

Instruction Manual

Model XTpc Pipe & Cable Locator Product Line

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Important Notice

Schonstedt believes the statements contained herein to be accurate and reliable. But their accuracy, reliability, or completeness is not guaranteed.

Schonstedt's only obligation shall be to repair or replace any instrument proved to be defective within seven years of purchase. Schonstedt shall not be responsible for any injury to persons or property, direct or consequential, arising from the use of any instrument.

Important FCC Notice

This unit has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This unit generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this unit does cause harmful interference to radio or television reception the user is encouraged to try to correct the interference by reorienting or relocating the receiving antenna, or by increasing the separation between the equipment and the receiver.

SECTION I: OPERATING MODES

Pipe and cable locators in general can operate in a variety of modes and frequencies. The following is a brief description of the basic operating modes supported by the XTpc line of pipe and cable locators

Passive 50/60 Hz (P)

In the passive mode the transmitter is not used at all. Instead, the receiver searches for an appropriate harmonic of 60 or 50 Hz signals (factory preset). These signals are typically present in energized power cables, making it possible to locate them without the use of a transmitter to impose a tracing signal on them.

Passive Cathodic (PC)

Long pipelines usually have to deal with the issue of corrosion. A known group of techniques used to control corrosion involves the use of periodic cathodes along the pipeline and the circulation of low-level currents rectified from the power grid. The passive cathodic mode does not use the transmitter at all. Instead, the receiver searches for an appropriate harmonic of rectified 60 or 50 Hz from the power grid, therefore making it possible to trace pipelines for long distances without the use of a transmitter to impose a tracing signal on them.

Conductive (C)

In the conductive mode the transmitter imposes a signal of the "active" frequency onto the pipe or cable to be traced. It does so by making direct contact with the pipe or cable at a point where it comes up to the surface (a transformer box, a water hydrant, a telephone switch box, a gas meter, etc.). The circuit is closed, providing a return path, by a ground stake that is buried in the ground in the vicinity of the transmitter.

Inductive Clamp (IC)

In the inductive clamp mode the transmitter imposes a signal of the "active" frequency onto the pipe or cable to be traced. It does so by energizing a "clamp" that is placed completely encircling the pipe or cable at a point where it comes up to the surface (a transformer box, a telephone switch box, a gas meter, etc.). The clamp then induces a current on the pipe or cable. In this mode it is not necessary to provide a return path for the induced current to the transmitter. The induced current will travel on the pipe or cable for a distance making it possible to trace it.

Inductive (I)

In the inductive mode the transmitter imposes a signal of the "active" frequency onto the pipe or cable to be traced. It does so by radiating a signal through the inductive antenna, which is placed on the ground in a direction perpendicular to the pipe or cable being traced. The inductive antenna then induces a current on the pipe or cable. In this mode it is not necessary to provide a return path for the induced current to the transmitter. The induced current will travel on the pipe or cable for a distance making it possible to trace it.

Sonde (S)

In the sonde mode the transmitter is not used at all. This mode is used to trace non-metallic pipes, or metallic pipes where the other modes are inapplicable or inefficient. A small sonde or "beacon transmitter" is pushed through the pipe by some means. The receiver searches for the signal emitted by the sonde. Since

the signal being traced by the receiver is produced by the sonde, and not travelling along the pipes, there are some differences in the way the receiver is used. Due to the nature and strength of the sonde signal, it is necessary to have some idea of where the sonde is, to narrow the search area to a circle of several feet radius centered at the sonde. This is usually not much of a problem, since the sonde is "guided" by a device under control of the work crew, often with a camera attached to it.

SECTION II: THE XTPC PRODUCT LINE

The XTpc line of pipe and cable locators offers several choices to suit just about any type of locating challenge, while emphasizing portability, size, and convenience. The unique ability of XTpc locators to collapse for portability and expand for greater sensitivity and full functionality is unparalleled in the industry.

Schonstedt has incorporated in the design of this line of locators more than fifty years of experience in producing the world's finest locating products for aerospace, military and civilian applications. All Schonstedt products are manufactured following high standards of reliability, durability and performance.



