

Supplemental Information & Instructions for 231-710 or RFK10 Revotec Electric Fan Kit TR 2, 3, 3A, 4 Negative Ground Only

Why an Electric Fan Kit?

There are generally two reasons for considering an electric fan conversion. The Triumphs are not well known for “keeping their cool” and anytime you boost performance, you generate more heat. If your cooling system was adequate, modifications that boost horsepower will often push it over the edge. When we started developing the Moss Supercharger System for the TR3-4A, we immediately ran into a problem with cooling. Horsepower related cooling problems aside, modifications like the Moss Rack & Pinion Conversion eliminate the stock fan altogether, so looking at fan options quickly becomes looking at electric fan options. There are many to choose from, with wide differences in price. When choosing a fan for the early TR, the first problem is the radiator- it is narrow. Add to that the limited room for a fan between the radiator and the engine, and your choices are really limited. A quick survey of the available fan kits left us looking for something with more air flow and better control. As luck would have it, our English R & D group had already solved our problem.

Why a Revotec Fan Kit?

It is about value. Revotec and Moss Europe have co-designed a high quality, complete electric fan kit specifically for the TR2-4. Most fan kits are “universal” in that they use fan blades that will pull or push air so they can be mounted in front of or behind the radiator core. Such a fan is a real compromise in terms of performance, but they are convenient and they keep the costs down. We found they just did not move enough air. The Revotec fan in this kit is designed to pull air, not push it, and it moves a large volume of air very efficiently, while drawing about 8.5 amps.

Every electric fan uses a temperature sensitive switch to turn the fan on. Most kits use a simple contact sensor, or a probe that pokes through the radiator fins. Neither solution gives accurate readings, but they are inexpensive. Revotec uses a temperature pickup in an aluminum sleeve installed in the radiator hose. This unquestionably provides the fastest and most accurate readings. A short coupler hose and hose clamps are included so you can easily install the sleeve. It is the best (and most costly) way to plumb the sensor, but it is without a doubt the best way to do it. The kits also include an electronic thermostatic controller to enable precise and easy adjustment of the temperature at which the fans come on.

Unlike other fan kits that use universal mounting systems, this Revotec kit has custom designed laser cut brackets that mount directly to the stock radiator mounts, making this kit specific to the applications listed. We also include a set of “through-the-radiator” mounts so you can actually install the fan without removing the nose section, should you prefer to do so.

This kit also includes the special bolt and spacer needed to replace the standard crank mounted fan and fan extension. The list of the bits included in this kit is long, much longer and more specific than any other kit on the market.

