



Installation Manual

P/N 1-301-1610-01 (STAGE 2+ FUEL KIT)

P/N 1-301-1610-02 (STAGE 3+ MODULE)

P/N 1-301-1610-03 (STAGE 4 MODULE)

E9X/E8X CHASIS VEHICLES



This installation is not recommended for a novice or the new guy in the shop. Use caution when installing not to damage any factory components or components included in this kit. If you are not experienced in working on cars we recommend taking this kit to your local BMW Performance shop for installation.

Note: Precision Raceworks holds no responsibility for any damage that occurs or laws that are broken in the installation or use of this kit. This kit is intended for off road purposes only.

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STAGE 2+ KIT CONTENTS

Qty	Description	Qty	Description
1	FUEL PUMP	1	PUMP MANIFOLD WITH O-RING
2	FUEL RING REMOVAL TOOL	1	LARGE 3 LEG BRACKET
1	SMALL BRACKET	4	ALLEN HEAD CAP SCREWS
4	SHORT ZIP TIES	1	LONG ZIP TIE
1	REPLACEMENT CLIP	1	STAINLESS ALLEN PLUG
2	QUICK CONNECT FITTINGS	1	VENTURI LINE WITH CLAMP
1	LOOSE O-RING FOR PUMP	1	NYLON WIRE GROMMET
3	NYLON PUSH RIVETS	2	NYLON BUTT SPLICE CONNECTORS

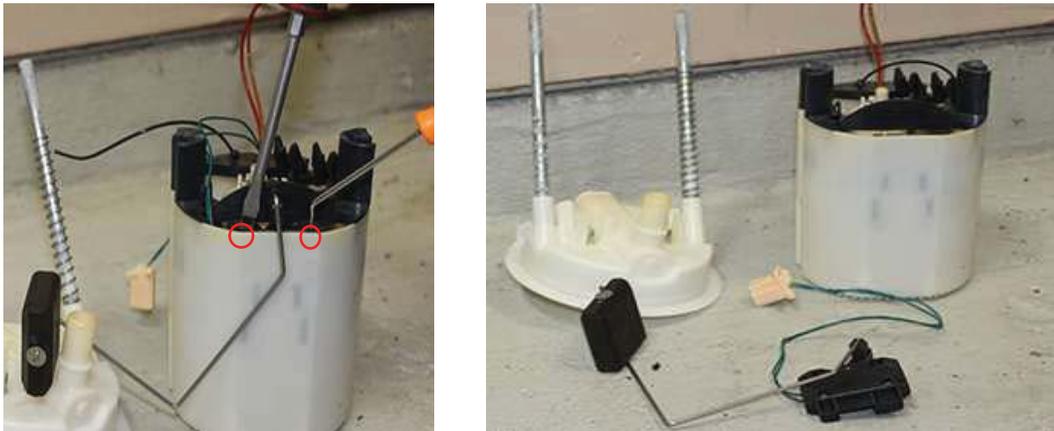
This section of the manual is intended to show the assembly of the **Precision Raceworks Stage 2+ Fuel Pump kit** P/N 1-301-1610-01 and final assembly. For instructions of the removal or installation of the factory fuel bucket please refer to your service manual or instructions found elsewhere.

1. Unpackage your Precision Raceworks Stage 2+ kit and verify the contents inside the box matches the list found at the top of this page.
2. Begin disassembly of the pump by cutting the black plastic strap which secures the top hat to the fuel bucket. Next unplug the two connectors by releasing the clip and pulling up on the connector.

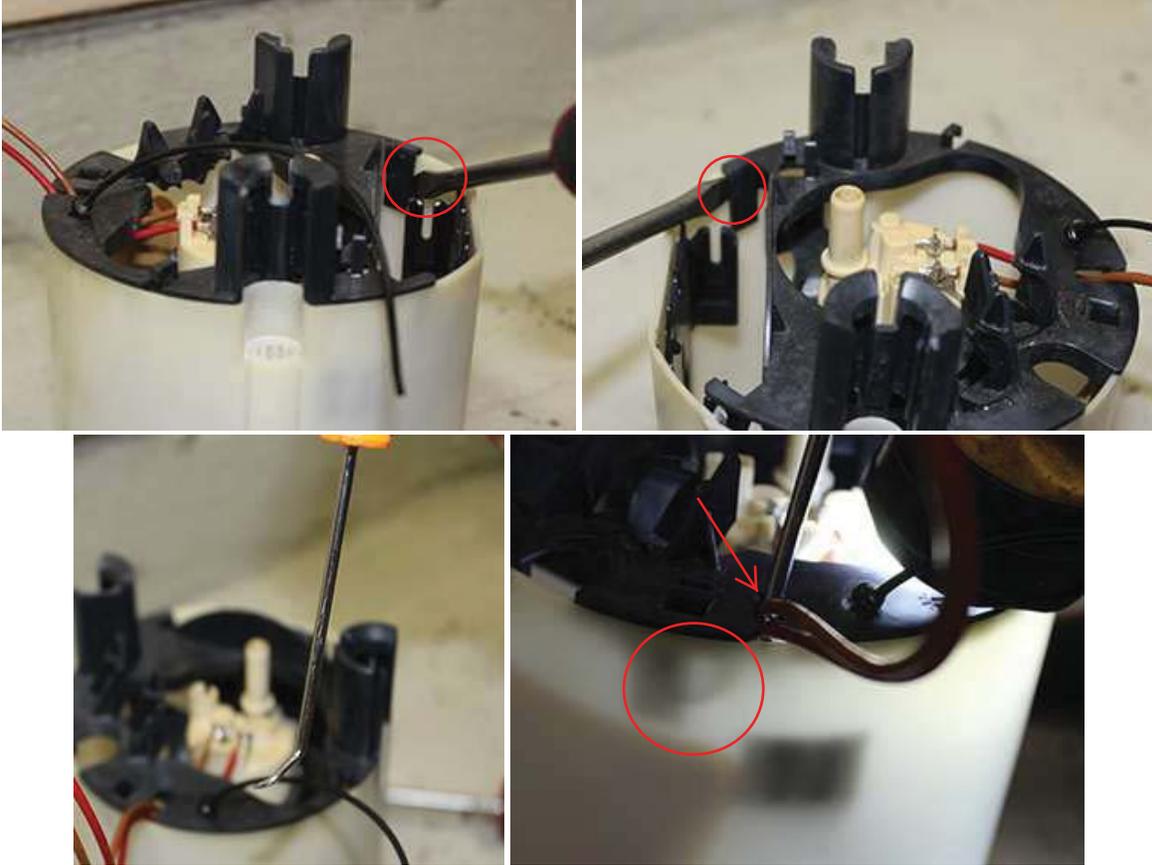
(This step can be done while removing the pump from car for easier access and removal of bucket)



