/99	DWG TYPE WIRING DIAGRAM	
TREATMENT	CHECKED BY	DATE	SIZE A	DWG NO. AC104020 REV B

5096 ALERT
TRANSMITTER RS232 CONNECTOR
7–PIN FEMALE CONNECTOR
CABLE END WITH CLAMP
MS3106A–16S–1S
& 97–3057–1008

9–PIN "D"
FEMALE CONNECTOR
WITH CONNECTOR HOOD



PIN #	COLOR
1	GREEN
2	RED
3	WHITE
4	GREEN
5	BLACK
6	GREEN

NOTES:
1. CABLE IS BELDEN #9533, 3 COND., 24 AWG, SHIELDED.
2. CABLE LENGTH IS 10 FT.
3. NOTE JUMPERS ON 9–PIN CONNECTOR, 7 TO 8, AND 1 TO 6 TO 4. USE INSULATED GREEN WIRE 24 AWG.
4. NOTE JUMPER ON CIRCULAR CONNECTOR, F TO G. USE BARE BUS WIRE, 24 AWG.

ECN#	DESCRIPTION	DATE
4	CHANGED MODEL #	6/11

MODEL USAGE

HydroLynx

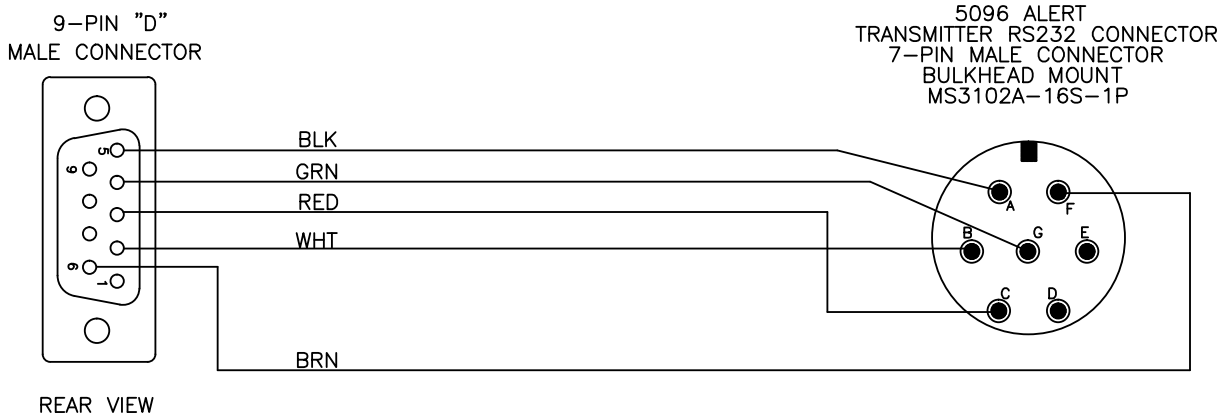
MODEL NO. 5071C – 5096–4

TITLE CABLE, RS232
7–PIN EXTERNAL

DRAWN BY	DATE	DWG TYPE		
T. JOHNSTON	08/11/00	WIRING DIAGRAM		
CHECKED BY	DATE	SIZE A	DWG NO. AC104021	REV 4

NOTES:

