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Title: CPA Base Engine Analysis Module (BEAM): Test Descriptions and Detailed Information

Applies To: MaxxForce Engines

CHANGE LOG

- 07/24/2017- Add IDLE & PPM Signal Diag. Documents. Formatted RCT+ and BBT tables
- 06/07/2017- Minor edits
- 06/02/2017- Structured Layout and added information
- 04/28/2017- Added common BBT error explanation
- 04/25/2017- Updated diagnostic software to Navistar Engine Diagnostics™

DESCRIPTION:

This document will serve as detailed descriptions to the CPA BEAM Tests

CPA BEAM Tests Apply To:

| Engine Platform | Emission Year | Engine Model |
|-----------------|---------------|-------------------|
| V8 | 2007-2016 | MaxxForce7 |
| MED | 2007-2009 | MaxxForce DT/9/10 |
| MED | 2010-2013 | MaxxForce DT/9/10 |
| MED | 2014-2017 | N9/ N10 |
| BB | 2010-2012 | MaxxForce 11/13L |
| BB | 2013-2016 | N13 |

SYMPTOM(s)/ FAULT CODE(s):

[Follow Appropriate Manual](#)

BEAM TESTS:

| Engine Platform Application | BEAM Test | Notes |
|-----------------------------|----------------------------------|--|
| V8 | IDLE Test | Utilize instead of Injector Misfire Detection |
| V8 | CrankCase Pressure (CCP) Test | |
| V8 | Relative Compression Test (RCT) | Utilize instead of Navistar Engine Diagnostics RCT |
| V8 | Relative Compression Test (RCT+) | |
| V8 | Blow-By Test (BBT) | |

| Engine Platform Application | BEAM Test | Notes |
|-----------------------------|----------------------------------|--|
| MED Duty (i6) | Relative Compression Test (RCT) | Utilize instead of Navistar Engine Diagnostics RCT |
| MED Duty (i6) | Relative Compression Test (RCT+) | |
| MED Duty (i6) | Blow-By Test (BBT) | |

| Engine Platform Application | BEAM Test | Notes |
|-----------------------------|----------------------------------|--|
| Big Bore (BB) | Relative Compression Test (RCT) | Utilize instead of Navistar Engine Diagnostics RCT |
| Big Bore (BB) | Relative Compression Test (RCT+) | |
| Big Bore (BB) | Blow-By Test (BBT) | |
| Big Bore (BB) | Full Load Blow-By Test (FL BBT) | Refer to IK 1201329 |

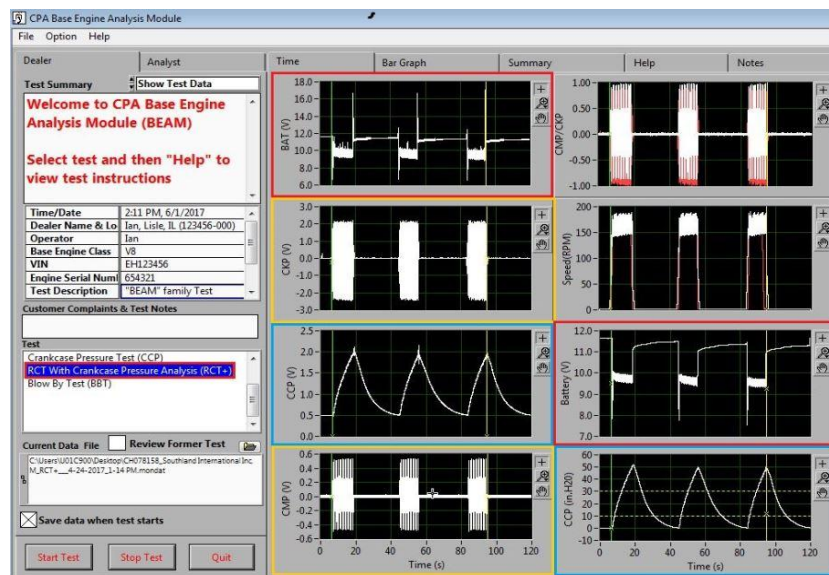
TEST DESCRIPTIONS:

Relative Compression Test Plus (RCT+):

Below is the basic set up overview of BEAM RCT+. Review the appropriate engine diagnostic manual for proper step-by-step installation instructions.

