

LCD EWP® /FAN DIGITAL CONTROLLER INSTRUCTIONS (SUITABLE FOR USE WITH ALL DAVIES, CRAIG EWP®'s (ELECTRIC WATER PUMP), EBP®'s (ELECTRIC BOOSTER PUMP), AND THERMATIC® FANS)

PLEASE READ ALL THESE INSTRUCTIONS THOROUGHLY BEFORE YOU START WORK. DON'T RUSH - ENSURE YOU HAVE FULL UNDERSTANDING OF THE WORK AHEAD BEFORE YOU COMMENCE. ENSURE YOU HAVE ALL TOOLS AND COMPONENTS REQUIRED.

Congratulations on your purchase of the Davies, Craig EWP®/Fan Digital Controller (PATENTS: USA 6425353, EU 1133624, AUS 756453). This Controller will manage the operation of your chosen EWP® or EBP® by varying the speed of your pump in response to coolant temperature and it will manage the on/off control of your Thermatic® Fan.

- The Controller will run the EWP® after ignition shutdown to dissipate heat and avoid heat-soak.
- The Controller has a push-button control to allow you to choose one of nine set operating temperatures.
- Generally, higher engine temperatures will offer improved fuel efficiency and lower temperatures will increase power.
- It's recommended that engine operational temperatures be checked against those nominated by your vehicle manufacturer.

KIT CONTENTS:

Item No.	Description	Qty
1.	EWP Digital Controller Assembly	1
2.	Wiring Harness (Includes 10Amp Fuse)	1
3.	Sensor Assembly	1
4.	In-Line Adaptor	1
5.	Hose Clamps	2
6.	Ring Terminal	1
7.	Rubber Sleeves	2
Not Shown	Velcro	2
Not Shown	Installation Instructions	1



Figure 1: LCD EWP/Fan Digital Controller Kit Components.

INSTALLING THE LCD EWP[®] /FAN DIGITAL CONTROLLER

1. The Controller should be installed inside the passenger compartment to minimise its ambient temperature and exposures to water as the unit is not waterproof. Also minimise exposure to direct sunlight. Locate a hole in the firewall (approx. 20mm in diameter) and pass the wiring harness (including the sensor & pump "T-connector") through. If a hole of adequate size cannot be located, then wires may be cut then re-joined as a last resort. Connect T-Plug in wiring loom to the pump.
2. Connect black **Sensor Plug** to the thermal sensor located in the thermostat housing/inline adaptor (Refer to Digital Controller Wiring diagram, **Page 3**).
3. Connect the white plug in the wiring harness to the controller then mount the controller with Velcro supplied. Ensure it is mounted where access to the temperature adjustment button is easy. **NOTE:** Ensure a good earth connection using the self-tapping screw provided. The earth lead must be connected to a metal part of the car body.
4. Connect the **Red** wire from the wiring harness to the battery positive using the ring terminal provided. Connect the **Green** wire from the wiring harness to an ignition source (accessory +12V/24V or switched 12V/24V), the wires may be spliced then soldered if necessary. Ensure no wire is exposed, by insulating the join with electrical tape.
5. Connect the **Green** and **Black** striped wire to the fan relay if you wish to control the Thermatic[®] Fan 3°C above the set temperature. **NOTE: The Controller will earth the fan relay, not power it.**
6. Mount 'Remote Test Light' in a location where it will be visible. The 'Test Light' may be fitted by inserting it through a 4.6mm diameter drilled hole in a plastic area of the interior/dashboard or simply with adhesive tape. The 'Remote Test Light' has a two pin connections. Heat shrink or insulation tape can be applied to these pin connections once the test light is mounted. This will ensure the connection points are insulated and secure.

NOTE:

- In carrying out the wiring procedure, please bear in mind that it is advantageous to minimise voltage drop by keeping the wiring as short as possible.
- Remove the engine thermostat from the thermostat housing and install the sensor using Method 1 or 2 as shown below.
- If you often operate in very cold climates, drill 2 x 5mm holes in the thermostat plate before reinstalling.
- Ensure there is no damage to the thermostat-housing gasket, and re-fit the thermostat housing without the thermostat.

