Techlusion 83i/TFi Power Box Installation for BMW Type 259 Oilhead Motorcycles

In September 2001, I installed a Techlusion 83i Power Box (83i) on my 1996 R1100RT, to eliminate lean fuel surging that developed between 3000-4000 RPMs. The 83i totally eliminated my lean-fuel surge. However, Techlusion later developed a new digital TFi, which not only eliminates the surge, provides better throttle response and additional adjustments. So I switched to the new TFi in February of 2002. So, how are they working? After 12,000 miles, I couldn't have been happier with the results. This article describes in a relatively painless way, how to install an 83i or TFi on an oilhead. For the purpose of this article, I will describe only the methodology for installing an 83i or TFi in the control mode (02 sensor disconnected), since this is a more time consuming application. To install an 83i or TFi in the stealth mode (02 sensor connected), follow steps 1, 2 and 8. I will also describe how to fine-tune an 83i with a Digital Voltmeter (DVM).

Borrowing from my article in the February's 2002 issue of BMWON, the following information explains what a Techlusion 83i Power Box does to reduce or eliminate lean fuel delivery surging. *"Drawing about 25 milliamps of power from the power side of the left fuel injector, the 83i operates by monitoring the triggering sent to the injectors. R1100 series injectors are ground-triggered devices. This means that the injectors have power supplied to them at all times. The Motronic simply turns on an internal transistor at the appropriate time to provide a momentary ground (measured in milliseconds). This causes the current to flow through the injectors, which energizes their solenoid coils, creating the magnetic fields, which lift the injector pintles to let fuel flow. The 83i box simply provides a ground circuit to continue power flow through the injector even after the Motronic has turned its transistor off. Since the 83i is extending the length of time the injector circuit has a ground, it is extending the length of time the pintle is open, therefore increasing the amount of fuel flow."*

Paul Glaves wrote in the same issue of BMWON, *"The Power Box can be adjusted to extend the pulse width in two regimes: one below the and one above a crossover setting. The crossover point is computed based on the percentage of total time that the injector is on. That crossover setting is adjustable using one of three small screwdriver adjustments on the device. The other two adjustments (center and right) control the length of pulse added, one for below and one for above the crossover point."*

To setup an 83i or TFi in the control mode, you are required to disconnect the 02 Sensor. The Techlusion web page states, *"The Control Mode is just that we default the ECU to a lean fuel map and let the 83i control both the cruise and performance aspects of the fuel curve. On the older bikes typically before 1999 this default map is attained by unplugging the O2 sensor and using the 83i to adjust the fuel curve to your personal preferences. Once this is completed, you are in control of the fuel curve using the 83i. The Control Mode is the 83i's normal function mode for all other motorcycles."*

To install an 83i or TFi in the control mode, follow steps 1-8. To install an 83i or TFi in the stealth mode, follow steps 1, 2 and 4, 8. Use the initial setting provided by the installation instructions. The fine tuning instructions in this article in steps 5-7, pertain only to bikes setup using the control mode.

STEP 1: Preparation for installation .

1. Remove the seat, saddlebags and side covers.

2. Remove left and right mirrors and side panels.

3. Disconnect the air intake sensor on top the air cleaner cover, remove air cleaner cover, and remove the black air intake tube to the air cleaner.

STEP 2: Installation (connecting the 83i or TFi)

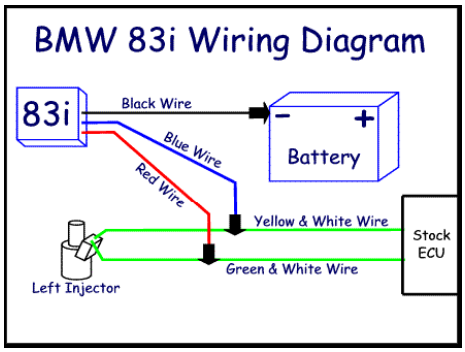
1. Disconnect the battery to allow the Motronic to reset at the negative post.

