



2501 Ludelle Street  
 Fort Worth, Texas 76105  
 817-244-6212 Phone • 817-244-4024 Fax  
 888-350-6588 Sales • 800-423-9696 Tech  
 E-mail: [painless@painlessperformance.com](mailto:painless@painlessperformance.com)  
 Web: [www.painlessperformance.com](http://www.painlessperformance.com)

# 30140

## F5 Dual Fan Controller

**Introduction:** The F5 Dual Fan Controller can be installed onto any vehicle with electric cooling fans. This 30140 fan controller is programmed to control two brushed 12VDC electric motor cooling fans. All terminals, wire, connectors, mounting hardware and other components are included within this kit. Make sure your kit came with all the components listed below.

- (1) F5 Fan Controller
- (1) 10 pin header connector with wire harness

<ul style="list-style-type: none"> <li>• (1) Euro style fuse holder</li> <li>• (1) Euro style 70 Amp fuse</li> <li>• (2) #6 x 1/2" fuse mounting screws</li> <li>• (2) #6 nuts for fuse mounting screws</li> <li>• (1) 10 gauge yellow #10 ring terminal</li> <li>• (1) 8 gauge pink #10 ring terminal</li> <li>• (2) 10 gauge yellow 5/16" ring terminal</li> </ul>	<= These are bagged together. <= <= <= <= <= <=-----
<ul style="list-style-type: none"> <li>• (4) Female terminals for fan connectors</li> <li>• (2) Black male fan connectors</li> <li>• (2) Black female fan connectors</li> <li>• (4) Male terminals for fan connectors</li> </ul>	<= These are bagged together. <= <= <=-----
<ul style="list-style-type: none"> <li>• (1) 10MM star washer ring terminal</li> <li>• (4) 10 gauge yellow butt splices</li> <li>• (3) Blue Posi-taps</li> <li>• (3) #8 black self tap screws</li> <li>• (20) 4" tie wraps</li> <li>• (10) 7" tie wraps</li> </ul>	<= These are bagged together. <= <= <= <= <=-----
<ul style="list-style-type: none"> <li>• (1) Thermostat</li> <li>• (1) Brass thermostat adapter</li> <li>• (1) Thermostat wiring pigtail</li> </ul>	<= These are bagged together. <= <=-----

- Parts list is continued on next page.

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|---------------------------------------|-------------------------------|
| • (1) 16 gauge blue ¼” spade terminal | <= These are bagged together. |
| • (4) 18 gauge pink ¼” spade terminal | <=                            |
| • (1) SPDT black toggle switch        | <=                            |
| • (1) Red push button                 | <=                            |
| • (1) Rubber grommet                  | <=-----                       |

**Note: Mounting location is critical to controller life span. There is a high probability of premature failure if mounted in a location with excessive heat.**

**Specifications:** The F5 Dual Fan Controller is manufactured to these specifications. Do not operate this controller beyond these specifications.

- Automotive Spec 125°C / 257°F temperature rating. Mounting location is critical to controller life span. This cooling fan controller is designed to handle temperatures up to 257°F (125°C). This is the standard automotive specification for any product that is considered to be under hood rated. Most areas within the engine compartment of most vehicles do not get this hot. But, some do including areas around exhaust manifolds/hedders and piping or areas where air will run off of these at temperatures upwards of 1500 °F. Needless to say if this fan controller is mounted anywhere near engine components that reach this temperature it will fail. We have written into the controls of the fan controller a temperature recording program. It records maximum PCB temperature and can be read back by our engineering department should the module be returned as a failed unit. If you overheat the PCB the warranty is voided.
- Water must also be kept from flooding the unit within the plastic enclosure. So, when mounting it make sure you do somewhere it won't see water in excess from rain or when washing the vehicle. It is encouraged to mount the controller in an area under the hood such as behind the headlight buckets, on the radiator core support or to one of the front fenders. Any area that does not see an excess of water or heat is fine.
- Continuous Amperage handling of 35 Amp per fan channel.
- Start up spike Amperage handling of 70 Amps per fan channel.
- Pulse Width Modulation (PWM) control of low side (-) of brushed 12VDC electric motors.