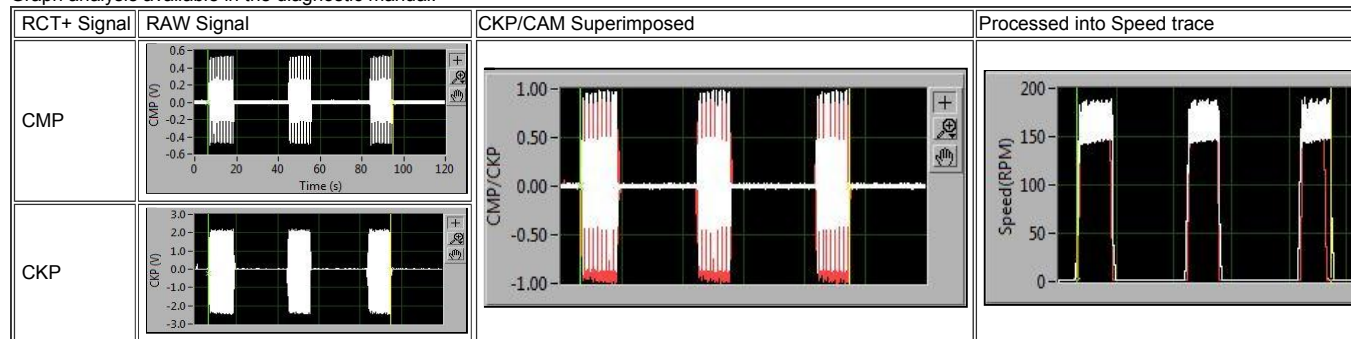
| RELATIVE COMPRESSION TEST PLUS (RCT+) | | |
|---|---|---|
| V8 | MED Duty (i6) | Big Bore (BE) |
| | | |
| <ol style="list-style-type: none"> 1. Cap Adapter 12-999-05-03 2. Camshaft Position (CMP) Sensor 3. Crankshaft Position (CKP) Sensor | <ol style="list-style-type: none"> 1. CAP Adapter 12-999-05-04 2. Camshaft Position (CMP) Sensor 3. Crankshaft Position (CKP) Sensor | <ol style="list-style-type: none"> 1. Oil Fill Adapter 12-999-05-05 2. E1 Harness 12-801-01 |

RCT+ User Interface:

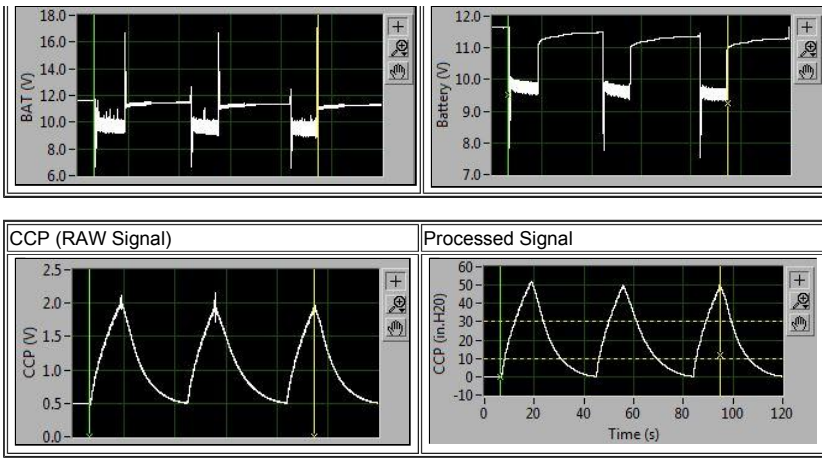


RCT+ Signals. Example of Good Signals

Graph analysis available in the diagnostic manual.

