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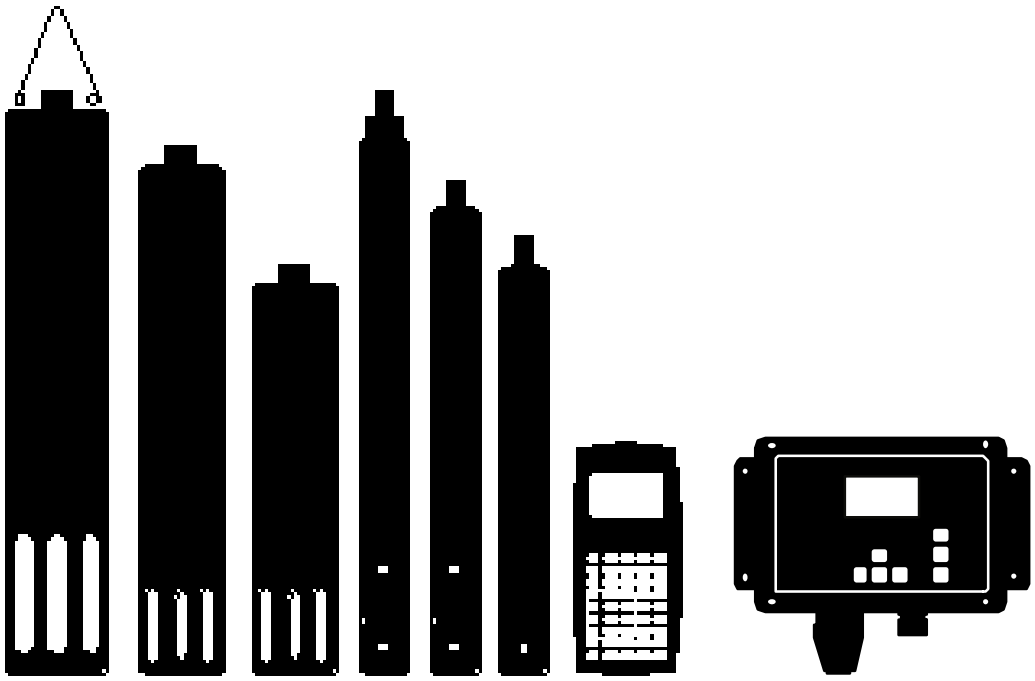

6-SERIES

ENVIRONMENTAL MONITORING SYSTEMS

Service Manual

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SECTION 1 INTRODUCTION

1.1 HOW TO USE THIS MANUAL

The manual is organized to help you maintenance and service YSI 6-Series Environmental Monitoring Systems products. For successful service, in addition to this Service Manual, an understanding of the Principles of Operation, Calibration Techniques, and System Setup is necessary. These sections are in the 6-Series Operations Manual, available from YSI Customer Service.

All YSI 6-series products (600, 600XL, 600XLM, 6600, 6820, 6920, 6500, and the 610) are covered in this manual. Each product has a separate section with exploded views, parts list, block diagrams and test processes. Maintenance procedures, calibration errors and troubleshooting are also covered in separate sections.

If you have any questions about this product or its application, please contact YSI Technical Support, an authorized regional service center or your authorized YSI Dealer.

1.2 QUALIFICATIONS

The following service sections are intended for use by qualified service technicians that have been authorized by YSI Incorporated. End users may find the illustrations and procedures in this manual useful when ordering parts or testing, but should not attempt to disassemble and service these products. **Non-authorized service will void the manufacturer's warranty.**

1.3 SERVICE PHILOSOPHY

From years of experience servicing water quality instrumentation it has been found that most service issues are the result of failed probes, sensors and/or cables. There are a number or reasons for this condition, including exposure to harsh environments, limited life expectancy due to design limitations, and maintenance requirements. For this reason, troubleshooting efforts should be initially directed at determining the condition and functionality of the probes and cables.

In the event that a service problem is isolated to the instrument itself, YSI recommends the replacement of the entire defective sub-assembly rather than individual components. To lessen down time, YSI and its Authorized Service Centers maintain an ample stock of replacement sub-assemblies.

The recommended method of determining a sub-assemblies condition is by substitution. For example, to test for a defective probe assembly, substitute the assembly with a known good one, or a decade resistance box of equivalent value. If, after testing, the PC board meets the established specifications, the probe assembly will have to be serviced or replaced.

1.4 PC BOARD HANDLING

YSI 6-series printed circuit boards utilize state-of-the-art SMT (surface mount technology) components. **WARNING:** PC board assemblies contain static-sensitive components. Always handle at a static-free (ESD) workstation.

SECTION 2 TROUBLESHOOTING

This section contains troubleshooting tables that will help identify the causes of the most common difficulties that may occur while operating the YSI 6-Series equipment. The **Symptom** column describes the type of difficulty that you might experience. The **Possible Cause** column describes the conditions that might cause the stated symptom. The **Action** column provides simple steps that can be followed to correct for the "possible cause" and cure the "symptom" being experienced. The column entitled **Ref** is the number of the reference section and subsection in a corresponding YSI Operations Manual where you may find additional information.

Troubleshooting problems have been categorized into six general areas.

- Calibration Error Messages
- PC6000 Software
- Sonde Communication
- Sensor Performance
- 6500 Environmental Process Monitor Performance
- 610 Display/Logger Performance

If you need assistance that this Troubleshooting section can not provide, please contact YSI Technical Support, an authorized regional service center or your authorized YSI Dealer.

2.1 CALIBRATION ERRORS

There is only three Calibration Error messages that are possible. They are listed below instead of in the troubleshooting table. Only two of the error messages are related to sensor performance.

High DO Charge: This message indicates a malfunction in the DO sensor that is generally due to the roughness of the electrodes on the surface of the probe face. The charge associated with the DO sensor must be in the range 25 to 75 or the error message will appear when calibration is attempted. If this error message is encountered, remove the DO probe from the sonde and resurface it according to the instructions in the 6-Series Operations Manual. After resurfacing the probe, activate the DO charge parameter in the Report setup section of the sonde software and confirm that the value is within the acceptable range. After resurfacing, allow the sensor to pulse in the Run mode for at least 5 minutes, during which time the DO charge may be expected to drop in value if the sensor is still functional. If resurfacing according to the instructions in the 6-Series Operations Manual does not result in a lowering of the charge, contact YSI Technical Support for additional help.

Out of Range: This message indicates that the output of the sensor being calibrated does not conform to the normal range for this parameter. This problem could be due to either a malfunctioning sensor or to a calibration solution that is out of specification. If this error message is encountered, first insure that your standards for pH, ORP, ammonium, nitrate, chloride, conductivity, and turbidity have not been contaminated and that your DO sensor is in air (DO % Cal) or in a solution of known dissolved oxygen concentration (DO mg/L). Also be certain that you have entered the correct value for the calibration solution. If the calibration error

message continues to occur, contact YSI Technical Support to determine whether the sensor in question needs to be factory-serviced or replaced.

Illegal Entry: This message simply indicates that your keyboard input does not conform to the accepted format for this parameter. For example, you may have entered the "letter O" instead of "zero" for a calibration value. Return to the desired parameter in the Calibrate menu and repeat the calibration entry, being certain to enter only numbers.

The following troubleshooting tables can help you if you encounter problems with software, communication protocol, or sensor malfunctions other than calibration errors.

2.2 PC6000 SOFTWARE PROBLEMS

For more information about PC6000 software, please reference the PC6000 Operations Manual, item # 6125. To obtain this manual, please contact YSI Customer Service.

SYMPTOMS	POSSIBLE CAUSE	ACTIONS
PC6000 software operates but no data are captured to disk.	Data capture not set up	Move cursor to data capture setup and make proper selections.
	Will not auto configure.	Enter parser, site name , ID
	After auto configure, no data arrives	Return to sonde menu and start sonde
PC6000 displays data, no files found.	Data directory path not recognized	Move cursor to PC6000 Advanced setup and establish a directory
	Data files not readable	Export file as PRN, CDF, SDF
Expected parameters are not displayed on reports or plots	Parameters not added to Y-axis list	Add parameter
	Sensor disabled	Check sensor setup instructions
Unable to print reports or plots	Printer port improperly configured	Try a screen print out to the printer (print screen)
	Printer port improperly set	Check setup
	Printer type improperly selected	Check setup
	Print cable improperly connected	Check connections at both ends
Video screen of PC is not readable	Incorrect menu color option has been selected	Select appropriate menu parameter
	Incorrect graphic mode	Select compatible graphic mode
When selecting "sonde" from PC6000 top line, sonde menu not shown	Prompt # appears in place of menu	Type "menu" and press (enter)
	Communication problem	Make certain Com port selection is correct.

2.3 SONDE COMMUNICATION PROBLEMS

For more information about PC6000 software, please reference the 6-Series Environmental Monitoring Systems Operations Manual, item # 069301. To obtain this manual, please contact YSI Customer Service.

SYMPTOM	POSSIBLE CAUSE	ACTION
Screen is locked at "connecting, please wait".	Com port selected is assigned to anther device, i.e. Modem or mouse	Select another com port
Cannot communicate with sonde	Sonde not powered	Check 12 vdc source
	Cable connection is loose	Check both ends of cable; secure connectors
	Damaged connectors	Check pins at both ends, insure they are straight, dry and clean.
	Com port not selected	Change to other Com port, other peripheral on the same port (Internal mouse). Try other PC, 610 hand held terminal or dumb terminal
	Make sure that the connectors are clean and dry	Clean if necessary
	Check battery contacts for corrosion or oxidation	Clean if necessary or replace batteries if they are damaged
	Confirm battery voltage, minimum 5 volts for the 600XLM sonde, minimum 9 volts for the 6600, 6920, 6600 sondes	
Scrambled data	Unmatched baud rate between host and sonde	Match the baud rate
	Host is too slow	Use faster computer
	Interface cable failure	Check cable for damage. If necessary, return for service
	Internal failure	Return sonde for service

2.4 SENSOR PERFORMANCE PROBLEMS

For more information about PC6000 software, please reference the 6-Series Environmental Monitoring Systems Operations Manual, item # 069301. To obtain this manual, please contact YSI Customer Service.

SYMPTOMS	POSSIBLE CAUSE	ACTION
ISE's unstable:	pH probe not in calibrator solution	Put pH probe in calibrator solution with ISE sensor
	ISE sensor has been exposed to pH buffers	Soak in 100 mg/L standard for a few hours overnight
	ISE sensor was exposed to water with a conductivity >2 mS/cm	Soak in 100 mg/L standard for a few hours overnight
Dissolved Oxygen reading unstable or inaccurate	Probe not properly calibrated	Follow DO cal procedures
	Membrane not properly installed or may be punctured	Follow 6562 setup procedure
	DO probe electrodes require cleaning	Follow DO cleaning procedure. Use 6035 maint. Kit
	Water in probe connector	Dry connector; reinstall probe
	Algae or other contaminant clinging to DO probe	Rinse DO probe with clean water
	Barometric pressure entry is incorrect	Repeat DO cal procedure
	Cal at extreme temperature	Recal at (or near) sample temperature
	DO Charge too high (>75) 610 Anodes polarized (tarnished) 2. Probe left on continuously	Enable DO charge parameter in the Sonde report menu. Run 6920, if charge is over 75, recondition probe with 6035 Maintenance Kit. Follow DO cleaning procedure.
	DO Charge too low (<25) Insufficient electrolyte.	Replace electrolyte and membrane.
	Poor probe performance	Probe output must start at a high DO value and go lower at initial power up. If DO output starts low and climbs, or a negative number appears, the probe is defective.
	DO gain range outside of 0.7 to 1.7 or the DO charge range is outside 25 to 75.	If the ranges are outside these numbers, the probe needs reconditioned.

Dissolved Oxygen reading unstable or inaccurate	When DO sensor is removed (on units that this is possible) – the output is NOT 0 to 1.2	If the output is outside this range, the connections are contaminated and need to be cleaned. Rinse both the probe and bulkhead connectors in warm water and let soak for 15 min. Then rinse with DI water and allow drying overnight with the parts disassembled.
	DO probe has been damaged	Replace 6562 probe
	Internal failure	Return sonde for service
pH, ORP, chloride, ammonium, or nitrate readings are unstable or inaccurate. Error messages appear during calibration.	Probe requires cleaning,	Follow probe cleaning procedure
	Probe requires calibration	Follow cal procedures
	Sensor and milli volt output for known pH buffers is incorrect.	Buffer 4= +170-185 MV $\pm$ 40 MV Buffer 7= 0 MV $\pm$ 40 MV Buffer 10 = -170-185 MV $\pm$ 40 MV The span between the 4 and 7 and the 7 and 10 buffers must be 170-185 MV. If the pH probe is not working correctly, a Cal error will appear on the screen.
	PH probe reference junction has dried out from improper storage.	Soak probe in tap water or buffer until readings become stable
	Water in probe connector	Dry connector; reinstall probe
	Probe has been damaged	Replace probe
	Calibration solutions out of spec or contaminated with other solution	Use new calibration solutions
	ORP fails Zobell check	Take into account temperature dependence of Zobell solution readings
	Internal failure	Return sonde for service
Depth unstable or inaccurate	Depth sensor has not been zeroed	Follow depth zero procedure
	Depth sensor access hole is obstructed	Follow depth cleaning procedure
	Depth sensor has been damaged	Return sonde for service
	Internal failure	Return sonde for service

Conductivity unstable or inaccurate. Error messages appear during calibration.	Conductivity improperly calibrated.	Follow cal procedure
	Conductivity probe requires cleaning	Follow cleaning procedure
	Conductivity probe damaged	Replace probe
	Calibration solution out of spec or contaminated	Use new calibration solution
	Internal failure	Return sonde for service
	Calibration solution or sample does not cover entire sensor.	Immerse sensor fully.
Installed probe has no reading	The sensor has been disabled	Enable sensor
	Water in probe connector	Dry connector; reinstall probe
	Probe has been damaged	Replace the 6560 probe
	Report output improperly set up	Set up report output
	Internal failure	Return sonde for service.
Temperature, unstable or inaccurate	Water in connector	Dry connector; reinstall probe
	Probe has been damaged	Replace the 6560 probe
Turbidity probe unstable or inaccurate. Error messages appear during calibration	Probe requires cleaning.	Follow probe cleaning procedure
	Probe requires calibration	Follow cal procedures
	Probe has been damaged	Replace probe
	Water in probe connector	Dry connector; reinstall probe
	Calibration solutions out of spec	Use new calibration solutions
	Wiper is not turning or is not synchronized.	Activate wiper. Assure rotation. Make sure setscrew is tight.
	Wiper is fouled or damaged.	Clean or replace wiper.
	Internal failure.	Return probe for service.

2.5 610 DISPLAY/LOGGER PERFORMANCE

For more information about PC6000 software, please reference the 6-Series Environmental Monitoring Systems Operations Manual, item # 069301. To obtain this manual, please contact YSI Customer Service.

SYMPTOMS	POSSIBLE CAUSE	ACTION
610 does not communicate with sonde.	Sonde power not turned on for 610.	Go into Setup 610 and turn on Sonde power.
	Baud rate does not match sonde.	Try different baud rates on 610.
	Sonde is configured to "power up to run" and/or "power up to menu" in Sonde software	Try communicating with sonde through "Terminal" in the 610 communications menu. If successful, disable both settings in Advanced|Setup menu.
610 appears to try to go into Run mode, but then gives "Comm time out error".	"Wait for DO" and/or "Wait for Filter" is active in Sonde software	Communicate with sonde via Smart Terminal in the 610 communications menu. Deactivate "Wait for DO" in the Advanced|Sensor menu. Deactivate "Wait for Filter" in the Advanced|Data Filter menu.
While trying to log data to an existing file while in the Run mode or setting up the 610 for logging using an existing file name, the error "file parameters differ" appears.	The parameters active in the new study are not IDENTICAL to parameters active when the file was created.	Create a new file for the new study. Alternatively view the data from the existing file and set up the sonde parameters to match those in the existing file.
When trying to "Capture" data to an existing file or to "Add" data to an existing file, the error "Wrong type of file" appears.	The 610 software does not allow the addition of data to "Capture" file using the "Add" function and vice versa, even if the parameters match.	Do not attempt to mix "Add" and "Capture" files.
When using a 610 to put a 6600 into Unattended mode, the error "Bad sonde response" appears.	The date/time setting and/or format on the 610 does not match the date/time setting and/or format on the 6600.	Make sure the values of date and time (e.g., 1/10/99; 12:10:00) and the format (e.g., 1/10/99 and not 10/1/99) are the same on both 610 and 6600.
When putting 610 into Run mode, the error message "Data format error" appears.	The "Radix mark" is not set the same in 610 as in the sonde.	Make sure that the radix selection ("." Or ",") is the same in the 610 Setup menu and in the sonde Advanced|Setup menus. For the sonde, if the

		comma selection is active, the radix will be "," and when inactive, the radix will be ".".
610 locks up in the Run mode with no response from keypad.	Microprocessor has locked up.	Remove charge block from 610 backside. The 610 screen should become blank. Reinstall charge block and the 610 should return to normal operation.
610 will not power up showing no response from keypad and no response when charger is installed.	Microprocessor has locked up.	Disassemble 610 and remove battery from circuit board. Leave battery disconnected for about 30 minutes. Reattach battery and attempt to power up the 610. Note that charge block must be installed to achieve power-up.
610 displays RUN only in left hand corner of display and will not power down.	The 610 software setup has been lost.	Remove charge block from 610 backside. 610 screen should go blank. Reinstall block and then re-initialize 610 software according to
610 displays "Checksum" error, or "Syntax" error during power-up procedure and may not power down.	The 610 software setup has been lost.	Remove charge block from 610 backside. 610 screen should go blank. Reinstall block and then re-initialize 610 software according to

2.6 6500 PERFORMANCE PROBLEMS

For more information about PC6000 software, please reference the 6500 Environmental Process Monitor Operations Manual, item # 065902. To obtain this manual, please contact YSI Customer Service.

SYMPTOM	POSSIBLE CAUSE	ACTION
6500 will not communicate with sonde.	"Autobaud" may be disabled in sonde. RS232. Full SDI-12 may be enabled in sonde.	Connect sonde to a terminal device and make certain that "Autobaud" is enabled in the System|Comm menu. Then make certain that "Full SDI-12 is disabled in the Advanced|Setup menu.
	Using sonde with old software	Must have Software Ver. 1.04 or later for 600R, 600XL, and 6820 sondes. Must have version 1.03 or later software for 600XLM, 6920, and 6600 sondes.
	An improper SDI-12 address is selected in the sonde.	Connect sonde to a terminal device and make certain a proper SDI-12 address (0-9) is selected in the System menu.
All parameters displayed on 6500 are missing the decimal point.	Comma Radix designation is active in the sonde.	Connect sonde to a terminal device and deactivate the Comma radix selection in the Advanced|Setup menu.
6500 appears to be attempting to communicate with sonde, but actual readings take several seconds to appear.	"Wait for DO" and/or "Wait for Filter" are enabled in the sonde.	Connect sonde to a terminal device and deactivate "Wait for DO" in the Advanced|Sensor menu and "Wait for Filter" in the Advanced|Data Filter menu.

SECTION 3 CARE, MAINTENANCE AND STORAGE

This section describes the proper procedure for storage of the sensors that will maximize their lifetime and minimize the time required to get the sonde ready for a new application. This section will describe interim or short-term storage between applications where the sonde is being used at a regular interval (daily, weekly, biweekly, etc.) and long term storage (e.g., over-the-winter) when the sonde will not be used on a regular basis for several months.

In the descriptions and instructions below, it is assumed that the user has retained the vessels (bottles, boots, etc.) in which the individual sensors were stored on initial delivery. If these specific items have been misplaced or lost, they can be replaced by contacting YSI Customer Service. Alternatively, the user may have similar (and equally acceptable) storage equipment on hand even though it was not part of the original YSI package. Common sense should be the guide on substitution of storage vessels.

3.1 SONDE CARE AND MAINTENANCE

The Model 6570 Maintenance Kit is available for use with your sonde. The kit includes several items that will be helpful or necessary to perform the proper routine maintenance on your sonde.

The 6570 Maintenance Kit includes two types of O-rings (for probes and cable connector), probe/installation/replacement tools, 2 cleaning brushes for the conductivity sensor, O-ring lubricant, and a syringe for cleaning the depth sensor port.

The 6570 Maintenance Kit can be ordered from any authorized YSI dealer, or directly from YSI.

When caring for your sonde, remember that the sonde is sealed at the factory, and there is never a need to gain access to the interior circuitry of the sonde. In fact if you attempt to disassemble the sonde, you would void the manufacturer's warranty.

SONDE PROBE PORTS

Whenever you install, remove or replace a probe, it is extremely important that the entire sonde and all probes be thoroughly dried prior to the removal of a probe or a probe port plug. This will prevent water from entering the port. Once you remove a probe or plug, examine the connector inside the sonde probe port. If any moisture is present, use compressed air to completely dry the connector. Check to see if the connector is corroded. When you reinstall a probe or port plug, lightly grease the O-ring with lubricant supplied in the 6570 Maintenance Kit.

CABLE CONNECTOR PORT

The cable connector port at the top of the sonde should be covered at all times. While communicating with the sonde, a cable should be installed and tightened in place. This will assure that a proper connection is being made and prevent moisture and contaminants from entering.

When a communications cable is not connected to the cable connector port, the pressure cap supplied with the instrument should be securely tightened in place.

If moisture has entered the connector, dry the connector completely using compressed air, a clean cloth, or paper towel. Apply a very thin coat of lubricant from the 6570 Maintenance Kit to the O-ring inside the connector cap before each installation.

3.2 PROBE CARE AND MAINTENANCE

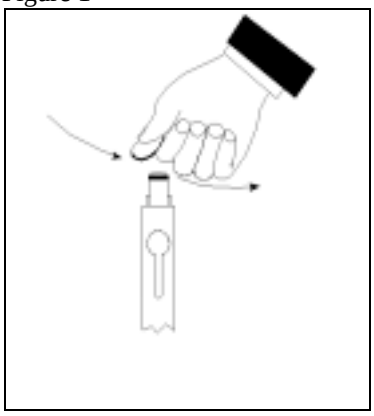
Once the probes have been properly installed, remember that periodic cleaning and DO membrane changes are required.

6562 DO PROBES

For best results, we recommend that the KCl solution and the Teflon membrane at the tip of the 6562 probe be changed prior to each sonde deployment and at least once every 30 days during the use of the sonde in sampling studies. In addition, the KCl solution and membrane should be changed if (a) bubbles are visible under the membrane; (b) significant deposits of dried electrolyte are visible on the membrane or the O-ring; and (c) if the probe shows unstable readings or other probe-related symptoms. See the 6-Series Operations Manual that came with your sonde for instructions on changing the DO membrane.

After removing the used membrane from the tip of the 6562 probe, examine the electrodes at the tip of the probe. If either or both of the silver electrodes are black in color, the probe should be resurfaced using the fine sanding disks which are provided in the 6035 reconditioning kit.

Figure 1



To resurface the probe using the fine sanding disk, follow the instructions below. See Figure 1.

First dry the probe tip completely with lens cleaning tissue. Next, hold the probe in a vertical position, place one of the sanding disks under your thumb, and stroke the probe face in a direction parallel to the gold electrode (located between the two silver electrodes). The motion is similar to that used in striking a match. Usually 10-15 strokes of the sanding disk are sufficient to remove black deposits on the silver electrodes. However, in extreme cases, more sanding may be required to regenerate the original silver surface.

After completing the sanding procedure, repeatedly rinse the probe face with clean water and wipe with lens cleaning tissue to remove any grit left by the sanding disk. After cleaning, thoroughly rinse the entire tip of the probe with distilled or deionized water and install a new membrane.

IMPORTANT: Be sure to: (1) Use *only* the fine sanding disks provided in the 6035 maintenance kit in the resurfacing operation and (2) Sand in a direction parallel to the gold electrode. *Not adhering to either of these instructions can seriously damage the electrodes.*

NOTE: If this procedure is unsuccessful, as indicated by improper probe performance, it may be necessary to return the probe to an authorized service center.

6560 CONDUCTIVITY/TEMPERATURE PROBES

The openings that allow fluid access to the conductivity electrodes must also be cleaned regularly. The small cleaning brush included in the 6570 Maintenance Kit is ideal for this purpose. Dip the brush in clean water and insert it into each hole 15-20 times. In the event that deposits have formed on the electrodes, it may be necessary to use a mild detergent with the brush. After cleaning, check the response and accuracy of the conductivity cell with a calibration standard.

The temperature portion of the probe requires no maintenance.

6561 pH AND 6565 COMBINATION pH-ORP PROBES

Cleaning is required whenever deposits or contaminants appear on the glass and/or platinum surfaces of these probes or when the response of the probe becomes slow.

Remove the probe from the sonde. Initially, simply use clean water and a soft clean cloth, lens cleaning tissue, or cotton swab to remove all foreign material from the glass bulb (6561 and 6565) and platinum button (6561). Then use a moistened cotton swab to carefully remove any material that may be blocking the reference electrode junction of the sensor.

CAUTION: When using a cotton swab with the 6561 or 6565, be careful NOT to wedge the swab tip between the guard and the glass sensor. If necessary, remove cotton from the swab tip, so that the cotton can reach all parts of the sensor tip without stress.

If good pH and/or ORP response is not restored by the above procedure, perform the following additional procedure:

1. Soak the probe for 10-15 minutes in clean water containing a few drops of commercial dishwashing liquid.

2. GENTLY clean the glass bulb and platinum button by rubbing with a cotton swab soaked in the cleaning solution.

3. Rinse the probe in clean water, wipe with a cotton swab saturated with clean water, and then rerinse with clean water.

If good pH and/or ORP response is still not restored by the above procedure, perform the following additional procedure:

1. Soak the probe for 30-60 minutes in one molar (1 M) hydrochloric acid (HCl). This reagent can be purchased from most distributors. Be sure to follow the safety instructions included with the acid.

2. GENTLY clean the glass bulb and platinum button by rubbing with a cotton swab soaked in the acid.

3. Rinse the probe in clean water, wipe with a cotton swab saturated with clean water, and then rerinse with clean water. To be certain that all traces of the acid are removed from the probe crevices, soak the probe in clean water for about an hour with occasional stirring.

If biological contamination of the reference junction is suspected or if good response is not restored by the above procedures, perform the following additional cleaning step:

1. Soak the probe for approximately 1 hour in a 1 to 1 dilution of commercially available chlorine bleach.

2. Rinse the probe with clean water and then soak for at least 1 hour in clean water with occasional stirring to remove residual bleach from the junction. (If possible, soak the probe for period of time longer than 1 hour in order to be certain that all traces of chlorine bleach are removed.) Then rerinse the probe with clean water and retest.

Dry the sonde port and probe connector with compressed air and apply a very thin coat of O-ring lubricant to all O-rings before re-installation.

DEPTH SENSOR

The depth sensor modules are factory installed options that are located between the bulkhead and the sonde tube. For 600XL and 600XLM sondes, there is a circular protective cap with two small holes. The cap cannot be removed, but a syringe is supplied in the maintenance kit to aid in cleaning the pressure port. Fill the syringe with clean water, place the tip of the syringe into one of the holes and gently force water through the pressure port. Ensure that the water comes out of the other hole. Continue flushing the pressure port until the water comes out clean.

CAUTION: Never try to remove the circular pressure port cap.

For 6920, 6820 and the 6600 sondes, the depth sensor is exposed to the water by either a circular access port on the side of the sonde or a though-hole on a module just above the sonde bulkhead. A syringe is supplied in the maintenance kit to aid cleaning the pressure port. Fill the syringe with clean water, place the tip of the syringe into one of the holes and gently force water through the access port. Ensure that the water comes out of the other hole. Continue flushing the pressure port until the water comes out clean.

CAUTION: Do not attempt to remove the depth module from the sonde body.

LEVEL SENSOR

For level sensors follow all the maintenance procedures given for depth sensors. In addition, ensure that the desiccant always remains active. Active desiccant is a distinctive blue color. When it can absorb no more moisture, it is a rose red or pink color. For either the cartridge or the canister, the end that is vented to atmosphere will begin to change color first. As long as the desiccant closest to the sonde is blue, no maintenance is required. Local conditions will dictate how long the desiccant will last. In humid environments, the desiccant may need to be changed or regenerated well before it is completely exhausted to ensure that it lasts the entire deployment.

You may regenerate the desiccant, replace the desiccant in the cartridge or canister, or replace the entire cartridge or canister. See the 6-Series Operations Manual for more information.

To regenerate the desiccant, remove it from the unit and spread it evenly, one granule deep, on a suitable tray. Heat for about one hour at about 200 ° C (about 400 ° F). The desiccant should then be cooled in a suitable, tight container before refilling the unit. The color of the desiccant will return to blue if the regeneration cycle has been successful. The felt filters should also be dried at about 100 ° C (about 200 ° F) for about 30 minutes before assembly.

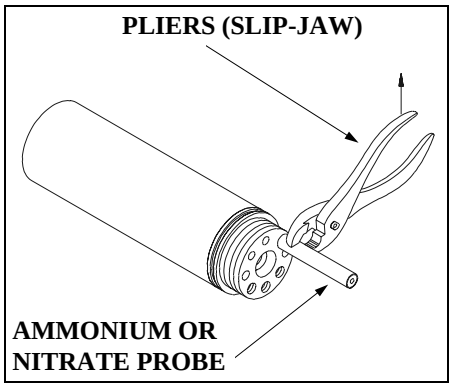
Desiccant material is sold separately. Both the cartridge and canister can easily be opened, emptied, and refilled.

CAUTION: It is important to keep the tube in vented sondes and cables dry. They are supplied with caps for closing the volume when not in use. Keep the caps on until just before calibration and deployment. For storage, replace the caps.