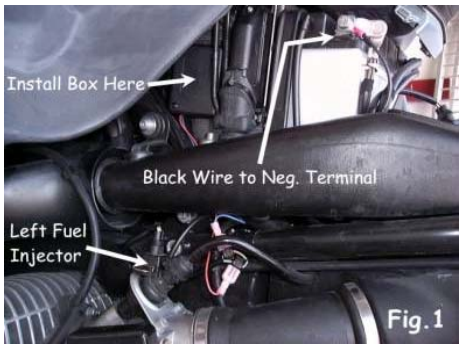
2. Connect the tap connectors to the left side fuel injector. (See diagrams below)

    a. Connect the blue wire to the yellow/white wire.

    b. Connect the red wire to the green/white wire.

    c. Connect the black wire to the battery ground wire.





Photos Reference: http://www.techlusion.com/OilHeads.htm

3. Place the 83i or TFi fuel module out of the way in preparation for lifting the fuel tank.

STEP 3: Disconnecting the O2 sensor

1. Carefully remove the fuel tank retaining bolt on the right side of the fuel tank. This bolt is located on the right bottom corner near the battery. **Caution:** The bolt has a nut on the backside. After loosening, gain positive control of the nut to avoid having it drop into a hard to reach place. Set the nut and bolt aside.

2. Pull the fuel tank slightly rearward and lift up about two inches. If you tilt the tank a bit to the left, it will stay up in that position.

3. Trace the O2 sensor located on the right side of the exhaust system in front of the catalytic converter to the cannon plug under the tank and disconnect the plug. Secure the disconnected cannon plugs in place.

4. Lower the fuel tank and secure the fuel tank retaining bolt.

Caution: Ensure your throttle cable on the right side returns properly into its retaining caps. By lifting the fuel tank, the cable may pull out of its seat and not properly reseat. Failure to return the cable to its seat may desynchronize your throttle bodies.

STEP 4: The Cat Code Plug

Techlusion no longer recommends removing the Cat Code Plug (CCP) and replacing it with a jumper. For all Techlusion applications, use the stock CCP. Do not use a Techlusion 83i or TFI without a CCP installed. Techlusion 83i and TFi's are designed to be used with the stock CCP.

STEP 5: Initial settings for the 83i fuel module

1. Open the 83i fuel module box by removing the two cover retaining screws.

2. With a small screwdriver, turn the left pot fully clockwise to the 11 o'clock position. This allows the 83i to automatic determine green (center pot) to red (right pot) changeover based on engine load. In the control mode, this pot will never need a future adjustment.

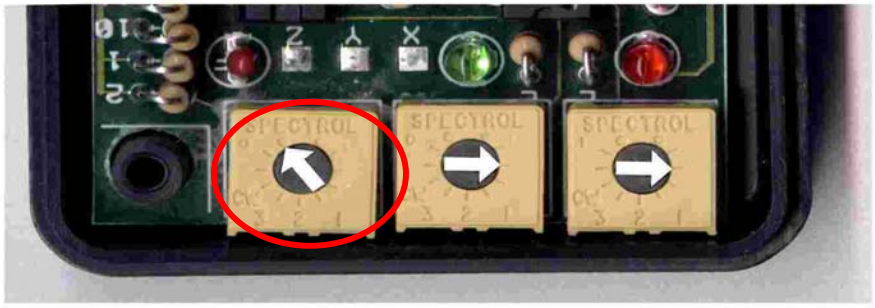


Photo Reference: http://www.techlusion.com/OilHeads.htm. Modification by Ken Krumm

3. With a small screwdriver, turn the center and right pots fully counter-clockwise to the 1 o'clock position. This turns off both midrange and high range pots for the initial startup.

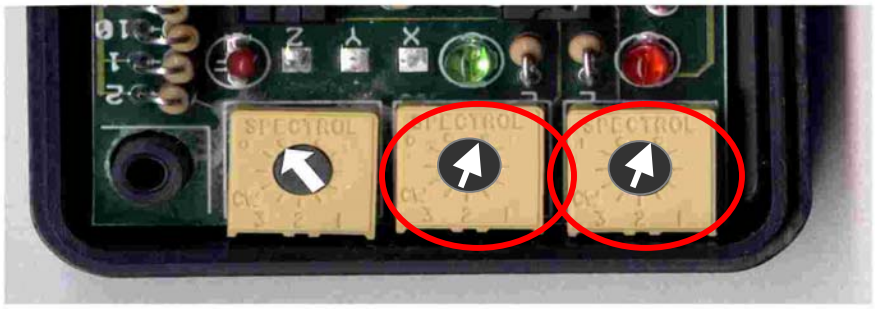


Photo Reference: http://www.techlusion.com/OilHeads.htm. Modification by Ken Krumm

