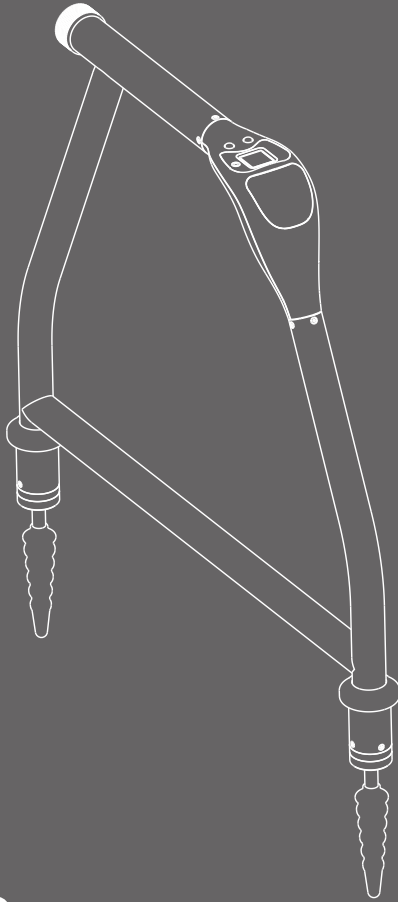


**AMPROBE®**



**AF-600**

**A-Frame cable ground fault finder**

**User Manual**

**ENG**

**FRE**

**SPA**

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**AMPROBE®**

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**English**



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
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# 1. PRECAUTIONS AND SAFETY MEASURES

## SYMBOLS

	Caution! Refer to the explanation in this manual.
	WARNING HAZARDOUS VOLTAGE. Risk of electric shock.
	Consult user documentation.
	The equipment is protected by double insulation or reinforced insulation.
	Battery.
	Certified by CSA Group to North American safety standards.
	Complies with European Directives.
	Conforms to relevant South Korean EMC Standards.
	Conforms to relevant Australian standards.
	This product complies with the WEEE Directive marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste. Product Category: With reference to the equipment types in the WEEE Directive Annex I, this product is classed as category 9 "Monitoring and Control Instrumentation" product. Do not dispose of this product as unsorted municipal waste.

## SAFETY INFORMATION

The product complies with:

- UL/IEC 61010-1, CAN/CSA C22.2 No. 61010-1, Pollution Degree 2
- EMC IEC 61326-1

### CENELEC Directives

The instrument conforms to CENELEC Low-voltage directive 2014/35/EU and Electromagnetic compatibility directive 2014/30/EU.

### **Warnings: Read Before Using**

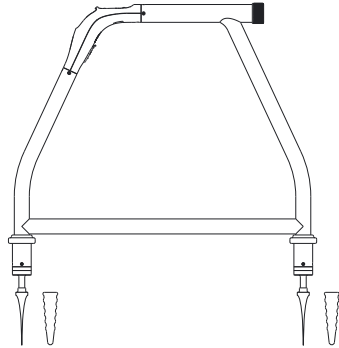
To avoid the possibility of electric shock or personal injury:

- Use the Product only as specified in this manual or the protection provided by the instrument may be compromised.
- Avoid working alone so assistance can be rendered.
- Test on a known signal source within the rated voltage range of the Product both before and after use to ensure the Product is in good working conditions.
- Do not use the Product around explosive gas, vapor, or in damp or wet environments that exceed IP54 rating. This Product meets water and dust protection IP 54 per IEC 60529.
- Inspect the Product before use and do not use if it appears damaged. Check for cracks or missing plastic. Pay particular attention to the insulation around the connectors.
- Inspect the earth spike and product body insulation (fiber glass and plastics) before use. Do not use if insulation is damaged.
- A-Frame is to be used with UAT-600-T Transmitter. Check all safety information in UAT-600 User Manual before use.
- Do not use the Product if it operates incorrectly. Protection may be impaired. When in doubt, have the Product serviced.
- Have the Product serviced only by qualified service personnel.
- Use extreme caution when working around bare conductors or bus bars. Contact with the conductor could result in electric shock.
- Do not hold the Product beyond the tactile barrier.

