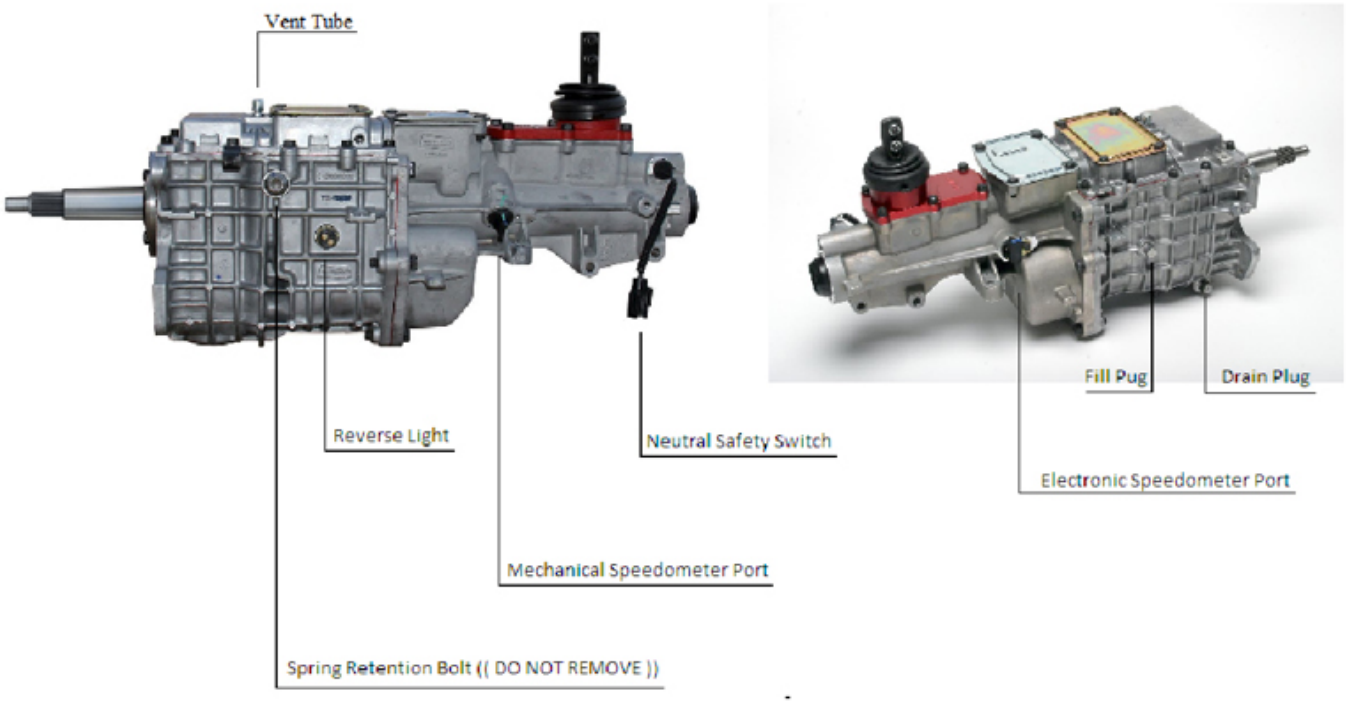
FACTORY FIVE PRE-INSTALL FREQUENTLY ASKED QUESTIONS

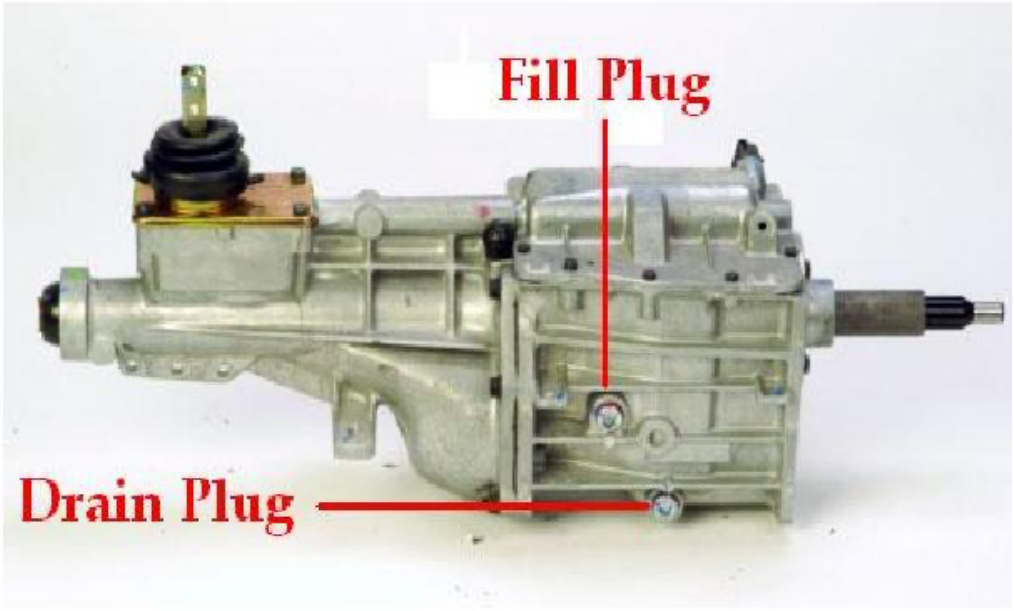
Contents

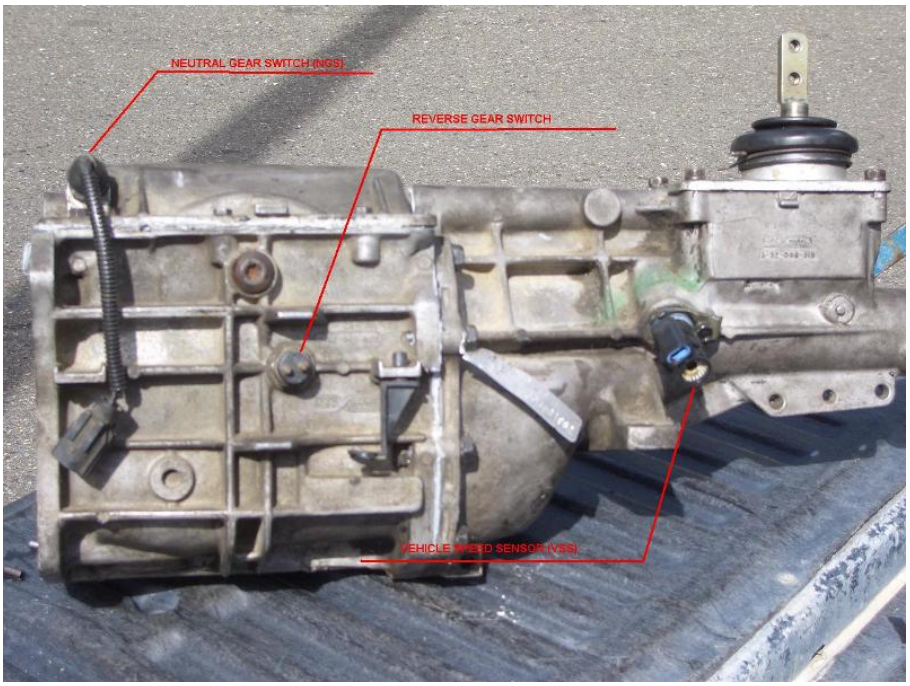
Section 1. Tremec Sensor / Sender / Fill Plugs / Locations

TKO600



Tremec T5





Q: What kind of Trans fluid for TKO?

A: For all TKO and T5, 5-speed models, TREMEC recommends GM Synchromesh™ (GM Part # 88861800) – or equivalent, or Mobil 1 Synthetic ATF

Q: What capacity TKO600?

A: The TKO 500 & 600 Tremec transmissions require approximately 3 quarts.

Q: My T5 is crooked?

A: Yes it is. that's how its manufactured. They do appear "twisted" and the shifter is at a slight angle.

Q: When/Why/What is a midshift kit. And do I want it?

A1: A midshift kit moves the shifter to the "middle" position on a Tremec TKO. There is NO T5 midshift.

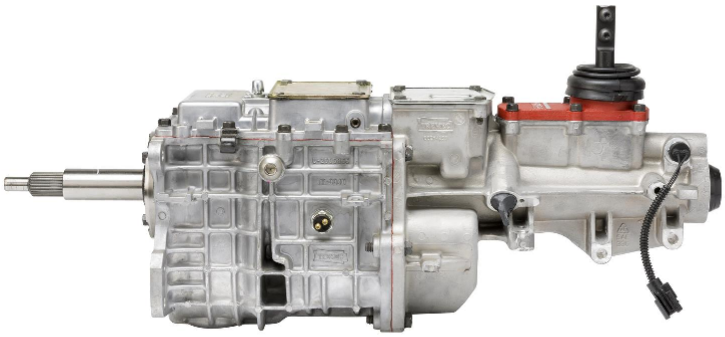
A2: The two served purposes are to move the shifter forward, and to eliminate the "45 degree" shift lever on the "typical" MKIV / TKO600 position.

MKIV can accept a midshift, BUT you will have to CUT out a middle support BAR. It is not common to put a midshift in a MKIV for this reason, but some much prefer the shifter position/lever.

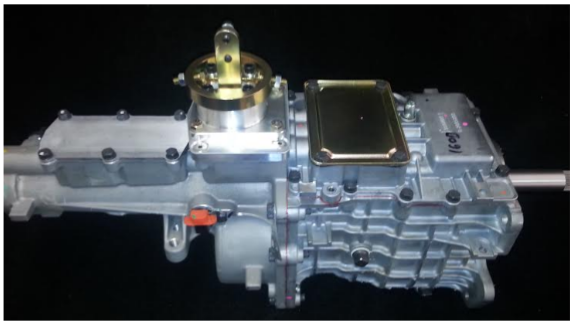
TYPE 65 is the exact opposite. It does not accept a standard position shifter w/o cutting. I consider the midshift basically ***REQUIRED*** for the type 65, It saves you from cutting the bar out.

Type 65 = order a midshift trans from Blueprint to avoid cutting

MKIV= stick w/ standard position



Stock position: Recommended for MKIV



Midshift Position: Recommended for Type65

Q: I ordered a midshift kit, and my shifter lever doesn't fit right. What do I do?

A: You can shorten, and re-drill the bolt holes on the stick of the FFR supplied shift lever. Best done in a drill press, and Vice. The type 65 basically requires a midshift, and it's an option on the roadsters. On the roadster, you will have to cut a tube out of the trans tunnel for clearance. Or, buy an aftermarket shifter stick.

Q: What size bolt holes are on the transmission, for mounting the FFR poly mount?

A: 7/16 is the inboard hole size. The outers are 10mm x1.5.

Q: Will my transmission have a hydraulic, or cable clutch?

A: Early 2020, we made the switch to hydraulic throw-out-bearings on ALL TKO600 transmissions. This includes both GM and Ford. These are easier to drive, much easier to setup in the car, and well worth it.

The inexpensive 302/T5 combo is the only cable clutch we still offer

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Q: I forgot to order a hydraulic MC from FFR. What is the PN?

A: Wilwood Z-260-14297 (From FFR with matching reservoir) Or **260-10372** can be used, if buying from a parts warehouse (White res included)

Q: How do I Bleed this system?

A: Be sure to bleed it the way shown in the video.

https://youtu.be/wgc7ApCMTGA

Also make sure there is no "pre load" on the rod of the master cylinder connection at your clutch pedal.

Q: What fittings and hoses will I need to connect your TOB with the FFR master cyl?

A: The TOB's we use come with 2 hoses protruding off of them.

One is a bleeder valve. It allows you to bleed air from the system.

The other is simply your feed line that you will have to connect to the FFR master.

Q: What size and type of fittings do I need?

A: The TOB lines can be 3AN, or 4AN pending application.

Russell **661751** is a simple 3AN to 4AN union fitting.

The FFR included fitting in their MC can be discarded. The port on their MC is 1/8 NPT.

1/8 NPT to 4AN in a 90 degree, use Aeroquip **FBM5031**

1/8 inch to 3AN in a 90 degree use Aeroquip **FBM5030**

Pre-assembled hoses are also readily avail via speed resellers. Measure what length you need, and you can pick 3AN, 4AN, or even some are Combo's with both ends.