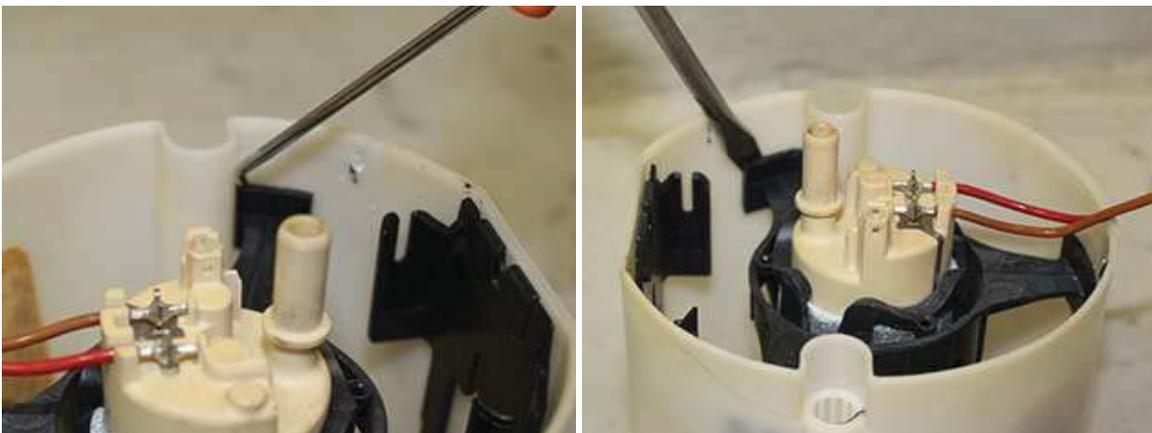
3. Remove the fuel float assembly by pushing back the two tabs shown in the photo below. While pushing in these two locking tabs lift up on the fuel float assembly to remove it.



4. Carefully locate and pry loose each of the 3 points, the black upper piece is secured to the white bucket. Heat can be applied but ensure there are no remains of gas or gas fumes. The best tool for the job is a small screwdriver and pick tools. The plastic can crack and minimal damage is ok and will not affect functionality but taking your time will ensure no damage to the bucket itself.



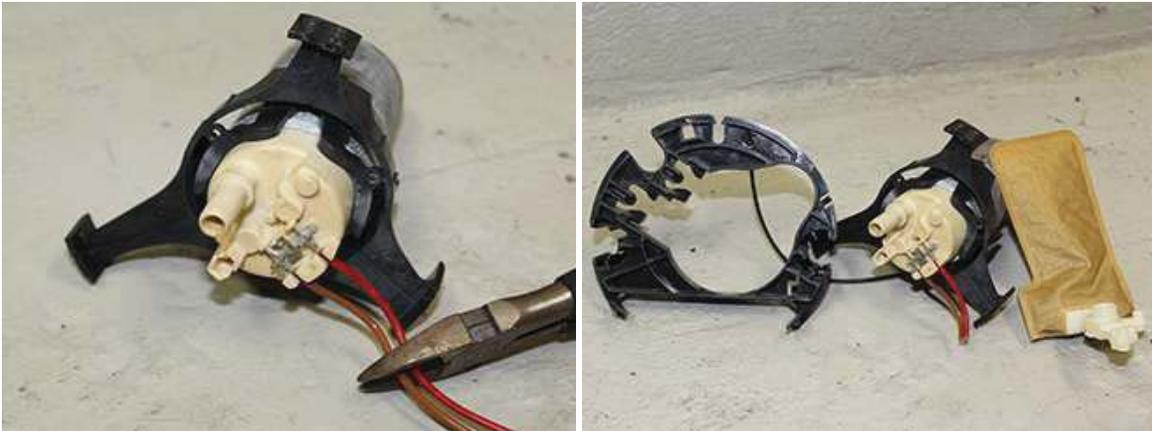
5. As done in the previous step you have 3 more points where the stock fuel pump was glued together. To remove these as before use a pick tool to gently work the tabs loose of the bucket. Once you get clearance enough to slide your screwdriver in it can be pushed in the slot like a wedge and wiggled back and forth. After all three glued joints are loose remove the fuel pump from and mount from the bucket by lifting up.



6. Next step is to remove the fuel sock and venture from the bottom of the pump. For this you simply take a screw driver as shown below and pry up on the fuel sock. Once the fuel sock is removed take your screwdriver and carefully push the venturi out as it is simply pushed into a hole on the fuel pump.



7. The next step is to cut the factory wiring going to the fuel pump. There is plenty of wire but it is always good to make sure you have plenty so cut about where shown in the image below. Once the harness is cut keep the connector end we will be reusing it. Take the other 3 items below and place them aside we will not be reusing them in the assembly of your Stage 2+ kit.



8. For this step you will take the bracket provided and install it as shown in the first image. The long tabs can be bent outward slightly if needed with a pair of pliers to help them better catch on the top of the bucket but is not required. Once it is sitting in place use a flashlight from the inside to make the holes for the bracket stand out then use a drill and small drill bit to mark the center of the hole on the outside of the bucket.



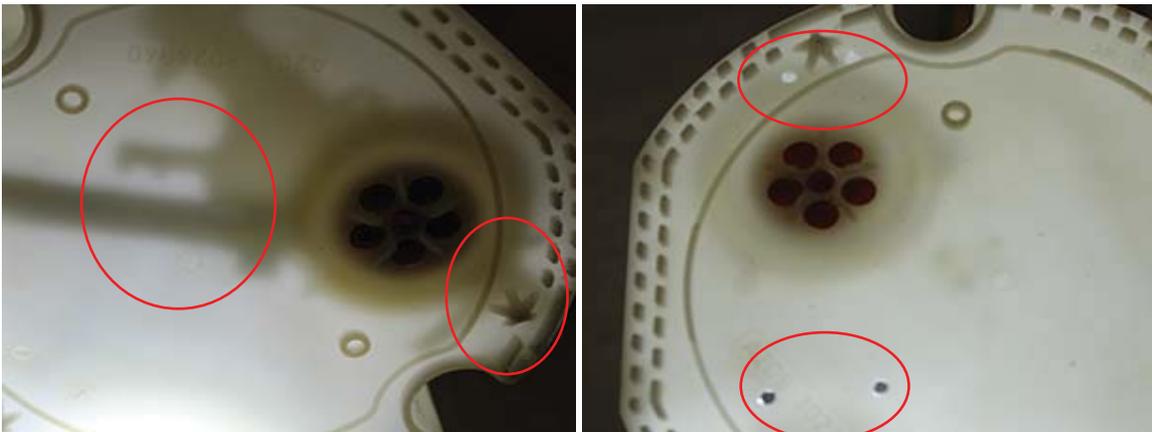
9. Once all 3 holes are marked on the outside of the bucket finish drilling through with the small bit working up to the final size bit which is 7/64". If you go from small to large instantly you risk cracking the bucket you do not have to use every size between the two but we advise at least 2 bits of in-between size.