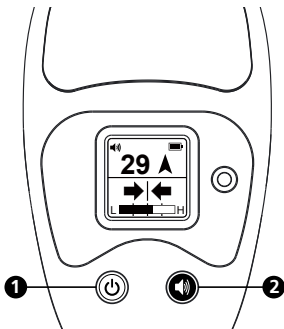
- Remove the Product from measuring position before opening the Product case or battery cover.
- Never operate the Product with the battery cover removed or the case open.
- Use caution when working with voltages above 30 V AC RMS, 42 V AC peak, or 60 V DC. These voltages pose a shock hazard.
- Do not attempt to connect to any circuit carrying voltage.
- To avoid false readings that can lead to electrical shock and/or injury, replace the batteries as soon as the low battery indicator appears. Check Product operation on a known source before and after use.
- Use only 6 x AA batteries properly installed in the battery compartment, to power the Product (see Section 7: BATTERY REPLACEMENT).
- When servicing, use only specified user serviceable replacement parts.
- Adhere to local and national safety codes. Individual protective equipment must be used to prevent shock and arc blast injury where hazardous live conductors are exposed.
- For use by competent persons only.
- Remove the batteries if the Product is not used for an extended period of time, or if stored in temperatures above 140 °F (60 °C). If the batteries are not removed, battery leakage can damage the Product.
- Follow all battery care from the battery manufacturer.

## 2. INTRODUCTION

The AF-600 A-Frame cable ground fault finder is an optional accessory specifically designed for the Amprobe UAT-600 series. In combination with the Transmitter, it will pinpoint the place where a cable metal conductor (either a sheath or a metallic conductor of the wire) touches the ground. It can also detect other conductors to ground faults such as pipeline coating defects.



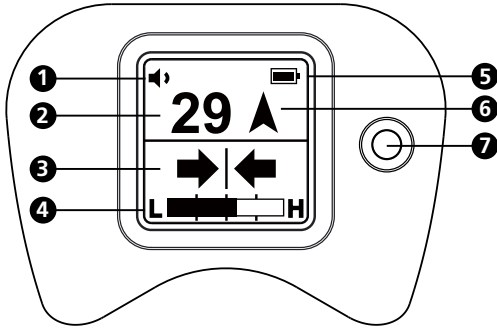
## 3. OPERATION



- 1 **On/off** (⏻): Press for 2 seconds to turn on or turn off the A-Frame.
- 2 **Speaker Volume** (🔊): Press repeatedly to loop between mute and three levels of volume.

## 4. FAULT LOCATE SCREEN

A short press on the On/Off button will switch on the unit, defaulting to the Fault Locate screen.



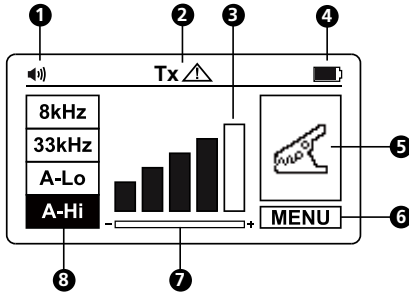
- ❶ Speaker Volume Setting
- ❷ 2-digit Fault Signal Level
- ❸ Left/Right Cable Position Indicator
- ❹ Signal Strength Indicator
- ❺ Battery Indicator
- ❻ Fault Direction Compass
- ❼ Light Sensor

## 5. UAT-600-T TRANSMITTER

The UAT-600-T Transmitter is used to apply a fault find signal to the utility under test. Use the Transmitter in combination with the A-Frame to receive the signal and pinpoint a place of the fault.

### 5.1 Transmitter Display

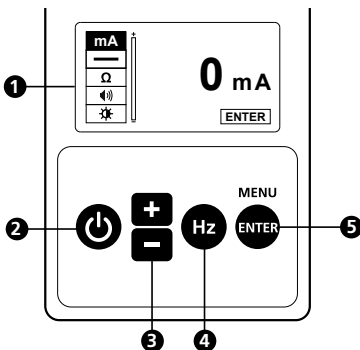
The contents of the screen depend on the function being performed. The below diagram shows general functions of the Transmitter screen (for further details, see the UAT-600 User Manual).