Q: Do I use the neutral safety switch? or FFR's Pedal Switch?

A: That's your choice. Some prefer to only have to push the clutch in, others the assurance of neutral. Some even wire both in parallel, in an either/or situation.

Q: My TKO in my MKIV has a slow leak out the cut section of the tailshaft. Do I now have to pull this transmission back out?

A: Firstly, it is NOT cut "too much" or "Too Deep". This is a known, and semi-common occurrence with Tremec. They specifically state that their aluminum is porous, and that seepage may occur if the cut surface is not sealed. We DO put a clear sealer on this (that was originally used by GM to stop leaks on engine block cases on Cadillacs) IF you experience this, we'll work through it. We can liberally clean the surface, re-apply the sealer in several coats, and get it to stop.

Permatex Spray Sealant Item# 82099

Q: My T5 is installed “Crooked”

A: no, its not…the shifter does have a slight angle toward the driver side.

Q: What speedometer pieces do I need for a T5 to work with the FFR Gauges

A: FFR does sell these T5 pieces. They have a whole sending unit for approx. $60.00, #14727.

-or-

Modern driveline, VS-32A001 - Speedometer sending unit C40Z-17271-A - ford gear C1DZ-17292-A – ford clip.

NOTE: ALL TREMECS SHIP DRY!!!!!! You must add fluid.

BIGGER NOTE: Install trans, Rotate input shaft and run through the gears BEFORE installing top trans tunnel panel, or carpet!!!!!!!!!!

Q: My trans is VERY hard to shift. What is the Deal?

A: If you have a cable clutch, you’re most certainly out of adjustment, or have a binding cable. Re-check, and make sure all slop is out of clutch fork.

A: if you have a hydraulic clutch, you most certainly have not bled all the air out of it. Watch this video. https://youtu.be/wgc7ApCMTGA

A: If you 1000% are SURE it must be the Trans. Scroll to the end of this document, for the shift re-alignment procedure. A VERY VERY small percentage have encountered this.

Section 2 Automatic Transmission Questions

Q: Why doesn’t the 700r4 come with a speedometer gear, or sender?

A1: Many FFR owners elect to use a GPS speedometer sender (autometer 5289) with the autometer 1988 speedometer, which does not require a trans sender. In this case, you must plug the hole with a freeze plug, or other aftermarket plug

https://www.jegs.com/i/ICT-Billet/335/551961/10002/-1

THIS WILL MAKE THINGS EXPOENTIALLY EASIER

A2: Furthermore, GM offers 2 different types, depending on rear gear selection. This will need purchased outside of the trans package, as we don't know what gear set the owner will be running

A3: One of FFR's gauge suppliers seems to send a ford speedo sender. This is not compatible for a 700R4. You'll need one of the parts below to house the GM sending unit (Again Per A2, we don't supply b/c we don't know your gearset) AND a drive gear. For a GM trans, with autometer 1988. The electric sender is autometer PN 5293. OR go GPS and BE DONE! (5289)

A4: based on your rear gears, rear tires, you typically just need to get "Close" Most electronic speedometers can be calibrated for incorrect gear sets.

1. TCI-880023 or TCI-880022
2. Driven gear
3. Drive gear

To Provide an example. 880023 housing, 880032 driven gear, TCI-880027 drive gear, and clip 880024 (if not present) are "close" for a car with 3.55 gears, 27 inch tall tires. YOU WILL still have to calibrate the speedometer.

I still think the GPS sender is less aggravation, and worth the $100 extra over gears/housings.

A5: I advise calling TCI to run through your gearing and get which two PN's to purchase.

1-888-776-9824

NOTE: AGAIN, MANY aftermarket speedometers can be calibrated, even if your gearing isn't perfect. Call your gauge provider if more clarification is needed.

NOTE: SEE SPEEDOMETER GEAR 700R4 GUIDE AT END OF SPREASHEET.

Q: is my 700r4 lockup compatible? AKA…what are these wires on the side??

A: the 700r4 comes with a lockup kit installed. You simply have to follow the instructions and wire it up. the Vac switch is already on the trans.

Q: Can you recommend a GM Auto shifter for your LS package?

A: Lokar ATS64L60EEM

Q: Does the auto trans come with a shifter?

A: No. you'll want to contact FFR and/or LOKAR to discuss shifter options.

Q: Is the 700R4 mechanically shifted with a kickdown?

A: YES

Q: Is the 4r70W package you dropship electronic control?

A: Yes. and it comes with the controller box, and instructions. Its electronically controlled. It comes with an electronic MSD atomic controller, that does require more wiring than a mechanical trans. Please thoroughly read the supplied instructions. MSD/HOLLEY will be point of contact with tech questions

https://documents.holley.com/2760.pdf

A: Recommended TPS passthrough harness Caspers Electronics TPS Breakout Harness 108103 for tps signal

The Auto Ford Trans is not a very popular FFR option. You may hear "we don't support that" from FFR. It CAN work, but you will have some minor things to work through it (like shifter sourcing)

Q: Why is the 4R70W "expensive"?

A: it's a Ford, fully electronic trans, with a custom 3200 stall converter. If you want an auto, it cost $

Q: Why is your AOD carb only?

A: The Sniper has no Ford kick down linkage. Therefore, the EFI and electronics are required.

Q: So your AOD only works for a carb b/c its mechanical, no electronics, and has a kick down cable that won't easily hook to the sniper?

A: YES!!

Q: Does the AOD ***REALLY*** not work with a sniper?

A: OK…if you're a mechanic with 20 years experience, you may be able to make it work. BUT the AOD is one of the easiest Ford transmissions to damage with improper adjustments. Our trans supplier highly recommends against it. Don't count on warranty if you don't follow instructions.

Q: Do I need to purchase a transmission mount?

A: Contact FFR, as they were working on an auto trans mount adapter.

Q: Does the auto transmission come with the correct high stall torque converter?

A: Yes, we worked with FFR to spec out the proper high stall converter. Your 700r4, or 4r70w from us will have a 3200-3400 stall.

Q: Why a 3200 stall? That sounds like a drag race stall, I want to drive mine on the street.

A: The FFR cars only weight 2200 lbs. The stall has to be high to keep the engine from pushing the car beyond what the brakes can even hold back. With such a light car, it's a different science that a heavy "muscle car"

Q: Do I need to fill my torque converter with ATF?

A: No. fill the trans, checking the dipstick periodically, until it reads full per the MFG instructions. Once the engine is started, the trans pump, in park, will fill the converter. Check the ATF level both after the engine run-in, and again after running through the gears in the garage BEFORE driving. While stationary, foot on the brake. Cycle through the gears w/o moving. Recheck fluid before and after driving. This ensures ATF level is good, and converter is full. Check again after a few miles of driving.

Q: Does FFR supply a driveshaft for the Ford 4R70W?

A: We have spoken about it, and at this time I don't believe they do. You will need to swap the yokes. PN Sonnax #T2-3-14061HP.

Or. payk45800 is the specific PN I have on file for a 4R70W specific yoke.

Q: Does FFR supply a driveshaft for the Ford AOD?

A: Yes. It's the same as a T5, C4, ETC.

Q: Will I run into other 4r70W fitment or wiring issues?

A: The 4R70W IS, without a doubt, the most "complicated" trans install we offer. This is MOSTLY due to the extra wiring (since its electronic) but its nothing any more complicated than the sniper EFI efi system in terms of wires. And if you can follow the instructions, you won't have a problem. This trans comes with an MSD Atomic trans controller, and I'm happy to share those instructions, and don't forget, we've sold dozens of these, so between holley / MSD, and our previous installer network, we can get you squared away.

A: Have also heard from customers that the rear corners of the transmission oil pan flange hit the emergency brake brackets. You may have to trim the corners of the bracket

Section 3: Wiring Questions.

Q: Is my alternator a "1-wire ???" and do I use the RF BROWN wire???

A: Your alternator IS a 1 wire. That means it literally only needs one wire ran from the charging post, to the positive side of the battery.

A: you do NOT need the Brown wire. Our alternator does not use it.

Q: I have no spark, why?

A: The distributor and coil BOTH need a 12V switched hot wire. Most will attach it to the coil, and jump it over to the distributor. This is especially true of the sniper system. The sniper, the coil, and the distributor, ALL need power.

Q: Where do I source a "switched 12v"?

A: The FFR harness will have multiple circuits with "Key on" activation. They have a thicker gauge, primary IGN COIL circuit. Pull your power from there.

Q: I have the EFI engine with the Holley Sniper. Do I need the oxygen sensor, and where does It go?

A: you 100% need the oxygen sensor, and you need it hooked up, plugged in, and mounted in the exhaust any time you run the engine.

> The optimal position for the O2 sensor is after the merge point of the header collector, and at least 18 inches from the end of the tail pipe.
>
> FFR headers, and most shorties have O2 Bungs. Even the type 65 has a merge point before the twin tubes. You really want to read all 4 cylinders on that bank.

Q: What happens if I run my engine w/o the O2 sensor plugged in, or without it mounted in the exhaust…or if it's leaking?

A: Anytime the oxygen sensor reads leaking, or full oxygen air, the sniper will go full rich to prevent lean conditions. Your engine will run very rich, and you will have soot covered all 8 spark plugs. Typically you'll need 8 new plugs.

Q: What is this gray wire on the distributor?

A: That has multi-function.

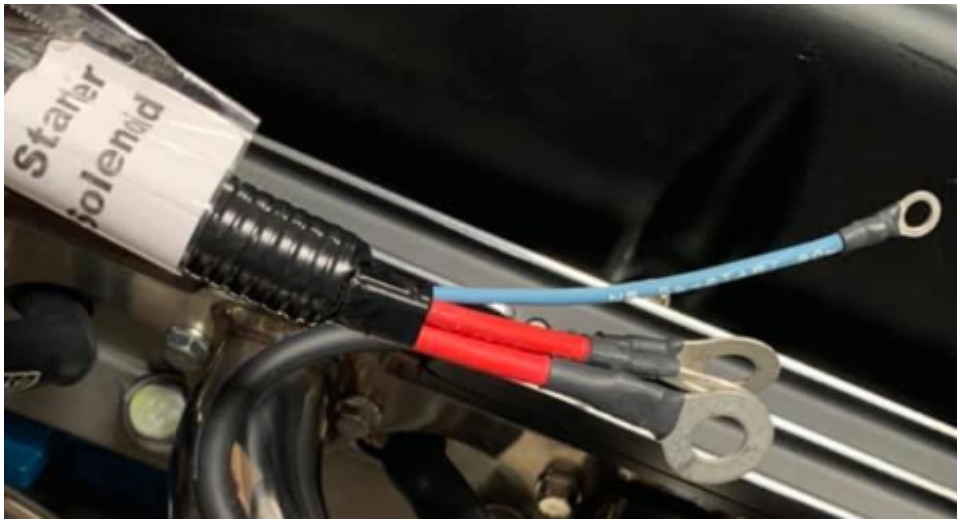
1. IF you're using EFI. It is typically NOT USED. Simply disconnect it, tie it up, and put an isolator like a shrink wrap on the end. (some SBC guys will use this wire as sniper tach INPUT…that's acceptable)
2. If you're carbed, you can use that wire to set your rev limiter. See MSD instructions. CARBED ONLY do NOT do with EFI. Control the Rev limit with the Sniper
3. You can pull a tach signal from that wire for your dash tachometer, OR the negative side of the coil, OR a sniper output are more practical.
4. **NOTE!!!!! That if your engine won't rev past a certain RPM. You would not be the first person that inadvertently grounded out that gray wire, (or mis programmed the sniper rev limiter) and have a rev limiter in place.**
5. **We disable the rev limiter here, during dyno testing, on EFI engines. HOWEVER. See the bottom of this document , or below link, for the MSD rev limit disable, if you need the procedure for future reference.**
   https://documents.holley.com/rev_limiter_addendum.pdf

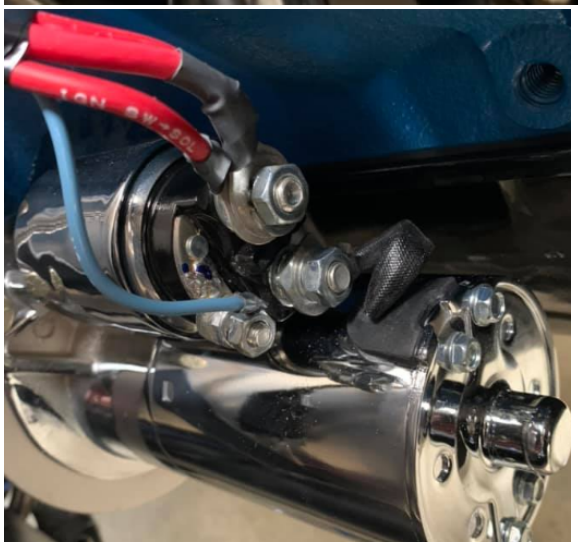
Q: how do I wire the starter?