10. Take the factory venturi fitting removed in step 6 of these instructions and locate the supplied venturi line. Remove the protective black rubber plug from the end of the tubing. Heat the end of the tube with a heat gun or hair drier to make the nylon more flexible. Once the nylon is warm push the nylon over the fitting shown in the image below making sure that the hose clamp provided is still on the nylon tube. Once the tube is seated flush against the venturi as shown below slide the hose clamp over the barb and clamp down on it to lock in place (dikes or other cutters can be used for this just do not cut through the clamp).



11. To install the venturi drill 4 holes in the bottom of the fuel bucket using your small drill bit and working up to one large enough for the supplied nylon zip ties to pass through the holes. The holes do not have to be on an EXACT location but the images below and use of a flashlight can help better understand where to drill the holes.



12. Secure the stock venturi in place using the supplied nylon zip ties. It is easiest if you install the one closest to the wall first only fastening the zip tie a couple clicks. Then insert the venturi as shown and then install the other zip tie performing a final tightening on both.



13. Located the blue manifold and the supplied stainless still hex plug. Insert the plug by hand and tighten by hand until you can no longer get your fingers on it. From here using a 3mm allen head wrench or socket continue to tighten until very snug but do not over torque.



14. Take the blue manifold with the stainless plug inserted and two fittings supplied in your Precision Raceworks Stage 2+ Fuel Kit. Screw both fittings into the other two holes on the OD of the part. The fittings come with O-ring seals preinstalled. Once the O-ring makes contact with the hole in the manifold they might need some pushing inward to continue going into the fitting.



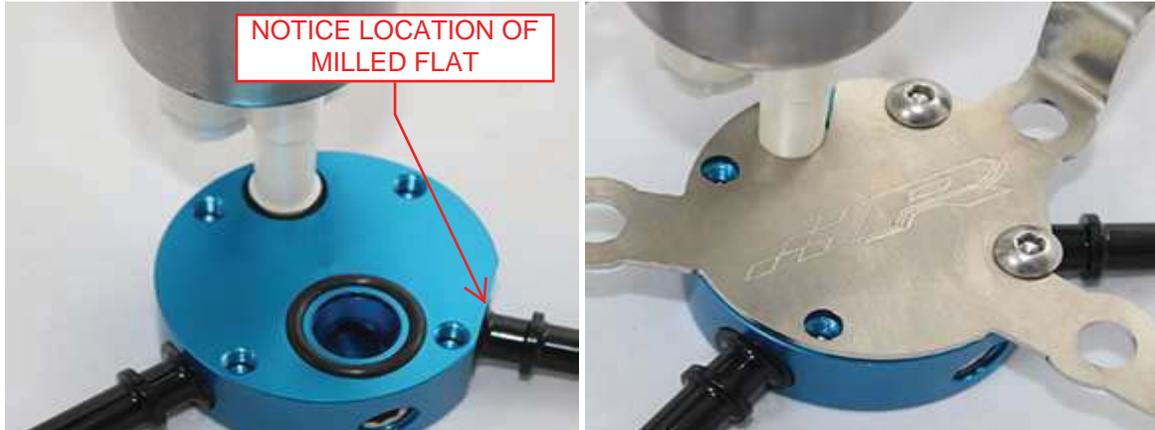
15. For the O-ring to go into the fitting you will no longer be able to tighten by hand as it is a very tight fit for a perfect seal. For final tightening we recommend using a **leather work glove** to protect the finish on the fitting and a pair of pliers to tighten. Tighten the fittings until close to flush with the OD of the part.



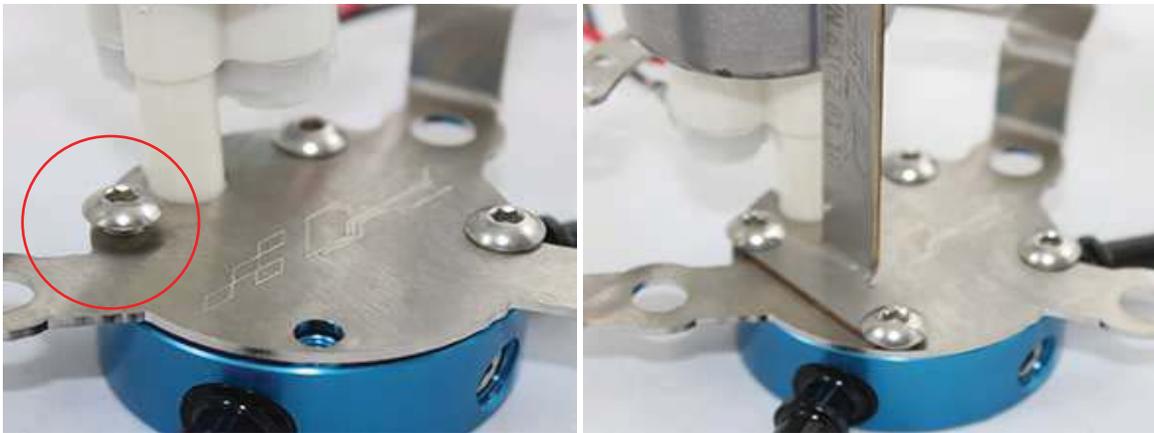
16. Locate the supplied Walbro 450 fuel pump and loose O-ring included in the kit. Install the O-ring over the end of the pump neck (some stretching is required).



17. Locate the 4 allen head screws provided in the kit along with the small stainless bracket and large stainless bracket previously used in step 8 of this manual. Slide to the pump into the hole as shown in the below picture then install the large bracket as shown in the picture installing and tightening only the two screws illustrated.