1. CABLE IS BELDEN #9535, 5 COND., 22 AWG.
2. (5096N) CABLE LENGTH IS 23 1/2".
3. (096CAN) CABLE LENGTH IS 16".



N/A	REDRAW ON NEW BORDER	08/14/00
ECN#	DESCRIPTION	DATE

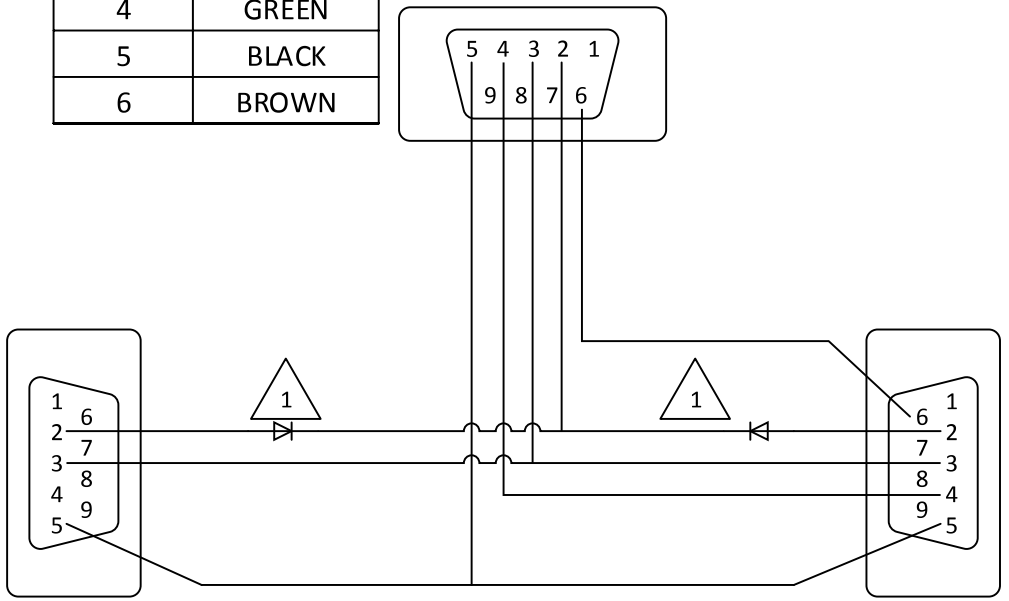
MODEL USAGE		HydroLynx	
		MODEL NO.	5096
		TITLE	CABLE, RS232
DRAWN BY: F. KING	DATE: 08/14/00	DWG TYPE	INTERNAL WIRING DIAGRAM
CHECKED BY	DATE	SIZE: A	DWG NO.: AC104076 / REV: D

PIN#	LENGTH	COLOR
2	12"	WHITE
3	8.5"	RED
5	8.5"	BLACK

REAR VIEW
9-PIN “D” MALE
CONNECTOR 156-1209
TO ALERT2 ENCODER

PIN#	COLOR
2	(X2) WHITE
3	RED
4	GREEN
5	BLACK
6	BROWN

REAR VIEW
9-PIN “D” MALE
CONNECTOR 156-1209
TO 5096 COM PORT



PIN#	LENGTH	COLOR
2	8"	WHITE
3	8"	(X2) RED
4	8"	GREEN
5	8"	(X2) BLACK
6	8"	BROWN

REAR VIEW
9-PIN “D” FEMALE
CONNECTOR 156-1309
TO CONSOLE TERMINAL
/ CHASSIS BRACKET

NOTES:
1. COVER BOTH 1N914 DIODES WITH HEAT SHRINK TUBING.

☆ ALL WIRE IS 22 AWG.

ECN#	DESCRIPTION	DATE
2	CHANGED NOTES/ADDED QUANTITY OF EA. COLOR WIRE	6/24/2016
1	CHANGED WIRE LENGTHS AND ADDED NOTES	8/2014

