Track Watch

June 26, 2019

Dip Switch Settings
for Track-Side Warning Alarm

1. Lay the Track Side Warning Alarm on its backside with key side facing up.
2. Locate tamper screws under the lip of the case lid.

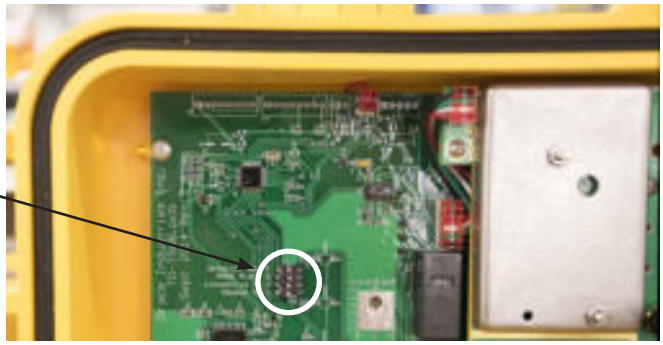
Figure 1

Back the screws out far enough to allow lid to open

3. Use T10 Torx driver and back out the screws so the case lid can be opened.
   NOTE: the screws do not have to come completely out.
4. Stand unit up, unlatch the two snaps, and open the lid.
5. Locate the Dip Switch on the circuit board.

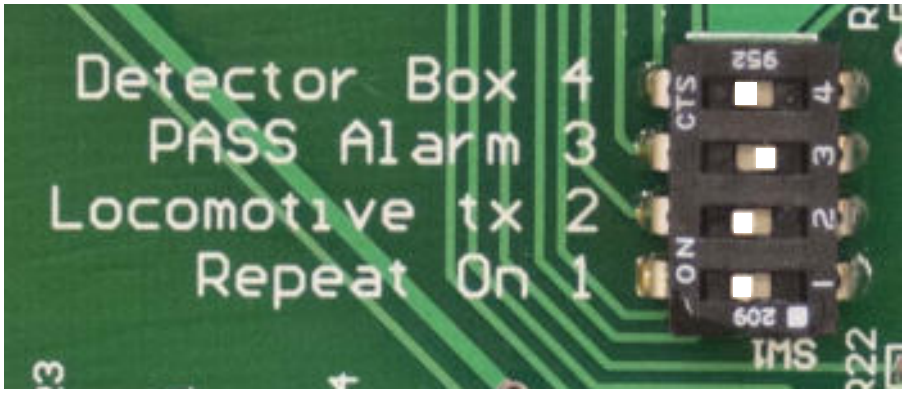
Figure

Dip Switch in upper left area of the circuit board



6. Set the Dip Switches as shown below.

Figure



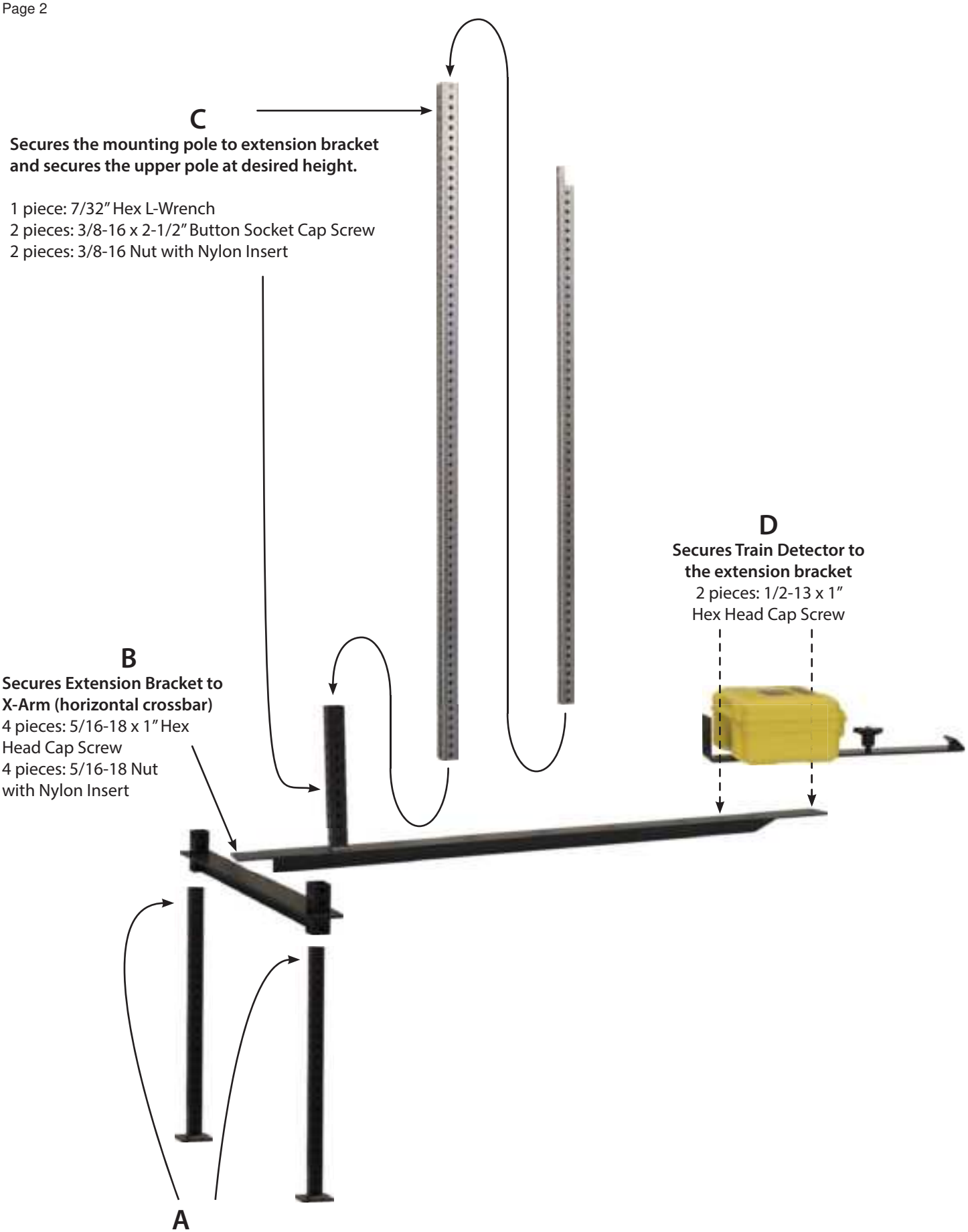
4 ON
3 Off
2 ON
1 ON

7. Close the lid. Latch the two snaps. Screw the Torx screws back into place.
   DO NOT OVERTIGHTEN the screws – doing so can strip the threads.
8. Test the Track Side Warning Alarm.

Track Watch

Track Watch Extension Bracket

ASSEMBLY INSTRUCTIONS



C

Secures the mounting pole to extension bracket and secures the upper pole at desired height.

1 piece: 7/32" Hex L-Wrench
2 pieces: 3/8-16 x 2-1/2" Button Socket Cap Screw
2 pieces: 3/8-16 Nut with Nylon Insert

D

Secures Train Detector to the extension bracket
2 pieces: 1/2-13 x 1" Hex Head Cap Screw

B

Secures Extension Bracket to X-Arm (horizontal crossbar)
4 pieces: 5/16-18 x 1" Hex Head Cap Screw
4 pieces: 5/16-18 Nut with Nylon Insert

A

Used to secure the X-Arm to support posts
2 pieces -- 5/16-18 x 2" Hex Head Cap Screw
2 pieces -- 5/16-18 Nut with Nylon Insert

Attaching Micro Repeater

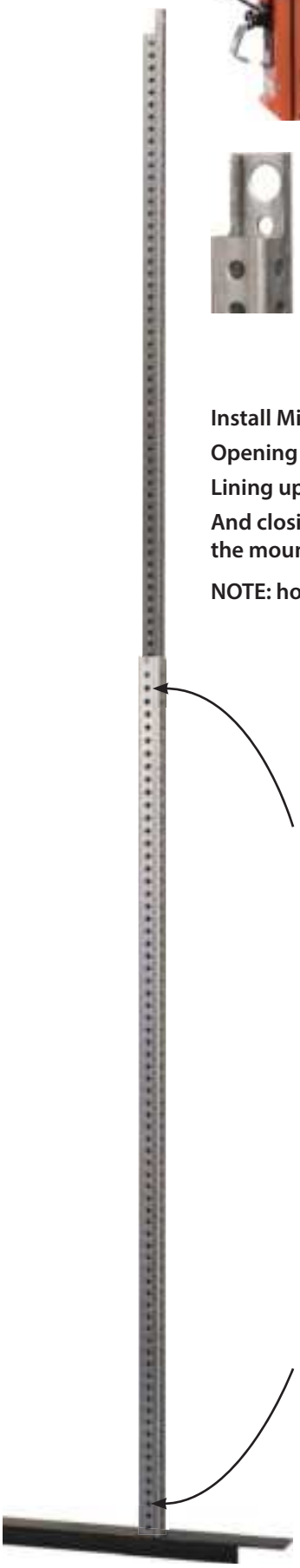
Install Micro Repeater to the mounting pole as shown by:

Opening the Grip Clip on the Micro Repeater,

Lining up the clip with the large hole at the top of the pole,

And closing Grip Clip completely to secure Micro Repeater to the mounting pole.