4. Reconnect the negative battery terminal.

STEP 6: Adjusting the 83i for operations

1. Start the bike and warm up to normal operating temperatures (five bars). **Note:** After restarting with the center and right pots turned off, the bike will initially have a hard time idling without engaging the choke lever. Why? With the 02 sensor disconnected, the Motronic will defaulted to a leaner map then it normally uses (R1100RT only).

2. Disengage the choke lever. With a small screwdriver, slowly turn the midrange center pot until it's between the 2-3 o'clock position or to the point where your bike idles at the proper RPM. This will add a small amount of fuel by extending the opening of the fuel injectors, and the engine will smoothen out. Since your center pot is your midrange pot, it will affect idle. So, you have two adjustment options at this point.

a. Your first option is you can adjust the center pot to where your idle returns to your desired idle speed. BMW specification is 1000 RPMs +150.

b. Your second option is you can adjust the center pot for best performance and readjust your idle with the brass air screws.

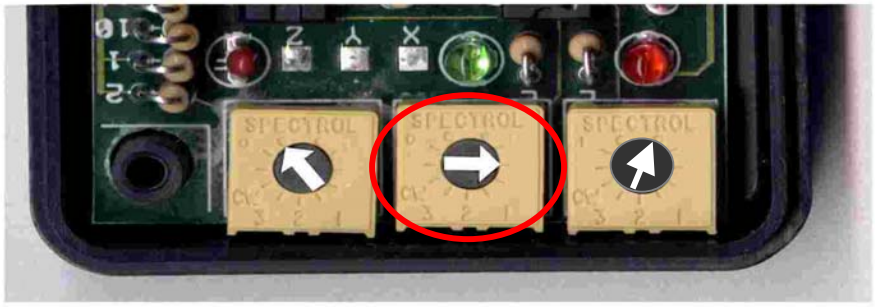


Photo Reference: http://www.techlusion.com/OilHeads.htm. Modification by Ken Krumm

3. With a small screwdriver, slowly turn the high range right pot until it was between the 2-3 o'clock position. Since this pot activates in the control mode under load at approximately 4500-5000 RPMs, the motor idle is not affected. This is the performance pot.

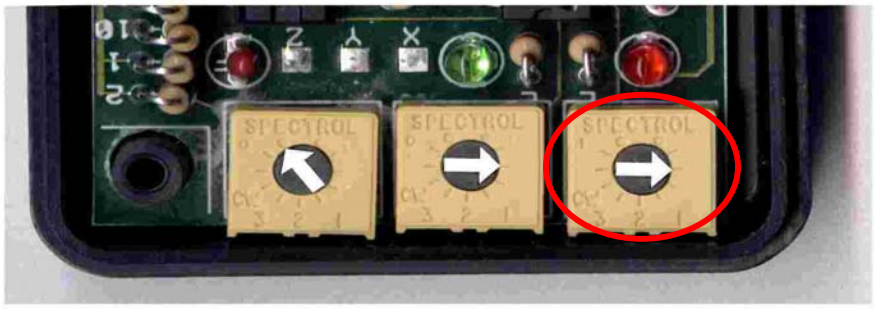
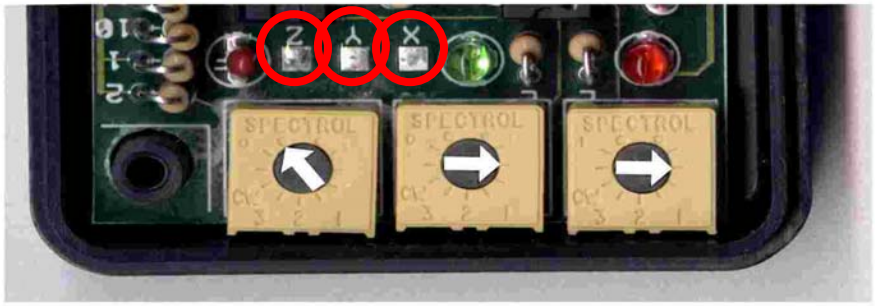


Photo Reference: http://www.techlusion.com/OilHeads.htm. Modification by Ken Krumm

Note: Techlusion does not recommend adjusting the center or right pots beyond the 3 o'clock position. Adjusting this pot past the 3 o'clock position will not damage your motor. This is a point where you've reached maximum performance. Adjusting beyond the 3 o'clock position will waste fuel without a performance return.