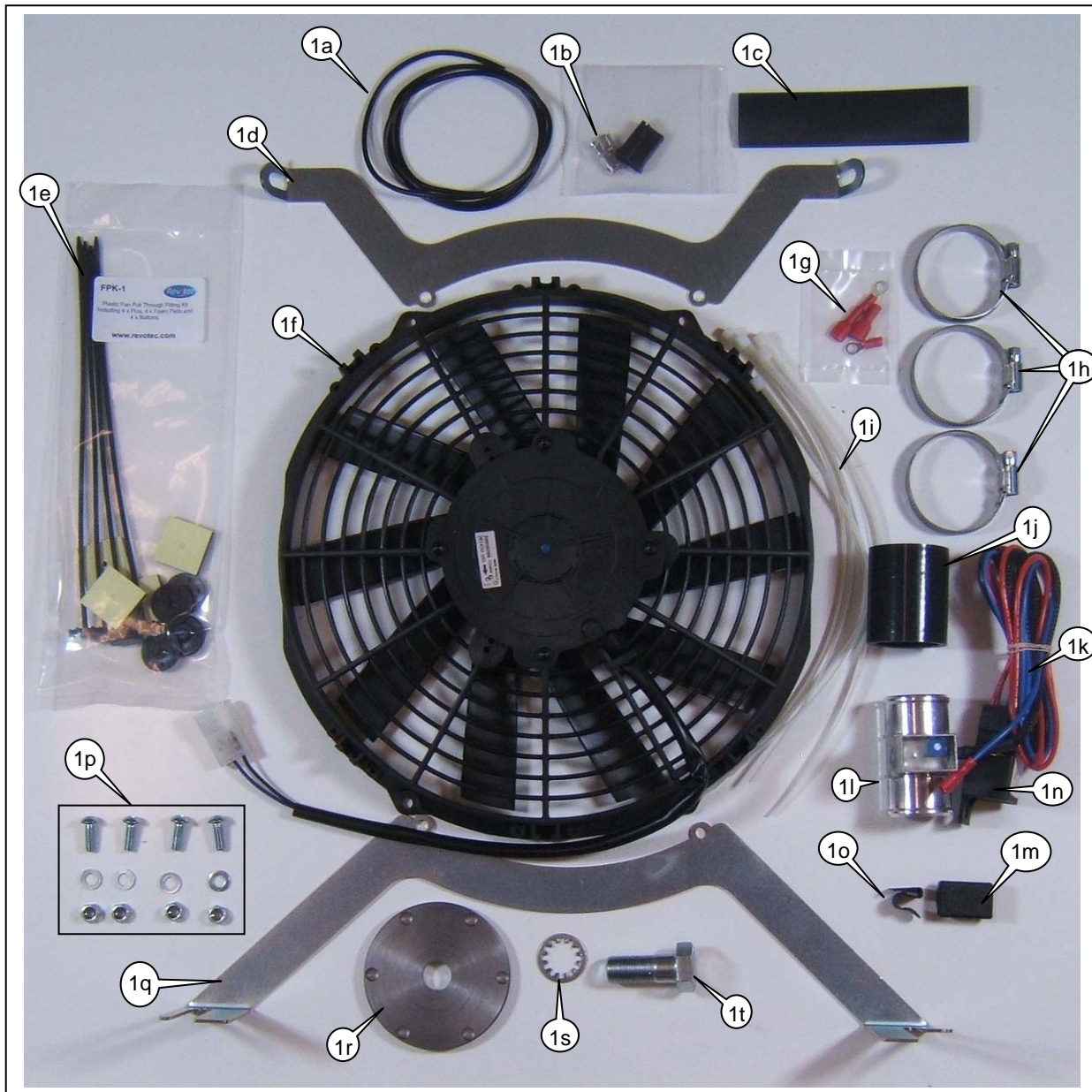
Understanding Fan Performance Data

All fan manufacturers publish performance data. The real testing is done to industry standards, generally using a AMCA Standard 210 Double Chamber. This measures how much air can the fan move, and how much air the fan can move **if the air flow is restricted**. Air flow is measured in cubic meters per hour (M^3/h) and/or cubic feet per minute (cfm). Please refer to Appendix 1 (last page of these instructions) The table starts off with a Static Pressure of zero, meaning there is no restriction on the airflow. This fan will move 1250 cubic meters per hour, or 738 cubic feet per minute under those conditions. As the restriction of the air flow increases, static pressure goes up and the fan moves less air. The reason this second factor matters is that the air flow is restricted in an engine compartment after the air gets through the radiator core. There are no “real world” comparisons of performance of various fans in a car, but this table does provide is a way of comparing fans from different manufacturers, assuming that they are all playing fair. Be wary of performance figures given without reference to static pressure; the numbers may not reflect real world performance.

51 As with all instructions, please read through these carefully before you begin. If you feel that this project is
52 outside your "confidence zone", please have the installation done by a professional, or enlist the
53 assistance of a fellow TR Club member. If you are not a member of a Club, consider joining. This is the
54 kind of project than many clubs would take on as a "Tech Session" for the benefit of the members. You
55 still have to do the work, but you will have help and knowledgeable advisors to assist.