NOTE: hole is large enough to allow Grip Clip to close easily.



At 3 holes down from the top of the mounting pole, use a 3/8-16 x 2-1/2" Button Socket Cap Screw and 3/8-16 Nut with Nylon Insert to secure the mounting pole to the extension bracket.

At 3 holes up from the bottom of the mounting pole, use a 3/8-16 x 2-1/2" Button Socket Cap Screw and 3/8-16 Nut with Nylon Insert to secure the mounting pole to the extension bracket.

GRACE
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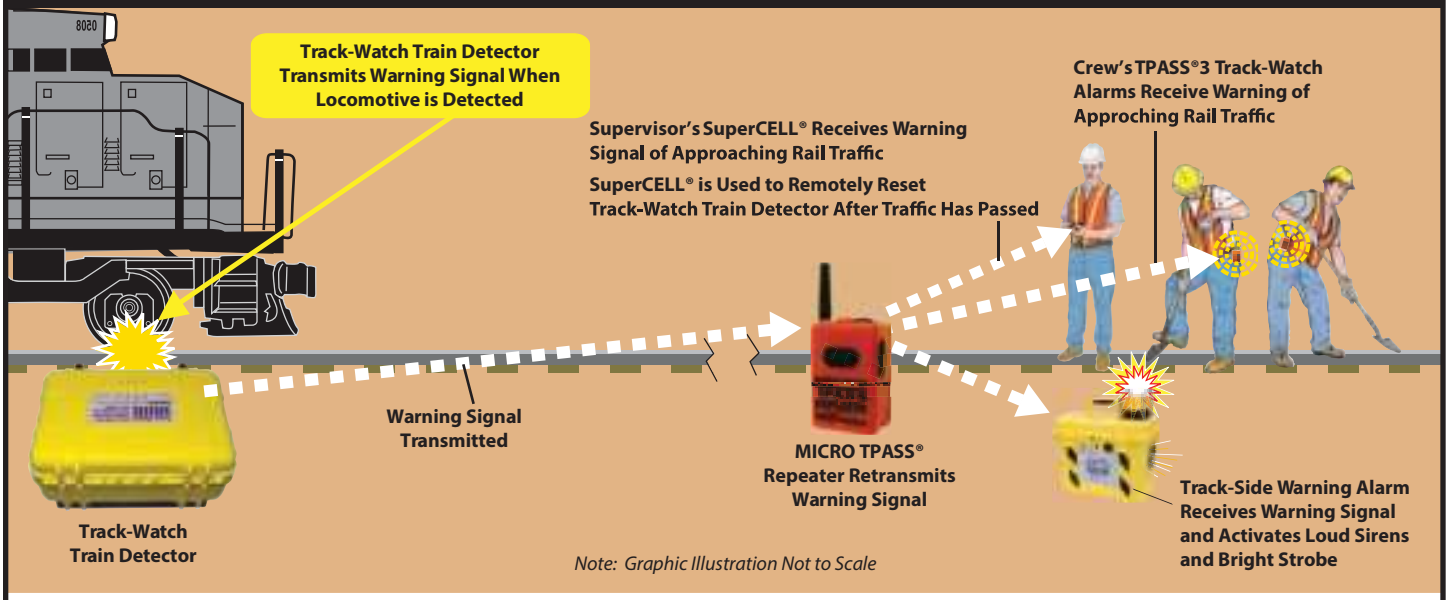
Solutions for Life Safety

305 Bend Hill Road, Fredonia, PA 16124 U.S.A.
www.graceindustries.com

Track Watch MAINTENANCE-OF-WAY SAFETY SYSTEM

USER'S INFORMATION



TRACK-WATCH SAFETY SYSTEM COMPONENTS

SuperCELL® SC500
SECTION 2

TPASS®3 TRACK-WATCH Personal Safety Alarms
SECTION 3

MICRO TPASS® REPEATERS
SECTION 4

TRACK-SIDE WARNING ALARM
SECTION 5

TRACK-WATCH TRAIN DETECTOR Shown with Rail Mounting Bracket
SECTION 1

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Solutions for Life Safety

TRACK-WATCH USER'S INFORMATION INTRODUCTION

Track-Watch is an advance warning system that alerts Maintenance-Of-Way crews to approaching rail traffic.

The Track-Watch Train Detector senses oncoming rail traffic and immediately transmits a radio warning Alarm signal to the track worker's personal safety device.

SuperCELL® and TPASS®3 Track-Watch are personal safety devices providing each worker with emergency notification by way of a loud, audible alarm and flashing LED indicators. SuperCELL® is also equipped with a vibration alert.

This advance warning is extremely valuable to all personnel working on railroads, subways, or related infrastructure.

Optional Equipment: Track-Side Warning Alarm is a self-contained warning device equipped with dual warning sirens and a strobe light; the sirens and strobe light are activated by the Alarm signal transmitted from the Track-Watch Train Detector. The Track-Side Warning Alarm provides the crew with the added protection of an additional safety alarm.

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GRACE INDUSTRIES, INC.
Solutions for Life Safety

SECTION 1: TRACK-WATCH TRAIN DETECTOR INTRODUCTION

Track-Watch Train Detector mounted to rail

Train Detector is the central component of the Track-Watch System. When rail traffic is detected by the Train Detector, the device transmits an Alarm signal to Maintenance-Of-Way Crews.

When the Alarm signal is received by SuperCELL® or TPASS®3-TW, these personal safety devices sound an audio alarm notifying the wearer of oncoming rail traffic. At the worksite, the Track-Side Warning Alarm sirens are also activated by the Alarm signals.

Track-Watch Train Detectors should be deployed in a manner consistent with your company's standard operating procedure.

We recommend placing Track-Watch Train Detectors at a minimum of one mile from the worksite, and on each approach to the worksite to provide personnel with ample time to safely move away from potential danger when rail traffic is detected. One Train Detector provides one-way protection while a second Train Detector provides full two-way worksite coverage.

Train Detector with mounting bracket should be securely attached to an appropriate section of rail. **We strongly recommend the mounting bracket be secured with a padlock once attached, to prevent unauthorized tampering or removal. NOTE: Security padlocks are not included.**

Micro TPASS® Repeaters enhance the system range by retransmitting the Alarm signals to the worksite. Track-Side Warning Alarm, SuperCELL® and TPASS®3-TW also act as repeaters, retransmitting emergency signals.

***WARNING*: Once deployed, it is critical to keep the detection eye of the Train Detector clean and clear of debris (such as dirt, snow, leaves, etc.) to ensure proper operation of the device.**

SECTION 1: TRACK-WATCH TRAIN DETECTOR INTRODUCTION (continued)