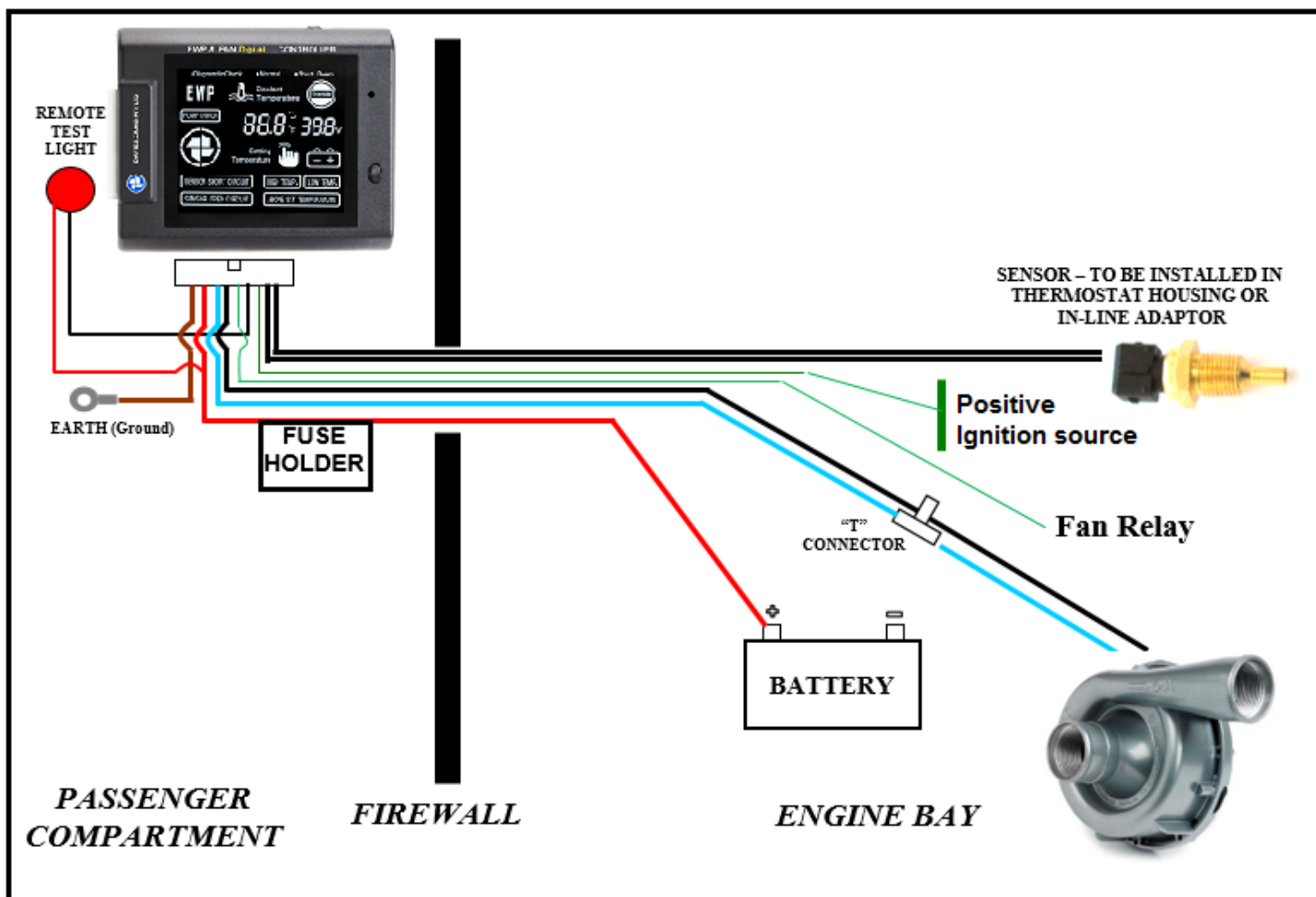
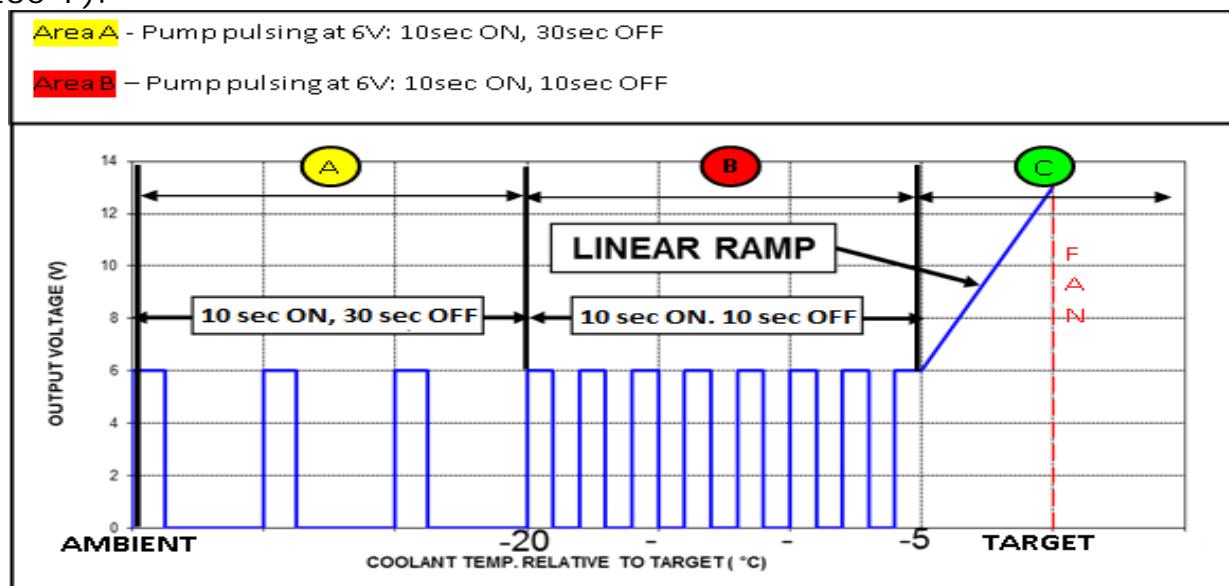


