

## *VPS Hot Rod Build Blog*

### *Volume 2 – Youth is Here - 2019*

#### **Progress During January 2019 - Happy New Year**

01/01/19 to 01/10/19: Starting the year with the body removed and resuming the mechanical work. The E-Brake cables were installed. The only way the driver's side cable can be routed is under the center section, it is not long enough to route anywhere else (0119-01, 0119-02). The Passenger side has a little more length but I routed it the same way (0119-03). These terminated in the chassis mounted bracket (0119-04).



0119-01

I made the decision to use the belt and braces approach for acoustic and thermal protection of the cabin space. I will be using the spray on LizardSkin acoustic and thermal coatings on the interior of the firewall, the underside of the floor panels, the cabin interior of the floor panels, and any interior side panels as applicable. I will also be adding the F5R sound and sound insulation that I purchased with the kit. Duplication at its best.



0119-02



0119-03



0119-04

Back to the firewall. I taped over the engine side to provide protection to the polished surface for the remainder of the build. Then I applied two layers each of LizardSkin acoustic and thermal coatings to the interior side of the firewall. I taped over the areas that come into contact with the chassis keeping a flat contact surface. Picture 0119-05 illustrates the results.



0119-05

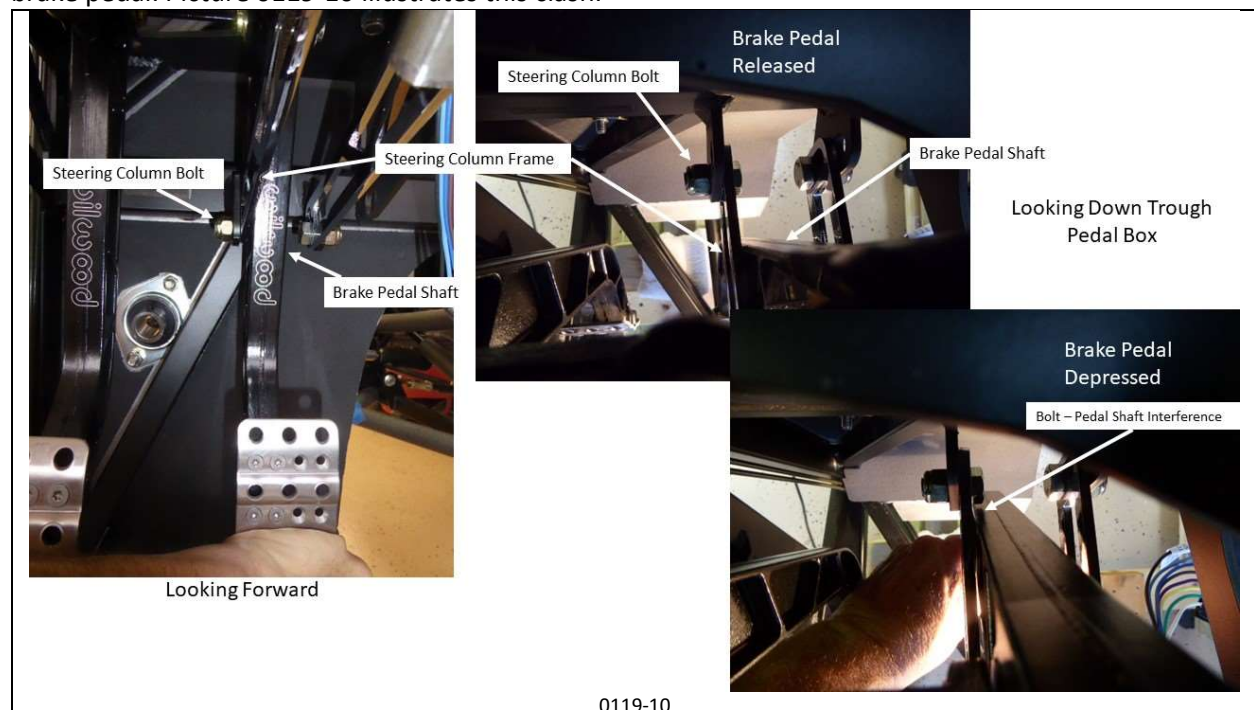
The foot panels were permanently mounted. Since the upper firewall will be removable, I used rubber cement to secure wax paper strips to the chassis contact areas. I then applied the silicone

sealant to the chassis and bolted the firewall to the chassis. I let the sealant dry overnight, removed the firewall, cleaned off the wax paper and rubber cement, and then re-bolted the firewall back into place (0119-06, 0119-07).

The triple reservoir, with hoses attached and grommets around the hoses, was installed onto the firewall (0119-08 and 1901-09). I made a neoprene gasket to fit between the reservoir and the firewall to eliminate any vibration and contact concerns. The hoses were then attached to the master cylinders. The brake system is now complete and is ready to be filled, bleed, and checked for leaks.

01/11/19 to 01/14/19: The Steering column was the next task to be handled. I installed the steering firewall bushing. (Note: In some pictures it is erroneously shown sandwiched between the firewall. This is an incorrect installation and I corrected this by mounting the complete bushing on the forward side of the firewall a bit later.)

I am using the chrome plated tilt column for my build and I installed it per the assembly manual instructions. However, I discovered an interference clash between the column mounting bolt and the brake pedal. Picture 0119-10 illustrates this clash.



I emailed F5R and advised them of this clash and asked them for their solution. After the email, I researched the forum and, low and behold, this is a known design problem as the chassis mounting brackets are not located correctly. The solution is to locate the column attachment frame on the outboard side of the chassis bracket and use a socket head low profile bolt to secure it. However, then there is about a ½" gap between the inboard side of the column frame and the chassis mounting bracket. I need to order some new bolts, so work came to a halt for a couple of days.

In the meantime, I painted the steering tie rods satin black so that they would match the parts adjacent to them. They are ready to be installed once the steering links are assembled. Waiting on bolts.

I received my new button heads and remounted the steering column to the outboard side of the bracket (0119-11). This eliminated the pedal shaft interference (0119-12).

The remaining steering links, for the manual steering setup, were installed (0119-13 to 0119-15).



0119-11



0119-12



0119-13



0119-14



0119-15

I have all of the electric assist option parts except for the small 2" DD link that goes between the motor and the steering rack. I have queried F5R about this and I'm waiting on a response.

Next up I installed the steering tie rods. An interesting design issue is that the "tub" is pointing upwards (0119-16) instead of downwards. Functionally, it makes no difference, however on the practical side, it will hold water, so I need to clean it out if the car ever sees rain or puddles, which I doubt.

With the steering system complete, I temporarily installed the steering wheel / hub and check that the rack was centered.

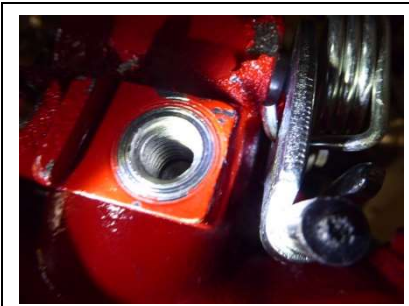
I moved onto the brake bleeding / leak checking procedures. In the



0119-16



process of gravity filling the system, I discovered a massive banjo bolt / aluminum crush washer leak on the driver's side brake caliper. I removed the banjo bolts, one front and one rear, to inspect and drained the system. Picture 0119-17 shows the front brake caliper banjo bolt port. This port has a nicely



0119-17



0119-18

machined smooth face for the crush washer interface. Picture 0119-18 is the rear brake caliper. The concentric ring grooves on the face of the port is of concern. I believe this is why it leaked. I will try copper crush washers and if they do not seal, I will try the Stat-O-Seal type washers. I am currently waiting to receive the crush washers.

Just received a response from F5R, the rear caliper situation is common and copper crush washers should solve the issue. The 2" DD link is made from the lower link that is made redundant with the electric assist. I will wait for the engine to be installed so that I can check for fitment clashes then install the electric assist.

In the meantime, back to some fixes on the body work.

01/15/19 to 01/22/19: I flipped the body so that it was on the floor upside down. This allowed me to fill in and sand out the imperfections on bottom faces. I then reinforced the inside areas along the top and back door interfaces with fiberglass and body filler. I also filled in the door striker holes as I will be reworking these areas during the final body fitment.

I also reinforced the inside of the body underneath the outer positions of the windshield mounting areas. I flipped the body back right side up and sanded down the driver's side windshield mount area so that the windshield will interface the body correctly (refer to picture 1218-01 to see the affected area). Once this was completed, the body was flipped upside down again, I scuffed out and then brushed on two coats of Rust-Oleum truck bed liner onto all the body's inner surfaces.

I received the copper banjo bolt crush washers and replaced all four of the aluminum washers. After torqueing the banjo bolts, I again gravity fed the brake system and did not discover any leaks. With Barb's help, she pumped the brakes and I bled the system clear of any air bubbles. I did discover a leak in one of the connections but tightening the connection resolved the leak.

I finished the week by preparing the shop for the engine installation. I moved the body outside, moved the chassis so that it was at a diagonal on the shop floor, and replaced the roller stands with the jack stands. I then moved the engine crate for better access with the engine hoist (0119-19 and 0119-20). I assembled the engine mounts (0119-21) as per the SBC Installation Instructions and laid out the parts for the transmission mount.



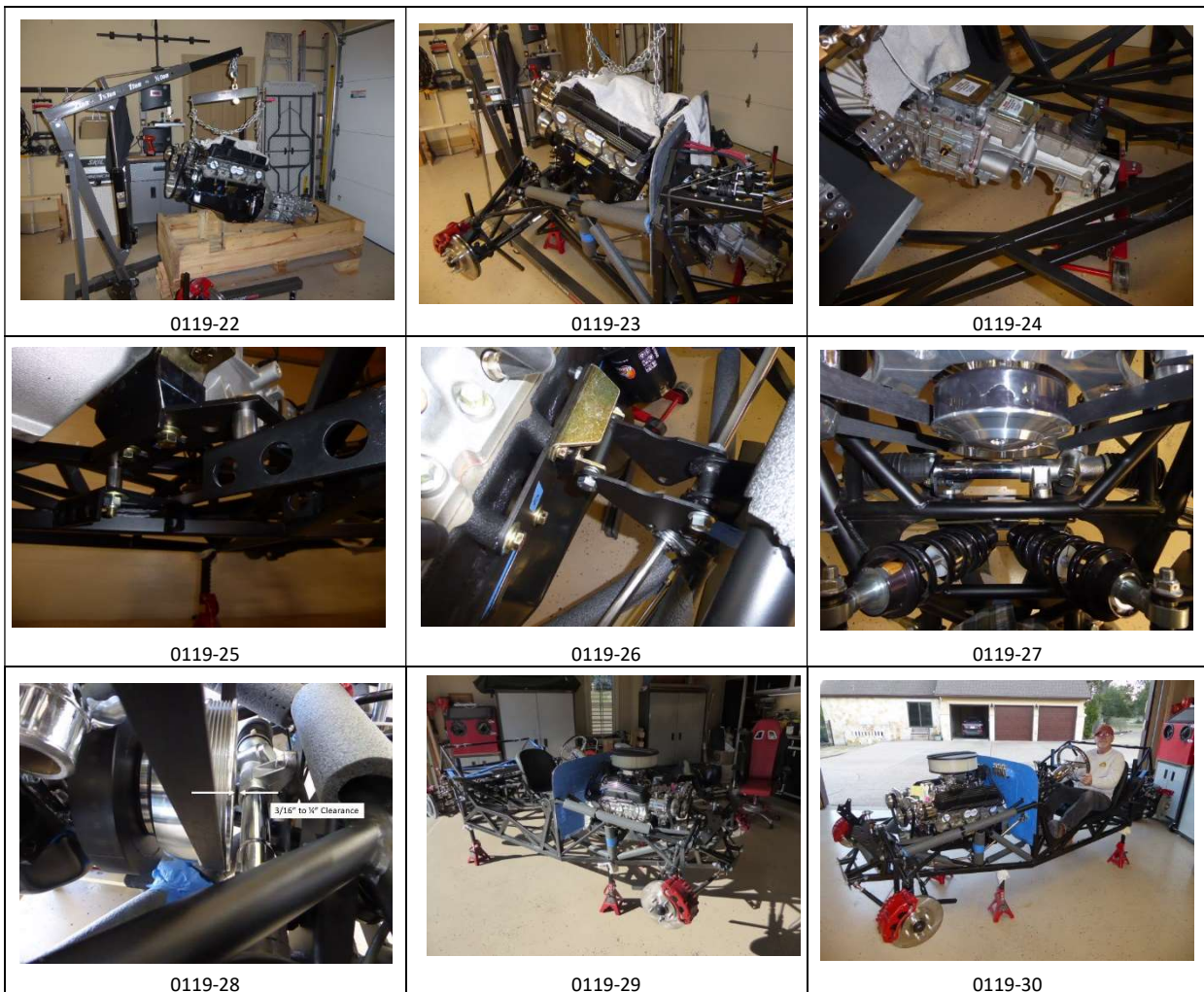
## 01/23/19: Engine Install Day

With the much-appreciated help from my good friend Ron, we tackled the task of installing the engine into the chassis. We followed the SBC Instructions. All bolt torque parameters were taken from Appendix J of the Assembly Manual since SBC instructions was limited in this information. The engine was installed without the shorty headers attached. The following steps were taken (refer to pictures 0119-22 to 0119-28):

1. The engine mounts were assembled per the instructions.
2. The drive shaft was loosely set in the chassis and shifted back and outboard slightly so it would not interfere with the engine installation. During Build School there was some difficulty trying to slide the shaft into place with the engine and differential in place. I did not want to chance any undue clashes with the IRS, so this was just a simple preemptive move from the Lessons Learned file.
3. We lifted the engine from the crate using the engine hoist and load leveler. Note: For whatever reason, the engine rotated transversely about 20 degrees when lifted. This produced some challenges during installation into the chassis.
4. We attached the engine mounts to the block and torqued the 3/8" bolts to 35 ft.lbs. (Note: M10 x 25mm bolts included with the kit were not compatible with the SBC block. We had to make a run to the orange store and purchase 3/8"-16 x 1" Grade 8 bolts to install the engine mounts.)
5. We moved the engine into position above the chassis.
6. We rotated the engine with the transmission down by approximately 15-20 degrees.
7. We lowered the engine slowly, moving it back into the chassis, and leveling it with the load leveler.
8. During this process we discovered two clashes. These were the engine mount to chassis brackets and the front-end main belt pulley with the steering rack.
9. We decided to remove the engine mount to chassis brackets.
10. We continued to lower the engine slowly and position it until the driver's side engine mount was approximately in the correct location.
11. We placed a 2x4 to support the transmission also in the approximate location.
12. We discovered that it was required to move the engine farther aft so that the main pulley would clear the steering rack. The engine mounts were disassembled again, the assembly order of the spacers was altered, and two additional washers were added which moved the engine aft by about 3/8" (0119-26). After final assembly, this resulted in a clearance of about 3/16" to 1/4" between the pulley and the steering rack (0119-28).
13. We installed the driver's side engine mount to chassis brackets with the 2 upper bolts and extra washers.
14. We lowered the engine slightly so that the chassis bracket would align with the chassis mounting holes and then we secured the engine mount brackets on the driver's side.
15. We placed the floor jack on the passenger side engine mount (keeping clear of the mounting holes so that the bolt could be installed) and jacked only this side of the engine up. This resulted in rotating the engine into a level transverse position.

