BOOST CONTROL INSTRUCTIONS
A STEP-BY-STEP EXAMPLE

STEP-BY-STEP EXAMPLE - Dual port wastegate with dual solenoids and a fixed external pressure source doing dome pressure control

We recommend this configuration. The dual solenoids combined with an external pressure source allow you to do some PID tuning before you even start your engine. Regulated compressed air can be used for pre-engine start tests and even for dyno work. See Figures 1, 2, & 3.
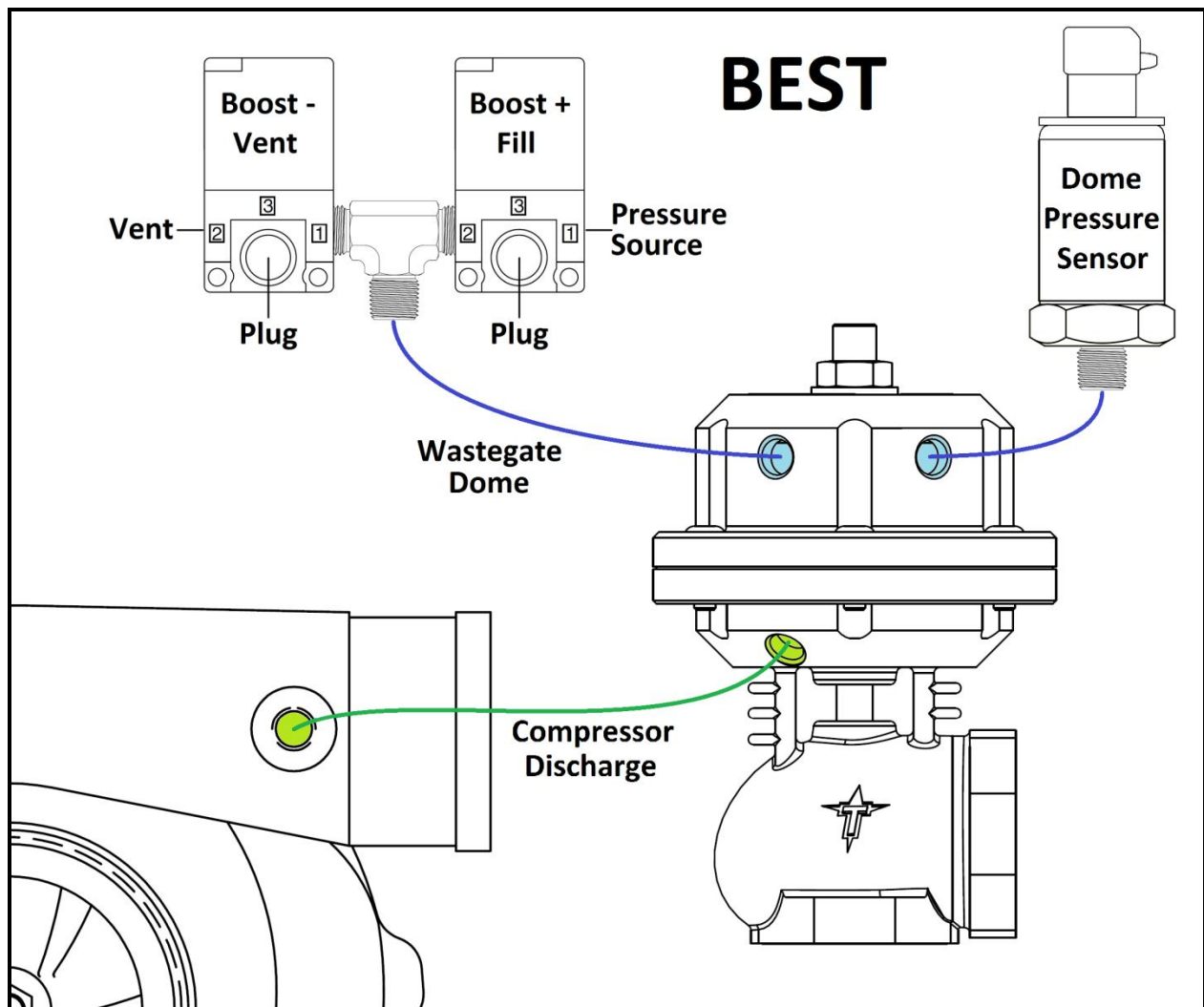
PLUMBING

