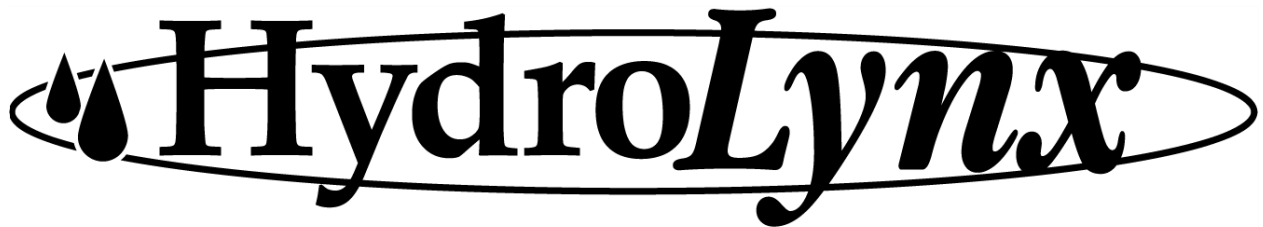


HydroLynx Systems, Inc.

**Model 5050LL-PTK
Submersible Pressure Transducer**

Instruction Manual



Document No: A102709
Document Revision Date: December, 2004

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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1.0 INTRODUCTION

1.1 General Description

The Model 5050LL-PTK Pressure Transducer is a submersible transducer with a vented cable, a moisture filter, and a termination enclosure. The stainless steel enclosed transducer measures water level by sensing the pressure of the water above the sensor location.

For use as a water level sensor, the 5050LL-PTK has been designed for direct submersion into liquids compatible with the 316 stainless steel housing and the polyurethane and Tefzel jacketed cable. The sensing element is a silicon pressure cell with an integral compliant stainless steel barrier diaphragm. A high pressure design allows the sensor to be subjected to pressures well beyond the specified operating range without any damage to the sensor.

An outside diameter of 1 inch allows use of the 5050LL-PTK in places where sensors with larger diameters cannot fit. The sensor still has sufficient mass to sink to the required depths. The output of the 5050LL-PTK is compatible with HydroLynx data transmitters and data loggers.

Cable lengths are specified based upon the length of vented cable required to fully submerge the sensor with enough extra length to place the end of the vented cable above flood level. Additional signal cable may be used to reach from the termination enclosure to the data transmitter location. This added cable is standard, unvented, three conductor cable. The termination enclosure is located as close as possible to the sensor while at the same time remaining above the flood water level. The data transmitter end of the signal cable is equipped with a circular, MS style, four-pin connector.

1.2 Specifications

ELECTRICAL

Power required:	10 to 40 Vdc, 12 Vdc typical
Current drain:	20mA _{dc} maximum
Power supply rejection:	
Vdc output:	<±0.001%FSO/Vdc
mA output:	<±0.05% FSO/Vdc
Output signal:	
0-5 Vdc:	3-wire standard
4-20 mA _{dc} :	2-wire optional
Zero offset:	
0-5 Vdc:	± 50 mVdc max
4-20 mA _{dc} :	± 0.06 mA _{dc} max
Output impedance:	<10 ohms
Insulation resistance:	>100 megohms at 50 Vdc
Circuit protection:	Polarity, Surge, Shorted Output

PERFORMANCE

Pressure range:	0-5 through 0-250 PSIG
Static accuracy:	±0.25% FSO typical, 0.50% FSO maximum (includes combined errors due to nonlinearity, hysteresis, and nonrepeatability for a BFSL at 25°C per ISA S51.1)
Thermal error:	±0.05% FSO/°C (maximum allowable deviation from BFSL due to a change in temperature per ISA S51.1)
Burst pressure:	X 2.0 rated pressure
Proof pressure:	X 1.5 rated pressure
Resolution:	Infinite, depends upon monitoring device
Frequency response:	1 k Hz

ENVIRONMENTAL

Operating temperature range:	-20 to +70°C
Compensated temperature range:	0 to 50°C
Barometric compensation:	Vented to atmosphere
Vibration response 10g's to 2000 Hz:	Nil
Shock:	1000 g's for 1 ms in each of the 3 orthogonal axes does not affect calibration