6882 CHLORIDE, 6883 NITRATE AND 6884 AMMONIUM SENSORS

You should clean these probes whenever deposits or contaminants appear on the ion selective membranes located on the tips of these sensor modules.

Figure 2



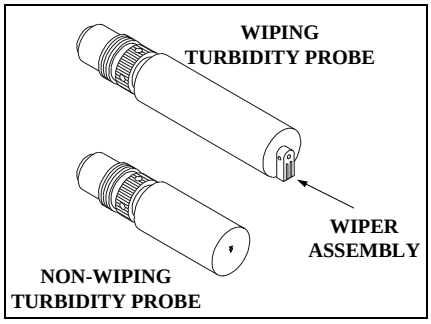
If possible, the module should be cleaned while installed in the sonde bulkhead. Use clean water and a moist piece of lens cleaning tissue to *gently* wipe the sensor membranes until no more contaminants are removed. However, under some conditions, it may be necessary to remove the module from the sonde bulkhead for cleaning and/or storage. To remove the module, follow the diagram at the side. Remove the module with finger pressure only, if possible. However, it is acceptable to use small pliers if necessary to loosen the module for final removal by hand. **Be very careful not to squeeze the module any more than is necessary for a firm grip. Use slipjaw pliers to minimize the chance of applying too much pressure on the module**. While the module is removed from the sonde, be sure to dry the sonde port and probe connector with compressed air and apply a very thin coat of lubricant to the O-ring before re-installation.

NOTE: The ion selective membranes are fragile. Be certain to: (1) Use only *moist*, high quality lens cleaning tissue for the cleaning procedure (not paper towels or other coarse materials); and (2) Stroke the probe face very gently with the tissue during the procedure. *If you do not adhere to these instructions, you can seriously damage the sensors.*

6025, 6026 AND 6036 CHLOROPHYLL AND TURBIDITY PROBES

The 6026 and 6036 turbidity probes require only minimal maintenance. After each deployment, the optical surface on the tip of the turbidity probe should be inspected for fouling and cleaned if necessary by gently wiping the probe face with moist lens cleaning paper. In addition, for the 6026 probe, it is recommended that the wiper be replaced periodically. The frequency of this replacement depends on the quality of water under examination. A replacement wiper is supplied with the 6026 sensor, along with the small hex driver required for its removal and reinstallation. Follow the instructions supplied with the turbidity sensor to insure proper installation of the new wiper assembly. Additional wipers are available from YSI.

Figure 3



3.3 SONDE STORAGE

INTERIM SONDE STORAGE

Since the introduction of the YSI 6-Series Environmental Monitoring Systems product line several years ago, YSI has learned a great deal about storage protocols which will maximize the lifetime of your sensors. This knowledge has come from our own extensive in-house testing programs as well as from feedback from a large number of customers and sales representatives.

Proper storage of the your sonde between periods of usage will not only extend the life of the sensors, but will also ensure that the unit will be ready to use as quickly as possible in your next application.

The recommended short term or interim storage procedure is simple and identical for all sondes, models 600R, 600XL, 600XLM, 6820, 6600 and 6920.

No matter what sensors are installed in the instrument, it is important to keep them moist without actually immersing them in liquid, which could cause some of them to drift or result in a shorter lifetime. For example, the reference junction of a pH sensor must be kept moist to minimize its response time during usage, but continued immersion in pure water may compromise the function of the glass sensor and/or result in long term leaching of the reference junction.

YSI recommends that short term storage of all multi parameter instruments be done **by placing approximately 0.5 inch of water in the calibration and/or calibration cup, that was supplied**

with the instrument, and by placing the sonde with all of the probes in place into the cup. The use of a moist sponge instead of a half-inch of water is also acceptable, as long as its presence does not compromise the attachment of the calibration cup to the sonde. **The calibration cup should be sealed to prevent evaporation.**

The key for interim storage is to use a minimal amount of water so that the air in chamber remains at 100 percent humidity. The water level has to be low enough so that none of the sensors are actually immersed. Any type of water can be used in this protocol: Distilled, deionized, or tap water. If the storage water is inadvertently lost during field sampling studies, environmental water can be used to provide the humidity.

Sondes with level sensors have a tube that vents the pressure transducer to the atmosphere**. It is important that the air in the tube remains dry at all times.** Sondes with integral cables should be stored with the desiccant in place and the vented end of the desiccant system sealed. Sondes with connectors should be stored with the connector cap firmly in place. When disconnecting the cable, put the cap on immediately. Vented cables should be stored in a bag containing desiccant, with their caps in place.

- Interim multi parameter storage is easy. Simply remember the following key points:
- Use enough water to provide humidity, but not enough to cover the probe surfaces.
- Make sure the storage vessel is sealed to minimize evaporation.
- Check the vessel periodically to make certain that water is still present.
- For sondes with level sensors, keep the tube sealed and dry.

GENERAL RECOMMENDATIONS FOR LONG-TERM SONDE STORAGE

The following are long term storage recommendations listed by instrument type. They will be applicable for sondes with typical sensor configurations.

600XL, 600XLM -- Remove the pH or pH/ORP probe from the sonde and store it according to the instructions found in the following section on individual sensors. Cover the empty port with the provided plug. Leave the conductivity/temperature and the dissolved oxygen probes in the sonde with a membrane and electrolyte on the DO sensor. Place enough of deionized, distilled, or tap water in the calibration cup to cover the sensors, insert the sonde into the vessel, and seal with the cap/O-ring to minimize evaporation.

6820, 6920, and 6600 -- Leave the conductivity/temperature and the dissolved oxygen probes in the sonde with a membrane and electrolyte on the DO sensor. Remove all other probes from the sonde and store according to the instructions found in the following section on individual sensors. Cover the empty ports with the provided plugs. Place approximately 300 mL of deionized, distilled, or tap water in the calibration cup, insert the sonde into the vessel, and tighten the threaded cup to attain a good seal and minimize evaporation.

600R (with Replaceable Reference Electrode Module) -- Instruments of this design were generally sold after January 1996 and can be identified by the presence of 4 probes (temperature,

dissolved oxygen, pH reference, and pH glass) in the bulkhead. Remove the reference module, store it as described below, and plug the open port with the insert that was provided. Make certain that the dissolved oxygen sensor has an undamaged membrane and electrolyte in place. Place approximately 300 mL of tap water in the storage vessel, insert the sonde, and seal the vessel with the cap and O-ring. **Do not use deionized or distilled water in this case, as it may damage the pH glass sensor that must remain in the sonde.**

600 (with Combination pH Sensor) -- Instruments of this design were generally sold prior to January, 1996 and can be identified by the presence of only 3 probes (temperature, dissolved oxygen, pH) in the bulkhead. Be certain that the dissolved oxygen sensor has an undamaged membrane and electrolyte in place. Fill the provided storage vessel with a solution that is 2 molar (2 M) in potassium chloride (KCl) to a level that completely covers the dissolved oxygen and pH probes. See the following section for instructions on preparation of the KCl storage solution. Seal the vessel with the cap and O-ring.

3.4 PROBE STORAGE

LONG-TERM STORAGE OF PROBES

The following sections provide additional details on the storage of individual sensors associated with instruments in the 6-series product line from YSI.

TEMPERATURE

No special precautions are required. Sensors can be stored dry or wet, as long as solutions in contact with the thermistor probe are not corrosive (for example, chlorine bleach).

CONDUCTIVITY

No special precautions are required. Sensors can be stored dry or wet, as long as solutions in contact with thermistor probe and conductivity electrodes are not corrosive (for example, chlorine bleach). However, it is recommended that the sensor be cleaned with the provided brush prior to long term storage.

DISSOLVED OXYGEN

Rapid Pulse dissolved oxygen sensors should always be stored with a membrane and electrolyte in place and in such a way that the drying out of the electrolyte on the probe face is minimized. For long-term storage, the medium should be water rather than the moist air used in interim storage. The long-term storage protocol is also dependent on the instrument under consideration.

For the 600XL, 600XLM, 6820, 6600 and 6920, two long-term storage methods are equally acceptable.

1. Remove all probes other than dissolved oxygen, conductivity, and temperature from the sonde and seal the vacant ports with the provided port plugs. Leave the electrolyte and membrane in place on the dissolved oxygen sensor. Fill the calibration cup with water

(tap, deionized, or distilled are equally acceptable) and insert the sonde. Make certain the water level is high enough to completely cover the DO sensor. Seal the vessel to prevent evaporation of the water. At the end of the storage time, remove the existing membrane and re-membrane the probe using new electrolyte.

2. Remove the dissolved oxygen sensor from the sonde leaving the electrolyte and membrane in place. Store the probes in water (tap, deionized, or distilled are equally acceptable) in a beaker, flask, or other vessel of the user's choice. **Be sure not to damage the membrane or the probe tip when placing the probe on the bottom of the vessel.** If possible cover the vessel with parafilm or plastic wrap to minimize evaporation of the water during long-term storage. Monitor the water level in the storage vessel periodically and replenish if loss due to evaporation occurs. At the end of the storage time, remove the existing membrane and re-membrane the probe using new electrolyte.

Because the user cannot remove the Model 600R's dissolved oxygen probe from the sonde, a slightly different long-term storage protocol is required:

For 600 systems equipped with a replaceable reference electrode module, remove the reference module, store it as described below and plug the open port with the port plug that was provided. Make certain that the dissolved oxygen sensor has an undamaged membrane and electrolyte in place. Fill the provided storage vessel with a solution which is 2 molar (2 M) in potassium chloride (KCl), insert the sonde and seal the vessel with the cap and O-ring. This solution can be prepared by dissolving 74.6 g of KCl in 500 mL (approximately 1 pint) of water or 37.3 g of KCl in 250 mL (approximately 0.5 pint) of water. The water should be distilled or deionized. If KCl solution is unavailable, it is acceptable to store the dissolved oxygen and pH glass sensors in tap water. **Do not use deionized or distilled water in this case, as it may damage the pH glass sensor, which must remain in the sonde.** At the end of the storage time, remove the existing membrane and re-membrane the probe using new electrolyte.

- For 600 systems equipped with a combination pH probe (purchased prior to 1996), none of the probes are user-replaceable and a different storage technique is required. Make certain that the dissolved oxygen sensor has an undamaged membrane and electrolyte in place. Fill the provided storage vessel with a solution, which is 2 molar (2 M) in potassium chloride (KCl), to a level that completely covers the dissolved oxygen and pH probes. Seal the vessel with the cap and O-ring. At the end of the storage time, remove the existing membrane and re-membrane the probe using new electrolyte.

pH

The key to pH probe storage, short or long-term, is to make certain that the reference electrode junction does not dry out. Junctions which have been allowed to dry out due to improper storage procedures can usually be rehydrated by soaking the sensor for several hours (overnight is recommended) in a solution which is 2 molar in potassium chloride (see dissolved oxygen section above for preparation of this solution). If potassium chloride solution is not available, soaking the sensor in tap water or commercial pH buffers may restore probe function. However in some cases the sensor may have been irreparably damaged by the dehydration and will require replacement. It is also important to remember not to store the pH sensor in distilled or deionized water as the glass sensor may be damaged by exposure to this medium.

The long-term storage protocol is dependent on the instrument.

For Model 600XL, 6820, 6600 and 6920 systems, the recommended long-term storage protocol is identical. Remove the probe from the sonde and seal the vacant port with the provided plug. Place the probe in the storage vessel (plastic boot or bottle) which was in place on delivery. The vessel should contain a solution which is 2 molar in potassium chloride. Make certain that the vessel is sealed to prevent evaporation of the storage solution. Electrical tape can be used to provide a removable seal between the boot and the module body.

For Model 600 systems equipped with a replaceable reference electrode module, remove the reference module and plug the open port with the provided insert. Place the module in the storage vessel boot, which was in place on delivery, and seal the vessel with electrical tape. The vessel should contain a solution which is 2 molar in potassium chloride and should be sealed to prevent evaporation of the storage solution. Make certain that the dissolved oxygen sensor has an undamaged membrane and electrolyte in place. Fill the provided sonde storage vessel with tap water, insert the sonde, and seal the vessel with the cap and O-ring. **Do not use deionized or distilled water in this case, as it may damage the pH glass sensor that must remain in the sonde.**

For Model 600 systems equipped with a combination pH probe (purchased prior to 1996), a different storage technique is required. Make certain that the dissolved oxygen sensor has an undamaged membrane and electrolyte in place. Fill the provided storage vessel with a solution which is 2 molar in potassium chloride (KCl) to a level which completely covers the dissolved oxygen and pH probes, insert the sonde, and seal the vessel with the cap and O-ring.

ORP

Long Term Storage: ORP is not available on the Model 600R. For the Model 6600, 600XL, 6820 and 6920 systems, the recommended long-term storage protocol is identical. Remove the probe from the sonde and seal the vacant port with the provided plug. Place the probe in the storage vessel (plastic boot or bottle) which was in place on delivery. The vessel should contain a solution which is 2 molar in potassium chloride. Make certain that the vessel is sealed to prevent evaporation of the storage solution.

AMMONIUM, NITRATE AND CHLORIDE

The active element in these ion selective electrode sensors is a polyvinyl chloride (PVC) membrane that is impregnated with the reagent that provides specificity for either ammonium or nitrate. The useful life of this sensor can be reduced if the membrane is stored immersed in water. Thus, storage in dry air is recommended for long term storage. While dry air is slightly preferable for general storage, the short-term storage of these sensors in the sonde, with the entire sensor array in moist air, will have no significant detrimental effect on the life of the membrane. Remove the sensor module (6820, 6920, and 6600) from the sonde and cover the vacant port with the provided plug. Place the sensor back in the storage boot that was provided, and set aside in room air.

TURBIDITY AND CHLOROPHYLL

No special precautions are necessary for either the short or long-term storage of the turbidity and chlorophyll sensors for the Models 6600, 6820 and 6920. However, for long-term storage, the user may wish to remove the sensor from the sonde and store it dry in air to minimize any cosmetic degradation of the probe body and to maximize the life of the wiper on the 6025 and 6026.

DEPTH AND LEVEL

No special precautions are required for the sensor itself, but see instructions above with regard to maintaining a dry atmosphere in the vent tube. Sensors can be stored dry or wet, as long as solutions in contact with the strain gauge sensor port are not corrosive (for example, chlorine bleach).

Recommendations are identical for short-term and long-term storage.

SECTION 4 600R SONDE

4.1 SONDE DISASSEMBLY/ASSEMBLY

Probes and interface cables can be serviced after disassembly of the sonde. It may be necessary to disassemble the sonde and troubleshoot from within the sonde. Use this chapter to assist in disassembly of the sonde, diagnosis, and selecting the replacement part required for repair. If you are unsure of any of these procedures, or if you uncover a problem not discussed in this manual, contact YSI Technical Support, an authorized regional service center or your authorized dealer.

WARNINGS

Opening of the sonde by non-authorized service personnel will void the warranty.

The 600R's internal Printed Circuit Board contains static-sensitive devices. Disassemble the sonde at a static-safe workstation, or permanent damage may occur.

Do not use a screwdriver or other device to pry apart the assembly or permanent damage may occur.

DISASSEMBLY PROCEDURE

Follow the procedure outlined below to disassemble the sonde. Refer to the exploded views in section 9.2 to understand the assembly.

1. Thoroughly dry the outside of the sonde using an absorbent cloth.

2. With the probe guard attached, remove the two bulkhead mounting screws located just above the probe guard mounting screws.

NOTE: The bulkhead has a cable and connector attached to the PC cable assembly.

3. GENTLY pull the bulkhead away from the sonde tube, being careful to avoid breaking the attached wires.

NOTE: The O-ring is covered with silicon grease, which prolongs their life.

4. Unplug the connector. Carefully grasp the bundle of wires and **GRADUALLY AND EVENLY** pull the entire bundle of wires until the connector is unplugged. Set the bulkhead and probe guard assembly aside.

5. Gently but firmly pull the cable assembly from the sonde tube. The O-ring can make this operation difficult.

NOTE: The PC board will still be connected to the bulkhead. To make troubleshooting easier, the bulkhead can be powered without the sonde tube. Be certain to disconnect any power source before attempting to remove the PC board.

ASSEMBLY PROCEDURE

Reference the *Assembly Drawing* during this procedure.

Inspect all O-rings and sealing surfaces for blemishes, scratches and dirt. If necessary, clean with a lint free cloth and isopropyl alcohol. Before assembly, O-rings and sealing surfaces should be lightly lubricated with stopcock grease. Also, the desiccant pack should be dried at 120 ^{o}F for 30 minutes.

Warning: It is extremely important to properly position all cables/wires so that they will not become pinched between the bulkhead, depth module or sonde tube. Failure to do so may compromise a main seal, causing permanent damage to the sonde.

If the depth module was separated from the bulkhead as part of the disassembly procedure, see *Depth Module Installation* before assembly.

1. Carefully, plug the bulkhead's 20-pin Amp connector into the printed circuit board assembly.
2. With shock mounts properly positioned on printed circuit board, carefully, install the printed circuit board into sonde tube. Install the desiccant pack into sonde tube.

4.2 PC BOARD REPLACEMENT

The Model 600R printed circuit board utilizes state-of-the-art SMT (surface mount technology) components. In the unlikely event of a failure, YSI recommends that the entire PC board be replaced, not repaired.

Warning: The 600R's PC board assembly contains static-sensitive devices, so always handle it at a static-free (ESD) workstation.

4.3 TEST PROCEDURE

The following procedures verify the functionality and accuracy of each of the Model 600R's measurement parameters.

Equipment required: Model 610 display/logger or a PC with EcoWatch for Windows or PC6000 software, 10 mS/cm conductivity calibrator solution, pH buffer 4, stirred temperature standard with 0.1^{o}C accuracy, 100% argon/nitrogen gas or a sodium sulfite Na_2SO_3 solution, and a tape measure.

PRE-TEST

- If necessary, make repairs to the system. Perform all routine probe and sonde maintenance before testing. Maintenance procedures are described in Section 3.
- Calibrate the Model 600's DO, and pH parameters using procedures described in the 6-Series Operations Manual. During pH calibration verify that the mV reading are within acceptable range.
- Do not calibrate conductivity unless necessary. Under normal circumstances, cleaning the conductivity sensor will restore the system normal operation.
- It is not necessary to remove the sonde guard to perform the tests described below. To prevent carryover between tests, rinse the sonde thoroughly in water, shake the excess off and out of the sonde. Dry the sonde's outside surfaces.

pH TEST

1. Put the Model 600 in RUN mode.
2. Place the Model 600 in pH 4 buffer and allow to stabilize.
3. The readings must be between 3.9 - 4.1 pH units within 2 minutes.

CONDUCTIVITY TEST

1. Place the Model 600 in 10 ms/cm. Move the Model 600 up and down in the solution to remove trapped bubbles. Moving the sonde until the readings stabilize.
2. The reading must be within 2%. Errors could be the result of bubbles in the cell, low solution level or the need for cell cleaning.

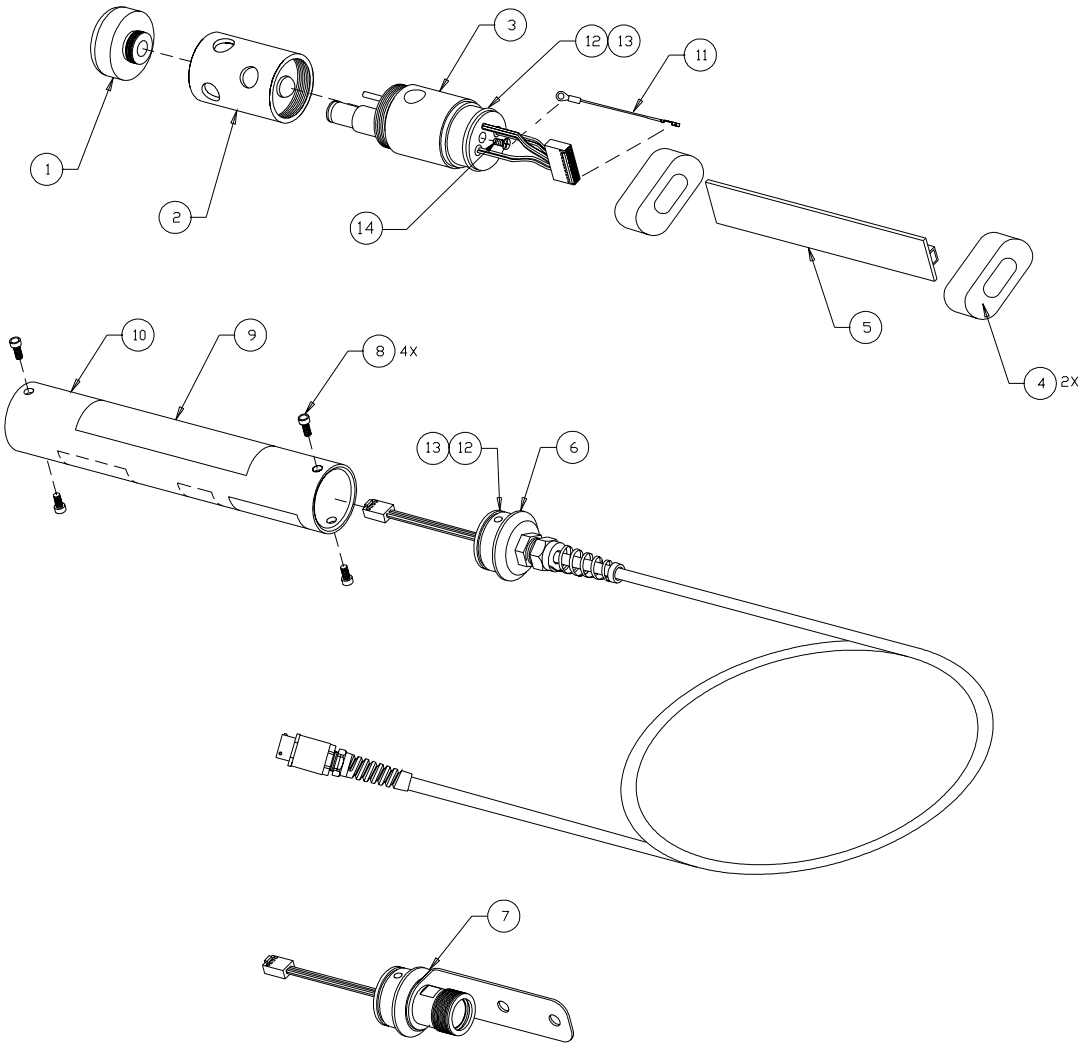
TEMPERATURE TEST

1. Place the Model 600 in a well-stirred bath of a known temperature.
2. The Model 600 must read within ± .25 ^{o}C of the standard.

OXYGEN TEST

1. Test the oxygen response and probe background current by placing the DO sensor in a zero oxygen environment. To establish zero oxygen, surround the DO sensor with argon gas, nitrogen gas or sodium sulfite solution.
2. The dissolved oxygen reading must read <2% in 3 - 5 minutes.

4.4 SONDE EXPLODED VIEWS

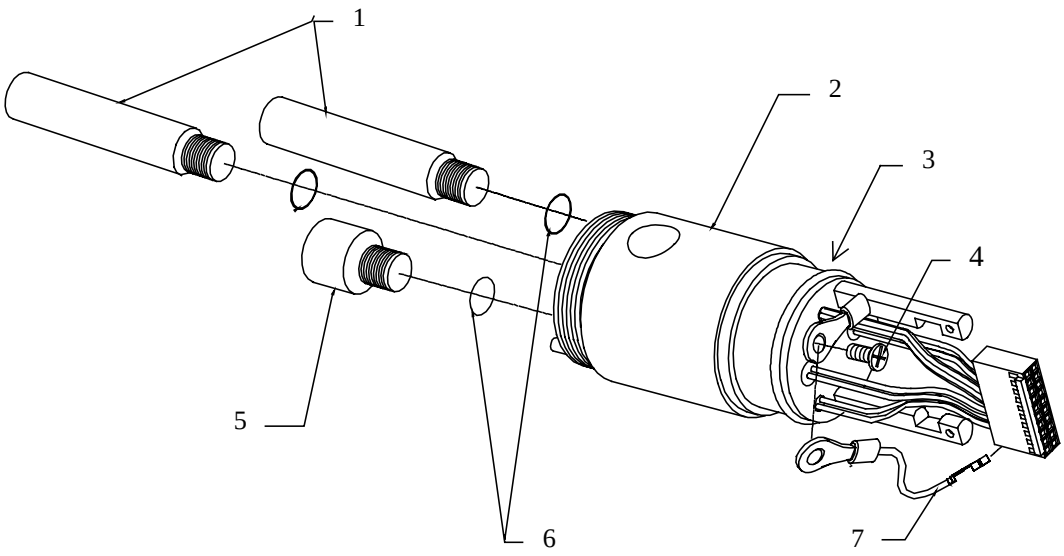


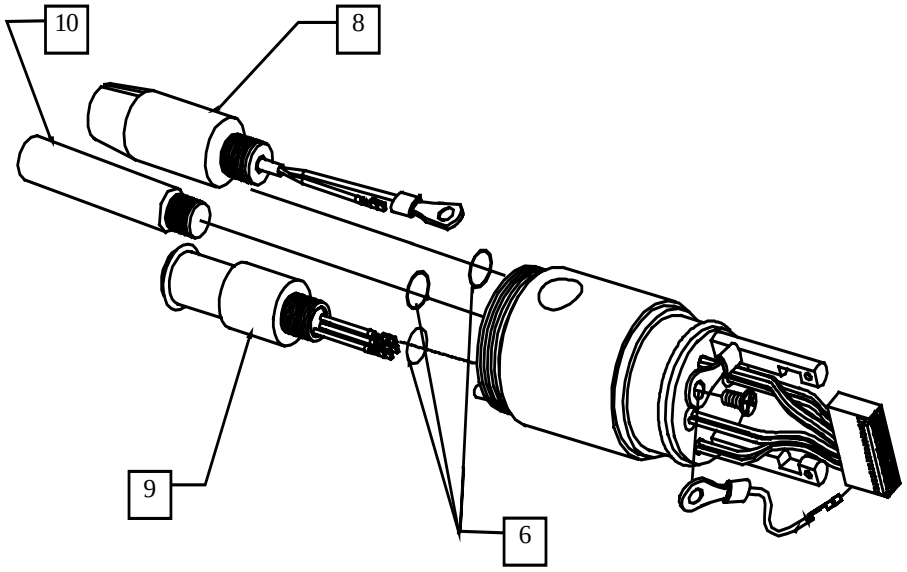
Assembly Drawing

Bubble #	Part #	Description
1	063018	Weight, 6 oz
1	063019	Weight, 24 oz
1	063020	Weight, 51 oz
2	063012	Probe Guard
3	063632	Bulkhead Assy
4	069236	Shock Mount
5	116744	Circuit Board Assy
6	063130	(25') Non-vented, CE
6	063131	(50') Non-vented, CE

Bubble #	Part #	Description
6	063132	(100') Non-vented, CE
6	063133	(200') Non- vented, CE
7	063090	Non-vented
8	001513	Screw, 6-32, .250
9	063021	Overlay, 600R
10	063051	Tube
11	063640	Cable Assy, pH Reference
12	059862	O-ring, 1.239,.070 D
13	062307	O-ring, 1.237,.100 D

BULKHEAD ASSEMBLY





Bubble #	Part #	Description
1	063636	Port Plug, pH
2	063632	Bulkhead Assy
3	059862	O-ring, 1.239,.070 D
3	062307	O-ring, 1.237,.100 D
4	001710	Screw
5	063023	Port Plug, DO

Bubble #	Part #	Description
6	062768	O-ring, .239, .070 D
7	063640	Cable Assy, pH Reference
8	006581	Probe, pH Glass
9	063040	DO Probe
10	006580	pH Reference

4.5 REPLACEMENT PARTS LIST

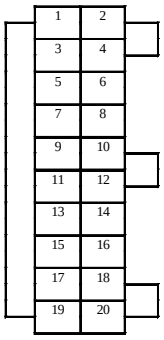
Item Number	Description	Comments
063636	Plug, pH	pH Reference and Glass Ports
063023	Plug, DO	
006580	pH Reference Electrode	
006581	pH Glass Electrode	
063632	Bulkhead	Includes Conductivity / Temperature
063640	pH Cable Assy	
063051	Tube, 600	Also Need 063021
063021	Overlay, 600	
065597	Desiccant, 3 Gram	
006583	P. M. Kit	O-rings, Lubricant, Cleaning Brush
063012	Guard, Probe, 600	
119444	Board Assy, 6-Series	
063018	Weight, 6 ounce, 1 inch	
063019	Weight, 24 ounce, 3 inch	
063020	Weight, 51 ounce, 6 inch	
063054	Cup, Transport	
059862	O-ring, EPR, 1.239	Sonde Tube
001513	Screw, Cap, 6-32, .25, SS	Retain Sonde Tube (Hex Head)
059851	Screw, Cap, 4.40, .375, SS	Retain PCB to Standoff
063090	Connector, End Cap	
063130	Cable Assy, Integral, 25’	Includes Sonde End Cap
063131	Cable Assy, Integral, 50’	Includes Sonde End Cap
063132	Cable Assy, Integral, 100’	Includes Sonde End Cap
063133	Cable Assy, Integral, 200’	Includes Sonde End Cap

CONTENTS OF 6583 PM KIT

Item Number	Description	Comments
063636	Plug, pH	pH Reference and Glass Ports
062768	O-ring, EPR, .239	pH and DO ports
063241	O-ring, Silicone, 1.299	Transport Cup
038154	Lubricant, O-ring	
038213	Brush, Tube Cleaner	

4.6 BLOCK / WIRING DIAGRAM

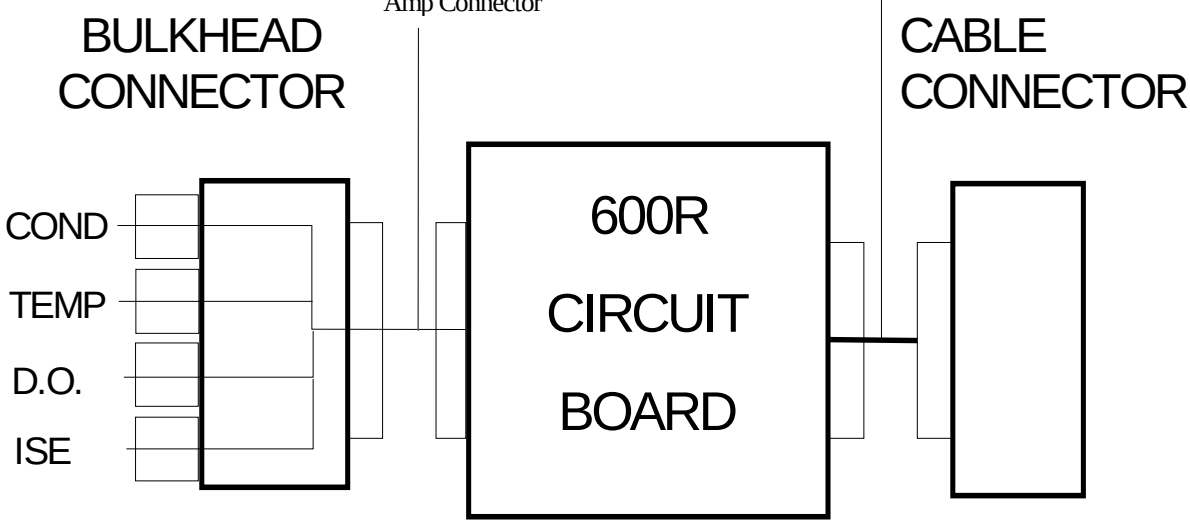
Probe	Wire Color	20 Pin Amp Connector
Oxygen	Yellow	1
	White	3
	White	5
pH Electrode	Black	19
pH Reference	Green	20
Conductivity	Gray	2
	Orange	4
	Brown	6
	Blue	8
Temperature	Red	10
	Red	12

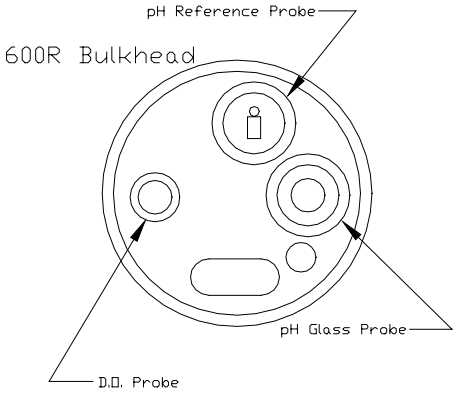


Wire Side 20 pin Amp Connector

Main Cable

Wire Color	Pin Description	DB-9	MS-4	MS-8
Yellow	RS232 TX	2	---	C
Orange	RS232 RX	3	---	D
Green	Alarm	---	---	E
Gray	RTS	---	---	G
Blue	CTS	---	---	H
Red	+ 12V DC	9	A	A
Black	GND	5	C	B
Purple	SDI-12	---	B	F
Bare	Shield	---		B





SECTION 5 600XL SONDE

5.1 SONDE DISASSEMBLY/ASSEMBLY

When used for its intended purposes and maintained according to YSI's recommendations, the 600XL sonde assembly will rarely need internal servicing. However, if service is required and the sonde must be opened, the instructions provided below should be followed or permanent damage to the sonde may occur.