STEP 7: Fine tuning the 83i with a DVM

1. Above the three pots are three small test point labeled **Z**, **Y** and **X**. The **Z** test point is for the left pot, a **Y** test point is for the center pot, and the **X** test point is for the right pot.



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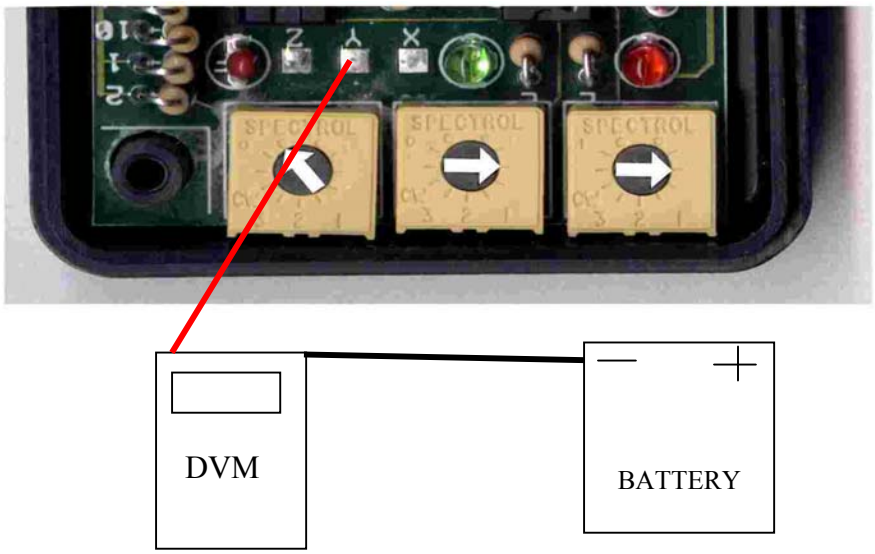
2. With the bike running, connect the negative lead of the DVM to a ground or the negative battery post. With the red positive DVM lead, touch the **Y** test point. At 1 o'clock (fully counter-clockwise), the pot is off and your DVM will display 0 volts. At the 3 o'clock position, the DVM will display approximately 2.50 volts (maximum range for control mode). Again, more fuel is not always better. Adjust your bike to where it runs best and is the most fuel-efficient. Each bike is

different. I prefer my bike around 2.35 volts. For touring, you can turn down the pot to around 1.50 - 2.00 volts for maximum fuel efficiency. The center pot is your primary adjustment for midrange touring or cruising.

Note: By securing the negative DVM lead to a ground, you can adjust the center pot with a small screwdriver while watching the DVM increase or decrease in voltage.