PHYSICAL

Size:	3.53" long by 1" diameter
Weight:	7 oz without cable
Wetted materials:	316, Stainless Steel, Viton
Mounting:	Suspended by vented cable. For turbulent conditions, specify optional mounting bracket

CABLE

Cable type:	Polyurethane jacket, shielded, with polyethylene vent tube and Kevlar tension members, 200 lbs pull strength Tefzel jacket optional
Cable weight:	0.05 lbs per foot
Min o.d.:	0.28"
Max o.d.:	0.31"
Number of conductors:	3 or 4
Insulation:	PVC
Shield:	36 gauge spiral tinned copper
Wire size:	22 AWG (19/34) tinned copper
Resistance:	16.45 ohms per 1000 feet
Vent tube:	0.060" o.d. polyethylene

2.0 INSTALLATION

2.1 Sensor Protection

The pressure transducer installation should provide protection against possible damage from debris during high and low water flows. Protection must also be provided to prevent excessive silting onto the sensor. Two mounting accessories are available for the sensor:

5050LL-PT-BM Mounting bracket for bolting the sensor onto a concrete abutment

5050LL-PT-CAB Concrete anchor for mounting the sensor in a stream

2.2 Cable Protection

Although the vented cable attached to transducer is waterproof, additional cable protection can be achieved using plastic or metal pipe. The pipe should cover the cable from the sensor location to the termination enclosure. Metal conduit or pipe is recommended as the best method of cable protection.

For installations involving hanging the sensor down a well or conduit, use strain reliefs designed for cables. These strain reliefs are constructed of steel mesh and are readily available. Also if space allows, provide a loop of cable just above the strain relief to allow extra protection against pulling from below. For extremely long cables, strain reliefs should be placed at several places along the cable.

2.3 Well Sites

The 5050LL-PTK may be used to measure well water depth. The sensor is usually placed directly into the well. The cable is able to withstand up to 200 pounds of tension and will not stretch. The cable can be tied off to hold the sensor at the required depth.

3.0 OPERATION

3.1 Transmitter

The 5050LL-PTK Pressure Transducer connects to the HydroLynx Model 5096 Data Transmitter via a four-pin circular connector. A 15-foot length of cable with the connector attached is supplied with the termination enclosure. The connector is normally plugged into the data transmitter's 4-pin analog port. The connector may also be connected into the 4-pin barometric pressure sensor port by rotating the index slot of the connector.

The data transmitter powers the pressure sensor through the switched +12 volts power line. The sensed pressure is converted by the sensor's internal signal conditioning into a 0-5Vdc or a 4-20 mAadc signal. The data transmitter converts the signal into a 0 to 255 decimal value. The sensor value is received by the base station and is converted into water level information.

To properly set the base level of the pressure transducer, refer to the operating manual for the base station and use the calibration data sheet supplied with the transducer.

3.2 Calibration Check

The 5050LL-PTK is calibrated at the factory and is furnished with a calibration data sheet. Calibration of the sensor can be checked using a known column of water and a +12 Vdc power source.

Placing the sensor into a known depth of water should produce an output signal proportional to the depth of the water. Refer to the calibration data sheet to obtain the calibrated range of the sensor. Make certain that the sensor is powered by a stable power source during the test.

Place the transducer into the column of water and measure the sensor's output signal. Using the calibrated range of the sensor, calculate the height of the water based upon the measured voltage:

$$\text{RANGE} \div 5 \text{ VDC} = \text{Ft/Volts}$$

$$\text{MEASURED VOLTAGE} \times \text{Ft/Volts} = \text{Height Of Water}$$

When used with the 5096 Data Transmitter, adjustments can be made in the programming set-up to compensate for slight changes in the sensor's calibration. The 5050LL-PTK sensor has no user accessible adjustments. Significant changes in the sensor calibration requires that the sensor be returned for factory testing and adjustment or replacement.