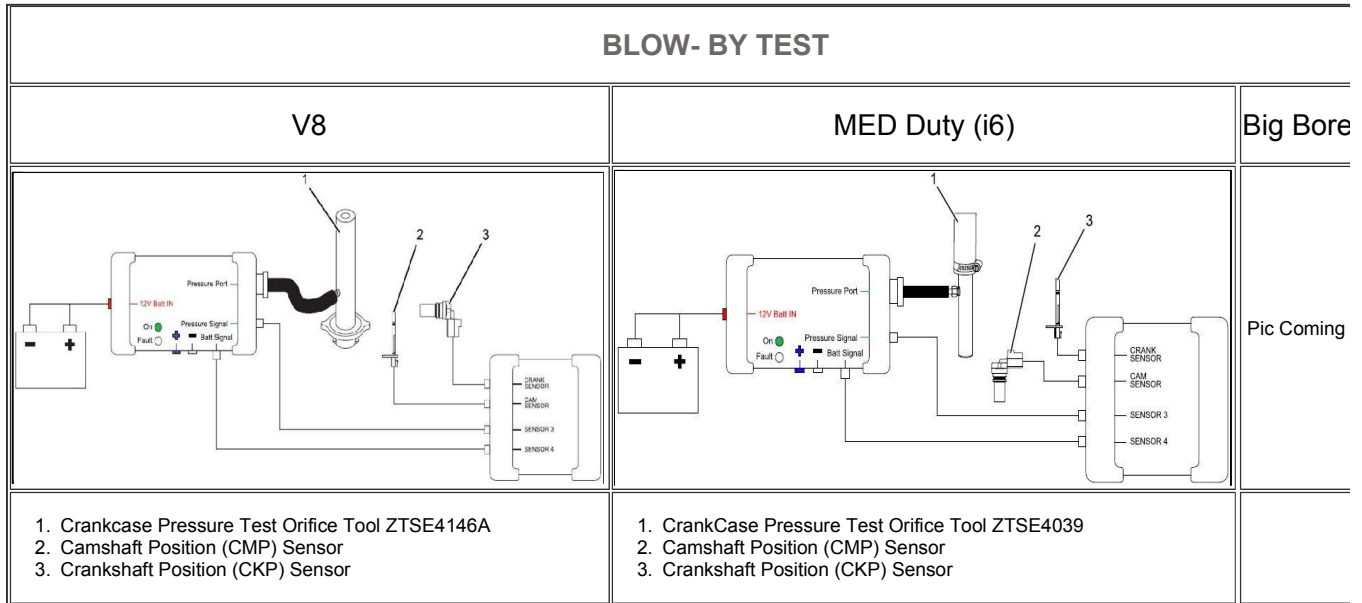


| BATTERY (RAW Signal) | Processed Signal |
|----------------------|------------------|
| | |

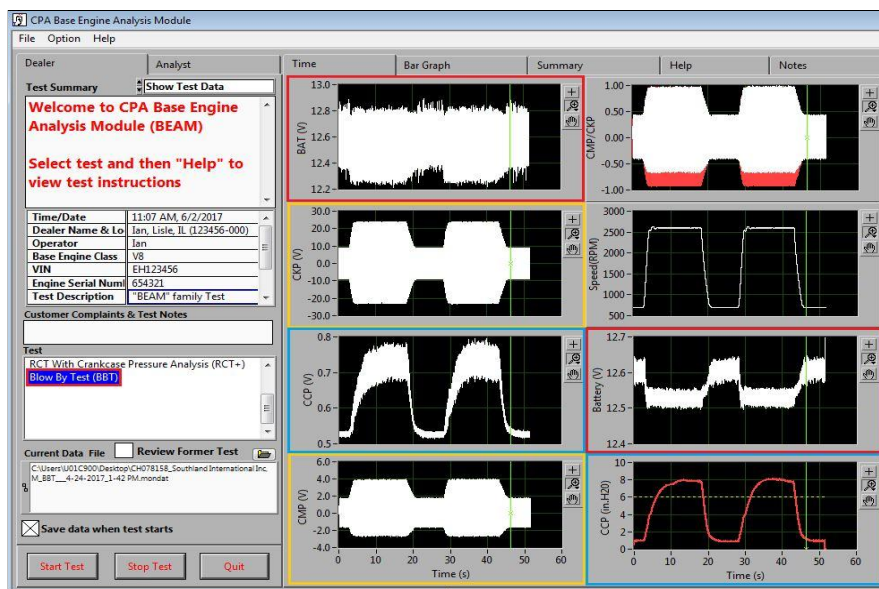


Blow-By Test (BBT):