16. We attached the engine mount to chassis brackets using the same spacer/washer sequence as the driver's side so that the engine was square with the chassis.
17. All 1/2" mounting bolts/nuts were torque to 80 ft.lbs.
18. No bolts were included with the kit to install the transmission mount to the transmission. So, off to the local orange store again where additional 1/2"-13 x 2" Grade 8 bolts were purchased. The threads in the transmission mounting holes were cleaned up with a tap.
19. The transmission mount was installed with an additional lower washer, upper lock washer, and upper locking nut. Red Loctite was also used. Prior to installing the upper nut, the bolt was torqued to 80 ft.lbs.
20. The lower mounting plate was attached to the transmission mount using the bolts provided. Red Loctite was used and the bolts were torque to 35 ft.lbs.
21. The lower mounting plate was attached to the chassis brackets utilizing the 1" spacers provided with the kit and new 1/2"-13 x 3" Grade 8 bolts top and bottom washers and the kits supplied deformed thread lock nuts (0119-27).

**The engine/transmission installation is complete.**





01/24/19 to 01/31/19: With the engine installed, I placed the chassis/engine assembly back onto the roller stands and arranged the shop back into its working configuration. I attempted to install the drive shaft adapter and discovered that it was the wrong one (0119-31). I questioned this with F5R and two days later, the correct adapter arrived in the mail. While I was waiting for the adapter, I installed the engine ground on the passenger side from the chassis engine mount bracket to the engine block mounting bolt (0119-32). I did a continuity check with an ohm meter which confirmed that I did have a good ground.

Next up was the grill, A/C condenser, radiator, fan assembly (0119-33). This assembly required the use of main assembly manual and the supplemental Hot Rod A/C Installation Instructions. This went together in a straight forward fashion but hole alignment was a critical issue with the installed rivnuts in the grill. The holes in condenser brackets and radiator mount plates had to be enlarged to eliminate any button head thread misalignment. My grill had the cross-brace notches precut so condenser clearance was not an issue.

When installing the electric fan onto the radiator I discovered a small fitment issue. On page 230 of the Assembly Manual it states that the fan mounting brackets to the radiator will be a tight fit. However, on my system there was a 3/16" gap at all four locations for the fan mounting. Five #10 washers were used as spacers in all four locations (20 washers total). Lastly the assembly included the radiator fan thermostat switch.

The grill/condenser/radiator/fan assembly was temporarily installed onto the chassis (0119-34). The hose connections between the radiator and engine will be delayed until final body fitment as future work includes removing and disassembling the assembly so that the:

- Grill finish/color can be finalized and completed.
- Radiator upper crown and sides are to be polished.

January closed out with the installation of the driveshaft and adapter.

Work that needs to be completed prior to starting the interior work includes:

1. Order ¾" DD steering link and install electric assist steering.
2. Order engine manifold gasket, ceramic coat manifolds, install on engine.
3. Install the hydraulic clutch tubing and bleed the system.
4. Install the Radiator Overflow Tank.
5. Install the Fuel System.
6. Install the A/C evaporator and install the hoses between the evaporator and engine.
7. Install the wiring harnesses and purchase the battery.
8. Design exhaust system, order parts, weld components, install.
9. Purchase Wheels & Tires.



0119-31



0119-32



0119-33



0119-34

## Progress During February 2019 – The Mardi Gras Season

02/01/19 to 02/28/19: February brings the Mardi Gras spirit and King Cakes. Everything about the Mardi Gras season is fun, even if the days are cold and wet. This is also a great time to for shop work but then something miraculous happens, we get a nice sunny warm day, like in the 70<sup>o</sup>'s and 80<sup>o</sup>'s. The garage door is raised, the temperature is perfect, the music is playing, what could be better for progress (and distractions). With the engine and radiator installed, work on the supporting systems continued. This included:

- Engine Cooling System
- HVAC System
- Electric Assist Steering System
- Fuel System
- Exhaust System

I jumped around working on all these systems throughout February sporadically due to waiting on part orders, possible clashes between the systems, Mardi Gras events, etc. So instead of a chronological order discussion, I am just going to discuss the progress that was accomplished in February on each of the systems individually.

### Engine Cooling System

With the grill/condenser/radiator/fan temporarily installed, it was time to look at the radiator hose connections. The kit comes with some very nice stainless-steel corrugated radiator hose that has a 1-3/4" OD. The kit also came with four ordinary hose connection adapters which have a 1-5/8" ID that can be reduced down to 1-1/2". The hot rod has 1-1/2" OD connections on the water pump in, water pump out, and the upper radiator connection. The lower radiator connection has a 1-3/4" OD.

I tried every which way I could think of to install the 1-5/8" ID adapter onto the 1-3/4" corrugated hose and lower radiator connection without success. I sent a query to F5R and was informed that they are supposed to be that way and that they are a pain to get installed. They suggested to try some silicone lubricant on the ID of the hose. I have not tried this yet as I think a better solution is to purchase the correct sized adapters. This would include:

- 3 each – 1-3/4" to 1-1/2" ID adapters, for water pump in, water pump out, radiator upper.
- 1 each – 1-3/4" to 1-3/4" ID adapter, for radiator lower.

Also, with the radiator installed but not necessarily in its final position, I decided to install temporary radiator hoses for engine start-up. After the hood, side panels, and nose cone final fitment with the grill is complete, I will install the corrugated hose utilizing some nice looking adapters especially for the upper radiator/water pump connections. Hence, I ordered a 1-1/2" x 15" flex hose for the upper radiator to water pump hose and a 1-1/2" x 36" (with 1-3/4" OD) not so flexible hose for the water pump to lower radiator hose. The 1-3/4" to 1-3/4" adapter is also required.

While I waited for the above parts, I installed the radiator overflow Tank. The only available place to install it is on the driver's side firewall (0219-01 and 0219-02) which is the location shown in the assembly manual. The passenger side firewall is fairly congested with HVAC connections and fuel lines. The overflow outlet on the radiator cap is on the passenger side (0219-03). This means that I will need about 8' of the 3/8" Gates heater hose to route it down and under the radiator and back to the firewall. Unfortunately, the kit only came with 5' of hose. I need to order some more hose so that this task can be finished.





## HVAC System

I installed the evaporator onto the firewall (0219-04). I then started to hose up the interior AC and heater hoses from the evaporator to the firewall fittings according to the assembly manual. I discovered that I could not keep the lower heater hose from kinking (0219-05) so I decided to utilize a 45° fitting and resize the hose length accordingly. Looking at the engine side hose runs, I discovered I needed two each straight #6 fittings to attached to the dryer, another three items to order as they were not included in the kit.

About the only run I could make was the heater hose from the engine to the firewall fitting (0219-06). I still need to modify this line to include the flow cut-off valve, but with everything else pending I put this system on hold.

I did contact Vintage Air for the additional parts and they were very accommodating and informative. The heater, evaporator, and dryer are purged with nitrogen to keep out moisture during storage and shipping. I was also worried about the compressor running during engine start-up and inadvertently damaging it. I had a great discussion with them and learned the following:

- It is allowable to hook up the hoses to the heater and evaporator and, thus, releasing the nitrogen purge as long as the system will be charged in the somewhat near future.
- It was strongly advised not to release the nitrogen in the dryer until just before charging the system. Since the dryer is filled with desiccant, long exposure will render the dryer ineffective.
- All engine side hoses can be hooked up, except for the dryer, but the dryer can be mounted to the chassis.
- To avoid damage to the compressor, they advised not to connect the clutch wire. This then effectively makes the compressor act like a pulley in the serpentine system.

Fortunately, Vintage Air is located in northeast San Antonio which is about a hour from the house. So I took a day off and drove down there to pick up my parts. With parts in hand, I will get back to this system in March (I Hope).

## Electric Assist Steering System (EASS)

The DD shaft between the EASS motor and firewall must be shortened in order to install the motor. I elected to purchase a new length of DD shaft to be utilized with the EASS. Now I have the manual steering system parts in inventory should I ever elect to remove the EASS and return to manual steering.

The holes bearing/motor mount bracket needed to be modified so the EASS motor could be rotated and eliminate the clash with the engine oil pan. As installed today, there is about a ¼" clearance between the motor and oil pan. This will need to be monitored during engine start-up, hopefully the engine will not rotate that much and create a clash, we will see. Picture 0219-07 to 0219-09 illustrate the EASS installation.

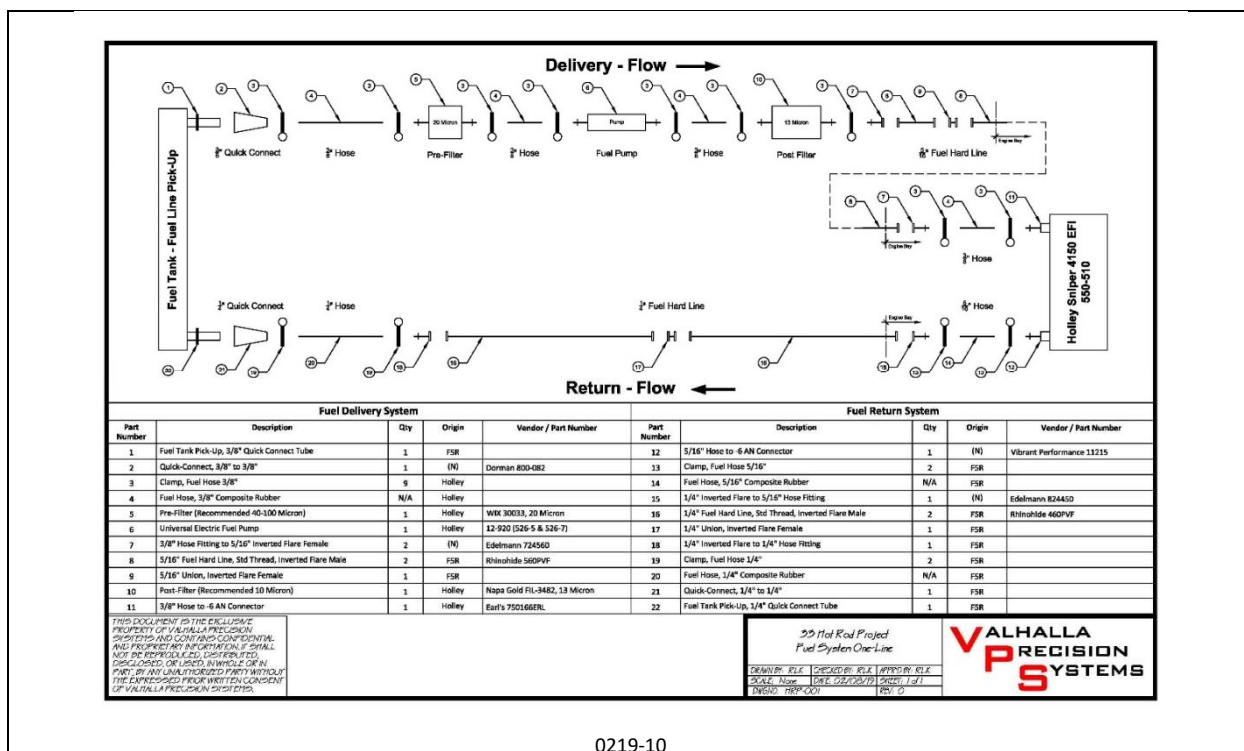


## Fuel System

The fuel system as outlined in the F5R Assembly Manual requires design modifications in order to meet the needs of the Holley Sniper 4150 EFI. Both F5R kit parts and Holley fuel system parts were reviewed. Holley recommends a 3/8" fuel hose for both delivery and return whereas F5R provided 5/16" hard line delivery and 1/4" hard line return. After the parts and systems were reviewed, I determined that the final configuration will be a hybrid of the Holley and F5R systems. Of importance, the following aspects are included in the design:

- The 5/16" and 1/4" hard lines will provide adequate flow for the Sniper unless the Hot Rod goes full throttle for an extended period of time. (Which it will not, well maybe not!)
- It is extremely important for safety reasons that the 5/16" and 1/4" hard lines be used running fore and aft. These lines could be subjected to road hazards and heat from the exhaust system.

The system I came up with is shown in drawing HRP-001, Fuel System One-Line (0219-10). Some additional parts were ordered to facilitate the cross over.



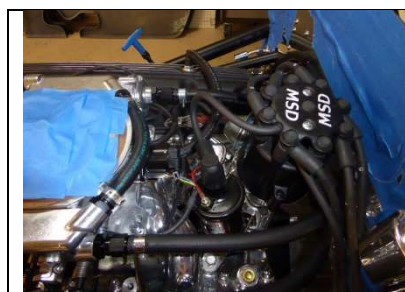
0219-10

While I was waiting for the receipt of the fuel line parts, I prepared the fuel tank aluminum floor. This work included:

- Underside is acoustic LizardSkin coated.
- Rivet holes are drilled and matching chassis holes are drilled.
- Fuel line tube holes are drilled and grommets installed.
- Vent line tube hole and grommets need to be completed.

After receipt of the fuel line parts, I routed the fuel lines per HRP-001 all the way from the carburetor to just below the fuel tank aluminum floor. This included mounting the pre-filter, fuel pump, and post filter below the aluminum floor and attached to the chassis. I did this so that there would be access, albeit difficult, to service the parts. I recognize that the in-line fuel pump should be as close to the fuel tank pick-up as possible. I thought about placing it in the fuel tank compartment, ie closer to the pick-up, but then the seats and waterfall would need to be removed in order to service these parts. Not an ideal situation. My second thought was to put them in the trunk space; this is still a possibility for a future refit. I'll make that decision once the fuel tank and trunk wall are installed.

I plan on installing the fuel tank and floor after the wiring harness is installed. This will allow easier access to running the harness without the floor installed. Pictures 0219-11 to 0219-16 illustrate the fuel line routing.



0219-11



0219-12



0219-13





## Exhaust System

The work on the exhaust system started with the headers. I purchased a set of Summit Racing's G9005 headers. These headers came with a set of gaskets but BluePrint Engines recommended not using the "stock style" gaskets. Their recommendation is to make use of a performance type of gaskets such as the FelPro Fiber Perforated Steel Core Gasket, so, I purchased a set of FelPro SFL1404 gaskets.

Eventually I want to redesign the exhaust system and utilize some exhaust cut-outs. But for now I plan on installing the system as provided with the kit including the rear exit exhaust pipes. This system will be used for engine start up and I will be able to evaluate the kit supplied mufflers. Phase 2 will redesign the system to include the electric cut-outs and most likely a muffler change out.