Figure 1

Figure 2

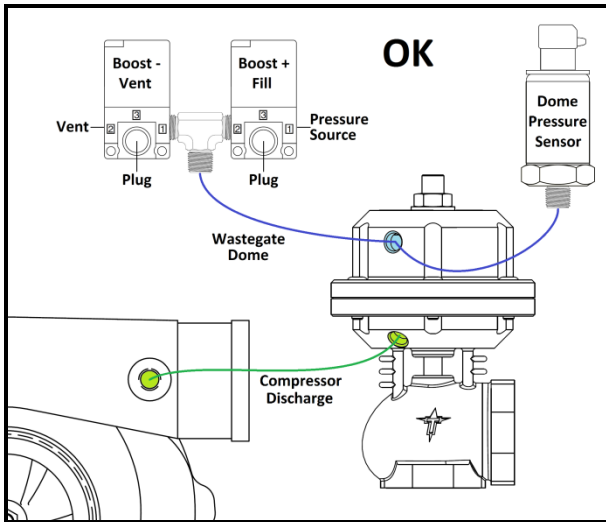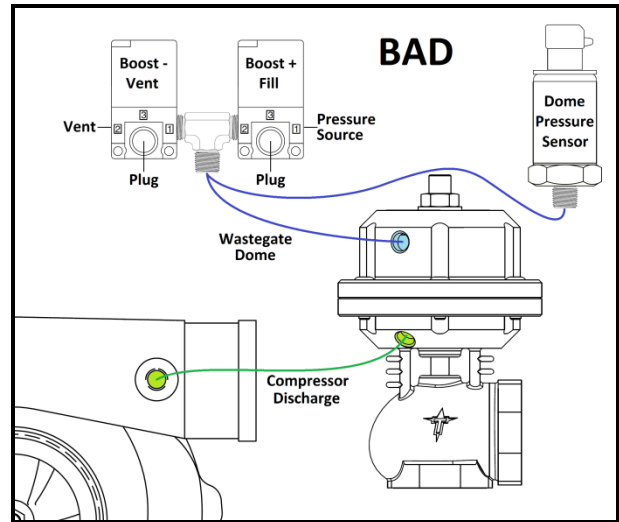**Figure 3**

1. Install a compressed air line from the compressor discharge to the bottom port of the wastegate.

2. Connect the fill solenoid's "1" port to the pressure source.

NOTE: In this example it is assumed to be a constant regulated 20psig.

3. Plug the "3" port.

4. Connect the fill solenoid's "2" port with a tee to the vent solenoid's "1" port.

5. Run a hose from this tee to the wastegate dome (top).

6. Install a silencer in the vent solenoid's "2" port (or leave it open).

7. Plug the "3" port.

8. Install the dome pressure sensor in the dome or to the dome via a short hose, not at the solenoid junction.

NOTE: If you are using a pressure sensor for the external pressure source it should be immediately before the fill solenoid's "1" port (post regulator if used).

SETUP IN SOFTWARE

NOTE: Add an IO ICF if you do not have one already.

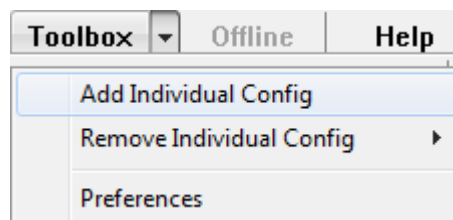1. Click "Toolbox" pulldown. Choose "Add Individual Config". See Figure 4.

