

AN-125: Solar Product Mounting Instructions



Installation Procedure Recommendations

Basic Components of the Tehama System:

- MDT (Metering Data Transceivers): A single MDT is connected to one utility meter. A dual MDT can connect to two utility meters (usually cold and hot water meters).
- Repeaters: High powered transceivers that forward metering data to the DCAP.
- DCAP (Data Concentrating Access Point): A combined Data receiver, database collector, and Internet gateway device that collects and forwards metering data by email or FTP to billing centers or energy monitor centers. Tehama also publishes an API you can use to *pull* your data rather than use the Tehama system to *push* the data to you. Refer to the API App Note for details.

The key to a successful site installation is having a robust Network Backbone (DCAP plus Repeaters) in order to forward radio messages from remote MDTs on toward the DCAP. The Tehama system provides a wealth of network performance data to help troubleshoot and verify that you have achieved a robust Backbone and that all MDT units are communicating within acceptable parameters.

Operational Background

The Tehama system uses a two-way radio communication protocol whereby each transmitting unit (MDT or Repeater) receives an ACK (Acknowledgment) from a Link Partner (the Repeater or DCAP to which the message was directed). If the ACK is not received, a unit will try again a number of times before either giving up (in our basic pulse only memory-less units) or storing the message to re-send again at the next measurement interval (in our Time of Use products).

A Tehama transmitting unit needs to synchronize itself to a member of the Network Backbone before it is able to communicate. First each unit starts by listening for Beacon signals that are periodically sent by the DCAP and Repeaters. Once a Beacon is heard, a unit then tries to "join" the network by sending a message to the strongest radio Beacon generator, then to other members of the Network Backbone whose Beacons were heard, until an ACK is received, verifying that Link Partner.

After joining the Network, an MDT or Repeater will always direct its radio messages to the selected Link Partner. Should it not receive an ACK for a number of transmission attempts, the unit will select another member of the Network Backbone and continue to operate seamlessly. Each Link Partner in turn forwards the radio message toward the DCAP using the same mechanism of ACKs to ensure the best subsequent Link Partner is always being used.

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Network Setup

Site Survey

Before setting up an installation, a site survey is recommended to determine locations where house power can be used to run the Repeaters, and where property supplied Internet connections are available for the DCAP. If you use our LTE Cellular DCAP system, the DCAP location will not be restricted to where property Internet is available, allowing the DCAP to be optimally placed at the site. Our solar offerings allow

Repeater Power & Placement

Next step is to install Repeater power as required.

- For Garden style properties, Repeaters should generally be placed outside in **PLASTIC** weather sealed electrically rated boxes with house power running through plastic conduit to a standard 120 VAC socket within the box.
- The plastic box should be mounted at least six feet off the ground, if possible, to minimize potential tampering and provide good signal propagation. Placement of the box should be away from any nearby metal breaker boxes.
- For tower style properties, Repeaters should be placed in utility closets or other similar locations inaccessible to a tenant. Placement within those rooms should be away from large areas of metal like furnaces, ducts, breaker panels, or wire mesh screens.
- Avoid using house power that is on a switched circuit (i.e. automatic light control).
- Avoid using power from a GFCI (ground fault circuit interrupt) source unless code requires it.
- The only ones we know of that have been specifically designed to shield RF interference are manufactured by Leviton, specifically their part number [GFWR1-W](#).
- Use only 5 VDC (1 AMP typical) power transformers (wall warts) for Repeaters.

Under no circumstances should Repeaters be placed:

- Inside a metal box.
- On a metal wall.
- Where water may submerge the repeater (i.e. pooling water on a roof).

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2-inch Pole Mounting Kit

The standard 2-inch pole mounting kit consists of the following parts:

- (4) 2-inch U-bolts
- (4) U-bolt washers
- (8) 7/16-inch nuts



These instructions follow installation on a building parapet often found at commercial sites. The material list reflects this type of installation. If sinking a pole in the ground, a U-Channel sign pole might be more secure.