56
57 Please use the illustrated list of components to inspect your kit. Identifying each piece now will make
58 assembly much easier. Should you find that you are missing a part, or if you believe you have received
59 something in error, please call Moss Technical Services at (805) 681-3411. Because the contents of this
60 kit are subject to periodic review and revision, any discrepancy noted is probably due to a change in the
61 kit and the content information is out of date. Nevertheless, we need to know so that the instructions may
62 be updated.
63

64 Contents of the Kit



106 **Contents of the Kit (October 2010)**

Ref	Moss US	Moss Europe	Description	Qty
1a	NA	NA	Wire, black	39"
1b	NA	NA	Female spade connectors	2
	NA	NA	Black plastic plug for female spade connectors	1
1c	NA	NA	Sleeve, black plastic	1
1d	NA	NA	Bracket #1 (smaller of the 2)	1
1e	NA	NA	Fasteners, for securing fan directly to radiator core	4 sets
1f	NA	NA	Fan Assembly	1
1g	NA	NA	Female Spade connectors, insulated	2
			Ring Connectors, insulated	2
1h	NA	NA	Hose clamps, 32-50mm "Jubilee" (solid band, not perforated)	3
1i	NA	NA	Zip-Ties, 10"	5
1j	NA	NA	Hose, 1 1/2" ID x 2" long	1
1k	NA	NA	Wiring, temp sensor/controller & fan power relay	1
1l	NA	NA	Temp Sensor & Adjustable Electric Fan Controller (EFC)	1
1m	NA	NA	Black Plug, for Controller	1
1n	NA	NA	Relay, fan power	1
1o	NA	NA	Wiring Clip	1
1p	NA	NA	Screws, securing fan to brackets	4
	NA	NA	Washers, for screws	4
	NA	NA	Nyloc nuts, for screws	4
1q	NA	NA	Bracket #2 (larger of the 2)	1
1r	NA	TT11321	Spacer, Pulley to Crank	1
1s	NA	LWZ410	Washer, Star, internal tooth, 5/8	1
1t	NA	BH610121	BOLT 5/8 UNF X 1.5IN	1

107 **Converting your Triumph from Positive to Negative Ground**

108 *In order install an electric fan, your car will need to be converted to negative ground..*

- 109 • Disconnect the battery cables and remove the battery
- 110 • If you have an original radio, remove it.
- 111 • If you have an ammeter, you'll need to reverse the wires connected to it.
- 112 • Some non-original distributors may have a diode across the points rather than a condenser.
- 113 Reverse the connections to the diode.
- 114 • If you have converted to an electric fuel pump, make certain it can be reconfigured to work in a
- 115 negative ground electric system.
- 116 • Reverse the connections going to the ignition coil: Connect the (-) side of the coil to the wire
- 117 going to the distributor and the (+) side of the coil to the wire going to the ignition switch.
- 118 • Check the output of the heater fan; if it is reduced after the conversion, reverse the connections to
- 119 the heater fan motor.
- 120 • Take a look at the battery terminals, noting which one is negative. Replace the battery so that the
- 121 negative battery terminal is closest to the cable strap that attaches directly to the body/chassis.
- 122 This will be 180° from the orientation of the battery when you removed it.
- 123 • Re-polarize the Generator. Look at the two wires connected to the generator. Locate the F
- 124 terminal on the generator; it is the one the smaller brown with a green stripe wire is connected to.
- 125 Disconnect the two wires from the generator. Temporarily connect one end of a spare piece of
- 126 wire to the positive terminal of the battery. Touch the other end of this wire to the F terminal on
- 127 the generator several times, very briefly. You'll get a few small sparks and that's ok. This re-
- 128 polarizes the field windings so you get the proper output for a negative ground vehicle.
- 129 • Reconnect the battery, and reconnect the two wires to the generator they way they were before
- 130 you disconnected them. Verify that the charging system is functioning properly.
- 131

132 *Note: It is not necessary to change the leads at the starter motor. The starter uses a series-wound*