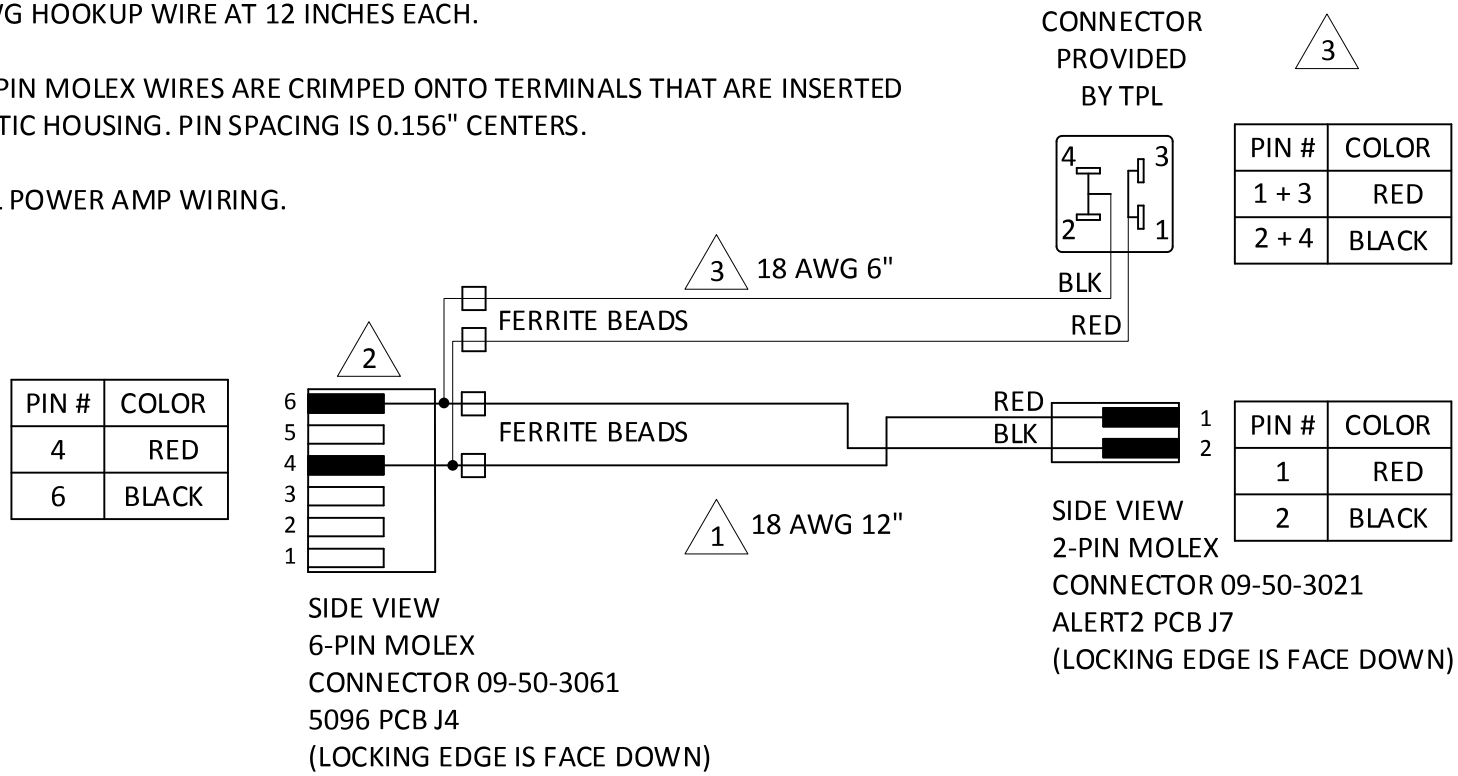
UNLESS OTHERWISE SPECIFIED: DIMESNIONS ARE IN INCHES TOLERANCES	MODEL USAGE 5096/A2		HydroLynx		
FRACTIONS = ±			MODEL NO. 5096/A2		
.XX = ±			TITLE “Y” CABLE		
.XXX = ±			COM TO ALERT 2		
MAT’L					
FINISH	DRAWN BY M.MALONEY	DATE 1/13	DWG TYPE WIRING DIAGRAM		
TREATMENT	CHECKED BY D.LEADER	DATE 6/24/16	SIZE A	DWG NO. VS108321	REV 2

NOTES:

1. USE 18 AWG HOOKUP WIRE AT 12 INCHES EACH.

2. 6-PIN & 2-PIN MOLEX WIRES ARE CRIMPED ONTO TERMINALS THAT ARE INSERTED INTO PLASTIC HOUSING. PIN SPACING IS 0.156" CENTERS.