Products Covered by this Manual

This manual covers in detail all the current versions and models in the XTpc line with features including various passive, active, and sonde modes. Feature description and specifications in this manual are applicable to all models and versions in the line, unless otherwise noted.

As of this publishing the XTpc line includes the following locators:

XTpc-33	XTpc-82	XT512
XTpc-33-PC	XTpc-82-PC	
XTpc-33-512	XTpc-82-512	

Next section provides a quick comparative overview of the main features and characteristics of each of these locators. Detailed operation is covered elsewhere in the text.

Model Comparison Chart

Model	P	PC	C	IC (*)	I (*)	S (freq.)	TX Freq.	Depth
XTpc-33	Y	N	Y	Y	Y	Y (33 kHz)	33 kHz	Y
XTpc-33-PC	Y	Y	Y	Y	Y	N	33 kHz	Y
XTpc-33-512	Y	N	Y	Y	Y	Y (512 Hz)	33 kHz	Y
XTpc-82	Y	N	Y	Y	Y	Y (82 kHz)	82 kHz	Y
XTpc-82-PC	Y	Y	Y	Y	Y	N	82 kHz	Y
XTpc-82-512	Y	N	Y	Y	Y	Y (512 Hz)	82 kHz	Y
XT512	Y	N	N	N	N	Y (512 Hz)	N/A	Y

(*) Requires optional accessory

Note: P = passive mode, PC = passive cathodic mode, C = conductive mode, IC = inductive clamp mode, I = inductive mode, S = sonde mode. See SECTION I: OPERATING MODES for a description of these modes.

Automatic and Manual Gain

XTpc receivers have the ability to operate in automatic gain mode or in manual gain mode. In automatic gain mode the sensitivity of the receiver is adjusted automatically, based on the strength of the detected signal, to produce a relatively constant and strong signal strength indication. In the manual gain mode the user has the ability to adjust the sensitivity up or down to suit different locating scenarios.

Directional Indication

XTpc receivers are equipped with directional indicators. These visual and audible indicators help the user locate the pipe or cable by showing in what direction he/she should move to get closer to the target. These indicators are not available in Sonde mode.

Depth Measurement

XTpc receivers have the ability to measure the approximate depth of the target pipe or cable being traced. The bottom tip of the receiver must touch the ground when depth measurement is made, and best results are obtained when the receiver is in a fully extended position. Depth measurements should only be made when the directional indication says that the target is directly below the receiver and the signal strength is adequate. Special considerations are required for the Sonde mode (see SECTION VIII: OPERATING RECOMMENDATIONS for details).

Automatic and Manual Output Power

XTpc transmitters deliver power to the "load" connected to them. In the conductive mode the load is the circuit formed by the cable or pipe being traced, the soil return and the ground stake. In the inductive clamp and inductive modes the loads are the clamp and the antenna, respectively. The inductive clamp and inductive modes require the maximum power that the transmitter can deliver. Therefore the transmitter automatically operates at maximum power output and there is no need for manual power adjustment.

In the conductive mode the power delivered to the load is highly dependent on the external elements (soil, type of conductor, stake placements, etc.). The transmitter defaults to an automatic output power mode and tries to maintain a medium output current through varying conditions. But in some cases more power is desired to achieve more distance or depth, in others less power is desired to avoid bleeding to nearby conductors. Therefore in this mode the user has the ability to adjust the output power manually.

Transmitter Current Measurement

XTpc transmitters operating in the conductive mode measure and display the amount of current flowing out of the transmitter and into the utility being traced. This is very useful in determining how good a circuit has been established by the operator, and whether or not some improvements can be made by relocating the ground stake or improving metal to metal contact of the conductive clips. A low current reading can indicate a poor trace conductor, poor soil conductivity or poor ground stake contact or placement. Higher current readings indicate a better circuit and therefore a better chance to trace longer distances and deeper conductors.