A: You'll have power source wires on the starter large terminal, as you'll also have a battery cable running there. This is a common "junction" point for your FFR harness to grab power for various things. DO NOT PUT A SNIPER POWER SOURCE HERE!

A: Blue, key activated wire goes on the small spade, or terminal. You may need to snip it off and add a butt connector.

FORD PICTURTED





Section 4: Timing Verification Questions.

Q: Shouldn't my timing be set out of the box?

A: Yes, but because it's been in and out of a crate a few times now. You'll want to verify its correct. You disconnect and plug the vac advance. You can then check idle timing, and full mechanical advance timing. Note that sometimes. You'll have to go as high as 3500 RPM to fully advance the distributor weights.

Plug the vac advance back in when you're done checking/setting timing, and you're done.

NOTE! Every Blueprint engine should have a Chisel mark on the distributor base, and intake, where we set the correct timing. With that mark lines up, your timing should be very very close.

Q: My engine is getting HOT during break-in?

A: Is the vac advance hooked up? Low Idle timing is the #1 overheat issue, usually because someone leaves the vac advance unhooked. The vac advance will add timing at idle. This is fine because the engine is not under load.

Q: Where do I check my timing on this ford timing pointer?

A: Right at the top line. Ours usually have the word TIME stamped right on them.

Q: That mark is hard to see/get it with my front accessories on….

A: Yes it is, and its further complicated by the multiple marks on a ford balancer. So lets go into more detail.

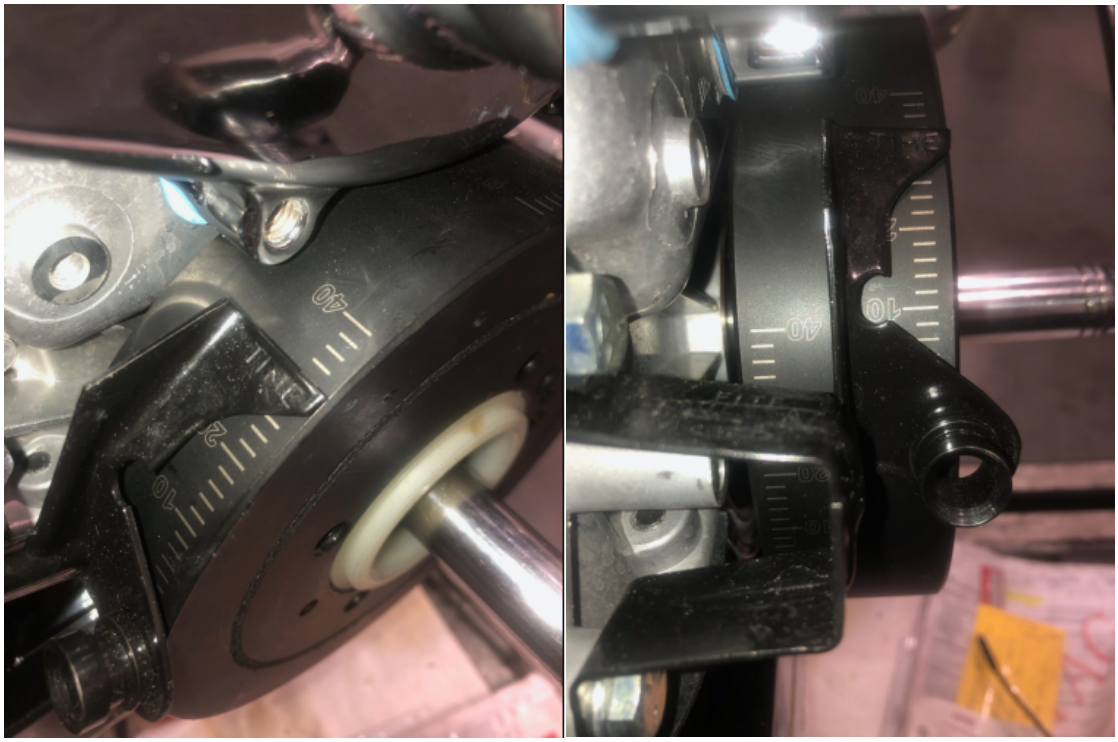
A: These images are what the timing marks should look like at 3500 RPM (or wherever the engine stops advancing timing)

This image shows the correct TIME line, showing 32 degrees. AGAIN at 3500 RPM. Vac advance plugged.

A: You do NOT use the ½ moon circle, or the tube. 32 degrees, at 3500+ RPM..**on the TIME line.**

NOTE, at 3500 RPM…the ½ moon is only showing about 11 degrees. b/c it's the incorrect position.

A: the below orientation is what you would see with 32 degrees at peak mechanical advance, on the SECOND set of timing numbers on the FRONT of the damper.



Section 5: Front Drive, Plumbing, Fittings and Water Pump Questions.

Q: Was my Engine dyno'd with the pulleys on it? And should I re-check the bolts on the brackets/pulleys for tightness?

A1: Your engine was dyno'd **W/O** the pulleys. SO its IS a good idea to RECHECK ALL BOLTS ON PULLEYS and BRACKETS. Especially after initial fire-up, and again after your first drive.

A2: It's not impossible for bolts to come a little loose after running for the first time. Or after a few street miles. **RECHECK ALL PULLEY AND BRACKET BOLTS AFTER INITIAL START**. Better safe than sorry.

Q: What does the wire coming out of my A/C compressor do?

A: That is your 12v activation wire. The compressor grounds through the case.

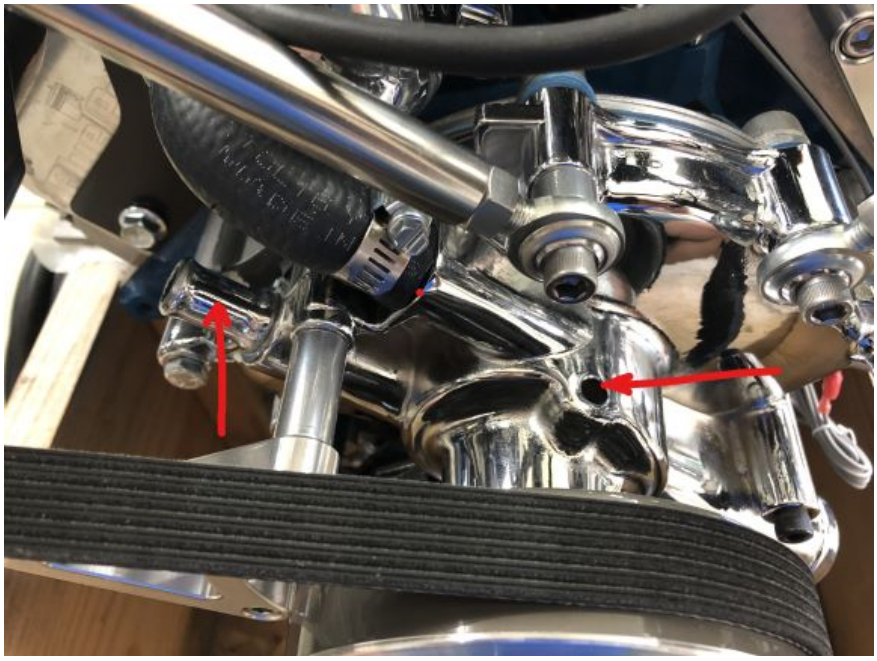
Q: Why is there an open barb on the water pump? Where does it go?

A: That is used for FFR owners that are using a heater. If you're not running a heater, you can put a cap and hose clamp on it. Or if your water pump features a screw in barb, it can be pipe plugged.

Q: What's this small open hole on my water pump?

A: A weep hole, designed to show pump bearing failure.

(Ford engine pictured)



Q: I AM using a heater, so what “out” and “in” do I use?

A: The open barb on your water pump will run to your heater core. The entrance back into the engine will need to be into one of the unused (currently plugged) ports on the intake. Ensure you’re looking at a water port, and not a vacuum port. There are water ports on both side of the thermostat entrance.

(Ford engine pictured)

Note: some FFR SBF engines are built with a water neck with an additional heater port. This can be utilized if needed for the dash water temp, but would not be recommended for a sniper EFI temp probe.

SBC intake/water pump picture for the same scenario above of “running out of ports” with a heater, Sniper (or fan controller) and dash gauge sender.

You’ll run your WP fitting to your heater core, then back out into one of the yellow intake port below.

The other intake port would have your Sniper sending unit (which will also control fans)

If you’re carbed, you can use one of these intake ports for the fan controller.

You can use the radiator drain for the dash temp probe, but do NOT EVER put the sniper directly on the radiator.

Same goes for the radiator adapter with the temp probe fitting. (REFERENCED IN THE SNIPER SECTION OF THIS GUIDE) Those are fine if you don’t want to replace the radiator drain, but only suitable for a dash gauge sender.

Q: How do I bleed all the access air out of my cooling system? And/OR…My radiator hoses keep popping off

A: The FFR's, and fords especially, seem to trap air in the cooling system. A cooling system simply works by pressure-trapping water and antifreeze, allowing water to go over 212 degrees F, without boiling (AKA, Boiling over)

A You need to fill the cooling system from the highest point possible, be it a remote filler neck, or even a heater fitting on the intake manifold.

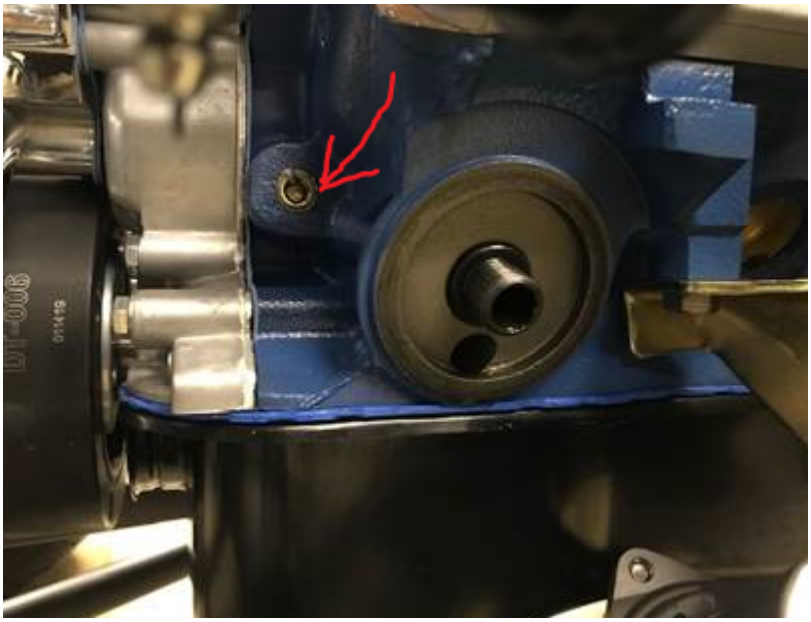
A: its not unheard of starting the car with the cap off, so try and force out any air. But keep in mind, the T-stat will open at 180, and water boils at 212. So you will have to get the cap back on before it hits 212. Or you WILL have a mess.

A: Also, I don't think FFR would even argue that their corrugated stainless tubes are "great". I recommend a true rubber tube, or aftermarket solid tubes, if you keep running into trouble with keeping hoses on.

Q: Where does my oil pressure gauge sender go?

A: SBC is on the top of the rear of the block, or there is an additional port near the oil filter. Common gauge adaptors (and practicality) lead to 95% of them going to the top of the block by the distributor.