3. OPTIONAL POWER AMP WIRING.



PIN #	COLOR
1 + 3	RED
2 + 4	BLACK

PIN #	COLOR
4	RED
6	BLACK

PIN #	COLOR
1	RED
2	BLACK

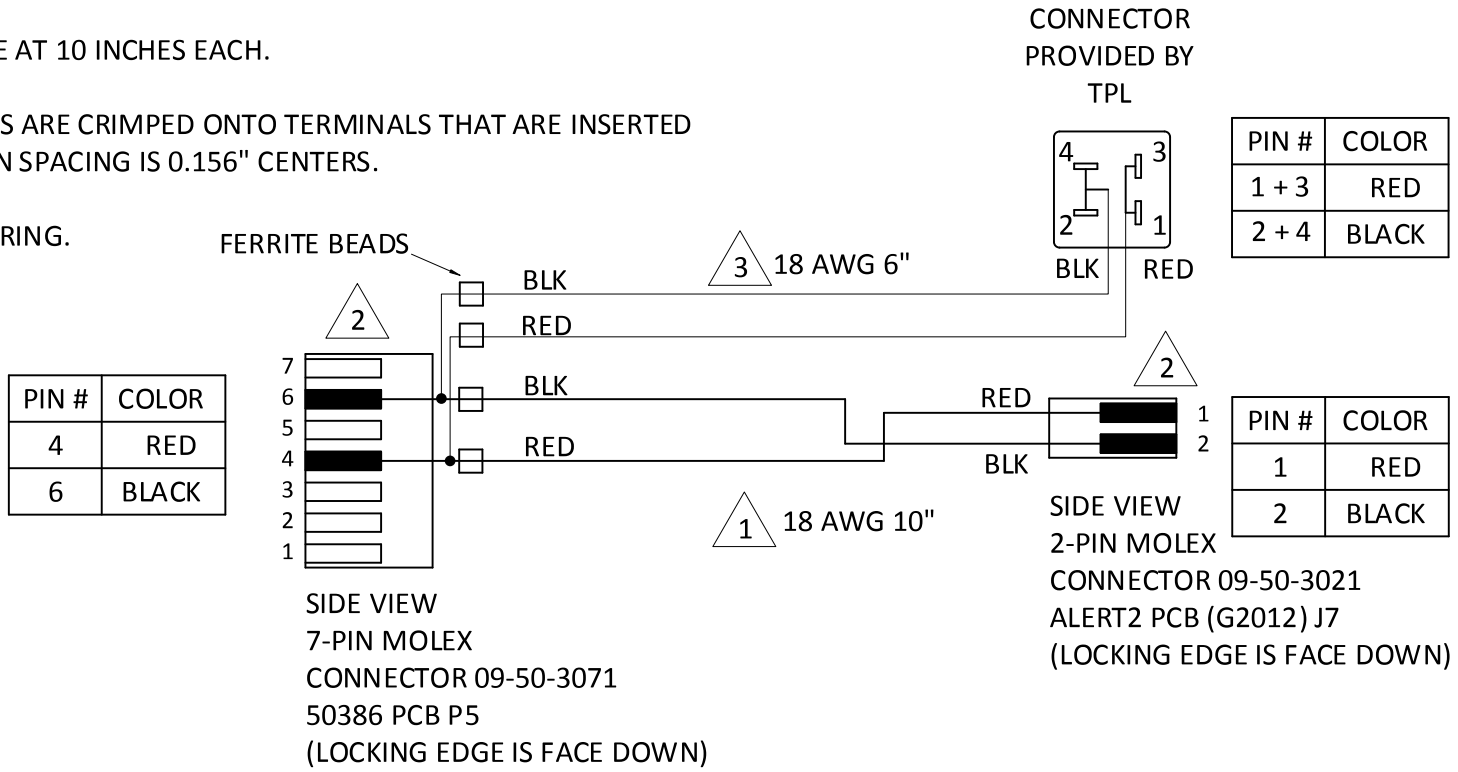
MODEL:	G2012 LENGTH:	OPTIONAL P/A LENGTH
5096/A2	12"	6"