Figure 4

2. Change file type to "Holley EFI Inputs/Outputs Config (*.io)".

3. Browse to Holley\HEFI\Individual Configuration Library\IO.

4. Select a blank base IO configuration.

5. Go to **Inputs** and add an input for the dome pressure sensor.

6. Pick an available input.

7. Give it a name like "Dome Pressure".

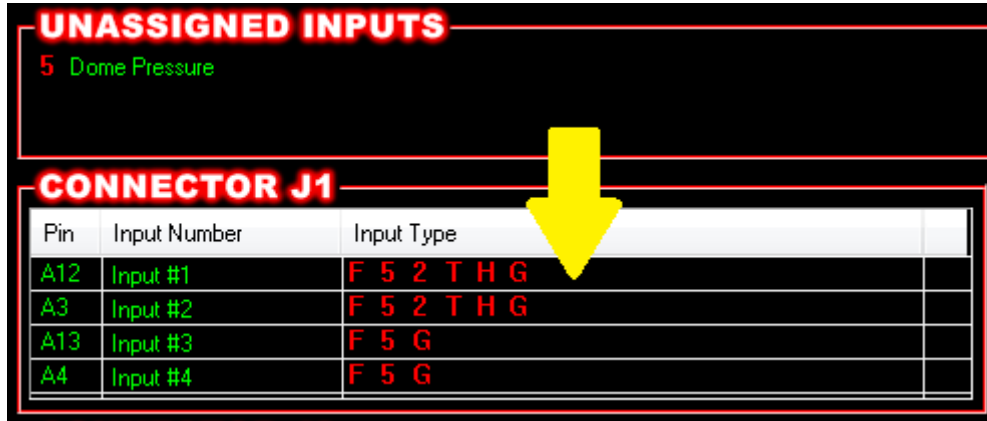8. Select "5 VOLT" for the sensor type (Figure 5).

Figure 5

9. Click "Configure" and select the sensor **Type** that corresponds to your sensor (like "Holley 3bar"). See Figure 6.

Figure 6

10. Go to the Pin Map and drag the sensor you just established to an available pin (mode 5). See Figure 7. This will result in Figure 8.
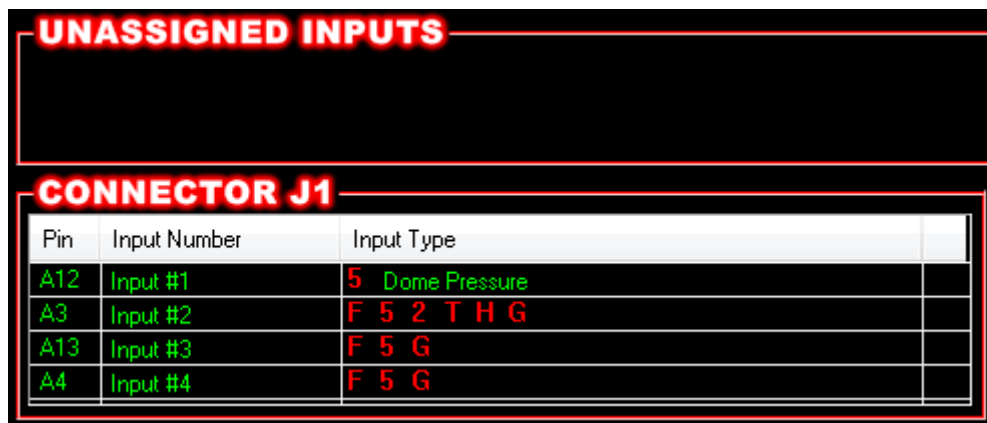

Figure 7

Figure 8

11. Wire the sensor signal to the appropriate pin at the ECU or IO connector.

- In this example it is J1A12 (or pin A on the IO connector).
- Inputs 1-4 are at the A-D pins of the Inputs/Outputs connector of terminated harnesses.