Figure 2: Digital Controller Wiring Diagram

OPERATION OF DIGITAL CONTROLLER

CONTROLLER ALGORITHM-PUMP OPERATION

The 'set point' can be programmed to any setting between 40°C (104°F) to 110°C (230°F).



Digital Controller Operation Chart.

OPERATION of LCD

TEMPERATURE INDICATOR

Rises with increased engine temperature

EWP SYMBOL

FLASHING = EWP[®] operating in 'pulsing' mode – Refer **Digital Controller Operations Curve**, areas (A) (B) & (C)

ON = Electric Water Pump (EWP[®]) working at full speed.

FAN SYMBOL Circulating = fan operating

DIAGNOSTIC CHECK

System warning has been triggered. Therefore, refer to "Diagnostic Chart" in order to determine possible cause, and take measures to correct the problem.

REMOTE TEST LIGHT (RED)

This light will "flash" when the system works in diagnostic check mode.

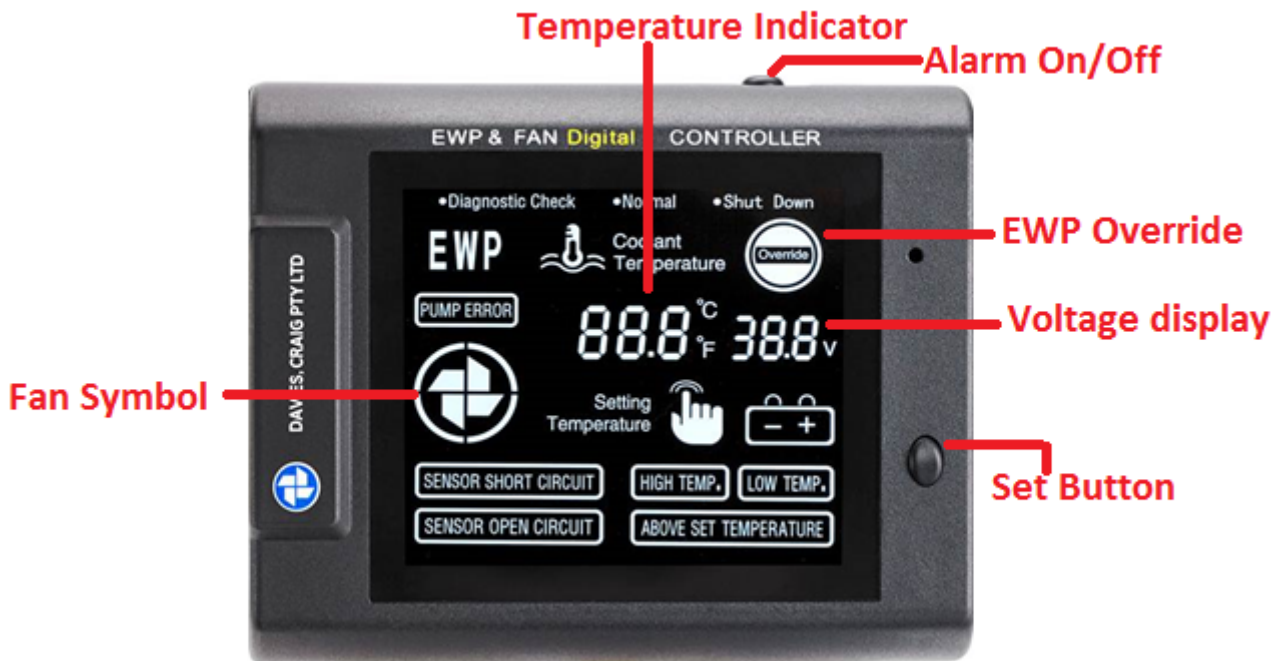


Figure 2: LCD EWP[®]/Fan Digital Controller.

SYSTEM CHECK:

Every time the ignition is turned ON, all symbols will illuminate. This feature allows you to check all functions are operational.

SHUT DOWN MODE:

Your Controller will continue to operate your EWP[®] for three (3) minutes or until the coolant temperature has reduced -10°C/-14°F below your set point – whichever occurs first. The "Shut Down" feature will eliminate heat soak and reduce engine temperature evenly. The feature protects your engine against gasket damage due to hot spots. This

cooling efficiency can be improved further with the use of high performance Davies Craig Thematic[®] Fan/s.

VOLTAGE DISPLAY:

Indicates the controller input voltage.

OVERRIDE:

When controller is at "Normal" mode, by pressing & holding the "Set Button" for 5 seconds the EWP[®] will override (7 Seconds for EWP & FAN). This feature benefits for drive the EWP[®] at full speed similar as hot wire the pump. To cancel the "Override" mode, press & hold the set button for 5 seconds or switch off the ignition.

°C to °F change:

When controller is at "Normal" mode, by pressing & holding the "Set Button" for 3 seconds the controller will change to °C to °F or °F to °C.

DIGITAL CONTROLLER THERMAL SENSOR INSTALLATION

There are two installation methods available.

METHOD 1: IN-LINE ADAPTOR METHOD (supplied & recommended)

As with other Davies Craig products the In-line Adaptor has universal application.

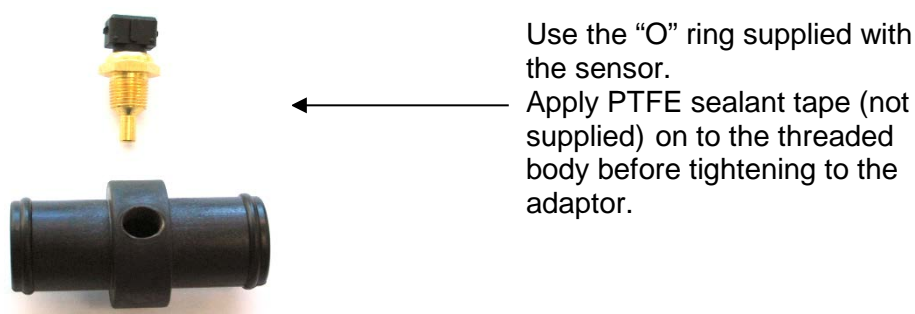


Figure 3: Thermal Sensor and In-line Adaptor Installation

NOTE: Top Radiator Hose Measurements to Sleeve.