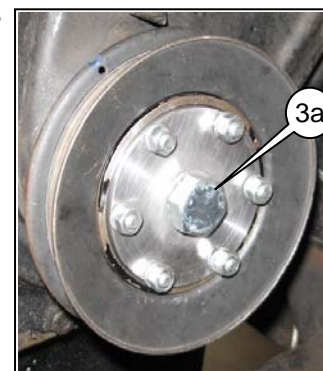
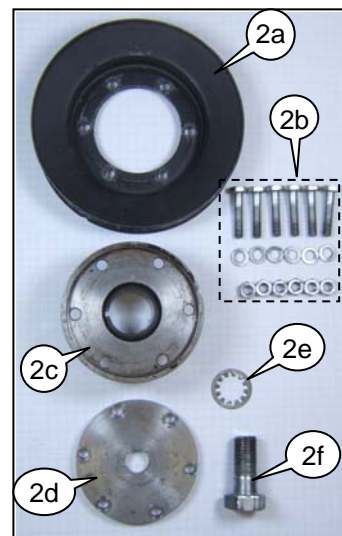
133 *motor that will always rotate the correct way with either polarity.*

134 **Installing the Fan**

135 *For any TR2-4, the radiator must come out before you can remove the original fan and fan extension.*
136 *Pulling the radiator means the front apron of the TR2-3B body will have to be removed. Once the original*
137 *fan is gone, the electric fan can be mounted on the radiator.*

138 **Preparation – Removing the Original Fan (refer to your workshop manual)**

- 139 • Disconnect the battery and drain the cooling system.
- 140 • TR2-3B: remove the front apron, bonnet & radiator.
- 141 • TR4: remove the radiator.
- 142
- 143
- 144 • Remove the mechanical fan and fan extension. You will need a 1 1/8”
- 145 socket for the large bolt on the end of the fan extension. Once the center
- 146 bolt is loose, you can pull the entire assembly out and put it on the bench.
- 147
- 148 • Loosen the six nuts securing the pulley (2a) and fan extension to the hub
- 149 (2c) using a 7/16” socket and combination wrench. *New bolts (320-080)*
- 150 *and nyloc nuts (310-100) are available if needed.*
- 151
- 152 • Install the spacer (2d), lock washer (2e), and new center bolt (2f) supplied
- 153 in the kit.
- 154
- 155 • Reinstall the six bolts, lock washers and nuts (2b), securing the two halves
- 156 of the pulley (2a) and the spacer (2d) to the hub (2c).
- 157
- 158 • Refit the pulley & hub assembly to the front of the engine.
- 159
- 160 • Thread the center bolt (3a) into the nose of the crank. Tighten the center
- 161 bolt to 40 lbs /ft.
- 162
- 163
- 164
- 165
- 166



167 *This kit includes the pieces necessary to mount the fan two different ways. The more*
168 *generic “through-the-core” pins can be used to install the fan (Method 1), or the laser-*
169 *cut steel brackets specifically designed for the Triumph may be used (Method 2).*

170 **Method 1: Mounting the Fan Using the Through-the-Core Pins (Fig 4)**

- 171 • Hold fan in desired position on rear face of radiator. Push the mounting pins through
- 172 the lugs on the fan and through the core.
- 173
- 174
- 175 • Push the four foam pads and the ratchet buttons onto the tail of each pin which are
- 176 now protruding through the front of the radiator core.
- 177
- 178 • Pull the tip of the pin toward you as you push the ratchet buttons home. Pull tight
- 179 until the fan is solidly mounted.
- 180

181
182 *With the fan mounted, follow the instructions for fitting the Electronic Fan Controller.*
183 *They begin immediately below the instructions for mounting the fan using the laser-cut*
184 *brackets on the next page.*



185 **Method 2: Mounting the Fan Using the Laser-Cut Brackets**

- 186
- 187 • When reinstalling the radiator, leave the top radiator stays off and leave the bottom radiator
 - 188 mounting bolts loose.
 - 189
 - 190 • Mount the brackets to the fan using the four bolts, washers and nuts supplied in the kit. Note that
 - 191 the brackets are mounted on the **rear** of the fan lugs so the fan will be as close to the radiator as
 - 192 possible.
 - 193
 - 194 • Slide the bottom bracket between the lower radiator mounting points and the chassis mount
 - 195 points (making sure the fan is on the engine side of the radiator!) and push the fan flat up against
 - 196 the radiator.
 - 197
 - 198 • Pinch the lower mount bolts to hold the assembly in place.
 - 199
 - 200 • Re-attach the upper stays with the upper fan bracket sandwiched between them and the
 - 201 radiator.
 - 202

203 *With the fan mounted, follow the instructions for fitting the Electronic Fan Controller.*

204 **REVOTEC ELECTRONIC FAN CONTROL**

205 This unit is intended for use on **Negative Ground** vehicles

206 only. As with all instructions, read through these carefully

207 before attempting to install the controller on your vehicle.