IMPORTANT! It would be good at this point to save the GF, send to ECU, and verify the Dome Pressure sensor is reading correctly. If there is a zero offset of more than about 0.25psi for a pressure transducer (from 0.0 PSI), or .25 kPa for a MAP sensor (vs the Baro reading), you can correct that here. See Figure 9.
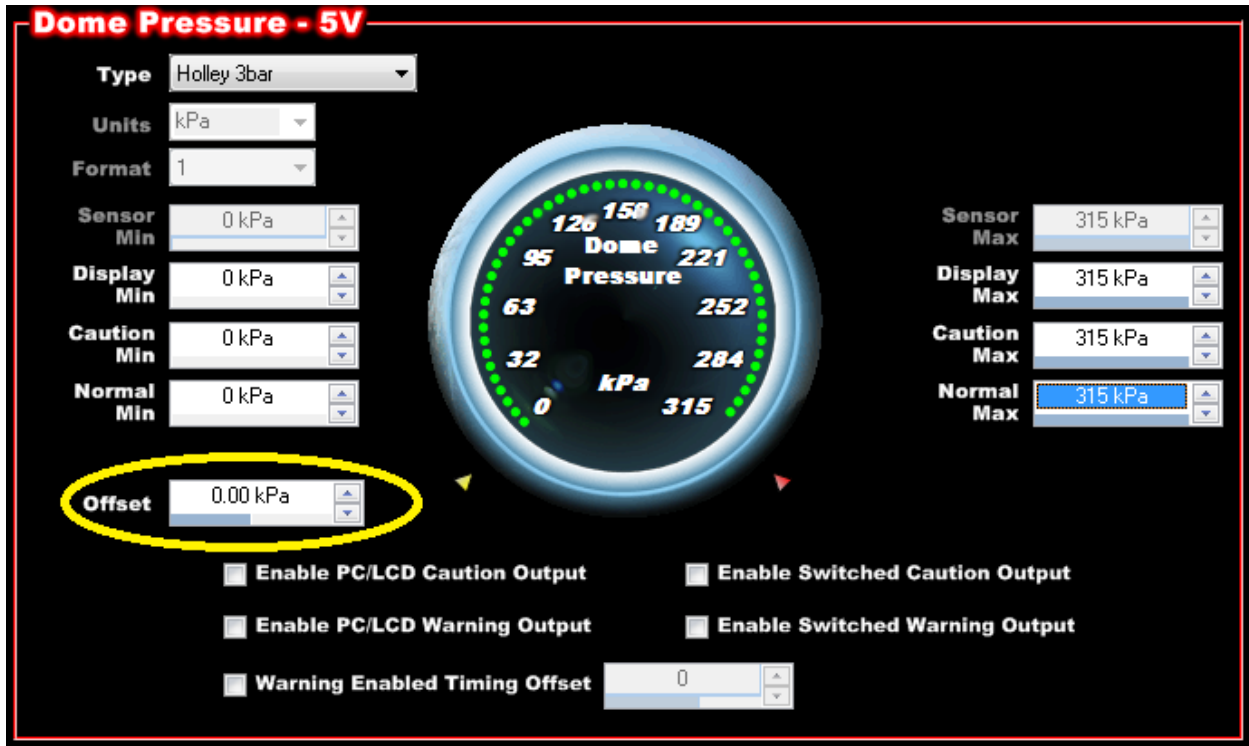

Figure 9

ADD A BOOST ICF

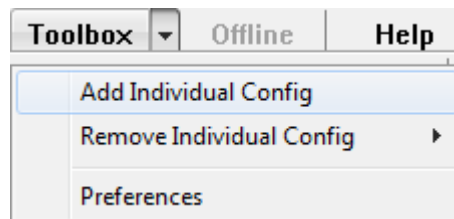1. Click "Toolbox" pulldown. Choose "Add Individual Config". See Figure 10.

Figure 10

2. Change file type to "Holley EFI Boost Config (*.boost)".

3. Browse to Holley\HEFI\Individual Configuration Library\Boost.

NOTE: This example is very similar to: Dual Port WG- Dome Control- Dual Solenoid.boost.

4. Click the Boost icon (compressor) and go to the **Boost Setup** section. See Figure 11.

Figure 11

5. Under the **Main Setup** tab (Figure 12):

   - Change **Wastegate Type** to "Dual Port (Dome pressure control)".
   - Change **Solenoid Configuration** to "Dual Holley".
   - Change **Control Method** to "Dome Pressure Only".
   - Select "Boost vs. Time" for your desired **Operating Mode** .
   - For now, deselect **TPS Based Boost Modulation Enable.**
   - Click **Trans Brake/Launch Input Enabled.**
   - Set **Launch Target** to a moderate pressure, like 5psig for testing.

Figure 12

6. Configure the **Safety Setup** parameters to something reasonable for your application. This is just an example. Adjust the limits and actions based on your engine's capabilities and your appetite for risk (Figure 13).

Figure 13

7. Under the **Dome Controller** tab of the **Boost Setup** section (Figure 14):

- Change **Solenoid Source Pressure** to "Fixed".
- Change **Fixed Pressure Value** to whatever you are actually using.
- In the **Controller Setup** area zero the **P**, **I**, and **D Term**s.
- Set the **Target Rate Limiter** to 100 psi/sec for initial PID tuning.
- Change the **Dome Pressure Input** to the input channel for the dome pressure sensor. Note that this is the one you created and named in the IO ICF.
- Zero the **Solenoid Control Signal Table** (only for custom solenoids).