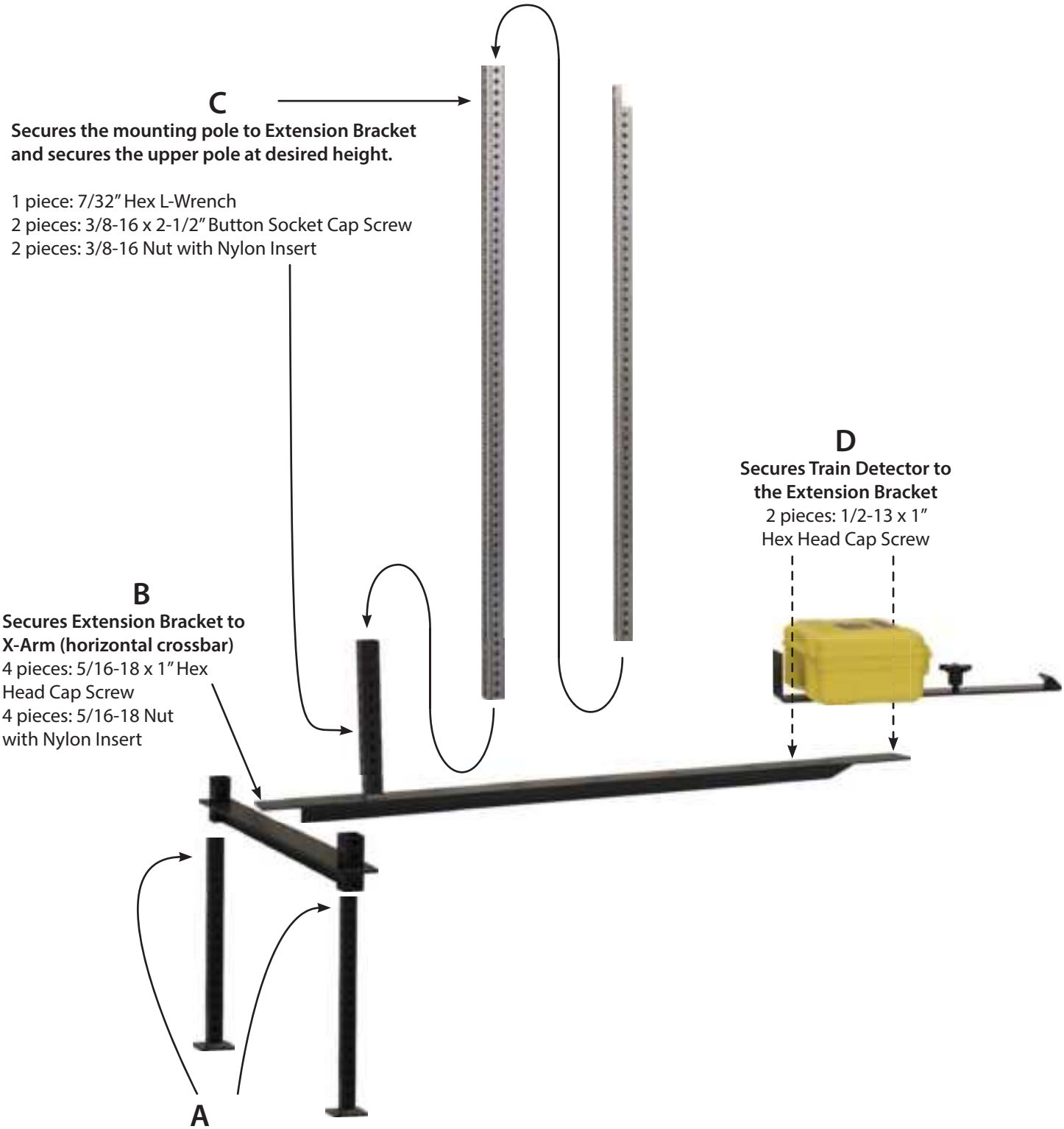
TRACK-WATCH TRAIN DETECTOR MOUNTING

SECTION 1: TRACK-WATCH TRAIN DETECTOR INTRODUCTION (continued)

TRACK-WATCH TRAIN DETECTOR EXTENSION BRACKET for Mounting the Micro Repeater High Above Train Detector

SECTION 1: TRACK-WATCH TRAIN DETECTOR INTRODUCTION (continued)

TRACK-WATCH TRAIN DETECTOR EXTENSION BRACKET



C

Secures the mounting pole to Extension Bracket and secures the upper pole at desired height.

1 piece: 7/32" Hex L-Wrench
2 pieces: 3/8-16 x 2-1/2" Button Socket Cap Screw
2 pieces: 3/8-16 Nut with Nylon Insert

D

Secures Train Detector to the Extension Bracket
2 pieces: 1/2-13 x 1"
Hex Head Cap Screw

B

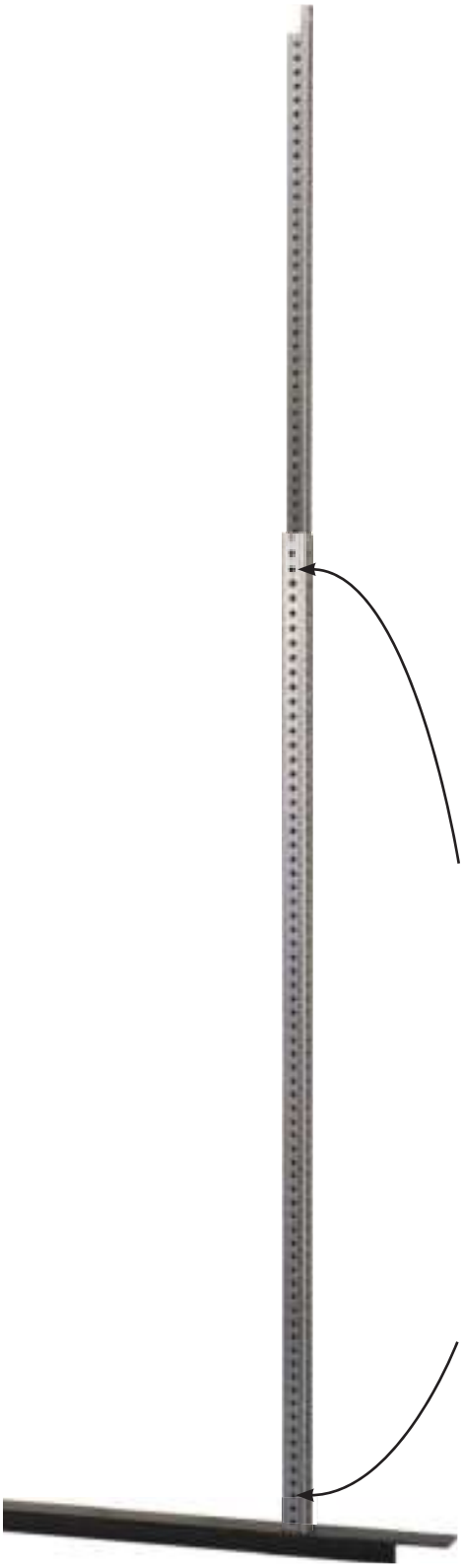
Secures Extension Bracket to X-Arm (horizontal crossbar)
4 pieces: 5/16-18 x 1" Hex Head Cap Screw
4 pieces: 5/16-18 Nut with Nylon Insert

A

Used to secure the X-Arm to support posts
2 pieces -- 5/16-18 x 2" Hex Head Cap Screw
2 pieces -- 5/16-18 Nut with Nylon Insert

SECTION 1: TRACK-WATCH TRAIN DETECTOR INTRODUCTION (continued)

TRACK-WATCH TRAIN DETECTOR EXTENSION BRACKET



Attaching Micro Repeater to Extension Bracket

Install Micro Repeater to the mounting pole as shown by:

Opening the Grip Clip on the Micro Repeater,

Lining up the clip with the large hole at the top of the pole,

And closing Grip Clip completely to secure Micro Repeater to the mounting pole.

NOTE: hole is large enough to allow Grip Clip to close easily.

At 3 holes down from the top of the mounting pole, use a 3/8-16 x 2-1/2" Button Socket Cap Screw and 3/8-16 Nut with Nylon Insert to secure the mounting pole to the Extension Bracket.

At 3 holes up from the bottom of the mounting pole, use a 3/8-16 x 2-1/2" Button Socket Cap Screw and 3/8-16 Nut with Nylon Insert to secure the mounting pole to the Extension Bracket.

SECTION 1: TRACK-WATCH TRAIN DETECTOR ACTIVATION

Inside of Train Detector case, shown with Micro TPASS® Repeater and SuperCELL®

1. Activation:

For enhanced security, a key-switch is used to select, change, and secure the operational status of the Track-Watch Train Detector.

There are three key-switch positions:

OFF / TEST / ON.

The key-switch is used to change operational status of the Track-Watch Train Detector.

Once the operational status is set, the security key may be removed to prevent unauthorized changes.

OFF - Key-Switch turned fully to the left (counterclockwise) turns the Track-Watch Train Detector **OFF**.

TEST - Key-Switch turned to the middle position (12 o'clock) activates testing mode of the train detection sensor.

ON - Turn Key-Switch fully to the right (clockwise) to turn **ON**.

SECTION 1: TRACK-WATCH TRAIN DETECTOR ACTIVATION (continued)

Key Shown in ON Position

Status LED Shown ON
Track-Watch Train Detector top view

2. Test Mode:

Test Mode allows the user to verify the Train Detector Sensor without activating or sending an Alarm Message.

Once the Train Detector is properly mounted to the rail, turn the key-switch to Test Mode and pass an object in front of the Detection Eye at the approximate distance of a passing train.

The **DETECT** LED indicator will glow as long as the passing object remains within detection range of the Detection Eye. After detection range has been verified, the Train Detector can be switched into ON mode.

3. Power ON:

With the lid open and the key-switch turned to the ON position, the Red Status LED indicator begins flashing at a rate of approximately 1 flash every 2 seconds (0.5 cycles-per-second). This slow flash rate indicates the unit is turned ON and the lid is open.

When the lid is closed, the Status LED begins flashing faster - approximately 3 flashes every 2 seconds (1.5 cycles-per-second). **This faster flash rate indicates the unit will arm itself within 45 seconds**. At this time, the Track-Watch Train Detector sensor is operational but will not trigger and will not transmit an Alarm.

After 45 seconds, the Red Status LED indicator will glow steadily. The unit is now armed, is actively sensing and awaiting rail traffic. Track-Watch Train Detector is now armed and will transmit an **Alarm signal** when a train passes by.

When the Track-Watch Train Detector is armed, it will transmit Heartbeat signals approximately every two seconds. Micro TPASS® Repeaters receive and repeat Heartbeat signals to other repeaters and the worksite. The Heartbeat signals are to aid in effective Micro TPASS® Repeater deployment to enhance system integrity.

Additional information on Micro TPASS® Repeater function and deployment may be found on page 8.