- ❶ Speaker Volume
- ❷ Output Hazardous Voltage
- ❸ Signal Output Level
- ❹ Battery Indicator
- ❺ Locating Mode
- ❻ Menu
- ❼ Gain Setting Reminder
- ❽ Frequency Selection

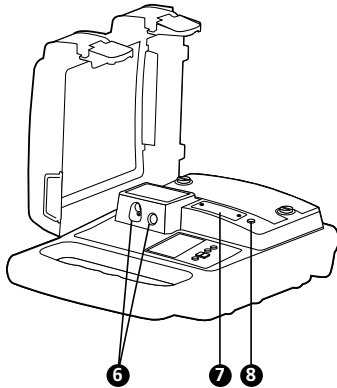
### 5.2 Transmitter Controls and Connections

The below diagram shows general functions of the Transmitter controls and connections (for further details, see the UAT-600 User Manual).



- ❶ LCD Display
- ❷ Power ON/OFF
- ❸ Down/Decrease
- ❹ Frequency Selection
- ❺ Enter/Menu





- 6 Terminals for direct connection and signal clamp
- 7 Output protection fuse
- 8 Hazardous voltage indicator (over 30 V)

## 6. USING THE A-FRAME TO PINPOINT A FAULT

### ⚠ WARNING

Always be aware of the location of buried utilities (especially buried power lines) when pushing the spikes of the A-Frame into the soil.

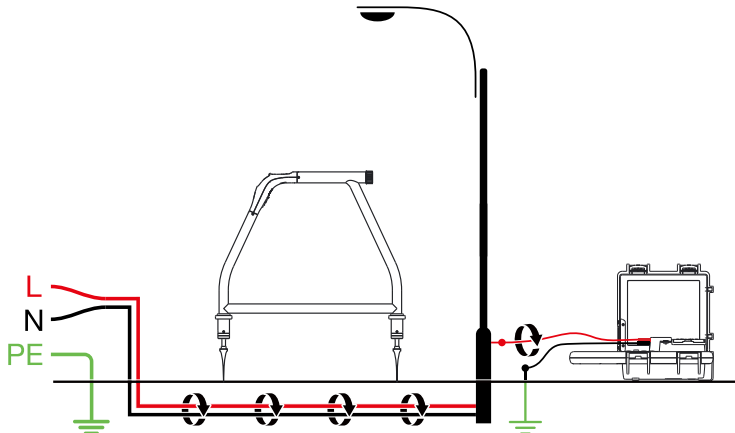
The spikes of the A-Frame are sharp. Always handle carefully to avoid injury.

The A-Frame is used to detect ground faults on cables and pipes. In the case of cables, faults are usually caused by insulation damage allowing the metallic sheath or internal conductor to become in contact with the ground. In the case of pipes, the faults consist of coating defects.

The A-Frame works in conjunction with the UAT-600-T Transmitter. The Transmitter is used to apply a fault find signal to the utility under test, and the A-Frame is used to receive the signal and pinpoint a place of the fault.

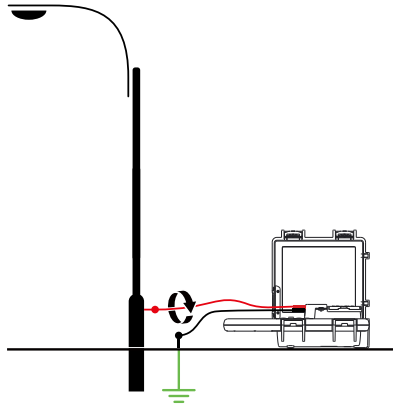
### 6.1 Preparing a Cable

1. Disconnect and isolate the cable on both ends. Make sure to disconnect all ground bonding. This will ensure that the test signal traveling through the ground fault is not masked or doesn't interfere with the one conducted by grounding bonding to the ground. The A-Frame cannot distinguish between these two signals.



2. Use the resistance measuring function on the Transmitter, or a dedicated resistance measuring device, to identify a cable with a fault to ground. The A-Frame will typically detect faults up to 2 MΩ (depending on the distance from the Transmitter, soil conditions, etc.).
3. Optionally, you can precisely detect and mark cable locations using the UAT-600-R receiver. Refer to the UAT-600 User Manual for detailed instructions how to locate underground utilities.