If the current reading is low, you should try to improve the connection (check the cables, the clips, the ground stake, wet the ground, clean rust or dirt, etc.) to see if the current increases. However, in many cases the reason for the low current is the soil itself (sandy or very dry) and/or the composition of the pipe or cable you are trying to trace (cast iron pipes, rusted or broken wires, heavy insulation to ground, etc.). In that case you may not be able to improve the connection. This does not mean that you won't be able to

locate, it just means that there is a smaller amount of current circulating in the circuit. You may try to increase the output power manually and/or increase your receiver gain.

Transmitter Time Out

The XTpc transmitter will turn itself off under the following conditions:

- 1) The charger, conductive clips, inductive clamp or inductive antenna are NOT plugged in

In this case the time out is 15 minutes from the last time the power was turned on or a button was pressed.

- 2) The conductive clips, or the inductive clamp, or the inductive antenna ARE plugged in:

In this case the time out is 4 hours from the last time the power was turned on, a button was pressed, or an accessory was changed (i.e. if two hours have passed with the inductive clips plugged in, and now the clips are unplugged and replaced with the inductive clamp, the 4-hr timer will restart).

- 3) When the battery voltage has reached 6.0 V and the charger is NOT plugged in. This low voltage cutoff will occur regardless of the timeout conditions listed above.

This is done in order to protect the battery from an extremely deep discharge.

These deep discharges can reduce the number of recharge cycles the battery can sustain before replacement is required, and can make recharging difficult.

SECTION III: OPERATING CONTROLS

The product controls are designed to be intuitive and require a minimum of training for effective use. The receiver can easily be operated with one hand. To operate the transmitter in the automatic power adjustment mode the user needs only to connect the conductive clips, optional inductive clamp, or optional inductive antenna and then turn the unit ON. The transmitter will then automatically recognize which accessory is plugged in and adjust its operating mode and settings accordingly.

Receiver



ON/VOLUME - This switch powers up the receiver and automatically sets the volume to High. Additional depressions of this switch will cycle the volume through Off (no sound), Medium, and High settings.



OFF - This switch removes power from the receiver.



UP/DOWN Arrows - When the receiver is operating in manual gain mode, pressing the UP or DOWN arrows will increase or decrease the gain from its current setting. When the receiver is operating in the automatic gain mode, the first press of the UP or DOWN arrow will switch the receiver to the manual gain mode.



AUTO - When the receiver is operating in the manual gain mode, pressing the AUTO button will switch the receiver to operate in the Automatic gain mode. In this mode the receiver adjusts its sensitivity as a function of the strength of the detected signal.



DEPTH - When the proper conditions to measure depth are present, pressing this switch will display the target's depth on the LCD, after a delay of 2.0 seconds. The depth will continue to be displayed on the LCD, along with the word "DEPTH", for as long as the switch is depressed. If the switch is pressed and quickly released, the depth will show on the LCD momentarily. The XTpc can be factory set to display depth in feet and inches or in meters. If the depth cannot be determined due to a weak or noisy signal the LCD will show 3 dashes "----".



SONDE - If the sonde mode is available and the receiver is not operating in sonde mode, pressing this switch will cause the receiver to go to the sonde mode of operation. If the receiver is already operating in sonde mode, pressing this switch will cause the receiver to stop the sonde mode of operation.



PASSIVE - If the receiver is not operating in passive mode, pressing this switch will cause the receiver to go to the passive mode of operation. If the receiver is already operating in passive mode, pressing this switch will cause the receiver to stop the passive mode of operation.



PC - If the passive cathodic mode is available and the receiver is not operating in passive cathodic mode, pressing this switch will cause the receiver to go to the passive cathodic mode of operation. If the receiver is already operating in passive cathodic mode, pressing this switch will cause the receiver to stop the passive cathodic mode of operation.

Transmitter



ON/OFF - This is a momentary push-button switch that toggles the power to the transmitter on and off. When the transmitter power is off, press this switch until the LCD indicators come on then release it, to turn the transmitter on. When the transmitter power is on, press the switch until the LCD indicators go off then release it, to turn the transmitter off.