A: SBF engines have ONE, yes ONE oil pressure port. It is ALWAYS by the oil filter/fuel pump on the front driver side of the block. Any other bosses on the block are NOT oil pressure.



Note: you may need an extension fitting. Link Below. Also FFR started including an OIL TEMP gauge. Again, only ONE oil port on the block…so you'll have to "T" or "Y" into this same port.

https://www.summitracing.com/oh/parts/sum-220699/overview/?gclid=Cj0KCQjwzozsBRCNARIsAEM9kBMIFL-svCZ5gPMspcsRU8knN0hmujT9aQETkTgJS425er-6SkFtbkIaAomKEALw_wcB

Q: What are these plugs on my intake runners?

A: THESE ARE NOT WATER PORTS, or HEATER RETURN PORTS of any kind!!!!!!!!!!!!!!!!!!!!!!!!

A: These are what would be vacuum sources. It's very rare on a FFR to run power brakes, so they are plugged.

(Ford engine pictured)

Q: My Ford block has threaded holes on the rear of the block that are open, but appear to be blind. What are these?

A: Those are for late 80's / early 90's knock sensors that a factory Mustang would have had. We/you will NOT use them. Even with the Sniper EFI. Not used.

Q: Does my A/C compressor have oil in it?

A:Yes, the A/C compressor is pre-filled with oil.

Section 6: Fuel Pump and Fuel Plumbing Questions.

Q: My carbed engine came with a "Holley Red" pump. Where is the regulator?

A: Holley Reds do not require a regulator. Their max PSI is compatible with a carb. They don't need regulated down

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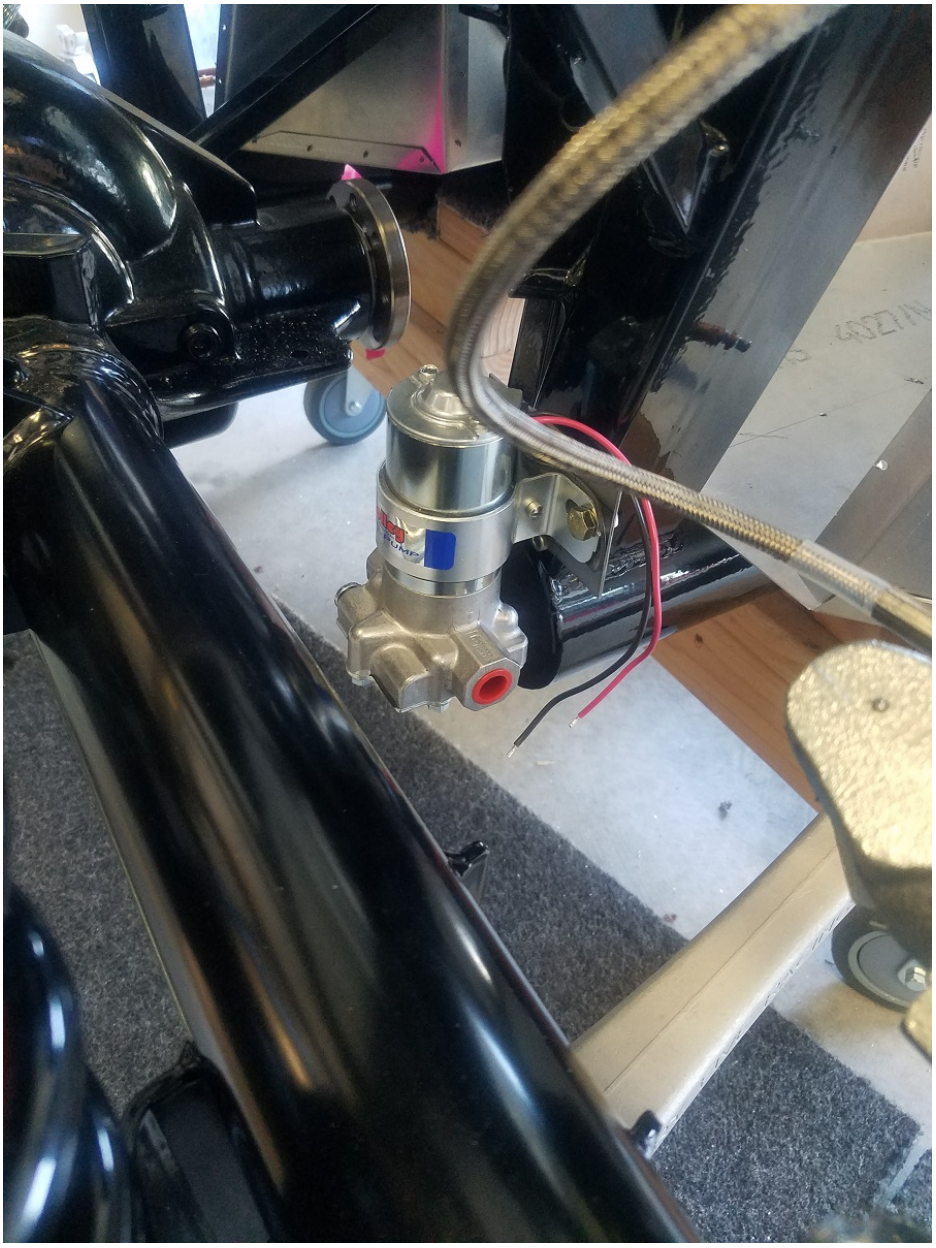
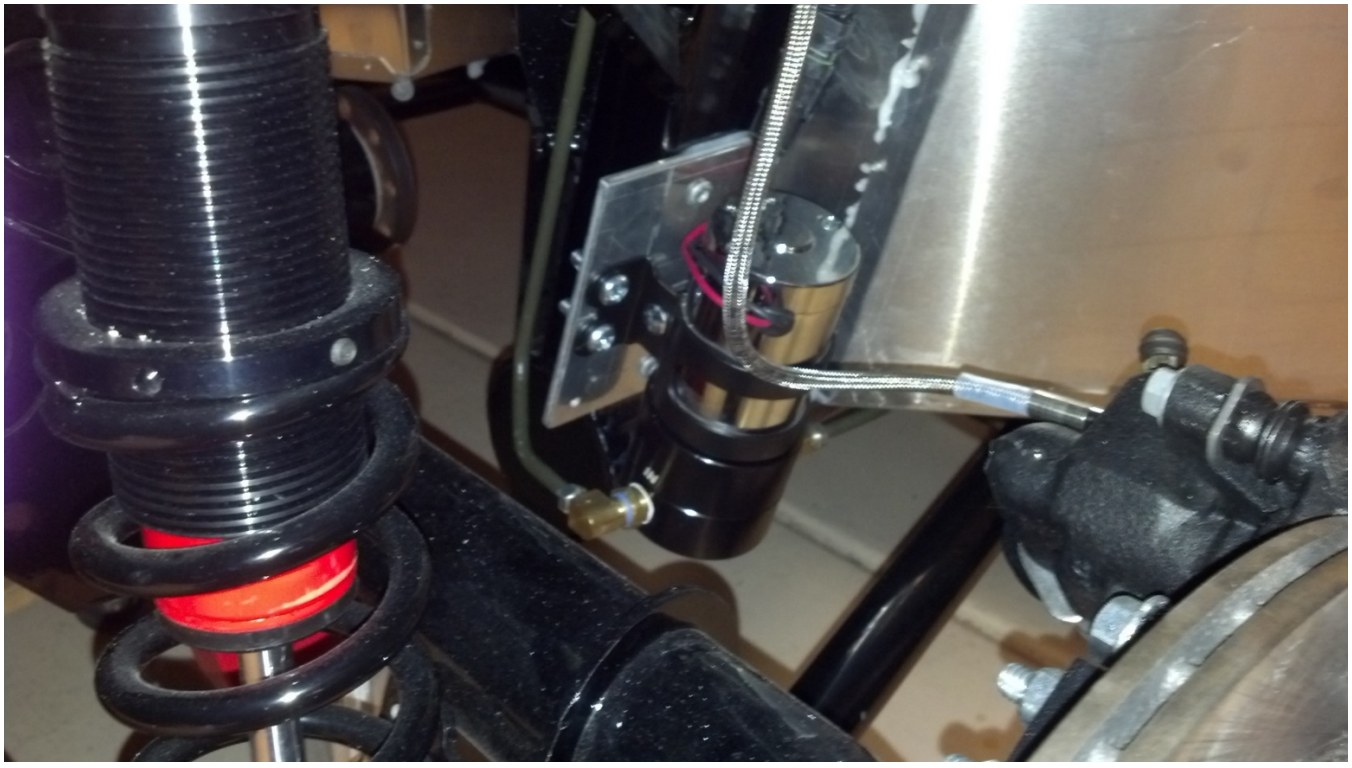
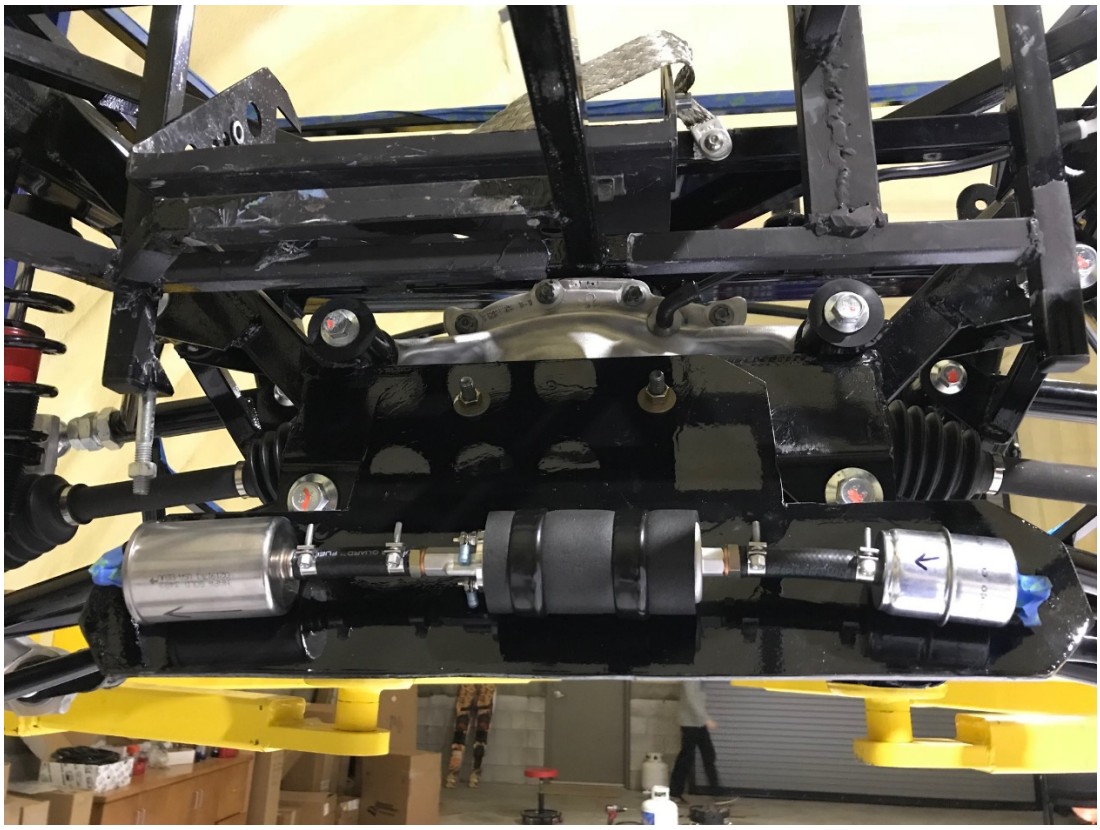
Q: Where do I mount this electric fuel pump on a roadster (Cobra)?

A: Most mount directly to or are attached to a bracket to the rear, passenger side, oval tube. That's the best low, and protected spot on the cobra. Some IRS users also make a bracket off that assembly.







Q: Where do I mount pump on a Type 65?

A: Here are some ideas, pending carb vs EFI pump


Holley
Electric
FUEL PUMP

Q: Where should I run my fuel lines?