ECN#	DESCRIPTION	DATE
2	ADDED OPTIONAL TO POWER AMP WIRING NOTES	11/13/2017
1	ADD POWER AMP OPTION	9/15

UNLESS OTHERWISE SPECIFIED: DIMESNIONS ARE IN INCHES TOLERANCES	MODEL USAGE		HydroLynx		
	5096/A2				
FRACTIONS = ±					
.XX = ±			MODEL NO. 5096/A2		
.XXX = ±			TITLE CABLE, ALERT2 ENCODER AND		
MAT'L			OPTIONAL POWER AMP POWER HARNESS		
FINISH	DRAWN BY M. MALONEY	DATE 1/13	DWG TYPE WIRING DIAGRAM		
TREATMENT	CHECKED BY D. LEADER	DATE 11/13/17	SIZE A	DWG NO. VS108505	REV 2

NOTES:

1. USE 18 AWG HOOKUP WIRE AT 10 INCHES EACH.
2. 7-PIN & 2-PIN MOLEX WIRES ARE CRIMPED ONTO TERMINALS THAT ARE INSERTED INTO PLASTIC HOUSING. PIN SPACING IS 0.156" CENTERS.
3. OPTIONAL POWER AMP WIRING.



PIN #	COLOR
1 + 3	RED
2 + 4	BLACK

PIN #	COLOR
4	RED
6	BLACK

PIN #	COLOR
1	RED
2	BLACK

MODEL:	G2012 LENGTH:	OPTIONAL P/A LENGTH
50386/A2	10"	6"
50386RP/A2	10"	6"

ECN#	DESCRIPTION	DATE
3	CORRECTED NOTES/ADDED MODEL TABLE	11/13/2017
2	ADD FERRITE BEADS TO POWER AMP WIRES	9/28/15
1	ADD POWER AMP OPTION	2/15

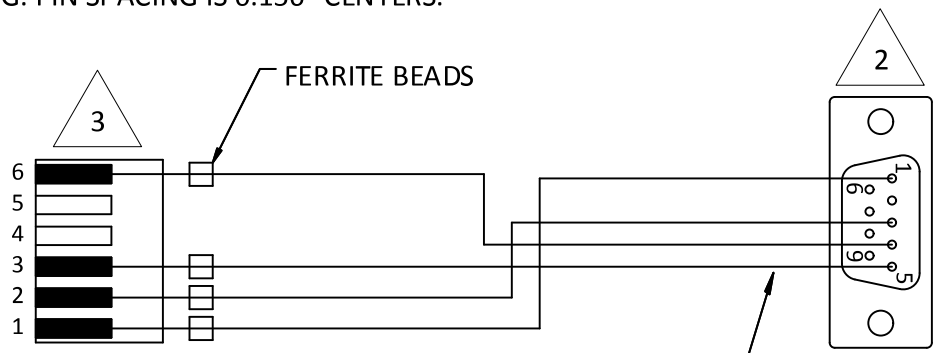
UNLESS OTHERWISE SPECIFIED: DIMESNIONS ARE IN INCHES TOLERANCES	MODEL USAGE		HydroLynx		
	50386/A2				
FRACTIONS = ±	50386RP/A2				
.XX = ±			MODEL NO. 50386/A2, 50386RP/A2		
.XXX = ±			TITLE CABLE, ALERT2 ENCODER AND		
MAT'L			OPTIONAL POWER AMP POWER HARNESS		
FINISH	DRAWN BY M. MALONEY	DATE 1/13	DWG TYPE WIRING DIAGRAM		
TREATMENT	CHECKED BY David C. Leader	DATE 11/13/17	SIZE A	DWG NO. VS108508	REV 3

NOTES:
1. USE 22 AWG WIRE AT LENGTHS FOR MODEL USAGE. SEE TABLE BELOW.

2. USE SHRINK TUBING ON SOLDERED WIRES AT 9-PIN "D" CONNECTOR.

3. 6-PIN MOLEX WIRES ARE CRIMPED ONTO TERMINALS, PN: 08-56-0108, THAT ARE INSERTED INTO PLASTIC HOUSING. PIN SPACING IS 0.156" CENTERS.