30 to 35 mm inside diameter (ID) – use adaptor without sleeves.

36 to 42 mm ID – use 2 sleeves included in the kit

42+mm ID – contact Davies, Craig for thicker 6mm sleeves (Part #18511)

1. Thermal Sensor Fitting

Apply a couple of layers of Teflon sealant tape around the threaded body of the sensor, Fit the sensor assembly into the threaded black In-line Adaptor and tighten.

Do not over tighten, which may damage the sensor body or adaptor.

2. Hose Fitting

- When the cooling system is cold, remove top radiator hose and confirm that the inside diameter of your top radiator hose is between 30 to 42 mm prior to cutting hose. If the hose is more than 42mm, call Davies Craig and await 6mm sleeves.

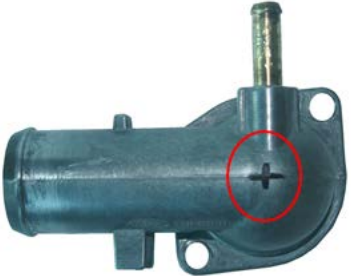
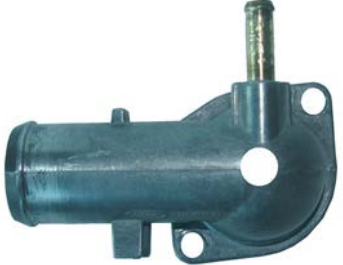
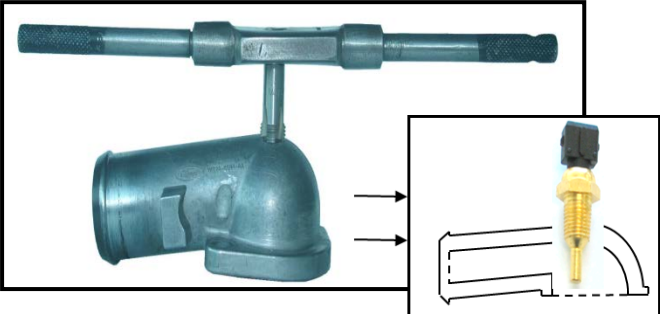
- If the parts supplied (adaptor and/or sleeves) are suitable, select an appropriate location in a straight section of the hose then cut the radiator hose.
- Temporarily slide radiator hose clamps on each end of the hose. Fit both cut ends of hose onto the In-line Adaptor (with or without sleeves as appropriate). If fitting is tight, use silicon base grease or petroleum jelly to assist fitment of adaptor to hoses.
- Refit top radiator hose, ensure no twisting of hose and tighten all clamps.

METHOD 2 - IN THERMOSTAT HOUSING OR RADIATOR

Please check wall thickness of thermostat housing/radiator as it is recommended that the Thermal Sensor only be installed if there is a wall thickness of at least 3mm.

If the thickness is less than 3mm, please proceed with installation Method '1'.

We suggest removal of the thermostat housing before beginning the installation process so that metal shavings do not enter the cooling system.

	<ol style="list-style-type: none"> 1. Mark location on thermostat housing where sensor assembly is to be fitted – “top of dome is recommended”.
	<ol style="list-style-type: none"> 2. Drill an 11.0mm (7/16”) hole through the marked area. For your safety and to avoid drilling on an angle, please ensure thermostat housing is well secured before beginning the drilling process.
	<ol style="list-style-type: none"> 3. Using a ¼” NPT tap, tap the hole to allow the sensor assembly to “just” protrude the thickness of the thermostat housing. It is recommended that the fitment of the sensor assembly be checked regularly to achieve the condition in the diagram.