Figure 14

8. Under the **Inputs/Outputs** tab of the Boost ICF (Figure 15):

- Select the input type for the **T-Brake/Launch** input. In this example we will use a "Ground" input type.
- Select the output type for the boost control solenoids. In this example we will use a "PWM-" output type.
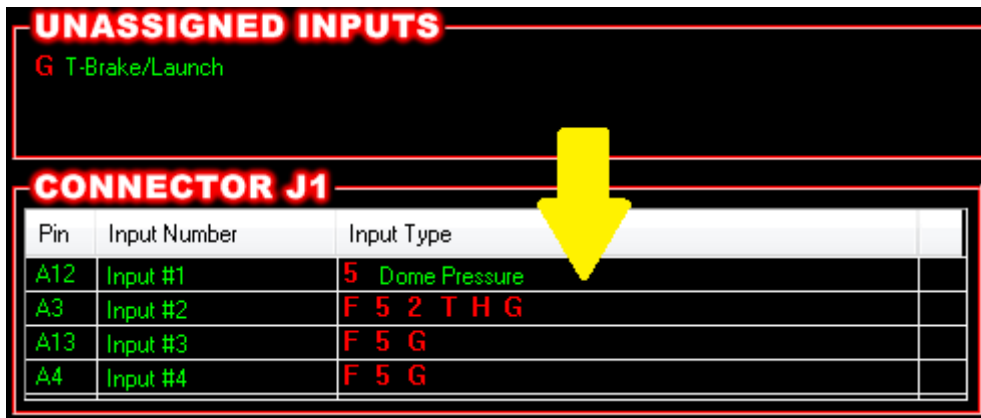
Figure 15

9. Return to the pinmap:

- Click on **View Inputs** and you will see a new unassigned input
- Drag "T-Brake/Launch" to a pin that supports the "G" input type (Figure 16). This will result in Figure 17.
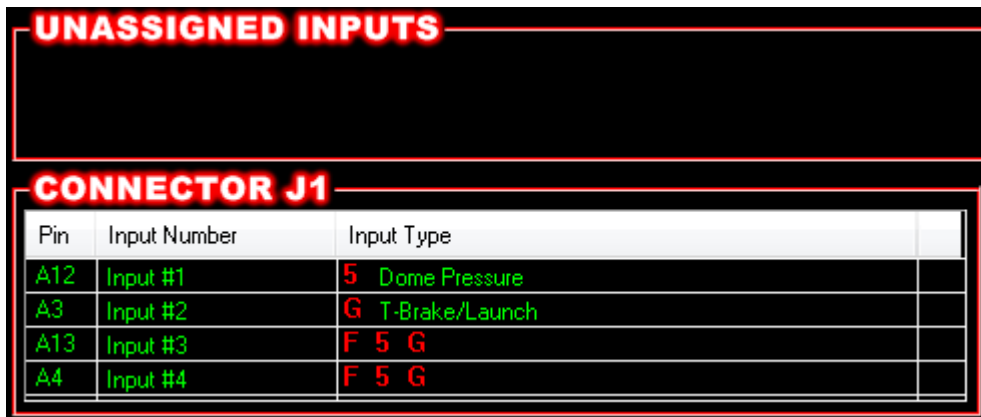
UNASSIGNED INPUTS

G T-Brake/Launch

CONNECTOR J1

Pin	Input Number	Input Type
A12	Input #1	5 Dome Pressure
A3	Input #2	F 5 2 T H G
A13	Input #3	F 5 G
A4	Input #4	F 5 G

Figure 16

UNASSIGNED INPUTS

CONNECTOR J1

Pin	Input Number	Input Type
A12	Input #1	5 Dome Pressure
A3	Input #2	G T-Brake/Launch
A13	Input #3	F 5 G
A4	Input #4	F 5 G

Figure 17

- Click on the **View Outputs** tab to see the unassigned outputs
- Drag "Boost + Solenoid" to a pin that supports the "PWM-" output type. In this example we use J1B10 (Figure 18). This will result in Figure 19.
- Drag "Boost - Solenoid" to a pin that supports the "PWM-" output type. In this example we use J1B3 (Figure 18). This will result in Figure 19.