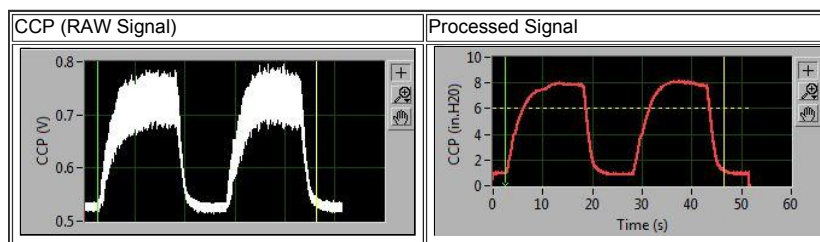
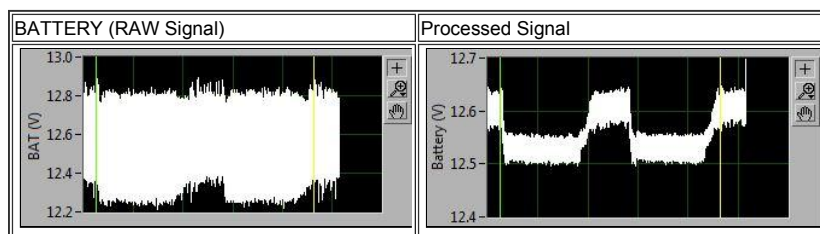
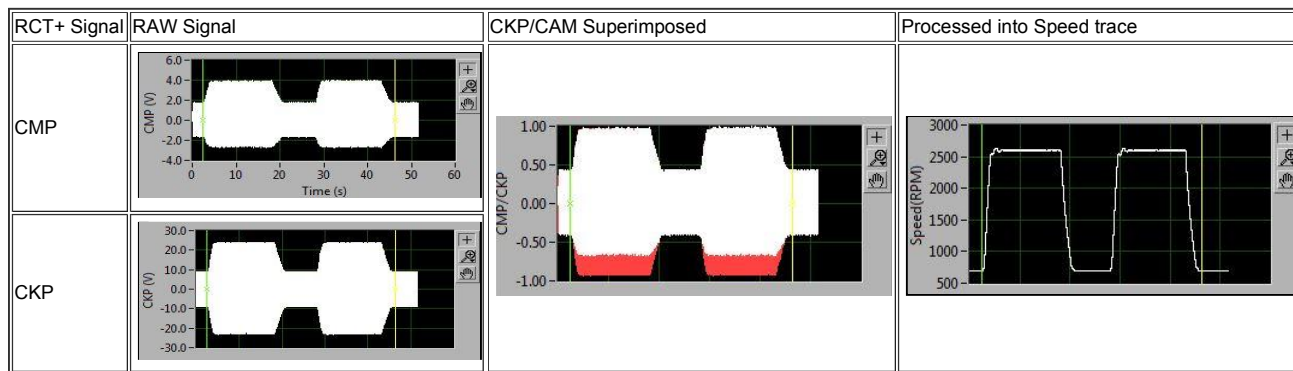
Below is the basic set up overview of BEAM BBT. Review the appropriate engine diagnostic manual for proper step-by-step installation instructions.



BBT User Interface:



BBT Signals. Example of Good Signals:



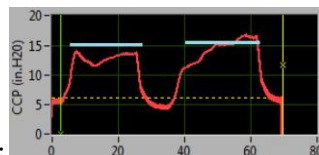
QUICK NOTES:

RCT+:

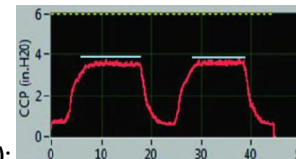
- Poor Battery Health while performing RCT+: Press "Stop Test" when the CPA prompts 3rd cranking event. RCT+ will process the data and issue a conclusion
- If Engine can Idle: For improved accuracy, warm the engine *Prior* to performing RCT+

BLOW BY TEST:

- Blow-By Test (BBT) utilizes the PressurePlus module instead of a water manometer or magnahelic gauge
- The fan must be OFF in order to achieve accurate results. The software is analyzing STABILITY within the data



Instability Result (FAN engaged):



Stable Result (FAN not engaged):

- Ensure PressurePlus Module is NOT connected to the oil fill adaptor when performing BBT. The PressurePlus Module hose connects to the the orifice tool (Crankcase Breather Outlet)
- Ensure proper channel set-up. BBT signals may OFFSET and look like the example below if connected incorrectly

Crankcase Pressure (CCP) Test (MF7 ONLY):