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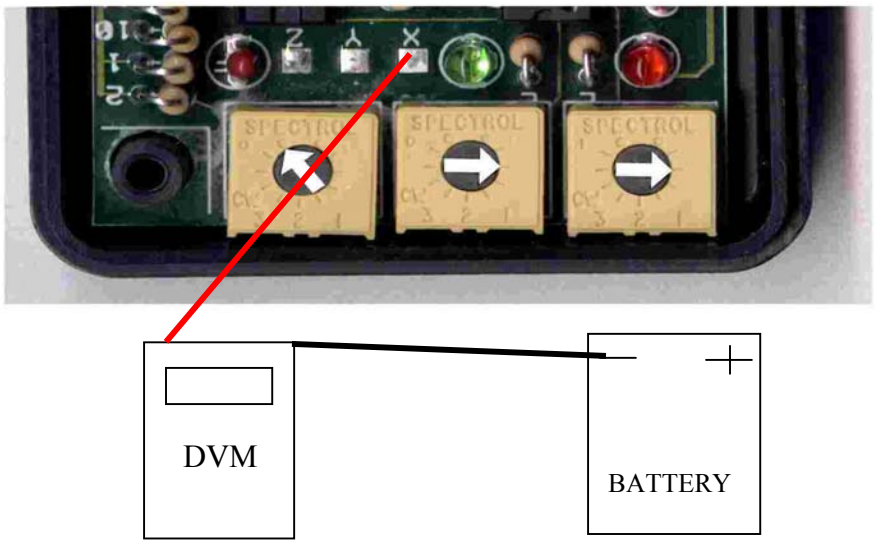
3. With the bike running, connect the negative lead of the DVM to a ground or the negative battery post. With the red positive DVM lead, touch the **X** test point. Again, at 1 o'clock (fully counter-clockwise), the pot is off and your DVM will display 0 volts. However, at the 3 o'clock position, the DVM will display approximately 1.50 volts (maximum range for control mode). About 1.0 volt less than the center pot. The right pot is your high range pot that activates in the control mode under load at approximately 4500-5000 RPMs. I prefer my bike around .95 to 1.05 volts.



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4. Put the cover back on the 83i fuel module box and secure it to the recommended location by Techlusion (see photo above). Retain in place.

5. Since you moved the throttle cables lifting the fuel tank, I recommend checking the throttle body synchronization before reassembly.

6. Reassembly the bike.

STEP 8: TFi Pot Settings Common for most Models with the O2 Sensor Unplugged

1. Let the bike warm up until it idles normally. At idle the green light should be on all the time.

2. Adjust the green fuel pot (usually in the 2-3 o'clock range) for the setting that sounds best. If it sounds the same over a small range always choose the lean side of the good running range.

3. Take the bike for a test drive. During this test you only want to drive the casually in the ranges where you have had the surge problem. You should notice that the surging is now better if not totally gone. If you still have a little surging turn in a little more green fuel.

4. The yellow fuel pot is used to enhance performance. It acts much like an accelerator pump and only effects fuel during heavy throttle. Try a couple of different setting until you find the one that is best suited for your style of driving. The yellow fuel is also helpful when you engine is having hot weather detonation problems, a little more yellow fuel will usually fix this type of a problem.

5. The photo below is the most common setting for R1100RT motorcycles with 02 sensor disconnected. Use this setting as a base setting. Adjust from this setting. On an R1100RT with the 02 sensor connected, turn down the green pot to 1 o'clock and add fuel to the red fuel pot to around 3 o'clock.

TFI PHOTO for R1100RT with 02 sensor disconnected

Note: With both the R1150RT and R1100RT, you can add fuel to the Red Fuel Pot to increase performance. Add in small increments.

Photo Reference: http://www.techlusion.com/OilHeads.htm.

6. The photo below is the most common setting for R1150RT motorcycles. Use these settings as a base setting. Adjust from these settings. Notice the green pot is almost turned off at the 1 o'clock setting. With the R1150RT, the bike will default to a richer map with the 02 sensor disconnected. With the 02 sensor connected, the green fuel pot can fine-tune the idle. With the 02 disconnected, the R1150RT defaults to a richer map then the R1100RT. Adjust the idle around the 1 o'clock position.

TFI PHOTO for R1150RT with 02 sensor connected

Note: With both the R1150RT and R1100RT, you can add fuel to the Red Fuel Pot to increase performance. Add in small increments.

Photo Reference: http://www.techlusion.com/OilHeads.htm. Modification by Ken Krumm

Final Notes: If you are fine-tuning an 83i with a DVM or a TFI and want to test different settings, I recommend temporarily securing with Velcro the 83i fuel module box to the top of the air cleaner cover for easy adjustment. **Caution:** Ensure your bike has adequate space between the air cleaner cover and seat before sitting on the bike to avoid damaging your 83i fuel module box. Since this location has a tendency to collect water during washing with a hose, I don't recommend mounting the 83i fuel module box on the air cleaner cover permanently. When you have achieve the desired adjustment for the center and right pot, record your voltage for each pot and return the 83i fuel module box to Techlusion's recommended mounting location. During 6,000 and 12,000-mile tune-ups, check the 83i or TFI fuel module for proper adjustment.

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