PIN #	COLOR	SIGNAL
1	GRN	TX AUDIO
2	WHT	TX PTT
3	RED	TX PWR
6	BLK	GND



SIDE VIEW
6-PIN MOLEX
CONNECTOR 09-50-3061
ALERT2 PCB J1
(LOCKING EDGE IS FACE DOWN)

REAR VIEW
9-PIN "D" FEMALE
CONNECTOR 156-1309
TO MAXON RADIO

PIN #	COLOR	SIGNAL
1	GRN	TX AUDIO
3	WHT	TX PTT
4	BLK	GND
5	RED	TX PWR

1

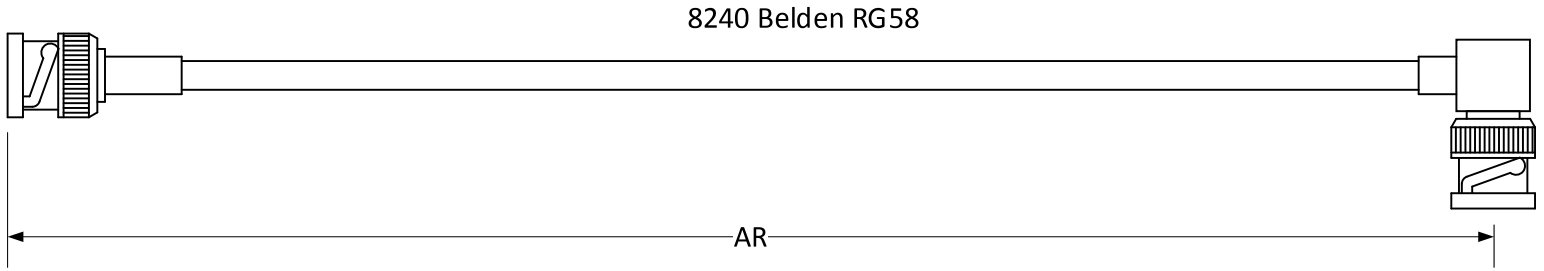
MODEL	LENGTH
5096/A2	11"
50386/A2	11"
5052RP	11"
5052RP-K	11"
5052RP-B/N	28"
50388/A2	11"
50386RP-2/A2	14"
5052RD-OP2	11"

ECN#	DESCRIPTION	DATE
5	ADDED INFO TO MODEL USAGE TABLE	9/21/18
4	ADDED 50386RP/A2 AND CREATED MODEL LENGTH TABLE	10/30/17

UNLESS OTHERWISE SPECIFIED: DIMESNIONS ARE IN INCHES TOLERANCES	MODEL USAGE SEE TABLE ON LEFT		HydroLynx	
FRACTIONS = ±			MODEL NO. 5096/A2, 50386/A2, 50386RP-2/A2, 50388/A2	
.XX = ±			5052RP, 5052RP-K, 5052RP-B/N	
.XXX = ±			TITLE CABLE, ALERT2 ENCODER TO MAXON RADIO (TX)	
MAT'L				
FINISH	DRAWN BY M. MALONEY	DATE 1/13	DWG TYPE WIRING DIAGRAM	
TREATMENT	CHECKED BY J. MATTEUCCI	DATE 9/25/18	SIZE A	DWG NO. VS108504 REV 5