UP/DOWN Arrows - In the conductive mode the output power can be adjusted manually up or down using these controls. After the first press of an arrow, the power adjustment mode switches to manual and it can be adjusted to go above or below the setting of the Auto mode. To return the transmitter to auto power, turn it OFF and then ON again.

SECTION IV: VISUAL AND AUDIBLE INDICATORS

The information display areas for the receiver and the transmitter are large and easy to understand. In addition, the receiver has audible indicators as well, to facilitate operation in heavy traffic areas.

Receiver

All visual indicators for the receiver are on the LCD display, which has six general areas to display information to the user: a Battery Indicator, a Gain Indicator, a Frequency/Mode Indicator, a Direction Indicator, a Numeric Display and a Volume Indicator.

BATTERY INDICATOR - The "Battery" symbol indicates the receiver's battery status. When all 3 segments inside the battery symbol are present, the battery is fully charged. When only the 2 bottom segments are present, the battery has a medium charge. When only the bottom segment is present, the battery has a low charge and should be replaced. If there are no segments present, the battery is extremely low and you should replace it immediately.



GAIN INDICATOR - The "(Auto)" legend next to the "GAIN" legend indicates that the gain is in the automatic mode. In this mode the receiver adjusts its sensitivity as a function of the strength of the detected signal. No bar graph is shown in this mode.



If the "(Auto)" legend is not visible the receiver is operating in the manual gain mode, and therefore a means to show the user the gain setting is necessary. The bar graph indicates the relative strength of the gain, with each bar roughly representing one tenth of the full scale available. It takes approximately 2 presses of the UP arrow to add one bar to the graph, and approximately 2 presses of the DOWN arrow to delete one bar from the graph.

FREQUENCY/MODE INDICATOR - This LCD area consists of 4 icons: "SONDE", "33 kHz", "82 kHz", and the "Passive Arrow". These icons are used by themselves or in various combinations to indicate different operating modes, as shown in the following table.

33kHz 82kHz
SONDE

	SONDE	33 kHz	82 kHz	PASSIVE ARROW
C, IC, I at 33 kHz	Off	On	Off	Off
C, IC, I at 82 kHz	Off	Off	On	Off
Sonde at 33 kHz	On	On	Off	Off
Sonde at 82 kHz	On	Off	On	Off
Passive 50/60	Off	Off	Off	On
Passive Cathodic (*)	On	Off	On	Off
Sonde at 512 Hz	On	Off	Off	Off

(*) Models with Passive Cathodic support do not support sondes

Note: C = conductive mode, IC = inductive clamp mode, I = inductive mode, See SECTION I: OPERATING MODES, for a description of these modes.

DIRECTION INDICATOR - The arrows and center bar in this indicator tell the operator in which direction to move the receiver in order to be directly over the target (see also "Alternate Directional Indication" Section). The direction indicator does NOT work in the Sonde operating mode.

Right Arrow - Receiver should be moved to the right to get closer to the target.

Left Arrow - Receiver should be moved to the left to get closer to the target.

Both Arrows and Bar - Receiver is placed directly over the target. This is also accompanied by a beeping sound.



When all three elements of this indicator are OFF, the signal strength is not adequate to make a directional determination or you are not close to the pipe or cable being traced. Keep searching based on the signal strength indication (see below) and the audio feedback, until one of the arrows comes ON

ALTERNATIVE DIRECTION INDICATOR (ADI) - The XTpc receiver is capable of presenting directional information to the user in a different way than the one described above. This alternate method can be accessed at any time by simultaneously pressing the ON button and the UP arrow button. When ADI is active the sound emitted by the speaker is continuous when the Right Arrow is on, and interrupted or "beeping" when the Left Arrow is on. When both arrows and the center bar are on, the speaker is silenced. The speaker is also silenced when the signal strength is too weak to make an accurate directional indication.

The advantage of this mode is that the user can use the sound to know in what direction the instrument should be moved without looking at the display. A continuous tone means: "move to the right", a beeping tone means: "move to the left", and silence means: "you are right on the utility" (unless the signal is too weak to make a determination).