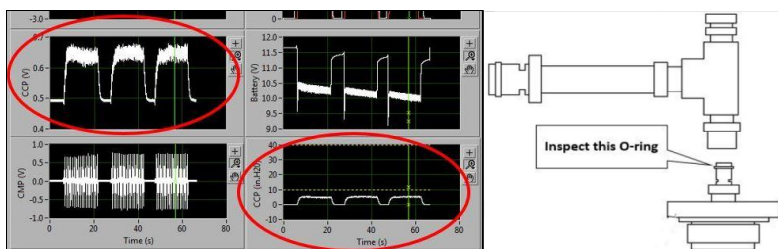
- The crankcase breather is functioning normally for this test.
- If the engine cannot run the Navistar Engine Diagnostics™ *Standard Test* (as requested in BBT and CCP test):
 - Check "Save data when test starts" box

- When Standard Test is requested: Hold Wide Open Throttle (WOT) for 5 seconds w/ FAN OFF
- Idle for 4 seconds
- WOT for 5 seconds (FAN OFF)
- Press "Stop Test"
- CPA will process the test and create the Results Graph

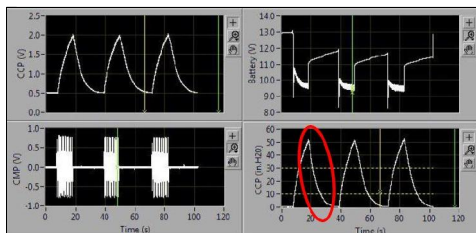
Crankcase Leak Detected Result:

This message occurs when crankcase is NOT properly sealed

- **Example 1 (RCT+): CCP not meeting minimum pressure threshold of 10"H2O (PIC Below)**
 - Confirm Crankcase Breather Outlet is properly plugged
 - Confirm Oil Dipstick (MF7 and MF11/13L ONLY) is correctly seated and properly sealed
 - Confirm oring on fill cap is NOT damaged (PIC Below)

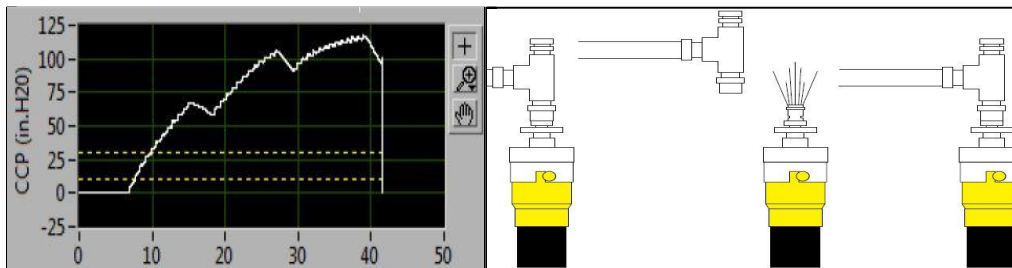


• **Example 2: CCP has rapid pressure decay**



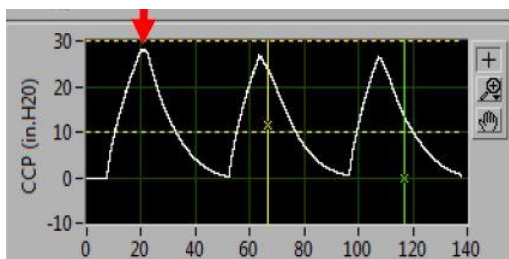
• **Example 3: CCP NOT allowed to decay between cranking events**

- Ensure the cranking prompt is correctly followed
- If removing cap (Applies to BB ONLY), ensure correct operation



• **Example 4 : CCP not meeting middle pressure threshold of 30" H2O (PIC Below)**

- Confirm Crankcase Breather Outlet is properly plugged
- Confirm Oil Dipstick (MF7 and MF11/13L ONLY) is correctly seated and properly sealed
- Confirm oring on fill cap is NOT damaged (PIC Below)

