

There are two Tap Commander designs; 16A Tap Commander and 40A Tap Commander. The 16A Tap Commander has 10 Orange relays (this color may vary) that operate to provide the Tap Settings on the rectifier. These relays are about 1" long and the Tap Commander board measures approximately 7.5 inches long.

The 40A Tap Commander has 10 black relays that operate to provide Tap Settings on the rectifier. The 40A Tap Commander has an external power source (from the power take off on the Surge Suppression board) that provides 12-18VAC to power these relays. The relays are 1.5" long and the 40A Tap Commander board measures approximately 8.5 inches long.

Both Tap Commander boards come prewired with 14 Yellow wires attached to the Tap Commander board. These wires are marked for the appropriate installation landing points on the rectifier.

Based in the installation instructions with the monitor, the field tech should have the Tap Commander module wired to these specifications:

- The yellow tap wires, with all but the common wires from the Tap Commander, wired to the rectifier.
- The AC power wires for the Tap Commander (on 40A Tap Commanders) from the power take off on the Surge Suppression Module to the Tap Commander board.
- The 4 wire control wire from the Tap Commander to the Com Module.

The rectifier should be off when the tech calls in. The battery in the RMU should be connected, the unit should be online and showing a Power Fail alarm. Additional alarm conditions might be active too.

When the tech calls in:

- Ask him for the Unit ID and confirm that unit passed the Relay Portion of the interruption test. The information is in the Raw Data view. You should see something like this:
:Relay PASS (8->0 mV) | GPS PASS
- If the RMU did not pass, **STOP!** and have the tech troubleshoot the relay. It is critical that the unit have a working interrupter relay before proceeding. If he has already connected the Tap Commander, have him disconnect the yellow wires from the Tap Commander at the taps and reinstall the shorting bars on the coarse **and** fine taps before he troubleshoots the relay. Have the technician reinstall the shorting bars on some setting other than Coarse 1/Fine 1. There are situations where this setting (Coarse 1/Fine 1) does not allow the Hero 2 to "see" if the relay is working. For the purpose of troubleshooting the relay, I'd recommend tap setting of Coarse 2/Fine 1.
- If **Relay Pass** is in the Raw Data, confirm that the Rectifier is off. This means that the external AC breaker is turned off and possibly (if the rectifier is so equipped) the secondary breaker, located on the rectifiers phenolic surface, is turned off also.
- The yellow common wires for the Tap Commander are **not connected** at this time

Cellular Comm module instructions (SAT Comm module instructions on next page)

- Queue (in this order):
 1. “Disable Int Check for Tap Functions” command

The command will be in the Raw Data queued as: `[0010010001:CF00000000000000] [[Disable Int Check For Tap Functions]`

2. “Reset Tap Commander” command

The command will be in the Raw Data queued as: `[0010010002:F0F5000000030000] [[Reset Tap Commander]`

- **With the common wires from the Tap Commander still uninstalled**, have the tech turn on the rectifier. Make sure that he turns on the main AC breaker (located in a junction box outside of the rectifier). If the rectifier has secondary breakers, located on the front panel of the rectifier, make sure these are turned on as well. If the tech disconnected the battery inside the RMU, have him reconnect it at this time
- You will get the following line of data back from the from the queued “Disable Int Check for Tap Functions”: `TapIntChk=0`
- The “0” means that the function has been disabled. If you don’t see a response from the “Disable Int Check for Tap Functions”, send the command via the network command structure until the unit responds appropriately. If the unit fails to respond to the “Disable Int Check for Tap Functions”, the “Reset Tap Commander” command will also fail
- You will get the following line of data back from the queued “Reset Tap Commander” command: `:F0FA1B0000000000:F0FA1A0000000000:F0FA190000000000:` These are the first three registers that look at Tap Numbers, Set Current and AutoMode. There will be more data that comes back, you can ignore this. If you go to the front page and refresh, you should see Tap Numbers=11, Set Current=0 and AutoMode=0. If the front page does not read these three values, send the “Reset Tap Commander” command, via the network command structure, again. If the unit still does not respond correctly, get me or Carey on the call
- If you see correct data; tell the tech to shut off the rectifier, **connect the common wires** and power the rectifier back on
- Send a **Get Data** command to the unit
- The rectifier should have **minimal voltage output (~2-3VDC) upon restarting**. This is the value of the Coarse 1/Fine 1 setting (Tap Numbers 11) on the rectifier. Remember, minimal voltage output will vary with the rectifier (it could be higher or lower). After we send the Tap Commander board a reset command, the Tap Commander board should be set on Coarse Relay 1/Fine Relay 1. There have been occasions when the Tap Commander has been jostled during shipping and the latching relays have been reset to some other value besides 1/1. This is the reason we do a “Reset Tap Commander” command (with the common wires disconnected). Confirm with the tech that the voltage output value you see on the home screen is the value he sees on the rectifier. He can look at the VDC gauge on the rectifier (if so equipped). It is preferable that he take a direct VDC reading with his fluke. If the tech doesn’t see a minimal output voltage value, have him shut off the AC at the external breaker and disconnect the Common wires from the taps. Send the “Reset Tap Commander” command again. If the rectifier is still showing above minimal voltage, get me or Carey on the call.