The XTpc can be returned to the normal directional indication mode by simultaneously pressing the ON button and the Down arrow button.

NUMERIC DISPLAY - The numeric display is used to display signal strength and depth.

Signal Strength - This is an indication of the relative signal level detected by the receiver and is a function of the gain setting. Good signal strength will typically be between 200 and 800. The display range for signal strength is 0 to 999.

Depth Reading - When measuring depth the word DEPTH lights up above the numeric display and the depth of the target in feet and inches (or meters) is displayed as shown below:

12 4 Ft - in (factory set) or 4.10 m

The display range for depth in ft and inches is 0" to 19 ft 11", and in meters is 0.00 m to 5.99 m.

See also SECTION III: OPERATING CONTROLS/Receiver/DEPTH.

VOLUME INDICATOR - The volume indicator consists of a speaker symbol with 3 sound wave bars. If the volume is off, the speaker symbol with NO bars is shown, for medium volume the speaker symbol with 2 bars is shown and for maximum volume the speaker symbol with 3 bars is shown.

The speaker produces an audible indication of signal strength. The pitch of the sound will increase with increasing signal strength. However, the volume is determined only by the VOLUME control, as explained above.



Volume OFF



Medium Volume



High Volume

Transmitter

All visual indicators for the transmitter are on the LCD display, which has four general areas to display information to the user: a Battery Indicator, a Power Indicator, a Numeric Display, and a Mode Indicator. There are no audible indicators for the transmitter.

BATTERY INDICATOR - The "Battery" symbol indicates the transmitter's battery status. When all 3 segments inside the battery symbol are present, the battery is fully charged. When only the 2 bottom segments are present, the battery has a medium charge. When only the bottom segment is present, the battery has a low charge and should be recharged as soon as possible. If there are no segments present, the battery is extremely low and it should be recharged immediately. In addition, the battery indicator is used to show that the charger is plugged in correctly. The battery box will be on, with all 3 segments rolling. See SECTION VI: BATTERIES AND CHARGER for additional information on the battery charging visual indicators.



POWER INDICATOR - The power indicator consists of a 10-bar graph located to the right of the word "POWER" on the faceplate, plus the legend (Auto) at the bottom and to the right of the bar graph. Its objective is to provide an indication of what type of power adjustment mode the transmitter is operating at and, if operating in manual adjustment mode, provide a relative indication of the output power being delivered to the circuit.



(Auto)

NUMERIC DISPLAY - The numeric display consists of 3 digits and it is used to display the measured output current delivered to the circuit, as well as mode indications in the other operating modes. The output current is displayed in mA (milliamperes) and it can range from 0 to 180 mA (internally limited for safety and battery life considerations).

MODE INDICATOR - The transmitter operates only at its factory set active frequency (see Model Comparison Chart). When the transmitter is on and operational, the operating frequency will be displayed at the top left corner of the LCD.

The transmitter automatically detects the operating mode when an accessory is plugged in (conductive clips, inductive clamp, inductive antenna, or battery charger). Once detected, the mode is indicated to the user by a combination of display indicators and legends, as shown in the following table:

Accessory Plugged In	Operating Mode	Mode Indicator
None	Not operational - Idle	Numeric Display Legend says "On" Battery Symbol = Lit Frequency Indicator = Lit Arrow indicators pointing to mode printed on the faceplate, along the right side edge of LCD, are all flashing
Battery Charger	Not operational - Charging	Numeric Display Legend says "CHA" Battery Symbol = Rolling bars inside battery box Frequency Indicator = Lit Arrow indicators = All OFF
Conductive Clips	Conductive	Numeric Display Legend = Shows output current in mA Battery Symbol = Lit Frequency Indicator = Lit Arrow indicator = Pointing to CONDUCTIVE
Inductive Clamp	Clamp	Numeric Display Legend says "CLP" Battery Symbol = Lit Frequency Indicator = Lit Arrow indicator = Pointing to CLAMP
Inductive Antenna	Inductive	Numeric Display Legend says "Ind" Battery Symbol = Lit Frequency Indicator = Lit Arrow indicator = Pointing to INDUCTIVE

SECTION V: CONNECTORS AND ACCESSORIES

Receiver Connector

This 2.5mm phone plug accepts any mono or stereo earphones or headphones. The receiver automatically detects the insertion of the plug and routes the audio signals to the earphones or headphones, silencing the internal speaker.