18. The pump will now be supported by the bracket but it needs to be treated with care for now. Install the 3rd screw as shown by only screwing in a couple threads. Once it is in slide the pump support bracket under the screw and install the 4th screw. Complete tightening of all 4 screws using a 3mm allen wrench.

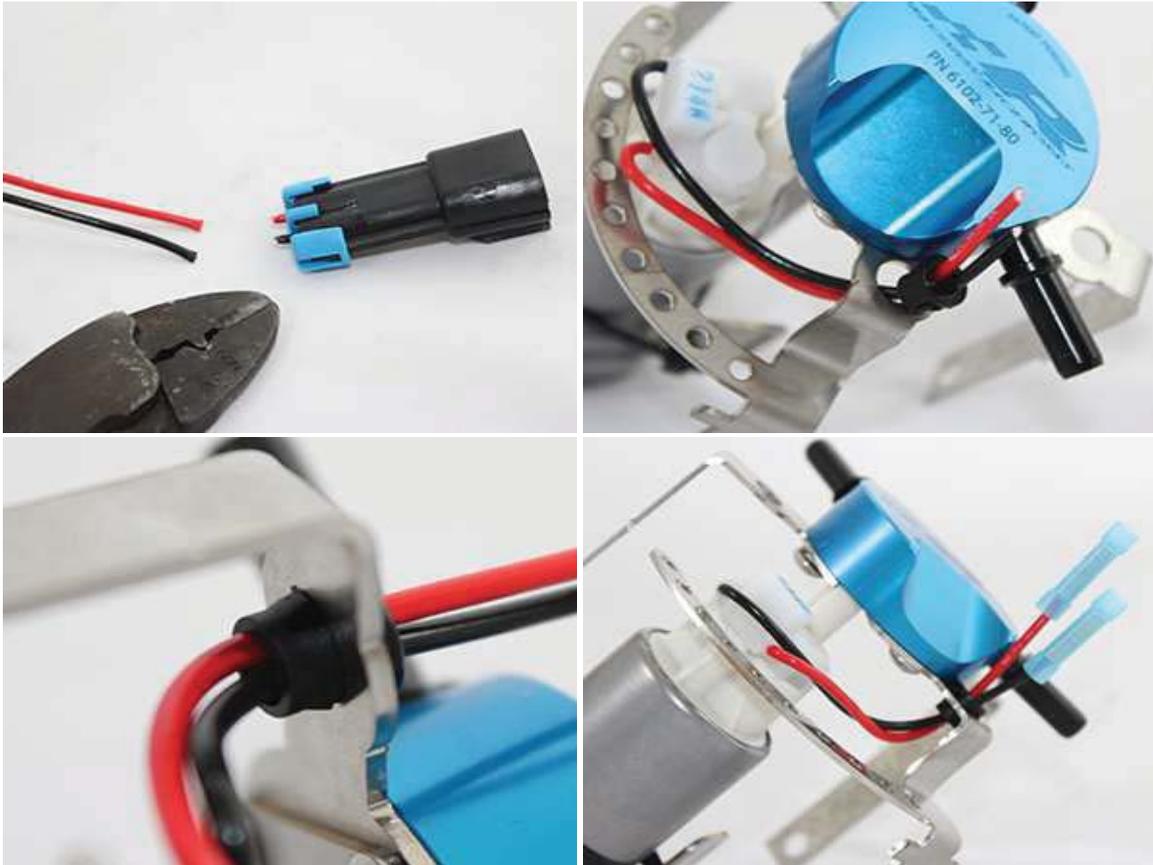


19. Secure the pump to the support using the supplied nylon zip tie being sure to keep the lock portion of the zip tie close to the stainless steel support as shown below. Once it is tight cut the excess off as shown.

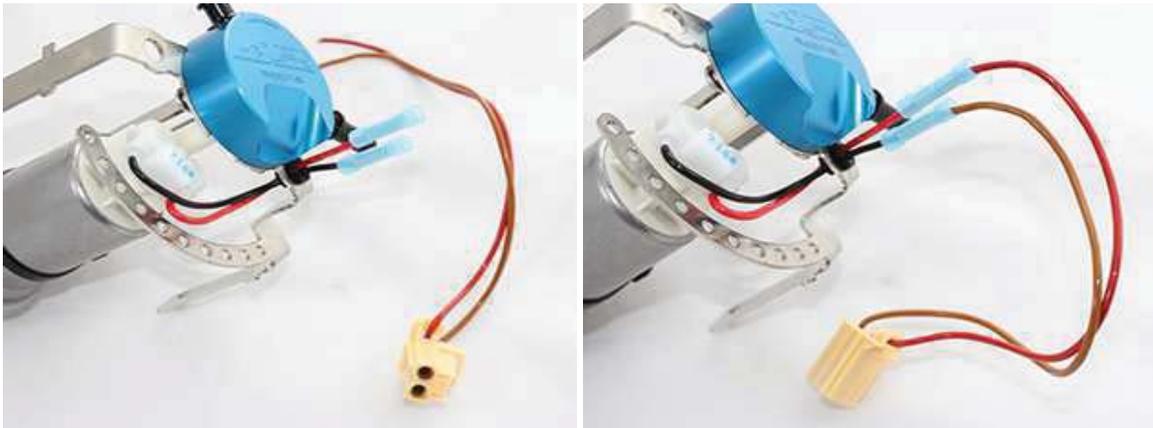


20. Cut the plug off the pump if it has not already been done. Insert the Red and Black wires through the hole located on the large bracket as shown in the image below. Then push the two wires through the supplied nylon grommet. Once the wires are through the grommet snap the nylon grommet into place on the bracket to ensure the wires are protected from any sharp edges. Finish this step by stripping and installing the supplied butt connectors.