## Tools Needed:

- Wire strippers, 20 gauge to 10 gauge
- Insolated terminal crimpers and roll crimpers if using cooling fan connectors and terminals included in parts kit.
- Electric drill with socket head bits and drill bits including 9/16” drill bit.
- Volt meter
- Heat gun and a small Phillips screwdriver

**Operation:** Once installed into a vehicle this fan controller will pulse width modulate (PWM) two 12VDC electric cooling fans. With all components included in the kit properly installed you can expect the controller to function as follows.

1. PWM control of cooling fan speed is primarily dictated by three things:
  - a. Signal from thermistor within the coolant sensor is read by the F5 controller. This signal is used to monitor engine coolant temperature.
  - b. The engine coolant temperature at which both cooling fans startup at 50% duty cycle is determined by the user adjustable “Start” potentiometer located on the side of the controller. The potentiometer is adjusted with a small Phillips screw driver. Adjustments are from 160°F - 235°F.
  - c. Temperature at which cooling fans are commanded to 100% duty cycle is determined by the user adjustable “Full” potentiometer (pot for short) located next to the “Start” pot. The potentiometer is adjusted with a small Phillips screw driver. Adjustments are from 160°F - 235°F.

**Note:** For instance, if the “Start” pot is set to 190 °F and “Full” pot is set to 210°F the controller will turn the cooling fan on at 50% duty cycle when the temperature sensor reads 190°F. If the engine temperature continues to rise the F5 controller begins to increase the duty cycle of the fan in direct relation to the temperature increase. The amount of change in fan duty cycle per increase of temperature degree is dependent upon how close the “Full” pot setting is to the “Start” pot setting. The closer their settings are to the same degree the faster the fan duty cycle will rise from 50% to 100%.

2. Cooling fan speed can also be controlled through the connection and use of secondary overrides. These overrides interrupt the primary fan control. Each override is listed and described below:
  - a. Toggle switch- A three position toggle switch is included in this kit. It is a simple On/Off/On toggle switch with three leads on it. Once

properly connected it allows the user to manually turn the cooling fans to 100% duty cycle (on), 0% duty cycle (off) or to function normal with the controller in control. Although this toggle switch is considered a secondary override it does in fact override all other functions of the controller. For instance if the toggle switch is put into the off position the cooling fans will be commanded to off no matter what. Same can be said for the on position.

- b. VSS cutoff- This controller can receive a signal from a vehicle speed sensor and use this sine or square wave signal to monitor vehicle speed. Once the push button switch and VSS signal wire are connected and the F5 controller is properly programmed it will shut off the cooling fans at a user defined vehicle speed. Vehicle speed at which fans turn off is set with the push button. When depressed the controller records the VSS signal into its memory. From that point forward the F5 controller will always shut off the cooling fans after the vehicle exceeds this set speed for more than 5 seconds. If the vehicle drops down below the set speed the F5 controller reengages the cooling fans.
- c. A/C compressor- A/C compressors are engaged with a 12 volt signal from a vehicle's A/C switch. This fan controller can monitor this 12 volt signal. Once the A/C sense wire is properly connected this controller will command the cooling fans to 100% on when the compressor is commanded on by the A/C switch.

**Note:** If the F5 controller should lose signal from the temp sensor it will proceed to operate the cooling fan at 100% duty cycle. It will do so indefinitely until the temp sensor signal is once again readable. The sensor included in this kit is manufactured by Delphi and has been in use in the automotive industry for over 15 years. It is very durable and reliable. A loss of signal by the F5 controller is most likely a broken wire or an incorrectly installed wire.

**Note:** If vehicle has the A/C compressor running but is also traveling above the vehicle speed set point the F5 controller will not engage the cooling fan. This is because when a vehicle is traveling at highway speeds the air moving across the A/C condenser should be adequate for the heat transfer required by the condenser.



## Component Installation:

1. Mount the F5 cooling fan module using the black self tap hex head screws from the parts kit. Make sure the two 12 gauge black/yellow and black/green PWM wires can reach the ground wires from the cooling fans.

**Note:** Before mounting this fan controller visualize how air will flow through your engine compartment. After the air passes through the radiator it will usually run into the front of your engine. At this point the air splits to the left, right and down. We suggest you mount this controller away from the areas that are within the direction of travel of this hot air. Inner fenders catch the brunt of this hot air so we feel this area is not suitable for mounting. However, the core support that is right behind the headlight buckets is usually a suitable place for mounting.