Transmitter Connector

This circular, lock-type, 8-pin connector is used to connect the conductive clips, the optional inductive clamp, optional inductive antenna, or the battery charger to the transmitter. The transmitter automatically detects what accessory has been plugged in and adjusts its operation and indicators accordingly. It is recommended that you turn the transmitter's power OFF before removing or inserting accessories from/into the connector.



A	-	Inductive Signal Out
B	-	N/C
C	-	Signal GND
D	-	Conductive / Clamp Signal Out
E	-	Battery Charger +V
F	-	Battery Temperature Sensor
G	-	Battery Charger GND
H	-	Accessory ID Resistor

Standard Accessories

The following accessories are included with all XTpc models:

- Hard carrying case
- Belt receiver holder cup
- Ground stake
- Conductive clips
- Disposable Battery for Receiver
- Battery charger for Transmitter Battery
- Instruction manual
- Locating 101 Book
- Locating DVD
- Universal power supply for battery charger w/ country-specific power cord
- Vehicle power supply for battery charger

For the XT512 model, the following accessories are included:

- Soft carrying bag
- Belt receiver holder cup
- Disposable Battery
- Instruction manual
- Locating 101 Book
- Locating DVD

Optional Accessories

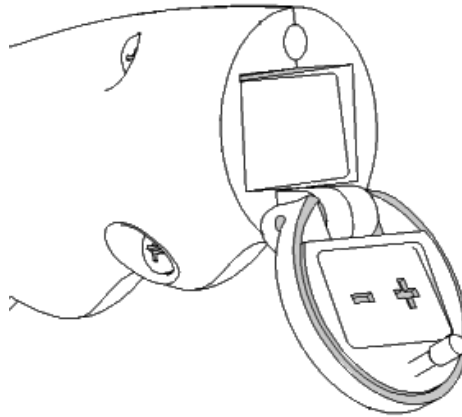
Many optional accessories are available for the XTpc Pipe and Cable locator line. The following list includes the most common ones, please contact Schonstedt for details and additional optional accessories not listed below.

- Inductive antenna (33 kHz or 82 kHz)
- Inductive clamp (3-1/8" ID, 5" ID and 7" ID)
- Sondes (33 kHz, 82 kHz and 512 Hz)
- "Carry All " duffel bag
- Padded transmitter and accessory belt-pouch w/ belt
- Shoulder strap
- Medium size conductive clips
- Large size conductive clips

SECTION VI: BATTERIES AND CHARGER

Receiver Battery

The XTpc receiver is powered by one 9-volt disposable battery. The battery is located in the handle of the instrument and can be accessed by turning the screw counterclockwise by hand or with the use of a screwdriver or coin. To remove the battery, simply tilt the unit so that the handle is pointing down, and the battery will slide out. When replacing the battery, look at the inside of the battery door for the proper battery orientation. (The positive terminal should be on the right on the inside of the unit) As a safety measure the unit has been "keyed" so that the battery will only make contact when it is inserted in the correct orientation. For this reason you should never have to force the battery door closed. If the battery does not seem to be going in all the way, remove the battery, reverse its orientation and then replace it.



Transmitter Battery

The batteries for the transmitter are 6 rechargeable NiMH cells packed to provide 7.2- volt, and need not be replaced. It is recommended to first charge the batteries for at least 4 hours before the initial use. If you suspect that the batteries are malfunctioning please contact Schonstedt Instrument Company.

Transmitter Battery Charger

The battery charger is especially designed to charge the internal NiMH, 7.2-volt battery pack that powers the transmitter. It will typically charge a fully discharged battery in under 4 hrs and it has smart safety features to monitor the charge process. The charger can be powered by the included AC power supply or the included vehicle power supply. The AC power supply operates from a range of input voltages and frequencies to suit most countries. The vehicle power supply allows the battery to be recharged while driving from job to job. Its input voltage is 12 to 14.4 VDC from a car battery.