A1: With an electric fuel pump, (all Sniper equipped engines and some carbed engines) most run both the feed line, and the return line (if applicable) down the passenger side of the vehicle.

A2: Fords with no PS may have a mechanical fuel pump. This is one of the few configurations where you may want to consider running down the driver side.

A3: SBC's with a mechanical pump have the pump on the passenger side, so pass side lines are preferred.

Q: What fuel line size should I use?

A1: On carbed engines, the FFR supplied lines are adequate. You will want to verify that your return barb on the tank pickup, has been "drilled out" per their instructions, to ensure no pinch point.

A2: On EFI engines, our packages come with a Sniper pump kit. This has enough line to run both feed and return lines. You can incorporate the FFR supplied lines that are larger than ¼. We advise against using

anything supplied that is smaller than 5/16, and we advise per the Holley instructions, that 6AN everywhere is optimal.

Q: Holley's Sniper instructions say to use all 3/8" (AKA 6AN) but my FFR sender has 5/16 and ¼ inch barbs?

A: It's advised to use the BPE supplied 6AN lines for supply and return. If your fuel pickup has a ¼ inch return, the Sniper pump kit contains a bulkhead fitting that can be used to replace the ¼ inch return. The FFR pickup assembly is easily removed, and can be drilled/cut out on a workbench or in a vice. Below is the bulkhead fitting. DO NOT FORGET the drop tube. With EFI, you want the return fuel below the fuel line. Below are some solutions FFR owners have submitted to upgrade the return.

Q: What fittings do I need to buy to go from the FR supplied hard line, to your pumps?

A: FFR supplied adaptor fittings. Check your FFR inventory.

Q: if I want to do an in-tank, with the proper sized fittings, do you have a recommendation.

A: Yes, customers have used these with good success.

https://www.highflowfuel.com/i-35467017-quantum-340lph-fuel-pump-hanger-6an-6an-fittings-1986-1997-mustang-5-0l-4-6l-340lph-e85-specific-intank-fuel-pump.html

OR The -8AN is overkill unless you're going very big, but doesn't hurt.

https://www.highflowfuel.com/i-35467014-quantum-340lph-fuel-pump-hanger-8an-6an-fittings-1986-1997-mustang-5-0l-4-6l-340lph-e85-specific-intank-fuel-pump.html

Q: I have no fuel at the injectors, or carb…why?

A: Is the pump running with power to it?

A: Do you have gas in it?

A: Is the polarity correct on your terminals?

A: AGAIN…. Is the pump running…is the polarity correct, and is there gas in the tank? These 3 are regularly your culprit for no fuel at the intake. This includes making sure painters, shops, installers, did it right, and/or have not messed with your wires when removing/installing the body.

Section 7: Exhaust Questions

Q: What headers do I need to buy?

A1: (SBF) FFR can either sell to you long tubes (MKIV and Type 65) (recommended for 347 and up)

or you can purchase shorties in the hotrod or roadster, see BBK-1515 or BBK-15150

A2: (SBF) there is also a company called GAS-N that makes a nice header with O2 Bungs. (Edit, the FFR headers now also have an O2)

A3: To run Catalytic converters. You will need the shorty headers. Instead of the FFR "J-pipe", you will bolt in a cat. See link https://www.factoryfiveparts.com/14265-1996-2004-catalytic-converters/

Q:Is there a ford header gasket you recommend?
A: Remflex **3035 (you may have to drill the bolt holes in these to use the "smaller" , inboard set of holes.**

A4: For a SBC, these are recommended for the 33/35, Gen II Chassis

Flowtech **11704FLT**, **11704-1FLT**, **11704-2FLT** I do NOT recommend the bare cast iron version. These run hotter.

https://www.holley.com/search/?q=11704

There is no CAT option, or long tube option, for the hotrod.

Section 8: Front Drive Questions.

Q: The Crank pulley on my 33/35 hits, or is too close to the steering rack?

A: See Johnny's, or FFR's instructions for adjusting motor mount in rearward direction.

Q: Is my A/C compressor pre filled with compression oil?

A: Yes

Q: Do I buy the A/C compressor from you, or FFR?

A: Needs to be ordered from us, on our engine. you then work backwards to the FFR kit. Do NOT buy a compressor from FFR for our engine. or at this point…arrange a return.

Section 9 : Sniper Wiring and Redundancy on Ron Francis FFR Harness.

(This D*oes NOT* apply to Carbed Engines)

Q:What model sniper do I have?

A:holley model 550-510 (polished) or 550-511 (Black) otherwise identical

A: If you're asking b/c you're running the setup wizard for a first fire-up. STOP…because the programming ***should*** be saved.

A; If the programming didn't save…don't Fret. Just run the wizard, start it up, and let it get WARM.

We use the "street strip" cam profile

Q:What is literally, the WORST thing I can do with my new EFI sniper engine?

A: #1 is disregarding this document, the sniper instructions, and proper wiring. You'll see this document filled with some redundant sniper warnings, and an extended list of Do's and Don't at the end of this doc.

A: #2 is …..**DO NOT** start it up, and then shut it back off a bunch of times, without letting the engine FULLY warm up. I cannot stress enough how many do this, and kill their plugs, and then cry foul (Pun intended) when their engine won't start. This is NOT a "bad" sniper. Its someone NOT following instructions.

Q: Do you have a digital copy of the sniper instructions?

A: https://documents.holley.com/199r11031r.pdf

Q: What wires do I need to hook up from the FFR harness to the Sniper?

A1: You will need 12V "on" (PINK SNIPER WIRE) Typically Ran to the same terminal on the Fuse Panel as the thick gauge orange wire, that goes to the coil. DO NOT PUT PINK WIRE DIRECTLY ON COIL!

You can split this orange wire if necessary. (one to (+) coil, one to sniper pink)

You could also run the pink 12V activation wire to the electric Choke wire that is otherwise unused. (MANY DO THIS)

A2: Power and ground, ran all the way to the battery, per the Sniper instructions. Thick gauge black and red

A3: Fan activation wire (light blue)

A4: Fuel pump wire – BLUE Thick wire, with relay built in. Use this wire to either travel back to the EFI pump (+) or disconnect the FFR pump feed wire from their existing relay, and attach it there. Do not double relay the circuit.

A5: Tach signal input sniper wire -YELLOW. (pulled form negative side of coil) on a SBC, some use the GRAY MSD tach wire, as its on the rear of the engine. you can use either source for tach INPUT

A6: The yellow wire on the sniper harness is pre-terminated for you, to hook back up to the negative side of coil.

A7: The Sniper needs a 12v, key on, signal from the FFR harness. Our MSD coil ALSO needs a 12V keyed on (the coil has already been jumpered to the MSD distributor, to provide power to it) ORANGE WIRE ON THE FFR to the COIL

Q: what do I do for my cooling fan wiring; AND/OR I'm confused about if I need this "Thermo Switch"?

A1: the Sniper has the ability to control a cooling fan, via a grounded activation relay wire. (its Pin C, light blue, on the 10 pin connector from the sniper) you do NOT need the FFR fan thermocouple switch for fan control.

A2: You will simply run this light blue wire to the GREEN fan thermo switch wire on the FFR harness, nearest to the intake Manifold. This green wire on the FFR harness does have a redundant flying lead near the FFR fan plug (by the radiator). Tape or cap off green lead by the FFR fan plug. You'll connect the fan, per the FFR supplied schematic. (blue to blue, black to black) The Sniper is now controlling the fan on/off, via activating a ground, to the FFR relay. Adjust temp control in the Sniper handheld.

Q: I'm out of water temp sensor ports? **(redundantly mentioned in the Plumbing Section 5, but very important)**

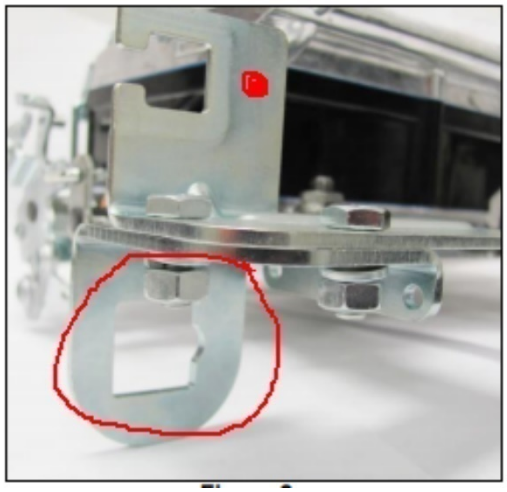
A1: If you truly are out of sending unit ports, or can't access them. See the radiator itself for a sensor port. I ONLY recommend this for your dash gauge. NOT for the Sniper temp sender.

A2: You will need water temp ports for the sniper AND your FFR gauge sender. If for some reason you can't access them (Or you're running a heater/defroster) you may need an additional temp port.

A3: See this link for a radiator hose adapter. https://www.summitracing.com/oh/parts/atm-2283
Autometer 2283 1.5 radiator hose. Do NOT use this for the Sniper…ONLY for a gauge on your dash.

Q: How do I use the supplier throttle bracket?

A: The FFR throttle cable does have a round hole. This makes providing a Throttle bracket difficult. The included bracket can be drilled to accept a round cable. The lower circled bracket can be discarded with a Manual trans.



Q: Do you have a recommended Sniper throttle bracket if I don't like the supplied bracket?

A: TCB-40HS

Q: What fuel pump relay do I use to run the EFI fuel pump? The Sniper or the FFR?

A1: You will want to use the Sniper fuel pump relay, and Blue 12V fuel pump wire (coming out of the 7 pin Sniper harness)

A2: This allows the "smart" "On/Off/Prime" function of the Sniper, to drive the fuel pump. EX: it primes the engine once, then won't do it again for XX minutes, so it doesn't flood the engine, opposed to just staying on.

A3: The BEST way to do this, is ignore the FFR harness pump relay, and just use the Sniper. The BLUE wire runs all the way to the 12V HOT side of the pump, the sniper also has a relay in this circuit. The pump is just grounded to the frame. You can incorporate the FFR provided inertia switch to break the "ground" wire running from the chassis, to the negative side of the pump. This is the best overall way to wire in the pump. You can trace the 12V pump wire backwards form the pump, to the fuse block, and attach the

12V blue Sniper wire into this wire “early” but you will need to disconnect it from the FFR relay (so it doesn’t back feed).

A4: The FFR fuel pump relay can be used for a different device, or eliminated, being sure to properly disconnect, or isolate any bare wire leads

Q: What is this holley “coil driver” in the box? Do I need it? why do I have it?

A: That is a device used for the timing control capability, which we DO NOT USE on our engines.

A1: Again, its not used in the engines delivered configuration. We simple pass it on because it comes with the sniper, and may be something you play with in the future (after fully researching timing control and becoming familiar with it)

Q:What rev limiter do I use? Sniper, or MSD?

A: with EFI, always use the sniper rev limit. Not the MSD

Q: my screen flickers or shuts off during cranking

A: usually attributed to ow batter voltage, especially at the pink “on” wire.

Q: What do you recommend avoiding on my new EFI engine, to make my experience enjoyable, and get off on the right note with EFI, and my new engine?

A: The WORST thing you can do is fire up the Engine, and shut it back off while its still cold. Under 180 degrees, the system is in whats called open loop, meaning its just running in a default (rich) setting. Shut it off like that a handful of times, and you'll foul the plugs, and then it just gets exponentially worst from there.

A: It only takes you firing the car up while having beers with buddies a handful of times, and then shutting it right back down because its midnight and you still have open headers…. To completely ruin the spark plugs. This can and will cause a literal NO START situation in extreme cases.

A: The Second worst thing you can do is start the engine without the Oxygen sensor installed, or it just dangling there, or without the side pipes on the car. That entire systems functions on its ability to properly read burnt oxygen, via the O2 sensor, when PROPERLY installed in the full exhaust.

(PAINT SHOPS ARE NOTORIOUS FOR THIS WHEN MOVING THE CAR AROUND) We hear “it ran great before it went to paint” more often than not.

Not trying to scare you, or imply that the EFI system is inadequate, or non-advanced, but remember. It self learns. It can only do that if you give it what it needs to do so.

Q: What replacement parts are available for the Sniper?