WARNINGS:

- Opening of the sonde by non-authorized service personnel will void the warranty.
- The 600XL's internal Printed Circuit Board (PCB) contains static-sensitive devices. Disassemble the sonde at a static-safe workstation, or permanent damage may occur.
- Do not use a screwdriver or other device to pry apart the assembly or permanent damage may occur.

Tools required: 7/64" hex wrench, small standard screwdriver, lint free cloth, and stopcock grease.

DISASSEMBLY PROCEDURE

Reference the *Assembly Drawing*, during this procedure.

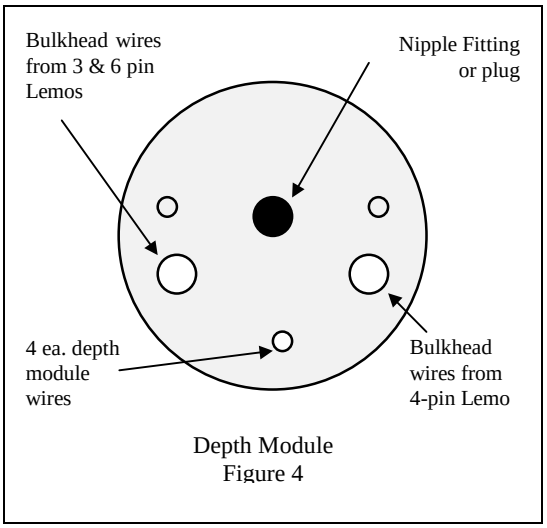
1. Thoroughly dry the outside of the sonde using an absorbent cloth. Install the sensor guard to protect probes.
2. Remove the two 7/64" hex screws located at the end of the sonde tube closest to the end cap (cable connector).
3. Grasp the sonde tube with one hand and the end cap with the other hand. Carefully, twist the two sections about 5 - 10° while pulling them apart. Extreme care must be exercised when the two parts separate so that the internal components are not damaged.
4. Disconnect the 8-pin Amp connectors from the printed circuit board. On sondes with vented level, the pressure tube will keep the end cap attached to the bulkhead.
5. Remove the two 7/64" hex screws that attach the sonde tube to the bulkhead or bulkhead/depth module assembly. If a depth module is present, it should remain attached to the bulkhead.
6. Grasp the sonde tube with one hand and the bulkhead assembly with the other hand. Carefully, twist the two sections about 5 - 10° while pulling them apart. Extreme care must be exercised when the two parts separate so that the internal components are not damaged.
7. For sondes with vented depth, use a small screwdriver to pry the pressure tube off of the depth module nipple. Remove the battery compartment and sonde tube.
8. Disconnect the 20-pin Amp connector from the printed circuit board. Note position of the shock mounts for the assembly process.

Note for units with depth or level: Unless replacing the depth module or bulkhead, it is not necessary to separate the two. See the next section, Depth Module Removal.

DEPTH MODULE REMOVAL (SONDES WITH DEPTH ONLY)

If separation of the depth module and bulkhead is necessary, the following instructions must be followed. Wires from the bulkhead are fed through the depth module making this a tedious procedure.

1. On the back of the depth module, locate bulkhead wires from the 3, 4 and 6 pin Lemo connectors. Reference the *Depth Module*, figure 4, drawing below. Carefully, remove these wires from the body of the 20-pin Amp connector by lightly pushing the tab on the side of connector in, while pulling on the wire. Reference the *Bulkhead Wiring Diagram* in Section 5.4, Sonde Exploded Views.
2. Wires in connector positions 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 16, 19 and 20 must be removed from the connector body. Wires from the depth module in positions 7, 9, 11 and 13 can remain attached to the 20-pin connector.
3. Remove the two 7/64" hex screws that attach the depth module to the bulkhead.
4. Grasp the depth module with one hand and the bulkhead assembly with the other hand. Carefully, separate the two sections while guiding the bulkhead wires through the two depth module holes. Extreme care must be exercised when the two parts separate so that the internal components are not damaged.



Depth Module
Figure 4

Note: The depth module and printed circuit board must be replaced as an entire assembly. See Section 5.2, PC *Board and Depth Module Replacement.*

ASSEMBLY PROCEDURE

Reference the *Assembly Drawing* during this procedure.

Inspect all O-rings and sealing surfaces for blemishes, scratches and dirt. If necessary, clean with a lint free cloth and isopropyl alcohol. Before assembly, O-rings and sealing surfaces should be lightly lubricated with stopcock grease. Also, the desiccant pack should be dried at 120 ^{o}F for 30 minutes.

Warning: It is extremely important to properly position all cables/wires so that they will not become pinched between the bulkhead, depth module or sonde tube. Failure to do so may compromise a main seal, causing permanent damage to the sonde.

If the depth module was separated from the bulkhead as part of the disassembly procedure, see the next section, *Depth Module Installation* before assembly.

1. Carefully, plug the bulkhead's 20-pin Amp connector into the printed circuit board assembly.
2. With shock mounts properly positioned on printed circuit board, carefully, install the printed circuit board into sonde tube. Install the desiccant pack into sonde tube.

   Sondes with vented level: Inspect the end of the pressure tube for holes or breaks. Before the printed circuit board is installed in the sonde tube, pull the vent tube (from battery compartment) through the sonde tube. While holding the vent tube, install the printed circuit

board into the sonde tube. Carefully, press the pressure tube onto the depth module nipple. Check for tight fit.

3. Carefully, press the sonde tube on to the bulkhead assembly. Install the two 7/64" hex screws.
4. Plug the 8-pin Amp connector into the printed circuit board (cable end of board).
5. Carefully, press the sonde tube on to the battery compartment assembly. Be careful not to kink the pressure tube on vented level sondes. Install the two 7/64" hex retaining screws.

DEPTH MODULE INSTALLATION (SONDES WITH DEPTH ONLY)

If the depth module was separated from the bulkhead as part of the disassembly procedure follow the procedure below to re-assemble.

1. Route the bulkhead wires from the 3, 4 and 6 pin Lemo connectors through the designated depth module holes. Reference the *Depth Module* drawing, figure 4, for hole positions.
2. Carefully, press wires into the proper position in the 20-pin Amp connector. Reference the *Bulkhead Wiring Diagram* Section 5.4, Sonde Exploded Views.
3. Attach the depth module to the bulkhead using two 7/64" hex screws.

5.2 PC BOARD AND DEPTH MODULE REPLACEMENT

The Model 600XL printed circuit board utilizes state-of-the-art SMT (surface mount technology). In the unlikely event of a component failure, YSI recommends that the entire PC board be replaced, not repaired.

Notice for sondes with depth: Model 600XLs with depth require replacement of both the printed circuit board and depth module if either fail because they are specially characterized as a pair at the factory. For disassembly procedures, *Sonde Disassembly / Assembly*, Section 5.1.

Warning: The 600XL PC board assembly contains static-sensitive components, so always handle it at a static-free (ESD) workstation.

5.3 TEST PROCEDURES

The following procedures verify the functionality and accuracy of each of the Model 600XL's measurement parameters.

Equipment required: Model 610 display/logger or a PC with EcoWatch for Windows or PC6000 software, 10 mS/cm conductivity calibrator solution, pH buffers 4, 7 and 10, stirred temperature standard with 0.1°C accuracy, 100% argon/nitrogen gas or a sodium sulfite Na_2SO_3 solution, Zobell solution and a tape measure.

PRE-TEST

- If necessary, make repairs to the system. Perform all routine probe and sonde maintenance before testing. See *Troubleshooting* and *Maintenance*, Sections 2 and 3.
- Calibrate the Model 600XL DO, pH, and depth parameters using procedures described in the *Calibration Section* of the 6-Series Operation Manual.
- Do not calibrate conductivity unless necessary. Under normal circumstances, cleaning the conductivity sensor will restore the system to normal operation.

- It is not necessary to remove the sonde guard to perform the tests described below. To prevent carryover between tests, rinse the sonde thoroughly in water, shake the excess off and out of the sonde. Dry the sonde's outside surfaces.
- The pH probe is also the reference for the other ORP sensor. Thus, the pH probe must be within specifications or the ORP readings may be affected.
- Under "Report Setup" in the 600XL main menu, turn on the millivolt reading for the ISEs (pH and/or ORP) being tested.

pH TEST

1. Put the 600XL in **Run** mode with pH millivolt **Report** setting activated.
2. Place the 600XL in pH 4 buffer and allow to stabilize.
3. Within 2 minutes the readings should be between 3.9 - 4.1 pH units and 150 to 210 mV.
4. Rinse thoroughly and place the 600XL in pH 10 buffer. Allow time for readings to stabilize.
5. Within 2 minutes the readings should be between 9.9 - 10.1 pH units and -150 to -210 mV.
6. Rinse thoroughly and place the 600XL in pH 7 buffer. Allow time for readings to stabilize.
7. Within 2 minutes the readings should be between 6.9 - 7.1 pH units and -30 to 30 mV.

CONDUCTIVITY TEST

1. Place the 600XL in 10 mS/cm conductivity calibrator solution. Move the 600XL up and down in the solution to remove trapped bubbles. Continue to move the sonde until the readings stabilize.
2. The reading should be within 5% of the standard value. Errors could be the result of bubbles in the cell, low solution level or the need for cell cleaning. See *Troubleshooting* Section 2.

TEMPERATURE TEST

1. Place the 600XL in a well-stirred bath of a known temperature, preferably between 20°C and 30°C.
2. The 600XL must read within ± .25°C of the standard.

OXYGEN TEST

1. Test the oxygen response time and zero oxygen offset by placing the DO sensor in a zero oxygen environment after being calibrated/run in a 100% saturated environment. To establish zero oxygen, surround the DO sensor with argon gas, nitrogen gas or sodium sulfite solution.
2. The dissolved oxygen reading should read < 2% in 3 - 5 minutes.
3. Rinse the sonde.

ORP TEST

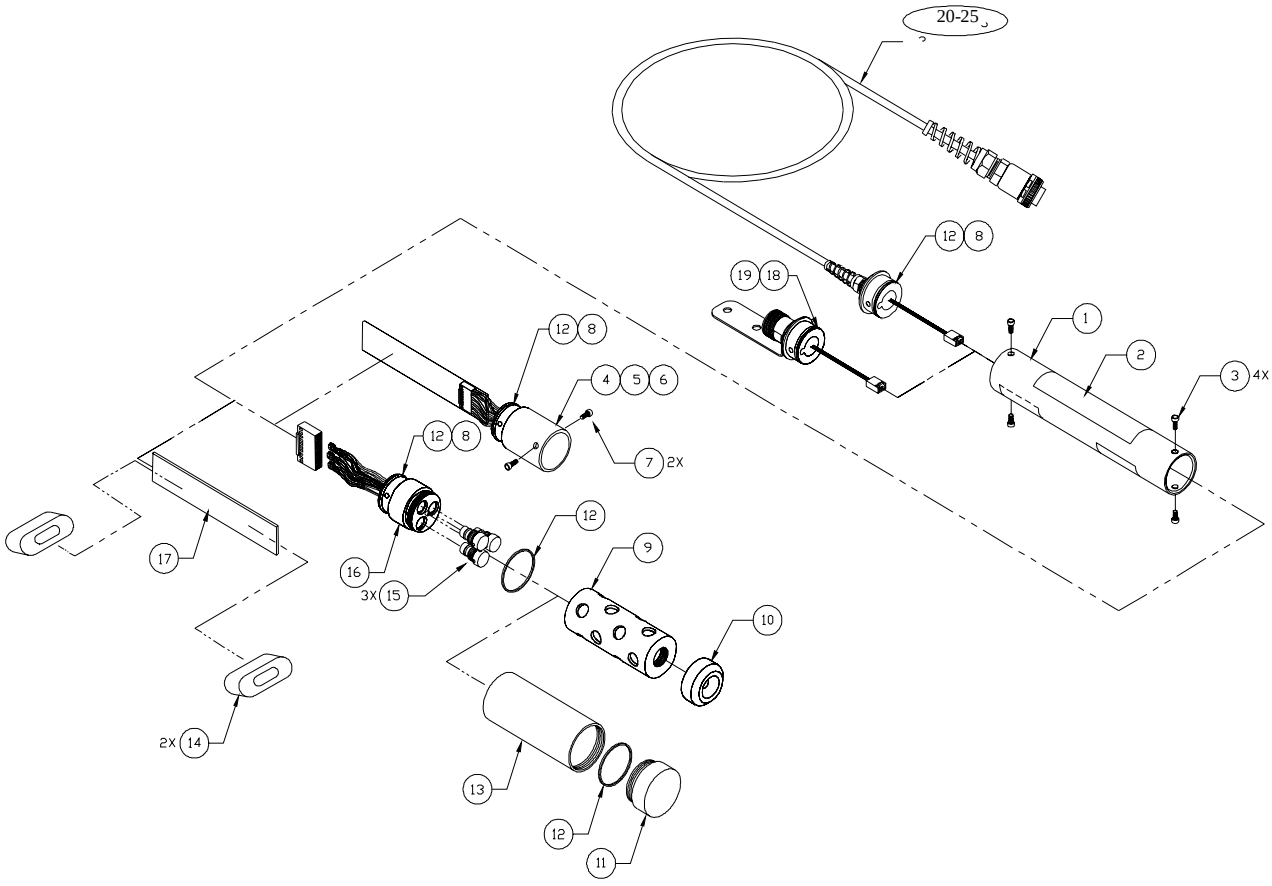
1. Go to the ORP calibrate mode.
2. Type "uncal".
3. Place the 600XL ORP electrode in Zobell solution and note the temperature.
4. The millivolt reading should be within ±50 mV of the value in the Millivolt versus Temperature Chart for Zobell solution.
5. Re-calibrate if required.
6. Rinse the sonde.

DEPTH

1. Stretch out the 600XL cable.

2. Hold the end of a tape measure to the top hole in the depth plug. The depth plug is located on the side of the depth module.
3. Stretch the tape measure along the cable.
4. For sondes with shallow depth capability, place a piece of waterproof tape at 15 feet. For medium depth capability, place a piece of waterproof tape at 50 feet.
5. Lower the 600XL into still water until the tapeline on the cable reaches the water's surface. Check the readings. Shallow sensors should read 15 ± .06 feet. Medium depth sensors should read 50 ± .4 feet.

5.4 SONDE EXPLODED VIEWS



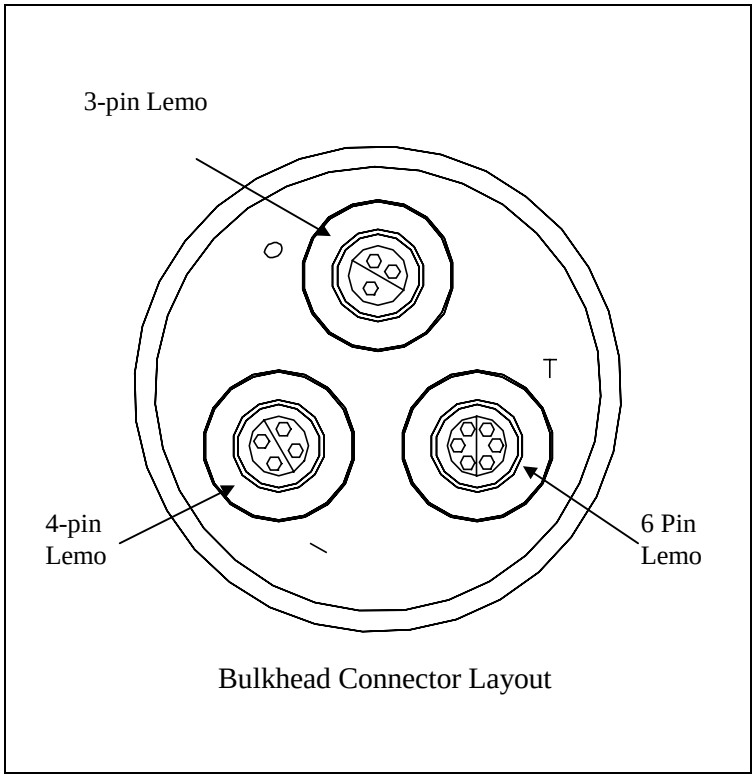
Assembly Drawing

5.5 REPLACEMENT PARTS LIST

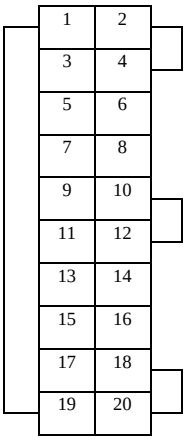
Drawing Bubble #	YSI Item Number	Description	Comments
1	063051	Sonde Tube	
2	065821	Overlay, 600XL	Self adhesive
3	001513	Cap Screw, 6-32, .250, SS	
4	065832	Depth Module Assy, Non-vented, Shallow	Calibrated w/PCB
5	065872	Depth Module Assy, Non-vented, Medium	Calibrated w/PCB
6	065873	Depth Module Assy, Vented, Shallow	Calibrated w/PCB
7	001513	Cap Screw, 6-32, .250, SS	
8	059862	O-ring, .070 D, 1.239 ID	Used in early units with small diameter O-ring.
9	065819	Guard, Sensor	
10	063018	Weight, SS, 1”	
11	069583	Lid, Transport cup	
12	062307	O-ring, .100 D, 1.237 ID	Newer design units with large diameter O-ring
13	069584	Tube, Clear Transport Cup	
14	069236	Shock Mount, PCB	2 ea., Retain circuit board
15	065839	Port Plug Assy	Includes 065807 O-ring
16	116737	Bulkhead Kit, 600XL	With or W/O depth
17	169444	Printed Circuit Board Assy, 6-Series	Units with depth, must use item 065872, 065832 or 065873
18	063090	Connector, End Cap, Non-vented	
19	063990	Connector, End Cap, Vented	
20	063130	Cable Assy, Integral 25’, Non-vented	
21	063131	Cable Assy, Integral 50’, Non-vented	
22	063132	Cable Assy, Integral 100’, Non-vented	
23	063133	Cable Assy, Integral 200’, Non-vented	
24	063137	Cable Assy, Integral 25’, Vented	
25	063138	Cable Assy, Integral 50’, Vented	
	065807	O-ring, Port Plug	
	069582	Calibration Transport Cup Kit, Clear	
	062763	Connector, 20-pin, Amp	Used on Bulkhead
	063089	Pressure Cap Assembly	
	065597	Desiccant Pack	

5.6 BULKHEAD WIRING DIAGRAM

				Bulkhead Probe Ports		
Wire Color	Description	20-pin Amp Connector (Connects PCB to bulkhead assy)	Depth Module	3-pin Lemo (Dissolved Oxygen)	4-pin Lemo (ISE 1 & 2)	6 Pin Lemo Cond. (Conductivity & Temp)
Red	DO Cathode	1		1		
Orange	Conductivity R Sense	2				2
White	DO Anode	3		3		
Brown	Conductivity R Drive	4				4
Black	DO Reference	5		2		
Purple	Conductivity L Drive	6				3
Yellow	Depth VSW	7	1			
Yellow	Conductivity L Sense	8				1
Black	Depth (-) Input	9	2			
Blue	Temperature 1	10				5
Orange	Depth (+) Input	11	3			
Gray	Temperature 2	12				6
Gray	Depth (-) Input	13	4			
		14				
Purple	ISE 1	15			2	
Orange	ISE 1	16			1	
		17				
		18				
White	ISE 2	19			4	
Green	ISE 2, Reference	20			3	



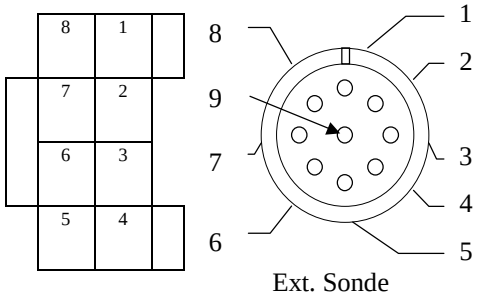
Bulkhead Connector Layout



20-pin Amp Connector

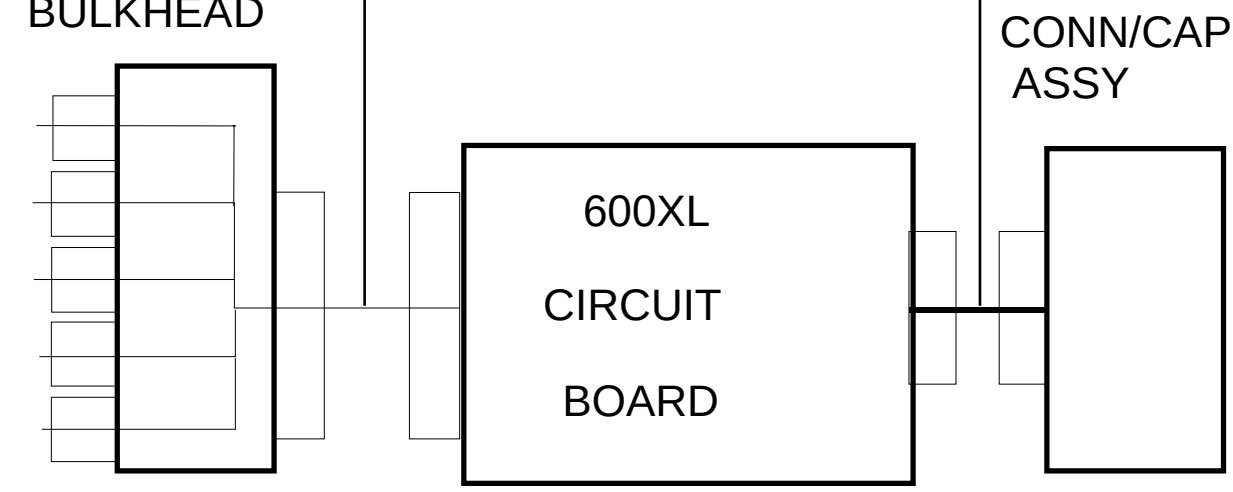
5.7 BLOCK / WIRING DIAGRAM

Internal 8-pin Amp Connector	Wire Color	Pin Description	Ext. Sonde Connector	External Cable Pinouts DB-9	MS-4	MS -8
1	Yellow	RS232 TX	Pin 3	2	---	C
8	Orange	RS232 RX	Pin 7	3	---	D
7	Green	Alarm	Pin 5	---	---	E
2		Not used		---	---	
6		Not used		---	---	
3	Red	+ 12V DC	Pin 8	9	A	A
5	Black	GND	Pin 6	5	C	B
4	Purple	SDI-12	Pin 2	---	B	F
	Bare	Shield		---		B



Ext. Sonde Connector

See Bulkhead Wiring Diagram.



SECTION 6 600XLM SONDE

6.1 SONDE DISASSEMBLY/ASSEMBLY

When used for its intended purposes and maintained according to YSI's recommendations, the 600XLM sonde assembly will rarely need internal servicing. However, if service is required and the sonde must be opened, the instructions provided below should be followed or permanent damage to the sonde may occur.

Warnings

Opening of the sonde by non-authorized service personnel will void the warranty.

The 600XLM's internal Printed Circuit Board contains static-sensitive devices. Disassemble the sonde at a static-safe workstation, or permanent damage may occur.
Do not use a screwdriver or other device to pry apart the assembly or permanent damage may occur.

Tools required: 7/64" hex wrench, small standard screwdriver, lint free cloth, and stopcock grease

DISASSEMBLY PROCEDURE

Reference the *Assembly Drawing* during this procedure.

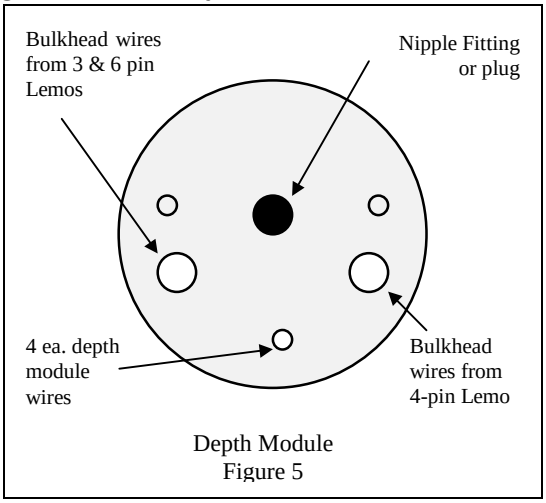
1. Thoroughly dry the outside of the sonde using an absorbent cloth. Install the sensor guard to protect probes.
2. Unscrew the battery cover and remove the batteries. Re-install the battery cover.
3. Remove the two 7/64" hex screws located at the end of the sonde tube closest to the battery compartment.
4. Grasp the sonde tube with one hand and the battery compartment with the other hand. Carefully, twist the two sections about 5 - 10° while pulling them apart. Extreme care must be exercised when the two parts separate so those internal components are not damaged.
5. Disconnect the 8-pin and 3-pin Amp connectors from the printed circuit board. On sondes with vented level, do not attempt to completely remove the battery compartment, the pressure tube will keep the battery compartment attached to the bulkhead.
6. Remove the two 7/64" hex screws that attach the sonde tube to the bulkhead or bulkhead/depth module assembly. If a depth module is present, it should remain attached to the bulkhead.
7. Grasp the sonde tube with one hand and the bulkhead assembly with the other hand. Carefully, twist the two sections about 5 - 10° while pulling them apart. Extreme care must be exercised when the two parts separate so those internal components are not damaged.
8. For sondes with vented depth, use a small screwdriver to pry the pressure tube off of the depth module nipple. Remove the battery compartment and sonde tube.
9. Disconnect the 20-pin Amp connector from the printed circuit board. Note position of the shock mounts for the assembly process.

Note for units with depth or level: Unless replacing the depth module or bulkhead, it is not necessary to separate the two. See the next section for *Depth Module Removal*.

DEPTH MODULE REMOVAL (SONDES WITH DEPTH ONLY)

If separation of the depth module and bulkhead is necessary, the following instructions must be followed. Wires from the bulkhead are fed through the depth module making this a tedious procedure.

5. On the back of the depth module, locate bulkhead wires from the 3, 4 and 6 pin Lemo connectors. Reference the *Depth Module* drawing below. Carefully remove these wires from the body of the 20-pin Amp connector by lightly pushing the tab on side of connector inward, while pulling on the wire. Reference the *Bulkhead Wiring Diagram*, Section 6.6.