- Ask the tech to confirm previous tap settings. He will respond something like “Coarse 2, Fine 3” or “Coarse B, Fine 3”. Most rectifiers use numbers to designate Taps, some use letters; 1=A, 2=B and so on.
- From the Send Command menu, choose “Tap Up” and add the value that you want the unit to tap up in the Lower Data Value Decimal field. Remember, the Tap Commander has 6 coarse and 6 fine taps. For example, if you were going to go the tap: “Coarse 2, Fine 3”:
 1. The unit is currently on 1-1 and you want to go to 2-3.
 - a. Subtract the Coarse “now” (1) from the Coarse “wanted” (2): $2-1=1$
 - b. Multiply the resulting number (1) by 6: $1 \times 6=6$
 - c. Subtract the Fine “now” (1) from the Fine “wanted” (3): $3-1=2$
 - d. Add the result from b&c together: $6+2=8$
 2. Enter “8” into the Lower Data Value Decimal field
 3. Submit the Command, confirm the Command and the unit will tap up to 2-3
- If you are uncomfortable entering the value into the Lower Data field, you can submit the Tap Up command (without entering a value in the data field), this will send one Tap Up command. You can also use the “Tap Up” command button on the front page to initiate a single occurrence of tapping.
- Confirm the Output Voltage, Output Current and Tap Numbers on the front page with the tech. Remember, the Output Current numbers could be different than the mV the tech reads on the shunt.
- Send the unit an “**Enable Int Check for Tap Functions (def)**” command, which will return this line of data: **TapIntChk=1**

For SAT Comm Modules

F.Y.I. This process is the same as the TC initialization process for cellular units, the main differences are that network commands are used instead of queued commands. The other difference is the raw data page for a SAT unit will not have the English language “translation” or comment in the raw data lines that are returned after sending/receiving commands in the cellular units.

- **With the common wires from the Tap Commander still uninstalled**, have the tech turn on the rectifier. Make sure that he turns on the main AC breaker (located in a junction box outside of the rectifier). If the rectifier has secondary breakers, located on the front panel of the rectifier, make sure these are turned on as well. If the tech disconnected the battery inside the RMU, have him reconnect it at this time
- Send the “**Disable Int Check for Tap Functions**” command which will be formatted as: **[0010010001:CF00000000000000]**
- The unit should respond: **TapIntChk=Disabled** It can take a few minutes for the unit to respond.
- After you receive the above response send the “**Reset Tap Commander**” command which will be formatted as: **[0010010001:F0F5000000030000]**

- The unit should respond with a line of data that contains the following in the last three registers: **F0FA190000000000:F0FA1A0000000000:F0FA1B0000000000**; these registers look at Tap Numbers, Set Current and AutoMode. There will be more data that comes back, you can ignore this. If you go to the front page and refresh, you should see Tap Numbers=11, Set Current=0 and AutoMode=0. If the front page does not read these three values, send the “**Reset Tap Commander**” command, via the **Send Command** structure, again. If the unit still does not respond correctly, get me or Carey on the call
- Follow the instructions from above that start with: “If you see correct data; tell the tech to shut off the rectifier, **connect the common wires...**”
- After you have confirmed Correct Output Voltage 1, Output Current 1 and Tap Numbers have been achieved, send the unit an “**Enable Int Check for Tap Functions (def)**” command, which will return this line of data: **TapIntChk=1**