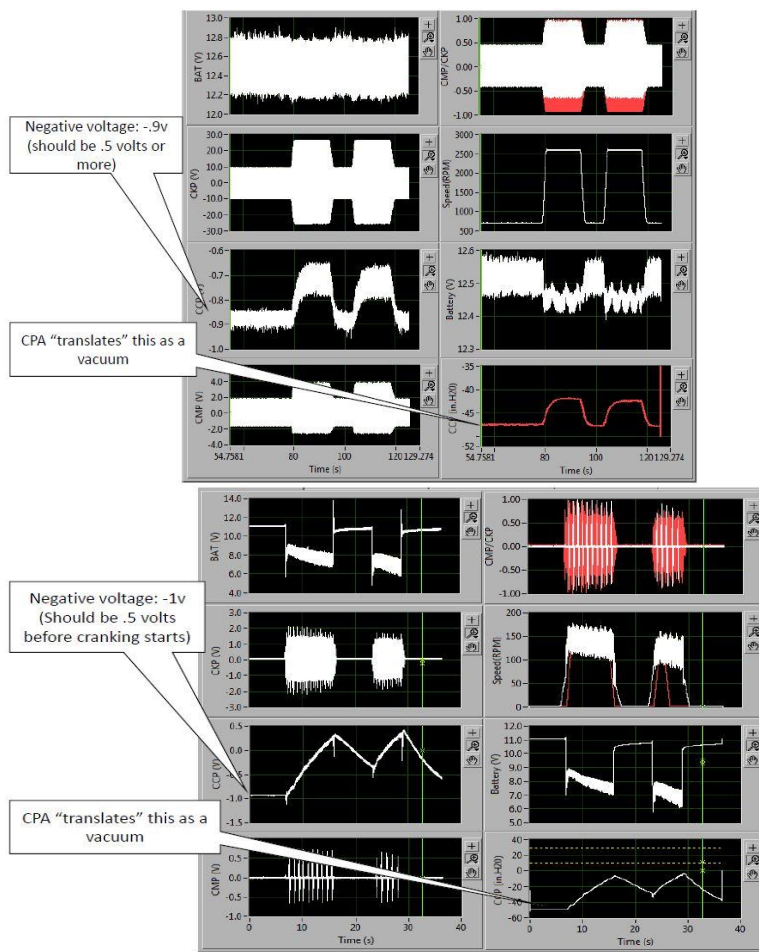


PRESSURE PLUS MODULE:

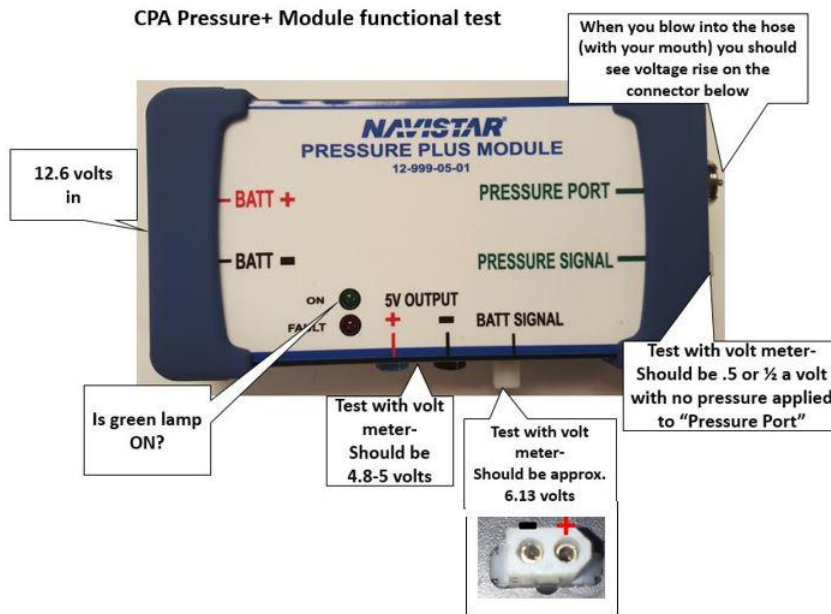
Errors with pressure plus module follow guidelines below

• **Example 1: CCP reading negative voltage. Signal GROUND is open or has high resistance**

- Using a DMM- Measure the BNC end and ensure correct voltage output at KOEO
- If voltage measured is NOT correct: Replace CPA Extension Cable and retest



- Overview of Pressure Plus Module (PPM)



Additional diagnostics available> [PPM SIGNAL DIAGNOSTICS](#)

RESOURCES

- [MED BEAM INSTRUCTIONS](#)
- [BB BEAM INSTRUCTIONS](#)
- [V8 RCT INSTRUCTIONS](#)
- [V8 RCT+ INSTRUCTIONS](#)
- [V8 CCP INSTRUCTIONS](#)
- [V8 BBT INSTRUCTIONS](#)
- [V8 IDLE INSTRUCTIONS](#)

| | |
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