Depth Module
Figure 5

Wires in connector positions 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 16, 19 and 20 must be removed from the connector body. Wires from the depth module in positions 7, 9, 11 and 13 can remain attached to the 20-pin connector.

6. Remove the two 7/64" hex screws that attach the depth module to the bulkhead.
7. Grasp the depth module with one hand and the bulkhead assembly with the other hand. Carefully, separate the two sections while guiding the bulkhead wires through the two depth module holes. Extreme care must be exercised when the two parts separate so those internal components are not damaged.

Note: The depth module and printed circuit board must be replaced as an entire assembly. See *PC Board and Depth Module Replacement*, Section 6.2.

ASSEMBLY PROCEDURE

Reference the *Assembly Drawing* during this procedure.

Inspect all O-rings and sealing surfaces for blemishes, scratches and dirt. If necessary, clean with a lint free cloth and isopropyl alcohol. Before assembly, O-rings and sealing surfaces should be lightly lubricated with stopcock grease. Also, the desiccant pack should be dried at 120 ^{o}F for 30 minutes.

Warning: It is extremely important to properly position all cables/wires so that they will not become pinched between the bulkhead, depth module or sonde tube. Failure to do so may compromise a main seal, causing permanent damage to the sonde.

If the depth module was separated from the bulkhead as part of the disassembly procedure, see *Depth Module Installation* in the next section before assembly.

3. Carefully, plug the bulkhead's 20-pin Amp connector into the printed circuit board assembly.
4. With shock mounts properly positioned on printed circuit board, carefully, install the printed circuit board into sonde tube. Install the desiccant pack into sonde tube.

Sondes with vented level: Inspect the end of the pressure tube for holes or breaks. Before the printed circuit board is installed in the sonde tube, pull the vent tube (from battery compartment) through the sonde tube. While holding the vent tube, install the printed circuit board into the sonde tube. Carefully, press the pressure tube on to the depth module nipple. Check for tight fit.

5. Carefully, press the sonde tube on to the bulkhead assembly. Install the two 7/64" hex screws.
6. Plug the 3-pin and 8-pin battery compartment connectors into the printed circuit board.
7. Carefully, press the sonde tube on to the battery compartment assembly. Be careful not to kink the pressure tube on vented level sondes. Install the two 7/64" hex retaining screws.

DEPTH MODULE INSTALLATION (SONDES WITH DEPTH ONLY)

If the depth module was separated from the bulkhead as part of the disassembly procedure follow the procedure below to re-assemble.

4. Route the bulkhead wires from the 3, 4 and 6 pin Lemo connectors through the designated depth module holes. Reference the *Depth Module*, figure 5, drawing for hole positions.
5. Carefully, press wires into the proper position in the 20-pin Amp connector. Reference the *Bulkhead Wiring Diagram*, Section 6.6.
6. Attach the depth module to the bulkhead using two 7/64" hex screws.

6.2 PC BOARD AND DEPTH MODULE REPLACEMENT

The Model 600XLM printed circuit board utilizes state-of-the-art SMT (surface mount technology) components. In the unlikely event of a failure, YSI recommends that the entire PC board be replaced, not repaired.

Notice for sondes with depth: Model 600XLMs with depth require replacement of both the printed circuit board and depth module if either fail because they are specially characterized as a pair at the factory. For disassembly procedures, see Section 6.1 *Sonde Disassembly / Assembly.*

Warning: The 600XLM PC board assembly contains static-sensitive devices, so always handle it at a static-free (ESD) workstation.

6.3 TEST PROCEDURES

The following procedures verify the functionality and accuracy of each of the Model 600XLM's measurement parameters.

Equipment required: Model 610 display/logger or a PC with EcoWatch for Windows or PC6000 software, 10 mS/cm conductivity calibrator solution, pH buffers 4, 7 and 10, stirred temperature standard with 0.1°C accuracy, 100% argon/nitrogen gas or a sodium sulfite Na_2SO_3 solution, Zobell solution and a tape measure.

PRE-TEST

- If necessary, make repairs to the system. Perform all routine probe and sonde maintenance before testing. See *Troubleshooting* and *Maintenance*, Sections 2 and 3.
- Calibrate the Model 600XLM DO, pH, and depth parameters using procedures described in the *Calibration Section* of the 6-Series Operations Manual.
- Do not calibrate conductivity unless necessary. Under normal circumstances, cleaning the conductivity sensor will restore the system to normal operation.

- It is not necessary to remove the sonde guard to perform the tests described below. To prevent carryover between tests, rinse the sonde thoroughly in water, shake the excess off and out of the sonde. Dry the sonde's outside surfaces.
- The pH probe is also the reference for the other ORP sensor. Thus, the pH probe must be within specifications or the ORP readings may be affected.
- Under Report setup in the 600XLM Main Menu, turn on the millivolt reading for the ISEs (pH and/or ORP) being tested.

pH TEST

1. Put the 600XLM in **Run** mode with pH millivolt **Report** setting activated.
2. Place the 600XLM in pH 4 buffer and allow to stabilize.
3. Within 2 minutes the readings should be between 3.9 - 4.1 pH units and 150 to 210 mV.
4. Rinse thoroughly and place the 600XLM in pH 10 buffer. Allow time for readings to stabilize.
5. Within 2 minutes the readings should be between 9.9 - 10.1 pH units and -150 to -210 mV.
6. Rinse thoroughly and place the 600XLM in pH 7 buffer. Allow time for readings to stabilize.
7. Within 2 minutes the readings should be between 6.9 - 7.1 pH units and -30 to 30 mV.

CONDUCTIVITY TEST

1. Place the 600XLM in 10 mS/cm conductivity calibrator solution. Move the 600XLM up and down in the solution to remove trapped bubbles. Continue to move the sonde until the readings stabilize.
2. The reading should be within 5 % of the standard value. Errors could be the result of bubbles in the cell, low solution level or the need for cell cleaning. See *Troubleshooting*, Section 2.

TEMPERATURE TEST

1. Place the 600XLM in a well-stirred bath of a known temperature, preferably between 20 ^{o}C and 30 ^{o}C.
2. The 600XLM must read within ± .25 ^{o}C of the standard.

OXYGEN TEST

1. Test the oxygen response time and zero oxygen offset by placing the DO sensor in a zero oxygen environment after being calibrated/run in a 100% saturated environment. To establish zero oxygen, surround the DO sensor with argon gas, nitrogen gas or sodium sulfite solution.
2. The dissolved oxygen reading should read < 2% in 3 - 5 minutes.
3. Rinse the sonde.

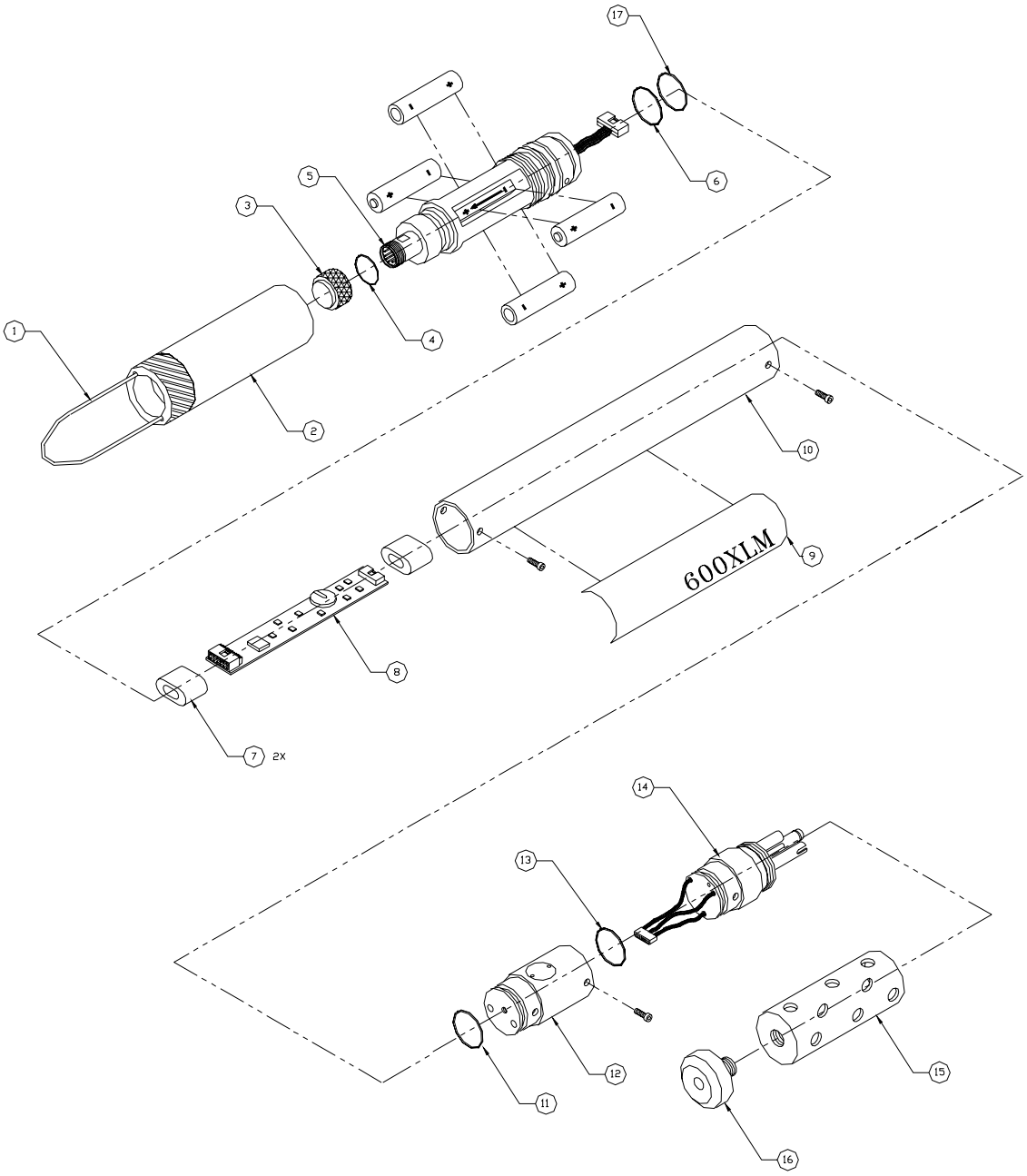
ORP TEST

1. Go to the ORP calibrate mode.
2. Type "uncal".
3. Place the 600XLM ORP electrode in Zobell solution and note the temperature.
4. The millivolt reading should be within ±50 mV of the value in chart for Zobell solution (millivolts versus temperature).
5. Re-calibrate if required.
6. Rinse the sonde.

DEPTH

1. Stretch out the 600XLM cable.
2. Hold the end of a tape measure to the top hole in the depth plug. The depth plug is located on the side of the depth module.
3. Stretch the tape measure along the cable.
4. For sondes with shallow depth capability, place a piece of waterproof tape at 15 feet. For medium depth capability, place a piece of waterproof tape at 50 feet.
5. Lower the 600XLM into still water until the tape line on the cable reaches the water's surface. Check the readings. Shallow sensors should read 15 ± .06 feet. Medium depth sensors should read 50 ± .4 feet.

6.4 SONDE EXPLODED VIEWS



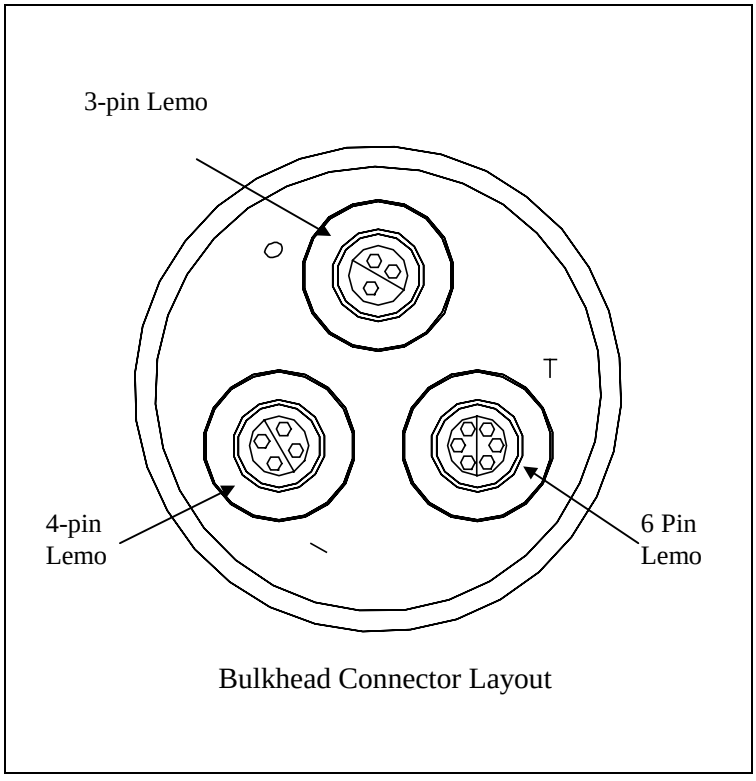
Assembly Drawing

6.5 REPLACEMENT PARTS LIST

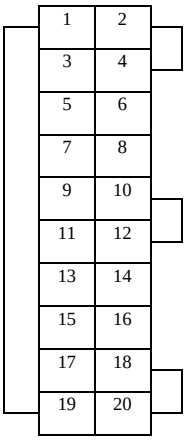
Drawing Bubble #	YSI Item Number	Description	Comments
1	067003	Bail, 600XLM	
2	067005	Cover, Battery	
3	063089	Pressure Cap Assembly	
4	062687	O-ring, .862 ID	
5	116706	Battery Compartment Assy, Non-vented	
5	116707	Battery Compartment Assy, Vented	
6	067010	O-ring	Battery cover end seal
7	069236	Shock Mount, PCB	2 ea., Retain circuit board
8	169444	Printed Circuit Board Assy, 6-Series	Units with depth, must use Depth module assy.
9	067002	Overlay, 600XLM	Self adhesive
10	063051	Sonde Tube, 9’5”	Short version
10	067007	Sonde Tube, 10’5”	Long version
11	059862	O-ring, 1.239 ID	Depth mod. to tube seal
12	065832	Depth Module Assy, Non-vented, Shallow	Calibrated w/PCB
12	065872	Depth Module Assy, Non-vented, Medium	Calibrated w/PCB
12	065873	Depth Module Assy, Vented, Shallow	Calibrated w/PCB
13 & 17	062307	O-ring, 1.237 ID	Main sonde seal
14	116738	Bulkhead Kit, 600XLM	With or W/O depth
15	065819	Guard, Sensor	
16	063018	Weight, SS, 1”	
Refer to the YSI 600XL drawing	069584	Tube, Clear Transport Cup	
	069583	Lid, Clear Transport Cup	
	069582	Kit, Clear Transport Cup	Includes 069584, 069583 & 062307
	116735	Battery Terminal Kit	Replace worn terminals
	065839	Port Plug Assy	Includes 065807 O-ring
	065807	O-ring, Port Plug	
	063234	Calibration Transport Cup	
	062763	Connector, 20-pin, Amp	Used on Bulkhead
	065597	Desiccant Pack	

6.6 BULKHEAD WIRING DIAGRAM

				Bulkhead Probe Ports		
Wire Color	Description	20-pin Amp Connector (Connects PCB to bulkhead assy)	Depth Module	3-pin Lemo (Dissolved Oxygen)	4-pin Lemo (ISE 1 & 2)	6 Pin Lemo Cond. (Conductivity & Temp)
Red	DO Cathode	1		1		
Orange	Conductivity R Sense	2				2
White	DO Anode	3		3		
Brown	Conductivity R Drive	4				4
Black	DO Reference	5		2		
Purple	Conductivity L Drive	6				3
Yellow	Depth VSW	7	1			
Yellow	Conductivity L Sense	8				1
Black	Depth (-) Input	9	2			
Blue	Temperature 1	10				5
Orange	Depth (+) Input	11	3			
Gray	Temperature 2	12				6
Gray	Depth (-) Input	13	4			
		14				
Purple	ISE 1	15			2	
Orange	ISE 1	16			1	
		17				
		18				
White	ISE 2	19			4	
Green	ISE 2, Reference	20			3	



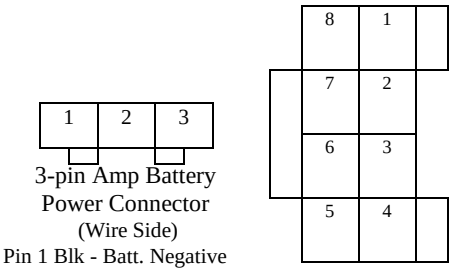
Bulkhead Connector Layout



20-pin Amp Connector

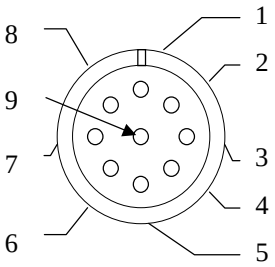
6.7 BLOCK / WIRING DIAGRAM

Internal 8-pin Amp Connector	Wire Color	Pin Description	Ext. Sonde Connector	External Cable Pinouts DB-9	MS-4	MS-8
1	Yellow	RS232 TX	Pin 3	2	---	C
8	Orange	RS232 RX	Pin 7	3	---	D
7	Green	Alarm	Pin 5	---	---	E
2		Not used		---	---	
6		Not used		---	---	
3	Red	+ 12V DC	Pin 8	9	A	A
5	Black	GND	Pin 6	5	C	B
4	Purple	SDI-12	Pin 2	---	B	F
	Bare	Shield		---		B



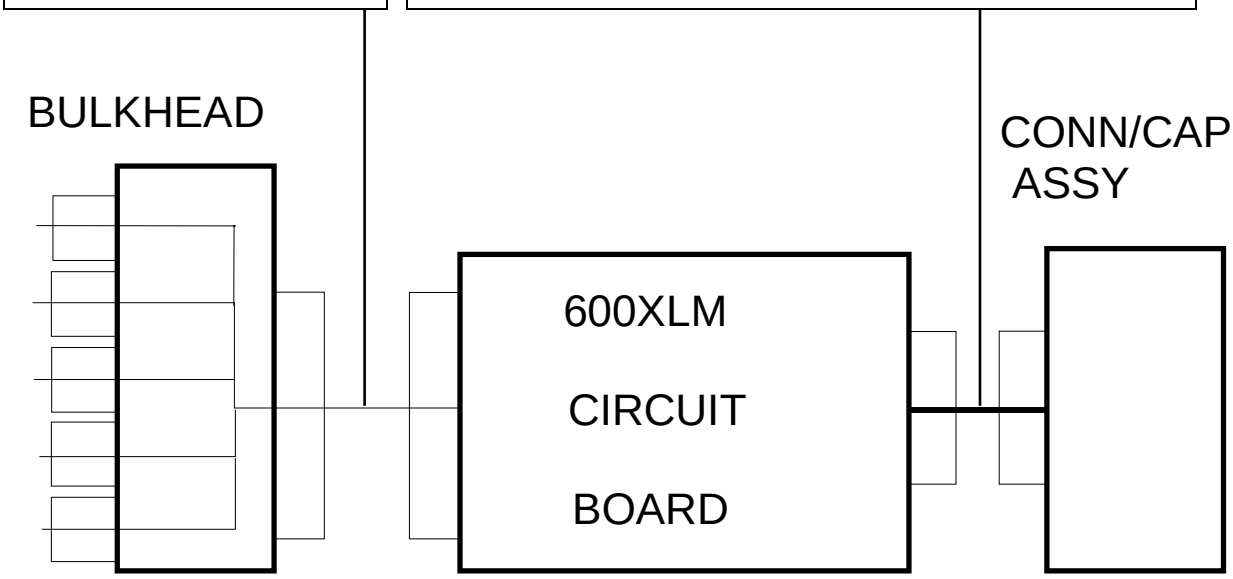
3-pin Amp Battery Power Connector
(Wire Side)
Pin 1 Blk - Batt. Negative
Pin 3 Red - Batt. Positive

8-pin Amp Connector
(Wire Side)



Ext. Sonde Connector

See Bulkhead Wiring Diagram.



SECTION 7 6820 SONDE

This section is intended for use by a qualified service technician that has been authorized by YSI. End users of the Model 6820 may find the illustrations and procedures in this chapter helpful in understanding and caring for the Model 6820. However, disassembly of the sonde by a non-authorized service technician will void the manufacturer's warranty.

If you need service or service support, please contact the dealer from whom you purchased the product or the YSI Technical Support Group.

7.1 SONDE DISASSEMBLY/ASSEMBLY

When used for its intended purposes and maintained according to YSI's recommendations, the 6820 sonde assembly will rarely need to be opened for internal servicing. However, if service is required and the sonde must be opened, the instructions provided below must be followed or permanent damage to the sonde assembly may result.

WARNING

Opening of the sonde by non-authorized service personnel will void the warranty.

The 6820's internal Printed Circuit Board contains static-sensitive devices. Disassemble the sonde at a static-safe workstation, or permanent damage may occur.

Do not use a screwdriver or other device to pry apart the assembly or permanent damage may result.

Tools required: Phillips screwdriver, 3/8" or larger nut driver, prying block 1/2" X 3/4" X 3" (see Figure 2), O-ring lubricant, and large pliers.

SONDE DISASSEMBLY

1. Remove the probe guard or storage cup. Thoroughly dry the outside of the sonde and probes using an absorbent cloth. Remove all of the probes.
2. Locate the Bulkhead Screw Port Plugs. See Figure 6. At the center of each plug is a tightened Phillips screw. Loosen one of the screws approximately 1/4".

WARNING: Loosening the screw too far may cause damage to the plug's threads during the next step.

3. Steady the sonde body in a vise or, while sitting, between your legs. It will take a significant amount of force to remove the Bulkhead Screw Port Plugs, so be sure that the sonde is firmly held during this procedure.

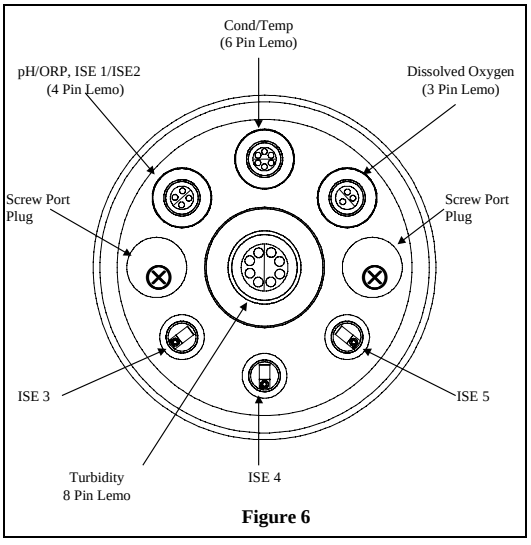


Figure 6

4. Position a 1/2" thick prying block and nut driver as shown in Figure 7.
5. With the nut driver opening attached under the lip of the loosened screw, "pop" the plug from the bulkhead by apply downward pressure on the handle of the nut driver.
6. Repeat steps 2 through 5 for the second Bulkhead Port Plug.
7. Once the plugs have been fully removed, remove both O-ring Screws from the bulkhead assembly with a Phillips screwdriver.
8. Grasp the bulkhead with one hand and the sonde body with the other hand and carefully pull the bulkhead away from the sonde body. While pulling, a slight twisting motion, about 5 °, may assist the disassembly. Please note that considerable force may be required to separate the two parts. **WARNING:** The bulkhead is connected to the internal PC board via wires.
9. To remove the PCB, grasp the board on either side of the 20-pin connector and pull until the 8-pin connector at the top pulls free. When removing the bulkhead from the PCB, take note of the Turbidity connector, and pull the connector from the PCB so that the pins remain on the wiring harness.

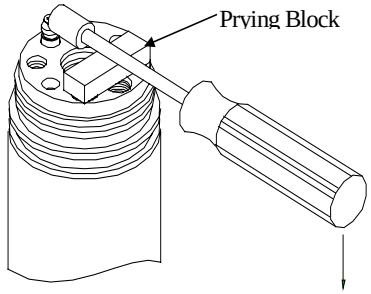


Figure 7

10. Using the large pliers or vise, loosen the cable and remove it, being careful not to scratch or damage the PVC piece. For BCR connectors, place the PVC base into a vise or use the pliers and turn entire sonde, being careful not to damage or markup the PVC piece. NOTE: Do not use a wrench on the Stainless Steel Connector flats.

SONDE ASSEMBLY

1. Before assembly, inspect the sealing O-rings and sealing surfaces for blemishes, scratches and dirt.
2. Clean and lightly lubricate the O-rings and sealing surfaces.
3. Dry the desiccant pack in a 120^{O} F oven for 30 minutes. Re-install desiccant pack into sonde.
4. Plug the bulkhead wires onto the PCB. Push the PCB into the sonde body. Install the cable's 8-pin connector onto the PCB. Put Loctite 242 or equivalent onto the threads. Allowing the PCB and bulkhead to rotate, carefully tighten the cable 1/8 of a turn after it just touches the sonde body. Push the bulkhead fully into sonde body.

   WARNING: It is extremely important to properly position the bulkhead wires so they will not become pinched between the bulkhead and the sonde body. Failure to do so may damage the main seal, causing permanent damage to the sonde.
5. Re-install the O-ring screws (068248) until the O-ring just touches the bulkhead. Seat the O-ring by turning the screw an additional $1^{1}/_{4}$ turn.

   WARNING: Once these screws are tightened, the bulkhead should not twist when the sonde guard or storage cup are installed or removed. If it does turn, apply more torque to the screws.
6. Screw in the screws from the port plugs and tap both plugs into the bulkhead. Note: Make sure the screws are all the way in so the threads are not damaged.
7. Inspect and lubricate probe O-rings and sealing surfaces. Re-install probes.

7.2 PC BOARD AND DEPTH MODULE REPLACEMENT

The Model 6820 PC board utilizes a state-of-the-art SMT (surface mount technology) PC board. In the unlikely event of a PC board failure, YSI recommends that the entire PC board be replaced, not repaired.

NOTICE FOR UNITS WITH DEPTH: Model 6820s with depth require replacement of both the board and depth sensor if either fail because they are specially characterized as a pair at the factory. See the Replacement Parts List.

WARNING: The 6820 PC board assembly contains static-sensitive devices, so always handle it at a static-safe workstation.

7.3 TEST PROCEDURE

The following procedures verify the functionality and accuracy of each of the Model 6820's measurement parameters.

Equipment required: Model 610 display/logger, or a PC with EcoWatch for Windows or PC6000 software, 10 mS/cm conductivity calibrator solution, pH buffers 4, 7 and 10, stirred temperature standard with 0.1°C accuracy, 100% argon/nitrogen gas or a sodium sulfite Na_2SO_3 solution, Zobell solution, ammonium 100 mg/L standard, nitrate 100 mg/L standard, turbidity 10 NTU standard, acridine orange, and a tape measure.

PRE-TEST

- If necessary, make repairs to the system. Perform all routine probe and sonde maintenance before testing. See *Troubleshooting* and *Maintenance,* Sections 2 and 3.
- Calibrate the Model 6820 DO, pH, depth, turbidity, chlorophyll, chloride, ammonium and nitrate parameters using procedures described in the *Calibration Section* of the 6-Series Operations Manual.
- Do not calibrate conductivity unless necessary. Under normal circumstances, cleaning the conductivity sensor will restore the system to normal operation.
- It is not necessary to remove the sonde guard to perform the tests described below. To prevent carryover between tests, rinse the sonde thoroughly in water, shake the excess off and out of the sonde. Dry the sonde's outside surfaces.
- The pH probe is also the reference for the ISEs reference. Thus, the pH probe must be within specifications or the readings from the other ISEs will be affected.
- Under Report setup in the 6820 Main Menu, turn on the millivolt reading for the ISEs being tested.

pH TEST

1. Put the 6820 in **Run** mode with pH millivolt **Report** setting activated.
2. Place the 6820 in pH 4 buffer and allow to stabilize.
3. Within 2 minutes the readings should be between 3.9 - 4.1 pH units and 150 to 210 mV.
4. Rinse thoroughly and place the 6820 in pH 10 buffer. Allow time for readings to stabilize.
5. Within 2 minutes the readings should be between 9.9 - 10.1 pH units and -150 to -210 mV.
6. Rinse thoroughly and place the 6820 in pH 7 buffer. Allow time for readings to stabilize.
7. Within 2 minutes the readings should be between 6.9 - 7.1 pH units and -30 to 30 mV.

CONDUCTIVITY TEST

1. Place the 6820 in 10 mS/cm conductivity calibrator solution. Move the 6820 up and down in the solution to remove trapped bubbles. Continue to move the sonde until the readings stabilize.
2. The reading should be within 5 % of the standard value. Errors could be the result of bubbles in the cell, low solution level or the need for cell cleaning. See *Troubleshooting*, Section 2.

TEMPERATURE TEST

1. Place the 6820 in a well-stirred bath of a known temperature, preferably between 20 °C and 30 °C.
   The 6820 must read within ± .25 °C of the standard.

OXYGEN TEST

1. Test the oxygen response time and zero oxygen offset by placing the DO sensor in a zero oxygen environment after being calibrated/run in a 100% saturated environment. To establish zero oxygen, surround the DO sensor with argon gas, nitrogen gas or sodium sulfite solution. The dissolved oxygen reading should read < 2% in 3 - 5 minutes.

2. Rinse the sonde.

ORP TEST

1. Go to the ORP calibrate mode. Type “uncal”.
2. Place the 6820 ORP electrode in Zobell solution and note the temperature. The millivolt reading should be within ±50 mV of the value in chart for Zobell solution (millivolts versus temperature).
3. Recalibrate if required.
4. Rinse the sonde.

NITRATE TEST

1. Place the 6820 in 100 mg/L Nitrate standard. The reading should be 100 ± 10 mg/L with a 40 ±25 mV indication.
2. Rinse the sonde.