SECTION 1: TRACK-WATCH TRAIN DETECTOR ACTIVATION (continued)

Status LEDs
Track-Watch Train Detector top view

4. LED Indicators:

There are 4 status indicator LEDs on the Track-Watch Train Detector lid.

- **CHARGE** LED glows Red when the Track-Watch Train Detector battery is charging. Once fully charged, the LED turns off.
- **LOW BATT** flashes Red when the battery is low and needs charged. This LED is active only while the Track-Watch Train Detector is in the Test or ON mode. When LOW BATT indicator starts flashing, the unit will operate for up to 4 hours. **For Safety, the Train Detector MUST be removed from service and recharged when low battery is indicated.**
- **DETECT**

  1. Steady glow indicates a detected object is in front of the sensor.
  2. A rapid flash rate of approximately 3 flashes-per-second indicates the Train Detector has sensed an object and is actively transmitting **Alarm** signals.

  NOTE: This will be overridden by a stationary object in front of sensor.

- **STATUS**

  1. A slow flash of 1 flash every 2 seconds indicates power is ON, the lid is open, and the detector is NOT armed.
  2. Medium flash rate of 3 flashes ever 2 seconds indicates the lid is closed and the 45-second pre-arming countdown timer is in progress.
  3. **Steady glow indicates the unit is armed and actively sensing for rail traffic.**

SECTION 1: TRACK-WATCH TRAIN DETECTOR ACTIVATION (continued)

5. MICRO TPASS® Repeater Deployment

After the Train Detector is securely mounted onto the Extension Bracket and clamped to the railroad track, turned ON and armed, the deployment of Micro TPASS® Repeaters can begin.

Always place the first Micro Repeater at the top of the Extension Bracket. Elevating the placement of all Micro Repeaters will improve line-of-sight performance of the system. Micro Repeaters should be mounted at a minimum of five feet above track level and clear of all line-of-sight obstructions.

Activate the Micro Repeater by removing the Activation Key on the front of the device. You will hear escalating audio tones when the unit turns ON.

When the Train Detector is armed, it will transmit Heartbeat signals every 2 seconds. Verify the Train Detector Heartbeat signals are being received and retransmitted by the Micro Repeater by observing a momentary flash of the Micro Repeater's front Red LED indicators approximately every 2 seconds.

Continue to place Micro Repeaters at the next line-of-sight locations. **This distance should NOT exceed 1/2 mile (800 m) from the previously placed Micro Repeater**. As each Micro Repeater is placed, turn it ON and verify the Heartbeat signals are being received and retransmitted by observing the momentary flash of the front Red LED indicators about every 2 seconds.

Note: In bright sunlight, it may be difficult to see the Red LED indicators flashing on the Micro Repeater, however, by placing the Activation Key onto the Micro Repeater (*DO NOT turn the device off*), the unit will beep every time it receives and retransmits the Heartbeat signals from the Train Detector.

Continue the deployment of the Micro Repeaters in 1/2 mile (800 m) or line-of-sight intervals (whichever is shorter) until the work zone is reached.

To verify the communication link between the Track-Watch Train detector and the worksite SuperCELL®, follow instructions for Train Detector Reset. See below for Train Detector Reset information.

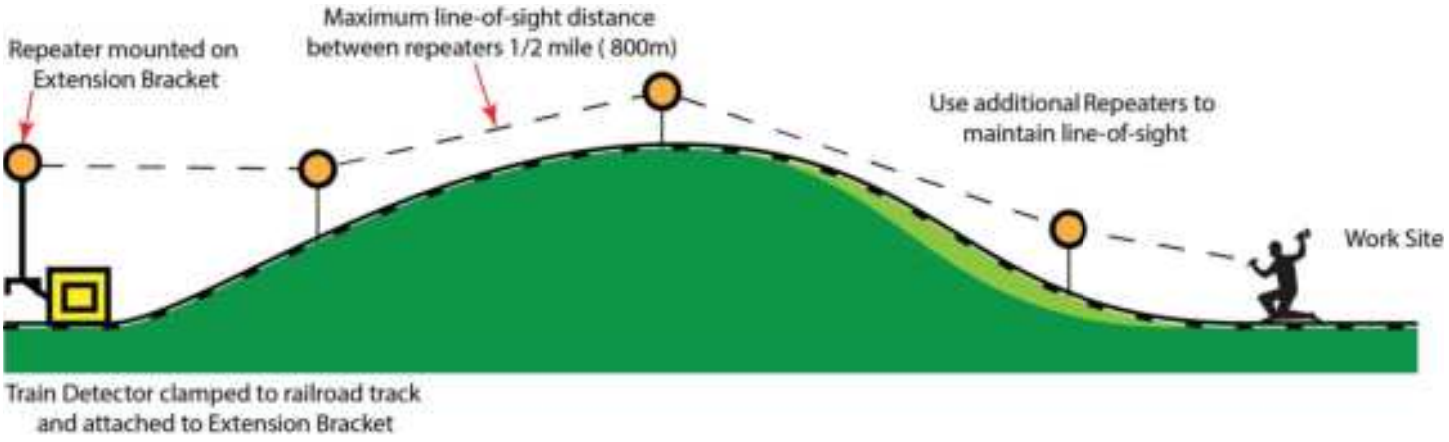
6. Train Detector Reset

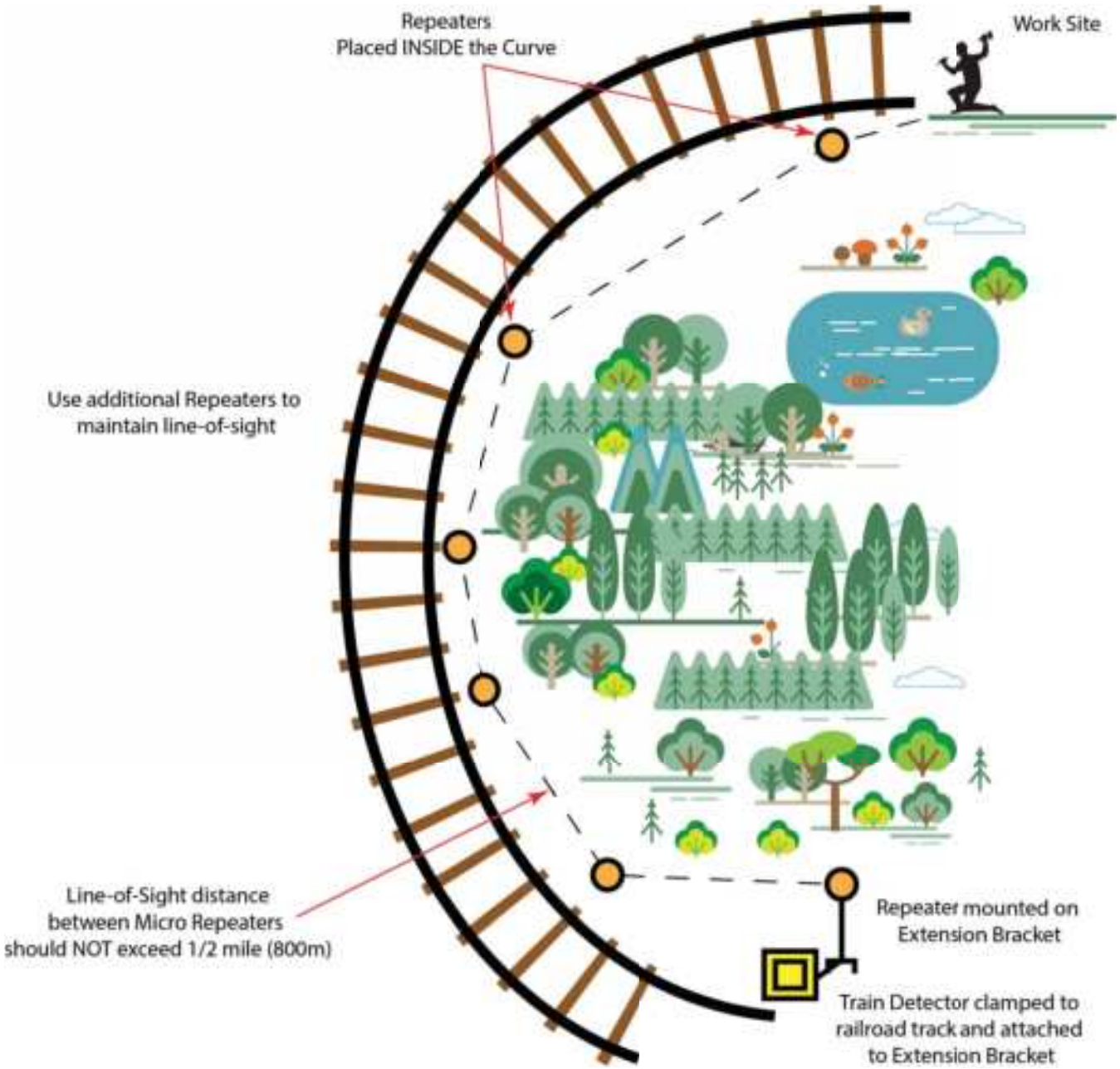
The '✱' and '#' buttons on the side of the SuperCELL® function as **Train Detector Reset** hotkeys. Pressing and holding either of these buttons will transmit a Train Detector Reset signal from the worksite to the Train Detector that corresponds to the specific hotkey that was pressed.