(NOTE: Stripping wires before pushing through hole is easier for some people this is ok but do not install connectors until wires are through grommet)



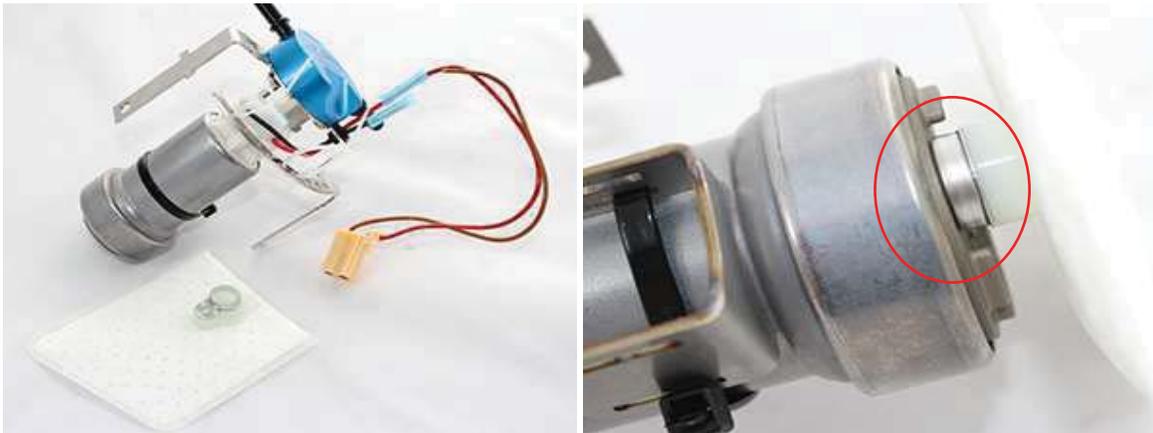
21. Take the factory plug with wires cut in step 7 of these instructions stripping both ends and crimping the supplied nylon crimp butt splice connectors to them. Then connect the Brown wire from the plug to the Black wire on the pump and crimp and repeat this step for the two Red wires.



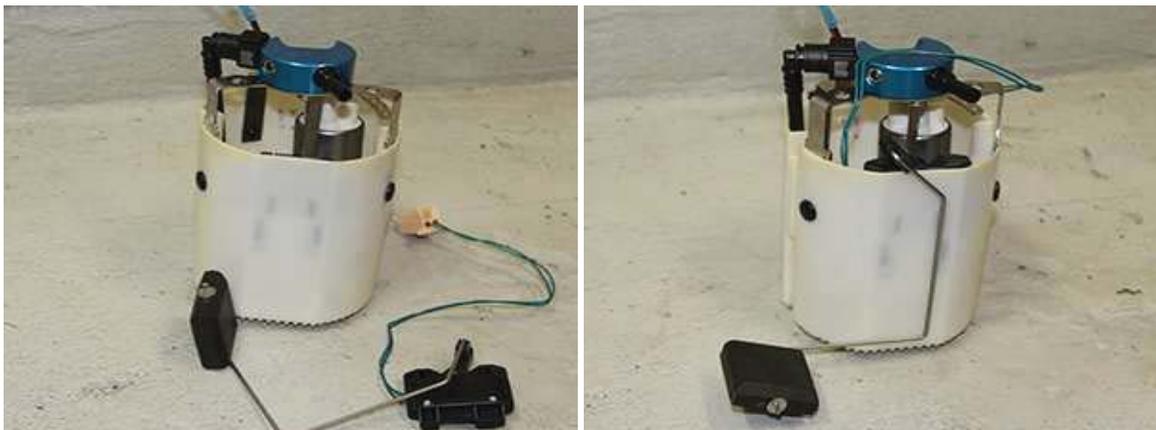
22. Insert the remaining 2 nylon zip ties supplied in your fuel kit as shown in the image below, do not tighten them completely only a few clicks are required for this step. We are preparing for future use during installation.



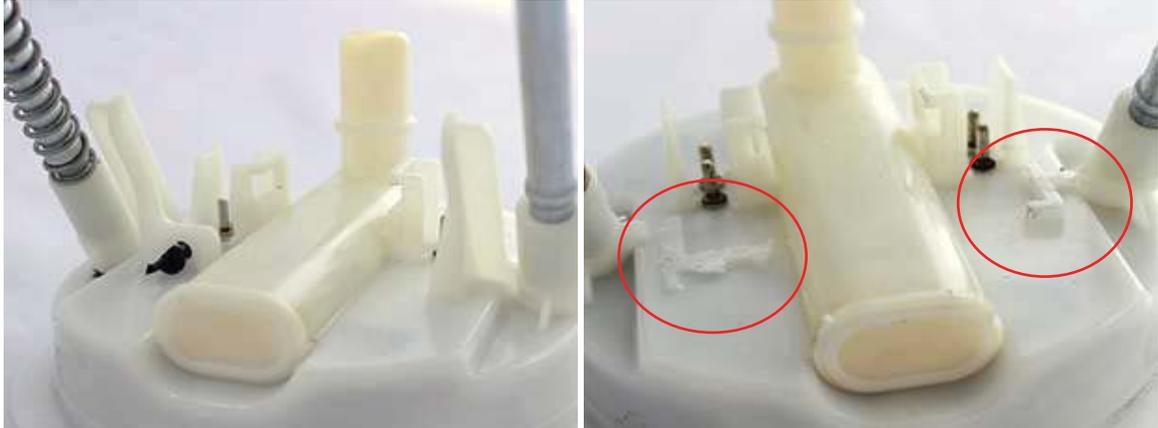
23. Install the supplied fuel sock onto the bottom of your Walbro 450 fuel pump tapping gently on the bottom of the sock below the port to insure it is completely seated on the pump.



24. Insert the assembled Stage 2+ Precision Raceworks Fuel Kit into the bucket. You can remove the protective cap from the venturi fitting and push the venturi line onto the fitting while doing this to make it easier to do later. Align each of the 3 holes and using the supplied nylon push rivets secure the mounting bracket with assembly to the stock fuel bucket. Once the assembly is mounted reinstall the fuel float at this time



25. Locate the two alignment tabs located on the top hat that were previously needed with the factory design. Using a cutting tool cut these tabs off close to the base. It is not required to be flush however they need to be removed within 1/8" - 1/4" from their base.



26. Now measure 2 1/8" down the rod as shown in the picture below (calipers are not required tape measure is fine) and make a mark using a fine tip sharpie or other marking pen. Install the top hat with all plugs connected and push down on the top hat until it can't be pushed down further. At this point the line drawn should meet flush as shown in the image below or be inside the hole unable to be seen. If not check for interferences such as wires or plastic on the plugs and inspect proper clearance is achieved.

(NOTE: Some revisions of the plugs hit slightly if pushing down does not allow them to clear trim the plastic on the plug that is causing the interference with dike style cutters)



27. Your pump assembly should now look like the image below take note of how wiring is routed away from the brackets to ensure no damage will occur in the future once installed. This is how it should look when installed inside your fuel tank.