First up was to prep the headers by:

- The headers were shipped with non-heat paint for shipping corrosion protection and this was stripped off.
- The headers were then coated with VHT Flameproof primer, flat black, and satin clear coat. I recognize that this coating system requires a high temperature cure cycle but it will have to wait until engine start.
- The headers and gaskets were mounted onto the engine block with anti-seize on the mounting bolts.

The remaining system of shorty pipes, mufflers, and routing pipes were installed as per the assembly manual. The muffler hangers were installed as well as the aft rubber hanger straps. Pictures 0219-17 to 0219-24 illustrate the exhaust system installation.





### February Ends – Mardi Gras Fat Tuesday is coming right up

Work that is planned for March (and whatever time it takes) includes:

1. Radiator Hoses to be fitted.
2. Overflow Hose to be fitted – Look into getting 10' of Gates 3270 3/8" Safety Strip Heater Hose.
3. Install hydraulic clutch lines and bleed system.
4. Check for brake line leaks and bleed system again.
5. Acoustic and Thermal Insulation to be applied to firewall interior.
6. Install throttle cable and carburetor bracket.
7. Install the throttle pedal.
8. Complete HVAC system hoses. Note: Install dryer but do not add the fitting which would release the nitrogen charge.
9. Tighten rear exhaust pipe connections.
10. Install wiring harness:
  - a. Do not connect the AC compressor power wire.
  - b. Lengthen Electric Steering control and power line, install control module.
11. Install battery. Note: this may require some trunk flooring and bulkhead aluminum so the battery position can be determined.
12. Install fuel tank and aluminum floor, complete fuel line connections.
13. Build Mock Dash Panel for instrument gauge mounting and engine start-up.

February was a good month, two pictures illustrating some progress is being made. 0219-25 was taken 07 January 2019 and 0219-26 was taken on 28 February 2019.



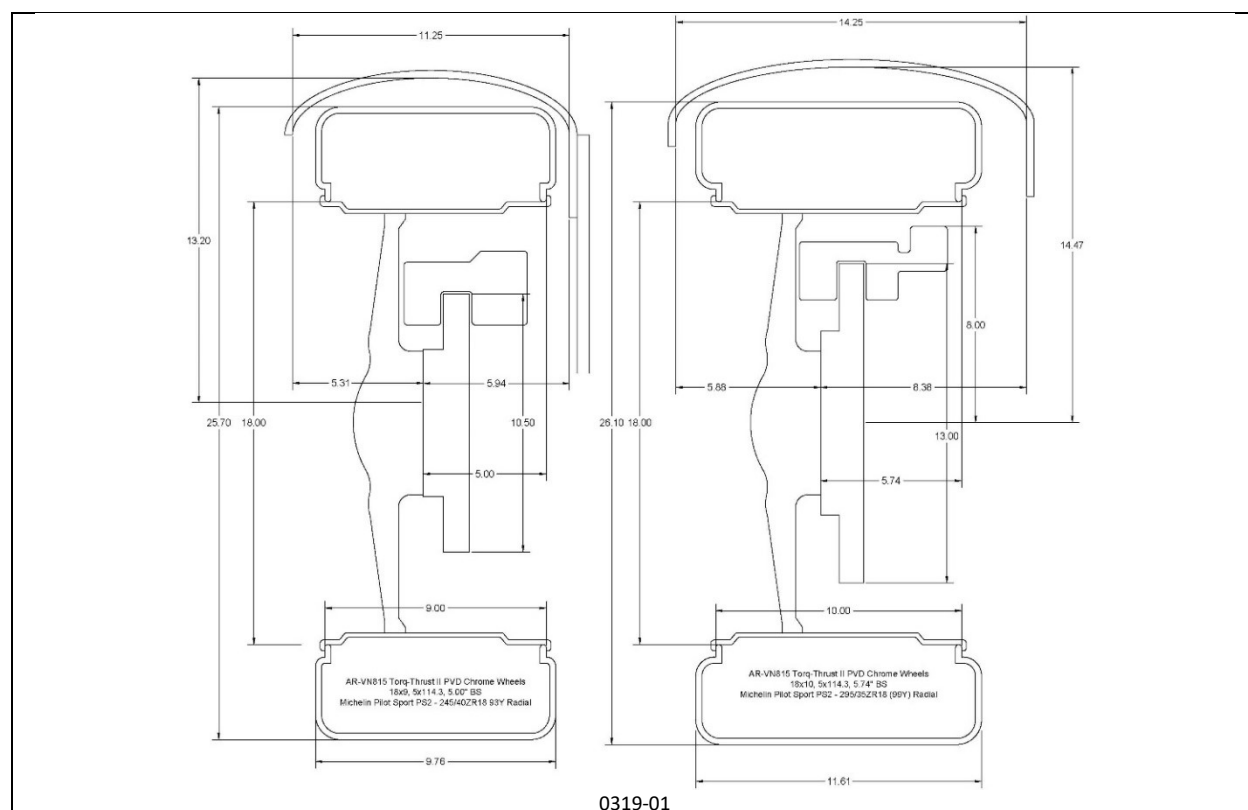
## Progress During March 2019

March brings Fat Tuesday and the Mardi Gras season winds down. The weather improves, the shop door is open, and a multitude of small tasks are completed in order to close out some of the systems. The good weather also brings many distractions, so progress was slow, but a little progress is still progress.

One of the most time-consuming tasks that was done during February and March was the research into the wheel and tire combinations that could be used for the project. Factory Five provides the following recommendations for wheels and tires when utilizing the bike fenders:

- Front: Wheel maximum width = 9" with a maximum backspace of 5.5". Tire maximum width = 255mm or 10"
- Wheel maximum width = 11" with a maximum backspace of 6.0". Tire maximum width = 305mm or 12"
- Maximum tire diameter, both front and rear, no greater than 25.7"

To illustrate the magnitude of the task, please consult the Summit Racing web site and search on wheels, you will get 222,713 possible wheels to select from. Tires are not as numerous, only 22,270 different types of tires to select from. Obviously, this can be narrowed down considerably when taking into account lug pattern (5x4.5"), wheel diameter (18"), wheel widths (9" and 10"), backspace requirements, tire section widths, tire aspect ratios, and cost. Using some rough field measurements, I developed the sketch shown in 0319-01 and checked the fitment of many different combinations of wheels and tires.



I also read everything I could find on the F5R forum and researched the web concerning wheels and tires. Final selection resulted in the following specifications:



#### Front Wheels and Tires:

- Wheels: 2 each, American Racing, VN-815 Torq-Thrust II, PVD Chrome, 18x9.0, 5 x 4.5" Bolt Circle, 5.00" Backspace, Possible PN VN8158965, need to confirm with AR.
- Tires: 2 each, Michelin Pilot Sport PS2, 245/40ZR18 93Y, 1433 lbs Maximum Load, Blackwall, PN 78156.

#### Rear Wheels and Tires:

- Wheels: 2 each, American Racing, VN-815 Torq-Thrust II, PVD Chrome, 18x10.0, 5 x 4.5" Bolt Circle, 5.74" Backspace, Possible PN VN8158165, need to confirm with AR.
- Tires: 2 each, Michelin Pilot Sport PS2, P295/35ZR18 (99Y), 1709 lbs Maximum Load, Blackwall, PN 05271.

Now its time to order them, but that will occur in April.

Mornings were spent doing the above research and some afternoons were devoted to working on the hot rod. Listed below are a series of line item tasks that were completed.

1. Hydraulic clutch hard lines installed and interfaced with clutch flex lines (0319-02 to 0319-04).
2. Lower radiator 30" flex hose purchased and installed, used a 6" x 1-3/4" hose coupler to the lower radiator hose connection (0319-05).
3. Upper radiator flex hose installed between water pump and radiator upper connection (0319-06).
4. Acoustic and Thermal Insulation installed onto firewall interior. Temporarily removed evaporator box to allow for insulation installation. Pictures 0319-07 and 0319-08 shows the silver backed sound dampening insulation on the driver side. This is then covered with the gray sound/heat insulation which is shown installed on the passenger side.
5. Completed the HVAC system hose installation (0319-09 to 0319-11).
  - a. Note: Install dryer but do not add the fitting which would release the nitrogen charge. Install fittings just prior to the freon charge.
  - b. Note: Do not install Trinary Switch until freon charge.
  - c. No. 2 spot interior heater hose needs a 45° fitting, this will allow for a better arrangement of the AC hoses.
  - d. Reversed No. 3 & 4 spots with respect to the manual with heater hose now in the No. 3 spot and the AC #10 hose in the No. 4 spot. This allowed for a cleaner hose routing in the engine bay.
  - e. No. 1 & 4 sport interior AC hoses need minor re-route modifications.
6. Installed heater cut-off switch in engine block to firewall hose (0319-12).
7. Purchased and installed initial stick shift and chrome ball (0319-13).
8. Purchased 10' of Gates 3270 3/8" Safety Strip Heater Hose and installed radiator overflow hose from radiator to firewall mounted reservoir tank (0319-14 and 0319-15)
9. Tightened exhaust system bolts. All bolts forward of the mufflers are torqued and tight. Need to check all exhaust system bolts for tightness aft of the mufflers.
10. Installed Lokar throttle cable bracket onto the carburetor (0319-16).

The second most time-consuming task started in March was the electrical harness and wiring installation. I spent a fair amount of time studying the documentation and identifying the harness interfaces. I am going to break down the work into the following elements:

- Hot Rod Systems (HRS): Battery, starter power, headlights, stop lights, turn signals, etc.
- Engine Interface (EI): Gauges, EFI computer, fuel pump, etc.
- HVAC System (HVAC): Controls, power.

- Electric Assist Steering System (EASS): Module location, power.



The following tasks were completed in March with respect to the wiring harness installation:

1. Studied and prepared for the wire harness installation.

- a. Determined placement of the EASS control module which will be mounted just above the pedal box. This will require lengthening of the EASS control and power wires.
  - b. Study the Heater/AC wiring and determine the interface requirements.
    - i. Do not connect the AC compressor clutch wire, this will allow the engine to run without damage to the compressor.
    - ii. Do not install the Trinary Switch to the dryer, the dryer is purged with nitrogen to keep out moisture during storage.
2. Powder coated the fuse block mounting bracket and installed it onto the chassis.
  3. Fitted main harness fuse block into the bracket (0319-17).
  4. Attached the mechanical speedometer sensor to the transmission (0319-18).



0319-17



0319-18

### **March Ends – Still having way more fun than any man should be allowed to have!**

This brings March to an end. The following work that is to be completed prior to Engine Start includes:

1. Hydraulic clutch lines bleeding.
2. Complete HVAC system hoses.
  - a. No. 2 spot interior heater hose needs a 45° fitting.
  - b. No. 1 & 4 sport interior AC hoses need minor re-route modifications.
  - c. All AC hoses require crimping.
  - d. All hoses need final installation into components and fittings.
3. Need to check all exhaust system bolts for tightness aft of the mufflers.
4. Check for brake line leaks.
5. Install the Lokar throttle cable. Install the throttle pedal. (Note: Temporary fitment of floor aluminum and transmission tunnel cover is required in order to determine proper placement of the throttle pedal.)
6. Complete electrical harness and wiring installation.
7. Install battery. Note: this may require some trunk flooring and bulkhead aluminum so the battery position can be determined.
8. Build Mock Dash Panel.
9. Install fuel tank and aluminum floor, complete fuel line connections. (Note: Attach fuel pump wiring prior to this task.)
10. Wrap Fuel Lines in heat protective loom.
11. Purchase Wheels & Tires and install on the Hot Rod.

### **Progress During April 2019 – Bluebonnets, Easter, and Family Oh My**

The electrical work continues. Focus was concentrated on the front and rear harness installation, the mock dash build-up, battery cable runs, and the Holley Sniper EFI interface. In general, the work progressed in the same order as the assembly manual. What did become very apparent early on was that the provided wire harnesses are designed and assembled for the Roadster and have some “minor” interface issues with the Hot Rod. These issues were addressed and remedied as they were discovered. Both the Hot Rod Assembly Manual and the Chassis Wiring Harness Installation and Instructions Manual that came with the wire harnesses were utilized.



The work is broken down into the following elements and identified accordingly:

- Hot Rod Systems (HRS): Battery, starter power, headlights, stop lights, turn signals, etc.
- Engine Interface (EI): Gauges, EFI computer, fuel pump, etc.
- HVAC System (HVAC): Controls, power.
- Electric Assist Steering System (EASS): Module location, power.

### Wiring Harness and Battery Cable (HRS):

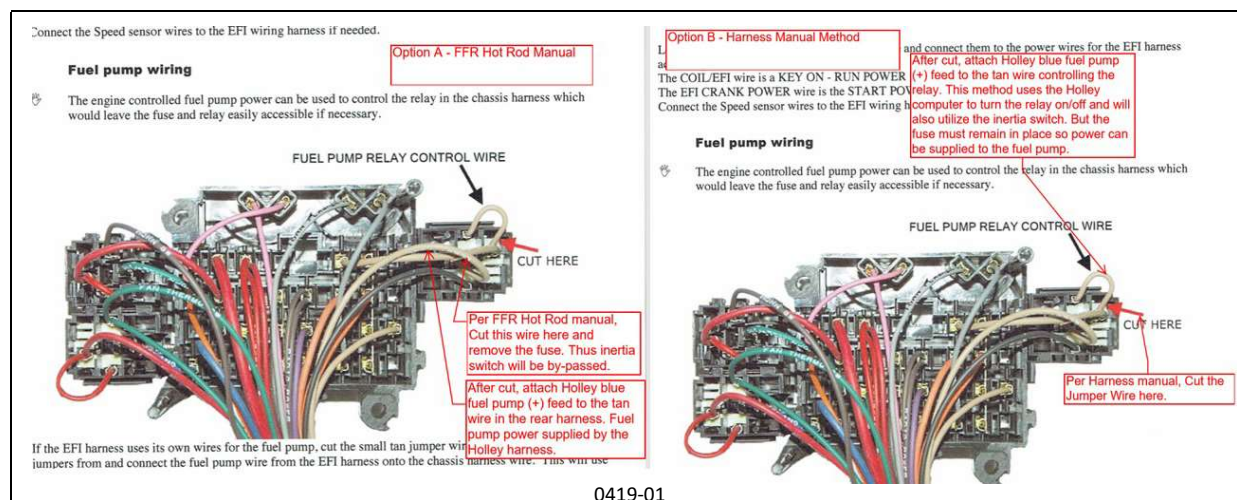
The completion of the fuel system was put on hold until the rear wire harness is installed. Basically, the fuel tank floor and the installation of the fuel tank remain outstanding prior to wiring. This allowed easier access to install the various segments of the rear harness.

### Fuel Pump Operation (EI):

The second issue to resolve is how to connect the fuel pump power wires. There is a fuel pump power feed coming from the Sniper EFI harness that is to be integrated into the Hot Rod electrical system. There are also two different options to power and operate the fuel pump. One is described in the Hot Rod Assembly Manual and the other is described in the Chassis Wiring Harness instructions that came with the harness. These options are (Refer to 0419-01 for a visual description of each option):

Option A – From the Hot Rod Manual, directly attach the Holley blue fuel pump (+) feed wire to the tan fuel pump feed wire in the rear harness. Remove the fuel pump fuse. This would by-pass the inertial switch and fuel pump power would be fed from the Holley harness.