A:

Sniper EFI Replacement Sensors - Auto Parts Store
CTS Sensor: Standard Motor Products **TX3**
TPS Sensor: Standard Motor Products **TH191**
IAC Motor: Standard Motor Products **AC416**
WBO2 Sensor: Bosch **17025**, **0258017025** (LINK/LINK/LINK/LINK)
(The Sniper EFI 2 bar MAP sensor is internal with the ECU.
The Sniper EFI IAT sensor is a circuit board sensor that measures one throttle bore.)
Innovate Motorsports HBX-1 Heat-Sink Bung Extender is great for protecting the WBO2.
https://www.holley.com/brands/holley...ce_components/ (Sniper EFI Service Components)

Section 10: LS

Q: What shifter for the 4L70e do you recommend?

A: Lokar ATS64L60EEM

Q: Do you have a list of common bolts and part numbers to mate my auto trans to my 4L_E gm auto trans?
A:

1) Part number for GM dust shield on transmission.
   These are very flimsy. Most throw them away. Very well may need trimmed for an aftermarket starter (FYI if we sent a starter, its common to have to file it a bit also)
   24261712
   24261713
2) Part number for the bolts to secure dust shield.
   12560226
3) Part number for the 6 bolts flex plate to crankshaft.
   19257940
4) GM and ARP part numbers for torque converter to flex plate bolts.
   24503068 This is a 10 pack…11562054 are singles or ARP-244-2902
5) Part number bell housing to engine block.
   11515768
6) 24205900 LS round 4l70E inspection hole cover.

   See this link and print the pictures
https://www.wholesalegmpartsonline.com/showAssembly.aspx?ukey_assembly=372182&ukey_product=2665791#002

Q: Do you have a belt PN for eliminating PS on your LS front drive, for hotrod install?
A: k080716hd

Q: where do I tap the TSP for auto trans control on a GM engine harness.
A: There is a lead for the TPS output on the engine harness in the bulkhead connector the customer can tap into if they don't want a pass-thru connector.

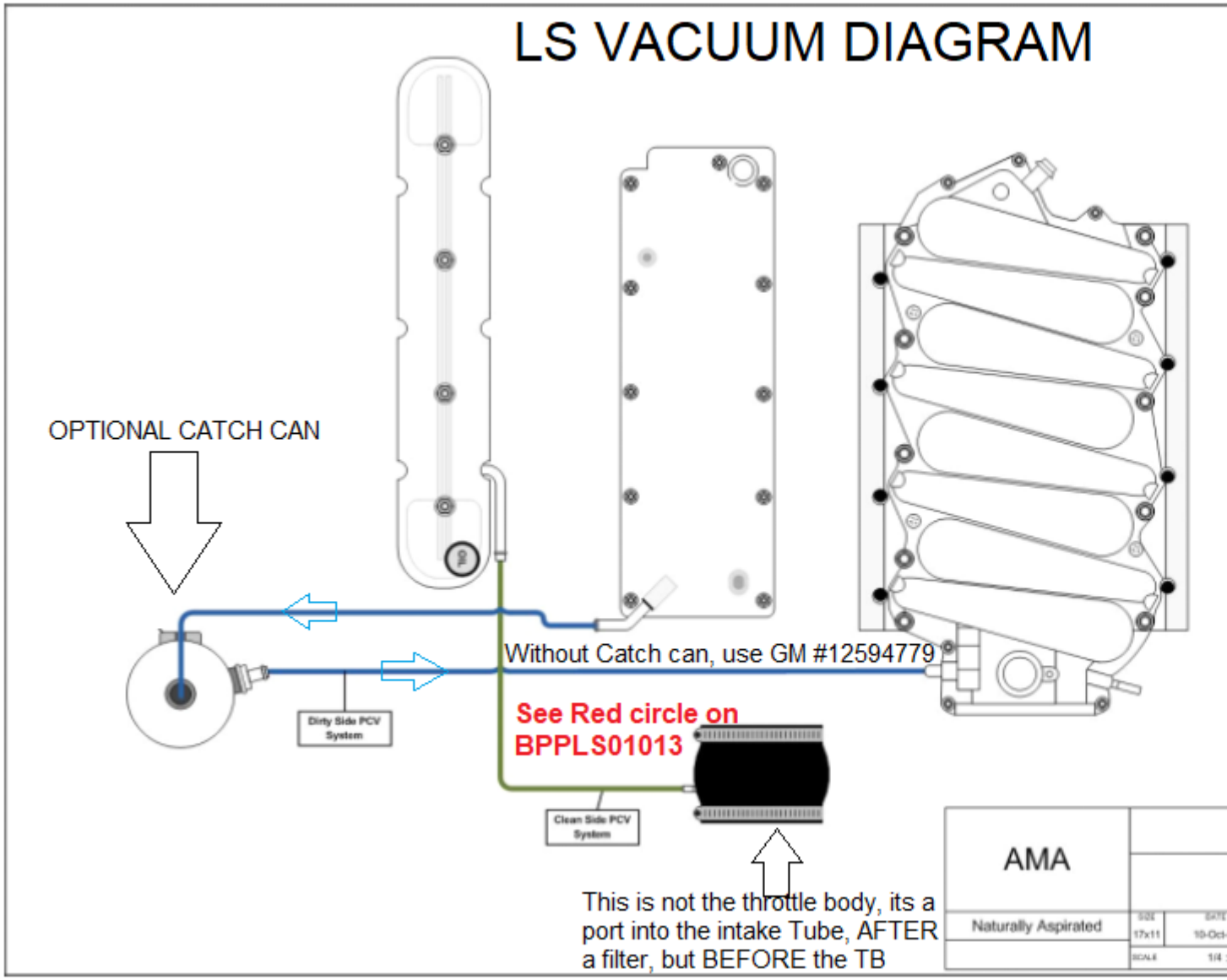
Throttle Position (PURPLE) - This is an output for use in gauges or for load indication in transmission controllers (any connection must be to a high-impedance device). The output is a 0.5 – 4.5 volt signal ranging from 0 – 100 %.

Use the ground wire in the bulkhead connector as the low reference (ground).

Or you can purchase this pass through lead connector

Pass-Thru part link - GMP-AWRE5130

Q: What do I do with all these vacuum and PCV Ports?
A:



Q:Where can I find another copy of the LS wiring instructions

A:
https://www.chevrolet.com/content/dam/chevrolet/na/us/english/index/performance/resources/installation-guides/crate-engines/01-images/ls-engine-controller-kits-all-naturally-aspirated-non-e-rod-except-lc9.pdf

Section 11: Known Field Issues

Problem: The 427 Ford block hits my FFR Motor mounts

Fix. The aftermarket block casting does have a webbing area that can be ground slightly for additional clearance. No more than 1/8 of an inch. Some customers even go 1/16 on the block, and 1/16 on the motor mount. No integrity issues at all.

Problem: Engine will not Idle down. (especially sniper)

Fix: Check for Vacuum leaks. This includes cap plugs, and the 4 mounting bolts. These can loosen up after a few heat cycles. Make sure the mounting bolts are snug, and you don't have Vac leaks.

Problem: EFI has fouled plugs.

FIX 1: This is usually from long, cold, idle time. Customers have a pattern of firing these up for 30 seconds at a time, to show buddies, and then shutting them off. In open loop (cold engine) configuration. The engine runs in a rich default setting. If you keep shutting it down before before it reaches temp, it never "learns" by going into closed loop. Call us to order a new set of plugs if yours are fouled/black.
https://blueprintengines.com/products/bpp7938-ngk-7938-bkr5e-spark-plugs-set-of-8

Fix 2: Oxygen sensor not installed, or installed properly.

Problem: BPf4271 air cleaner hits MKIV bodyF

Fix 3: Adding a shorter spacer to the build going forward. mrg-9340 is the easy find for a customer in the field. Note the 4273 and 4274 use a different intake. Not an issue.

Problem: Incorrect oil pan vs chassis.

Fix: See Johnny

Problem: Incorrect transmission configuration vs chassis.

Fix: See Johnny

Problem: Issues with Ford header fitment

Fix: Ensure headers came from FFR, and were shipped in mid-2018. Early 2018 and older FFR headers may not fit great with alum heads, but they have since revised. FFR WILL swap these customers headers.

12: Oil System Capacities and Pan Notes

OEM dual sump pan: 5 qts

OEM front sump pan: 5 qts

306/347 Front sump Canton 7 qts

427 front sump Canton 9 qts

427 rear sump Canton 7qts

NOTE: in some applications it is easier to install dipstick prior to engine install. Some pan configurations come with the dipstick loose in the crate. (coupes with 306/347 especially)

13: What Else do I Need That You Haven't Told Me About???

Ford Oil Filter Adapter.

Needed for hotrods with power steering, and Cobras running J-pipes/shorty headers.

Avail at Ford dealer, or speed reseller. M-6880-B50 (Replaces earlier M-6880-A50)

Ford Oil Pressure Sending Unit Extension.

This is not needed with mechanical gauges, but typically FFR sells electronic gauges. Most sending units hit the block casting on the Fords.

You can piece this together yourself digging through the Napa/Autozone brass fitting sections if needed.

https://www.summitracing.com/parts/sum-220699?seid=srese1&gclid=Cj0KCQiAz53vBRCpARIsAPPsz8W_bBwkC0LMva8W3cooOR2UOyNA7uxc1aatAG3ulBtsN_AFnykpqwcaAvsqEALw_wcB

Replacement Air Filter for the smaller 306/347 (oval)

https://www.amazon.com/gp/aw/d/B07FJLFBDN?psc=1&ref=ppx_pop_mob_b_asin_title

Replacement spark plugs for Aluminum headed engines.

NGK 7938 BKR5E or. Autolite 3924 The NGK is my #1 Choice. Autolite are fine and sometimes more avail locally.

Both are hotter than the previously used champion 792. , and sometimes clean up a tune that is fouling plugs.

NOTE GAP

.035 on the NGK

.044 on the AUTOLITES

https://blueprintengines.com/products/bpp7938-ngk-7938-bkr5e-spark-plugs-set-of-8

What Battery do you recommend?

FFR Recommends a Odyssey PC925.

Johnny's Pro Tips

Basic carb adjustments: Something Customers seem to be extremely unfamiliar with is basic Carburetor, and Choke operation and adjustment. We do Dyno every engine we build here, but basic changes is altitude, temp, humidity, can all lead to carburetor adjustments being required.

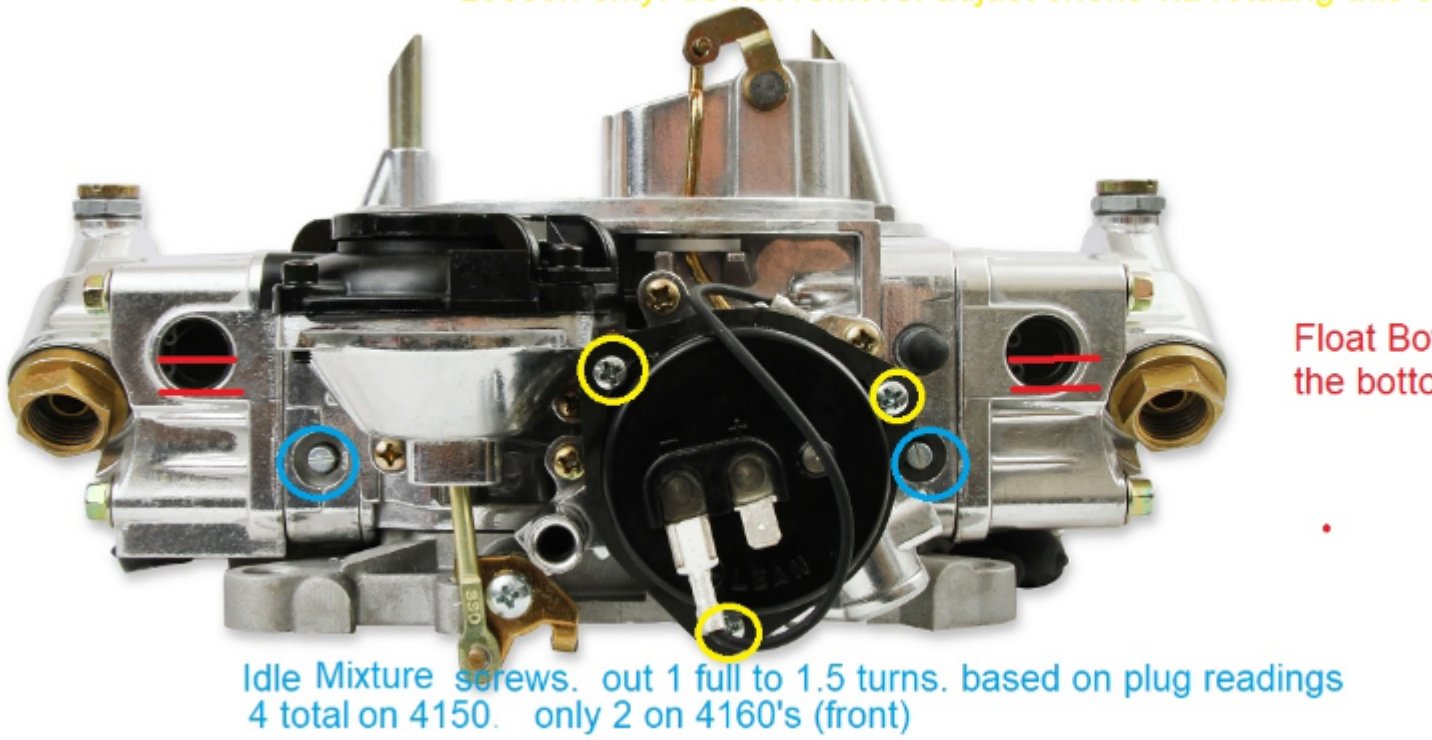
Follow the diagrams, videos, and pictures below to familiarize yourself with basic carb setup, and choke operation.

