Ford Coyote Ti-VCT Controller
PN 554-145

Use With: 558-124 or 558-125 Ti-VCT harness and 558-110 or 558-122 main engine harness.

Operation: The Ford Coyote Ti-VCT controller is designed to work with gen one (2011-2014) and gen two (2015-2017) coyote engines. It has pre-programmed cam position tables internal to the controller that have been developed by Holley for best drivability and power under most circumstances.

Inputs/Outputs: The Ti-VCT controller sends and receives information over the CAN bus with the Holley EFI and inputs 47-70 are setup in the available base cal to record the data (packaged with V4 build 110). If you are not using the supplied base cal you will at minimum be required to add the CAN_VVT_VEtrim_1 and CAN_VVT_VEtrim_2 for proper operation. Their definitions along with the other Inputs are covered in more detail under the diagnostics section later in these instructions.

Advanced Table Features: The base calibration included with the Holley EFI software has several advanced tables (in the Advanced ICF) enabled in the calibration. Below is a listing of them and their purpose.

- **Start_Idle_Offset:** 2D Table – This is used to allow a time versus coolant temp (CTS) idle speed adjustment. This table is used in lieu of the normal coolant rpm offset table. This raises the RPM to approximately the same level that those tables would, but also allows for a high RPM/quick drop off when warm. This allows the cam activators to fill with oil quickly and remove any chain slop immediately after start up. When the engine is cold, it actually allows the RPM to come down to a much more manageable level quicker than the normal coolant decay table. This table can be adjusted if necessary, but the user should probably just play with the base idle versus coolant temp to get his warm idle where he wants it. The normal table will be a flat number instead of having the ramp that you may be used to.

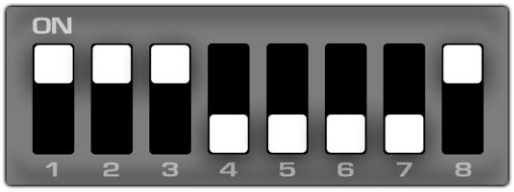
- **Fuel_Press_Comp:** 2D Table – Fuel pressure versus MAP. This table should not be adjusted by the end user unless he knows exactly what he is doing. It will most likely be close enough to work with any injector, but is set up for the stock Coyote injectors. It is setup to turn off if the fuel pressure falls too low or goes too high. This should protect against a bad sensor going out of range high or low. It should also automatically turn off the table if they do not have a pressure sensor plugged in (should fall below the 5psi set point).

  NOTE: This table should not be used on boosted engine or vacuum referenced fuel system without modification.

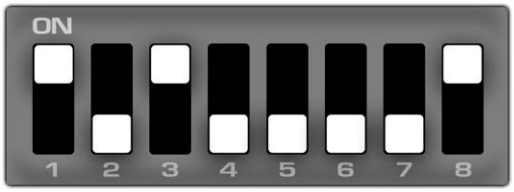
- **Cyl_VE_Trims:** 2D Per Gear Tables – These tables are a polynomial model based fuel correction for cam movement. What that means is that the Ti-VCT controller calculates a transient fuel value when the cams move and sends that value to the Holley EFI to be used as a fuel correction. These tables should not be adjusted for any reason.

Dip Switch Settings: On the back of the Ti-VCT Controller are a bank of dip switches. These switches are used to select the proper year range engine and cam table for the application. Currently there are 4 options available.

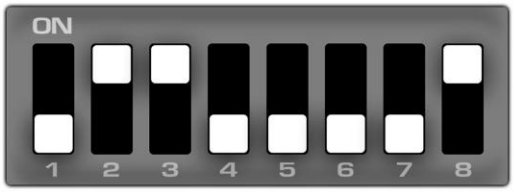
GEN 1
INTERNAL TABLE



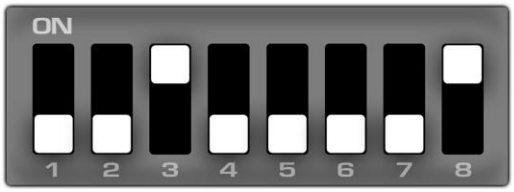
GEN 1 USER
ADJUSTABLE TABLES



GEN 2
INTERNAL TABLE



GEN 2 USER
ADJUSTABLE TABLES



Diagnostics: There are two different areas of diagnostics with the Ti-VCT controller. The first are CAN inputs from the controller that are read by the Holley EFI. These are pre-setup in the base cal. The second area of diagnostics is the 4 LEDs on the controller itself. Both are explained below

- **INPUTS:** For the inputs to work you must make sure the calibration you are using has CAN Bus 1 type set to “Holley Standard” under the basic I/O in system parameters. Failure to do so will result in the Ti-VCT controller not working.

  - **Input 47 and 48:** CAN_VVT_Exh1&2_DC – These are the commanded duty cycle of the cam phaser solenoids for each of the two exhaust cams.
  - **Input 49-56:** CAN_VVT_Status1-8: **-** These are diagnostic outputs from the Ti-VCT controller. See table for a brief description of what they report.