Option B – From the Chassis Wiring Harness instructions, cut the relay jumper and attach the Holley blue fuel pump (+) feed wire to the remaining jumper wire which would only control the relay. Leave the fuse in place and utilize the rear harness for the fuel pump power. This method also uses the inertia switch to control the relay.



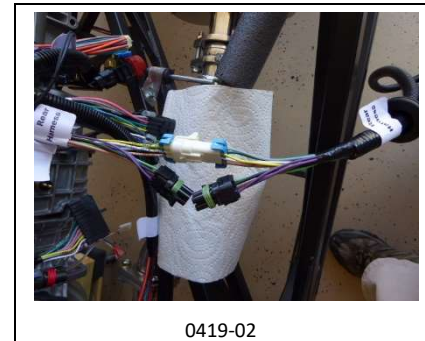
Utilizing the inertia switch Option B will provide another degree of safety into the Hot Rod so this option was selected.

### Fuse Panel Installation (HRS):

The fuse panel bracket was powder coated and the Main Harness Fuse Block was installed into fuse bracket. This in turn was installed onto the chassis using rivnuts and ¼" button heads so that the panel could be removed, if necessary, in the future. The LED flasher units were installed and grounded. The fuse box inertia switch relay wiring according to Option B was completed to accommodate the Sniper EFI fuel pump control.

### Rear Harness and Battery Cable (HRS):

First thing out of the box it was discovered that there was an incorrect harness plug connection between the rear harness and the main harness, both harnesses had male plugs 4-pin connectors attached (0419-02). These were removed and a proper male/female weatherpack 4-pin connector was attached.

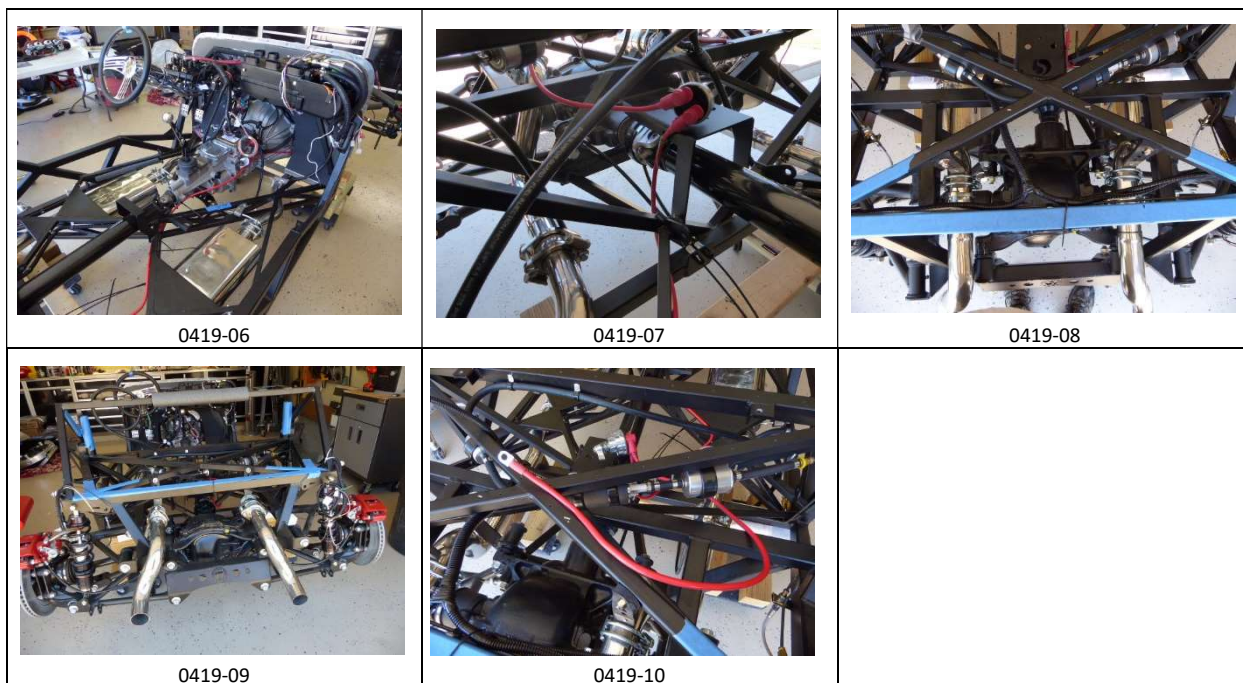


The rear harness was routed along the driver side of transmission. The speedometer sensor was installed onto the transmission. The harness speedometer sender connector had to be relocated in order to fit the Hot Rod configuration. The speedometer sensor utilizes the green wire.

The fuel pump power and ground wires in the harness were relocated to better accommodate the fuel pump location in the Hot Rod. The fuel level (Gas Sender) was temporarily positioned, waiting on tank floor and fuel tank to be installed. The left and right rear taillights and the license plate light wire harnesses were temporarily placed into position.

The location of the battery as per the assembly manual only provides limited access to it once the Hot Rod is complete. Hence, I decided to relocate the battery to the trunk. The kit battery cable is too short to reach the new battery location, but I am going to install a Master Switch in a glove box compartment that will be located using the old battery location. An extension cable will then reach to the trunk location. There will also be a by-pass fuse installed in order to power any devices that have a memory (ie radio, possible EFI computer, etc.). The battery cable was temporarily installed running along the transmission on the passenger side. The Sniper EFI power cable is to be installed alongside the battery cable and run directly to the battery. This will allow the engine computer to retain its memory during engine shut down periods. Pictures 0419-03 to 0419-10 illustrate the rear harness and battery cable installation.

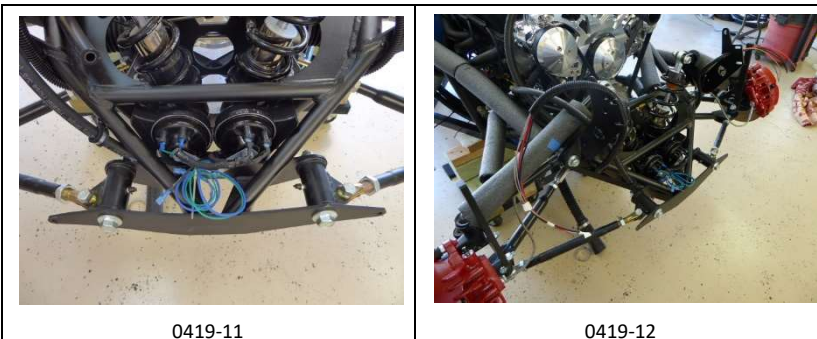




I also need to decide on speaker/sound system location and requirements and possibly run the speaker wires with the rear harness. In addition, I want to add some heat shielding looms to the wires on each side of the transmission.

#### Front Harness (HRS):

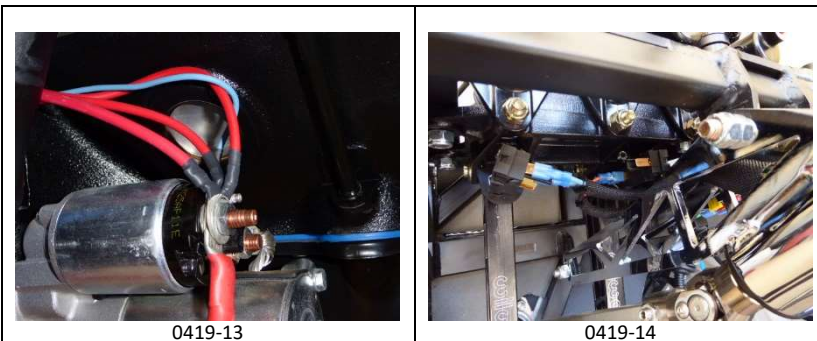
The radiator was removed in order to facilitate the front harness and horn installations. The front harness was run according to the assembly manual. The horns are in the location at the front of the chassis in the space just in front of the front shocks as shown on page 205 of the assembly manual. The horn connection wires required relocation on the harness and they were also lengthened. The radiator fan power and switch wires were relocated to a location approximately at the center of the chassis and were adjusted to facilitate hook-up. The left and right headlight harnesses are temporarily located. (0419-11 and 0419-12)



The radiator fan power and switch wires were relocated to a location approximately at the center of the chassis and were adjusted to facilitate hook-up. The left and right headlight harnesses are temporarily located. (0419-11 and 0419-12)

#### Starter Solenoid Wiring (HRS):

The starter solenoid wires from the main harness were installed as per the assembly manual (0419-13). The HVAC system power wires will need to be added later. Heat Shield loom will be added to these wires in the area of the exhaust headers for protection.





### **Brake and Clutch Safety Switches (HRS):**

The Brake and Clutch Safety Switches were installed as per the assembly manual. Note: Switch positions with respect to brake and clutch pedals require final adjustment. (0419-14)

### **Fuel Inertia Switch (HRS):**

There are two methods described to hook-up the fuel pump power as described above. Option B which utilizes the inertia safety switch will be used. This work was completed

### **Headlight Switch (HRS):**

The connector will need to be integrated into the dash layout.

### **Under Dash Lighting (HRS):**

The cockpit lighting scheme requires development. I plan to look at this when I design my custom center console.

### **Steering Column Wiring (HRS):**

As the dash harness is designed for the roadster, it required modifications to facilitate the steering column wiring, this included:

- The dash harness horn wire was cut and terminated as per the assembly manual. Also refer to the dash gauges installation comments.
- The pink hazard wire was cut and terminated as per the assembly manual.
- The yellow and white rear turn signal wires were cut and terminated as per the assembly manual.

After the above work was completed, the steering column wire harness was wrapped in loom and connected to the main harness as per the assembly manual.

### **Fan Wiring (HRS):**

The fan power was connected according to the assembly manual. I need to double check this and will most likely modify it so that the EFI computer will control the fan. The EFI computer already has a water temperature sensor installed which is shown on the passenger side of the radiator hose in 0419-15.

### **Alternator Wiring (HRS):**

A one-wire alternator connection is utilized. The 10 ga red wire was attached to the alternator and starter as per the assembly manual (0419-15).

### **Battery Installation (HRS):**

The battery is to be relocated to the trunk. This work is pending on the installation of the fuel tank floor aluminum, fuel tank, fuel hose connections, and the fuel level sensor wires. I will also need to install some of the trunk floor aluminum.



## Horn Installation (HRS):

The horns are in the location at the front of the chassis in the space just in front of the front shocks as shown on page 205 of the assembly manual. The horn connection wires required relocation on the harness and they were also lengthened. A set of jumper wires were assembled and installed.

## Dash Instrument Mock-Up and Wiring (EI):

The Chassis Wiring Harness Installation and Instructions Manual section on Dash Harness/Gauges were primarily utilized for the Hot Rod Build. It should also be noted that the provided dash harness is designed and assembled to fit the roadster and, though the wiring elements are the same, it required major modifications and wire relocation to fit neatly into the hot rod dash design. In addition, a custom redesigned dash layout will be utilized for this build.

The basic concept for the dash is to utilize a separate mounting frame so that the body can be installed onto the chassis and then the dash to be mounted to the body. I also wanted to include the AC ducts into this frame to facilitate the AC vent hose connections. Then only the defroster hoses will to be mounted to the body as the body is mounted to the chassis. I also plan to build a custom transmission tunnel cover which will incorporate a center console for the cockpit interior. The dash will be installed at the body centerline and the radio/sound system along with some additional switches will be installed in the center console.

The first step was to develop a gauge and switch layout drawing and print it in full scale (0419-16). This drawing was used to ensure proper fit to the body dash area and to estimate a proper fit within all the components mounted to the firewall. The second step was to fabricate a mock up so that the gauges and switches could be mounted, hooked-up, and used during engine start and go-cart. The mock up frame was made from some very economical fiber board.



0419-16

Once all the gauges and switches were mounted to the frame, I started to interface the provided dash wiring harness. At this point I realized that none of the turn signal lights, hazard lights, and some of the sensor wires were not needed for the hot rod and that the layout of the harness wires would not work for my custom dash layout. I removed the loom and relocated the wires into 3 groups and adjusted their lengths so that they would terminate at approximate the same place. The three groups are:

- Headlight Hi/Low switch and indicator.
- Gauge sensor wires and power (gauge feed) and ground wires.
- Gauge illumination light power, turn signal indicator power, and grounds.

I then created a jumper harness for the gauge illumination lights and a second jumper for the gauge feed power (0419-17). Individual jumper wires were created for each of the sensor wires. The following color codes were used for the jumpers:

- Black – All Ground Wires.
- White – All +12V Power Wires.
- Green – All Sensor Jumper Wires.

All dash connectors have female disconnects on the gauge connections and male disconnects on the harness connections. The provided harness was fitted with female disconnects.



0419-17

### **Dash Harness Wiring Utilization:**

There are three connectors on the dash harness. The following is a description of which wires were used or not used.

#### **3-Pin Headlight Hi/Lo Switch:**

All wires were utilized as described in the wiring harness manual. I relocated the Hi Beam Indicator light wire (brown) to better facilitate the layout.

**10 Pin Male Connector** – This connector contains all the sensor wires.

The following wires were used:

1 each	Gauge Feed	Brown
1 each	Coil/Tach	Purple
1 each	Gas Sender	Light Green
1 each	Speed Sensor	Dark Green
1 each	Water Temperature	Light Blue
1 each	Dash Lights (+)	White
1 each	Oil Pressure	Gray

The following wires were not used:

2 each	Speed Clock Mem	Red
1 each	Speed Sensor	Gray
1 each	Gauge Feed (+)	Brown
1 each	Oil Temperature	Light Blue

**10 Pin Female Connector** – This connector contains all the turn signal and indicator wires.

The following wires were used:

2 each	Ground	Black
1 each	Left Indicator Light	Light Green
1 each	Right Indicator Light	Light Blue

The following wires were not used:

1 each	Left Front Turn	Green
1 each	Right Front Turn	Light Blue
1 each	Left Rear Turn	Yellow
1 each	Right Rear Turn	White
1 each	Turn Flasher FD	Gray
1 each	Hazard Flasher	Pink
1 each	Horn Switch	Brown
1 each	Horn Switch Ground	Black
3 each	Ground	Black

The dash mock up is ready to be plugged in and used.

#### **Key Ignition Switch (EI):**

The key ignition switch was wired to the main harness as per the instructions in the Chassis Wiring Harness manual, pages 25-27 and the Hot Rod Assembly Manual, page 197. All wires were utilized.



## **Main Harness - EFI Interface Wires (EI):**

The following wires were used:

- Purple Coil Tach wire – Attached to the Holley EFI 10 pin brown Tach Output wire.
- Orange EFI or Coil wire – Attached to the Holley EFI 7 pin pink Switched Ignition (+12v) wire. It is also connected to the coil (+) terminal.