4.0 MAINTENANCE

The Model 5050LL-PTK Pressure Transducer should require minimal maintenance. During each site maintenance visit, it is advisable to check the operation of the pressure transducer. If a manual depth gauge is located nearby, a comparison can be made of the latest sensor reading with that of the depth gauge. Visually check that the cables are in good condition. Check that the transducer has not moved and is still securely in place. If possible, clear away any silt or debris from the transducer.

Water collecting in the vent tube is a major cause of pressure transducer problems. Excessive moisture in the vent tube may driven off by heating the sensor and its cable. Place the transducer and its coiled cable into a pan and heat the pan in an oven at 122°F (50°C) for two hours. The oven temperature must not exceed 122°F. An alternate method involves hanging the transducer in a vertical position with the sensor at the top for eight to ten hours. The water should drain down and out of the vent tube.

Algae or marine growth is also a major problem for pressure transducers located in warm water. There is no perfect solution to this problem. One method of protection involves wrapping the sensor with copper wire such as that found in scouring pads. Any marine

growth will be deposited onto the copper and as it erodes the copper will drop off. The copper wire may also be removed manually during scheduled maintenance. Another alternative is to impregnate the stainless steel housing with an antifouling chemical.

5.0 TROUBLESHOOTING

If data from the pressure transducer seems high, check for excessive silting around the open end of the sensor. If other errors appear, check that the transducer is mounted securely and that its position has not changed. If the cause of the erroneous data is not due to changes in the physical surroundings, the next step is to determine whether the transducer is faulty or the data transmitter is at fault.

Refer to the data transmitter manual for testing the transmitter for errors. If the output vs the water pressure as compared on the calibration curve is correct, the problem is in the transmitter.

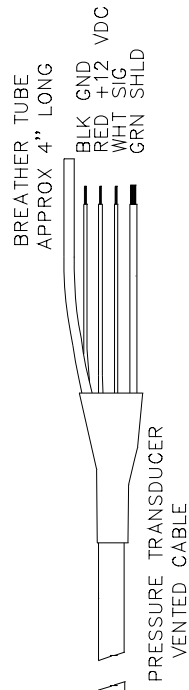
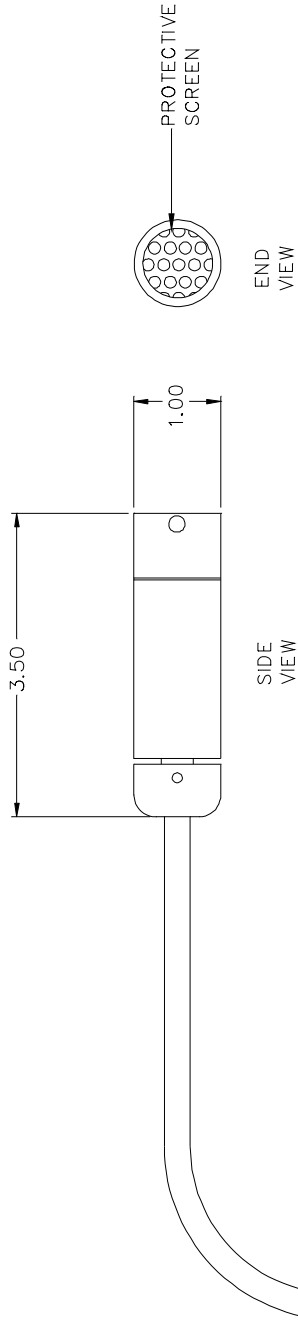
To determine if the transducer is at fault, connect the sensor to a stable 12 Vdc source. Disconnect the signal connector from the transmitter and measure the sensor output voltage at the terminal block inside the cable termination enclosure. Determine the present stream or reservoir water level and calculate the sensor output voltage. The measured voltage should agree or be very close to the calculated value.

Another method for testing the pressure transducer operation is to blow into the open end of the vent filter. Blowing into the tube increases the pressure on the back side of the sensor and in turn creates a change in the output. Typically, an average person can exert about 1 psi by blowing into the tube.