28. Your pump will install exactly like the factory unit that you previously removed. The only difference is the securing of the factory return lines. The factory plastic unit had voids they snapped into for securing them. Our system uses the 2 previously installed nylon zip ties. To secure the lines once the bucket is in place simply slide the hose through and pull tight on the zip tie. Once this is done you can install the top hat lining up the metal rods on the top hat with the 2 holes in the bucket.



29. Complete install in accordance with your service manual or other instructions found online.

STAGE 3+ KIT CONTENTS

Qty	Description	Qty	Description
1	FUEL PUMP	2	LOOSE O-RING FOR PUMP
1	LARGE 3 LEG BRACKET	1	NYLON WIRE GROMET
4	SHORT ZIP TIES	1	LONG ZIP TIE
2	WIRES WITH CONNECTORS	2	NYLON BUTT SPLICE CONNECTORS
1	REPLACEMENT CLIP	2	STAINLESS BOLTS WITH 2 NUTS EA

This section of the manual is intended to show the assembly of the **Precision Raceworks Stage 3+ Fuel Pump module** P/N 1-301-1610-01. For instructions for final assembly refer to Stage 2+ kit section listed at the beginning of this manual. For instructions of the removal or installation of the factory fuel bucket please refer to your service manual or instructions found elsewhere.

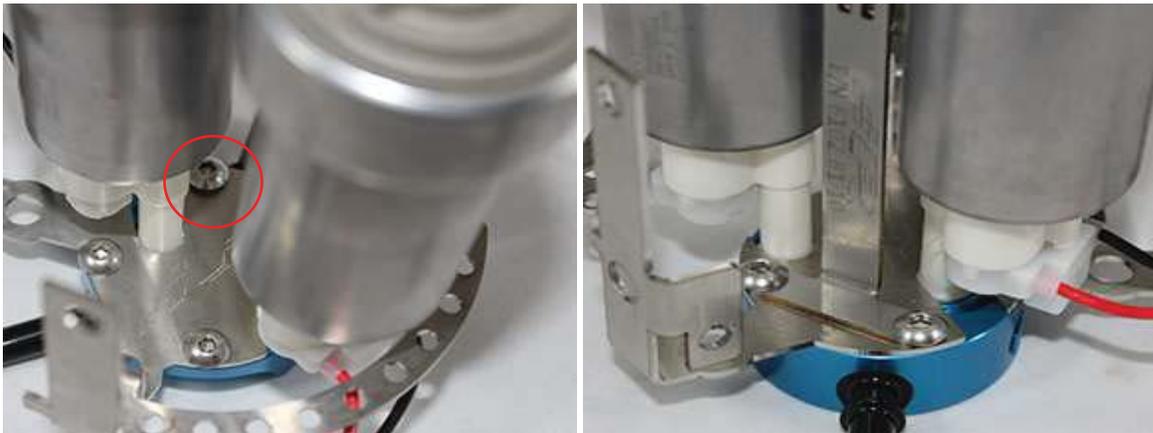
1. Unpackage your Precision Raceworks Stage 3+ module and verify the contents inside the box matches the list found at the top of this page.
2. Disconnect the fuel float harness and the harness for the fuel pump from the top hat. Remove the 3 nylon rivets from the bucket use care as not to break or damage them as they will be needed for reassembly. Disconnect the venture line quick connect from the pump manifold and remove pump assembly.
3. Cut both wires for the fuel pump where they connect to the butt splice connectors during stage 2+ assembly. Set factory plug with wires aside for later use. Make sure to cut so your wires are as long as possible short wires can make for difficult installation.
4. Remove the fuel float assembly as shown in step 3 of the Stage 2+ assembly instructions.
5. Turn the assembly upside down so it is resting on the manifold. While supporting the pump remove the 4 allen screws securing the manifold to the Stage 2+ bracket that were previously installed ins steps 17 & 18 of the Stage 2+ assembly instructions. Remove the brackets and pump from the manifold and cut the zip tie from the pump support.
6. Remove the factory installed O-ring from the pump manifold



7. Install the new supplied O-rings on both the Stage 2+ pump as well as your new Stage 3+ pump. As shown in step 16 of the Stage 2+ assembly instructions.
8. Install the Stage 3+ bracket supplied in your kit by hooking the lips of both pumps over the bracket and then place the manifold on top inserting the pumps into the manifold ports. While holding this together place the manifold upside down so you can hold both pumps in 1 hand and everything stays together.



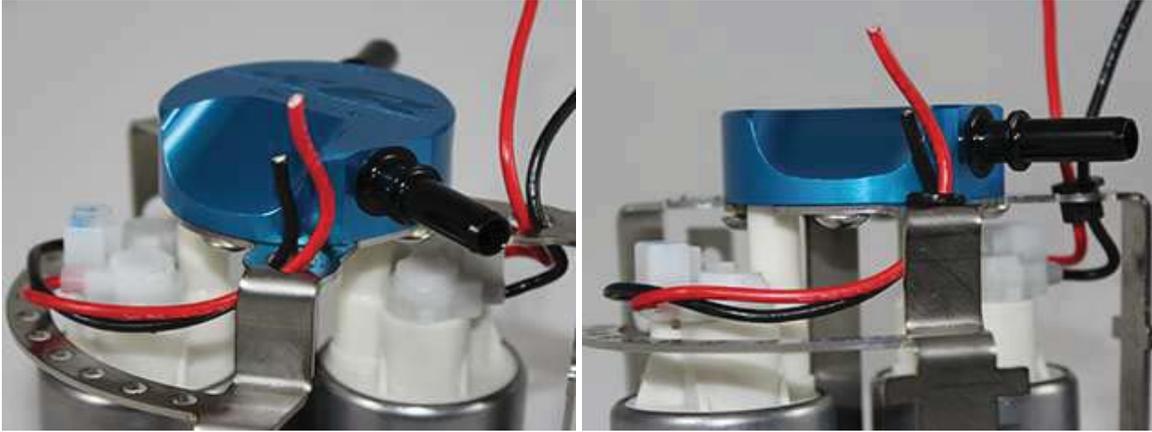
9. Install 3 of the 4 screws as shown below (2 on side with venturi tighten down), on the other side install 1 screw only a turn or so. Slide the pump support under the loose screw and install the 4th screw once lined up. Continue to tighten all 4 screws until they are tight while holding the pumps.