## 6.2 Connecting the UAT-600-T Transmitter



### ⚠ ⚠ Warnings: Read Before Using

- Use the UAT-600-T Transmitter only as specified in UAT-600 User Manual or the protection provided by the instrument may be compromised.
- Check and read all safety information in UAT-600 User Manual before use.
- Inspect the test leads before use. Do not use if insulation is damaged or metal is exposed.
- Check the test leads for continuity. Replace damaged test leads before using the Product.
- Never operate the Product with the battery cover removed or the case open.
- Use extreme caution when working around bare conductors or bus bars. Contact with the conductor could result in electric shock.
- Disconnect and isolate the cable on both ends before connecting the UAT-600-T to the cable.

### Setting up the Transmitter

1. Turn the Transmitter on by pressing power button for 2 seconds.
2. Connect the black and red test leads to the Transmitter inputs. The Transmitter will switch automatically to Direct Connection Mode and the display will show the direct connection icon .
3. Insert the ground stake into the ground a few yards away, perpendicular to the line. Connect the black lead to the ground stake with an alligator clip.
4. Connect a red test lead to the target line.
5. Press Hz button repeatedly to select "A-LO" (A-Frame low signal) or "A-Hi" (A-Frame high signal). Use "A-LO" for higher accuracy pinpointing. Use the "A-Hi" setting if the line to be surveyed is long or the fault resistance is high.
6. Press the "+/-" buttons to set the output to level one. Increase the level if the resulting signal strength is poor. Increasing the signal unnecessarily may result in the signal "bleeding off" onto other services and creating misleading "ghost" signals. It will also drain more power from the battery.


**Note:** When connected, the Transmitter will emit a beep tone. The better the connection to the line and ground, the faster the beep tone will be. Check for a good connection by disconnecting and then reconnecting the red lead. It is also possible to check the signal current being supplied by the Transmitter by entering the user menu and selecting the mA option.

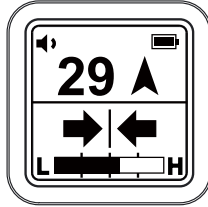
Things that can affect the quality of connection are a rusty pipe connection point (clean the connection area with a wire brush) or poor grounding. To improve the connection quality due to poor grounding, try inserting the stake into damp ground. If necessary, dampen the surrounding ground with water. If grounding is still an issue, try connecting test lead to a manhole cover surround. Avoid connecting to fence railings as these may create return signal currents along the fencing that will interfere with the locating signal.

**Note:** If the signal level bars do not fill, this indicates that the impedance of the line is limiting the current output. Increasing the output beyond this point will not increase the signal. If more signal is required, check the quality of the connection to the line and ground.

When connecting to large diameter pipes and cables, it is sometimes not possible to find a suitable projection to apply the alligator clip. If the material is ferrous, use a magnet to make contact to the line and then attach the alligator clip to a magnet. For example: making a connection to a street lighting circuit. Usually it is practice to connect the sheath of a lighting cable to the metallic inspection cover of a street lamp. Making a connection to the inspection plate will induce a signal to the cable via the plate and sheath. Usually, there is no projection on the plate on which to clip so using a magnet on the plate provides a suitable clipping point.

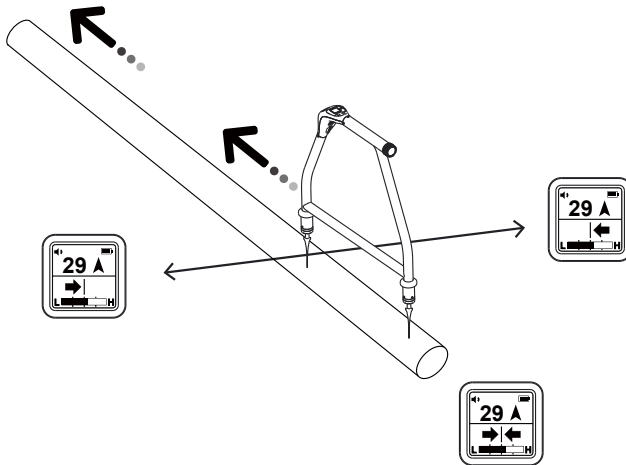
### 6.3 Pinpointing the Fault with the A-Frame

1. Remove the rubber spike covers from the A-Frame.
2. Press the **On/Off** button to turn the unit on.
3. Use the Left/Right indicator arrows to position A-Frame over the cable. At that point, the bar graph at the bottom of the display will show maximum value for the test signal strength. The speaker will emit a pulsed tone on one side of the cable and a solid tone on the other, so it is possible to locate the cable without looking at the screen. If necessary, adjust the volume by using short presses on the speaker button .