4. Once the tapping process is completed, apply a couple of layers of PTFE sealant tape (not supplied) to the thread on the brass body, then screw it into the thermostat housing.

Figure 4: Sensor Installation in to Thermostat Diagram

SETTING THE LCD EWP[®] /FAN DIGITAL CONTROLLER

It's recommended as a minimum the Digital Controller's set-point is fixed to that of the engine manufacturer's mechanical thermostat opening temperature. You may use a lower 'set-point' to run the engine colder or a higher 'set-point' to run the engine hotter if appropriate. Generally, running the engine slightly colder will increase the power and running the engine slightly hotter will improve the fuel efficiency.

The LCD EWP & Fan Digital Controller has been set at the factory at 85°C/185°F. This setting can be altered up or down by using the 'set-point' adjustment button on the right hand side as follows:

1. Pushing the 'set' button once will indicate the present setting.
2. Push set button repeatedly until the desired set temperature displays. Hold set button down 2 seconds until Controller beeps. The 'set' temperature will then illuminate
3. If the new setting is not confirmed within 2 sec, the Digital Controller will revert to previous 'set' temperature.
4. To check 'set' temperature, repeat Step 1 above.

Note: Controller will keep the last state of "Set Temp" memory, when disconnected from the power source

NOTE: Monitor the existing engine temperature gauge to check that your set engine temperature is similar to the actual engine temperature. The engine temperature sender unit may be located in a different position than your Thermal Sensor and may display a temperature variation.

FAN ONLY OPERATION

The Davies, Craig LCD EWP/Fan Digital Controller is programmed to earth the electric fan relay at 3°C above the set point. The Controller will continue to operate the fan until the coolant temperature is below the set point.

To enable fan only control without using an Electric Water Pump, connect the remote LED (supplied) to the controller wires labelled "PUMP" as shown below

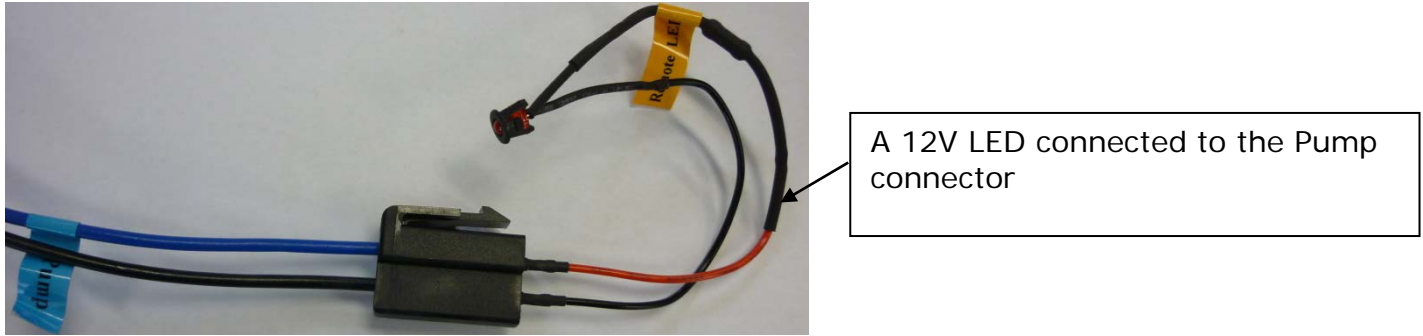


Figure 5: Fan Only Connection Wiring Diagram

Please refer to the **Figure 6** (page 9) for fan to controller wiring details. Please call Davies, Craig at (03)93691234 if you require another remote LED to complete the wiring.