Other materials needed:

(1) 8-foot, 1-7/8-inch galvanized chain link fence pole. This seems to be the cheapest, lightest, and most efficient material for a mounting pole. Available at any Home Depot. About \$20.00 for an 8 foot pole.

About 4 feet of 3/8-inch commercial all-strut

Polyurethane caulking

Flat washers

Tapcon 1-1/2-inch fasteners for stucco or masonry

(3) 1-1/2-inch strut pipe clamps

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Step 1: Securing Pole to Roof Parapet



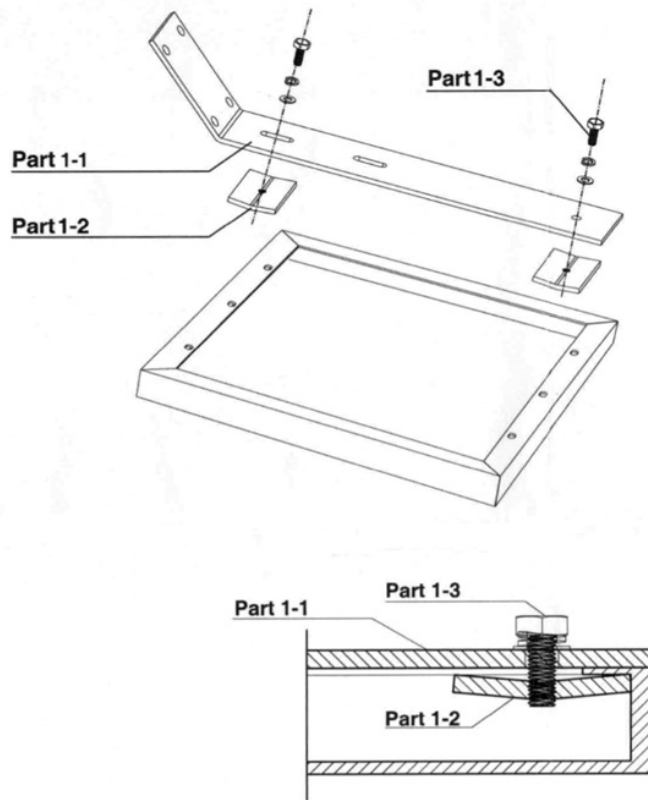
Cut all-strut pieces to length. Three pieces ensure a robust connection to the parapet that can sustain gusty winds.

Attach all-strut pieces to the parapet using the Tapcon fasteners. Note: It is very important, when penetrating a roof parapet with fasteners, that you put a dab of polyurethane caulking under the screws before sending them home to ensure a positive water seal, especially if the substrate material is stucco. This is critical; an ounce of prevention is worth a ton of cure here.

Attach the strut pipe clamps to the struts and run the pole through them. Secure the pipe clamps for a tight fit.

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Step 2: Assemble Solar Panel and Bracket



Step 2: Attach Equipment to the Pole

Pass the u-bolts through the mounting holes on the Repeater box and the solar mounting bracket. Add the u-bolt washers then the nuts. Tighten nuts until secure. Make sure the panel and Tehama box are aligned and the panel provides as much shade as possible to the Tehama box.

Loosen the strut pipe clamps so you can rotate the pole assembly. Rotate the pole so the solar panel is facing due South. Using a phone compass is recommended. Re-secure the strut pipe clamps.

The advantages of a roof installation are immense, this abates nearly all RF interference issues, especially if going across large parking lots.

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Roof Installation:



Finished Repeater, Ground View:



Notes:

A big chunk of the labor time is getting everything up to the roof, especially when working solo. You will want to use both hands when climbing typical roof access ladders. It's often necessary to climb the roof then send down rope to tie off a bucket with tools and material, ladders, and the repeater. It takes a few trips up and down the roof access ladder to do so. A helper would be most efficient if one is available.

Figure about 3-6 hours for this type of installation, including the time is devoted to schlepping tools and material up a high roof.