UNASSIGNED OUTPUTS

P- Boost + Solenoid
P- Boost - Solenoid

CONNECTOR J1

Pin	Output Number	Output Type	
B12	Output #1	H P+	
B11	Output #2	H P+	
B10	Output #3	G P-	
B3	Output #4	G P-	

Figure 18

UNASSIGNED OUTPUTS

CONNECTOR J1

Pin	Output Number	Output Type	
B12	Output #1	H P+	
B11	Output #2	H P+	
B10	Output #3	P- Boost + Solenoid	
B3	Output #4	P- Boost - Solenoid	

Figure 19

10. If you return to the **Inputs/Outputs** tab you can see that the functions have ECU pins associated with them.

11. Initialize the **Boost vs. Time** curve to a constant value like 10psig (Figure 20).

Figure 20

12. Save the GF.

COMPLETE THE WIRING

Dome Pressure Sensor Connector Pinouts

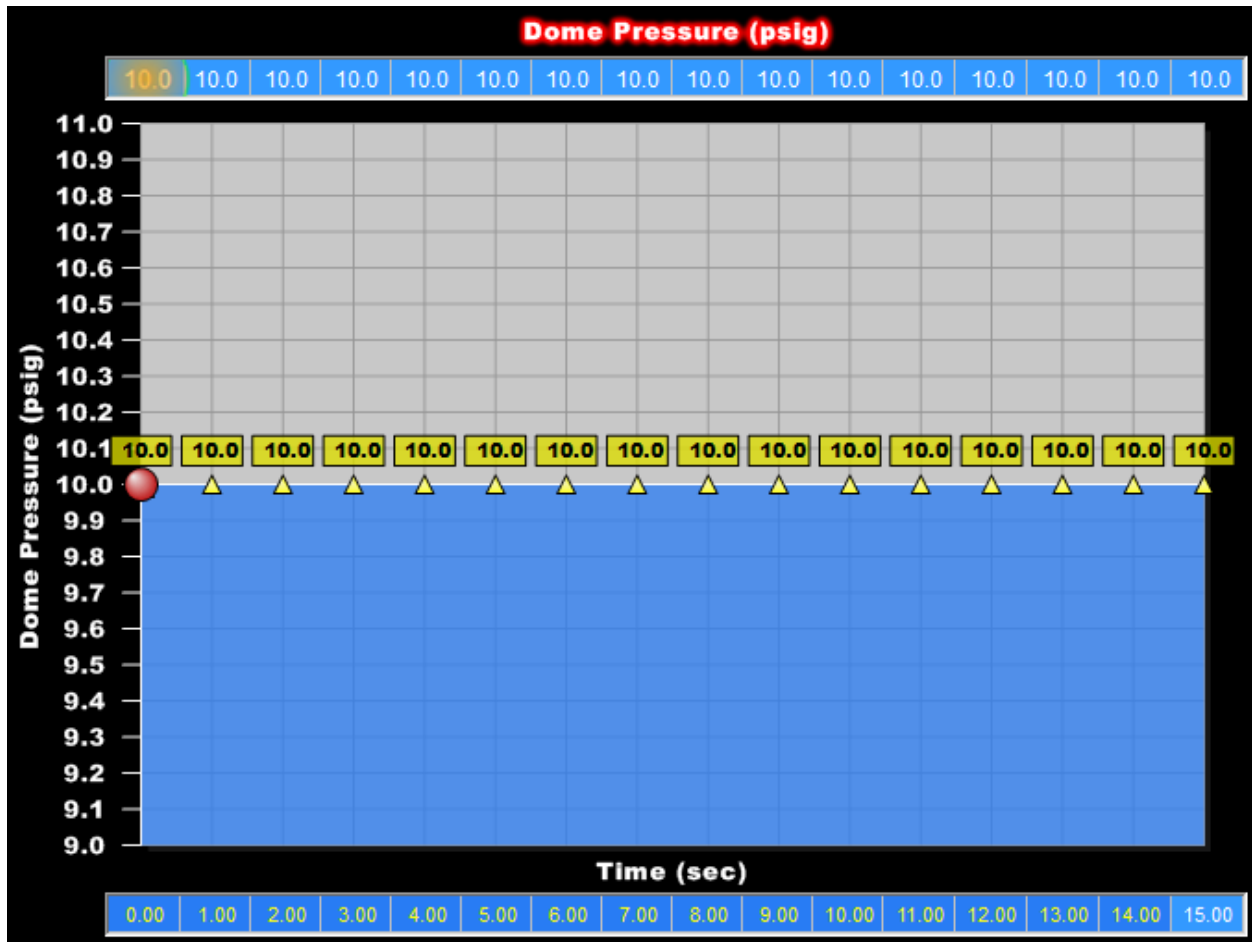| Sensor Ground	A	Holley MAP
Sensor Output	B	
+5V Sensor REF	C	