After plugging the charger into the XTpc transmitter and connecting the AC power to it, allow a few minutes for it to settle the LED indicators as follows:

- FULL (Green): The charger has determined that the battery is fully charged
- CHARGING (Yellow): The charger is charging the battery
- FAULT (Red): See explanation below

Conditions Under Which the FAULT LED Will Come On:

The FAULT LED indicates that the battery charger is not charging the battery successfully. This can be for a number of reasons: The battery may be overcharged; the battery may not be taking a charge in a reasonable amount of time; the battery may be too warm to be charged without causing damage to its internal cells; or, the battery charger may have an internal fault.

The FAULT LED may also come on if power is applied to the charger, but the charger is not connected to the instrument. This is because the charger cannot distinguish between a missing battery and a battery that is not responding to charging correctly.

If the FAULT LED comes on, take the following steps to try to clear the condition:

1. Make sure that the charger is properly connected to the XTpc transmitter and wait a few minutes (2-5) to see if the FAULT LED comes off.
2. If the FAULT LED does not come off after a few minutes, remove the power connector from the charger, and reconnect it to start the charger.
3. If the XTPC transmitter is warm, move it to a conditioned space and allow it to cool for several hours before attempting a charge again.
4. If the FAULT LED remains on after the steps above, contact Schonstedt Instrument Company for further instructions.

Recommendations for Battery Charging and Storage

Due to battery composition and safety features built into the charger, it may be necessary to do two or more full-charging cycles to bring the battery back up to full capacity if it has been completely discharged. If you suspect the battery has been fully depleted, such as when it has been in storage for a long time, or when the transmitter won't even turn on, it is recommended to do at least two consecutive charging cycles before resuming normal use of the battery. Make sure you unplug the charger from the battery in between the two cycles.

The higher the storage temperature, the faster the battery will self-discharge, reducing its shelf life. The recommended storage temperature is 50° to 70°F (10° to 20°C). Storing the battery at higher temperature can reduce its overall life, storing at colder temperatures is preferred and beneficial.

SECTION II : SPECIFICATIONS

(Specifications are subject to change without notice)

Receiver

Operating Frequency:	Active and passive frequencies depending on model (see Model Comparison Chart)
Battery:	9 V Alkaline single battery
Battery Life:	12 hrs intermittent use
Audio Output:	10 - 1500 Hz determined by signal strength 0 - 70 db SPL (Sound Pressure Level), volume controlled
Weight (incl. batteries):	Under 2.8 Lbs
Operating Temp.:	-4°F to 140°F (-20°C to 70°C)
Overall Dimensions:	Closed: 17.5 in x 3 in x 8.5 in (44 cm x 7.6 cm x 21.5 cm) Extended: 27.7 in x 3 in x 8.5 in (70 cm x 7.6 cm x 21.5 cm)
Max. Depth Capability:	Approximately 19' (5.8 m) Sonde mode approximately 5'- 8' (1.5m - 2.5m)

Transmitter

Operating Frequency	33 kHz or 82 kHz, depending on model (see Model Comparison Chart)
Output Power:	33 kHz - 1.8 W maximum (conductive mode) 82 kHz - 1.0 W maximum (conductive mode)
Dimensions:	7.2 in x 2.2 in x 1.5 in (18.3 cm x 5.6 cm x 3.8 cm)
Battery Type:	Rechargeable NiMH pack (7.2 V)
Battery Life:	8 hours intermittent operation
Charging:	Smart charger powered by AC supply or vehicle supply
Outputs/Inputs:	Circular "smart" connector to: 1) Inductive antenna 2) Inductive clamp 3) Conductive clips 4) Battery charger
Weight:	Under 1.5 lbs
Operating Temp.:	-4°F to 140°F (-20°C to 70°C)

SECTION VIII : OPERATING RECOMMENDATIONS

Follow these tips and recommendations to operate your XTpc Pipe and Cable Locator:

- 1) Whenever possible, use the conductive mode, which provides the strongest and best-coupled signal.
- 2) When operating in conductive mode:
 - The ground stake should be buried on a line perpendicular to the utility to be traced and as far from it as possible.
 - Verify that a good circuit has been established by checking the output current from the transmitter.
 - If necessary, make adjustments to the ground stake or clips to improve the connection.
 - You can also manually adjust the output power to affect the output current.
- 3) If using the inductive mode, place the antenna tube (attached to the transmitter) over the buried cable or pipe in the direction indicated by the arrows on the antenna tube label.
- 4) If using the inductive clamp mode, place the clamp so that it completely encircles the desired cable or pipe. Make sure the clamp can fully close so that both ends touch.
- 5) When operating in the passive mode, or the passive cathodic mode. Be aware of your surroundings and possible interference from overhead power lines or nearby transformers or substations.
- 6) In all operating modes, always set the gain at the minimum setting that shows a clear "peak" over the target. Optimum results will most likely be obtained with a signal strength reading between 200 and 800. A reading of 999 indicates the signal is saturating the amplifiers and the gain should be reduced.
- 7) Searching for a sonde:

Once in the surroundings of the sonde, it is important to differentiate whether you are positioned along the axis of the sonde (the direction of the pipe) or off to either side. In the sonde mode the arrows are not functional, so the signal strength is the only indication available, and it will be "null" (very close to zero) if the receiver is placed on the axis of the sonde with the plane of the sensors perpendicular to it. Move away from the axis and follow the direction that results in increasing signal strength. Rotate the receiver back and forth and move in the direction that produces the maximum. As the receiver gets closer to the sonde the signal strength increases to a maximum when directly over the sonde, if the plane of the sensors is parallel to the axis of the sonde (approaching from a direction that is perpendicular to the direction of the pipe). A rotation of 90 degrees from this position should produce a null. To measure depth simply place the tip of the unit on the ground and press the DEPTH button when the signal strength is at a maximum. The achievable depth depends on a number of factors, but typically it is possible to read depth up to 5 to 8 feet.

SECTION IX: TROUBLESHOOTING GUIDE

Symptom	Possible Cause	Action
Receiver Inoperative	Discharged or faulty battery	Replace battery
	Incorrect battery polarity	Check bottom of battery door for correct polarity, and re-insert battery.
No Audio	Audio turned off	Press the “ON” button on the receiver to cycle through the audio volume options.
Transmitter Inoperative	Discharged battery	Charge battery as described in manual.
Transmitter battery life is short	Battery not fully charged	Charge battery until the green light on the charger comes on. Then unplug the charger, reconnect, and repeat charging cycle.

SECTION X: TECHNICAL SUPPORT

Schonstedt offers technical support and sales support. For any reason regarding usage and application please contact our technical support team at 888-32-TRACE (888-328-7223).

FOR SERVICE OR REPAIR

Please ship locator to:

Schonstedt Instrument Company
100 Edmond Road
Kearneysville, WV 25430
Attn: Customer Service Dept.

SECTION XI: WARRANTY INFORMATION

The Schonstedt Instrument Company (Schonstedt) warrants each product of its manufacture to be free from defects in material and workmanship subject to the following terms and conditions. The warranty is effective for 3 years (with the return of the Customer Registration Card) after the shipment by Schonstedt to the original purchaser.

Schonstedt's obligation under the warranty is limited to servicing or adjusting any product returned to the factory for this purpose and to replacing any defective part thereof. Such product must be returned by the original purchaser, transportation charges prepaid, with proof in writing, to our satisfaction, of the defect. If the fault has been caused by misuse or abnormal conditions of operation, repairs will be billed at cost. Prior to repair, in this instance, a cost estimate will be submitted. Service or shipping information will be furnished upon notification of the difficulty encountered. Model and serial numbers must be supplied by user. Batteries are specifically excluded under the warranty.

Schonstedt shall not be liable for any injury to persons or property or for any other special or consequential damages sustained or expenses incurred by reason of the use of any Schonstedt product.