2. Find a good place to mount the 70 Amp fuse holder. It is suggested to mount this as close to the battery as possible. Use the two #6 screws and nuts in the bag with the fuse and fuse holder to mount it.
3. Find a suitable spot in the water jacket of the engine to mount the thermostatic sensor. The threads on the sensor are 3/8-18 NPT. You will also find a 3/8-18 x 1/2-14 adapter in the bag with the sensor. It is ideal to thread the sensor into the engine head. If you cannot then install it into the water pump, thermostat housing, intake manifold coolant crossover or if all else fails the radiator. Once installed plug in the adapter pigtail and route the wires over towards the F5 module.
4. **[Optional]** Inside the vehicle find a suitable place to mount the toggle switch and push button switch. Use the rubber grommet from the parts kit to run the wires through a firewall for the switches. The grommet will require you to drill a 9/16" hole in whatever you plan to route it through.
  - a. The push button switch is only used to set the vehicle speed signal fan cutoff. If you do not plan to use this option don't install the push button switch or its wires.
  - b. The toggle switch can be used to manually turn the fans to 100% or to 0% duty cycle. If you do not want to have the option of manual control over your cooling fans then do not install the toggle switch or its wires.

**Wire Harness Installation:** Connect each wire as described in this section. This fan controller has a few connections that are optional and they are denoted as well. It is up to you and your specific needs from the controller as to whether the optional components should be used.

**Note:** This kit includes the popular two pin T-connectors used by many aftermarket fan manufacturers. When connecting the power and ground wires to the cooling fan we suggest you use these T-connectors instead of the included butt-splices. Use roll crimpers on these terminals. Doing so will make it easier to remove the fan from the vehicle, if necessary in the future.

1. Wire #1- Black 10 gauge wire protruding from the center slot on the side of the F5 controller. Connect this wire to a good ground source such as the engine block or vehicle chassis. The parts kit has a star washer ring terminal in it for use with this connection. There is also a small strip of heat shrink within the parts kit to be used to cover the crimp area of the terminal once installed. This wire can also be connected directly to the negative battery post with the 5/16" heat-shrinkable ring terminal in the parts kit.
2. Wire #2- Black/Green 12 gauge wire protruding from one of the side slots on the side of the F5 controller. Route this wire to the ground wire of cooling fan #1.
3. Wire #3- Black/Yellow 12 gauge wire protruding from the other slot on the F5 controller. Route this wire to the ground wire of cooling fan #2.
4. Wire #4- Red 10 gauge wire that is spliced to Wire #5 and #6. This wire is to be connected to the inline 70 Amp fuse and then from the other side of the fuse onto the positive battery post. Please see wire #15 before making this connection.
5. Wire #5- Red 12 gauge wire that is spliced to Wire #4 and #6. This wire is to be connected to the power wire for fan #1.
6. Wire #6- Red 12 gauge wire that is spliced to Wire #4 and #5. This wire is to be connected to the power wire for fan #2.
7. **[Optional]** Wire #7- Black 20 gauge wire in pin #1 of the 10 pin connector. It is to be connected to the center terminal of the black three position toggle switch and to either terminal of the push button switch, both from the parts kit. Use the 1/4" spade connectors from the parts kit to make this connection.

8. Wire #8- Yellow 20 gauge wire in pin 2 of the 10 pin connector. This wire is to be connected to yellow Wire #17 from the temp sensor pigtail. It already has a butt connector crimped to the end of it. Route the yellow #17 wire from the temp sensor pigtail over to it. Cut it to length, strip it and make the connection. Use a heat gun to make the connection waterproof.
9. **[Optional]** Wire #9- Blue 20 gauge wire in pin 4 of the 10 pin connector. This wire is to be connected to either outside terminal of the toggle switch.
10. **[Optional]** Wire #10- Purple 20 gauge wire in pin 5 of the 10 pin connector. This wire is to be connected to the high side or signal wire of the vehicle's speed sensor. Use one of the blue Posi-taps from the parts kit to make this connection. Connecting this wire provides the F5 controller signal from the vehicle's speed sensor. This signal is monitored and used during the VSS fan cut off algorithm.