The following wires were not used, terminated, and were coiled up for storage:

- Dark Green EFI Speedo Signal
- Gray EFI Speedo Signal Return
- Light Blue EFI Crank Power

## **Main Harness – Sending Unit Wires (EI):**

The following wires were used:

- Gray Oil Pressure Wire – Attached to the oil pressure sensor mounted just above the oil filter.
- Dark Blue Water Temperature Wire – Attached to the water temperature sensor mounted to the driver side port in the Edelbrock intake manifold.
- Tan Electric Choke – This wire is used for accessory “Power On” requirements. It is currently attached to the Green EASS power wire and one side of the EASS indicator LED.

The following wires were not used, terminated, and coiled up for storage.

- Green Fan Thermo Switch
- Light Blue Oil Temperature
- Black Ground – 3 each

## **Holley Sniper 4150 Interface Wiring (EI):**

The interface wiring for the EFI was completed as per the “Holley Sniper EFI Fuel Injection Installation Manual”, document 199R11031, dated 04/12/2018. The ECU basic wiring was installed as per the illustration shown on page 16. Initially the system will be configured as a Non-Timing Controlled Ignition System. Per the Holley manual, the EFI will not control the ignition timing of the engine. The timing will be based on the distributor initial, mechanical, and vacuum advance, similar as it did with a standard carburetor. Once the engine and EFI system is running satisfactorily and when I have some extra time, I will convert it to a Timing Controlled Ignition System. In summary, the following connections were installed:

**O2 Sensor Interface:** The O2 sensor was installed onto the driver side exhaust header just prior to the installation of the header. There is a predefined threaded nipple welded on this header for the O2 sensor. The only work necessary to complete the O2 sensor was to drill out the header tube at the nipple location. The O2 sensor was screwed into the nipple. The EFI connectors were attached and I added loom over the wires for protection and for consistent appearance.

**EFI Touchscreen Installation:** The connectors were attached and loom was added over the wires for protection and for consistent appearance.

**Coolant Temperature Sensor:** This unit was installed by BluePrint Engines prior to engine delivery.

**10 Pin Connector:** Only the dark brown Tach Output was used and was connected to the purple coil-tach wire from the main harness EFI interface wires. All other wires were terminated with heat shrink and coiled up with zip ties for storage.

**7 Pin Connector:** The pink Switched Ignition (+12v) wire was attached to the orange EFI or Coil wire on the main harness EFI interface wiring. The yellow Coil (-) Input wire was attached to the coil (-) terminal. The remaining wires were coiled up for storage.

**Fuel Pump Power Wire:** The blue EFI fuel pump power wire was connected to the tan fuse box relay as per Option B which defines the fuel pump and inertia switch interface.

**Main Power Wires:** The black ground wire and the red (+12v) wire were bundled with the main red (+12v) power cable loom and run back to the battery mounting location. These wires will be connected directly to the battery as per the EFI manual. (They will not utilize the master switch by-pass fuse).

## **Wheels and Tires**

In addition to all the electrical work, I placed a deposit on my tires and wheels on 11 April 2019. It should be noted that the below specification differs from my earlier specs. What I discovered, contrary to what is posted and offered on the manufacturer's web site, is that



my previous specs were no longer in production or available. Hence, I had to re-evaluate what I was going to accept. I continue to wait for their delivery. The final configuration resulted in the following specifications:

### **Front Wheels and Tires:**

- Wheels: 2 each, American Racing, VN-615 Torq-Thrust II, Chrome, 18x9.0, 5 x 4.5" Bolt Circle, 5.00" Backspace.
- Tires: 2 each, Michelin Super Sport, 245/40R18 97Y XL.

### **Rear Wheels and Tires:**

- Wheels: 2 each, American Racing, VN-615 Torq-Thrust II, Chrome, 18x10.0, 5 x 4.5" Bolt Circle, 5.74" Backspace.
- Tires: 2 each, Michelin Super Sport, P295/35R18 103Y XL.

The Wheels and tires were picked up on 26 April 2019.

## **April Ends**

A very good month ends as work continues towards engine start. It seems that the more I complete, the more detailed I become so I keep making engine start lists and keep checking off the items.

### **Work Required Prior to Engine Start:**

- Install Master Switch By-Pass fuse.
- Complete final installation of battery cable and EFI power cables.
- Add loom to the EFI interface wires.
- Add heat shielding as required.
- Install Oil Pressure sensor and wire same.

- Install water temperature sensor and wire same.
- Remount radiator and hook up fan (+) and (-) and Thermo Switch wire.
- Make 10 ga alternator ground jumper and attach same (this is redundant but safe).
- Complete fuel system, tank installation, and final wiring requirements.
- Electric Steering Assist Control Module installation and wiring.
  - Make a mounting bracket for the control unit and mount same above the pedal box on the firewall horizontal tube.
  - Extend the power and control cables from the EASS motor to the new control unit location.
  - Make a mock dash mount for the on/off switch and indicator light.
  - Control Box output wiring:
    - Red power wire: Control box connector – dash switch – 40 am fuse – starter solenoid (+)
    - Black ground wire: attach to a good ground location.
    - Green key on power: Connect this to the Tan Electric Choke wire in the sending harness. This wire can also be used if any other “Power On” requirements are necessary. Also take this to one side of the indicator LED.
    - Green key on power: attach to one LED wire.
    - Orange LED: attach to second LED wire.
    - Purple wire and White wire: Diagnostic wires, need to locate with possible switch arrangement.
    - Yellow wire and Blue wire: not used, terminate accordingly (remove from plug).
- HVAC Wiring.
  - Basic Power hook-up.
  - Compressor to Trinary Switch connection. (Leave connector separated until Freon charge.)

### **Progress During May 2019 – Packed Full of Friends, Travel, and Fun**

May is a very short month with respect to the Hot Rod Build Project. Barb & I enjoyed way too much fun with visiting friends and our own R&R travel. However, using April’s Engine Start Work List as my outline, I completed the following.

### **Master Switch By-Pass Fuse, Battery Cable, and EFI Power Cables**

The EFI power wires and the starter main power wire was wrapped in loom and mounted to the chassis. These were run to the master switch. The by-pass fuse wires were attached to the starter side of the master switch. From the battery side of the master switch, the EFI power wires, the starter main power wire, and the by-pass fuse wire was wrapped in loom and run to the battery location in the trunk. (0519-01 to 0519-03).





## Oil Pressure Sensor

The only location that I could utilize on the SBC to install the kit provided oil pressure sensor was the port just above the oil filter. However, because of the angle of the port, there was no room to directly mount the sensor because of interference with the block casting for the oil

filter. The solution was to install a brass nipple with a coupler and elbow and then mount the sensor to the elbow (0519-04 and 0519-05). This was then connected to the (BLUE) sending unit harness wire.



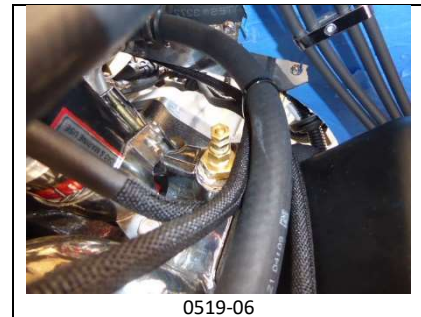
0519-04



0519-05

## Water Temperature Sensor

The kit provided water temperature sensor was mounted into the rear driver side port of the intake manifold. This was then connected to the (GREEN) sending unit harness wire (0519-06).



0519-06

## Radiator, Fan, and Wiring

The fan ground wire from the front harness was lengthened as suggested in the assembly manual. The radiator was remounted to the chassis and the fan power, (+) and (-), and thermo switch wire was hooked up.

## Fuel System Completion

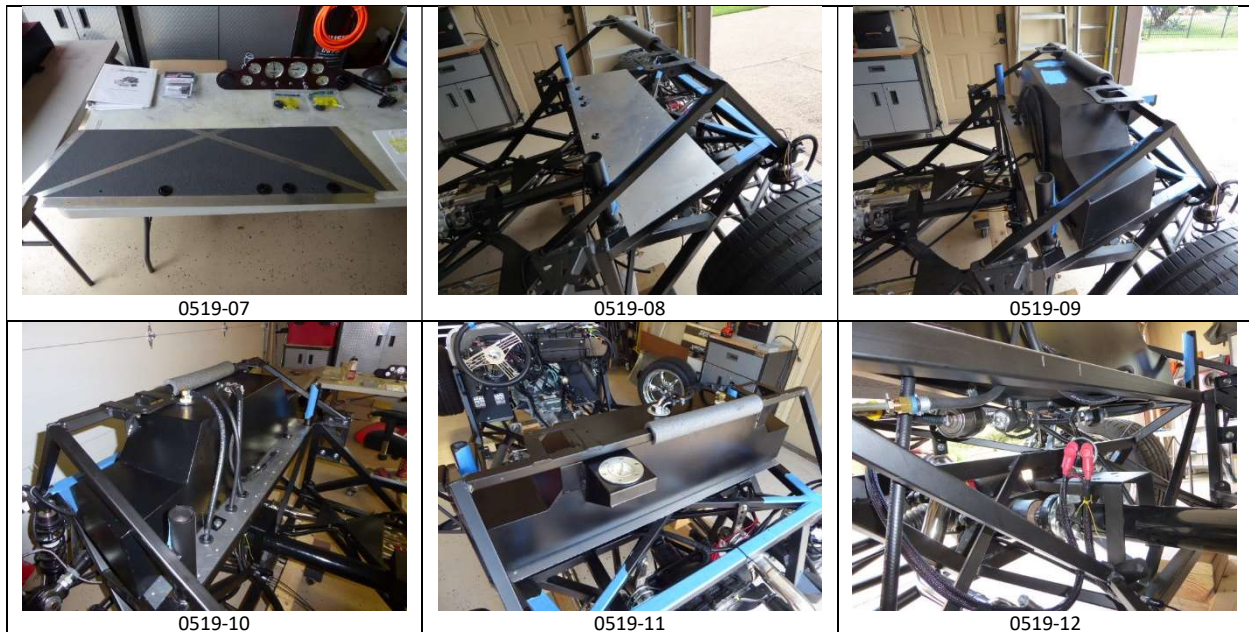
With the majority of the components that are installed on the chassis and under the fuel tank floor completed, the fuel tank can be installed and the system completed. The fuel tank was temporarily positioned in place so that the upper and lower mounting bolt holes could be drilled out, however, a clash was discovered. The tank height between the bottom of the tank and the upper mounting bracket was within tolerance but the tank itself was slightly warped. This in turn lead to a very tight fit for the aft upper mounting brackets. I suspect the tank warpage occurred during the welding fabrication of the tank.

The tank was removed after the mounting holes were drilled and the aluminum floor was temporarily clamped into position. The chassis tubes were marked on the bottom side of the floor and the mounting hole were drilled into the aluminum. Holes for the rivet pattern were drilled into the aluminum and then these holes were used as a template to drill the chassis tube holes.

I applied a layer of LizardSkin acoustic spray to the bottom of the fuel tank floor aluminum and added the grommets for the vent line, fuel supply line, fuel return line and the level sensor wire loom (0519-07). Sealant was added between the floor aluminum and chassis and the floor was riveted onto the chassis.

The tank was installed and a little help from a dead blow hammer was needed in order to get the upper bracket mounting holes lined up (0519-09). The mounting bolts were installed, the vent line hardware and the level sensor hardware were installed. The fuel supply and return lines hooked up, the vent line

installed, and the level sensor wires were connected (0519-10). Lastly, the fuel fill cap was installed (0519-11).



### Wire Loom Heat Shielding

I felt that the starter solenoid wire looms were a bit too close to the exhaust header so I added some additional heat shielding in that area (0519-13).



### Center Section Vent Tube

I finally got around to adding the center section vent tube (0519-14), ya-hooo.

### Battery Temporary Install

The battery was temporarily installed in its trunk location for engine start. I just used a piece of plywood held into position. Battery position, mounting holes, and wire grommet locations will be transferred to the trunk aluminum when required (0915-15).



### May Ends - With Visions of Engine Start in the Future

As Barb always reminds me, a little progress is still progress.



## Progress During June – The Trek Towards Engine Start

June starts off as fast as a turtle race. After about two weeks of travel, there were many chores around the house to be done. So, I finally was able to get into the shop and continue with the work attempting to make progress toward engine start. But first I decided to complete a couple of systems checks.

### Preliminary System Checks

**Brake System Leak Check:** The braking system is obviously a core system that requires the most intensive attention. So, I spent a complete afternoon pumping the brakes, checking the master reservoir, and then, after some time passed, checking for leaks. No leaks were identified or found. I felt good enough about the leak test that I touched up the calipers when the previous leaks had stripped off the paint.

**Exhaust System Bolts:** Another item on my list of things to check so I went around and made sure all the bolts were tight.

**Electrical System Check:** I could not resist the temptation to turn the key to the on position and with the battery temporarily installed, this was going to happen. I plugged in the mock dashboard and then attached the wires to the battery. With eyes wide open, I inserted the key into the switch and gave it a turn to the ON position (there was no attempted to crank the engine). No pops, sparks, or sizzles all the while watching the gauges come to life and the fuel pump running as per the EFI protocol. About the only other items that could be tested were the turn signals indicators and the horn, all worked just fine. I ran the setup wizard for the EFI computer without a problem. So being satisfied, I turned the key off and disconnected the battery.



## Back to Work – This Engine Will Start Some Day

HVAC Hoses: All the AC hoses were provisionally installed but they required final crimping. I made several phone calls seeking out a shop the can crimp AC hoses but apparently there is only one shop left in Austin that has the ability to crimp AC hoses. It seems that no one makes their own hoses anymore as today's cars are equipped with OEM supplied crimped hoses as replacement parts. The shop was very accommodating and had the complete job done while I waited, about 30 minutes. 0619-01 shows the crimped ends and all the hoses were installed and tightened up.

Alternator Ground Wire: Just to have a redundant ground for the alternator, I ran a ground wire from the alternator ground terminal screw to an engine block bolt (0619-02).

### Cockpit Interior Paneling

The next step towards engine start according to the assembly manual is the interior assembly. However, my first step here was to design and build the rear cockpit master switch glove box. The master switch is located at the original battery location and I designed an aluminum box to fit in this location (0619-03).

The next step was to make the glove box cutout in the rear wall aluminum and drill out the mating rivet holes. I then LizardSkin'ed the exterior of the rear wall and glove box. For the (almost) final step, I painted the interior of the glove box and the interior side of the rear wall chassis matte black (0619-04).

It is unfortunate that the glove box is too large to mount onto the rear wall pre-installation and then have enough room to install the rear wall onto the chassis. The seat/seat-belt lugs on the chassis prevent this. So, I put the glove box in place and installed the master switch. With the rear wall set in place, I Cleco'd the box to the wall and the wall to the chassis (0619-05, 0619-06, 0619-07).