VARIABLE	DESCRIPTION
VVT_Status_1	Displays active errors
VVT_Status_2	Displays all stored errors from current key cycle
VVT_Status_3	Intake cam Error Counter
VVT_Status_4	Exhaust cam Error Counter
VVT_Status_5	Error index – intake cam 1 (commanded vs actual)
VVT_Status_6	Error index – intake cam 2 (commanded vs actual)
VVT_Status_7	Error index – exhaust cam 1 (commanded vs actual)
VVT_Status_8	Error index – exhaust cam 2 (commanded vs actual)

- **Input 57 and 58:** CAN_VVT_VETrim1&2 – These are used as inputs for the advanced table features explained earlier in the instructions
- **Input 59 and 60:** CAN_VVT_Var1&2 – These are reserved for future use.
- **Input 61-64:** CAN_Int/exh_SP – These are the commanded cam positions for the individual cams.
- **Input 65-68:** CAN_Int/exh_FB – These are the actual cam positions for each cam.
- **Input 69 and 70:** CAN_VVT_Int1&2_DC - These are the commanded duty cycle of the cam phaser solenoids for each of the two intake cams.

- **LEDS**

LED	Status
LED 1	OFF = NO ERROR RED = CAM POSITION ERROR
LED 2	SOLID GREEN = GOOD CRANK/CAM SYNC BLINKING GREEN = N CAM/CRANK SYNC OR ERROR WITH SYNC
LED 3	OFF = NO ERROR RED = NO CAN COMMUNICATION FROM HOLLEY EFI
LED 4	NOT USED

Custom Cam Table Setup

WARNING: YOU CAN PHYSICALLY DAMAGE YOUR ENGINE BY ADJUSTING THESE VALUES. Holley does not offer technical support on this feature. It is your responsibility to make sure you fully understand cam movement and its possible effects on the motor before attempting to modify the cam position tables.

- Enabling the dipswitches for an external table will make the Ti-VCT controller look at output 21 and 22 in the I/O ICF. These are setup in the base calibrations with a copy of the controller's internal table and simply need to be enabled.

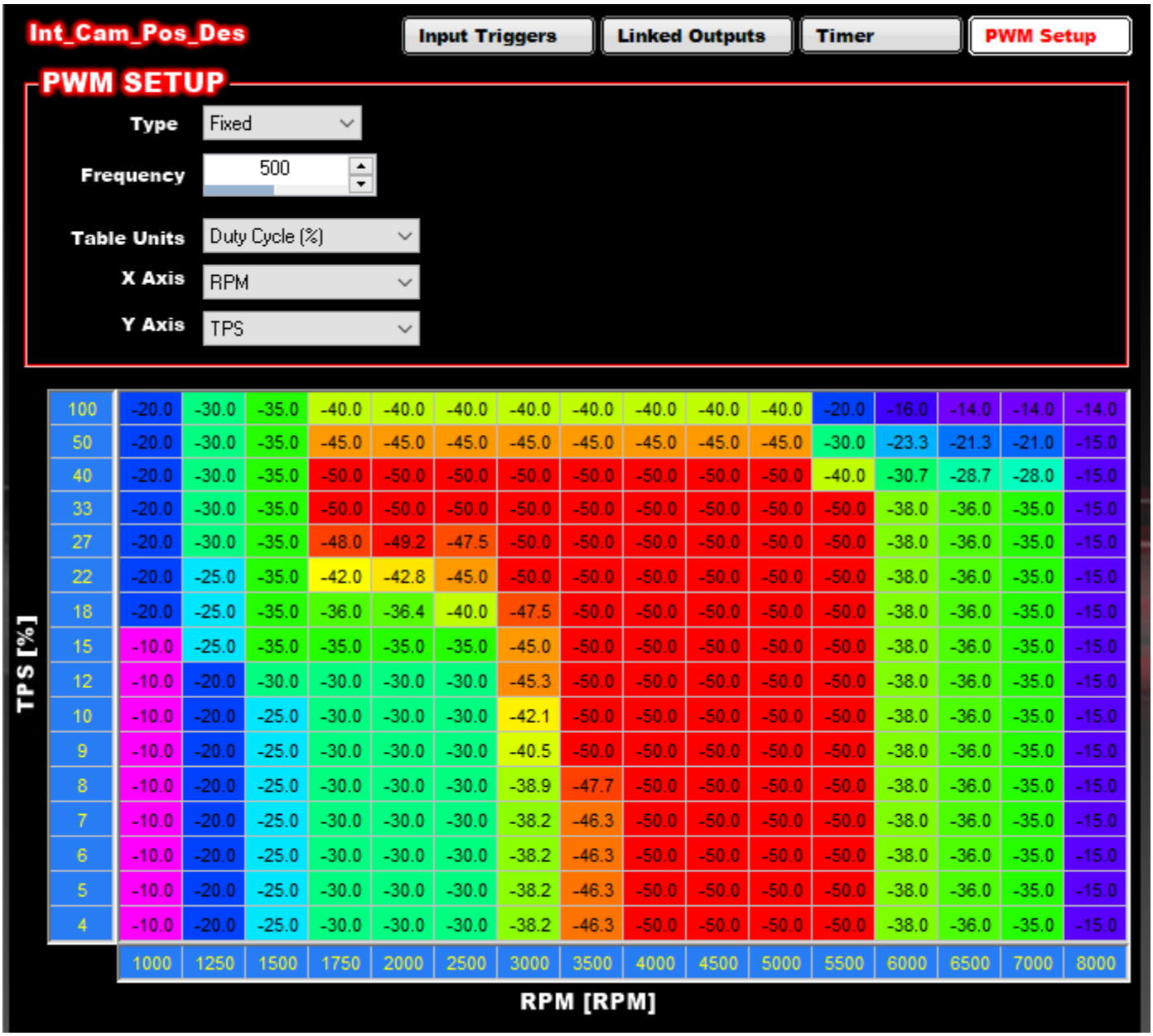
- Early Intake Cams (2011-2014)
  - The intake cams on the 2011-2014 engines have a phaser range of 50 degrees. The table value will range from 0 to -50 to reflect that with 0 being full advance and -50 being full retard.