**Note:**

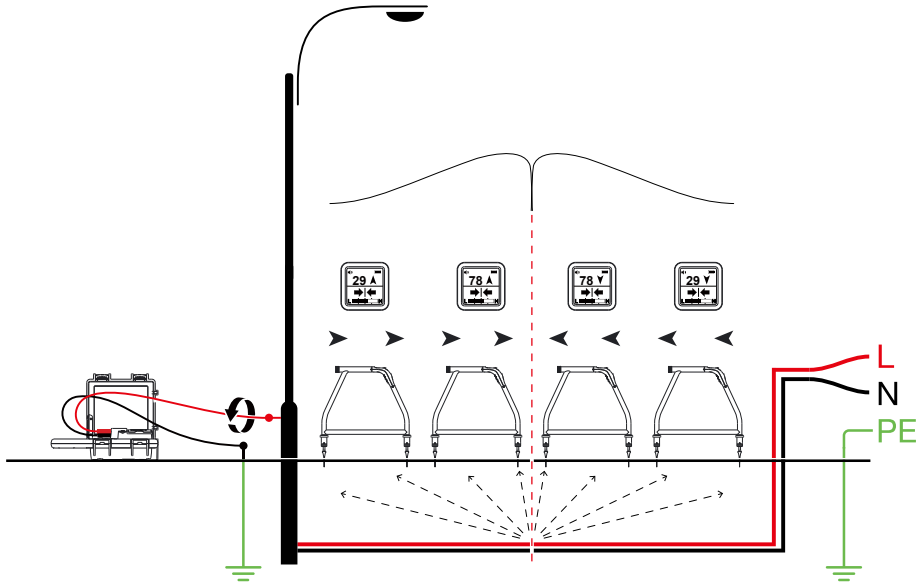
- If the spikes are not in the ground or there is only a very low signal, the 2-digit Fault Signal Level reading and Fault Direction Compass arrow may not be visible. These are only shown when there is a valid fault find signal.
- If the position of the line is different when comparing the Left/Right position to the peak bar graph position, there could be a distorted signal that may affect readings. Proceed with caution.



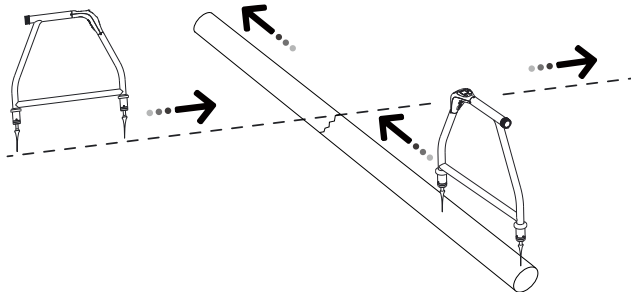
4. Start near the Transmitter. Hold the A-Frame in line with the route of the cable. Walk along the route of the line placing the spikes of the A-Frame in the ground every two or three paces. Allow a couple of seconds for the readings to settle before moving to the next position. Keep the A-Frame aligned with the cable by using the Left/Right arrows.

Note: Initially, the Fault Direction Compass arrow on the display may point towards the Transmitter grounding stake, but as you continue walking along the cable away from the Transmitter it will fluctuate or disappear. The 2-digit Fault Signal Level may also continue decreasing or disappear. This is because the A-Frame detects signals conducted by the Transmitter ground stake and a cable fault is further along the line.

5. In proximity of the fault, the A-Frame will detect the fault signal and the Fault Direction Compass arrow will point forward.
6. Continue moving forward. The 2-digit Fault Signal Level reading will increase as the fault is neared. When you cross the place of the fault, the Compass Fault Detection will change a direction and the 2-digit Fault Signal level will start decreasing as you go away from the fault. Maximum reading will be just before and just after the fault.