It is critical to know which Train Detector Reset hotkey the Train Detector responds to before deployment. When deploying two Train Detectors, ensure one detector responds to the '✱' hotkey and the other responds to the '#' hotkey.

Press and hold (for three seconds) the '✱' or '#' button until SuperCELL® LCD screen indicates the Train Detector Reset message has been transmitted. Once received, the Train Detector will transmit an acknowledgment message **TD Reset** to the SuperCELL®, verifying the communication link integrity has been established between the worksite and the Train Detector.

SECTION 1: TRACK-WATCH TRAIN DETECTOR ACTIVATION (continued)





SECTION 1: TRACK-WATCH TRAIN DETECTOR ACTIVATION (continued)

IR Sensor Activates When an Object Enters Detection Field

7. Rail Traffic Detected:

An object passing by the sensor will activate and transmit an **Alarm** signal.

- Alarm signals are transmitted continuously until the Track-Watch Train Detector is reset by turning the key-switch OFF or by a Train Detector Reset signal sent from a SuperCELL®.
- Alarm signals received by SuperCELL®, TPASS®3-TW and Track-Side Warning Alarms will trigger the audible warning tones.
- SuperCELL® side PWR buttons can be simultaneously pressed to temporarily silence the audio alarm. However, the audio alarm will automatically re-activate after 30 seconds if the Track-Watch Train Detector is not reset and continues to transmit the Alarm signal.
- TPASS®3-TW side buttons can be simultaneously pressed to temporarily silence the audio alarm. However, the audio alarm will automatically re-activate after 30 seconds if the Track-Watch Train Detector is not reset and continues to transmit the Alarm signal.

<u>WARNING</u>: Once deployed, it is critical to keep the detection eye of the Train Detector clean and clear of debris (such as dirt, snow, leaves, etc.) to ensure proper operation of the device.

SECTION 1: TRACK-WATCH TRAIN DETECTOR ACTIVATION (continued)

Remove Cap-Plug to Access Dip-Switch for Sensor Adjustment
Cap-Plug Inside of Track-Watch Train Detector Lid

8. Sensor Sensitivity Adjustment:

Adjustment control switches are located behind the hole-plug on the inside lid of the Track-Watch Train Detector. These controls can adjust the manner in which objects passing by the Train Detector's sensor triggers an Alarm. The factory default setting is one (1) object detected will activate the alarm.

Please consult the factory before making any adjustments. Improper settings can result in false alarms or objects not triggering alarms.

9. Train Detector Reset:

When a train is detected and an Alarm signal is received by the SuperCELL®, the SuperCELL® will display the **ALARM** message and sound the audible warning tones. Both side PWR buttons must be simultaneously pressed to clear the Alarm and silence the audio alarm.

NOTE: It is critical to know which Train Detector Reset hotkey the Train Detector responds to before deployment. When deploying two Train Detectors, ensure one detector responds to the '*' hotkey and the other responds to the '#' hotkey.

To remotely reset the Train Detector with SuperCELL®, the '*' or '#' button must be pressed and held for 3 seconds to send a Train Detector Reset signal to the corresponding Train Detector.

After the Train Detector Reset message is sent, 3 acknowledgment tones will sound on the Super CELL® and a **Message Sent** indication will be displayed on the LCD screen.

When a Train Detector Reset signal is received by the Train Detector, an acknowledgment message is transmitted back to the SuperCELL® and will be displayed as **TD Reset**, indicating the Train Detector Reset message has been acknowledged by the Train Detector. The Track-Watch Train Detector will reset and be fully operational within 15 seconds.

If the Track-Watch Train Detector is not reset, the SuperCELL® and TPASS®3-TW will automatically go back into Alarm after 30 seconds; this is due to the Track-Watch Train Detector continuing to transmit the Alarm signal.

10. Tamper Detection:

If the lid of the Track-Watch Train Detector is opened, a Tamper Detection signal is immediately transmitted. SuperCELL® and TPASS®3-TW units will sound a rapid, ringing alarm when a Tamper signal is received. SuperCELL® will display the Tamper Detection text message **Tamper TD**.

After addressing and correcting the Tamper condition, the Train Detector will arm itself within 15 seconds of closing the lid. When the lid is closed, and the Status LED glows steady, The unit is now armed, is actively sensing and awaiting rail traffic.

An object (train) sensed while in the Tamper mode has priority and will override the Tamper signal by transmitting an Alarm signal. SuperCELL® and TPASS®3-TW units will sound a rapid, ringing alarm and SuperCELL® will display a Train Detected message.

SECTION 1: TRACK-WATCH TRAIN DETECTOR ACTIVATION (continued)

11. Track-Watch Train Detector Charging:

An external charger socket is located on the side of lid of the Track-Watch Train Detector enclosure.

- A 110-120VAC (100-240VAC international) or a +12VDC power source is required for charging the battery.
- The battery may be charged from a vehicle's +12V auxiliary power outlet with a proper adapter.
- The battery may be charged from 110-120VAC (100-240VAC international) with the proper charger and power adapter (international power adapters available).
- Track-Watch Train Detector can be connected to either charger continuously, even during operation.

ALWAYS TEST TRACK-WATCH TRAIN DETECTOR FOR PROPER OPERATION BEFORE USE

TRACK-WATCH TRAIN DETECTOR SPECIFICATIONS

Dimensions: 14 inches long, 10.5 inches wide and 6.25 inches deep (35.6cm x 26.7cm x 15.9cm) (without bracket).

Weight: Approximately 25 lbs (11.3 kg) with Micro Repeater, SuperCELL®, and mounting bracket.

Case: Safety Yellow, rugged, impact and weather resistant plastic.

Mounting Bracket: Rugged 1/4" (.64cm) steel bracket with a rust resistant finish.

Radio Frequency: 902-928MHz, license free spread spectrum. Other frequencies are available to comply with various national regulations around the globe.

Power: Internal 6 Volt, 3.5Ahr, rechargeable, lead-acid battery provides over 24 hours of continuous standby operation.

Battery Charging: Battery can be charged from 110-120VAC (100-240VAC international), or a 12VDC vehicle auxiliary power outlet with provided adapters. International power adapters optional.

Battery Charging Time: Approximately 4-6 hours

FCC ID: J5MXHEM -- Meets FCC Part 15

IC: 5916A-MXHEM -- Complies with Canadian ICES-003

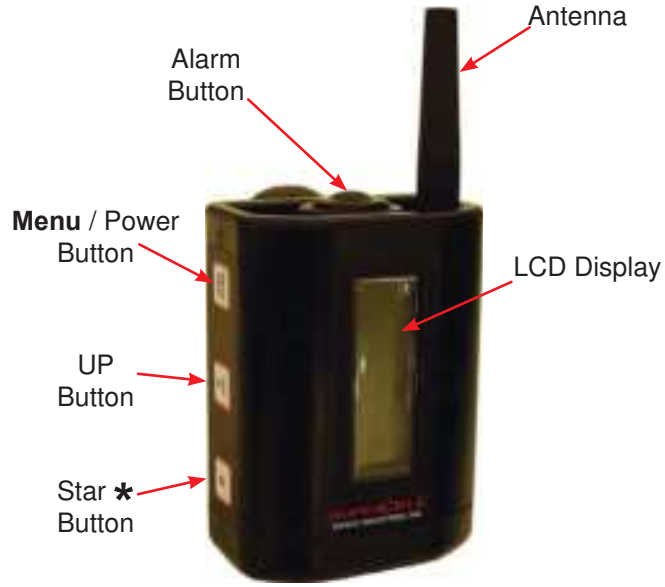
SECTION 2: SuperCELL® SC500
INTRODUCTION

SuperCELL® SC500 is a small, lightweight, two-way signaling personal safety alarm intended for use by the crew supervisor.

SuperCELL® provides emergency signaling, alarm monitoring, and messaging capabilities, and the ability to remotely reset the Train Detector.

SuperCELL® is able to monitor and identify emergency alarm signals from other Grace Industries telemetry products.

With Smart-Signal® Intelligent Repeating, the SuperCELL® also acts as a repeater for all emergency signals.




Charging Base


12VAC Charger Adpater


12VDC Charger Adapter

OPERATING INSTRUCTIONS

All signals from the Track-Watch Train Detector and compatible Grace Telemetry devices are **Smart-Signal®** repeated by SuperCELL®, TPASS®3-TW, Micro TPASS® Repeaters and the Track-Side Warning Alarm.

To turn SuperCELL® **ON**, press both PWR (Power) buttons simultaneously.

Please note the SuperCELL® MUST be in the ON mode to receive and repeat emergency signals.

To turn SuperCELL® **OFF**, simultaneously press and hold both PWR (Power) buttons until display shows “Off”.