Inspect the cable installation for problems. Severe crimps, tight bends, or loops with a radius of less than 1 inch will cause the sensor to read incorrectly. Wherever the vented cable passes into an enclosure, check to see that the cable grip does not pinch the cable. The maximum allowable force on the vented cable is 15 ft/lbs.

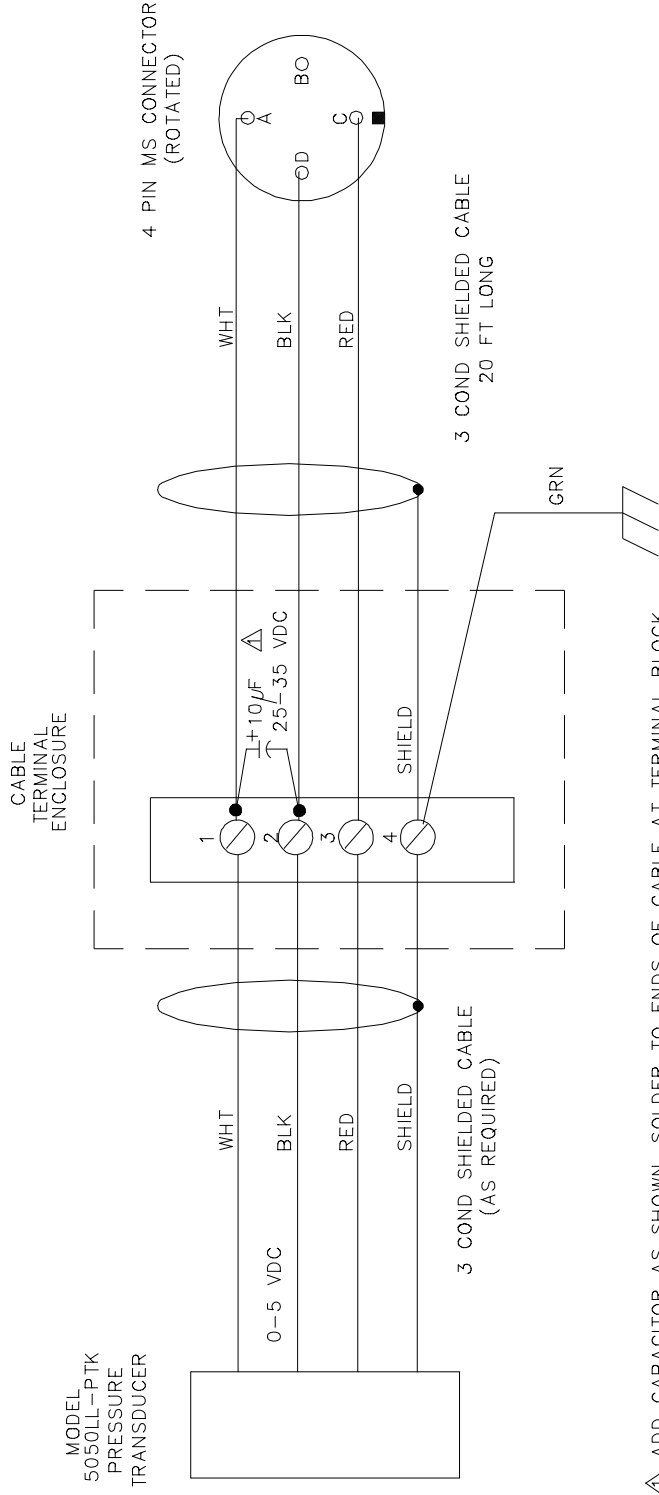
6.0 FORMS AND DRAWINGS

AC107408	Outline - Sensor
AC107407	Wiring Diagram - Terminal Enclosure
AC107867	Wiring Diagram - Sensors to 5096N
AC107587	Wiring Diagram - PCB, 4-20 mA Output Terminal Enclosure
AC100901	Curve - Voltage vs Feet of Water
A100966	5050LL-PTK Test Results
A104973	Maintenance Report



- NOTES :1. END OF CABLE ENLARGED TO SHOW COLORS AND USES.
2. CABLE ORDERED TO LENGTH SPECIFIED BY USER.