EWP & FAN DIGITAL CONTROLLER TECHNICAL SPECIFICATIONS

Input Voltage	12VDC to 29VDC			
Output Voltage	6V to 29V			
Max. Current	12A			
Operating Temperature	-20°C to 120°C (-4°F to 248°F)			
Setting Temperatures	C	40°	To	110°
	F	104°	To	230°
Fan Cut in Temperature	+3°C/5.4°F above the set temperature			
Sensor Type	Thermistor			
Time Out	3 Min. (or Set -10°C/14°F) after ignition OFF			
Weight	100 grams (3.5 oz.)			
Dimensions	110mm (L) X 90mm (W) X 30mm (D) [41/3" (L) x 31/2" (W) x 1.1" (D)]			

THERMATIC[®] FAN WIRING TO THE DIGITAL CONTROLLER

Please follow the instructions 1&2 below if you are using the Davies Craig Universal Fan Fitting Kit (Parts #1000, 12V; #1001, 24V).

1. Cut the ring terminal off the black wire (85) from the Fan wiring loom to a sufficient length, this wire (with relay) to be joined with the black/green wire from the Digital Controller.
2. Cut the green wire, then join sufficient length of wire to connect to battery positive as shown in the diagram below (86).

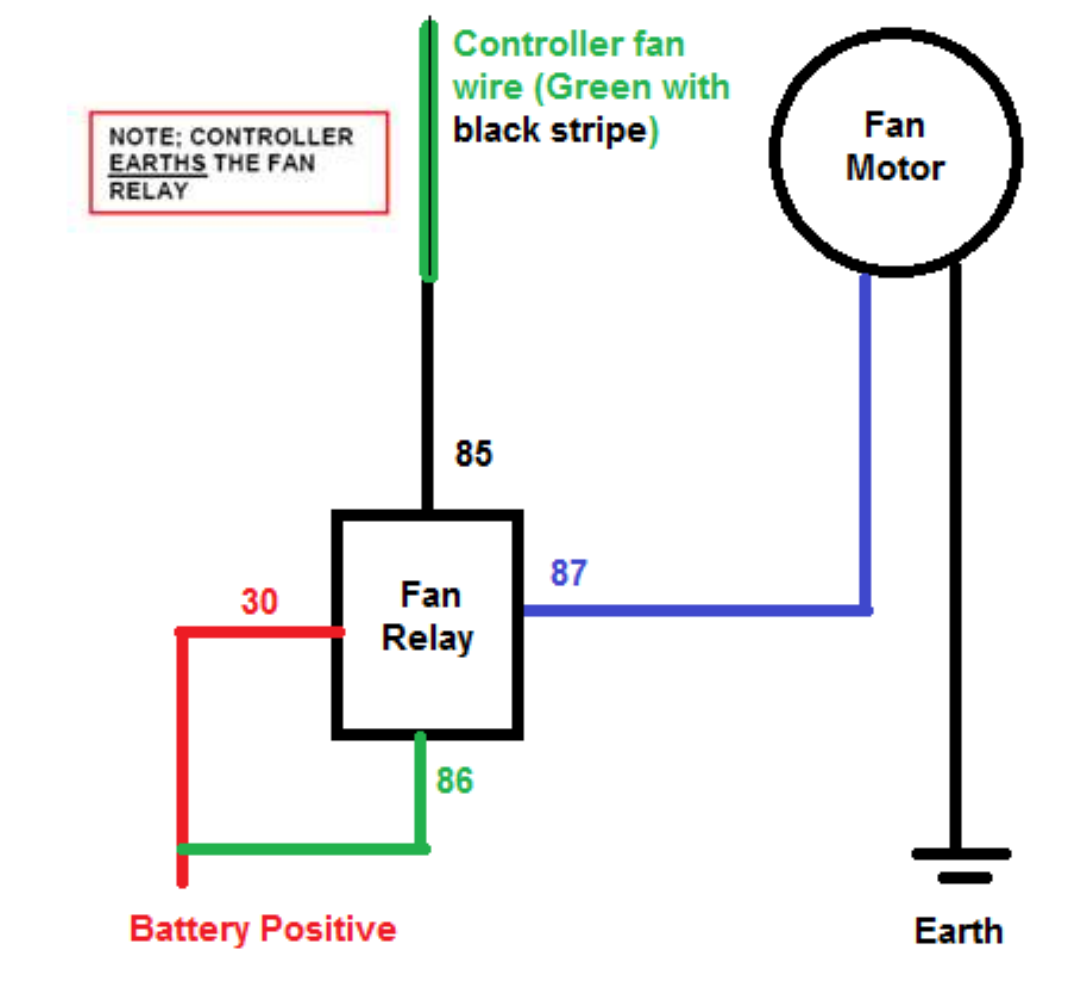


Figure 6: Fan Controller Wiring Diagram

Note: To wire the controller for dual fan operation repeat the wiring instructions above for a second relay (not supplied). Pin 85 on both relays should be connected to the green wire with black stripe from the controller. We recommend getting a second Davies Craig Universal Fan Fitting Kit (Parts #1000, 12V; #1001, 24V) for proper fan installation.

CONTROLLER DIAGNOSTIC CHART

<u>Condition</u>	<u>Troubleshooting</u>
Controller does not operate / No display	<ul style="list-style-type: none"> • Blown fuse • Check all the wire connections
12V voltage indicator flashing	<ul style="list-style-type: none"> • Controller receiving low voltage < 10.5V • Controller receiving high voltage > 17.5V
24V voltage indicator flashing	<ul style="list-style-type: none"> • Controller receiving low voltage < 21.5V • Controller receiving high voltage > 27.5V
Sensor open circuit	<ul style="list-style-type: none"> • Check sensor wiring for any open circuits
Sensor short circuit	<ul style="list-style-type: none"> • Check sensor wiring for any short circuits
Low Temp <40°C (104°F) after 5 Minutes	<ul style="list-style-type: none"> • Check engine temperature
Above Set Temperature	<ul style="list-style-type: none"> • Sensor temperature is at least 10°C (18°F) above the set temperature.
Pump Error	<ul style="list-style-type: none"> • Check pump wiring for open/short circuits