208 **INTRODUCTION**

209 This sub-kit contains all of the necessary parts to ensure a

210 professional quality installation. There are two main parts

211 which are connected by a wiring harness. The **Electronic Fan**

212 **Control, or EFC** (5a) will be mounted in a coolant hose, and

213 the harness connects it to the **Fan Power Relay** (5b), which

214 will supply the switched 12V feed for the electric fan. The

215 temperature setting is fully adjustable (5c) to suit the

216 requirements of your particular vehicle.

217 Before you begin, ensure that the Revotec controller tube size (5d) is correct for your radiator hose. Note: The

218 direction of coolant flow through the controller is not important. Failure to use the controller with the relay

219 included will void the warranty.

220

221 **Which Hose?**

222 Normally, Revotec suggest installing the EFC in the upper radiator hose. However, in the

223 Triumph TR2-4 the upper radiator hose is quite short, and the OE type upper hose (6a)

224 has very pronounced ridges. In addition, the outlet on the engine and the inlet on the

225 radiator are often not perfectly lined up.

226

227 These factors (individually or collectively) make installing the EFC in the upper hose

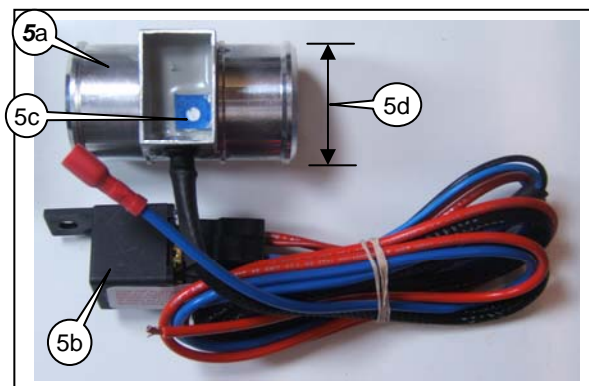
228 virtually impossible. The lower hose installation is altogether neater and less obtrusive.

229 The instructions cover the installation of the EFC in the lower hose based on our

230 experience with the Moss TR3.

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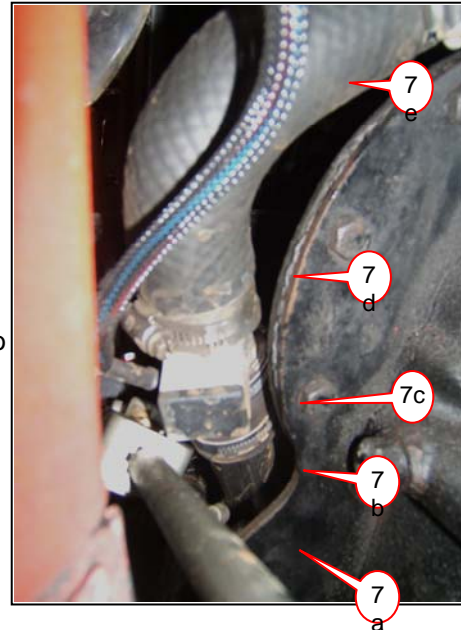
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233 **Installing the EFC**