For detailed SuperCell® operating instructions, please reference SuperCell® User’s Information.

SECTION 2: SuperCELL® SC500
OPERATION: Train Detector RESET with SuperCELL®

When a train is detected, the Train Detector sends an Alarm signal to the SuperCELL®.

The SuperCELL® displays the Train Detected message and sounds audible warning tones. The supervisor can immediately warn other personnel on site of approaching rail traffic.

SuperCELL® also repeats the Train Detector Alarm signal.

Press both side PWR buttons simultaneously to clear the Alarm and silence the audio alarm on the SuperCELL® for one minute. If the Train Detector is not reset, the audio alarm on the SuperCell® will automatically re-activate after 1 minute.

It is critical to know which Train Detector Reset hotkey the Train Detector responds to before deployment. When deploying two Train Detectors, ensure one detector responds to the '*' hotkey and the other responds to the '#' hotkey.

To remotely reset the Train Detector with the SuperCELL®, the '*' or '#' button must be pressed and held for 3 seconds to send a Train Detector Reset signal to the corresponding Train Detector.

After the Train Detector Reset message is sent, 3 acknowledgment tones will sound on the SuperCELL® and a **Message Sent** indication will be displayed on the LCD screen.

When a Train Detector Reset signal is received by the Train Detector, an acknowledgment message is transmitted back to the SuperCELL® and will be displayed as **TD Reset**, indicating the Train Detector Reset message has been acknowledged by the Train Detector. The Track-Watch Train Detector will reset and be fully operational within 15 seconds.

ALWAYS TEST SuperCELL® SC500 FOR PROPER OPERATION BEFORE USE

SuperCELL® SC500 SPECIFICATIONS

Dimensions: 2-3/16" wide, by 1-3/8" deep (without clip), 4" high with antenna. (5.6cm x 3.5 x 10.2)

Weight: 5.6 ounces (159 gm)

Alarm Audio Output: 75 dBA @ 10 ft (3m)

Case: Black polycarbonate; impact, temperature, dust, and water resistant

Antenna: Small, rugged and replaceable

Radio Frequency: 902-928MHz, license free spread spectrum, other frequencies available to comply with various national regulations around the globe

Battery: Integrated, intrinsically safe Lithium-ion

Battery Life: Estimated 80 hrs in Sensing mode

Battery Charging: 110-120VAC (100-240VAC International) or +12VDC. International power adapters optional.

Battery Charging Time: 6 to 8 hours

Battery Charging Cycles: 500

Certifications:

Intrinsically Safe per ANSI/UL913, for use in Class 1, Groups A, B, C and D; and Class II, Groups E, F, G: Division 1 Hazardous Locations. Operating Temperature Code T6.

CSA C22.2 No. 157-92,

FCC ID: J5XT3HEP -- Meets FCC Part 15

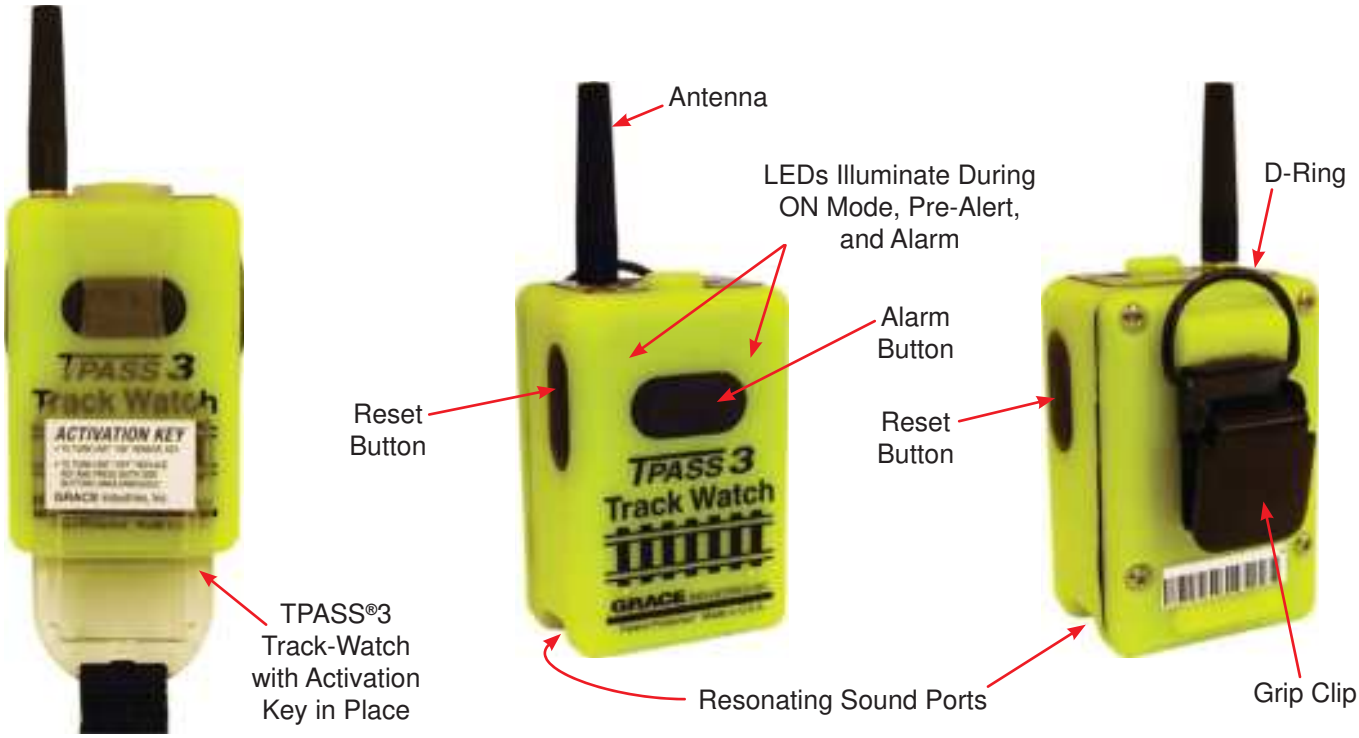
IC: 5916A-T3HEP -- Complies with Canadian ICES-003

SECTION 3: TPASS®3 TRACK-WATCH INTRODUCTION

TPASS®3 Track-Watch is a two-way signaling and Alarm Monitoring personal safety device for Maintenance-of-Way Crews.

TPASS®3-TW is certified intrinsically safe and meets FCC and Industry Canada requirements.

With **Smart-Signal® Intelligent Repeating**, the TPASS®3-TW acts as a repeater for all emergency signals.



OPERATING INSTRUCTIONS

When TPASS®3-TW Activation Key is removed, the unit is activated. Power On audio tones (an escalating series of audio tones) will be heard and an alternating display of Yellow LEDs indicates the TPASS®3-TW is in Motion Sensing Mode.

When no motion is detected by the device for approximately 48 to 53 seconds, TPASS®3-TW will enter **Pre-Alert Mode**. When in **Pre-Alert**, the alternating Yellow LED display is interrupted by the intermittent pulsing of two Red LEDs accompanied by a progressively louder, sweeping Pre-Alert audio tone. Any detected motion will reset Pre-Alert.

MOTION ALARM: When there is lack of motion for approximately 60 to 65 seconds, TPASS®3-TW enters Alarm Mode as indicated by the rapid pulsing of two Red LEDs and a rapidly modulating, loud audio alarm.

MANUAL ALARM: Alarm can be manually activated at any time by pressing the Emergency Alarm Button on the front of the unit.

Reset the Alarm Mode and return TPASS®3-TW to Sensing Mode by simultaneously pressing both side buttons.

TRAIN DETECTED: TPASS®3-TW must be ON to receive Alarm signals from the Train Detector. When an Alarm signal is received, the TPASS®3-TW will sound audible warning tones and provide a visual indication with a flashing Yellow LED located at the base of the antenna

To silence the Alarm, press both side buttons simultaneously. The Power On audio tone will sound. This will cause the flashing LED indicators and the warning tones to cease for 30 seconds, but the flashing LEDs and audio alarm will reactivate if the Train Detector is not reset.

WARNING: Silencing of this Alarm does not indicate that oncoming rail traffic is not present!

SECTION 3: TPASS®3 TRACK-WATCH ALARM MONITORING FEATURE

The Alarm Monitoring feature allows personnel to monitor the status of other personnel working in the same general area, when they are equipped with Grace Telemetry products.

When a unit goes into Alarm and another TPASS®3-TW receives the signal, the receiving TPASS®3-TW will sound a rapid, ringing tone and provide a visual indication with a flashing Yellow LED located at the base of the antenna.

The Alarm Monitoring signal may be silenced for one minute by pressing both side buttons simultaneously.

If other units which go into Alarm during the one minute period, the TPASS®3-TW will reactivate the Alarm Monitoring audio tones and visual display. After one minute, if the original unit is still in Alarm, the Alarm Monitoring feature and display will be reactivated. This cycle will continue until the telemetry unit in Alarm is reset to Motion Sensing Mode or turned OFF.