AMMONIUM TEST

1. Place the 6820 in 100 mg/L Ammonia standard. The reading should be 100 ± 10 mg/L with a 110 ±50 mV indication.
2. Rinse the sonde.

TURBIDITY

1. Place the 6820 in 10 NTU Turbidity standard. The reading should be 8 to 12 NTU.
2. Rinse the sonde.
3. Rotate the wiper. It should park 150 to 210 degrees from the optics.

DEPTH

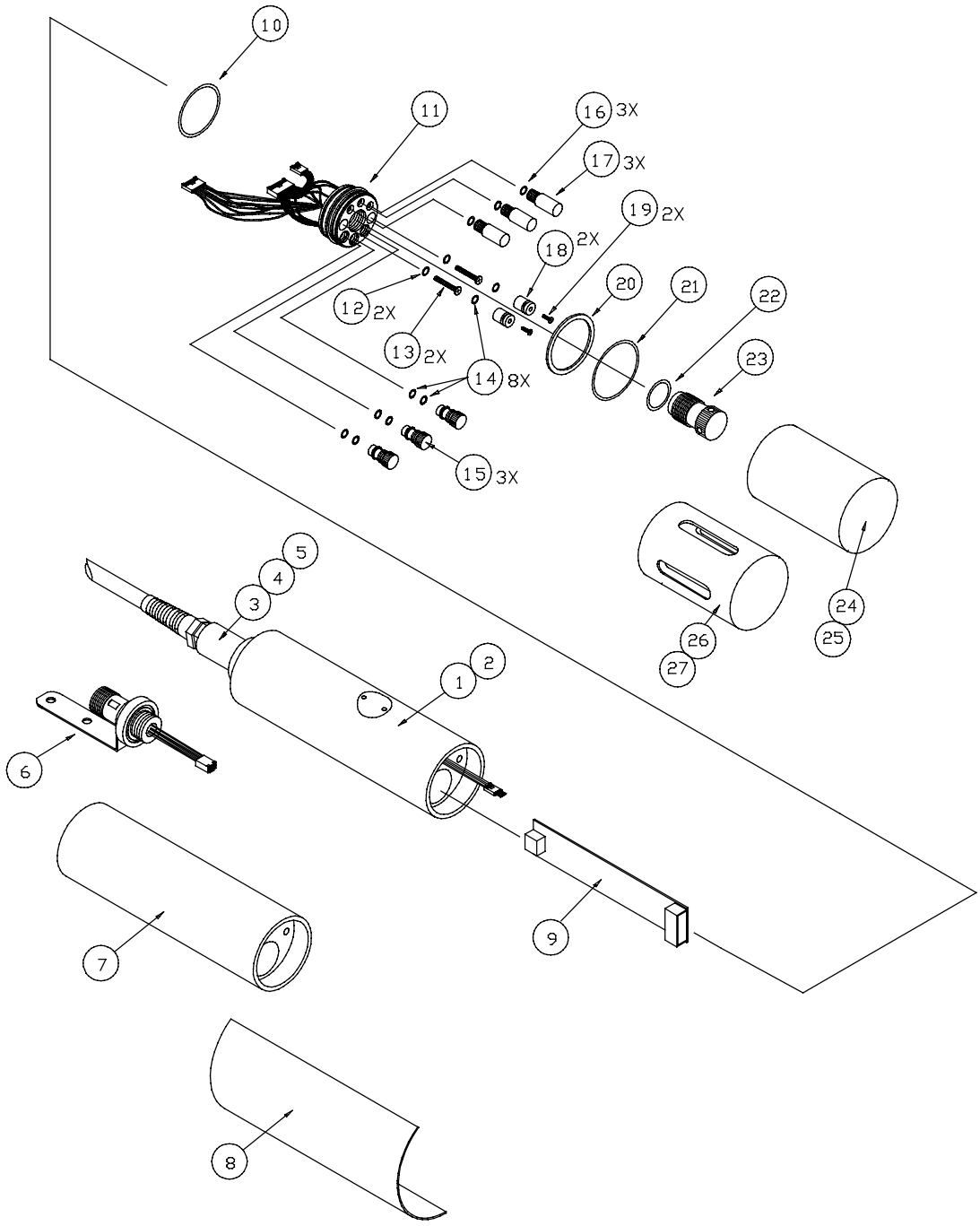
1. Stretch out the 6820 cable.
2. Hold the end of a tape measure to the top hole in the depth sensor plug. The depth plug is located on the side of the sonde body.

3. Stretch the tape measure along the cable. For shallow depth sensors, place a piece of waterproof tape at 15 feet. For medium depth sensors, place a piece of waterproof tape at 50 feet.
4. Lower the 6820 into still water until the tapeline on the cable reaches the water's surface. Check the readings. Shallow sensors should read 15 ±.06 feet. Medium depth sensors should read 50 ± .4 feet.

CHLOROPHYLL

1. Calibrate according to the calibration procedures in the YSI 6-Series Operations Manual. If no error messages appear, the probe should be assumed to be linear.
2. Make sure the wiper rotates and parks between 150 and 210 degrees from the optics.

7.4 SONDE EXPLODED VIEWS



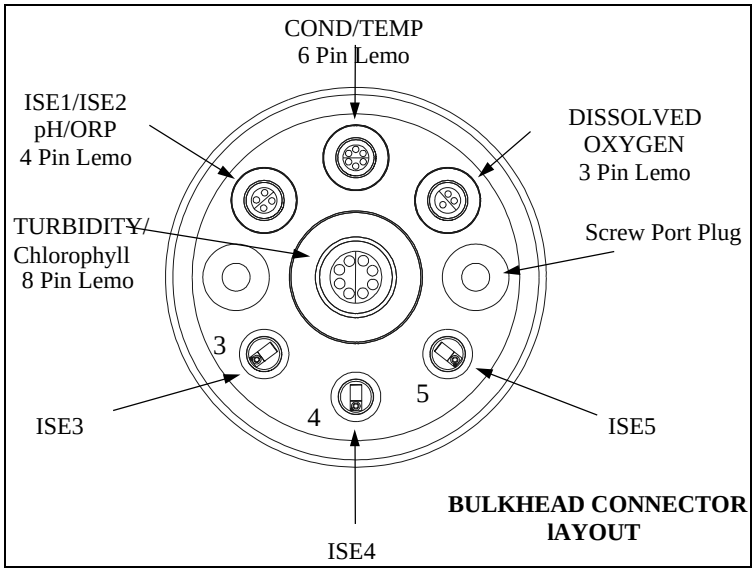
Assembly Drawing

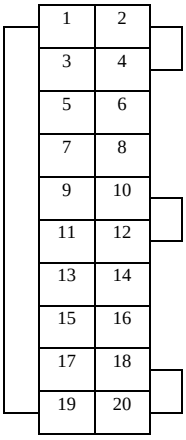
7.5 REPLACEMENT PARTS LIST

Drawing Bubble #	YSI Item Number	Description	Comments
1	068259-01	Sonde Body Assy, Shallow	Characterized Assy W/PCB & Depth Sensor
2	068259-02	Sonde Body Assy, Medium	Characterized Assy W/PCB & Depth Sensor
2	069258-3	Depth Module Assy, Shallow-vented	
3	068283	Cable Assy, Integral, 5M	
4	068284	Cable Assy, Integral, 10M	
5	068285	Cable Assy, Integral, 25M	
6	068296	Sonde Body Connector Assy	
7	118223	Sonde Body Assy, W/O Depth	
8	068251	Overlay	
9	169444	Board Assy, 6820	If depth unit, must use 068259-01 or 068259-02
10	068246	O-ring, AS 141	Bulkhead to sonde body
11	068255	Bulkhead Assy	
12	068245	O-ring	Use with 068248 screw
12 & 13	068248	Screws, O-ring	Screw with O-ring
14	065807	O-ring	Use with 065840 & 068249
15	065840	Plug, Port	W/O O-ring
14 & 15	065839	Plug Assy, Port	Includes 065840 & 065807
16	062768	O-ring	Use with 063636, 1 per
17	063636	Plug, ISE Port	Use with 062768
18	068249	Plug, Bulkhead Screw Port	
19	061673	Screw, SS, 8-32	
20	068267	Gasket, Transport Cup	2ea on units w/clear transport cup.
21	068247	O-ring, AS-229	Bulkhead to transport cup. Used with grey transport cup only.
22	062749	O-ring	Use with 062646
23	062646	Plug, Turbidity Port	W/O O-ring
24	069288	Tube, Clear, Transport Cup	Part of 069268
25	069287	Lib, Transport Cup	Part of 069268
24 & 25	069268	Kit, Clear Transport Cup	Use with wiped/unwiped Turb., Includes 068267 gasket
26	068230	Probe Guard Assy	Use with unwiped Turbidity
27	068233	Probe Guard Assy	Use with wiped Turbidity
	068275	Header, 8-pin connector	Connects Depth Assy to PCB
	068238	Bottle, Calibration	
	069301	6-Series Operations Manual, Instruction	
	062763	Connector, 20-pin, Amp	Used on Bulkhead
	062212	Connector, 4-pin, Single Row	Used on Bulkhead
	059862	O-ring	Seals Integral Cable to sonde
	065597	Desiccant Pack	

7.6 BULKHEAD WIRING DIAGRAM

		Amp Connectors			Bulkhead Connectors						
Wire Color	Description	20-pin Conn	8-pin Conn Turb.	8-pin Conn Depth	ISE 3	ISE 4	ISE 5	3-pin Lemo DO	4-pin Lemo	6 Pin Lemo Cond.	8-pin Lemo Turb.
Red	DO Cathode	1						1			
Orange	Cond. R Sense	2								2	
White	DO Anode	3						3			
Brown	Cond. R Drive	4								4	
Black	DO Excitor	5						2			
Purple	Cond. L Drive	6								3	
Yellow	Depth VSW	7		1							
Yellow	Cond. L Sense	8								1	
Black	Depth (-) Input	9		2							
Blue	Thermistor	10								5	
Orange	Depth (+) Input	11		3							
Gray	Thermistor (-)	12								6	
Gray	Depth (-) Input	13		4							
	Solution	14									
Purple	ISE-2	15							2		
Yellow	ISE-3	16			1						
Yellow	ISE-4	17				1					
Yellow	ISE-5	18					1				
White	ISE-1	19							4		
Green	ISE Reference	20							3		
Gray	Turb. LED		1								5
Red	Turb. Motor (1)		2								1
Black	Turb. Motor (2)		3								2
Orange	Turb. Temp. Comp.		4								6
Purple	Turb. VCCSW +5		5								8
Blue	Turb. VEE -5		6								4
White	Turb. GND		7								3
Brown	Turb. Input		8								7
Orange				8					1		

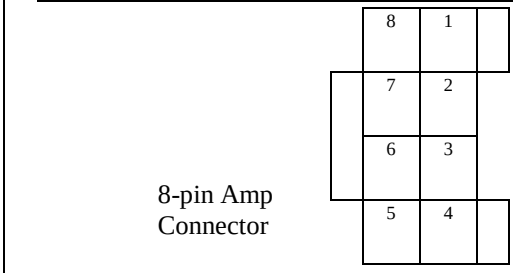




20-pin Amp Connector

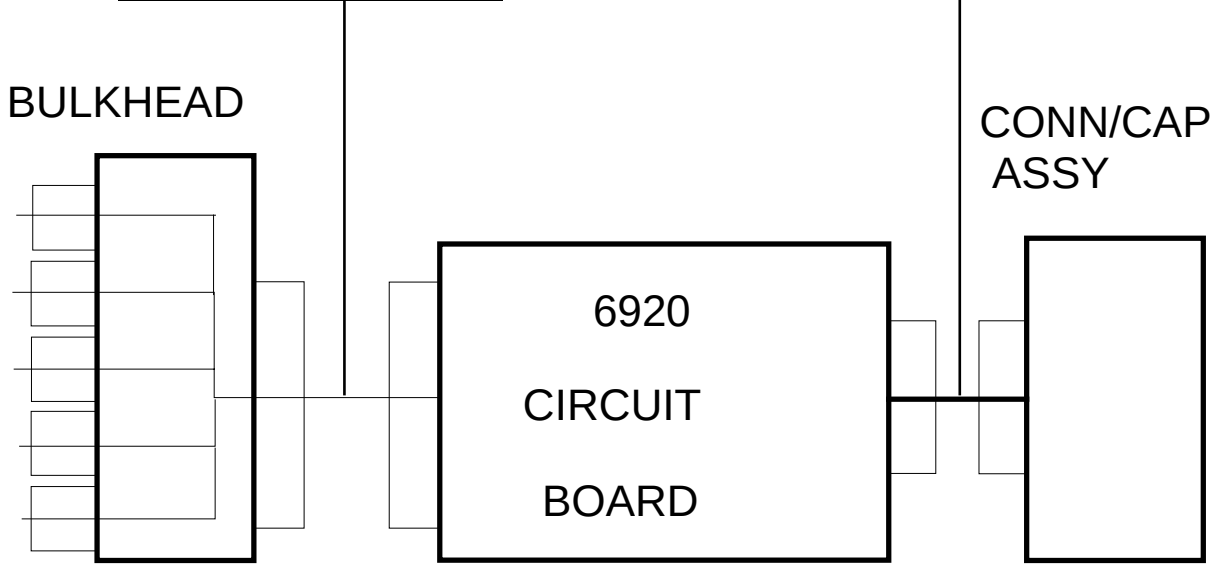
7.7 BLOCK / WIRING DIAGRAM

Internal 8-pin Amp Connector	Wire Color	Pin Description	External Cable Pin-outs DB-9	MS-4	MS-8
1	Yellow	RS232 TX	2	---	C
8	Orange	RS232 RX	3	---	D
7	Green	Alarm	---	---	E
2	Gray	RTS	---	---	G
6	Blue	CTS	---	---	H
3	Red	+ 12V DC	9	A	A
5	Black	GND	5	C	B
4	Purple	SDI-12	---	B	F
	Bare	Shield	---		B



8-pin Amp Connector

See 6820 Bulkhead Wiring Diagram.



SECTION 8 6920 SONDE

8.1 SONDE DISASSEMBLY/ASSEMBLY

When used for its intended purposes and maintained according to YSI's recommendations, the 6920 sonde assembly will rarely need internal servicing. However, if service is required and the sonde must be opened, the instructions provided below should be followed or permanent damage to the sonde may occur.

WARNINGS

Opening the sonde by non-authorized service personnel will void the warranty.

The 6920's internal printed circuit board contains static-sensitive devices. Disassemble the sonde at a static-safe workstation, or permanent damage may occur.

Do not use a screwdriver or other device to pry apart the assembly. Permanent damage may occur.

Tools Required: Phillips screwdriver, nut driver (3/8" or larger), prying block (1/2" x 3/4" x 3"), O-ring lubricant and pliers.

SONDE DISASSEMBLY

Reference the *Assembly Drawing* during this procedure.

1. Thoroughly dry the outside of the sonde using an absorbent cloth. Unscrew the sonde cap assembly and remove the batteries.
2. Remove the 4 screws than retain the connector cap assembly to the sonde tube and unplug the assembly's 8-pin connector from the board.
3. Set aside the connector cap assembly.
4. Remove the probe guard or storage cup. Thoroughly dry the outside of the sonde and probes using an absorbent cloth. Remove all of the probes.
5. Locate the Bulkhead Screw Port Plugs. See Figure 8. At the center of each plug is a tightened Phillips screw. Loosen one of the screws approximately 1/4".

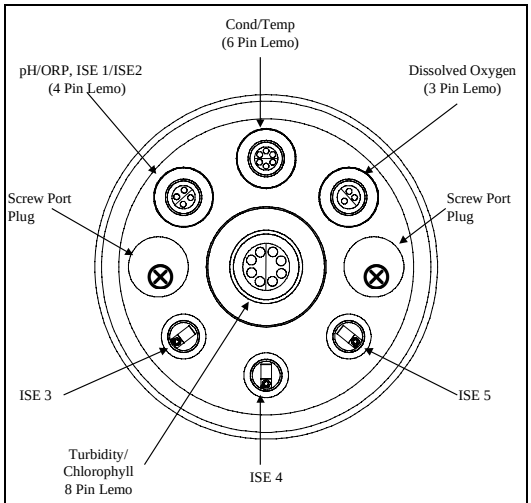


Figure 8

WARNING: Loosening the screw too far may cause damage to the plug's threads during the next step.

6. Steady the sonde tube in a vise or, while sitting, between your legs. It will take a significant amount of force to remove the bulkhead screw port plugs, so be sure that the sonde is firmly secured.

7. Position a 1/2" thick prying block and nut driver as shown in Figure 9. With the nut driver opening attached under the lip of the loosened screw, "pop" the plug from the bulkhead by applying downward pressure on the handle of the nut driver.
8. Repeat steps 5 through 7 for the second bulkhead port plug.
9. Remove both O-ring screws from the bulkhead assembly with a Phillips screwdriver.
10. Grasp the bulkhead with one hand and the sonde tube with the other hand and carefully pull the bulkhead away from the sonde tube. While pulling, a slight twisting motion of about 5 ° may assist the disassembly. Please note that considerable force may be required to separate the two parts.

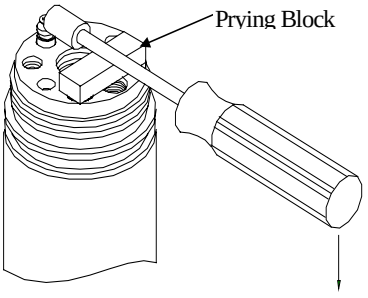


Figure 9

WARNING: Be careful, the bulkhead and depth modules are connected to the internal circuit board via wires.

11. 11 To remove the circuit board from sondes with no depth module, carefully pull the board out of the sonde tube and disconnect the 20-pin connector. Note the position of the shock mounts for the re-assembly process. Take note to the Turbidity connector located at the 8-pin connector. Remove this connector from the PCB with the pins staying in the wiring harness. **NOTE:** The 3-pin power connector will be disconnected when the PCB is out of the Sonde Tube.
12. To remove the circuit board from sondes with a depth module, carefully lay aside the bulkhead and remove the two machine screws that retain the depth module to the sonde tube. Grasp the depth module with one hand and the sonde tube with the other hand and carefully pull the depth module away from the sonde tube. Again, a slight twisting motion may assist with the disassembly. Please note that considerable force may be required to separate the two parts. Next, carefully, pull the circuit board from the sonde tube and disconnect the 20-pin connector. Note the position of the shock mounts for the re-assembly process. Take note to the Turbidity connector located at the 8-pin connector. Remove this connector from the PCB with the pins staying in the wiring harness. **NOTE:** The 3-pin power connector will be disconnected when the PCB is out of the Sonde Tube.

NOTE: Unless replacing the depth module, it is not necessary to pull the wires through the holes in the depth module. Also, see *PC Board and Depth Module Replacement*.

SONDE ASSEMBLY

1. Before assembly, inspect all O-rings and sealing surfaces for blemishes, scratches and dirt. Clean and lightly lubricate the O-rings and sealing surfaces.
2. Dry the desiccant pack in a 120^{O} F oven for 30 minutes. Re-install desiccant pack into sonde.
3. Plug the 3-pin power connector into board assembly. Plug the bulkhead wires and Turbidity wires into the board assembly. Carefully install the circuit board into the sonde tube, making sure that the shock mounts are properly positioned. If the sonde has a depth module, install the depth module assembly. While sliding board assembly into sonde tube, take care not to damage or bind the power connector and wires. NOTE: Confirm the location of the Red and Black wire on sonde tube, this will have to be noted for installation of connector cap.

Note for sondes with depth: If cables were removed from the depth module as part of the disassembly procedure, reassemble by routing the turbidity cable and the 20-pin bulkhead connector cable through holes on opposite sides of the module. Reinstall depth module.

4. Reinstall the bulkhead to the sonde tube.

WARNING: It is extremely important to properly position all of the cables so that they will not become pinched between the bulkhead, depth module or sonde tube. Failure to do so may damage the main seal, causing permanent damage to the sonde.

5. Plug in the 8-pin connector cap connector to the board. NOTE: Newer sondes have polarity markings on the connector cap. These markings have to be in line with the proper polarity from the power lines located where the bulkhead was installed (Red +, Black -). Older sondes don't have polarity markings on connector cap; therefore, don't be concerned how the connector is installed. Install the 4 screws that attach the connector cap assembly to the sonde tube. Install the cap assembly.
6. Install the O-ring screws (068248) until the O-ring just touches the bulkhead. Seat the O-ring by turning the screw an additional $1^1/_4$ turn.

WARNING: Once these screws are tightened, the bulkhead should not twist when the sonde guard or storage cup are installed or removed. If it does turn, apply more torque to the screws.

7. Clean, inspect and grease the port plug O-rings. Screw the screws from each of the port plugs, then tap both plugs into the bulkhead. **NOTE:** Make sure the screws are all the way in so the threads are not damaged.
8. Inspect and lubricate probe O-rings and sealing surfaces. Re-install probes.

8.2 PC BOARD AND DEPTH MODULE REPLACEMENT

The Model 6920 printed circuit board utilizes state-of-the-art SMT (surface mount technology) components. In the unlikely event of a component failure, YSI recommends that the entire PC board be replaced, not repaired.

NOTICE FOR SONDES WITH DEPTH: Model 6920s with depth require replacement of both the printed circuit board and depth module if either fail because they are specially characterized as a pair at the factory. See *Replacement Parts List,* Section 8.5.

WARNING: The 6920 PC board assembly contains static-sensitive devices, so always handle it at a static-free (ESD) workstation.

8.3 TEST PROCEDURE

The following procedures verify the functionality and accuracy of each of the Model 6920's measurement parameters.

EQUIPMENT REQUIRED: Model 610 display/logger or a PC with EcoWatch for Windows or PC6000 software, 10 mS/cm conductivity calibrator solution, pH buffers 4, 7 and 10, stirred temperature bath with 0.1°C accuracy, 100% argon/nitrogen gas or a sodium sulfite Na_2SO_3 solution, Zobell solution, ammonium 100 mg/L standard, nitrate 100 mg/L standard, turbidity 10 NTU standard, 1000 mg/L chloride standard, acridine orange, and a tape measure.

PRE-TEST

- If necessary, make repairs to the system. Perform all routine probe and sonde maintenance before testing. See *Troubleshooting* and *Maintenance*, Sections 2 and 3.
- Calibrate the Model 6920 DO, pH, depth, turbidity, chlorophyll, ammonium, chloride and nitrate parameters using procedures described in the *Calibration Section* of the 6-Series Operations Manual.
- Do not calibrate conductivity unless necessary. Under normal circumstances, cleaning the conductivity sensor will restore the system to normal operation.
- You need not remove the sonde guard to perform the tests described below unless you use the sonde transport cup to hold standard solutions. To prevent carryover between tests, rinse the sonde thoroughly in water, shake the excess off and out of the sonde. Dry the sonde's outside surfaces.
- The pH probe is also the reference for the other ISE probes. Thus, the pH probe must be within specifications or the readings from the other ISEs will be affected.
- Under Report setup in the 6920 Main Menu, turn on the millivolt reading for the ISEs being tested.

pH TEST

1. Put the 6920 in Run mode with pH millivolt Report setting activated.
2. Place the 6920 in pH 4 buffer and allow to stabilize.
3. Within 2 minutes the readings should be between 3.9 - 4.1 pH units and 150 to 210 mV.
4. Rinse thoroughly and place the 6920 in pH 10 buffer. Allow time for readings to stabilize.
5. Within 2 minutes the readings should be between 9.9 - 10.1 pH units and -150 to -210 mV.
6. Rinse thoroughly and place the 6920 in pH 7 buffer. Allow time for readings to stabilize.
7. Within 2 minutes the readings should be between 6.9 - 7.1 pH units and -30 to 30 mV.

CONDUCTIVITY TEST

1. Place the 6920 in 10 mS/cm conductivity calibrator solution. Move the 6920 up and down in the solution to remove trapped bubbles. Continue to move the sonde until the readings stabilize.
2. The reading should be within 5 % of the standard value. Errors could be the result of bubbles in the cell, low solution level or the need for cell cleaning. See *Troubleshooting*, Section 2.

TEMPERATURE TEST

1. Place the 6920 in a well-stirred bath of a known temperature, preferably between 20 ^{o}C and 30 ^{o}C.
   The 6920 should read within ± 0.25 ^{o}C of the standard.

OXYGEN TEST

1. Test the oxygen response time and zero oxygen offset by placing the DO sensor in a zero oxygen environment after being calibrated/run in a 100% saturated environment. To establish zero oxygen, surround the DO sensor with argon gas, nitrogen gas or sodium sulfite solution.
2. The dissolved oxygen reading should read < 2% in 3 - 5 minutes.
3. Rinse the sonde.

ORP TEST

1. Go to the ORP calibrate mode.
2. Type “uncal”.
3. Place the 6920 ORP electrode in Zobell solution and note the temperature.
4. The millivolt reading should be within ±50 mV of the value in chart for Zobell solution (millivolts versus temperature).
5. Re-calibrate if required.
6. Rinse the sonde.

NITRATE TEST

1. Place the 6920 in 100 mg/L Nitrate standard. The reading should be 100 ± 10 mg/L with a 40 ± 25 mV indication.
2. Rinse the sonde.

AMMONIUM TEST

1. Place the 6920 in 100 mg/L Ammonium standard. The reading should be 100 ± 10 mg/L with a 110 ± 50 mV indication.
2. Rinse the sonde.

CHLORIDE

1. Place the 6920 in 1000 mg/L chloride standard. The reading should be 1000 ± 150 mg/L with a 100 ± 50 mV indication.
2. Rinse the sonde.

TURBIDITY

1. Place the 6920 in 10 NTU Turbidity standard. The reading should be 8 to 12 NTU.
2. Rinse the sonde.
3. Rotate wiper. It should park 150 to 210 degrees from the optics.

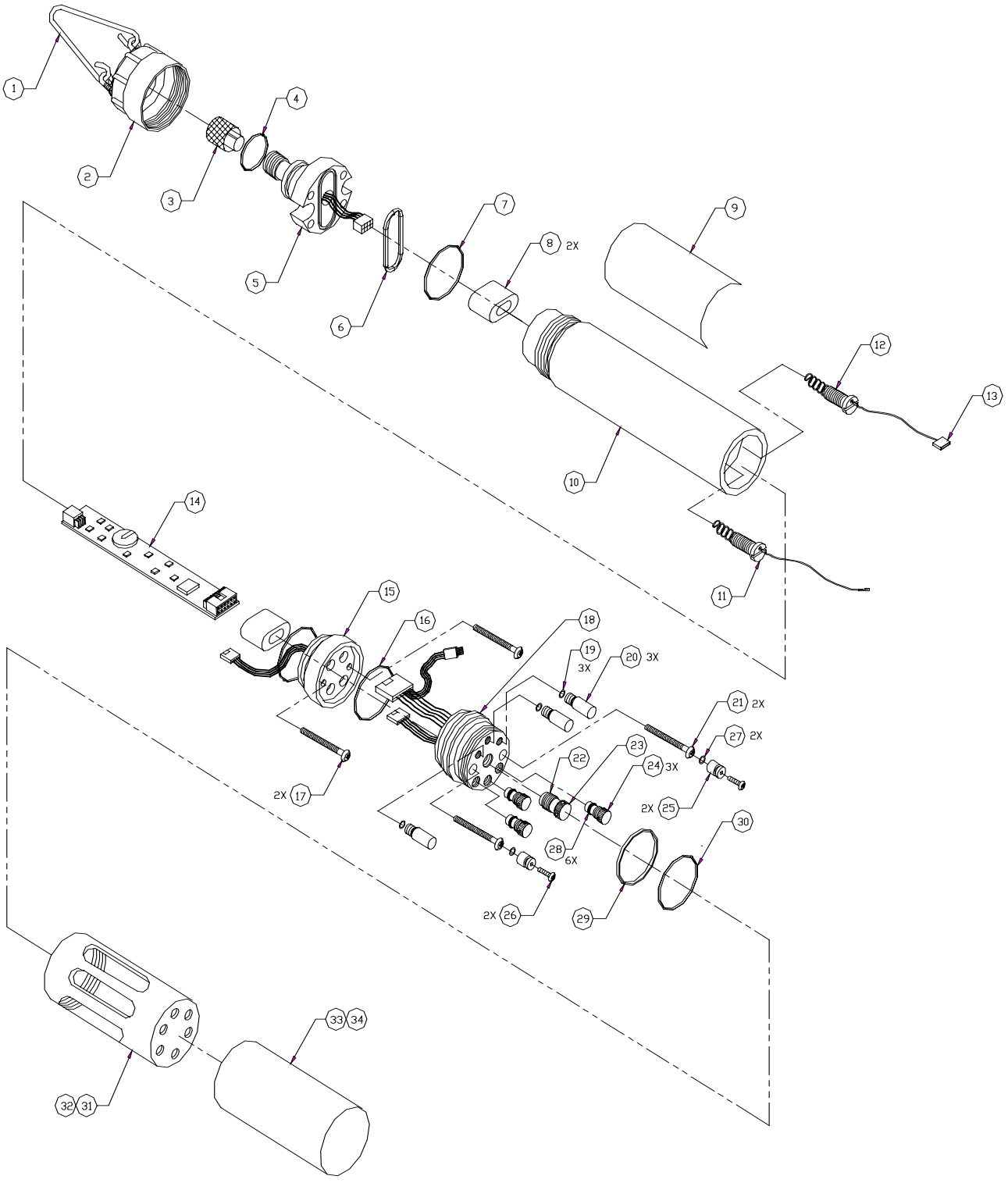
DEPTH

1. Stretch out the 6920 cable.
2. Hold the end of a tape measure to the top hole in the depth module plug. The depth plug is located on the side of the sonde tube.
3. Stretch the tape measure along the cable.
4. For sondes with shallow depth capability, place a piece of waterproof tape at 15 feet. For medium depth capability, place a piece of waterproof tape at 50 feet.
5. Lower the 6920 into still water until the tapeline on the cable reaches the water’s surface. Check the readings. Shallow sensors should read 15 ± .06 feet. Medium depth sensors should read 50 ± .4 feet.