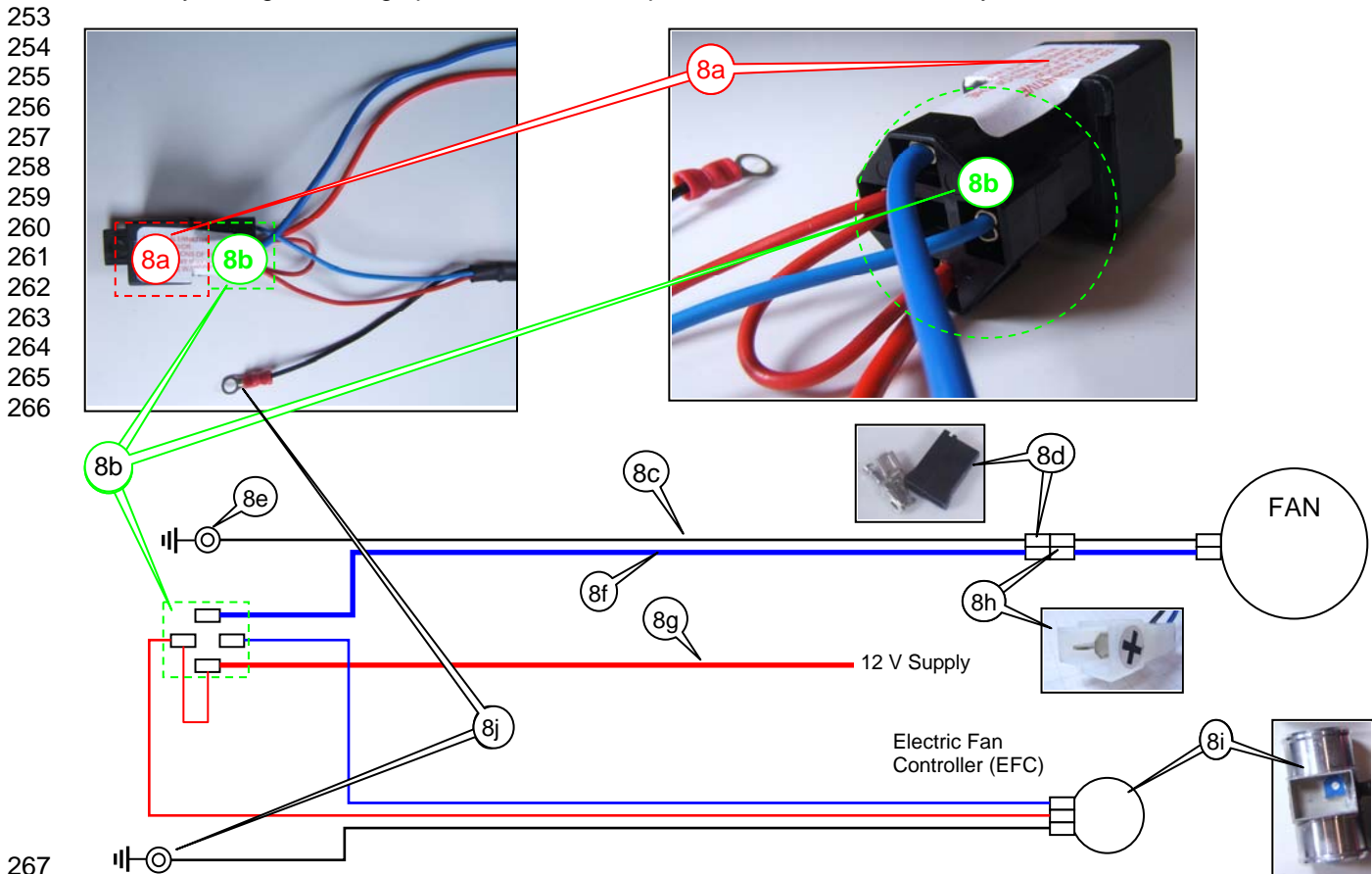
234 *The cooling system was drained as the first step in installing*
235 *the fan; unless you have refilled it, you can begin.*

- 236 • Remove the steel water return pipe.
- 237 • Measure 2 ½ inches (65 mm) from the top lip of this
- 238 pipe and mark it.
- 239 • Cut the pipe on your mark with a hacksaw.
- 240 • De-burr the cut edge of the pipe with a suitable file.
- 241 • Refit the steel tube (7a).
- 242 • Fit the 2 inch long piece of hose supplied in the kit onto
- 243 the lower end of the EFC. Secure it with one of the
- 244 hose clamps supplied in the kit.
- 245 • Attach the EFC (7c) with the short section of hose (7b)
- 246 to the shortened steel tube.
- 247 • Attach the upper hose (7d) between the EFC and the
- 248 water pump housing.
- 249 • Tighten all the clamps.
- 250 • Top up the coolant and check for leaks.