1. The first thing you need to do is connect a 12V wire that is on with the key on, to the open tab on the black choke canister. The FFR harness has the choke wire clearly labeled.
2. The YELLOW screws can be loosened to adjust how fast, or slow, your choke comes on. some hot climates will not require much choke at all. You can make it so the choke is even slightly open when "cold" and change how quick it opens.
3. The choke will start to slowly open with you key turned on, and take between 8-12 minutes to go full vertical (open) if the choke is NOT opening at all, you more than likely do NOT have the correct wire, or any wire, running to the required choke terminals. Or a fuse is blown, etc. its very rare the choke is defective.

Then check your other adjustments below, such as float level (RED) Idle air adjustments (BLUE)

Your carbed engine should idle around 1100 with the choke ON (CLOSED) and then "Kick down" to around 800 once the choke opens fully, and you "Blip" the throttle once. That little throttle hit will adjust the idle down to regular 800 ish RPM for idle.

THEN you can start adjusting the curb idle screw down to the desired hot idle speed.



Picture of a choke flap that is CLOSED. This is what the choke flap should look like when the engine is COLD, for about 10 minutes. You can adjust per the videos below.

Picture of a choke flap that is OPEN! This would be after about 10 minutes of running if your choke is wired properly to a 12V source. Note its near vertical, and all 4 carb barrels are visible.

BASIC ELECTRIC CHOKE SETUP VIDEO

https://www.youtube.com/watch?v=OoW9pWZmtBI

HOLLEY CURB IDLE RPM ADJUSTMENT SCREW VIDEO

https://www.youtube.com/watch?v=yPe9OsnLzQ8

Pro-Tip - Johnny Pump Prime- Before Start.

What I recommend doing is taking the plugs out, and disconnecting the coil wire (so you can crank it with the starter w/o it sending spark, and it'll spin easy b/c there is no compression with no plugs)

Also disconnect fuel pump wire. We don't want it pumping fuel during prime.

Crank it over for a few 20 second bursts, and let the starter cool down for a minute in between.

By the 2nd or 3rd cranking session, you should have adequate oil prime and flow.

Remember, electric sending unit gauges will require the power be on to them, and sometimes don't even show pressure under 15 PSI. Don't be shocked if your ELECTRIC gauge only flickers, or doesn't show pressure. Mechanical gauges WILL show pressure.
If you don't get pressure with a mechanical gauge, try lightly loosening the oil filter. Sometimes they get an air bubble in them. Be ready to spin it back tight however or you'll have a mess on your hands.
You can also disconnect the oil pressure line/sender, and just put a little catch cup under it (takes 2 ppl) If its spitting out oil there when cranking…you have pressure, it's probably just working on burping air bubbles.
Remember to hook everything back up before actual starting.
Run our break-in oil for 500 miles. Help to seat the rings, cam gear, etc. Then go to a non-synthetic 10w30. (unless you have a flat tappet cam {only the basic iron headed 302} then you still need zinc oil)

Pro Tip - Removing Engine From Crate.

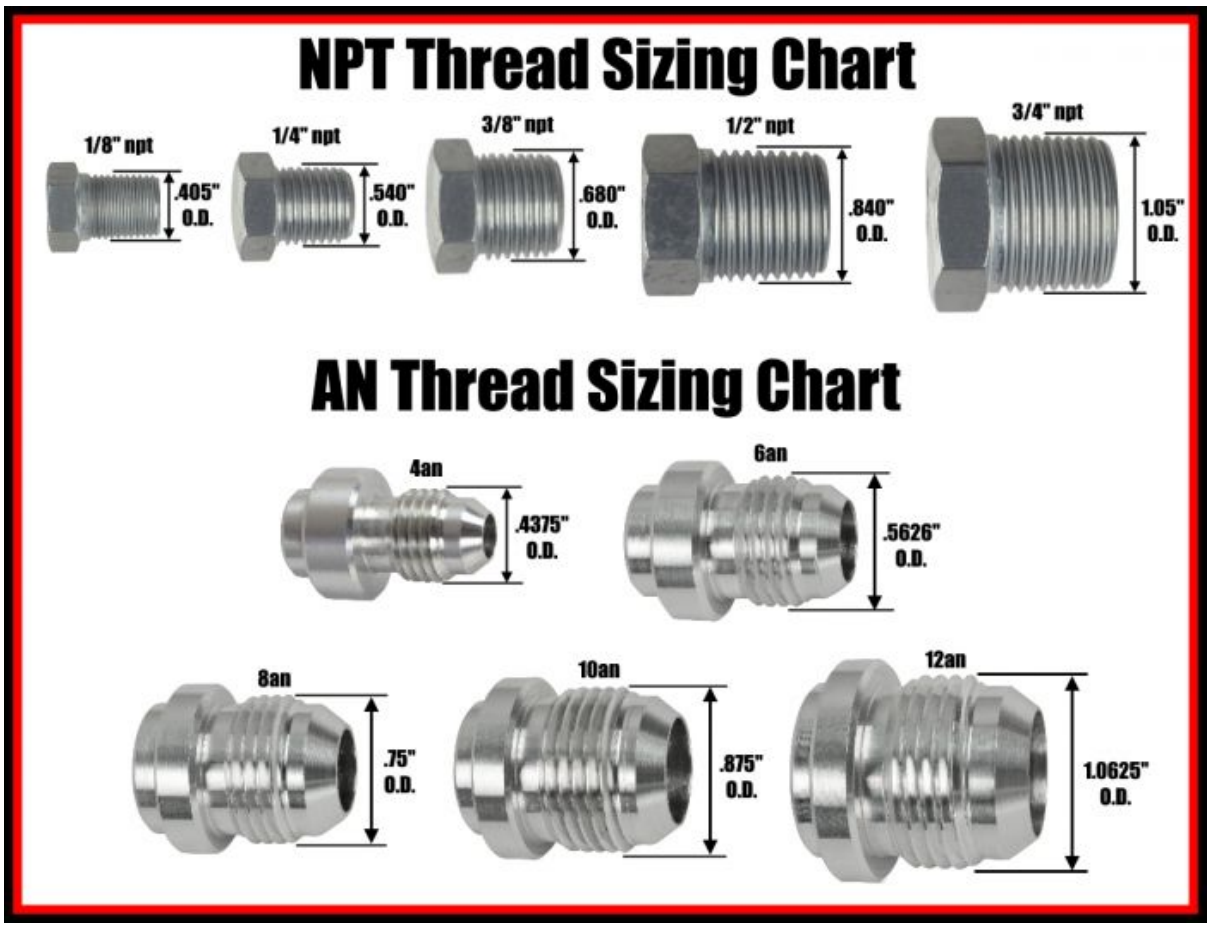
Sometimes cherry picker isn't wide enough. Lift entire crate first and throw a block under it. You don't need to remove anything from the engine to lift it from the crate. Most use a nylon strap, or chain. And run it opposite corner from the front of one head to the opposite rear. Use long bolts w/ washers, and thread them in all the way, finger tight, into an unused hole on the head.

Pro Tip – Selecting an engine lift / Cherry picker.

All FFR cars have long noses. The Cheap 1 ton harbor freight engine hoist has a VERY SHORT boom on it. Although the engine doesn't weight nearly a ton….The boom simply isn't long enough. Everyone seems to gravitate to Harbor Freight, as we all hope we won't be needing a cherry picker too many times, but in this case, you'll need their 2 ton, or a different brand, if you want to install the engine with the picker in the front, which you'll more than likely be doing, as our combo's come with the trans attached.

Pro-Tip - The engine is NOT centered in the car. Do NOT cut the hood scoop out before measuring thoroughly. FFR does this to add footbox room. MANY old muscle cars are also like this.

15. Helpful Charts


NPT Thread Sizing Chart
1/8" npt
.405" O.D.
1/4" npt
.540" O.D.
3/8" npt
.680" O.D.
1/2" npt
.840" O.D.
3/4" npt
1.05" O.D.
AN Thread Sizing Chart
4an
.4375" O.D.
6an
.5626" O.D.
8an
.75" O.D.
10an
.875" O.D.
12an
1.0625" O.D.

How to properly bleed your new Hydraulic Bearing

Always have the AN -4 line with the bleeder valve at the top when the bearing is properly installed. It is OK to swap the lines on the swivel fittings if necessary. Remember the line with the bleeder valve must be at the top position!

Fill the master cylinder with DOT 3 brake fluid. ***DO NOT USE SILICONE BASED FLUID or DOT 5 FLUID!!*** Use of silicone or synthetic fluid will damage the o-rings resulting in leaks and or damage to the assembly.

After the master cylinder is filled, bleed the bearing assembly. Example: Pump the pedal 3 to 4 times, with the bleeder valve open and the end of the opening submerged in a cup partially filled with brake fluid. This will release fluid and air trapped in the system.

Continue the bleeding process until all of the air is removed from the system. Always keep fluid in the master cylinder while performing the bleeding process. Now reach into the cup and tighten the bleeder fitting while fitting is submerged under fluid. Set the cup aside and then be sure to tighten the bleeder valve.

Once the bleeding is complete refill the master cylinder, just don't fill it all the way to the top. The fluid level should be ½" to ¾" from the top. This will allow room for the brake fluid in the reservoir when the bearing self adjusts. Unlike brakes, the fluid level will rise in the master cylinder, as the clutch wears, not lower.

HOLLEY SNIPER TROUBLESHOOTING GUIDE. DIRECTLY FROM HOLLEY's EFI WORKSHOP INSTRUCTOR

1. #1 READ the instructions and Follow them. If you do not understand a step seek assistance.
2. #2 Wire it properly… Most important!!! MAIN POWER AND GROUND need to go to the battery.!!! Direct to the BATTERY!!! Not to the fuse panel, starter solenoid or some

random distribution stud or strip or other location. Direct to the battery means to the battery. Make sure you are using proper wiring practices; incorrect connections will result in excessive resistance. Resistance results in heat and heat results in more resistance. A common issue we see is a result of poor fuel pump grounding running an eyelet from the pump to a rust or painted surface. The resulting resistance can burn up fuel pumps, wiring and relays. Extending wires with too small of a wire gauge will also result in the same damage.