N/A	REDRAWN ON NEW BORDER	10/2/98
ECN#	DESCRIPTION	DATE
MODEL USAGE		
HydroLynx		
MODEL NO. 5050LL-PTK		
TITLE SENSOR ASSEMBLY		
FOR PRESSURE TRANSDUCER		
DRAWN BY MYERS	DATE 10/2/98	DWG TYPE OUTLINE
CHECKED BY	DATE	SIZE A
	DWG NO. AC107408	REV A

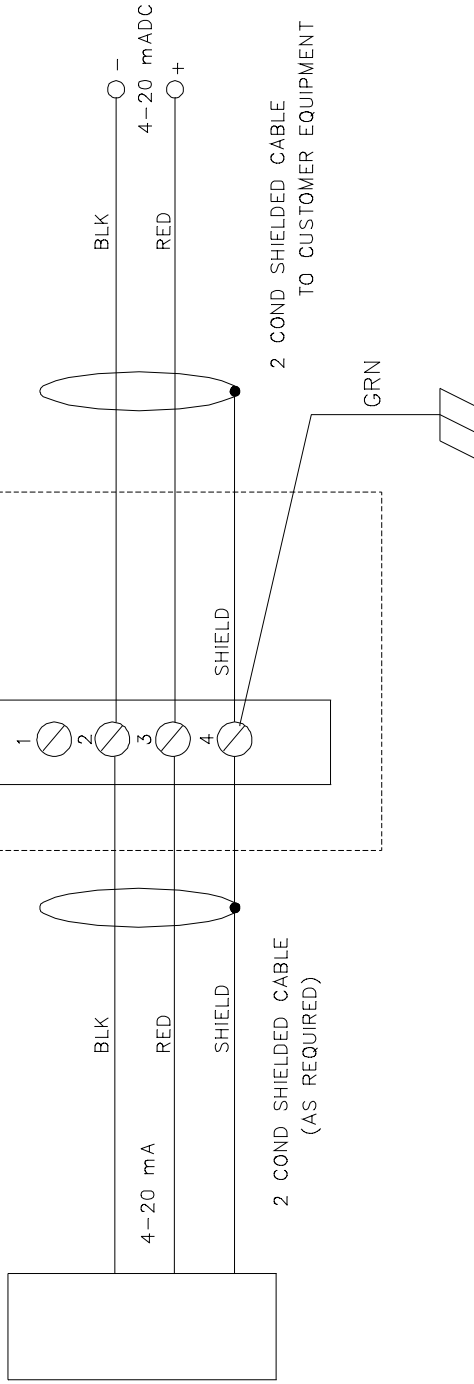


NOTES: Δ ADD CAPACITOR AS SHOWN. SOLDER TO ENDS OF CABLE AT TERMINAL BLOCK.

N/A	CHANGE CABLE LENGTH	11-20-98
N/A	REDRAWN ON NEW BORDER	10/2/98
ECN#	DESCRIPTION	DATE
MODEL USAGE		
MODEL NO. 5050LL-PTK		
TITLE PRESS. XDCR 0-5 VDC OUTPUT WITH		
TERMINAL ENCLOSURE		
DWG TYPE WIRING DIAGRAM		
DRAWN BY MYERS	DATE 10/2/98	REV A
CHECKED BY	SIZE A	DWG NO. AC107407