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12-inch Mounting Kit

The 12-inch mounting kit contains the following parts:

- (4) cut strut pieces
- (8) square no-spin strut washers
- (8) strut nuts and (8) nulock nuts
- (8) centering washers
- (16) bolts
- (4) 36-inch band clamps



Tools needed:

- #3 Philips screwdriver
- 7/16-inch open ended wrench

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Step 1

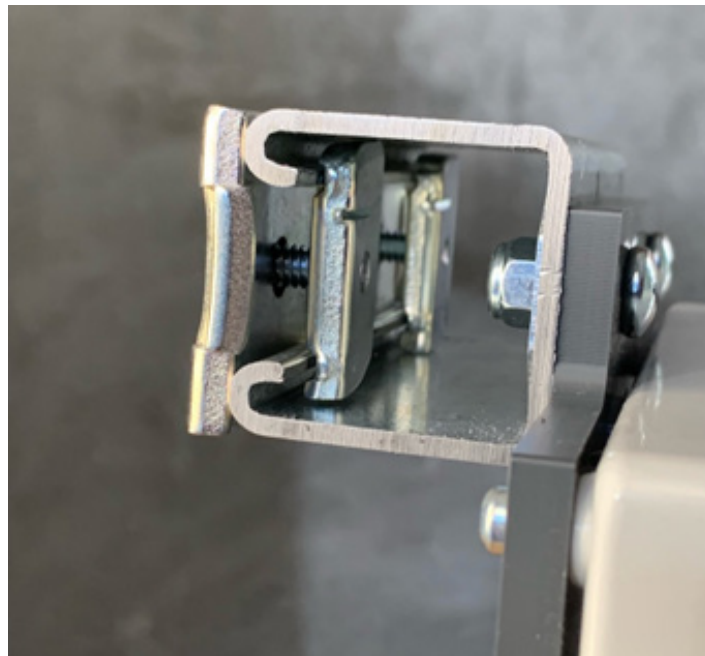
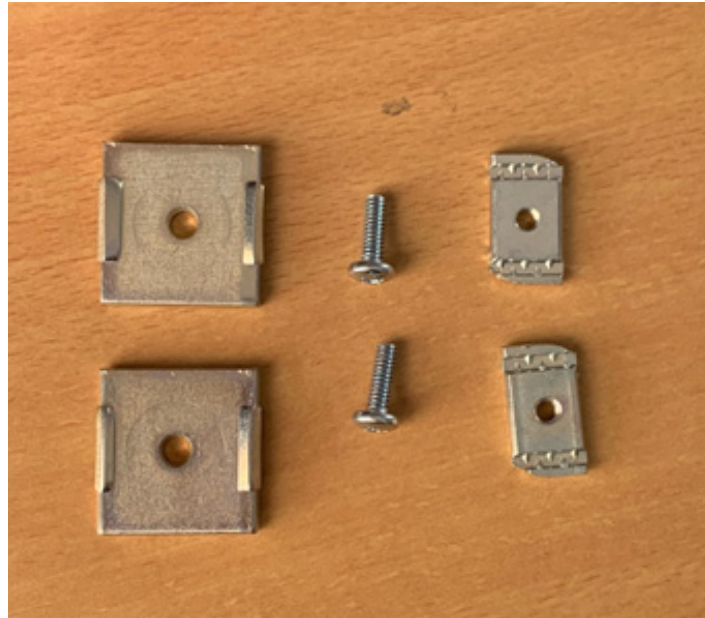
With each strut piece, take a pair of bolts, unlock nuts, and centering washers and attach the strut pieces to the Repeater box and the solar mount arm.



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Step 2

With a pair of bolts, square washers, and strut nuts, mount the washers on the strut rail.



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Step 3

Run the band clamps through the strut channel and around the mounting pole. Tighten the band clamp. Always place the solar panel right above the Repeater box to protect the repeater from the heat of direct sunlight.