3. #3 Engine ground…. It should be 1AWG or larger and go direct from the battery to the engine. Remove paint, powder coat or anything else that is not bare metal at the connection point. Grounding the battery to the frame and the frame to the engine may have been OK for your carburetor, but it's not sufficient for digital electronics.
4. #4 Ignition parts…. you need to run resistor plugs and resistor, non-solid core wires. Be sure to properly gap your plugs and if you plan to run Magnetic pickup distributors for timing control you need to properly phase the rotor. Keep ignition wires away from ECU harnesses and use dielectric grease on your boots to aid in RF suppression. If you have RF and or EMI issues you need to correct them or they will result in drivability issues including idle control problems and could possibly damage the ECU. Have you ever watched a post nuclear apocalypse movie? EMI is what wipes out all the electronics they were not defective they were damaged. Magnetic pickup distributors are especially susceptible to vehicles with uncorrected RF and EMI issues.
5. #5 O2 sensors…. The Sniper ships with an OEM grade Bosch O2 sensor. Not some generic piece as some have speculated. Oxygen sensors read unburnt Oxygen, not Fuel. All it knows is what it sees in the pipe. When a wide band sensor is (DAMAGED) it almost always reads dead lean. Why; because the sensor gets fouled and exhaust gasses cannot get to the sensing element leaving oxygen as the only thing present for it to read, hence the dead lean reading. So, what (DAMAGE'S) O2 sensors…. Top cause… Excessive fuel, most often caused by the system adding fuel due to false readings resulting from incorrect sensor placement, cylinder misfires, exhaust leaks, overly rich tunes. You may be surprised to know that excessively rich engines can cause a false lean reading, resulting in closed loop adding even more fuel making it read leaner and adding more fuel until it floods the engine and fuel fouls the sensor. Oil control, if your burning oil you will kill your O2 sensor, closed loop chasing unstable fuel supply issues (see fuel pumps comment) wrong sealants or fuel additives that are not O2 sensor safe will kill your sensor. The O2 needs to be mounted 6-8" after the merge in the header collector. It needs the tip pointed down at least 10 degrees from horizontal and at least 15 degrees from vertical I prefer about a 45-degree angle from horizontal. You should then have at least 18-24" of pipe after the sensor. If you have any exhaust leaks between the combustion chamber

and 18-24” after the sensor you are going to have problems. Pinched and burnt O2 sensor wiring, keep it high tight and safe, if you short the harness, not only are you likely to damage the sensor you probably just short circuited your ECU. For the most part all you need is a solid foundation. Fix mechanical issue before installing the system and follow the instructions.

6. #6 Fuel pumps…... The sniper master kits ship with OEM grade 255 LPH Walbro Pumps. Not some generic pump as some have speculated. Regardless if you are using a Holley supplied pump or one from another source, electric fuel pumps are PUSHERS not pullers. The pump needs to be GRAVITY FED. Meaning the pump inlet needs to be at or below the bottom of the tank and as close to the tank as possible. This is why most OEM EFI pumps are in the tank. It needs to have an 80-100-micron pre-filter installed between the tank and the pump. And 10-micron filter between the pump and throttle body. Avoid using any 90 degree fittings between the tank and pump. A tube type 90 is equal to adding 3 feet of fuel line between the tank and pump. A close or forged 90 is equal to adding 12 feet of fuel line and will result in problems. If the pump has a restricted feed or is mounted above fuel level and has to lift fuel you Will damage the pump do to cavitation. Most current pump fuels boil around 130 degrees. Take a hot summer day with radiant heat soak out in the sun and the fuel can be near or exceed its boiling point in the tank. If vacuum is required to overcome a restriction or to lift the fuel to a high mounted pump, the resulting reduction in pressure can and will boil fuel in the line and at the pump inlet resulting in fuel pressure issues and pump damage. If your pressure drops the system will react by adding fuel in closed loop and learn. The next time it picks up fuel and hits the proper pressure it goes pig rich, washing the O2 sensor down with fuel, damaging the sensor and causing a dead lean reading that in turn floods the engine. The resulting O2 sensor failure is damaged not defective. How did you install the return line to the tank? If you free dumped it in the top, it will aerate and foam up the fuel. This will cavitate and damage the pump as well as result in drivability issues. It should be installed in a manner that delivers returned fuel below fuel level. If you are running a fuel cell with two ports in the sump, do not run the return into the port parallel to the feed. Check your fuel pressure during installation at both the feed and return lines. Feed pressure should be knocking on 58 PSI and the return should ideally be zero, if the feed pressure is not correct, or if the return line pressure is greater than 4-5 PSI find and correct the restriction before proceeding.

7. #7 Idle / IAC…. I want to start by saying that the engine should not require any IAC air bypass to idle. The IAC is essentially a computer controlled vacuum leak that allows

additional air past the throttle plates to assist in idle stability and additional cold idle speed. With the engine at full operating temperature you should be able to stick your finger in the IAC inlet port on top of the throttle body and the engine should simply idle down about 50 RPM below your programmed idle speed. If it dies or drops more than 50-75 RPM, the throttle is closed too far. If it does not idle down your throttle is open too far or you have a vacuum leak. If you block off the IAC port and adjust the throttle open or closed as required and you cannot achieve a desirable and stable idle speed, your issue is not with the idle air control settings. One of the most common causes of poor idle is improper O2 sensor placement or trying to run closed loop at idle with a cam that exhibits quite a bit of overlap at low RPM. Both of these are easily corrected. Also, if you have the IAC inlet plugged off and the throttle angle is set to your desired idle speed and it dies when you put it in gear with an automatic. Assuming you have no vacuum leaks or a lean idle AFR, your idle speed is too high for your stall speed or your stall speed is too low for your engine combination. Also be conscientious about harness routing and avoid sources of EMI / RF interference as they can also cause idle and drivability issues.

8. #8 hard starting and hot restart issues…. Make sure the fuel pump is properly mounted and picking up fuel. If you turn your key to run and the RPM on your tach sweeps you probably have an MSD 6425 digital 6AL or ready to run distributor with the 12V square wave tach output wire and you missed the part in the ignition system or distributors instruction manual that said you need to disable your ignition systems rev limit verification feature if your running EFI. If not, you will fight startup issues. Flood the engine and damage your O2 sensor. Also check your cranking voltage if it starts hard. If your voltage drops below 11 volts replace the battery with one capable of supporting the vehicles cranking needs ideally it should not drop below 12 digital electronic like clean stable voltage if you’re getting in the 10's you’re asking for issues.

9. #9 this could have been lumped in with #8 but I felt it needed a place of its own. Incorrect ignition switch wiring.... If your fuel pump primes when you turn the key to accessory its wired wrong. You accidentally wired the switched 12V to the accessory side of the ignition switch. This circuit shuts off during crank and will obviously cause problems. Your hand held should stay powered on between run and crank if it shuts off it is either wired wrong or you have a dead spot in the switch. If the switch has an engineered dead spot between run and crank (It did not matter with a carburetor when they designed your vehicle, but it’s not EFI friendly) and it’s just not plum worn out, you can install a time delay relay in-line to correct this I use relay part number 74985 from Delcity. To overcome the switch design.

10. #10 Weird sounds…. Clicking, ticking and sucking sounds. Many of these are completely normal with EFI. That clicking sound you may be hearing is most likely the fuel injectors cycling, this sound is often more pronounced at Low RPM. Part throttle sucking sounds. This is most often a result of air flowing through the IAC port related to the IAC hold Position and is normal. Another cause may be the proximity of a dual plane intakes plenum divider to vacuum passages under the throttle body resulting in an odd sucking or whistling sound. While it may sound odd it's not a defect and will not cause any drivability issues. Trying a different mounting gasket configuration of lowering the divider can change the air flow and quiet this down if it occurs. This happens with some carburetors on dual planes as well. Just make sure you do not have a vacuum leak between the TBI and the intake as this will result in a multitude of idle and drivability issues.

11. #11 Capabilities: Use the sniper for Fan control, fuel pump control, when avail. This eliminates the need for "extra" wiring, fan controllers, temp probes, etc. Thinks like the fuel pump relay feature even has a "prime" shot.

MSD IGNITION ADDENDUM

REV Limiter Verification
MSD Ready-to-Run Distributors

The MSD Ready-to-Run Distributors have a built in Rev Limiter Verification feature. When the key is i
the On position (not cranking or running), an rpm signal is sent to the tachometer to verify the unit'
rev limit setting. With this function users can be sure of their rev limit settings before each drive.

DISABLE WITH EFI

Users who are pairing the unit with an EFI system may experience issues with this feature. If th
system's ECU detects high rpm shortly after ignition On it may prompt the injectors to supply fue
for the given RPM. Not all EFI systems will experience this flooding problem. If a system has issue
because of the Rev Limiter Verification feature, the feature can be turned off with a simple process
To activate the feature again, repeat the same process.

1. Ground the Gray tach output wire.
2. Turn on power to the ignition without cranking the engine.
3. Hold the Gray tach output wire to ground for seven seconds. (AT LEAST five seconds.)
4. Release the wire from ground before ten seconds have passed.
5. To confirm the process has worked, cycle the ignition power off and back on.

Playback Tach: If you use a playback tach, be sure to check the high rpm value prior to turning th
key to the On position. When the key is in the On position, the rev limit will be displayed and ma
override the tach memory.

MORE TKO INFO, AND REPEATED BLEED PROCEDURE

Q: How do I Bleed this system?

A: Be sure to bleed it the way shown in the video.

https://youtu.be/wgc7ApCMTGA

Also make sure there is no “pre load” on the rod of the master cylinder connection at your clutch pedal.

TKO Shift Assembly Re-alignment Procedure.

Background: Thank you for purchasing a TREMEC transmission
Your new TREMEC TKO may get jostled during shipping, causing a misalignment of the shift mechanism. You should shift your transmission through all the gears before putting it in the car and rotate the input shaft to make sure it moves freely.

Note that reverse must be engaged from the neutral position. The transmission has a mechanical reverse lock-out that will not allow a straight shift from 5th to reverse.

If your transmission shifts into all gear positions and the input rotates freely you may proceed with installation.

Should you have a transmission that is locked up due to misalignment you can easily correct the problem with a few simple tools in about fifteen minutes.

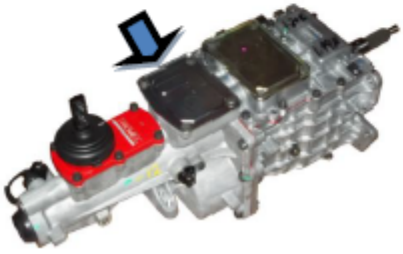
NOTE: This alignment issue can only happen when the transmission is out of the car. This problem will never occur after installation.

Correction Procedure:

Step 1: If you have a clutch disc handy, place it on the input shaft and attempt to turn the disc like a steering wheel. If the alignment issue is minor this will often correct the problem.

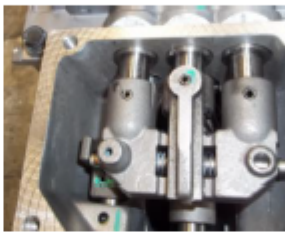
If that fails, move on to step 2

Step 2: Remove the four bolts that secure the mid-plate on top of the transmission. This is the flat five-sided plate in the center of the gearbox. See image:



Step 3: Gently pry the
Work slowly around th
chisel punch can be use

Step 4: Under the cove
aligned in neutral posit
aligned (image below c
lugs back to neutral (im
in an incorrect forward
There will be an audibl
neutral detent.



Once the lugs are re-ali
the input shaft should r

Step 5: Now that the tr
sealer from the case an
blade on the case, but d
with a rag and solvent.
top of the case and arou

NOTE: Don't go crazy w
dropping off and gumm

If these steps do not co
931.646.4836. If your t
images of the transmiss
will allow us to make a
can walk you through t

Thank you for working

700R4 Speedometer Gears

Drive Gears	Driven Gears
15 teeth - gray	18 teeth - (truck) brown
17 teeth - red*	19 teeth - (truck) dark aqua
18 teeth - blue	20 teeth - (truck) silver
19 teeth - yellow	21 teeth - (truck) red/chartreuse
20 teeth - brown	22 teeth - (truck) gold
	23 teeth - (truck) maroon
	24 teeth - (truck) dark blue
	34 teeth - light green
	35 teeth - orange/pink
	36 teeth - white
	37 teeth - red
	38 teeth - blue
	39 teeth - brown
	40 teeth - black
	41 teeth - yellow
	42 teeth - green
	43 teeth - purple
	44 teeth - dark gray
	45 teeth - light blue