Sensor Ground	A	Holley 100psi
+5V Sensor REF	B	
Sensor Output	C	

I/O Connector on Main Harness

		INPUTS/ OUTPUTS	
A12	A		Dome Pressure
A3	B		T-Brake/Launch
A13	C		
A4	D		
B12	E		
B11	F		
B10	G		Boost + Solenoid
B3	H		Boost - Solenoid

Switched 12V — **Boost -** **Vent**

Switched 12V — **Boost +** **Fill**

Vent — ③ ② ①
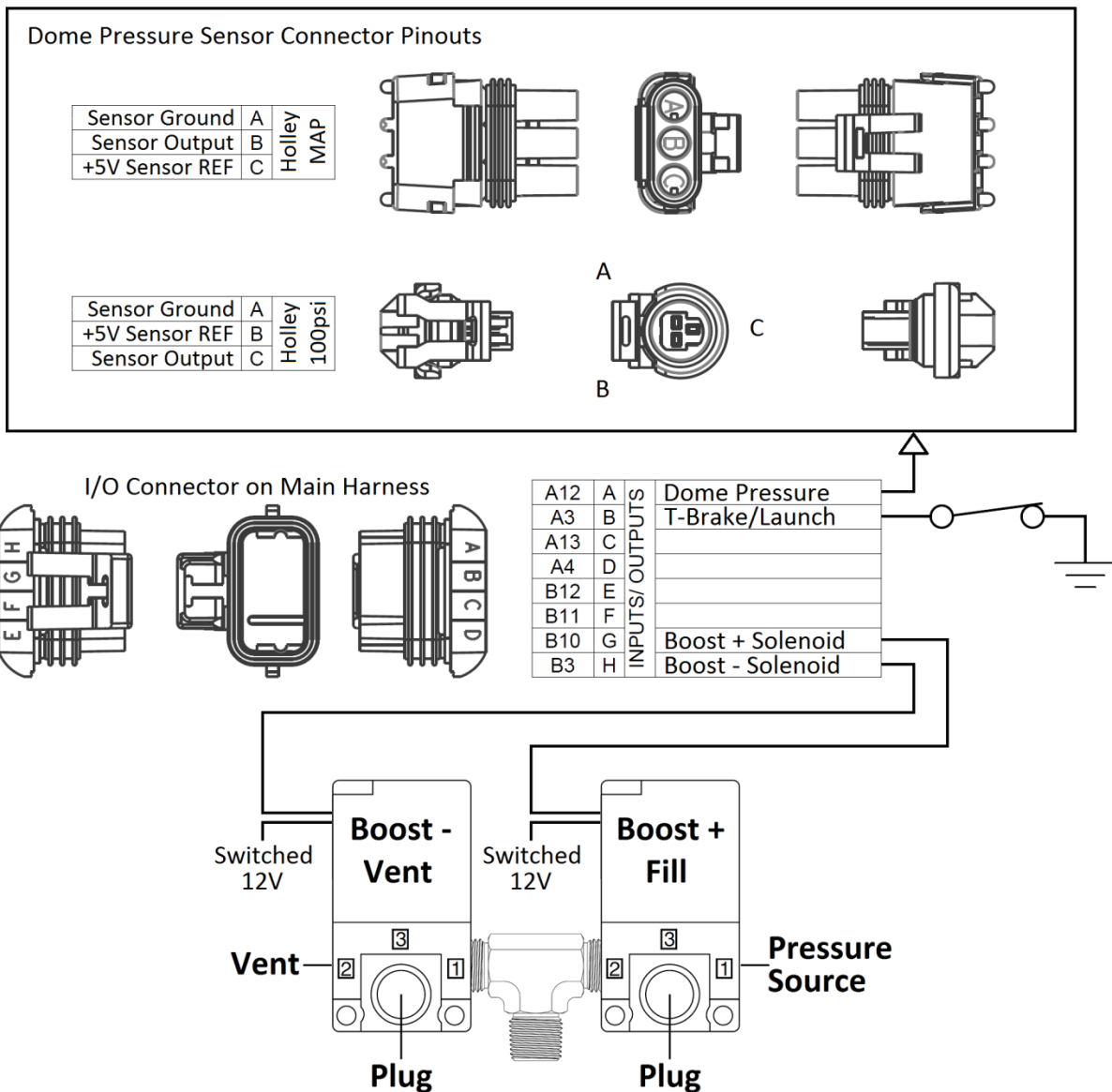
Pressure Source — ③ ② ①

Plug   Plug

Figure 21

1. Wire the T-Brake/Launch switch's output to the ECU's input pin that you chose. In this example it was J1A3 (or pin B on the IO connector).