7. Carefully place the A-Frame before and after the fault to pinpoint it. Repeating this in a line perpendicular to the direction of the cable will pinpoint the fault laterally.



- ☞ If it is suspected that there is just one fault, insert the A-frame approximately 3 ft (1 m) from the ground stake. Note the two digit number - this is approximately the maximum reading that will be measured over the fault.

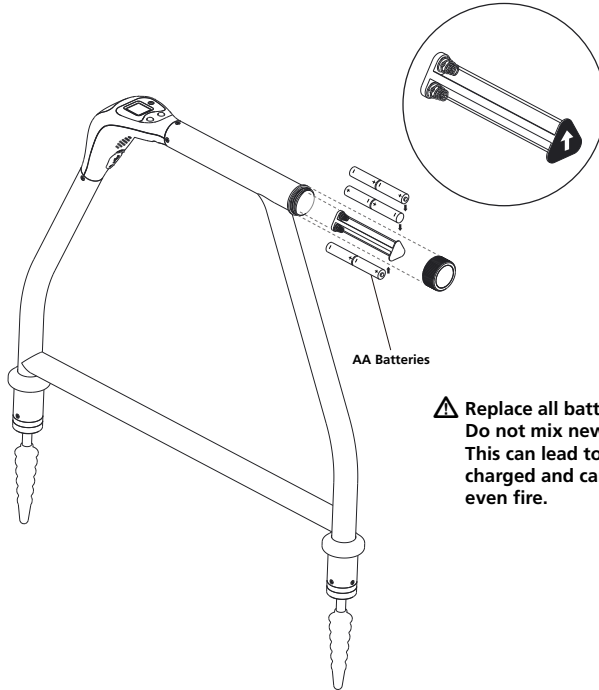
## 7. BATTERY REPLACEMENT

The unit is powered by six AA alkaline batteries (included). When the battery indicator on the screen indicates empty , the batteries should be replaced.

### Accessing the Batteries






Unscrew the battery cap on the A-Frame handle and remove by gently pulling the battery holder.

When inserting the battery pack, ensure the correct orientation of the holder. The two contacts at the end of the battery pack should be at the bottom as shown in the adjacent graphic.



- ⚠ **Replace all batteries at the same time. Do not mix new and old batteries. This can lead to batteries being reverse charged and can cause damage, heat and even fire.**

## 8. SPECIFICATIONS

Tracing mode (de-energized)	8 kHz (8,192 Hz)
Locating mode	Ground fault locating
Sensitivity (typical)	Cable locate mode at 1 meter depth: 10 uA Fault locate mode: up to 2 MΩ fault
Display backlight	Automatic
Audio indication	Speaker indicates left/right by pulsed/continuous tone
Compatible transmitter	UAT-600-T Transmitter
Display	1.28 in (33 mm) 128 x 128 BW outdoor LCD display with auto backlight
Update rate	Instantaneous
Operating temperature and humidity	-4 °F to 122 °F (-20 °C to 50 °C), ≤90% RH
Storage temperature and humidity	-40 °F to 140 °F (-40 °C to 60 °C), ≤90% RH
Operating altitude	< 6561 ft (< 2000 m)
Pollution degree	2
Water and dust resistance	IP54
Drop proof	3.28 ft (1 m)
Power supply	Six (6) 1.5 V AA alkaline batteries
Auto power off	15 minutes idle
Battery life	Approx. 60 hours at 70 °F (21 °C) (Typical)
Low battery indication	Blinking 
Agency approval	   
Safety compliance	IEC 61010-1 CSA/UL 61010-1
Electromagnetic Compatibility	IEC 61326-1 Korea (KCC): Class A Equipment (Industrial Broadcasting & Communication Equipment) <sup>[1]</sup> <sup>[1]</sup> This product meets requirements for industrial (Class A) electromagnetic wave equipment and the seller or user should take notice of it. This equipment is intended for use in business environments and is not to be used in homes.
Size (H x W x L)	Approx. 14 x 9 x 4.7 in (355 x 230 x 120 mm)
Weight	Approx. 4.2 lb (1.9 kg) (batteries installed)