**Sine Wave Generators:** Vehicle speed sensors that generate A/C or sine waveforms are two wires sensors. If your vehicle has an aftermarket two wire speed sensor then connect this wire to the same wire ran to either your fuel injection computer or speedometer. If your vehicle has a factory VSS generator you will need to identify which of the two wires is the high side wire. OEM schematics usually show this as VSS High wires. If you are having issues identifying which wire to connect to here call our tech line for assistance.

**Square Wave Generators:** Vehicle speed sensors that generate square waveforms have three wires. These sensor wires are power, ground and signal. Connect the VSS signal wire from the F5 controller to the signal wire from the sensor.

**Note:** If you do not have a VSS and/or do not want to use this optional feature this wire must then be connected to a ground source.

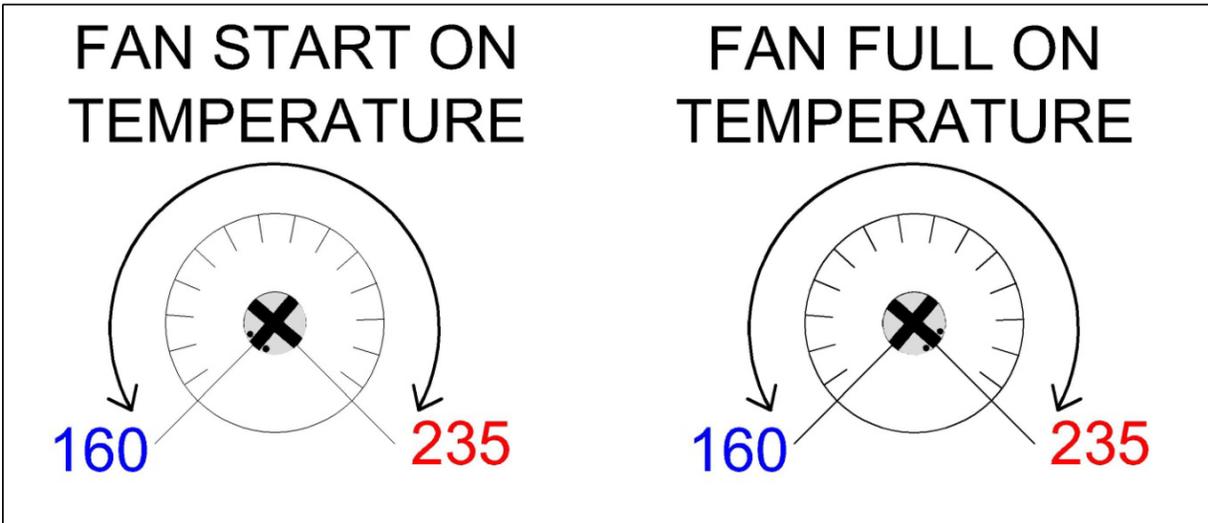
11. **[Optional]** Wire #11- Grey 20 gauge wire in pin 9 of the 10 pin connector. This wire is to be connected to the opposite outside terminal from Wire #9 on the toggle switch.
12. **[Optional]** Wire #12- Tan 20 gauge wire in pin 8 of the 10 pin connector. This wire is to be connected to the other terminal of the push button switch. Connecting this wire provides a signal to the F5 controller from the push

button. When the controller sees the signal that the button is pushed it then captures the signal from the VSS wire and records it to memory for use during the VSS fan cut off algorithm.

13. **[Optional]** Wire #13- Green 20 gauge wire in pin 7 of the 10 pin connector. This wire is to be connected to the A/C compressor activation wire. Connecting this wire provides a signal for the F5 controller to command 100% duty cycle from the cooling fans when the A/C compressor is activated.
14. Wire #14- Orange 20 gauge wire in pin 6 of the 10 pin connector. This wire is to be connected to a FUSED, ignition 12 Volt source. It turns the F5 module on. Use a voltmeter to find an ignition 12 Volt source either in the engine compartment or under the dash. Use one of the blue Posi-taps from the parts kit to make this connection.
15. Wire #15- Red 20 gauge wire in pin 10 of the 10 pin connector. This wire is to be connected to the same threaded post on the 70 Amp fuse holder along with Wire #4.
16. Wire #16- Black 20 gauge wire in pin 3 of the 10 pin connector. This wire is to be connected to black Wire #18 from the temp sensor pigtail. It already has a butt connector crimped to the end of it. Route the black #18 wire from the temp sensor pigtail over to it. Cut it to length, strip it and then make the connection. Use a heat gun to make the connection waterproof.