CHLOROPHYLL

1. Calibrate according to the calibration procedures in the YSI 6-Series Operations Manual. If no error messages appear, the probe should be assumed to be linear.
2. Make sure the wiper rotates and parks between 150 and 210 degrees from the optics.

8.4 SONDE EXPLODED VIEWS



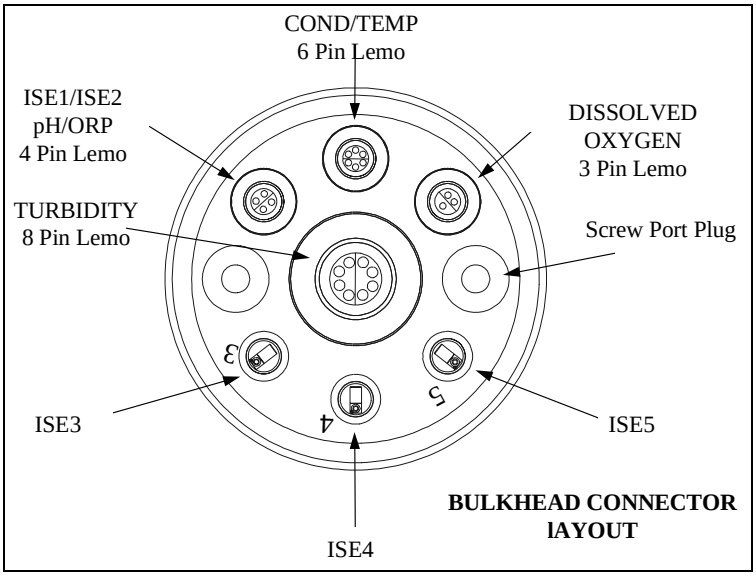
Assembly Drawing

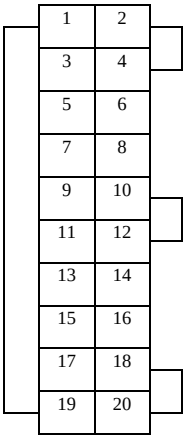
8.5 REPLACEMENT PARTS LIST

Drawing Bubble #	YSI Item Number	Description	Comments
1	062647	Bail	Eye screws separate, 062688
2	119256	Cap Assy, Sonde	Includes bail
3	063089	Pressure Cap Assembly	
4	062687	O-ring	
5	119277	Connector, Cap Assembly, Vented	
5	119254	Connector Cap Assembly	
6	069239	O-ring	
7	068247	O-ring	
8	069236	Shock Mount	Retain circuit board
9	069214	Overlay, 6920	Self adhesive
10	069230	Sonde Tube	
11	119252	Battery Terminal, Red	
12	119253	Battery Terminal, Black	
13	061732	Connector, Plug, 3 Cond.	
14	169444	Circuit Board Assy	If replaced in a unit with depth, must use item 069258-1, 2 or 3.
15	069258-1	Depth Module Assy, Shallow	Characterized with circuit board
15	069258-2	Depth Module Assy, Medium	Characterized with circuit board.
15	069258-3	Depth Module Assy, Shallow, Vented	Characterized with circuit board.
16	068246/ 068244	O-ring, If no depth module, use 068244	
17	069264	Screw, Mach, 10-24, TRS	
18	068255	Bulkhead Assy	
19	062768	O-ring	Use with 063636, 1 per
20	063636	Plug, ISE Port	Use with 062768
21	068248	Screw, O-ring	Screw with O-ring
22	062749	O-ring	Use with 062646
23	062646	Plug, Turbidity Port	Without O-ring
24	065839	Plug Assy, Port	Includes 065807 O-ring
25	068249	Plug, Bulkhead Screw Port	
26	061673	Screw, SS, 8-32	
27 & 28	065807	O-ring	Use with 065839 & 068249
29	068267	Gasket	
30	068247	O-ring, AS-229	Bulkhead to transport cup
31	068230	Probe Guard Assy, Short	Use with unwiped Turbidity
32	068233	Probe Guard Assy, Long, Std	Use with wiped Turbidity
33 & 34	069268	Kit, Clear Transport/Cal Cup	With 069288, 069287 & 068267
33	069288	Tube, Clear Transport Cup	Use with wiped or unwiped Turb.
34	069287	Lid, Clear Transport Cup	Use with wiped or unwiped Turb.
	062212	Connector, 4-pin, Single Row	Used on Bulkhead
	062763	Connector, 20-pin, Amp	Used on Bulkhead
	065597	Desiccant Pack	
	068238	Bottle, Calibration	
	068245	O-ring	Use with 068248 screw
	069301	6-Series Operations Manual	

8.6 BULKHEAD WIRING DIAGRAM

		Amp Connectors			Bulkhead Connectors						
Wire Color	Description	20-pin Conn	8-pin Conn Turb.	4-pin Conn Depth	ISE 3	ISE 4	ISE 5	3-pin Lemo DO	4-pin Lemo	6 Pin Lemo Cond.	8-pin Lemo Turb.
Red	DO Cathode	1						1			
Orange	Cond. R Sense	2								2	
White	DO Anode	3						3			
Brown	Cond. R Drive	4								4	
Black	DO Excitor	5						2			
Purple	Cond. L Drive	6								3	
Yellow	Depth VSW	7		1							
Yellow	Cond. L Sense	8								1	
Black	Depth (-) Input	9		2							
Blue	Thermistor	10								5	
Orange	Depth (+) Input	11		3							
Gray	Thermistor (-)	12								6	
Gray	Depth (-) Input	13		4							
	Solution	14									
Purple	ISE-2	15							2		
Yellow	ISE-3	16			1						
Yellow	ISE-4	17				1					
Yellow	ISE-5	18					1				
White	ISE-1	19							4		
Green	ISE Reference	20							3		
Gray	Turb. LED		1								5
Red	Turb. Motor (1)		2								1
Black	Turb. Motor (2)		3								2
Orange	Turb. Temp. Comp.		4								6
Purple	Turb. VCCSW +5		5								8
Blue	Turb. VEE -5		6								4
White	Turb. GND		7								3
Brown	Turb. Input		8								7
Orange									1		

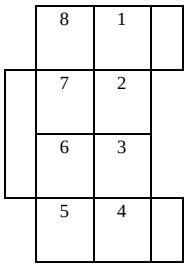




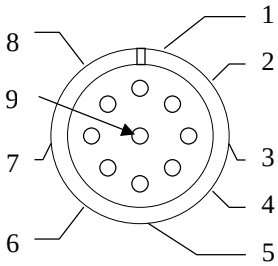
20-pin Amp Connector

8.7 BLOCK / WIRING DIAGRAM

Internal 8-pin Amp Connector	Wire Color	Pin Description	Ext. Sonde Connector	External Cable Pinouts DB-9	MS-4	MS -8
1	Yellow	RS232 TX	Pin 3	2	---	C
8	Orange	RS232 RX	Pin 7	3	---	D
7	Green	Alarm	Pin 5	---	---	E
2	Gray	RTS		---	---	G
6	Blue	CTS		---	---	H
3	Red	+ 12V DC	Pin 8	9	A	A
5	Black	GND	Pin 6	5	C	B
4	Purple	SDI-12	Pin 2	---	B	F
	Bare	Shield		---		B

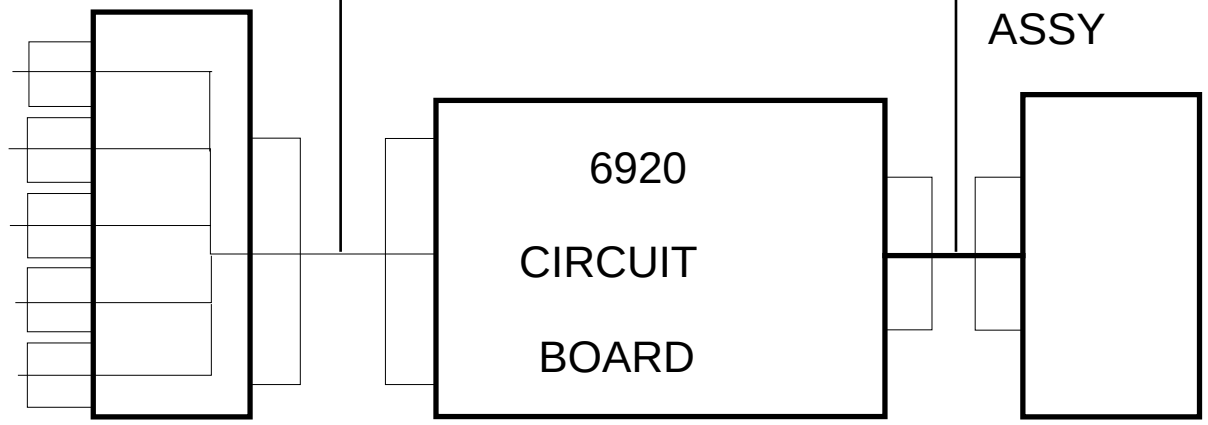


8-pin Amp Connector



Ext. Sonde Connector

See 6920 Bulkhead Wiring Diagram.



SECTION 9 6600 SONDE

9.1 SONDE DISASSEMBLY/ASSEMBLY

When used for its intended purposes and maintained according to YSI's recommendations, the 6600 sonde assembly will rarely need internal servicing. However, if service is required and the sonde must be opened, the instructions provided below should be followed or permanent damage to the sonde may occur.

WARNING

Opening of the sonde by non-authorized service personnel will void the warranty.

The 6600's internal Printed Circuit Board contains static-sensitive devices. Disassemble the sonde at a static-safe workstation, or permanent damage may occur.

Do not use a screwdriver or other device to pry apart the assembly or permanent damage may occur.

Tools required: 9/64" hex wrench, small standard screwdriver, lint free cloth, and stopcock grease

9.2 PC BOARD AND DEPTH MODULE REPLACEMENT

The Model 6600 printed circuit board utilizes state-of-the-art SMT (surface mount technology). In the unlikely event of a component failure, YSI recommends that the entire PC board be replaced, not repaired.

Notice for sondes with depth: Model 6600s with depth require replacement of both the printed circuit board and depth module if either fail because they are specially characterized as a pair at the factory. For disassembly procedures see Section 9.2, *Sonde Disassembly /Assembly.*

Warning: The 6600 PC board assembly contains static-sensitive components, so always handle it at a static-free (ESD) workstation.

DISASSEMBLY PROCEDURE

Reference the *Assembly Drawing* during this procedure.

1. Thoroughly dry the outside of the sonde using an absorbent cloth. Install the sensor guard to protect probes.
2. With a 9/64" hex wrench, remove the two 8-32 cap screws located at the end of the sonde tube closest to the bulkhead. If the sonde has a depth module, these screws will allow the depth module to separate from the sonde tube.
3. Grasp the sonde tube with one hand and the bulkhead with the other hand. Carefully, twist the two sections about 5 - 10 ° while pulling them apart. Extreme care must be exercised when the two parts separate so those internal components are not damaged.
4. Disconnect the 20-pin and 8-pin Amp connectors from the printed circuit board. For sondes with vented level, use a small screwdriver to pry the pressure tube off of the depth module nipple. The bulkhead assembly is now detached from the rest of the assembly. If a depth module is present, it can remain attached to the bulkhead. See the next section, *Depth Module Removal.*
5. Remove the two 8-32 cap screws that attach the sonde tube to battery compartment assembly.

6. Grasp the sonde tube with one hand and the battery compartment assembly with the other hand. Carefully, twist the two sections about 5-10 ° while pulling them apart. Extreme care must be exercised when the two parts separate so those internal components are not damaged.
7. The printed circuit board can be removed from the battery compartment by disconnecting the 3-pin and 8-pin Amp connectors.

Note for units with depth or level: Unless replacing the depth module or bulkhead, it is not necessary to separate the two. See *Depth Module Removal*.

DEPTH MODULE REMOVAL (SONDES WITH DEPTH ONLY)

If separation of the depth module and bulkhead is necessary, the following instructions should be followed.

1. Remove the two 8-32 cap screws that attach the depth module to the bulkhead. See *Figure 10*.
2. Grasp the depth module with one hand and the bulkhead assembly with the other hand. Carefully, separate the two sections by twisting the two sections about 5-10 ° while pulling them apart. Extreme care must be exercised when the two parts separate so those internal components are not damaged.

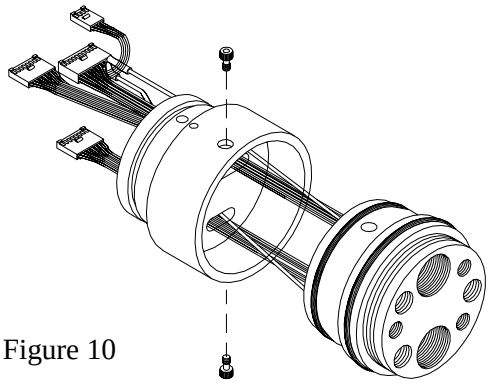


Figure 10

3. Disconnect the 4-pin Amp connector that connects the depth module to the bulkhead 20-pin connector. Guide the bulkhead wires/connectors through the two depth module holes.

Note: Sondes with depth. The depth module and printed circuit board must be replaced as an entire assembly. See *PC Board and Depth Module Replacement.*

ASSEMBLY PROCEDURE

Reference the *Assembly Drawing* during this procedure.

Before assembly, inspect all O-rings and sealing surfaces for blemishes, scratches and dirt. If necessary, clean with a lint free cloth and isopropyl alcohol. O-rings and sealing surfaces should be lightly lubricated with stopcock grease. Also, the desiccant pack should be dried at 120 ^{o}F for 30 minutes prior to assembly.

Warning: It is extremely important to properly position all cables/wires so that they will not become pinched between the bulkhead, depth module or sonde tube. Failure to do so may compromise a main seal, causing permanent damage to the sonde.

PC BOARD INSTALLATION

1. Carefully, install a shock mount onto the board by slipping it over the end of the board and sliding it into location between the PCB's 3-pin connector and the PCB's battery. See *Figure 11*
2. Plug the 8-pin connector from the battery compartment and the 3-pin Amp connector from the battery terminal leads into their proper locations on the top of the board.
3. Position the PCB w/ shock mount on the battery compartment as shown figure 11.

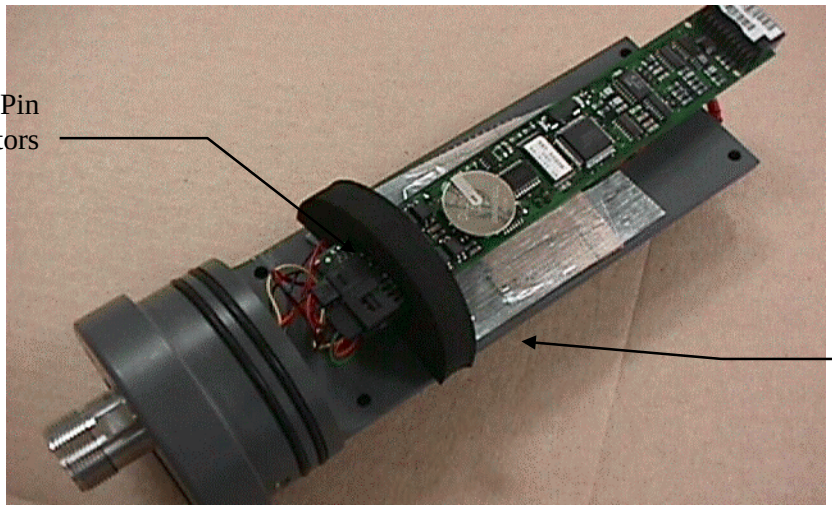


Figure 11

4. Lightly lubricate the installed O-rings on the battery compartment.
5. Insert the battery compartment with connected board and shock mount into the sonde tube; do so in the end of the tube that is labeled with the battery label.

WARNINGS: When assembling a VENTED battery compartment, be sure the vent tube is not damaged or pinched.

When inserting the battery compartment, be sure that the side of the compartment where batteries are installed lines up directly with the battery label on the sonde tube.

6. Secure the battery compartment to the sonde tube with two 8-32 Cap Screws (062690).

DEPTH MODULE INSTALLATION: (SONDES WITH DEPTH ONLY)

If the depth module was separated from the bulkhead as part of the disassembly procedure follow the procedure below to re-assemble.

1. Lightly lubricate the outer O-rings of both the depth module and the bulkhead.
2. Pass the Amp connectors through the oval slots in the depth module in the following order:
   Pass the 8-pin chlorophyll connector of the bulkhead through one of the oval slots.
   Pass the 4-pin depth connector of the bulkhead through the same slot.

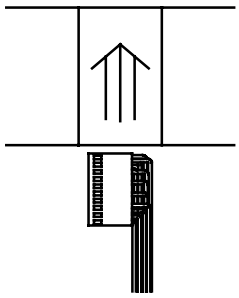


Figure 12

Pass the 20-pin connector through the same slot as the depth connector. The 20-pin must be passed through length-wise, so rotate it 90 °. See figure 12.
Pass the 8-pin turbidity connector of the bulkhead through the other slot.

3. Insert the bulkhead into the depth module while slowly rotating the bulkhead 5-10 ° until it is both fully seated and the bulkhead's threaded inserts align with the holes in the module. See figure 10.
4. Secure the bulkhead to the depth module with two 8-32 Cap Screws (062690).

BULKHEAD/DEPTH MODULE ASSEMBLY TO SONDE TUBE

1. Reach into the sonde tube and grab the PCB by the edges. Pull the board toward the bottom of the sonde tube. Allow the board to protrude ONLY 1" out from the end of the sonde tube.

Warning: DO NOT unplug the board from the battery compartment

2. Install a shock mount onto the board by slipping it over the end of the board and sliding it into location just beyond the 8-pin turbidity connector so that the connector is visible.
3. Plug the 8-pin turbidity connector from the bulkhead onto the PCB, at the proper location, with the two nubs facing away from the board. Do not install the chlorophyll connector.

Note: The turbidity connector has white and black wires.

4. Plug the 20-pin connector from the bulkhead into the PCB at the proper location. Be sure it is fully seated.
5. Skip to step #7 if sonde does not have depth. Plug the 4-pin Amp connector from the bulkhead onto the 4-pin header coming from the depth module. Make sure the wires match colors (Yellow to Yellow, Black to Black, Etc.). Tuck the 4-pin depth connectors into the sonde tube.
6. If your unit is NOT a vented depth unit then skip to step (7). If the depth module is vented, then push the vent tube of the battery compartment onto the fitting of the depth module. Be sure the vent tube is fully seated against the flange of the fitting and that no holes are present.
7. Position the shock mount (the last one installed), so that it will be sandwiched between the battery compartment and the sonde tube, similar to the first shock mount. It is shaped to fit this area.
8. Slide the PCB completely into the sonde tube and gather the wires from the bulkhead so they will not be pinched. Be sure to tuck the 8-Pin Chlorophyll cable assembly into the sonde tube.

Warning: When attaching the depth module to the sonde tube, be sure the vent tube is not being pinched.

9. Insert the depth module (with bulkhead) or bulkhead into the sonde while slowly rotating them 5-10 ° until they are both fully seated and the module's threaded inserts align with the holes in the sonde tube.
10. Secure the depth module or bulkhead to the sonde tube with two 8-32 Cap Screws (062690).

BATTERY COMPARTMENT CLOSING

1. Lightly lubricate the O-ring on the outside of the battery cover. DO NOT lubricate the internal O-ring (066273). See figure 13.
2. Secure the battery cover to the battery compartment using two Cap Screws. Be sure to tighten down completely, but do not over-tighten. The cover should be slightly below the top of the battery compartment.

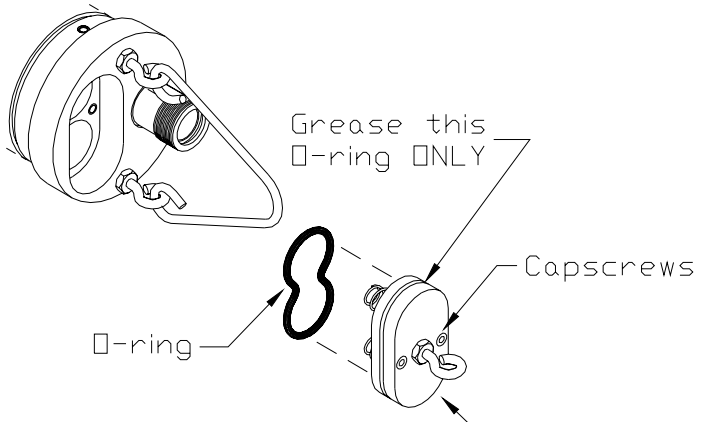


Figure 13

9.3 TEST PROCEDURES

The following procedures verify the functionality and accuracy of each of the Model 6600's measurement parameters.

EQUIPMENT REQUIRED: Model 610 display/logger or a PC with EcoWatch for Windows or PC6000 software, 10 mS/cm conductivity calibrator solution, pH buffers 4, 7 and 10, stirred temperature bath with 0.1°C accuracy, 100% argon/nitrogen gas or a sodium sulfite Na_2SO_3 solution, Zobell solution, ammonium 100 mg/L standard, nitrate 100 mg/L standard, turbidity 10 NTU standard, 1000 mg/L chloride standard, acridine orange, and a tape measure.

PRE-TEST

- If necessary, make repairs to the system. Perform all routine probe and sonde maintenance before testing. See *Troubleshooting* and *Maintenance*, Sections 2 and 3.
- Calibrate the Model 6600 DO, pH, turbidity, chlorophyll, chloride, nitrate, and depth parameters using procedures described in the *Calibration Section* of the 6-Series Operations Manual.
- Do not calibrate conductivity unless necessary. Under normal circumstances, cleaning the conductivity sensor will restore the system to normal operation.
- It is not necessary to remove the sonde guard to perform the tests described below. To prevent carryover between tests, rinse the sonde thoroughly in water, shake the excess off and out of the sonde. Dry the sonde's outside surfaces.
- The pH probe is also the reference for the other ORP sensor. Thus, the pH probe must be within specifications or the ORP readings may be affected.
- Under "Report Setup" in the 6600 main menu, turn on the millivolt reading for the ISEs (pH and/or ORP) being tested.

pH TEST

1. Put the 6600 in **Run** mode with pH millivolt **Report** setting activated.
2. Place the 6600 in pH 4 buffer and allow to stabilize.
3. Within 2 minutes the readings should be between 3.9 - 4.1 pH units and 150 to 210 mV.
4. Rinse thoroughly and place the 6600 in pH 10 buffer. Allow time for readings to stabilize.
5. Within 2 minutes the readings should be between 9.9 - 10.1 pH units and -150 to -210 mV.
6. Rinse thoroughly and place the 6600 in pH 7 buffer. Allow time for readings to stabilize.
7. Within 2 minutes the readings should be between 6.9 - 7.1 pH units and -30 to 30 mV.

CONDUCTIVITY TEST

1. Place the 6600 in 10 mS/cm conductivity calibrator solution. Move the 6600 up and down in the solution to remove trapped bubbles. Continue to move the sonde until the readings stabilize.
2. The reading should be within 5% of the standard value. Errors could be the result of bubbles in the cell, low solution level or the need for cell cleaning. See *Troubleshooting,* Section 2.

TEMPERATURE TEST

1. Place the 6600 in a well-stirred bath of a known temperature, preferably between 20°C and 30°C.
2. The 6600 must read within ± .25°C of the standard.

OXYGEN TEST

1. Test the oxygen response time and zero oxygen offset by placing the DO sensor in a zero oxygen environment after being calibrated/run in a 100% saturated environment. To establish zero oxygen, surround the DO sensor with argon gas, nitrogen gas or sodium sulfite solution.
2. The dissolved oxygen reading should read < 2% in 3 - 5 minutes.
3. Rinse the sonde.

NITRATE TEST

3. Place the 6920 in 100 mg/L Nitrate standard. The reading should be 100 ± 10 mg/L with a 40 ± 25 mV indication.
4. Rinse the sonde.

AMMONIUM TEST

3. Place the 6920 in 100 mg/L Ammonium standard. The reading should be 100 ± 10 mg/L with a 110 ± 50 mV indication.
4. Rinse the sonde.

CHLORIDE

3. Place the 6920 in 1000 mg/L chloride standard. The reading should be 1000 ± 150 mg/L with a 100 ± 50 mV indication.
4. Rinse the sonde.

TURBIDITY

4. Place the 6920 in 10 NTU Turbidity standard. The reading should be 8 to 12 NTU.
5. Rinse the sonde.

6. Rotate wiper. It should park 150 to 210 degrees from the optics.

ORP TEST

1. Go to the ORP calibrate mode.
2. Type “uncal”.
3. Place the 6600 ORP electrode in Zobell solution and note the temperature.
4. The millivolt reading should be within ±50 mV of the value in the Millivolt versus Temperature Chart for Zobell solution.
5. Re-calibrate if required.
6. Rinse the sonde.

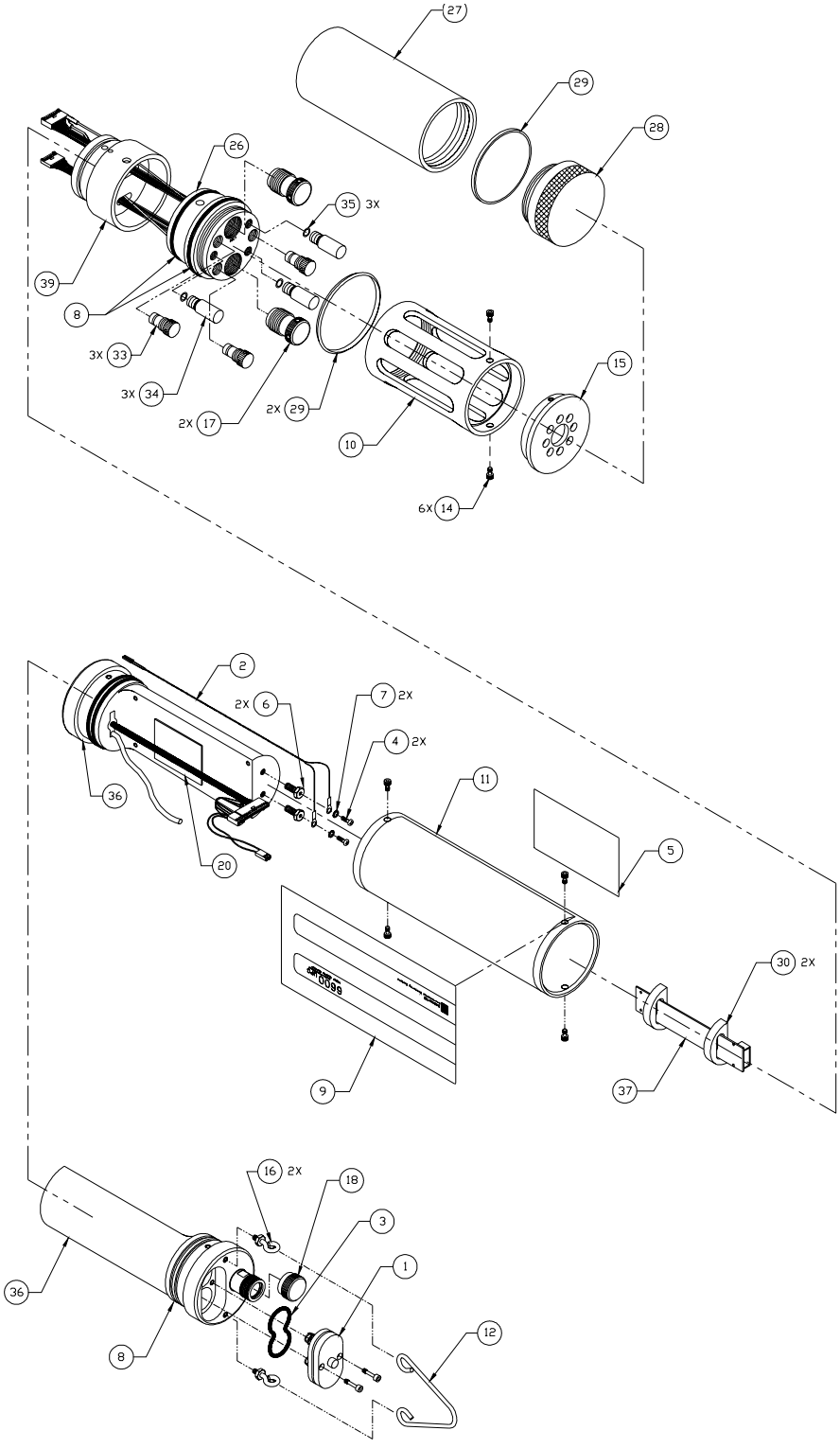
DEPTH

1. Stretch out the 6600 cable.
2. Hold the end of a tape measure to the top hole in the depth plug. The depth plug is located on the side of the depth module.
3. Stretch the tape measure along the cable.
4. For sondes with shallow depth capability, place a piece of waterproof tape at 15 feet. For medium depth capability, place a piece of waterproof tape at 50 feet.
5. Lower the 6600 into still water until the tapeline on the cable reaches the water’s surface. Check the readings. Shallow sensors should read 15 ± .06 feet. Medium depth sensors should read 50 ± .4 feet.

CHLOROPHYLL

3. Calibrate according to the calibration procedures in the YSI 6-Series Operations Manual. If no error messages appear, the probe should be assumed to be linear.
4. Make sure the wiper rotates and parks between 150 and 210 degrees from the optics.