251 **Understanding the Wiring and Electrical Connections**

252 Before you begin hooking up wires, it will be helpful to understand how this system works.



270 The power relay (8a) for the fan comes with the electrical plug (8b) attached, and the plug comes with the
271 wiring attached at the relay end. The kit comes with a 39" long piece of black wire (8c), and a bag
272 containing a black plastic plug (8d) and two metal female spade connectors for that plug. The 39" long
273 piece of black wire is simply the ground for the fan. Suitable ring connectors (8e) are included in the kit so
274 you can terminate the ground wire. The terminals are not installed so you can trim the wire to the exact
275 length you need for your installation. The thick blue wire (8f) from the relay is the power wire for the fan.
276 The thick red wire (8g) supplies 12V to the fan relay when the ignition switch is on. The fan is pre-wired
277 with a blue (power) and a black (ground) wire that terminate in a plug with two male spade connectors
278 (8h). The plug is usually marked with a "+" indicating which male spade is attached to the blue power
279 wire; it is a good idea to identify the blue-wire spade before you connect the fan. The Electric Fan
280 Controller or EFC (8i) is the "switch" that trips the relay, sending power to the fan when the temperature
281 reaches the level you set, and cutting the power off when the temperature drops. By powering the fan
282 through the relay, the control unit is protected from the current that would otherwise flow through it on the
283 way to the fan. The control unit is grounded to the chassis through a black wire with a ring connector (8j).

284 **Installing the Relay, Connecting the Fan**

285 ***For safety reasons disconnect the vehicle battery when you are carrying out this installation***
286 ***procedure. While there are any number of alternate ways of wiring the fan, bear in mind that this is***
287 ***an engineered package, with components carefully selected to provide the best possible results.***
288 ***Failure to adhere to the recommended wiring instructions will necessarily void the warranty.***
289

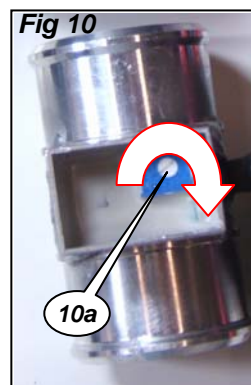
- 290 • Choose a position for the relay. *Ensure that the wire harness with the relay connector will reach*
291 *your chosen position allowing you route the harness with no strain on the wiring. Keep the wiring*
292 *away from excessive heat. We mounted the relay to the firewall below the pedal assembly.*
- 293 • Mount the relay (8a) using an existing screw, or drill a hole for a suitably sized self tapping screw.
- 294 • Connect the black wire (8j) from the control unit harness to the vehicle chassis. *If the mounting*
295 *screw for the relay is suitable, the ground wire may be secured there.*
- 296 • Connect the RED wire (8g) to a fused and switched 12v power supply. *It is recommended that the*
297 *feed is from a "switched" (meaning an ignition switch controlled power supply) so that the*
298 *controller will not operate when the engine is switched off. If the red wire is connected to an*
299 *unswitched supply, the controller will continue to operate after the engine is switched off. The fan*
300 *will either stay on after the key is switched off, or come on if the temperature rises above the*
301 *temperature set in the controller. This is not unusual as the hot engine will continue to dump heat*
302 *into the coolant after shut down. The water will continue to circulate slowly, driven by the*
303 *temperature differential. This may drain the vehicle battery if the fan runs for a long time.*
- 304 • Look at the plug attached to the fan motor. (Fig 9) The blue wire is
305 power, the black is ground. Find the bag with the two female spade
306 connectors and the plastic plug. This male plug will plug into the
307 female plug attached to the fan. Connect one of the female spade
308 terminals to the BLUE wire (8f). Pop the connector into the plastic
309 plug (8c) so that the BLUE wire from the relay will connect to the
310 blue wire going to the fan motor. Connect the second female spade
311 terminal to the length of BLACK wire (8c) supplied loose in the kit.
312 Pop this connector into the plastic plug (8d) so that the BLACK wire
313 will connect to the black wire going to the fan motor.
- 314 • Determine where you will ground the black wire (8c). Trim it to length, strip the end, and crimp on
315 one of the ring connectors provided. Secure the fan ground wire.
- 316 • Secure the wiring harness with the cable ties provided.
- 317 • Reconnect the vehicle battery.