2. Ground the other side of the switch.

NOTE: Do not hook any ECU input up in parallel with a high current solenoid like a trans brake. The deactivation of the device will create a large voltage spike as the current decreases, which can damage the ECU's inputs. The recommended practice is to put a relay between the trans brake and the ECU, where the relay's coil is wired across (in parallel with) the trans brake solenoid and the contacts of the relay generate a clean +12V or Ground output for the ECU's input.

3. Wire the fill (+) solenoid to the to the ECU's output pin that you chose. In this example it was J1B10 (or pin G on the IO connector).

4. Connect the other side of the solenoid to a switched 12V power source.

5. Wire the vent (-) solenoid to the to the ECU's output pin that you chose. In this example it was J1B3 (or pin H on the IO connector).

6. Connect the other side of the solenoid to a switched 12V power source.

PREPARE ECU

1. Power up the ECU and insure the FW version is >= greater than version 513.

   - "Get ECU Info".

2. Sync with the ECU and "send" this GF.

3. After the sync dialog box has closed, power down the ECU.

   - IO and pinmap changes require an ECU reset to take effect.

TEST AND TUNE THE DOME PRESSURE PID CONTROLLER

1. Power up the ECU.

2. Go online with the Holley PC software.

3. Switch to the data monitor window that has boost related variables.

4. As you cycle the T-Brake/Launch switch, you should see the *Target Boost* change.

   - When the switch is on, the *Target Boost* should be the **Launch Target** value.
   - When the switch is off, the *Target Boost* should come from the **Boost vs. Time** curve.

5. You can also use the TPS modulation of the *Target Boost* by checking **TPS Based Boost Modulation Enable**.

6. Since the PID controller has zero gains, the *Boost Solenoid Duty* should remain at zero.

7. If you increase the **P Term** while cycling the T-Brake/Launch switch you will see that the *Boost Solenoid Duty* will start to respond to changes in *Target Boost.* For dome pressure control with dual Holley solenoids you can usually start with PID values the range in Figure 22 and go up.
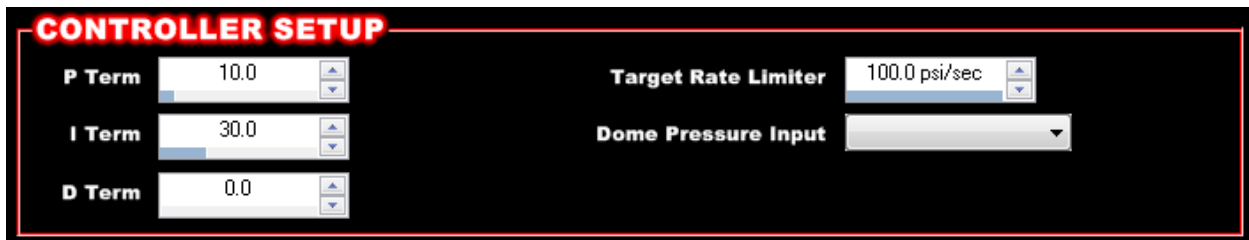

Figure 22

8. Try to tune the controller so that the dome pressure attains the *Target Boost* without major overshoot or oscillation. You can then reduce the target rate limiter to give you a little more stability if desired.

9. See the PID Controller Tuning Information section in the Appendix of the main boost control instructions for more detailed information.

10. When you are finished rough tuning of the PID change the test values for **Launch Target** and **Boost vs. Time** to safe values.

PERFORM FINAL PID TUNING UNDER BOOST

NOTE: Because wastegate motion will affect the dome pressure, the PID controller tuning may need more refinement when the wastegate is actively regulating boost pressure.

NOTE: It is not a bad idea to reduce the gains that you derived during the engine-off tests, and then work back up as the system proves stable.

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