To turn TPASS®3-TW OFF, replace the Activation Key and then press both side buttons simultaneously.

Please note the TPASS®3-TW MUST be in the ON mode to receive and repeat emergency signals.

For detailed TPASS®3-TW operating instructions, please reference TPASS®3-TW User's Information.

ALWAYS TEST TPASS®3 TRACK-WATCH FOR PROPER OPERATION BEFORE USE

TPASS®3 TRACK-WATCH SPECIFICATIONS

Dimensions: 2-1/8" wide, 2-1/4" deep (with clip), 5" high with antenna. (5.4cm x 5.7 x 12.7)

Weight: 7.9 ounces (224 g)

Alarm Audio Output: 90+ dBA @ 10 feet (3 m)

Case: Apache Yellow, translucent polycarbonate, rugged, water resistant, impact and temperature resistant.

Methods of Attachment: Rugged Grip Clip and D-ring for versatility in attaching to clothing

Antenna: Small, rugged and replaceable

Radio Frequency: 902-928MHz, license free spread spectrum, other frequencies available to comply with various national regulations around the globe

Battery: Internal, intrinsically safe Lithium-Ion.

Battery Life: Estimated at 80 hrs in Sensing Mode and 4 to 6 hours in the Alarm Mode.

Battery Charging: 110-120VAC (100-240VAC International) or +12VDC. International power adapters optional.

Battery Charging Time: 6 to 8 hours

Certifications:

Intrinsically Safe
II 1 G Ex ia IIC T4 Ga -40°C ≤ T_A ≤ 40°C

IP67

FCC ID: J5XT3HEP -- Meets FCC Part 15

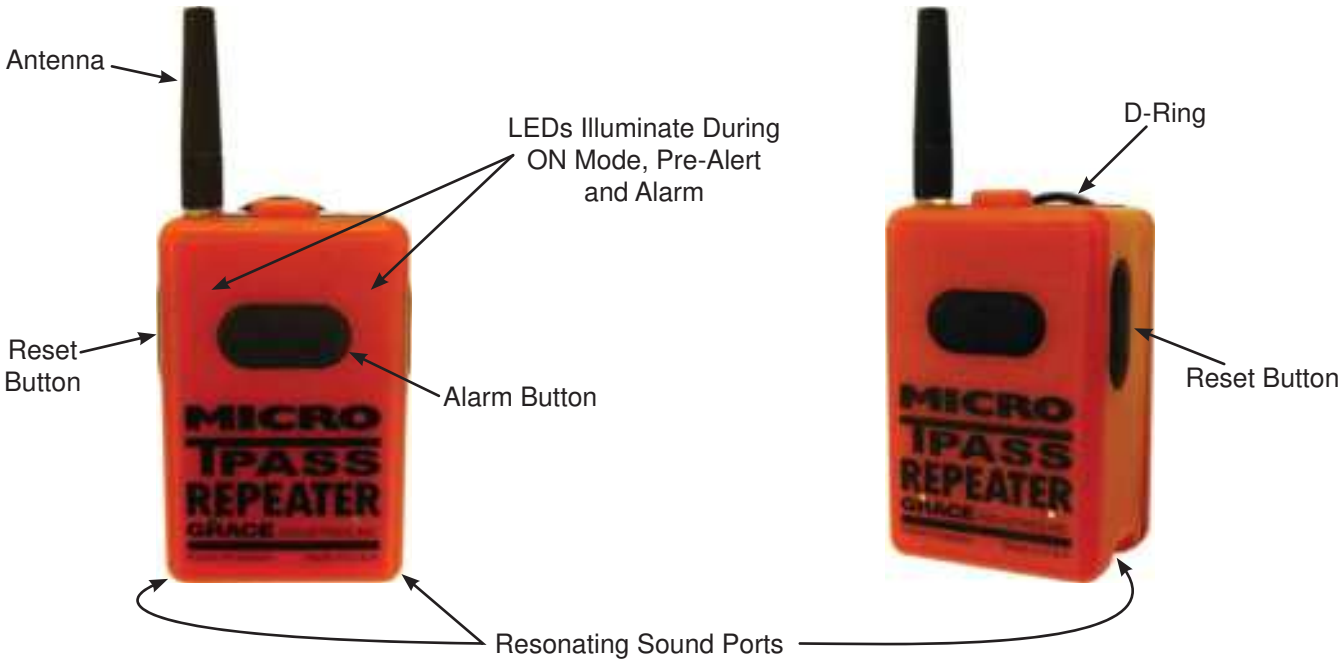
IC: 5916A-T3HEP -- Complies with Canadian ICES-003

SECTION 4: MICRO TPASS® REPEATER INTRODUCTION

Micro TPASS® Repeater is a small, lightweight, portable signaling device that operates interactively with Grace Telemetry Systems.

By receiving and retransmitting radio signals, the Micro TPASS® Repeater enhances system performance where long distances are required, or when environments with poor radio propagation are encountered.

Micro TPASS® Repeater is compatible with similar Grace Telemetry Systems.



OPERATING INSTRUCTIONS

We suggest that Track-Watch Train Detectors be deployed in a manner consistent with your company's standard operating procedure.

We recommend Train Detector placement at a minimum of one mile (1.6km) from the worksite to provide personnel ample time to safely move away from potential danger. Micro TPASS® Repeaters are an integral part of the system and multiple units may be required to reach the worksite.

Always place the first Micro Repeater at the top of the Extension Bracket. Elevating the placement of all Micro Repeaters will improve line-of-sight performance of the system. Micro Repeaters should be mounted at a minimum of five feet above track level and clear of all line-of-sight obstructions.

Activate the Micro Repeater by removing the plastic Activation Key. You will hear escalating audio tones when the device turns ON.

Verify the Train Detector Heartbeat signals are being received and retransmitted by the Micro Repeater by observing a momentary flash of the Micro Repeater's front, Red LED indicators approximately every 2 seconds.

Continue deployment of Micro Repeaters in **1/2 mile (800 m) or line-of-sight intervals [whichever is shorter]** until the work zone is reached.

Reference Section 5 on page 11 for full details on Micro Repeater Deployment.

SECTION 4: MICRO TPASS® REPEATER ACTIVATION

To activate or turn Micro TPASS® Repeater ON, remove the Activation Key.

To turn Micro Repeater OFF, replace the key and press both side buttons simultaneously.

Please note the Micro Repeater MUST be ON to receive and repeat emergency signals.

For detailed instructions, please reference Micro Repeater User's Information.

ALWAYS TEST MICRO TPASS® REPEATER FOR PROPER OPERATION BEFORE USE

MICRO TPASS® REPEATER SPECIFICATIONS

Dimensions: 2-1/8" wide, 2-1/4" deep (with clip), 5" high with antenna. (5.4cm x 5.7 x 12.7)

Weight: 7.9 ounces (224 g)

Case: Bright Orange, translucent polycarbonate, rugged, water resistant, impact and temperature resistant.

Methods of Attachment: Rugged Grip Clip and D-ring.

Antenna: Small, rugged and replaceable

Radio Frequency: 902-928MHz, license free spread spectrum, other frequencies available to comply with various national regulations around the globe

Battery: Internal, intrinsically safe Lithium-Ion.

Battery Life: 20-50 hours depending on radio traffic.

Battery Charging: 110-120VAC (100-240VAC International) or +12VDC. International power adapters optional.

Battery Charging Time: 6 to 8 hours

Certifications:

Intrinsically Safe
II 1 G Ex ia IIC T4 Ga -40°C ≤ T_A ≤ 40°C

IP67

FCC ID: J5XT3HEP -- Meets FCC Part 15

IC: 5916A-T3HEP -- Complies with Canadian ICES-003

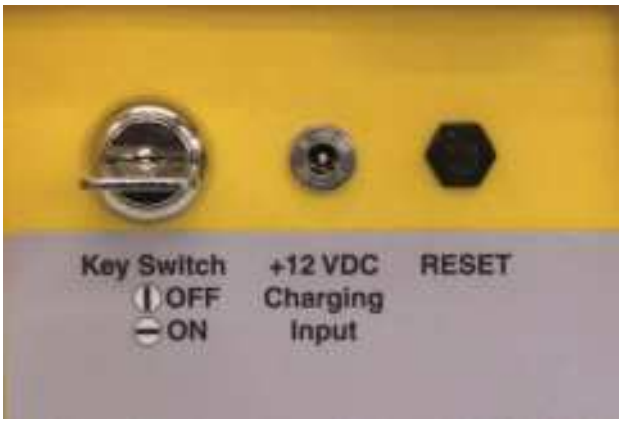
SECTION 5: TRACK-SIDE WARNING ALARM INTRODUCTION

Track-Side Warning Alarm is an optional and highly recommended warning device that provides maintenance-of-way crews with the protection of an additional safety alarm.

The Track-Side Warning Alarm incorporates dual warning sirens and a strobe light. Both are automatically activated by the Alarm signal transmitted from the Track-Watch Train Detector.