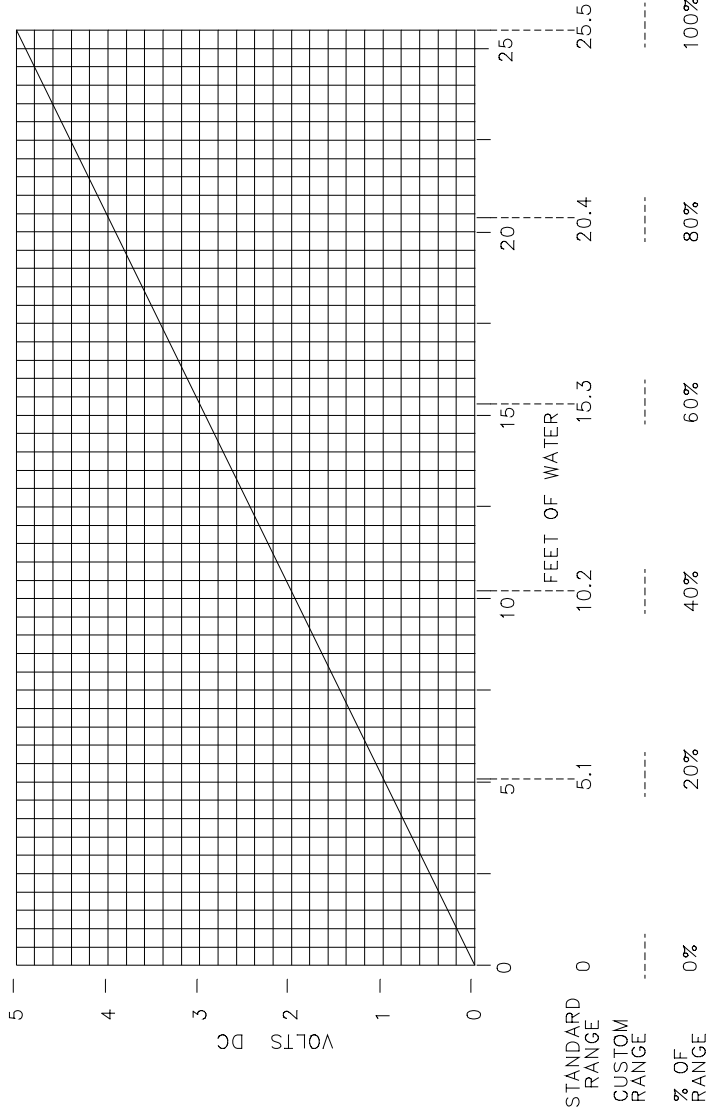
HydroLynx


MODEL
5050LL-P TK
PRESSURE
TRANSDUCER



2 COND SHIELDED CABLE
TO CUSTOMER EQUIPMENT

N/A	REDRAW ON NEW BORDER	12/23/98
ECN #	DESCRIPTION	DATE
MODEL USAGE		
HydroLynx		
MODEL NO. 5050LL-P TK		
TITLE 4-20 mA OUTPUT		
WITH TERMINAL ENCLOSURE		
DWG TYPE WIRING DIAGRAM		
DRAWN BY G. BARRITT	DATE 12/23/98	
CHECKED BY	DATE	
SIZE A	DWG NO. AC107587	REV A



N/A		REDRAW ON NEW BORDER	07/24/00
ECN#		DESCRIPTION	DATE
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES		MODEL USAGE	
FRACTIONS = €			
.XX = €		MODEL NO.	5050LL-PT"x"
.XXX = €		TITLE	VOLTAGE VERSUS FEET OF WATER
MATT'L		DWG TYPE	CURVE
FINISH		DRAWN BY	P. COSTA
TREATMENT		CHECKED BY	
		DATE	07/21/00
		DATE	
		SIZE	A
		DWG NO.	AC100901
		REV	D



5050LL-PTK TEST RESULTS

Document Number A100966-1

Date:	Serial number:
Inspector:	Range:
Job number:	PSI:
Customer:	Current consumption: _____ mA (20 mA max)

CALIBRATION DATA

BY: _____

DATE: _____

	Range	PSI	Expected Vdc	Actual Vdc
100%			5.000	
80%			4.000	
60%			3.000	
40%			2.000	
20%			1.000	
0%			.000	

WATER TEST

BY: _____

DATE: _____

Immersion test:	_____ feet (3' minimum)		
Readings:	DVOM: _____ Vdc	Calibration curve:	_____ Vdc

NOTES



Maintenance Report

Document No. A104973

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					