Screen Shots of Cellular commands (these are in reverse order of how they show up in the Raw Data):

[0010010001:CF00000000000000] *[[Disable Int Check For Tap Functions]* Command Sent

TapIntChk=0-Response from unit

[0010010002:F0F5000000030000] *[[Reset Tap Commander]* Command Sent

:F0FA1B0000000000:F0FA1A0000000000:F0FA190000000000:F0F Response from unit, these are the first three registers in the cellular Raw Data view

[0010010001:CF01000000000000] *[[Enable Int Check For Tap Functions (def)]* Command Sent

TapIntChk=1 Response from unit

If you attempt the **Reset Tap Commander** command without first sending the *[[Disable Int Check For Tap Functions]* the unit responds (in either **Cellular** or **SAT** coms):

18:35|04/28/21|GPS:1|Rpt:01380-00274=01106Mn|Int:....

:FOFB200000000002D

Relay FAIL (0->0 mV) | GPS PASS

The “Relay Fail” indicates the unit will not attempt the **Reset Tap Commander** function because the external interrupter relay is not functioning (the unit is measuring 0mv when the relay is closed and 0mv when it is open). The Interrupter Check for Tap Function must be disabled before you can issue a successful **Reset Tap Commander** command.

Screen Shots of **SAT** Comm commands:

[0010010001:CF00000000000000] Command Sent is **Disable Int Check For Tap Functions**

TapIntChk=Disabled Response from unit

[0010010002:F0F5000000030000] Command Sent is **Reset Tap Commander**

F0FA190000000000:F0FA1A0000000000:F0FA1B0000000000: these are the last three registers in the SAT Raw Data view

[0010010001:CF01000000000000] Command Sent is **Enable Int Check For Tap Function (def)**

TapIntChk=Enabled Response from unit

Things to remember:

1. It is possible that the rectifier is putting out a Shunt Voltage of less than **1mV**. When the relay is tested, the unit will respond: **:Relay PASS (0->0 mV) | GPS PASS**(if it has disconnected the relay successfully). The important thing is the unit says: "Relay Pass". The "(0->0mV)" thing can be disconcerting, but our Rectifier Monitor can read low mV output (the website just doesn't have the ability to show fractional mV readings. **Below 1mV it will display "0mV"**)
2. It has happened that a cellular com module was shipped without the Tap Commander loader file installed (my mistake). If you command "**Tap Up**" and see changes in the Output Voltage 1/Output Current 1 but don't see changes in the Tap Number column, go to the Raw Data view see if there are numerical values in the **F0FA190000000000:** (the "Tap Numbers" register) of the last response to the **Tap Up** command. If there are values (beside "0"):
 - a. Go to the "Upload" menu and choose the "Apply Global Loader" tab.
 - b. From the "Machine Configuration Loader" page choose:
"CP_RM_H2_1V_1S_1A_Tapper_03229"
 - c. Upload the file to the machine.
 - d. Go to the "Command" menu and choose "Send Command"
 - e. From the "Send Command" page, send the "Download Loader File" command
3. Tap Numbers are translated as: First Digit = Coarse Tap Setting, Second Digit = Fine Tap Setting. When the tech says he needs to be on Coarse 2/Fine 3, that equals Tap Numbers 23
4. When doing the Tap Up/Tap Down function, remember that we have 6 Coarse and 6 Fine wires. If the customer has numerically less fine taps (say 4 instead of 6) and he wants you to bring the unit up to Coarse 2, Fine 3, you will have to Tap the unit Up 6 times (from Tap Numbers 11) to get to Coarse 2/Fine 1 and 2 more times (for a total of 8 Tap Up) in order to have the unit display Coarse 2/Fine 3 (Tap Numbers 23). The Tap Commander unit, in the case where there are 4 Fine taps, will show the same Output Voltage 1/Output Current 1 readings on Tap Numbers 14, 15 & 16 (and 24, 25 & 26, etc.)