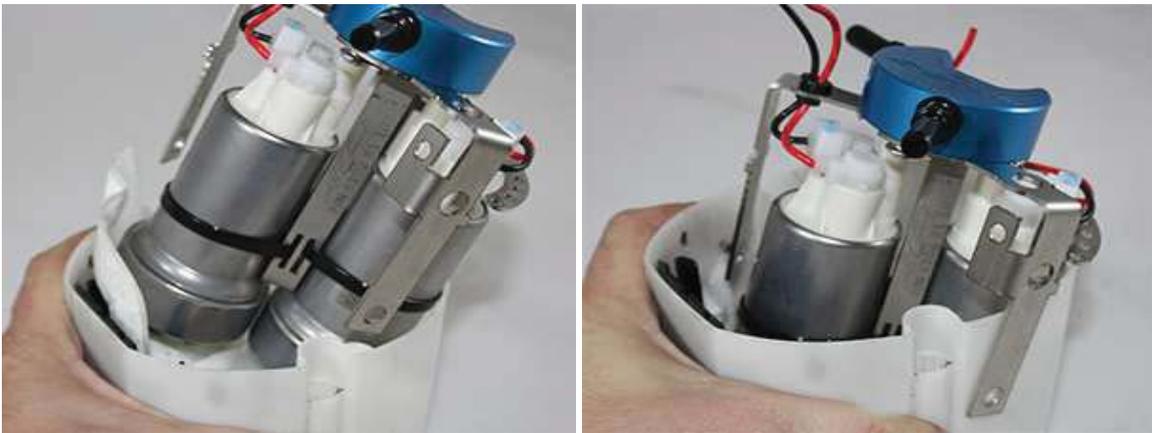
10. Insert the two supplied nylon zipties through the fuel support as shown below. Then secure both pumps to the fuel support with the zip ties, tighten, and cut off the excess.



11. Run the wiring through the required holes in the 3 leg bracket and remove the nylon wire grommet from the Stage 2+ bracket and install along with the new grommet as shown in step XXX of the Stage 2+ assembly instructions.

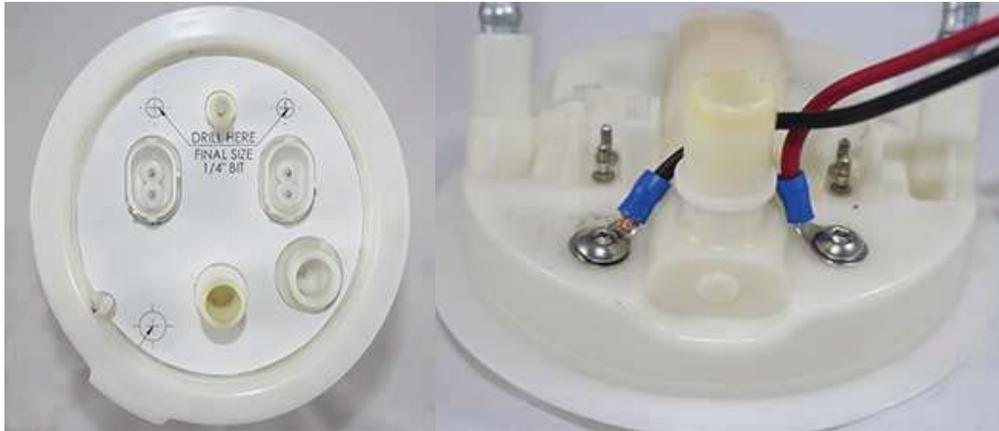


12. Now to install the pump assembly in the bucket by tilting the pump closest to the fuel float mount locations and as shown in the photo below. While doing this grab the bucket as seen in the other photo and squeeze slightly. For these photos we did not even touch the assembly only squeezed slightly on bucket for it to drop in so force is not required.



13. Once the assembly is in with all 3 legs inside the bucket you can reconnect the venture line and reinstall the 3 nylon push rivets.
14. Next strip the wires on both pumps and reconnect the previously cut wires for the Stage 2+ kit to the factory plug as done in step 20 & 21 of the Stage 2+ assembly instructions. Then crimp the two insulated spade connectors included with your stage 3+ wire kit on the pump wiring ensuring the mates will match up with the corresponding color on the harness provided.

15. Disconnect the mates for the Stage 3+ fuel pump if you have not or you reconnected them after crimping. Locate the 2 stainless electrical terminals provided in your kit and drill two $\frac{1}{4}$ " holes using the supplied template on the last page of this document. Insert the two bolts from the bottom with the wires attached and secure by tightening nut from the top while holding the bolt on bottom still.



16. Install the pump and reconnect the return lines as shown in step 28 of the Stage 2+ assembly instructions. Connect the 2 mating wire spades previously installed for the Stage 3+ fuel pump. Install top hat and secure the lock ring with the tools provided in your Stage 2+ kit.
17. From here your Stage 3+ fuel module has been installed in the tank and you need to connect your pump control method preferred. On the next page we have included a simple wire diagram for how to make and install a simple hobbs switch style relay harness. If you are running a JB4 product you are able to control the fuel pump through the use of it and a relay. It can also be controlled by many other methods as well such as our PWM-30a fuel pump control module.

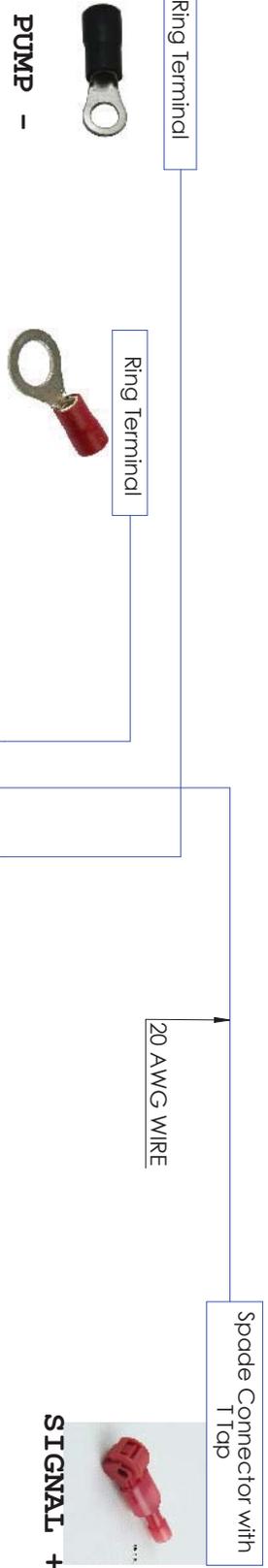
(Disclaimer the PWM-30a has not been released yet at the time of this install manual but will be released during Q1 of 2017.)