318 **Adjusting the Controller**

319 The operating temperature for the fan is adjusted by turning the small screw (10a)
320 inside the body of the unit. The adjustment screw has a total rotation of just over
321 3/4 of a turn, which corresponds to a temperature range is 70°C to 120°C (158° F
322 to 248° F). It increases as you rotate the screw in a clockwise direction. Turn the
323 adjuster by hand, using a suitably sized flat bladed screwdriver. Do not use
324 excessive force! You can easily damage the controller.

- 325 • Rotate the screw slowly counterclockwise until it stops.
- 326 • Start the vehicle and allow the engine to warm up. The fan will come on
327 when the engine coolant temperature reaches about 70°C (158° F).
- 328 • Verify the fan controller is working properly by slowly rotating the
329 adjustment screw clockwise until the fan stops.
- 330 • Continue to increase the setting until the fan remains off when the engine is at normal running
331 temperature. The fan will then come on when the engine temperature exceeds normal. When the
332 temperature recovers, the fan will shut off. *Note: This procedure assumes that you have a*
333 *functioning and accurate temperature gauge; it won't hurt to verify your temp readings with an*
334 *infrared temperature sensor or a thermometer in the top tank.*
- 335 • When you have finished with the adjustment and the fan control is operating at the desired
336 temperature fit the black plastic dust cap into the rectangular opening, covering the controller.



337 **PLEASE NOTE**

338 This fan kit **will** move enough air to keep a TR2-4 within normal operating temperatures under normal
339 conditions. The premise of this kit is that you have an engine properly tuned and a cooling system that is
340 in good working order. An electric fan is being installed because
341 a) you are installing components (alternator conversion, rack & pinion steering) that require the removal
342 of the stock crank-mounted fan or
343 b) the stock engine driven fan is not capable of moving enough air at idle or in stop-and-go traffic
344 (possibly due to modifications that have boosted the power output).

345
346 An electric fan absolutely **will not** cure a chronic overheating problem due to a mechanical problem,
347 tuning issue, or other defects. The Revotec fan and controller **cannot** compensate for fundamental
348 problems with the engine and/or cooling system.

349
350 If you think you may have an overheating problem, please download the article on Overheating Triumphs
351 and take the time to figure out exactly what is wrong, and fix it or have it fixed. The article is available on
352 our website www.mossmotors.com. Go to the TR2-4A cooling system web page and open the link. If you
353 have trouble finding the article, contact Moss Technical Services at (805) 681-3411.

354
355
356
357 *Although every effort has been made to ensure the accuracy and clarity of this information, errors and/or*
358 *omissions on our part are almost inevitable. Any suggestions that you may have that will improve the*
359 *information (especially detailed installation notes) are welcome. Please use the simple email form on the*
“Contact Us” page on the Moss website: <http://www.mossmotors.com/AboutMoss/ContactUs.aspx>
If you prefer, you may call our Technical Services Department at 805-681-3411. So many people call us for
help that we are often not able to answer the calls as fast as we'd like, and you may be asked to leave a
message. We apologize in advance for the inconvenience. We will get back to you within 2 business days.



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Appendix 1: Fan Specifications

 	<h1>AXIAL FANS</h1> <h2>12V DC</h2> <h3>SLIM-LINE</h3>	<h1>10"</h1> <h2>255mm</h2>
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PULLER			
General CAB Part No:		90050223	
Revotec No:		255S53	
Static Pressure	Airflow		Current Amp.
	mm H ₂ O	M ³ /h	
0	1250	738	8.5
2.5	1170	690	8.6
5	1050	620	8.8
7.5	930	549	8.6
10	850	502	8.5
12.5	740	437	8.5
15	620	366	8.6
17.5	500	295	8.8
20	400	236	9.1