0619-01



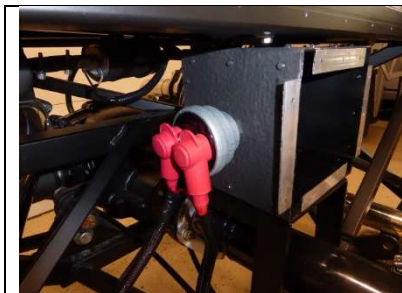
0619-02



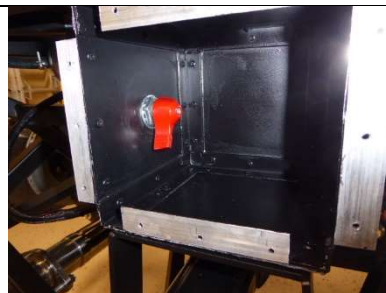
0619-03



0619-04



0619-05



0619-06



0619-07

I test fitted the floor panels, marked up the chassis tubes, and once removed, I laid out the rivet pattern and drilled it out. I transferred the rivet pattern onto the chassis tubes and Cleco'd all into place. As I surveyed all of this with satisfaction, I made two realizations. These were:

- I better run speaker wires before I permanently install the floor panels and the rear wall for ease of installation. This also meant that I better design and spec out my audio system so I know what wires to run, makes sense to me. I started my research into audio systems and all I can say is that today's systems have changed considerably since I was a teen.
- The Hot Rod has no provisions for a back-up light. Hence, another wire needs to be run to the rear of the vehicle via the transmission reverse switch and I need to figure out a back-up light scenario. Work to be completed at a later date.

While I was researching audio systems, I LizardSkin'd the bottom of the floor panels and prepped them for installation (0619-08).

### Audio Systems Research Results

I investigated everything from single DIN to Double DIN, CD Plus BT, Nav Systems, 2/4/5 Channel systems, subwoofers, to amplifiers. Major discussions on this with Barb (yes, in the evenings over a cool glass of wine) resulted in us agreeing that, with the Hot Rod being a roadster and the noise will be about the same (or more) as the jeep with the top off, a simplified system will work out just fine. Plus, space is somewhat limited for the components, especially the speakers.



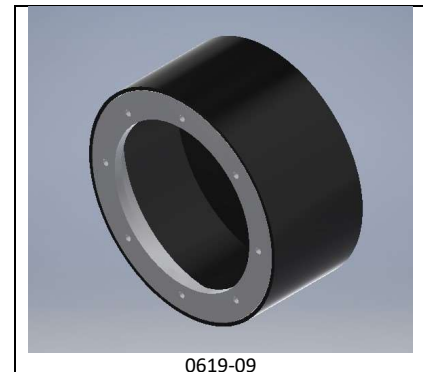
0619-08

All the above work boiled down to this system:

- Pioneer DEH-S5120BT single DIN stereo receiver with Bluetooth, CD, MP3, Front USB, Auxiliary, Pandora, AM/FM, Built in iPod, iPhone and iPad Controls, ARC Phone app, and Dual Phone Connection. This is a 5-channel receiver, but I am initially going to use it as a 4-channel system. (Possible future upgrade.) No subwoofer at this time because I can not find a decent place to mount it.
- Pioneer GM-A4704 4-Channel Bridgeable Amplifier with 40-watt RMS output per channel. This will be mounted in the trunk adjacent to the battery.
- Pioneer TS-A1370F A-Series 5-1/4" 3-Way Car Speakers, 50-watt RMS, 4 each. Front speakers will be mounted in the doors and the rear speakers will be mounted in the lower outboard corners of the rear cockpit wall.

Obviously, the front speakers will be mounted on the doors so they will be protected. However, the rear wall mounted speakers' aft side are exposed to the environment and an enclosure is required. My solution was to make the enclosure out of ABS plastic utilizing my 3D-Printer. Because of 3D printing limitations, I made it out of two pieces, a mounting flange and a cap. These parts will be glued together and sealed. 0919-09 illustrates the design.

Once I received all the components for the audio system, I could not resist setting it all up on the bench and wiring it together temporarily. It sounded pretty good. I even synced my iPhone to it and called Barb.



0619-09

## June Ends – Summer is here, it's HOT!

June ends with the audio system back in its boxes. I finished the month by temporarily installing the rear cockpit walls, glove/master switch box, floor panels, and the driveshaft cover. Next step will be to tackle the transmission cover and all of the remaining steps required getting always closer to engine start.



0619-10

## Progress During July 2020 – God Bless the USA, Happy Independence Day

The heat is on, literally the hot days outside and my personal race towards engine start. Nominal progress, albeit very significant progress, was made in July. Very satisfying for me was putting the wheels on the ground on 07 July 2019, 01:14 pm. Wheel alignment was another satisfying step which was very time consuming using the primitive tools at hand. I have outlined the details below. 20-22 July were also very big days as discussed below.



Wheels on the Ground

### Transmission Tunnel Cover

The floor panels, rear cockpit wall, and driveshaft cover are installed and held in place temporarily with Cleco's, so it is time to install the transmission cover. My plan is to use the fiberglass cover that came with the kit during the initial outfitting. Once I get to finishing the interior, I am contemplating fabricating a narrower custom console cover that will be integrated with the dash. The kit provided cover will be satisfactory for now for protection during engine start and Go-Cart. It slipped in fairly easily. The wire harness is very bulky and the EFI harness make fitting all of this in somewhat cumbersome (0719-01).



0719-01

### Accelerator Pedal

Installing the accelerator pedal was completed as per the assembly manual. Note that the pedal was installed slightly skewed outboard in order to accommodate the throttle cable firewall penetration. The fuse box interfered with, more or less, a vertical installation. This will require removal and re-mounting after the interior carpet is installed.

The throttle cable provided with the kit was challenging. I believe it is designed to be long enough to fit to fit just about any engine/carburetor configuration. Unfortunately for my application, I only needed about a 12" run. Nowhere could I find a satisfactory instruction on how to shorten this cable safely. So, I purchased a LoKar XTC-1000HT cable and installed it modifying the length as required. This is shown in pictures 0719-02 and 0719-03.



0719-02



0719-03

### Clutch Initial Fill



I filled the hydraulic clutch reservoir and opened the bleeder valve and watched. I let the hydraulic clutch gravity fill until fluid came out the bleeder and then closed the valve. I pumped the clutch several times inspecting for any leakage, in which I had to tighten one connection. I need some help with the final bleeding so hence this is on hold.

Update: A few days later and with Barb's assistance the clutch bleeding was accomplished. I used the bleeding technique outlined on the McLeod website and encountered no problems. I did observe that, after the clutch pedal is depressed and as it is being released, the clutch fluid does get sucked back into the system at the bleeder valve. Hence, it is critical that the bleeder valve is submerged in fluid during the bleeding operation.

## Wheels on the Ground

The Driver's seat harness (0719-04) is required for G-Cart and it was installed as per the manual. Just the shoulder and lap harness are installed at this time, the fifth belt will be installed onto the chassis floor tubing when I permanently install the floor panels.



It was time to put the wheels/tires onto the Hot Rod. The lug nuts were torqued, the rear end was jacked up, the roller stands were removed, and then jacked down to place the wheels on the ground. The front end was placed on the ground in the same manner. This occurred on 07 July 2019 at 01:14 pm. Wheels Down.

The wheels on the ground allowed me to check some previous work. The wheel lug nuts torque was checked. The driveshaft adapter torques were completed previously so there was nothing to do here at this time.

My challenge was the rear axle nuts. The assembly manual instructions include torquing the nut to 98 ft.lbs. and then rotating the nut an additional 45 degrees. Well, I was only able to turn the nut about another 2 degrees and nothing more. I tested this with my big torque wrench and it maxed out at 250 ft.lbs. I quired F5R and they suggested to back off the nuts and retorqued to 220 ft.lbs. This made sense with me as over torquing the nuts could lead to some fatigue issues down the line. I did as suggested.



## Electric Steering Assist Control Module

I tested the steering while sitting in the seat. I am very glad that I purchased the electric steering assist option when I bought my kit. Yes, the Hot Rod was stationary, but it was tough turning the steering

wheel. I decided to install the control module and have the electric steering assist operational for Go-Cart.

I have always intended to install the control module up under the dash in a protected area. I did not make sense to me to mount it onto the chassis in the engine compartment area. I picked out a location so the control module could be mounted to the firewall chassis tubing directly in front of the master cylinders. I fabricated a mounting plate to facilitate the installation and attached the control module to the chassis (0719-08).

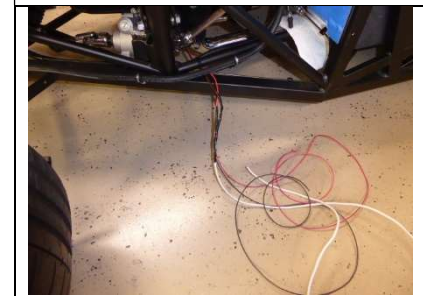
This work also included extending the 4-wire communication bundle and the 2 power wires so that they would reach the mounted control module. I purchased a length of communication 4-wire 18 AWG wire bundle and spliced it into the existing bundle (0719-09). The same was accomplished with the 2 power wires. These wires were wrapped in loom and run along the bottom chassis tube to the firewall and then run up adjacent to the brake and hydraulic clutch tubing entering the dash where the control module was mounted.

The control box interface wiring to the Hot Rod wiring harness included:

- The red power wire: Connected to the control box connector and the 40-amp fuse was spliced in. A spade connector was added here so that a dash mounted on/off switch can be added at a later date. This wire was then embedded into the wiring harness loom and run to the starter solenoid (+) and attached with a ring connector.
- Black ground wire: This was attached to the chassis tubing adjacent to the control module as a ground.
- Green key on power: This wire was connected to the tan Electric Choke wire in the sending harness. This wire can also be used if any other “Power On” requirements are necessary. Also, an additional wire was run to one side of the indicator LED.
- Orange LED: This wire was run the second LED wire.
- Purple wire and White wire: These are diagnostic wires, spade connectors were added to the ends, wrapped in loom and then coiled up by the control module.
- Yellow wire and Blue wire: These are not used, they were terminated and tucked into the power wire loom.



0719-08



0719-09

The system was tested after the wiring was complete and it really makes a difference.

### **07/11/19 to 07/16/19: Wheel Alignment**

Wheel alignment is a relatively straight forward process but, for me, it was a very tedious task. This was basically because I used rudimentary tools and a simplistic process. I do understand the alignment requirements, but I can always learn. I read the alignment procedure outlined in “Dangerous Curves” along with watching several YouTube videos. All these processes assume that a solid axle rear end system is installed and that the wheels are centered with the chassis and parallel with the centerline of the vehicle. Unfortunately, this is not the case with an IRS system.

The IRS system also required alignment with respect to toe and camber but there is no direct reference starting point nor was anyone providing bolt-to-bolt measurements as a starting point like those provided for the front end. So, as Glenda the Witch of the West told Dorothy "It is always best to start at the beginning".

I purchased a camber measurement level which worked well. I built two alignment "Tees" out of orange store  $\frac{3}{4}$ " aluminum square tube riveted together using two 0.019" thick aluminum plates. These tees were clamped onto the tires. The vertical shaft was used in combination with the camber level to measure the wheel camber. I set up a camber level calibration station by clamping a level to my cabinet and shimming it so that vertical face reflected true vertical. This was used frequently to calibrate the camber level. Two tape measures were strung across the Hot Rod to the other clamped on tee just in front of the tire (0719-10), these were used to measure toe. A third tape measure, shown as the aft most tape in picture 0719-10 and forward most tape in 0719-11, was used to measure the parallel-ness of the wheels with respect to the chassis frame. Both driver and passenger sides were measured and adjusted to be identical. Toe was measured with the two tapes by the tires. I did utilize the tile-grease-tile turn-table idea on both the front and rear alignments. These worked well and allowed for numerous adjustments and measurements before making a 3'-4' roll of the Hot Rod.



0719-10

The rear tire alignment was first up. When I mounted the rear suspension, I set the lower and upper adjusters so that the disk brakes were reasonable straight, this assumption ended up being very wrong. I decided to track the adjustments on a spreadsheet by keeping count of the rotations, clockwise or counterclockwise, of the adjusters. The following parameters were recorded:

- Turns of the driver side lower adjuster.
- Turns of the driver side upper adjuster.
- Driver side camber.
- Driver side chassis measurement.
- Aft tire tape length.
- Forward tire tape length.
- Passenger side camber.
- Passenger side chassis measurement.
- Turns of the passenger side upper adjuster.
- Turns of the passenger side lower adjuster.



0719-11 (Tile Turntable Not Shown)

I started by taking my initial measurements and determining, as expected, everything was way off. Iterating through several steps by making  $\frac{1}{2}$  turns or 1 complete turns of the adjusters, then taking all the measurements and recording the results, I began to understand how the upper and lower adjusters affected camber and toe. But I had no idea of where I was at with respect to adjuster thread engagement in the mating suspension tubes. For all I knew, I could have been on the last couple of threads with minimal engagement. This would be obviously unacceptable. I decided to start over. Future Note: Measure and record the thread lengths of all the adjusters, front and rear, so that after alignment the final thread engagement is known.

I started by cranking all the adjusters in tight and measuring the adjuster lengths, nut to nut, ending up with the driver and passenger adjusters being the same length. This resulted in an extreme negative

camber and toe condition, but with a fairly reasonable chassis measurement agreement. All adjustments now are all accomplished by lengthening the adjusters and, when aligned, the maximum number of adjuster threads will be engaged.

Again, iterating through several steps (understatement, a gazillion steps), the rear end was dialed in so that the chassis measurements were equal, toe in by 1/8", and about -0.75 camber. After each step I would rock the Rod fore-aft and side-to-side on the grease tiles. When I thought I was close, I would remove the measurement equipment and roll the Rod 3-4 feet fore and aft. Then I would set up the measuring equipment again and start the process over.

All of this was based using my rudimentary tools and assuming the chassis was square and true. I do not know what the tolerances are for the toe and camber recommendations and I do not know the tolerances are allowed in the chassis assembly. Hence, I am not sure of where I ended up, but I think I am in the 1/2 degree and 1/8" range. When I take the Hot Rod to the shop for the registration safety inspection, I am going to ask them to check the alignment. It will be fun to determine if I am close.

Front alignment was a little easier as the lower alignment tubes primarily effected camber and the tie rods effected toe. I initially set the bolt-to-bolt and bolt-to-zert distances as per the assembly manual as a starting point. The same measurement process was utilized as I did on the rear end. It is noted that the steering rack rod ends have no flats in order to make adjustments. Hence, I used a vice-grip which left the expected gouges and marks. I also cut off the boot zip tie so that the boot could be counter-rotated and kept in its correct alignment. The forward tube could sometimes be turned by hand, but I also had to occasionally use a vice-grip on it, marring it as expected. Future work to clean up these areas. I turned both the forward and aft adjusters the same amount hoping this would maintain the caster angle as I do not know how to measure it.

Numerous adjustment and measurement iterations later, the front end was dialed in as accurate as possible. As a final check, I set up a string line starting at a point just forward of the front passenger tire and attached it to a jack stand. I then ran the string around the centerline of the rear tires and then up to a jack stand just forward of the front driver tire. The jack stands were both moved so that the string just barely touched the front edge rear tires. Measurements were taken at the front wheel rim edges to the string. I was satisfied with the results.