- Late Intake Cams
  - The intake cams on the 2015-2017 engines have a phaser range of 70 degrees. The table value will range from 0 to -70 to reflect that with 0 being full advance and -70 being full retard.

    NOTE: The extended range of the late phasers means that table values are 20 degrees offset from the early cam table values to achieve the same absolute position of the intake camshaft.

- All Exhaust Cams
  - The exhaust cams have a phaser range of 50 degrees. The table value will range from 0 to 50 with 0 being full retard and 50 being full advance.

Example of a 2011-2014 cam table



TPS [%] \ RPM [RPM]	1000	1250	1500	1750	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	8000
100	-20.0	-30.0	-35.0	-40.0	-40.0	-40.0	-40.0	-40.0	-40.0	-40.0	-40.0	-20.0	-16.0	-14.0	-14.0	-14.0
50	-20.0	-30.0	-35.0	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0	-30.0	-23.3	-21.3	-21.0	-15.0
40	-20.0	-30.0	-35.0	-50.0	-50.0	-50.0	-50.0	-50.0	-50.0	-50.0	-50.0	-40.0	-30.7	-28.7	-28.0	-15.0
33	-20.0	-30.0	-35.0	-50.0	-50.0	-50.0	-50.0	-50.0	-50.0	-50.0	-50.0	-50.0	-38.0	-36.0	-35.0	-15.0
27	-20.0	-30.0	-35.0	-48.0	-49.2	-47.5	-50.0	-50.0	-50.0	-50.0	-50.0	-50.0	-38.0	-36.0	-35.0	-15.0
22	-20.0	-25.0	-35.0	-42.0	-42.8	-45.0	-50.0	-50.0	-50.0	-50.0	-50.0	-50.0	-38.0	-36.0	-35.0	-15.0
18	-20.0	-25.0	-35.0	-36.0	-36.4	-40.0	-47.5	-50.0	-50.0	-50.0	-50.0	-50.0	-38.0	-36.0	-35.0	-15.0
15	-10.0	-25.0	-35.0	-35.0	-35.0	-35.0	-45.0	-50.0	-50.0	-50.0	-50.0	-50.0	-38.0	-36.0	-35.0	-15.0
12	-10.0	-20.0	-30.0	-30.0	-30.0	-30.0	-45.3	-50.0	-50.0	-50.0	-50.0	-50.0	-38.0	-36.0	-35.0	-15.0
10	-10.0	-20.0	-25.0	-30.0	-30.0	-30.0	-42.1	-50.0	-50.0	-50.0	-50.0	-50.0	-38.0	-36.0	-35.0	-15.0
9	-10.0	-20.0	-25.0	-30.0	-30.0	-30.0	-40.5	-50.0	-50.0	-50.0	-50.0	-50.0	-38.0	-36.0	-35.0	-15.0
8	-10.0	-20.0	-25.0	-30.0	-30.0	-30.0	-38.9	-47.7	-50.0	-50.0	-50.0	-50.0	-38.0	-36.0	-35.0	-15.0
7	-10.0	-20.0	-25.0	-30.0	-30.0	-30.0	-38.2	-46.3	-50.0	-50.0	-50.0	-50.0	-38.0	-36.0	-35.0	-15.0
6	-10.0	-20.0	-25.0	-30.0	-30.0	-30.0	-38.2	-46.3	-50.0	-50.0	-50.0	-50.0	-38.0	-36.0	-35.0	-15.0
5	-10.0	-20.0	-25.0	-30.0	-30.0	-30.0	-38.2	-46.3	-50.0	-50.0	-50.0	-50.0	-38.0	-36.0	-35.0	-15.0
4	-10.0	-20.0	-25.0	-30.0	-30.0	-30.0	-38.2	-46.3	-50.0	-50.0	-50.0	-50.0	-38.0	-36.0	-35.0	-15.0

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