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CONNECT WIRES IN EITHER ORDER TO SWITCH

PRESSURE SWITCH (HOBBS SWITCH)

Switch should be NO (Normal Open)

20 AWG WIRE

20 AWG WIRE

10 AWG WIRE

20 AWG WIRE

10 AWG WIRE

10 AWG WIRE

10 AWG WIRE



30A Fuse

Ring Terminal (8mm ID)



BATTERY +

BATTERY -



Spade Connector with 1 Top



SIGNAL +



BASIC PRESSURE SWITCH FUEL CONTROL SYSTEM / HOBBS SWITCH STYLE 2ND PUMP CONTROL RELAY & HARNESS

* SIGNAL + : THIS SHOULD BE CONNECTED TO A 12V ACCESSORY SOURCE THAT ONLY SHOWS 12V WHEN CAR IS IN ON POSITION
 BATTERY - : THIS CAN BE CONNECTED TO BATTERY NEGATIVE POST OR GROUND ANYWHERE ON CHASSIS
 BATTERY + : THIS IS THE SUPPLY WIRE AND MUST BE CONNECTED DIRECTLY TO THE POSITIVE POST OF THE BATTERY SECURELY
 PUMP - : THIS CONNECTS TO THE NEGATIVE SIDE OF THE FUEL PUMP
 PUMP + : THIS CONNECTS TO THE POSITIVE SIDE OF THE FUEL PUMP

PRESSURE SWITCH INFO: SWITCHES DO NOT HAVE A POSITIVE OR NEGATIVE TERMINAL THE WIRES CAN BE CONNECTED IN EITHER ORDER. YOU WANT AN ADJUSTABLE PRESSURE SWITCH (HOBBS STYLE) THAT IS NORMALLY OPEN AT REST AND CLOSED UNDER PRESSURE.

* signal + can be connected to battery + (30) for more simple wiring without secondary failsafe

4

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12 Month Limited Warranty

Precision Raceworks, LLC warrants to the consumer that all Precision Raceworks products will be free from defects in material and workmanship for a period of twelve (12) months from date of the original purchase. Products that fail within this 12 month warranty period will be repaired or replaced at Precision Raceworks discretion, when determined by Precision Raceworks that the product failed due to defects in material or workmanship.

This warranty is limited to only the repair or replacement of the Precision Raceworks part. In no event shall this warranty exceed the original purchase price of the Precision Raceworks part nor shall Precision Raceworks be responsible for special, incidental or consequential damages or cost incurred due to the failure of this product.

Warranty claims to Precision Raceworks must be transportation prepaid and accompanied with dated proof of purchase. This warranty applies only to the original purchaser of product and is non-transferable. All implied warranties shall be limited in duration to the said 12 month warranty period. Improper use or installation, accident, abuse, unauthorized repairs or alterations voids this warranty.

An Precision Raceworks Warranty Claim Form Must Accompany All Warranty Claims. Products returned to Precision Raceworks with no Return Goods Authorization and or No Warranty Claim Form may be rejected and returned to sender. Precision Raceworks disclaims any liability for consequential damages due to breach of any written or implied warranty on all products manufactured by Precision Raceworks. Warranty returns will only be accepted by Precision Raceworks when accompanied by a valid Return Goods Authorization (RGA) number. Credit for defective products will be issued pending inspection. Product must be received by Precision Raceworks within 30 days of the date RGA was issued.

Please note that before we can issue an RGA for any product, it is first necessary for the installer or end user to contact us at Warranty@PrecisionRaceworks.com to discuss the problem. Most issues can be solved through email or over the phone. Under no circumstances should a product be returned or RGA requested before the above process transpires.

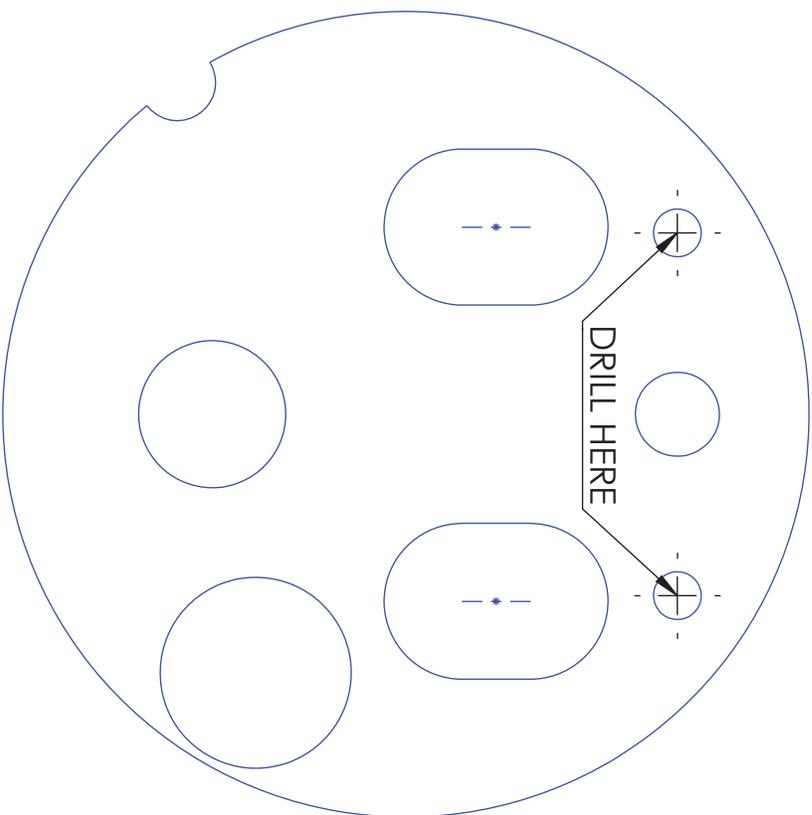
AN PRECISION RACEWORKS WARRANTY CLAIM FORM MUST ACCOMPANY ALL ELECTRONICS WARRANTY CLAIMS. Precision Raceworks Products returned to Precision Raceworks with no RGA and or No Warranty Claim Form may be rejected and returned to sender.

A copy of the Precision Raceworks Warranty Claim Form can be obtained by sending a request for the form to Warranty@PrecisionRaceworks.com .

2

1

1. Cut template along lines
2. Drill pilot holes using small drill bit
3. Remove template and redrill with 1/4" drill bit



TITLE:
**E9X / E8X TOPHAT
 DRILL TEMPLATE**

SIZE	DWG. NO.	REV
A	6102-01-21	01
SCALE: 1:1	SHEET 1 OF 1	

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