It also serves as an additional repeating device, retransmitting all emergency signals from Grace Telemetry devices.

OFF Position



ON Position

SECTION 5: TRACK-SIDE WARNING ALARM OPERATING INSTRUCTIONS

Turn ON Track-Side Warning Alarm:

- Insert On/Off Security Key and turn to **ON** position.
- Remove key for security. Key should be kept by Supervisor. (Two keys are provided with system).
- Track-Side Warning Alarm will be armed in forty-five (45) seconds and ready to receive and repeat Emergency Alarm signals.

Reset Alarm:

- To momentarily silence the sirens activated by a Train Detector Alarm or Personal Safety Device Alarm, press the Reset button, located on the front of unit.
- This will silence the sirens for approximately forty-five (45) seconds.

Turn OFF Track-Side Warning Alarm:

- Replace the On/Off Security Key, turn to **OFF** position.

IMPORTANT NOTE: **Track-Side Warning Alarm** must be turned **ON** to **Receive** and **Repeat** the **Emergency Signals**.

ALWAYS TEST TRACK-SIDE WARNING ALARM FOR PROPER OPERATION BEFORE USE

TRACK-SIDE WARNING ALARM SPECIFICATIONS

Alarm Display: Dual loud sirens and bright flashing strobe light activated when Alarm signal is received from Track-Watch Train Detector or other Grace Industries telemetry products.

Siren Audio Output: 120 dBA at 10 feet (3m).

Range: Approximately 1/2 mile (800 m) depending on environmental conditions.

Controls: ON/OFF Key Switch for enhanced security.

Case: Safety Yellow, rugged, impact and weather resistant plastic.

Size: 16” high x 16-1/2” wide x 8-3/4” deep (41cm x 42 x 22.2)

Weight: 12 lbs. (5.4 kg)

Power: Internal 12V, 5Ah, rechargeable lead-acid battery provides over 24 hours of continuous operation.

Battery Charging: Battery can be charged from 110-120VAC (100-240VAC international), or a 12VDC vehicle auxiliary power outlet with provided adapters. International power adapters optional.

Battery Charging Time: Approximately 4 to 6 hours.

Hours of Operation in Monitor Mode: Approximatly 40 hours.

Hours in ALARM: 2 hours at low battery.

FCC ID: J5MXHEM - Meets FCC Part 15

IC: 5916A-MXHEM - Complies with Canadian ICES-003

ALARM and Audio Tones

SuperCELL® SC500

ON: Escalating series of loud, attention-getting audio tones
OFF: De-escalating, sweeping audio tones
Man-Down ALARM: Loud, rapidly modulated audio alarm tones
ALARM Monitored (Train Detected or Man-Down): rapid ringing tones

TPASS®3-TW

ON: Escalating series of loud, attention-getting audio tones
OFF: De-escalating, sweeping audio tones
Man-Down ALARM: Loud, rapidly modulated audio alarm tones
ALARM Monitored (Train Detected or Man-Down): rapid ringing tones

Trackside Warning Alarm

ALARM Monitored (Train Detected or Man-Down): Extremely loud, oscillating siren

SETUP: Speed / Time / Distance

Use the Speed/Time Table below to determine how far away to set up the Track Watch Train Detector.

For example: If trains will be travelling at a maximum speed of 60 mph (97 kph) and 60 seconds of Warning time is desired - the Train Detector must be placed at least 5,280 feet (1 mile, 1.6 km) away from the work zone and in the direction from which the train would be approaching.

NOTE: If trains will be travelling from both directions, set up a Train Detector in both directions at the distance prescribed by the table below.

IMPORTANT: Track-Watch Train Detectors should be deployed in a manner consistent with your company's standard operating procedure.

We recommend placing Track-Watch Train Detectors at a minimum of one mile from the worksite, and on each approach to the worksite to provide personnel with ample time to safely move away from potential danger when rail traffic is detected. One Train Detector provides one-way protection while a second Train Detector provides full two-way worksite coverage.

Always place the first Micro Repeater within 100 ft. (30.5 meters) of the Train Detector.

Continue the deployment of the Micro Repeaters in less than 1/2 mile (800 m) or line-of-sight intervals (whichever is shorter) until the work zone is reached.

Refer to page 8 for full details on Micro Repeater deployment.

Track Watch

Speed / Time Table

GRACE INDUSTRIES, INC. *Solutions for Life Safety*

Seconds		10	15	20	25	30	35	40	45	50	55	60
Miles/Hr	Feet/Sec	Distance Traveled In Feet										
1	1.5	15	22	29	37	44	51	58	66	73	80	88
2	2.9	29	44	59	73	88	103	117	132	147	161	176
3	4.4	44	66	88	110	132	154	176	198	220	242	264
4	5.9	59	88	117	147	176	205	234	264	293	322	352
5	7.3	73	110	146	183	219	256	292	329	365	402	438
10	14.6	146	219	292	365	438	511	584	657	730	803	876
15	22.0	220	330	440	550	660	770	880	990	1,100	1,210	1,320
20	29.3	293	440	586	733	879	1,026	1,172	1,319	1,465	1,612	1,758
25	36.7	367	551	734	918	1,101	1,285	1,468	1,652	1,835	2,019	2,202
30	44.0	440	660	880	1,100	1,320	1,540	1,760	1,980	2,200	2,420	2,640
35	51.3	513	770	1,026	1,283	1,539	1,796	2,052	2,309	2,565	2,822	3,078
40	58.7	587	881	1,174	1,468	1,761	2,055	2,348	2,642	2,935	3,229	3,522
45	66.0	660	990	1,320	1,650	1,980	2,310	2,640	2,970	3,300	3,630	3,960
50	73.3	733	1,100	1,466	1,833	2,199	2,566	2,932	3,299	3,665	4,032	4,398
55	80.7	807	1,211	1,614	2,018	2,421	2,825	3,228	3,632	4,035	4,439	4,842
60	88.0	880	1,320	1,760	2,200	2,640	3,080	3,520	3,960	4,400	4,840	5,280
65	95.3	953	1,430	1,906	2,383	2,859	3,336	3,812	4,289	4,765	5,242	5,718
70	102.7	1,027	1,541	2,054	2,568	3,081	3,595	4,108	4,622	5,135	5,649	6,162
75	110.0	1,100	1,650	2,200	2,750	3,300	3,850	4,400	4,950	5,500	6,050	6,600
80	117.3	1,173	1,760	2,346	2,933	3,519	4,106	4,692	5,279	5,865	6,452	7,038
85	124.7	1,247	1,871	2,494	3,118	3,741	4,365	4,988	5,612	6,235	6,859	7,482
90	132.0	1,320	1,980	2,640	3,300	3,960	4,620	5,280	5,940	6,600	7,260	7,920
95	139.3	1,393	2,090	2,786	3,483	4,179	4,876	5,572	6,269	6,965	7,662	8,358
100	146.7	1,467	2,201	2,934	3,668	4,401	5,135	5,868	6,602	7,335	8,069	8,802

FCC Statements

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to pro-vide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Industry Canada Statements

This Class A digital apparatus complies with Canadian ICES-003.

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.(select the class for your device)

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

WARRANTY INFORMATION

Grace industries, Inc. warrants T-PASS & related Grace telemetry products to be free from defects in workmanship and materials for a period of one year from the date of purchase. This warranty is valid only when the returned product is accompanied by a sales slip or other proof of purchase that states the date and location of purchase. Grace Industries, Inc. will not repair or replace any merchandise under warranty which has been damaged because of accident, misuse or abuse while in possession or control of the consumer. This warranty is void if any attempt to repair or replace parts was made or attempted by other than qualified Grace Industries, Inc. personnel. This warranty is void if any of the sealed compartments are opened or tampered with. Send all returned merchandise, prepaid and accompanied by proof of purchase to: Grace Industries, Inc., Repair Division, 305 Bend Hill Road, Fredonia, PA 16124 USA. Grace Industries, Inc. shall not be liable for any direct, incidental or other consequential loss or damage arising out of the failure of the product to operate. End-user or customer is responsible for return shipping/freight charges.

The sole and exclusive remedy under all guarantees or warranties, express or implied, is strictly limited to repair or replacement as herein provided. ALL IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO, WARRANTIES OF FITNESS AND MERCHANTABILITY, ARE HEREBY LIMITED IN DURATION TO A PERIOD ENDING ONE (1) YEAR FROM THE DATE OF PURCHASE. The warranty and liability set forth in the prior paragraphs are in lieu of all other warranties, expressed or implied, in law or in fact, including implied warranties of merchantability and fitness for a particular purpose. Some states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which may vary from state to state.

This information is believed to be accurate and reliable. Grace Industries, Inc. provides this information as a guide only.

Technical assistance is available by contacting Grace Industries, Inc. at telephone

724-962-9231, M – F, 8:00 am – 4:30 pm.

For training purposes a copy of User's Information is available by contacting Grace Industries, Inc.

305 Bend Hill Road, Fredonia, PA 16124 U.S.A.
www.graceindustries.com

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