AMPHENOL
31-5800
BNC MALE
TO TOP PLATE

AMPHENOL
31-335-RFX
BNC MALE
RIGHT ANGLE
TO RTR



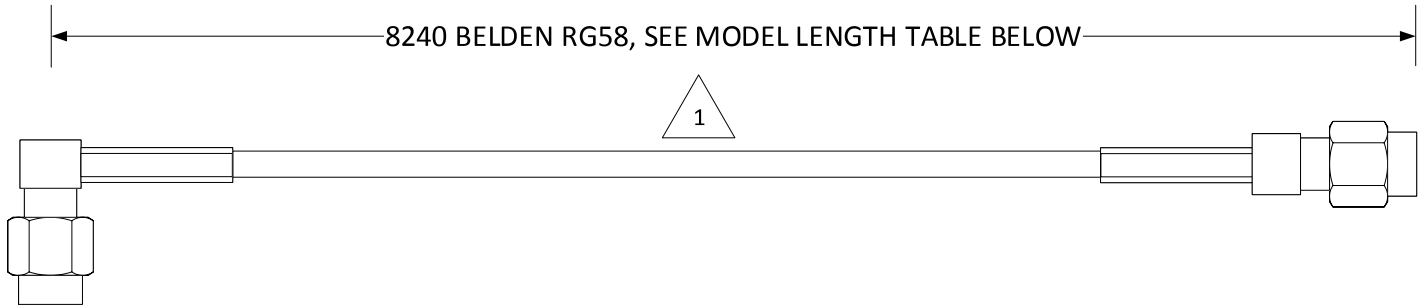
MODEL:	LENGTH:
5096/A2-UP	17"
50386/A2-UP	17"
5052RP-3-OP1 LS	20"
5052RP-2,3-OP1 MX	7"
5052RP-3-H-OP1 LS	14.5"

ECN#	DESCRIPTION	DATE
2	ADDED MODEL 5052RP-H AND MOVED LENGTHS TO TABLE	11/6/18
1	UPDATED LENGTHS IN “MODEL USAGE” TABLE	9/28/18

UNLESS OTHERWISE SPECIFIED: DIMESNIONS ARE IN INCHES TOLERANCES	MODEL USAGE		HydroLynx		
	5096/A2-UP				
FRACTIONS = ±	50386/A2-UP				
.XX = ±	5052RP-2		MODEL NO. 5096/A2, 50386/A2, 5052RP		
.XXX = ±	5052RP-3-OP1		TITLE CABLE, ANTENNA		
MAT’L	5052RP-3-H-OP1				
FINISH	DRAWN BY M. MALONEY	DATE 7/13	DWG TYPE ASSEMBLY		
TREATMENT	CHECKED BY A. HERBERT	DATE 11/6/18	SIZE A	DWG NO. VS108509	REV 2

PN: RSA 3010-C
SMA COAXIAL CONNECTOR,
MALE, RIGHT ANGLE TO
ALERT2 ENCODER PCB
(G2012) J8

PN: 01F2196
SMA COAXIAL CONNECTOR,
MALE, TO SMA BULKHEAD
CONNECTOR



MODEL:	LENGTH:
5096/A2	7"
50386/A2	7"
50386RP/A2	7"
50386RP/A2-2	7"
50388/A2	7"
5052RP	7"
5052RP W/PWR AMP	13"
5052RP-H	13"

1

1 PN: CRG 174, SMAM/SMAM, 18" LENGTH, MAY BE SUBSITUTED FOR 108503 IN 5052RP-K, 5052RD-K OP2, 5052RD/RP-K MODELS.

ECN#	DESCRIPTION	DATE
4	ADDED MODEL 5052RP-H, REMOVED MODELS FOR 18"	11/7/18
3	ADDED/REMOVED MODELS/LENGTH/ADDED NOTES	11/6/2017
2	ADDED TABLE FOR CABLE LENGTH PER MODEL	10/28/2016
1	MODEL USAGE 5052RD-OP2 18"	5/15

UNLESS OTHERWISE SPECIFIED: DIMESNIONS ARE IN INCHES TOLERANCES	MODEL USAGE: SEE MODEL/LENGTH TABLE ON LEFT		HydroLynx		
FRACTIONS = ±			MODEL NO. 5096/A2, 50386/A2, 50386RP/A2, 5052RP,		
.XX = ±			5052RD-OP2, 50388/A2		
.XXX = ±					
MAT'L N/A			TITLE CABLE, ANTENNA, GPS		
FINISH N/A	DRAWN BY M. MALONEY	DATE 7/13	DWG TYPE ASSEMBLY		
TREATMENT N/A	CHECKED BY David C. Leader	DATE 11/06/18	SIZE A	DWG NO. VS108503	REV 4