The Hot Rod is ready for Engine Start and Go-Cart.

## **ENGINE START**

I spent the next couple of days inspecting for leaks, etc. and safety checks when the time permitted. I was ready for engine start.

07/20/19: Saturday, 05:00 pm, Initial engine start. Barb and I rolled the Hot Rod out into the driveway and she filmed the event. All was going very well. I turned the key on and heard the fuel pump run through its five second priming cycle. I then programmed the EFI computer with the initial start-up information. I went to the computer's "Monitor" screens and confirmed that the start-up parameters were all within norms. I walked the Rod for another safety check, tire chocks in place, e-brake set, transmission in neutral, etc. All set, I turned the key to the start position with all the anticipation to hear the engine crank. However, what we heard was nothing, silence, no crank, and no start-up. With 100% disappointment, Barb and I rolled the Rod back into the shop.



We finished the evening by putting the battery on a 2 amp trickle charge, it was reading right at 12.0V and it has been sitting around for quite some time. During the evening and with time to think about it, the only two items that would prohibit all power to the starter is the Master Switch and the Clutch Safety Switch. I doubled checked the master switch to ensure it was in the "On" position and checked the fuse. All was in good operating condition.

I believe I misunderstood the purpose of the Clutch Safety Switch (CSS). My perception of the switch's function was to complete the start crank circuit when the clutch was depressed, hence the Rod being out of gear. So, I loosened the switch in the bracket so that the button was fully out thinking I disabled the function. I came to the assumption that it was the CSS that prohibited the engine from cranking over. Sunday morning, I made a spade jumper wire and hooked it up to by-pass the CSS altogether. I have come to understand that the wiring method outlined in the manual has the CSS wires on the aft terminals which complete the circuit with the button depressed, i.e. when the clutch pedal is in the rest position. In this condition, the shifter must be in neutral prior to turning the key.

07/21/19: Sunday, 10:30am, I plugged the jumper wire in place, reconnected the battery, turned the key to the "On" position, and re-programmed the EFI computer. I tested the system by turning the key to the crank position for just a second as the engine started to crank. Yahoo moment!

I ran back into the house, with all the excitement of a little boy getting his first (add anything you want here) to get Barb, my photographer and camera-cowgirl. At about 10:50am on Sunday, 07/21/19, I turned the key to crank and with about 4-5 cranks (maybe just 3), the engine came to full life.

DOUBLE WHAMEE YAHOO MOMENT, the Hot Rod lives.

The engine has a great sound. I let the engine idle and brought it up to temperature for about 10-15 minutes. The dash gauge went to 160 degrees and the EFI computer was indicating in the range of 175-183 degrees. I walked around the Rod looking for any anomalies or leaks, all's good man. The radiator fan kicked on as required. The exhaust manifolds smoked for a bit as the VHT ceramic paint cured. I turned off the engine to let it cool down. Once somewhat cool, I checked the oil level and radiator level. Oil level was good, but I needed to add some more antifreeze to top the radiator off. It was time to toast our success and with a bottle of Axis Sparkling Almond Wine, Barb and I toasted to our future hot-rodding days (0719-12).



0719-12 – Our Toast to Engine Start

07/22/19, Monday: Go-Cart time – I did a walk around and safety check and being satisfied I brought the Rod to life. I jumped in and buckled up the seat harness. I slowly backed out of the shop, testing the brakes as I rolled backwards. I then did a series of brake tests in the confines of the driveway starting off slowly and then increasing my speed and braking harder and harder. I was satisfied with the brakes and ready for Go-Cart.

Slowly departing from my driveway with anticipation, I took the Hot Rod around the block for a couple of laps. Mostly drove in 2nd gear, did some in 3rd with the engine at idle (subdivision speed limit is 25 mph, but they are private roads, so it was okay to drive around without a registration or license plate). Way too much fun. During the run, I did some more brake tests at different, albeit slow, speeds. The Rod handled well, no problems with steering or brakes, the gauges looked good, but the speedometer was not working (more about this later).

Check out 0719-13 through 0719-17 for the Engine Pre-Start Walk-Around, Start Sequence, and Brake Tests Videos.

07/23/19 to 07/31/19: I was a very happy man now that engine start and Go-Cart was a complete success. One issue that really bugged me was and still does is the main wire harness configuration. I decided that I was going to completely re-work the harness and make it fit the Hot Rod more appropriately. I also decided that I was going to install the HVAC wiring (except for the trinary switch as discussed earlier). I did this for the remainder of the month basically grouping the dash connectors together and the front/rear/sensor connectors together and shortening everything as much as I could. I created a trinary switch harness so that it could be plugged in when I was ready to charge the system.

During the first Go-Cart run I discovered that the speedometer was not working. I researched the forums and learned that the green sensor wire is attached to the speedometer and the second wire must be manually grounded. I thought this occurred internal to the harness, but it is not, and it is not mentioned in any of the manuals. Once I grounded this wire, the speedometer registered speed but the odometer was not functioning. I am hoping that this will be taken care of once I perform the 2-mile calibration procedure. Fingers Crossed for now!

In summary, I completed the following work:

- I added separate power wires for electric assist steering (EAS) and for the main HVAC power. These wires were incorporated into the main harness with terminal ring connectors to the starter (+) terminal.
- I isolated the electric choke wire all the way back to the fuse panel as this wire is used as the EAS ignition switch power. The EAS control box is mounted just above the fuse panel.
- I added an EAS power switch to the mock dashboard and built a pigtail with spade connectors so that the EAS could be turned on and off. I also added the red LED EAS indicator light to the dashboard along with a pigtail and connectors.
- The brake and clutch safety switch wires were isolated and drawn back to the fuse box so that they were very close to the actual switches located in the pedal box.
- The Holley Sniper EFI harnesses were cleaned up by basically removing the wires I would not be using.

However, the fan control wire was run up to the fuse box for a future connection to the fan power relay so that the EFI computer can control the radiator fan instead of the kit provided radiator thermo switch. In addition, I left the wires required for the EFI computer to control the distributor timing functions intact for a possible future upgrade.

- I grouped the dash harness connectors and the accessory leads together about 12" from the fuse panel and pointed them aft. (I plan to use a removable dashboard centered on the body dash area.)
- The removable dashboard now has the following connections: 1) The 3 main connectors, 2) The ignition switch, 3) The headlight switch connector, 4) The EAS power switch, and 5) The EAS LED indicator.
- I grouped the front/rear/sensor connectors together, again about 12" from the fuse panel and pointed them forward on the driver side of the transmission cover.



0719-18 – As-Delivered Harness



0719-19 – Modified Harness

- The HVAC wiring was bundled, the thermo switch bundle was run adjacent to the main power harness and the other two power and control connections were run to the approximate location for the control panel, which will be installed just below the dash.
- The main power wires in the main harness are too long for the Hot Rod application. This portion of the harness will need to be coiled up in the dash area in order to fit. I left this as-is instead of attempting the re-terminate them to the proper length.

After the above work was completed, there were two transmission cover penetration zones which included:

- Drivers Side: Front Harness, Rear Harness, Sensor Harness.
- Passenger Side: Main Power Harness, EFI Interface Harness, EFI Computer Harness, Coil (+) Power and Coil (-) EFI interface Lines, Heater Thermo Switch Harness, and the AC Trinary Harness.

The end result was still a pile of spaghetti in the dash area, albeit a somewhat more organized smaller pile of spaghetti than the install of the original harness configuration. I will definitely need to cover in the area between the transmission cover and the dash to hide the pile.

### **July Ends – A Month of Many Celebrations**

The major portion of the mechanical work is complete. Engine start and Go-Cart was a total success. Next up is the start of Assembly Manual Chapter 4, The Body Work. However, I have a couple of odds and ends to clean up on the mechanical side which include:

- Check steering wheel center position.
- Need to calibrate the speedometer.
- Clutch Switch adjustment, final check after engine start.
- Finalize pedal placement and Loctite pedal screws.
- EAS: Check for engine rotation clash, On/Off Switch and LED indicator in dash.
- Rust on steering DD link. Powder coating with a chrome powder or replace with modified surplus link. Re-Powder coat front adjuster tubes.
- Clean up all wire harnesses.
- Connect EFI Fan Control - Option
- Run Coil (+) through MSD Relay - Option
- Complete HVAC wiring (except compressor connection).
- Run Speaker wires
- Decide on cockpit lighting.
- Modify aft cockpit wall for speakers.
- Floor heat protection - Mandatory
- Take pictures and design exhaust system cutouts.
- Mount (0) glove box and seal, (1) aft cockpit wall, (2) floor panels, (3) driveshaft cover, (4) e-Brake. Do not forget sealant.
- Side Panel cutout to be fitted with sheet aluminum patch (Page 304)
- Determine patch for hole in driver side floor panel.
- Decide on 5th point for seat harness.
- Decide on transmission cover, kit supplied versus custom.
- Design transmission cover and fabricate shell.
- Adjust accelerator pedal inboard for brake pedal foot clearance.

I am looking forward to August and putting the body back onto the chassis.



## Progress During August – This is “Boomers Making A Difference Month” and also “Motor Sports Awareness Month”, who would have known!

August was a very HOT month. High temperatures can lead to being slow and lazy and I may have slipped into this category. Engine start and go-cart were successful last month leaving me with a lengthy list of odds and ends to finish up on. My goals for August were to:

- Complete as much as possible post go-cart to-do list.
- Install the trunk aluminum so that the battery can be set up in its final configuration. This will allow for engine starts.
- Put the main body back onto the chassis.

I put the Rod back onto the chassis roller stands so that it could be manipulated under the hoist and facilitate the body installation and removed the rear tires. Picture 0819-01 illustrates the body installed which occurred the first couple of days in September. However, prior to that, the following work was completed:



## Steering Wheel Center Position Check

During Go-Cart and when I was driving in a straight line, it appeared that the steering wheel is about 10 degrees ccw for straight wheels. The horn wire prohibits the adapter hub and steering wheel rotation. It most likely is a wheel alignment issue. I might also just need to re-clock the spline connection for the u-joint at the steering rack. This will be checked after final wheel alignment.

## Speedometer Calibration

During Go-Cart, the speedometer was not operating. After research, I discovered in the F5R forum that the gray speedo sensor wire is to be grounded (Note: Nowhere in the manuals is this mentioned and the installation instructions that came with the AutoMeter gauges did not cover this. The gray wire is now grounded. Tested active, but the speedometer still requires calibration. One of these days I plan to take the jeep around the block and map out a 2-mile course so that the speedometer can be calibrated as per the instructions. This will be as accurate as I can do for now.

## Clutch Safety Switch

I decided not to install the kit supplied clutch safety switch that was installed in the pedal box, so it was removed. Fortunately, the TKO 600 has a neutral position switch installed with its leads exiting the transmission between the shifter and the drive shaft. It had a factory installed Ford connector on it and I did not have the mating connector on hand. So, it was cut off and a 2-cavity weatherpack connector was installed. Two white wires from this connector were run to the fuse box location and connected to the



two light blue IGN SW→NS SW wires. The engine will not crank unless the shifter is in neutral and, with this configuration, the clutch pedal position is a moot point now.

### **Backup Light**

What, no backup light included. Is a backup light required for the safety check which leads to a successful registration? I do not want to chance that. Fortunately, the TKO 600 has an installed switch which closes when the shifter is put into the reverse position. The mating connector was purchased and installed. A green wire was run from the fuse box area, through the switch, and then back to the rear end in parallel with the tan and ground license plate light feed wires. This wire will be connected to the main harness "Brown Radio Power" wire (along with the audio system and gauge feed). This is fed by a 10-amp fuse on the ACC FEED, hence, the backup light will be turned off when the key is off and the gear shift is left in reverse.

### **Check for any EAS Drive Motor / Engine Clash**

There is about a ¼" gap between the Electric Assist Steering drive motor and the engine oil pan. I was worried that possible engine torque rotation would close this gap and create a clash situation. The engine was accelerated from idle to 3000 rpm and very little engine rotation was observed with respect to the EAS motor. However, the increased additional torque due to full acceleration was not tested. This will need continued monitoring.

### **EAS On/Off Switch.**

An EAS on/off switch was added to the mock dashboard. The EAS control module red power wire was routed through the switch using spade connectors. This was successfully tested while the Rod was parked and also tested during a go-cart.

### **Steering DD Link Rust Problem**

The DD link between the EAS mount bearing and the fire wall bearing was replaced by a plain steel DD link. This link was custom cut to fit the EAS application thus saving the original SS link, which could be re-used if I later decided to scrap the EAS system. So I decided to powder coat the plain steel DD link with a chrome powder. It looks OK (0819-02)



### **Front Adjuster Tube Coating Damage**

One tries to do their best but sometimes crap just happens. The front suspension adjuster tubes coatings were damaged during the wheel alignment process (0819-03). This is because there are no wrench hex profiles on the adjuster tube to facilitate adjustment and vice grips were used. This will always be a problem as I will most likely need to recoat them again after final wheel alignment.

I did not want to change the alignment length, so the front adjuster links were removed complete with the mounting clevises. The mounting clevises and adjuster locking nuts were protected with high temp tape and aluminum foil. The remaining middle tube was powder coated and oven cured. Hence, the adjuster link length was not altered when it was re-installed.



### **Aft Cockpit Wall Speaker Modifications**

Speakers are to be added forward in the doors and aft mounted behind the cockpit wall, both sides. Holes were cut out of the aluminum aft cockpit wall to facilitate the speaker mounting. Speaker enclosures were built by 3D printing the speaker housing out of ABS plastic. The exterior speaker housings were coated with a layer of fiberglass and epoxy and then sprayed with LizardSkin acoustic coating. A light layer of ceramic coating was added as the final coat. 0819-04 and 0819-05)

### **Aft Cockpit Wall Installation**

The aft cockpit wall could not be installed with the speaker enclosures pre-installed onto the wall or with the glove box pre-installed, so each component was installed individually. Sealant was applied to the glove box front and chassis tubing. The wall was installed using 1/8"



rivets and were applied to the glove box interface and to the chassis tubing. The wall/glove box interior interface was sealed with black caulk. Sealant was applied sealant to the speaker enclosures mating face and then installed onto the aft wall.

### **Speaker Wires**

A 9-wire bundle was run from the fuse box area, eventually connected to the audio receiver, to the trunk where the audio amplifier and battery will be installed. A speaker wire harness was created and run to each of the speaker locations:

DF – Driver Front, to be mounted in the forward section of the door.

PF – Passenger Front, ditto above.

DR – Driver Rear, to be mounted in the custom-built speaker enclosures that are mounted onto the aft cockpit aluminum wall.

PR – Passenger Rear, ditto above.

The speaker wires were run into the enclosure and prepared with connectors ready for speaker installation. The temporary covers were installed onto the speaker housings (for protection during construction).