9.4 SONDE EXPLODED VIEWS



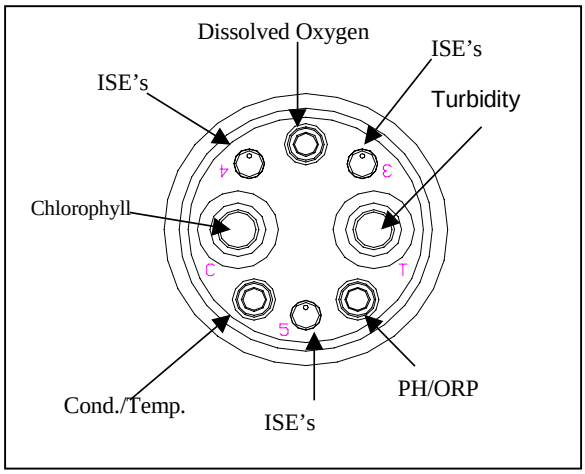
Assembly Drawing

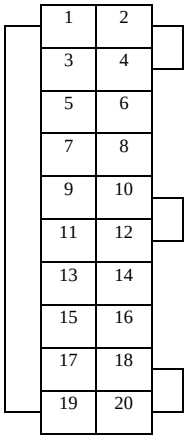
9.5 REPLACEMENT PARTS LIST

Drawing Bubble #	YSI Item Number	Description	Comments
1	116003	Battery Cover Assy	With 062630 O-ring
2	116273	Power Cable Assy	
3	066273	O-ring, Battery Compartment, Square	
4	001740	Screw, 6-32	
5	062697	Label, Battery	
6	062635	Battery Terminal	
7	002670	Washer, Lock, #6	
8	062651	O-ring, 2.862D	Sonde tube seal
9	066264	Overlay, 6600	
10	066263	Guard, Sensor	
11	062644	Sonde Tube	
12	062647	Bail	
14	062690	Cap Screw, 8-32	
15	062678	End Plate, Sensor Guard	
16	062688	Eye Screw, Modified	
17	062698	Port Plug Assy, Turbidity, Chlor, Turb.	
18	063089	Pressure Cap	
20	065597	Desiccant Pack	
26	066279	Bulkhead Assy, 6600	With or w/o depth
27	066267	Tube, Clear Transport Cup	
28	066272	Cap, Transport Cup	
29	066266	Gasket, Bulkhead	
30	066265	Shock Mount, PCB	2 ea., Retain circuit board
33	065839	Port Plug Assy	With 065807 O-ring
34	063636	Port Plug	Use with 062768 O-ring
35	062768	O-ring	
36	116269	Battery Compartment, Non-vented	With 116273 power cable and 062635 terminals
36	116270	Battery Compartment, Vented	With 116273 power cable and 062635 terminals
37	169444	Printed Circuit Board Assy, 6600	Units with depth, must use Depth Module Assy
39	116242	Depth Module Assy, Non-vented, Shallow	Calibrated w/PCB
39	116243	Depth Module Assy, Non-vented, Medium	Calibrated w/PCB
39	116244	Depth Module Assy, Non-vented, Deep	Calibrated w/PCB
39	116245	Depth Module Assy, Vented, Shallow	Calibrated w/PCB
	006570	Maintenance Kit	
	116274	Cal Cup Kit	Includes 066267, 066272 & 066266

9.6 BULKHEAD WIRING DIAGRAM

		Amp Connectors				Bulkhead Connectors							
Wire Color	Description	20-pin Conn	8-pin Conn Turb.	8-pin Conn Chlor	4-pin Conn Depth	ISE 3	ISE 4	ISE 5	3-pin Lemo DO	4-pin Lemo	6 Pin Lemo Cond.	8-pin Lemo Turb.	8-pin Lemo Chlor.
Red	DO Cathode	1							1				
Orange	Cond. R Sense	2									2		
White	DO Anode	3							3				
Brown	Cond. R Drive	4									4		
Black	DO Excitor	5							2				
Purple	Cond. L Drive	6									3		
Yellow	Depth VSW	7			1								
Yellow	Cond. L Sense	8									1		
Black	Depth (-) Input	9			2								
Blue	Thermistor	10									5		
Orange	Depth (+) Input	11			3								
Gray	Thermistor (-)	12									6		
Gray	Depth (-) Input	13			4								
	Solution	14											
Purple	ISE-2	15								2			
Yellow	ISE-3	16				1							
Yellow	ISE-4	17					1						
Yellow	ISE-5	18						1					
White	ISE-1	19								4			
Green	ISE Reference	20								3			
Gray	Turb. LED		1									5	
Red	Turb. Motor (1)		2									1	
Black	Turb. Motor (2)		3									2	
Orange	Turb. Temp. Comp.		4									6	
Purple	Turb. VCCSW +5		5									8	
Blue	Turb. VEE -5		6									4	
White	Turb. GND		7									3	
Brown	Turb. Input		8									7	
Orange										1			
Green	Chlorophyll			1									5
Brown	Chlorophyll			2									1
Red	Chlorophyll			3									2
Blue	Chlorophyll			4									6
Gray	Chlorophyll			5									8
Yellow	Chlorophyll			6									4
Orange	Chlorophyll			7									3
Purple	Chlorophyll			8									7

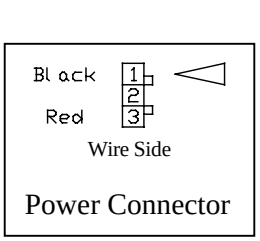




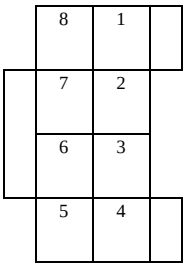
20-Pin Amp Connector

9.7 BLOCK / WIRING DIAGRAM

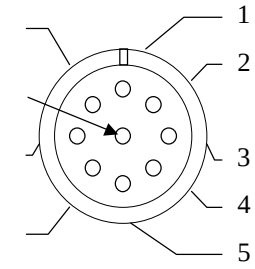
Internal 8-pin Amp Connector	Wire Color	Pin Description	Ext. Sonde Connector	External Cable Pinouts DB-9	MS-4	MS -8
1	Yellow	RS232 TX	Pin 3	2	---	C
8	Orange	RS232 RX	Pin 7	3	---	D
7	Green	Alarm	Pin 5	---	---	E
2		Not used		---	---	
6		Not used		---	---	
3	Red	+ 12V DC	Pin 8	9	A	A
5	Black	GND	Pin 6	5	C	B
4	Purple	SDI-12	Pin 2	---	B	F
	Bare	Shield		---		B



Power Connector

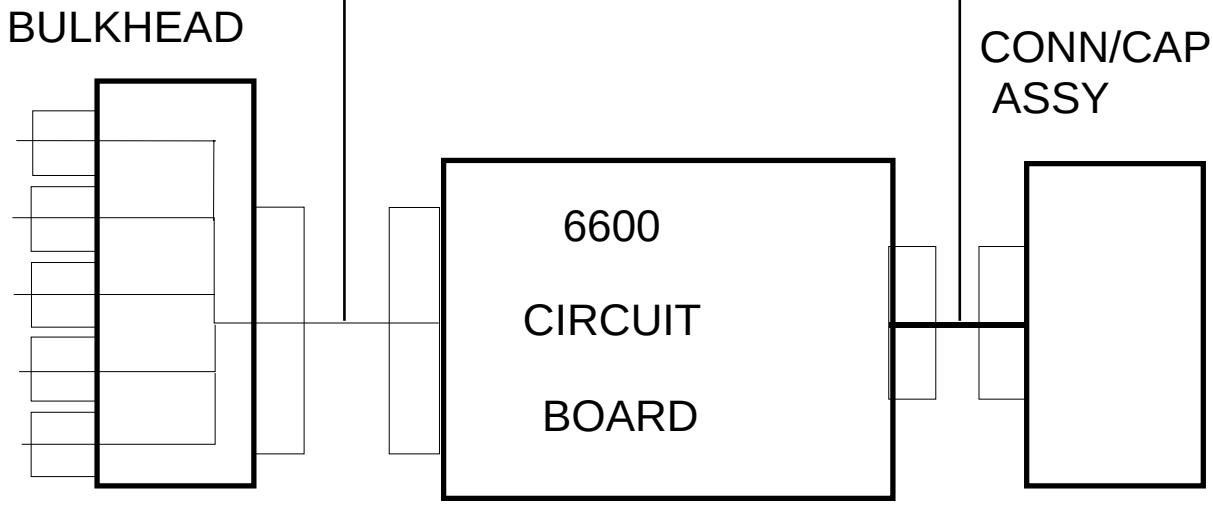


Wire Side
8-pin Amp Connector



Ext. Sonde Connector

See Bulkhead Wiring Diagram.



SECTION 10 6500 PROCESS MONITOR

10.1 DISASSEMBLY/ASSEMBLY OF 6500 MONITOR

When used for its intended purposes and maintained according to YSI's recommendations, the 6500 will rarely require service. However, if service is required or the instrument must be opened, the instructions provided below, used in conjunction with the *Assembly Drawing*, should be used during this procedure.

WARNINGS!

Opening the 6500 by non-authorized service personnel may void the warranty. The 6500's internal printed circuit board contains static-sensitive devices.

Disassemble following ESD (Electro-Static Discharge) safe guidelines, or permanent damage may occur.

Do not use a screwdriver or other device to pry apart the assembly or permanent damage may occur.

Tools required: Slotted screwdriver and 5/32" hex key.
Front Panel and Display Board Removal

1. Shut off AC power to the 6500 Monitor.
2. If wet, thoroughly dry the outside of the 6500 using an absorbent cloth.
3. Loosen the four slotted screws positioned at the corners of the Front Panel Assembly.
4. Carefully, remove the Front Panel Assembly. Do not use a prying tool, bare hands should be sufficient.

The Display I/O Cable is long enough to allow the Display PCB Assembly to be moved aside while work is performed, or can be unplugged from the Display PCB Assembly for easy board removal or replacement.

- The Display PCB Assembly can be separated from the Front Panel Assembly by removing the 4 slotted screws located on the back corner of the Display PCB Assembly.
- The Display Module Assembly can be removed from the display PCB Assembly by removing the 4 slotted screws located on the back corner of the Display Module Assembly.

I/O Plate, I/O and Power Supply Board Removal

1. Unplug, pull forward and move out of the way all cables that are attached to Pluggable Socket Connectors.
2. Remove the 4 hex screws than retain the I/O Plate to the enclosure.

WARNING:

1. When removing the I/O Plate, care must be taken not to damage the Sonde Interface Cable. This cable will have to be unplugged from the I/O Board before the I/O Plate can be completely removed.
2. When removing the I/O Plate, both the I/O and Power Supply Boards will be removed.

3. Carefully, pull the I/O Plate far enough out of the enclosure to access the Sonde Interface Cable. Unplug the Sonde Interface Cable from the I/O Board Assembly. The I/O Plate, I/O Board and Power Supply Board can now be removed from the enclosure for servicing.

- To remove the Power Supply Board from the I/O Board Assembly, disconnect the AC and DC Cables and disconnect the 4 mounting tabs/snaps.
- Removal of the I/O Board Assembly from the I/O Plate can be accomplished by removing the 7 slotted mounting screws.

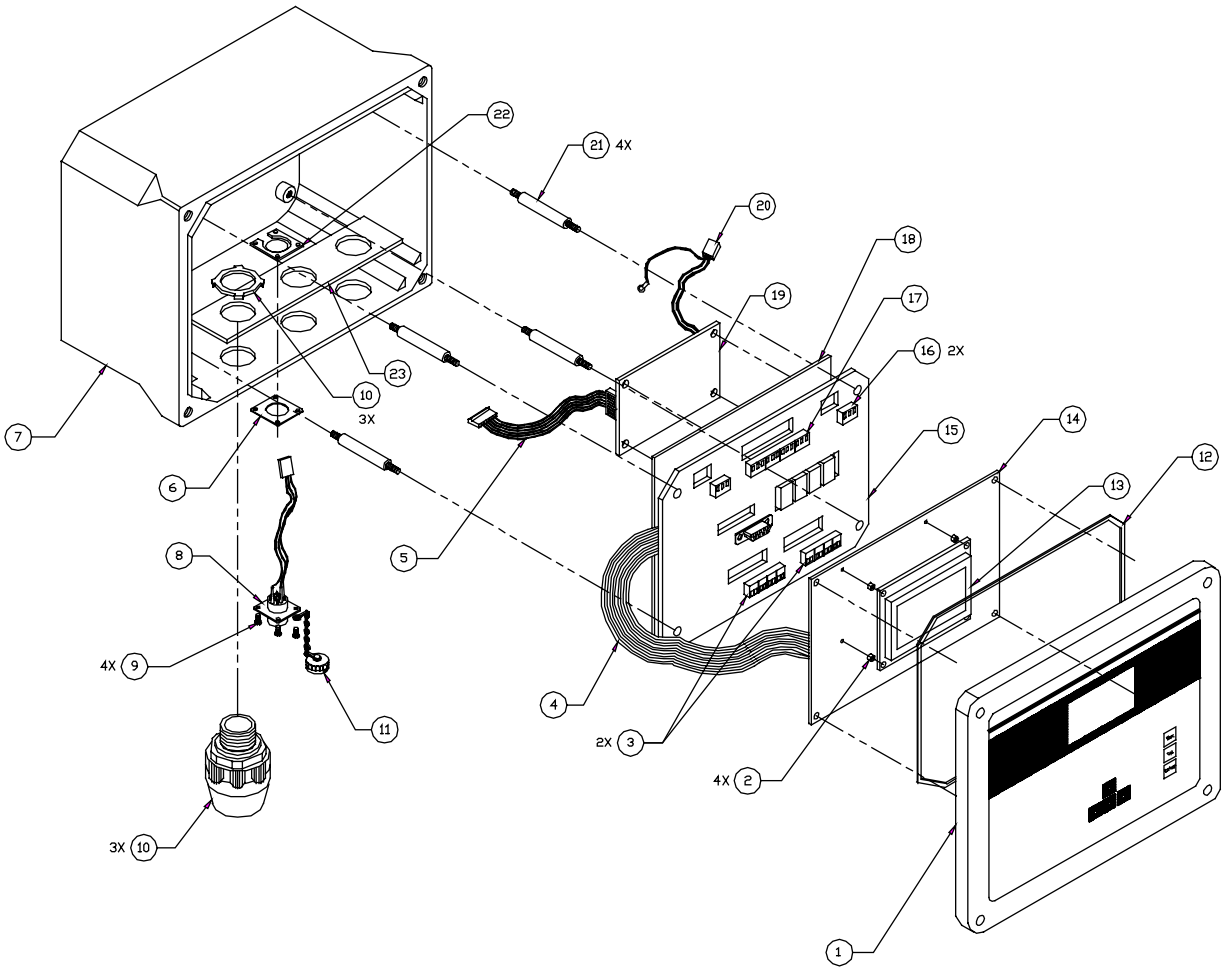
ASSEMBLY

1. Inspect all gaskets and sealing surfaces for blemishes, scratches and dirt. As necessary, clean or replace affected parts. Case gasket replacement is recommended if the existing case gasket has been in place for more than one year and the case is opened.
2. Remove old desiccant packs from the enclosure. Place two new desiccant packs inside the 6500. The YSI 6506 contains 6 packs of desiccant.

To assemble, simply reverse disassembly steps.

NOTE: Be certain that the Mylar sheet (2.5 x 3.5 inches) has been reinstalled between the I/O board and the power supply board.

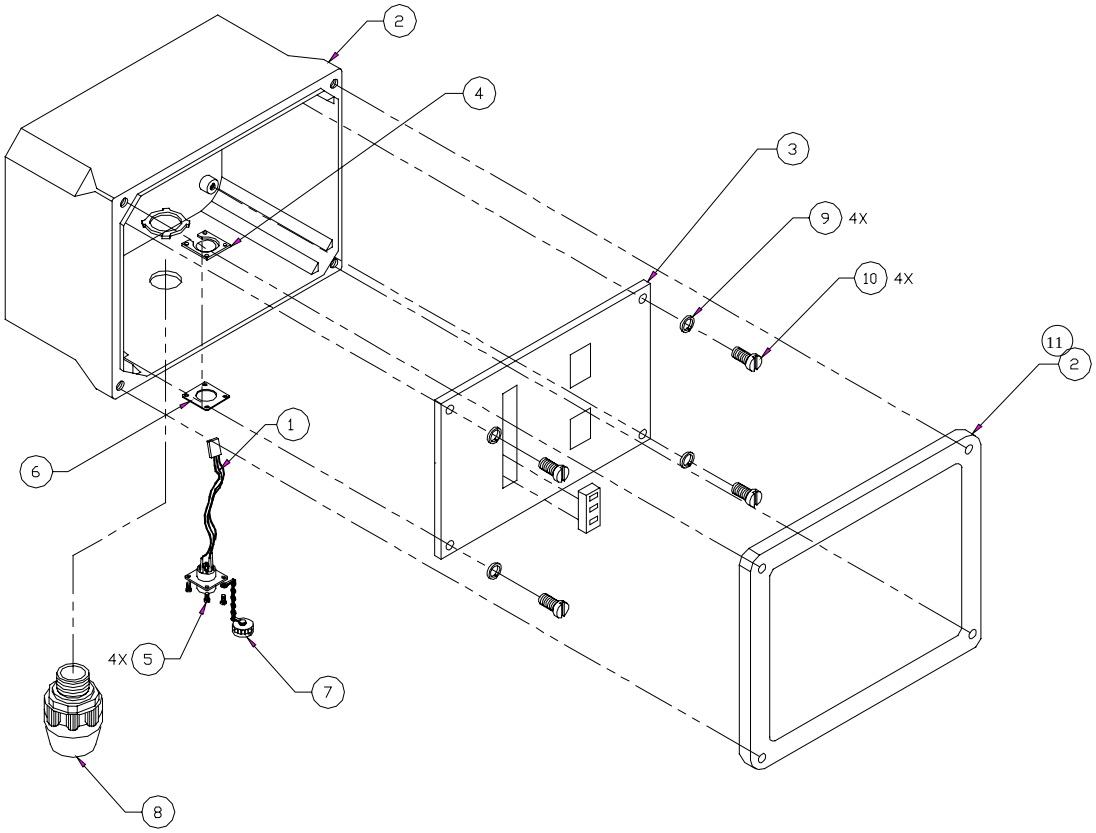
10.2 6500 MONITOR EXPLODED VIEW



Bubble Number	Part Number	Description
1	115953	Panel Assy, Front
2	065949	Spacer, LCD
3	065943	Conn, Pluggable, 8
4	065911	Cable, Display, I/O
5	065914	Cable, DC
6	065930	Gasket, MS-8
7	065903	Enclosure, NEMA4
8	065912	Cable, Sonde Inter.
9	065929	Screw, Sealing
10	065926	Fitting, Conduit
11	065936	Cap, Dust, MS-8
12	065974	Gasket, Case

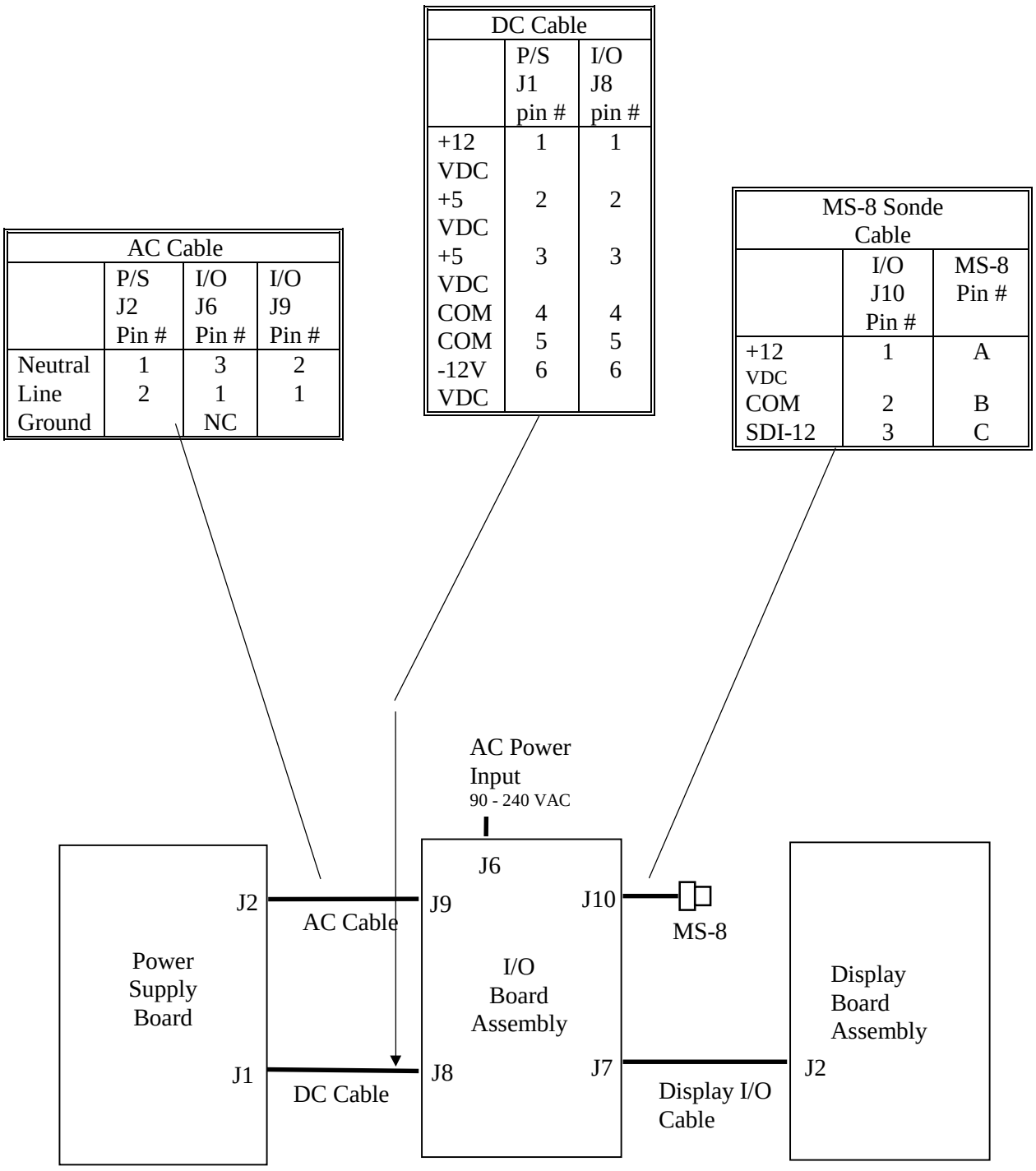
Bubble Number	Part Number	Description
13	115952	Display Mod. Assy
14	115905	Display, PCB Assy
15	065915	Plate, I/O
16	065942	Conn, Pluggable, 3
17	065944	Conn, Pluggable, 12
18	115906	Board Assy, I/O
19	065907	Board Assy, Power
20	065913	Cable, AC
21	065917	Standoff, I/O Plate
22	065928	Nutplate
23	065918	Plate, Support
	065910	Key Extender

10.3 EXPLODED VIEW OF 6502 BREAKOUT BOX

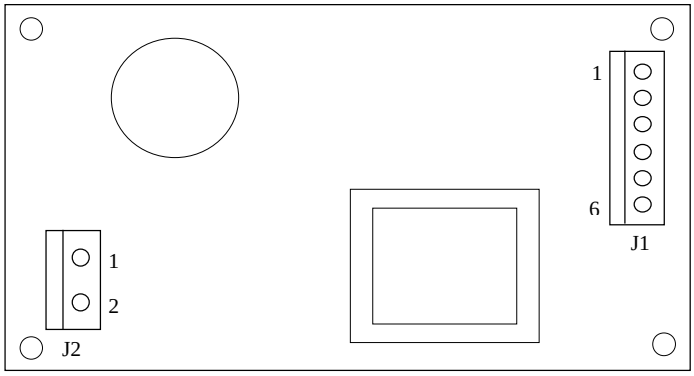


Bubble Number	Part Number	Description
1	065912	Cable, Sonde Interface
2	065932	Enclosure, NEMA4X, W/Front
3	065940	Board Assy, Breakout Box
4	065928	Nutplate
5	065929	Screw, Sealing
6	065930	Gasket, MS-8
7	065936	Cap, Dust, MS-8
8	065926	Fitting, Conduit
9	065950	Washer, Lkin, #10
10	065958	Screw, Cap, 10-32
11	115981	Cover Assy, Front, W/Gasket

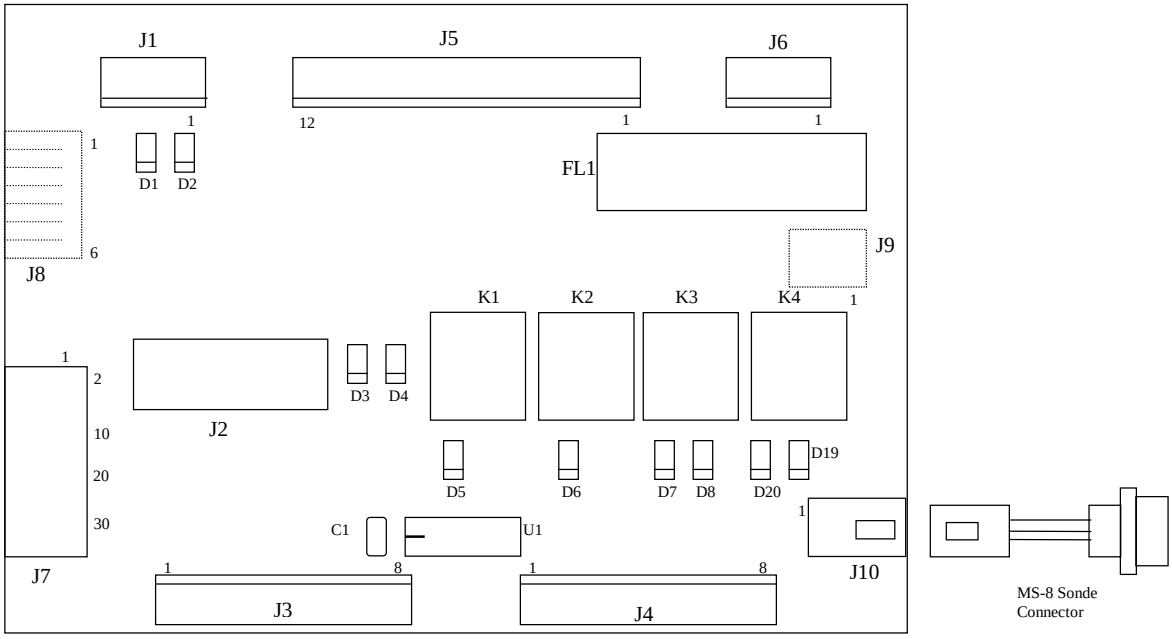
10.4 BLOCK DIAGRAM OF 6500 MONITOR



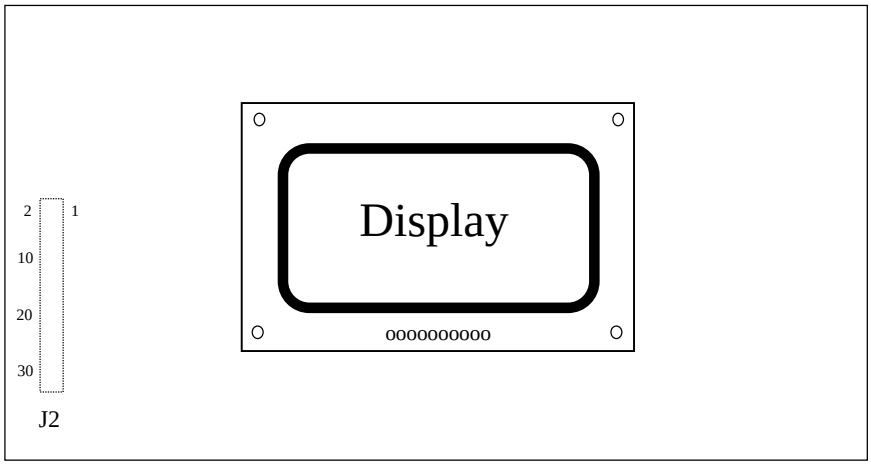
10.5 BOARD ASSEMBLIES



Power Supply



I/O Board Assembly



Display Board Assembly

SECTION 11 610D/DM DISPLAY/LOGGERS

11.1 SOFTWARE UPDATES

YSI 610 software may be updated from time to time. This is simple since the 610 uses non-volatile FLASH memory to hold the software. New 610 software can be installed by using a PC. To update software all you need is download it from YSI's website at www.ysi.com, or you can request a copy of the YSI 610 software update diskette from YSI Customer Service. Everything else you need comes with the standard YSI 610 kit.

The 610 software update diskette contains two files used for update, and may contain other files. The two files are AOUT.A03 that contains the new 610 software, and LOAD4.EXE, which is a PC program you run to send the new 610 software to the 610.

When loading new 610 software, the entire keyboard will appear to work incorrectly. This is normal. Follow the instructions below carefully. If you type a wrong character, hit the Skip key (which is a backspace).

11.2 LOADING NEW SOFTWARE

To load new YSI software into the 610, proceed carefully as follows:

1. Connect the 610 to an (MS-DOS) Personal Computer, using the Null Modem cable (provided). This forms a 5-wire RS-232 connection. You must use the COM1 RS-232 port of the PC.

2. Make sure there is no mouse on COM1 or COM3.

3. Set the PC to run from the floppy drive which holds the YSI programs (type A: or B: on the PC, and press **Enter** on the PC).