Override ON	<ul style="list-style-type: none"> • EWP manually override by the user. • To turn OFF, Press & hold the set button for 5 to 7 seconds or switch OFF & ON the IGN.
ERR	<ul style="list-style-type: none"> • Temp sensor Open or Short circuit



INSTALLATION RECOMMENDATIONS

- For improved heater performance on vehicles which have the heater inlet (return) and outlet ports in the mechanical pump housing, Davies Craig has available an Electric Booster Pump Kit, EBP®15 #9001 (12V) or EBP23 #9050 (12V) or EBP40 #9040 (12V). These compact units fit neatly into the heater hose and boosts coolant flow through the heater circuit and/or cylinder heads.
- LPG (Liquid Petroleum Gas) vehicles require constant coolant flow through the LPG converter once a EWP® Combo Pack has been fitted. We strongly recommend the installation of Electric Booster Pump Kit, EBP®15 #9001 (12V) or EBP23 #9050 (12V) or EBP40 #9040 (12V) to overcome freezing of the converter on engine start-up.

CAUTIONS

- Engine temperature must be monitored closely at all times, especially, immediately after EWP® installation and until the EWP® operation and capability have been confirmed.
- Do not use the vehicle's engine management system or wiring connected to the vehicle's engine management system as an ignition source because it may cause failure of the management system and/or the electrical system. The ignition source must be a steady positive supply of 12-29V DC.

These installation instructions may suit most applications but there are circumstances surrounding some engine designs, environments, and the nature of system involved, which may require other installation arrangements not outlined here. Frequently Asked Questions (FAQ) are listed on our website www.daviescraig.com.au . Emails can be directed to info@daviescraig.com.au or Telephone +61 (0) 3 9369 1234 during business hours.

WARRANTY

Davies, Craig Pty Ltd warrants for a period of two years or 2000 hours continuous running (whichever is the lesser) from the date of purchase. Davies, Craig shall carry out, free of cost, any repairs that are reasonably necessary to correct any fault in the operation of your Davies, Craig product provided that such a fault is directly attributable to a defect in the workmanship or materials used in the manufacture of the part(s) and is not due to installation other than described in these instructions. Labour and consequential costs are excluded.

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