**F5 Setup:** Follow these setup steps to check for proper operational behavior from the F5 controller.

**Note:** The potentiometers located on the side of the F5 controller are depicted in the illustration below. Both pots have a movement swing of 270°. When using the small Phillips screw driver to move these pots please be careful. The screw driver will turn the pots very easily, if you feel resistance to movement then the pot is most likely turned all the way one way.



1. Turn the vehicle's ignition key on and start the engine. The "Start" pot is already set to its lowest setting, 160°F. See above illustration. As the engine warms up to 160°F the cooling fans should turn on to 50% duty cycle. Use a small Phillips screw driver to turn this pot slowly to the right. As you do this you are increasing the start temperature at which the fans are turned on at 50% duty cycle. Turn it to the right until the fans shut off. Now continue to turn the pot to the right, let the engine warm up and the fans turn on until the engine is at the temperature you want the fans to run at 50% duty cycle. Make sure you are watching the coolant temperature gauge in your instrument cluster.

**Note:** Once the F5 controller senses the engine temperature has reached its "Start" pot setting it will operate both cooling fans at 50% duty cycle. A 3°F drop in engine temperature from the "Start" pot setting will command the F5 controller to shut the fans off. So, if you have the "Start" pot set where the fans turn on at 200°F, the F5 controller will continue to operate the fans until the engine temperature decreases to 197°F.

2. The “Full” pot is already set to its highest setting, 235°F. Turning this pot to the left will decrease the temperature at which the F5 controller commands the cooling fans to 100% duty cycle. Your vehicle, its radiator size, engine horsepower and cooling fan size will determine this pots setting.

**Note:** A vehicle with cooling fans that are quite large, an efficient radiator installed and good airflow dynamics through the engine compartment may get away with leaving this pot at its highest setting. It will all depend on whether the engine’s temperature is maintained properly with the commanded cooling fan speed. If your engine temperature is higher than you like then turn this “Full” pot to the left. Do so in small increments.

3. With the engine still running turn the A/C compressor to on. If you have elected to connect the A/C compressor sense wire the cooling fans should now be running at 100% duty cycle. Turn the A/C to off.
4. With the engine still running move the toggle switch from the center position (Normal Operation) to either other position. The switch should command the fans to off in one of the positions and to 100% duty cycle in the other. Put the switch back into the normal position. It should be left here at all times unless you need to manually turn the fans off or on. Keep in mind that this switch’s position overrides all other controls of the cooling fans. If you put the switch into the off position the cooling fans will never turn on. If you put the switch into the on position the cooling fans will only turn off if the ignition switch sense wire loses its 12 volt signal by turning the vehicle off.
5. Now with all the other F5 controller features functioning properly it is time to calibrate the VSS shut off set speed. This is done by driving the vehicle at a speed you would like the fans to not operate above and then pushing the red push button once. At this point the F5 controller captures the VSS signal into its memory. Each time the button is pushed the signal is captured into memory. So, if you set it but don’t like the speed at which it was set just drive the vehicle at the new speed and press the button again. We suggest you set your VSS shut off at a speed greater than 35 miles per hour.

**Note:** If the vehicle is traveling below your VSS shut off speed and then accelerates to a speed greater than the stored VSS value it must continue to travel so for 5 seconds before the F5 controller will shut the cooling fan off.

**Note:** If the vehicle is traveling above your VSS shut off speed and then decelerates to a speed less than the stored VSS value the F5 controller will immediately turn the fan on if they are commanded so by the A/C or coolant temperature sensor.

**Note:** To disable the VSS shut off or delete the stored VSS shut off value simply put the toggle switch into manual off mode and push the red button. Then put the toggle switch back into the center position (normal mode).

**Painless Performance Limited Warranty and Return Policy:** Chassis harnesses, fuel injection harnesses and Striker ColdShot units are covered under a lifetime warranty. All other products manufactured and/or sold by Painless Performance are warranted to the original purchaser to be free from defects in material and workmanship under normal use. Painless Performance will repair or replace defective products without charge during the first 12 months from the purchase date. No products will be considered for warranty without a copy of the purchase receipt showing the sellers name, address and date of purchase. You must return the product to the dealer you purchased it from to initiate warranty procedures.