4. Disconnect the wall charger from the 610 if it is connected.

5. Turn off the 610 by pressing Power, or by pressing Esc then Power. Reset the 610 by tapping the Esc and Skip keys simultaneously, and then releasing them immediately. If you did this correctly the message RESET DONE or MASTER RESET will appear in the 610 display. If you do not get either message, go back to step 5.

6. Type the following 5 keys on the 610: D C ? Del Bksp. Verify you see PMODE on the 610 screen. If you make a typo, press Skip to backspace over the typo and retype it. Once you see PMODE press the Z key. The 610 screen displays PROGRAMMING MODE !!LOADING!!

7. On the PC at the DOS prompt, type the command "LOAD4 -ROM -F128" and press Enter (also on the PC). This runs the transfer program. Loading begins at once and takes about 5 minutes. Loading is complete when the DOS prompt returns to the PC screen, and you hear a chirp from the 610.

8. Verify the message ALL ROM BANKS SENT is on the PC screen, and the word COMPLETE has appeared on the 610 screen. If either message is not shown, go back to step 1.

9. If the 610 has never been loaded with YSI software before, you need to do items A-E below. These items are shown here for completeness. Otherwise proceed to step 11.

10. (A) Type the 5 keys: ' Bksp _ G D. Verify you see SETUP on the 610 screen. Press the Z key.
    (B) Press Q until baud rate is 9600, then press "
    (C) Press Q until word format is 8D+1 STOP then press "
    (D) If bank number is not 0, press Q Y Z then press "
    (E) If prog addr is not 16384, press Q S P U J N Z then press "

11. Type the following 3 keys on the 610: F G ". Verify you see RUN on the 610 screen. If you make a typo, press Skip to backspace over the typo and retype it. Once you see RUN press the Z key. The 610 displays YSI SOFTWARE INITIALIZED for 3 seconds, then shuts itself off.

12. The 610 is now ready for use.

11.3 REPLACEMENT PARTS LIST

Item #	Description	Comments
116100	Overlay, Front, 610D	
116101	Overlay, Front, 610DM	
116102	I/O, Module Board Assembly	
116103	Display Assembly	
116104	Display Gasket	
116105	Connector Gasket	
116106	Body Gasket	Main case seal
116107	Screw Casing	
116108	Keyboard Backplate	
116109	EEPROM (Latest software revision. Re-programmable)	
063511	Battery Pack, Kit	
116117	Keypad Assembly	
116110	Board Assembly, 610D	
116111	Board Assembly, 610DM, 126K Memory	
116112	Board Assembly, 610DM, 512K Memory	

SECTION 12 WARRANTY AND SERVICE INFORMATION

YSI EPG instruments are warranted for two years against defects in workmanship and materials when used for its intended purposes and maintained according to instructions. All cables are warranted for one year. The depth, dissolved oxygen, temperature/conductivity, pH, and pH/ORP combination probes are warranted for one year. Damage due to accidents, misuse, tampering, or failure to perform prescribed maintenance is not covered. The warranty period for chemicals and reagents is determined by the expiration date printed on their labels. Within the warranty period, YSI will repair or replace, at its sole discretion, free of charge, any product that YSI determines to be covered by this warranty.

To exercise this warranty, write or call your local YSI representative, or contact YSI Customer Service in Yellow Springs, Ohio. Send the product and proof of purchase, transportation prepaid, to the Authorized Service Center selected by YSI. Repair or replacement will be made and the product returned, transportation prepaid. Repaired or replaced products are warranted for the balance of the original warranty period, or at least 90 days from date of repair or replacement.

LIMITATION OF WARRANTY

This Warranty does not apply to any YSI product damage or failure caused by (i) failure to install, operate or use the product in accordance with YSI's written instructions, (ii) abuse or misuse of the product, (iii) failure to maintain the product in accordance with YSI's written instructions or standard industry procedure, (iv) any improper repairs to the product, (v) use by you of defective or improper components or parts in servicing or repairing the product, or (vi) modification of the product in any way not expressly authorized by YSI.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. YSI's LIABILITY UNDER THIS WARRANTY IS LIMITED TO REPAIR OR REPLACEMENT OF THE PRODUCT, AND THIS SHALL BE YOUR SOLE AND EXCLUSIVE REMEDY FOR ANY DEFECTIVE PRODUCT COVERED BY THIS WARRANTY. IN NO EVENT SHALL YSI BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY DEFECTIVE PRODUCT COVERED BY THIS WARRANTY.

AUTHORIZED U.S. SERVICE CENTERS

North Region

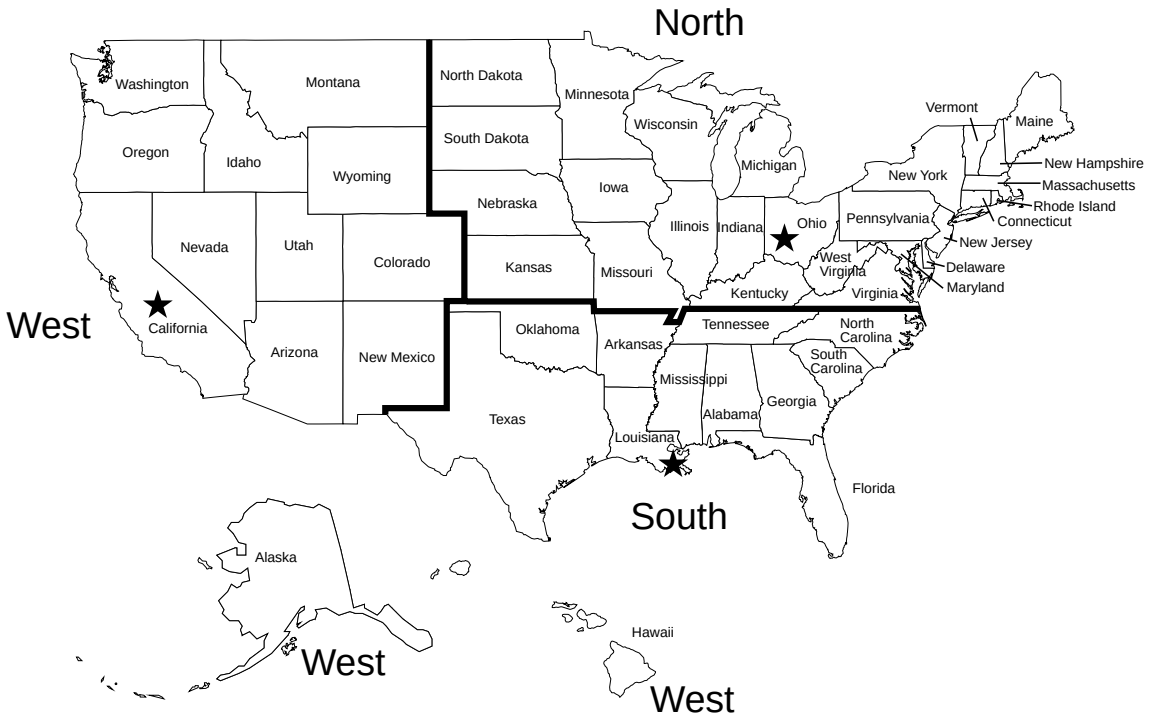
YSI Incorporated • Repair Center • 1725 Brannum Lane • Yellow Springs, Ohio • 45387 • Phone: (800) 765-4974 • (937) 767-7241• E-Mail: info@ysi.com

South Region

C.C. Lynch & Associates • 212 E. 2nd Street • Suite 203 • Pass Christian, Mississippi • 39571 • Phone: (800) 333-2252 • (228) 452-4612 • Fax: (228) 452-2563

West Region

EQUIPCO Sales and Service • 1110 Burnett Avenue, Suite D • Concord, CA • 94520 • Phone: (800)550-5875 • Fax: (510)674-8655



INTERNATIONAL SERVICE CENTERS

YSI Incorporated
YSI Incorporated • Repair Center • 1725 Brannum Lane • Yellow Springs, Ohio • 45387 • Phone: (937) 767-7241• E-Mail: info@ysi.com

Hydrodata Services Ltd.
Alexander Road • London, Colney • AL2 1JB • Phone: 011-44-2737-827-837 • Fax: 011-4401727-827-838

YSI Japan Ltd.

Sakura – Building 6-5-6-13 • Shinjuku, Shinjuku-ku, Tokyo • 160 • Phone: (81-3) 5360-3561 • Fax: (81-3) 5360-3565

APPENDIX A HEALTH AND SAFETY

YSI Conductivity solutions: 3161, 3163, 3165, 3167, 3168, 3169

INGREDIENTS:

- ❑ Iodine
- ❑ Potassium Chloride
- ❑ Water

WARNING: INHALATION MAY BE FATAL.

CAUTION: AVOID INHALATION, SKIN CONTACT, EYE CONTACT OR INGESTION. MAY EVOLVE TOXIC FUMES IN FIRE.

Harmful if ingested or inhaled. Skin or eye contact may cause irritation. Has a corrosive effect on the gastro-intestinal tract, causing abdominal pain, vomiting, and diarrhea. Hyper-sensitivity may cause conjunctivitis, bronchitis, skin rashes etc. Evidence of reproductive effects.

FIRST AID:

INHALATION: Remove victim from exposure area. Keep victim warm and at rest. In severe cases seek medical attention.

SKIN CONTACT: Remove contaminated clothing immediately. Wash affected area thoroughly with large amounts of water. In severe cases seek medical attention.

EYE CONTACT: Wash eyes immediately with large amounts of water, (approx. 10 minutes). Seek medical attention immediately.

INGESTION: Wash out mouth thoroughly with large amounts of water and give plenty of water to drink. Seek medical attention immediately.

YSI pH 4.00, 7.00, and 10.00 Buffer Solutions: 3821, 3822, 3823

pH 4 INGREDIENTS:
- ❑ Potassium Hydrogen Phthalate
- ❑ Formaldehyde
- ❑ Water

pH 7 INGREDIENTS:
- ❑ Sodium Phosphate, Dibasic
- ❑ Potassium Phosphate, Monobasic
- ❑ Water

pH 10 INGREDIENTS:
- ❑ Potassium Borate, Tetra
- ❑ Potassium Carbonate
- ❑ Potassium Hydroxide
- ❑ Sodium (di) Ethylenediamine Tetraacetate
- ❑ Water

CAUTION - AVOID INHALATION, SKIN CONTACT, EYE CONTACT OR INGESTION. MAY AFFECT MUCOUS MEMBRANES.

Inhalation may cause severe irritation and be harmful. Skin contact may cause irritation; prolonged or repeated exposure may cause Dermatitis. Eye contact may cause irritation or conjunctivitis. Ingestion may cause nausea, vomiting and diarrhea.

FIRST AID:

INHALATION - Remove victim from exposure area to fresh air immediately. If breathing has stopped, give artificial respiration. Keep victim warm and at rest. Seek medical attention immediately.

SKIN CONTACT - Remove contaminated clothing immediately. Wash affected area with soap or mild detergent and large amounts of water (approx. 15-20 minutes). Seek medical attention immediately.

EYE CONTACT - Wash eyes immediately with large amounts of water (approx. 15-20 minutes), occasionally lifting upper and lower lids. Seek medical attention immediately.

INGESTION - If victim is conscious, immediately give 2 to 4 glasses of water and induce vomiting by touching finger to back of throat. Seek medical attention immediately.

YSI Zobell Solution: 3682

INGREDIENTS:
- Potassium Chloride
- Potassium Ferrocyanide Trihydrate
- Potassium Ferricyanide

CAUTION - AVOID INHALATION, SKIN CONTACT, EYE CONTACT OR INGESTION. MAY AFFECT MUCOUS MEMBRANES.

May be harmful by inhalation, ingestion, or skin absorption. Causes eye and skin irritation. Material is irritating to mucous membranes and upper respiratory tract. The chemical, physical, and toxicological properties have not been thoroughly investigated.

Ingestion of large quantities can cause weakness, gastrointestinal irritation and circulatory disturbances.

FIRST AID:

INHALATION - Remove victim from exposure area to fresh air immediately. If breathing has stopped, give artificial respiration. Keep victim warm and at rest. Seek medical attention immediately.

SKIN CONTACT - Remove contaminated clothing immediately. Wash affected area with soap or mild detergent and large amounts of water (approx. 15-20 minutes). Seek medical attention immediately.

EYE CONTACT - Wash eyes immediately with large amounts of water (approx. 15-20 minutes), occasionally lifting upper and lower lids. Seek medical attention immediately.

INGESTION - If victim is conscious, immediately give 2 to 4 glasses of water and induce vomiting by touching finger to back of throat. Seek medical attention immediately.

YSI Ammonium Standard Solutions: 3841, 3842, and 3843

INGREDIENTS:
- ❑ Ammonium Chloride
- ❑ Lithium Acetate Dihydrate
- ❑ Sodium Azide (trace)
- ❑ Hydrochloric acid

CAUTION - AVOID INHALATION, SKIN CONTACT, EYE CONTACT OR INGESTION. MAY AFFECT MUCOUS MEMBRANES.

May be harmful by ingestion or skin absorption. May cause eye and skin irritation. The chemical, physical, and toxicological properties have not been thoroughly investigated.

Ingestion of large quantities of lithium salts can affect the central nervous system producing symptoms ranging from dizziness to collapse. It may also cause kidney damage, nausea, and anorexia. Note that the ingestion of harmful quantities form the solutions is considered unlikely given the low concentration of lithium and the volumes likely to be handled.

FIRST AID:

INHALATION - Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT - Remove contaminated clothing immediately. Wash affected area with soap or mild detergent and large amounts of water (approx. 15-20 minutes).

EYE CONTACT - Wash eyes immediately with large amounts of water (approx. 15-20 minutes), occasionally lifting upper and lower lids. Seek medical attention immediately.

INGESTION - Immediately rinse out mouth with large quantities of water. If reagent was swallowed, give 2 glasses of water and seek medical attention immediately.

YSI Nitrate Standard Solutions: 3885, 3886, and 3887

INGREDIENTS

- ❑ Potassium Nitrate
- ❑ Magnesium Sulfate
- ❑ Gentamycin Sulfate (Trace)

CAUTION - AVOID INHALATION, SKIN CONTACT, EYE CONTACT OR INGESTION.

May be harmful by ingestion or skin absorption. May cause eye and skin irritation. The chemical, physical, and toxicological properties have not been thoroughly investigated.

FIRST AID:

INHALATION - Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT - Remove contaminated clothing immediately. Wash affected area with soap or mild detergent and large amounts of water (approx. 15-20 minutes).

EYE CONTACT - Wash eyes immediately with large amounts of water (approx. 15-20 minutes), occasionally lifting upper and lower lids. Seek medical attention immediately.

INGESTION - Immediately rinse out mouth with large quantities of water. If irritation occurs or reagent was swallowed, seek medical attention immediately.

YSI Turbidity Standards: 3845, 3846, 3487, 6072, and 6073

INGREDIENTS

- Styrene divinylbenzene copolymer spheres

The material is not volatile and has no known ill effects on skin, eyes, or on ingestion. Therefore, no special precautions are required when using the standards. General precautions should be adopted as required with all materials to minimize unnecessary contact. Note, however, that the chemical, physical, and toxicological properties have not been thoroughly investigated.

FIRST AID:

SKIN CONTACT - Remove contaminated clothing. Wash affected area with soap or mild detergent and water.

EYE CONTACT - Wash eyes immediately with large amounts of water (approx. 15-20 minutes), occasionally lifting upper and lower lids. If irritation occurs, seek medical attention immediately.

INGESTION - Rinse out mouth with large quantities of water. If irritation occurs or reagent was swallowed, seek medical attention as a precaution.

YSI Replacement Desiccant 065802

INGREDIENTS

- Calcium Sulfate and Calcium Chloride

CAUTION - AVOID INHALATION, SKIN CONTACT, EYE CONTACT OR INGESTION. MAY AFFECT MUCOUS MEMBRANES.

FIRST AID:

SKIN CONTACT - Flush with water.

EYE CONTACT - . Flush with water. If irritation continues, obtain medical attention.

INGESTION - If patient is conscious, induce vomiting. Obtain medical attention.

APPENDIX B REQUIRED NOTICE

The Federal Communications Commission defines this product as a computing device and requires the following notice.

This equipment generates and uses radio frequency energy and if not installed and used properly, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class A or Class B computing device in accordance with the specification in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- ❑ Reorient the receiving antenna
- ❑ Relocate the computer with respect to the receiver
- ❑ Move the computer away from the receiver
- ❑ Plug the computer into a different outlet so that the computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet, prepared by the Federal Communications Commission, helpful: "How to Identify and Resolve Radio-TV Interference Problems". This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No.0004-000-00345-4.

APPENDIX C ACCESSORIES AND CALIBRATION STANDARDS

STANDARD EQUIPMENT WITH YSI SONDES

- ❑ 600R, 600XL, 600XLM, 6820, 6600 or 6920 Sonde with Calibration Cup
- ❑ EcoWatch for Windows Software
- ❑ Operations Manual
- ❑ Guard for Probe Compartment
- ❑ 6570 Maintenance Kit
- ❑ 6560 Conductivity/Temperature Probe (not supplied with the 600R)

PROBES FOR THE SONDES

- ❑ 6560 Conductivity/Temperature Probe
- ❑ 6561 pH Probe
- ❑ 6562 Rapid Pulse DO Probe
- ❑ 6565 Combination pH/ORP Probe
- ❑ 6026 Turbidity Probe, wiped
- ❑ 6036 Turbidity Probe, unwiped
- ❑ 6882 Chloride Probe
- ❑ 6883 Ammonium Probe
- ❑ 6884 Nitrate Probe

OPTIONAL ACCESSORIES FOR THE SONDES

- ❑ 062781 PC6000 Software (Available at no cost)
- ❑ 6027 Turbidity Wiper Kit
- ❑ 6035 Probe Reconditioning Kit for 6562 Dissolved Oxygen Probe
- ❑ 062655 Carrying case
- ❑ 6038 12 VDC Power Supply with 110 VAC input
- ❑ 6037 12 VDC Power Supply with 220 VAC input
- ❑ 6100 External Power Connector, attaches to 6095B Field Cable
- ❑ 6570 Maintenance Kit
- ❑ 068230 Short Probe Compartment Guard, for 6036 turbidity probe (non-wiping) for 6820 & 6920
- ❑ 5775 Membrane Kit
- ❑ 6108 Desiccant Cartridge Kit
- ❑ 6109 Desiccant Canister Kit
- ❑ 065802 Replacement Desiccant
- ❑ 6120 6-Series Operations Manual, Spanish
- ❑ 6121 6-Series Operations Manual, German
- ❑ 6089 Non-Vented CE Cable Kit
- ❑ 6194 Vented CE Cable Kit

CABLES FOR THE SONDES

- 6093 Field Cable, 100 ft (30 m)
- 6092 Field Cable, 50 ft (15 m)
- 6091 Field Cable, 25 ft (7.5 m)
- 6090 Field Cable, 8 ft (2.4 m)
- 6191 Field Cable, Vented, 25 ft (7.5 m)
- 6192 Field Cable, Vented, 50 ft (15 m)
- 6067B Low Cost Calibration Cable, Dry use only; 10 ft (3m)
- 6077B CE Calibration Cable, 10 ft. (3m)
- SP6093-L Special field cables available in 25 ft (7.6 m) increments; Maximum 1000 ft (305 m)
- 6098B Field Cable to 610-D/610-DM adapter
- 6096 Field Cable to Flying Lead (wire) adapter, 15 ft (5m)
- 6095B Field Cable to Female DB-9 (PC Serial with Power Connector)
- 6099: 610 to Female DB-9 (PC Serial)
- 6100 External Power Connector, attaches to 6095B Field Cable (6ft)
- 6102: 610 to Portable Power Pack Adapter
- 6103 MS-8 Dust Cover (caps connector when not in use)

CONDUCTIVITY REAGENTS

- 3161 Calibrator Solution, 1,000 uS/cm (quart)
- 3163 Calibrator Solution, 10,000 uS/cm (quart)
- 3165 Calibrator Solution, 100,000 uS/cm (quart)
- 3167 Calibrator Solution, 1,000 uS/cm (box of 8 pints)
- 3168 Calibrator Solution, 10,000 uS/cm (box of 8 pints)
- 3169 Calibrator Solution, 100,000 uS/cm (box of 8 pints)

pH REAGENTS

- 3821 pH 4 Buffer (box of 6 pints)
- 3822 pH 7 Buffer (box of 6 pints)
- 3823 pH 10 Buffer (box of 6 pints)

ORP REAGENTS

- 3682 Zobell Solution (125 ml)

AMMONIUM REAGENTS

- 3841 1 mg/L ammonium-nitrogen standard solution
- 3842 10 mg/L ammonium-nitrogen standard solution
- 3843 100 mg/L ammonium-nitrogen standard solution

NITRATE REAGENTS

- 3885 1 mg/L nitrate-nitrogen standard solution
- 3886 10 mg/L nitrate-nitrogen standard solution
- 3887 100 mg/L nitrate-nitrogen standard solution

TURBIDITY REAGENTS

- 3845 0 NTU standard
- 6073 100 NTU standard suspension
- 3846 200 NTU standard suspension
- 3847 800 NTU standard suspension

DISPLAYS, LOGGERS, AND ACCESSORIES

- 610-D Handheld Field Display with Accessories
- 610-DM: 610-D with 128K of memory
- 610-DM: 610-D with 512K of memory
- 614 Ultraclamp, C-clamp Mount for 610
- 615 Leather Carrying Case for 610
- 616 Cigarette lighter adapter (powers and charges 610s)
- 617 Replacement Battery Pack for 610
- 6099: 610 to Female DB-9 (PC serial)
- 6097 Blank port plug for 610
- 6104 Replacement Charger Jack for 610
- 6042 Battery Charger for 610
- 6101 Portable Power Pack for 610 or sondes

LOGGER/TELEMETRY

- 1240: SDI-12 Logger for interfacing as many as 10 6-Series devices. Can also serve as RF telemetry platform (RF radio, battery, interface cable, junction box not included)
- 1240B1: 7 amp hour, lead acid 12 VDC rechargeable battery
- 1240B2: 20 amp hour, alkaline 6 VDC battery (2 required)
- 1240AC: 110 VAC charger/transformer assembly, charges 1240B1
- 1240SO: 1240 Solar Panel Assembly, includes panel, mount, cable
- 1240SE: 1240 Serial data interface cable, connects 1240 to PC
- 1240JU: 1240/6 series Junction Box, provides input of multiple SDI-12 devices (standard configuration is for 5 devices)

Note: For RF radio frequency telemetry system applications, contact YSI Massachusetts Customer Support @ 1-800-363-3269 (USA) or 508-748-0366 or fax 508-748-2543.

SOFTWARE

- PC6000: MS-DOS compatible communication, upload, plotting
- 610SOFT: Software upgrade for Model 610 D/DM
- 6920SOFT: Software upgrade for Model 6920
- EW-DOS EcoWatch for MS-DOS Applications
- EW-WIN EcoWatch for Windows (Use EW-WIN for 6-Series Applications)

APPENDIX D SOLUBILITY AND PRESSURE/ALTITUDE TABLES

Table 1: Solubility of Oxygen (mg/L) in Water Exposed to Water-Saturated Air at 760 mm Hg Pressure.

Salinity = Measure of quantity of dissolved salts in water.
Chlorinity = Measure of chloride content, by mass, of water.
$S(^0/_{00}) = 1.80655 \times \text{Chlorinity } (^0/_{00})$

Temp °C	Chlorinity 0 Salinity: 0	5.0 ppt 9.0 ppt	10.0 ppt 18.1 ppt	15.0 ppt 27.1 ppt	20.0 ppt 36.1 ppt	25.0 ppt 45.2 ppt
0.0	14.62	13.73	12.89	12.10	11.36	10.66
1.0	14.22	13.36	12.55	11.78	11.07	10.39
2.0	13.83	13.00	12.22	11.48	10.79	10.14
3.0	13.46	12.66	11.91	11.20	10.53	9.90
4.0	13.11	12.34	11.61	10.92	10.27	9.66
5.0	12.77	12.02	11.32	10.66	10.03	9.44
6.0	12.45	11.73	11.05	10.40	9.80	9.23
7.0	12.14	11.44	10.78	10.16	9.58	9.02
8.0	11.84	11.17	10.53	9.93	9.36	8.83
9.0	11.56	10.91	10.29	9.71	9.16	8.64
10.0	11.29	10.66	10.06	9.49	8.96	8.45
11.0	11.03	10.42	9.84	9.29	8.77	8.28
12.0	10.78	10.18	9.62	9.09	8.59	8.11
13.0	10.54	9.96	9.42	8.90	8.41	7.95
14.0	10.31	9.75	9.22	8.72	8.24	7.79
15.0	10.08	9.54	9.03	8.54	8.08	7.64
16.0	9.87	9.34	8.84	8.37	7.92	7.50
17.0	9.67	9.15	8.67	8.21	7.77	7.36
18.0	9.47	8.97	8.50	8.05	7.62	7.22
▼						▼

▼						▼
19.0	9.28	8.79	8.33	7.90	7.48	7.09
20.0	9.09	8.62	8.17	7.75	7.35	6.96
21.0	8.92	8.46	8.02	7.61	7.21	6.84
22.0	8.74	8.30	7.87	7.47	7.09	6.72
23.0	8.58	8.14	7.73	7.34	6.96	6.61
24.0	8.42	7.99	7.59	7.21	6.84	6.50
25.0	8.26	7.85	7.46	7.08	6.72	6.39
26.0	8.11	7.71	7.33	6.96	6.62	6.28
27.0	7.97	7.58	7.20	6.85	6.51	6.18
28.0	7.83	7.44	7.08	6.73	6.40	6.09
29.0	7.69	7.32	6.96	6.62	6.30	5.99
30.0	7.56	7.19	6.85	6.51	6.20	5.90
31.0	7.43	7.07	6.73	6.41	6.10	5.81
32.0	7.31	6.96	6.62	6.31	6.01	5.72
33.0	7.18	6.84	6.52	6.21	5.91	5.63
34.0	7.07	6.73	6.42	6.11	5.82	5.55
35.0	6.95	6.62	6.31	6.02	5.73	5.46
36.0	6.84	3.52	6.22	5.93	5.65	5.38
37.0	6.73	6.42	6.12	5.84	5.56	5.31
38.0	6.62	6.32	6.03	5.75	5.48	5.23
39.0	6.52	6.22	5.98	5.66	5.40	5.15
40.0	6.41	6.12	5.84	5.58	5.32	5.08
41.0	6.31	6.03	5.75	5.49	5.24	5.01
42.0	6.21	5.93	5.67	5.41	5.17	4.93
43.0	6.12	5.84	5.58	5.33	5.09	4.86
44.0	6.02	5.75	5.50	5.25	5.02	4.79
45.0	5.93	5.67	5.41	5.17	4.94	4.72

Table 2: Calibration Values for Various Atmospheric Pressures and Altitudes

PRESSURE			ALTITUDE		CALIBRATION VALUE
Inches Hg	**mm Hg**	**Millibars**	**Feet**	**Meters**	**Percent Saturation**
30.23	768	1023	-276	-84	101
29.92	760	1013	0	0	100
29.61	752	1003	278	85	99
29.33	745	993	558	170	98
29.02	737	983	841	256	97
28.74	730	973	1126	343	96
28.43	722	963	1413	431	95
28.11	714	952	1703	519	94
27.83	707	942	1995	608	93
27.52	699	932	2290	698	92
27.24	692	922	2587	789	91
26.93	684	912	2887	880	90
26.61	676	902	3190	972	89
26.34	669	892	3496	1066	88
26.02	661	882	3804	1160	87
25.75	654	871	4115	1254	86
25.43	646	861	4430	1350	85
25.12	638	851	4747	1447	84
24.84	631	841	5067	1544	83
24.53	623	831	5391	1643	82
24.25	616	821	5717	1743	81
23.94	608	811	6047	1843	80
23.62	600	800	6381	1945	79
23.35	593	790	6717	2047	78
23.03	585	780	7058	2151	77
22.76	578	770	7401	2256	76
22.44	570	760	7749	2362	75
22.13	562	750	8100	2469	74
21.85	555	740	8455	2577	73
21.54	547	730	8815	2687	72
21.26	540	719	9178	2797	71
20.94	532	709	9545	2909	70
20.63	524	699	9917	3023	69
20.35	517	689	10293	3137	68
20.04	509	679	10673	3253	67
19.76	502	669	11058	3371	66

Table 3. Conversion Factors for Feet/Meters, Celsius/Fahrenheit, mg/L/ppm

TO CONVERT FROM	TO	EQUATION
Feet	Meters	Multiply by 0.305
Meters	Feet	Multiply by 3.28
Degrees Celsius	Degrees Fahrenheit	5/9×(ºF-32)
Degrees Fahrenheit	Degrees Celsius	9/5×(ºC) + 32
Milligrams per liter (mg/L)	Parts per million (ppm)	Multiply by 1

Table 4. Conversion Factors for Common Units of Pressure

	kilo Pascals	mm Hg	millibars	inches H_20	PSI	inches Hg
1 atm	101.325	760.000	1013.25	406.795	14.6960	29.921
1 kiloPascal	1.00000	7.50062	10.0000	4.01475	0.145038	0.2953
1 mmHg	0.133322	1.00000	1.33322	0.535257	0.0193368	0.03937
1 millibar	0.100000	0.750062	1.00000	0.401475	0.0145038	0.02953
1 inch H_20	0.249081	1.86826	2.49081	1.00000	.0361	0.07355
1 PSI	6.89473	51.7148	68.9473	27.6807	1.00000	2.0360
1 inch Hg	3.38642	25.4002	33.8642	13.5956	0.49116	1.00000
1 hectoPascal	0.100000	0.75006	1.00000	0.401475	0.0145038	0.02953
1 cm H_20	0.09806	0.7355	9.8×10^{-7}	0.3937	0.014223	0.02896

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