### **Cockpit Floor Heat Protection**

We all know that the cockpit floor aluminum proximity to the exhaust system creates an extreme heat situation for the cockpit area. Even with the LizardSkin coating to the underside of the aluminum, after go-cart, it was impossible to even touch the floor aluminum. With a belt and braces approach, I decided to apply two coats of LizardSkin Sound Control and two coats of Ceramic Insulation to the upper surface

of the floors. The F5R sound and insulation kit will be installed later as well as the carpet. Hopefully this will help to protect us from the high heat levels, we really do not need extra heat from below as well as heat from the Texas sun.

### **Cockpit Floor Temporary Installation**

The cockpit floors were temporarily installed (0819-06) along with the driveshaft cover and the kit provided transmission cover, holding all together with Cleco's. The e-brake was also re-installed. A near future modification is to add cutouts to the exhaust system and, in late August, I started the initial design for the modified exhaust system. I will most likely leave the floors in the temporary installed state until after body painting and final body mount. Removal of the floors will greatly facilitate the exhaust modifications.



### **Left Over To-Do's**

I really want to put the body on so the remaining to-do's were placed on hold. These include:

- Side Panel cutout to be fitted with sheet aluminum patch (Page 304)
- Cover Panel for hole in driver side floor panel (mirror of the e-brake cutout).
- Connect EFI Fan Control
- Run Coil (+) through MSD Relay
- Finalize brake and clutch pedal placement and locktite pedal screws.
- Decide on cockpit lighting.
- Decide on 5<sup>th</sup> point for seat harness.
- Decide on transmission cover, kit supplied versus custom.
- Design transmission cover and fabricate shell.
- Adjust accelerator pedal inboard for brake pedal foot clearance.
- Decide if this is a good time for radiator polish?

### **Let's Get to the Body Installation**

We are late in August (circa 08/25/19) and I am back to, sort of, following the assembly manual starting now with Chapter 4 – Body Work. The chassis was prepared by temporarily setting the upper trunk aluminum in place. The door hinge driver and passenger standoffs were previously installed. I previously removed the door stops to facilitate body hinge cutouts so I re-tightened them as required. I noticed that rust was starting to form on the socket bolt.

### **Body Temporary Installation**

Both upper seat harnesses were installed prior to installing the body. The Rod was moved out of the way and the body was hoisted up clear of the area. With the Rod positioned, the body was then lowered onto the chassis to check for fitment. The following clashes required attention:

- Cutouts are required for the seat harnesses. This was completed using the upholstered top cover as a template (also refer to page 427 in the assembly manual).
- The fuel delivery line clashed with the leading edge of the body, note this is the new combined fuel pick-up and level sender unit. A notch was cut in the body to relieve the clash. This may lead to a big clash when I try to fit the fiberglass cockpit rear cover.



- There is no way to install the trunk front aluminum panel after the body is installed. This is because of the new fuel tank design fuel filler location and the requirement that the top edge of the aluminum panel must be tucked under the body edge. Also, the chassis side diagonals are skewed inboard which prohibits the panel from slipping into position.
- (08/30/19): Note - The fuel tank needs to be perfectly centered so that the trunk back panel with the fuel filler cutout is also centered. The fuel tank was installed with the forward edge just barely clear (a very small gap) of the 1" down tubes. This leaves about 1/16" gap between the trunk forward panel and the fuel tank aft panel. Hence, no fasteners can be used in the lower portion of the trunk aft panel and two side panels.
- (08/30/19): The steering column was installed utilizing the lower forward mounting hole in the pedal box. This resulted in a clash between the steering column and the bottom of the body dash edge.

The body was lifted off the chassis so that the following work could be completed:

- Temporarily fitted the trunk forward panel, side panels, and upper floor panel, drill mounting holes and installing all with Cleco's (complete 083019).
- Remounted the steering column in the upper pedal box holes so that the column is in the most horizontal position possible.

### **August Ends – Blood Sweat and Tears, Let the HOT Days Be Over**

To reiterate, a little progress is still progress. August ended up being a fairly successful month with two of the three goals almost complete. Now onto Labor Day weekend, time to relax on the banks of the Guadeloupe river watching tubers with a glass of fine wine and lots of music.

### **Progress During September – A Time to Remember and Reflect 9/11**

September hopefully will bring some cooler weather and rain. I envision days where I will be working on the Rod with the shop door open, that will be very pleasant. September goals include (yes, to finish the August goals):

- Installing all the trunk aluminum so that the battery can be set up in its final configuration. This will allow for engine starts.
- Finish the battery enclosure box and install, hook-up, start the engine, and go for another go-cart.
- Put the main body back onto the chassis so that the next step in the body work can be started.

Time to get to work.

09/01/19 to 09/10/19: The month began by lifting the body up slightly and removing the trunk aluminum. I then LizardSkin'ed the trunk forward panel and side panels with Acoustic and Ceramic coatings (0919-02). The trunk upper floor, front panel, and side panels were temporarily installed, held in place with Cleco's, and the body lowered back down onto the chassis to check fitment. The aft lower edges of the side panels clash with the body installation and need to be gently folded inboard so the body can be slipped over them. (I worry that the trunk hood edge is a big clash issue, I will not know until I can see the fitment.)



After the body was lowered back onto the chassis, it was checked for fitment and clashes (0919-03). The cockpit gap of 45.5" was double checked. At this point, all is Looking Very Good (0919-04). I attached the body to the chassis with the aft wheel well bolts/spacers, side cockpit screws and the firewall button heads.



0919-03



0919-04

I took some time to design the battery box enclosure. I fabricated a clamp spacer/bracket out of ABS plastic with my 3D printer so that the kit provided battery clamp would fit the Odyssey battery more securely (0919-05). Construction of the battery box enclosure was completed on 09/07/19. Next step is final epoxy and finishing. I also determined the final location for the battery and audio amplifier.

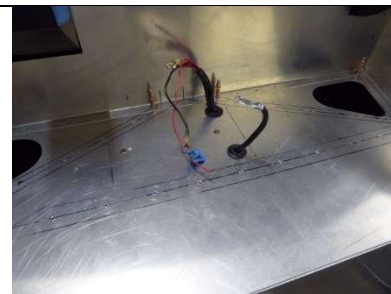


0919-05

Work continued on the trunk aluminum by drilling out all the rivet holes. The battery cable holes were drilled out, grommets installed, and the cables run into position. The battery box enclosure hold-down rivnuts were installed. Holes were drilled into the aft lower corners of the trunk side panels, grommets installed, and the rear wiring harnesses were run through the grommets and placed at the rear taillight locations (0919-06 to 0919-08).



0919-06



0919-07



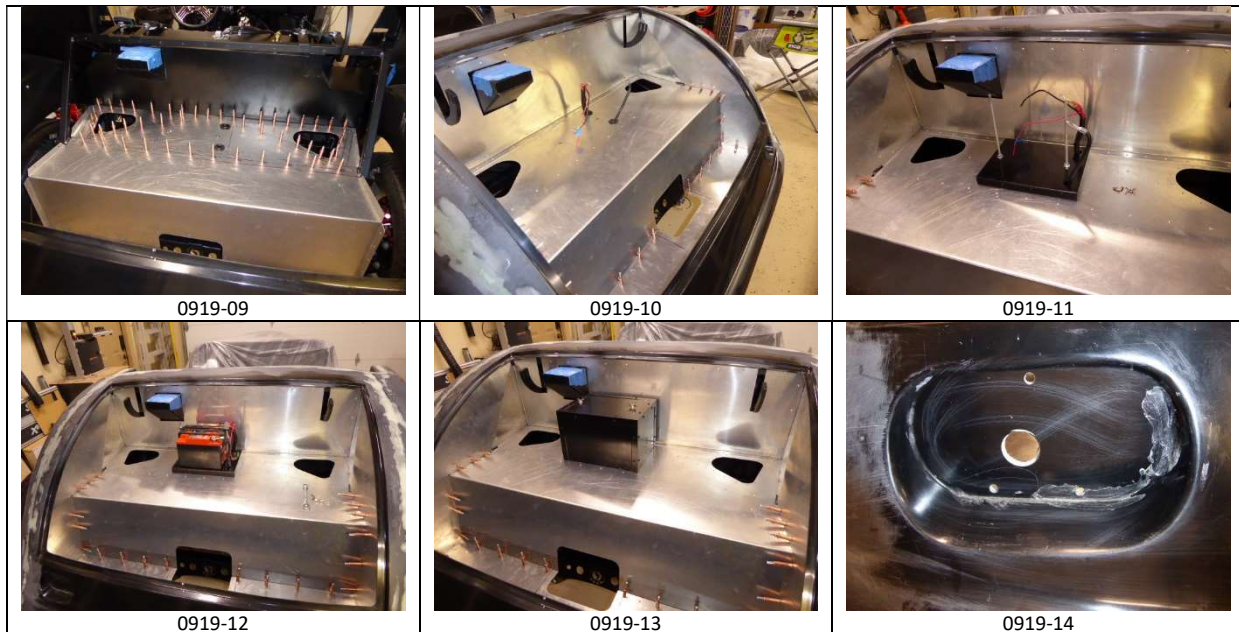
0919-08

09/11/19: A Day of Reflection.

09/14/19 to 09/21/19: Barb and I did a Branson Bug-Out week of fun.

09/21/19 to 09/30/19: Time to permanently install some of the trunk aluminum. This will include the trunk upper floor, trunk front panel, and to partially install the trunk side walls. The side walls do need to be folded towards the center of the Rod in order to remove the body so all the lower connections will remain temporary. I raised the body up a couple of inches and left it hanging on the lifting bracket. Starting with the upper floor, sealant was applied between the chassis and panels, the floor was placed into position, and was held into place with Cleco's (0919-09). Rivets were then installed. The process was repeated with the front panel and the side panels (0919-10). The body was lowered back into position onto the chassis and fitment was again checked. The rear bolts, firewall button heads, and the

side screws were installed. The battery was installed starting with the base, then the battery and cover (0919-11 to 0919-13).



I went back to the assembly manual with most of the trunk work as complete as possible at this time and started to look at all the body cutouts. I started with the taillight cutouts (0919-14). Next item to look at was the cutout in the body dash area for the removable dashboard. I set up the mock dashboard and taped the printout to the dash. This concept has the AC vents installed into the outboard wings of the removable dash. OOPS, the driver side AC vent has a direct clash with the pedal box and brake master cylinder lines. Oh well, back to the drawing board.



I set the dash cutout work to the side for the moment in order to develop the trunk audio amplifier box. I was OK with the construction of the battery box (epoxied wood with aluminum angle edges) but I wanted to try an all-aluminum amp box so that it could be matte black powder coated the same as all the chassis parts. So far, I'm very happy with the results of the amp box (0919-16 to 0919-18).



## September Ends – And it is still friggin' HOT

September closes with the month's goals almost complete.

- The trunk aluminum was installed so that the battery can be set up in its final configuration.



- The battery enclosure box was finished and installed. The engine was fired up and allowed to idle to running temperature even though the Rod is still resting on the roller stands, ie no go-cart just yet.
- The body was installed back onto the chassis so that the body work can be started.

Hopefully, some day it will start to cool off!

### Progress During October – Fall Weather and Ghosts Coming Right Up

My October goals are fairly simple:

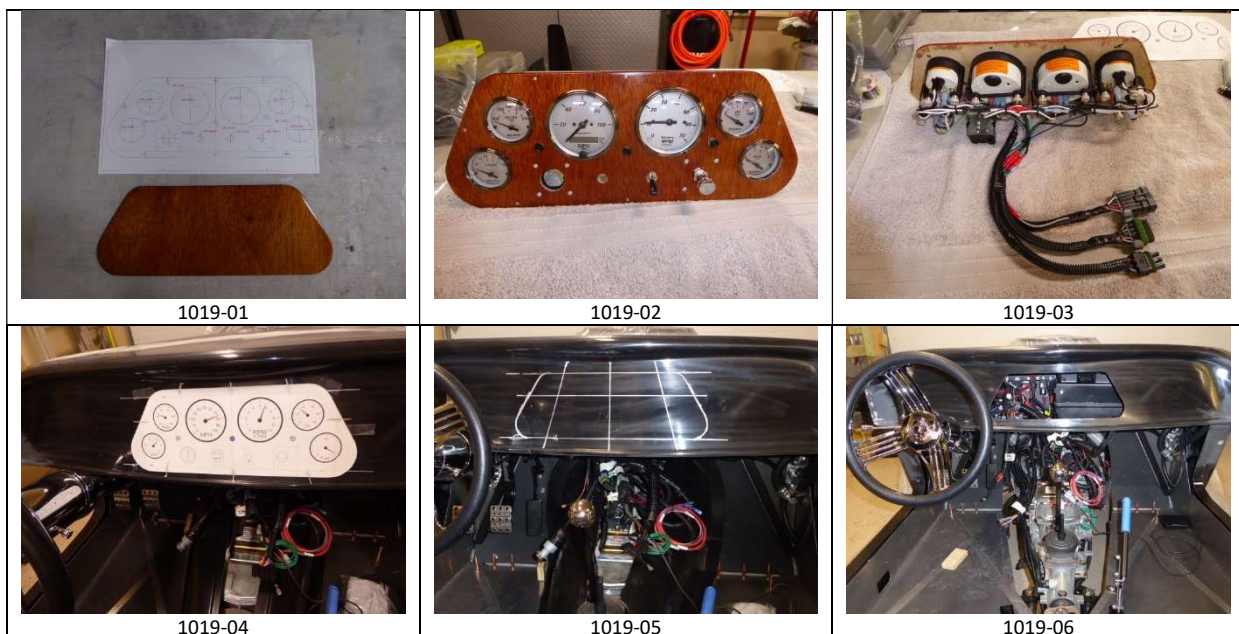
- Finish the September outstanding work so that the Rod can go-cart again.
- Build an all-aluminum battery box, powder coat, and install.
- Finish the fabrication the Dashboard Mockup II and install.
- Complete the work on the transmission cover so that the work on the custom console can begin.

October, please bring some cooler weather.

### Dashboard Mockup II

A new dashboard arrangement was designed without the AC vents during the last week in September. I decided that I wanted to work through the process for finishing the dash just like I would for the eventual final exotic wood (yet to be determined) configuration. So, I used a cheap piece of Luan (door skin) plywood and, after it was cut to shape and sanded, applied epoxy and fiberglass. A couple of epoxy coats later, sanded completely, and clear coated, the dash was ready for the gauges. The gauges were installed and wiring harness were simplified. Sensor wires are now attached directly to the appropriate gauge with the jumpers removed. All other wires were shortened so that the harness was more compact and easier to handle. This is illustrated in photos 1019-01 to 1019-03.

The body dash cutout was accomplished by taping the cutout drawing to the dash, marking the cutout along with the mounting bolts alignment lines, and using a Dremel jigsaw to cutout the fiberglass (1019-04 to 1019-07).



10/05/2019: The removable dash was installed onto the body, plugged in, and tested (1019-07).

The time has come to put the Rod back onto the ground, so the roller stands were removed. The engine was fired up and the Rod went for another go-cart ride. The following issues were noted during the test ride:

- The speedometer still needs calibration.
- The turn signals were functional, but the hazard signals did not work.
- The high-beam indicator light was not functional.

I am assuming that the headlights and taillight installations will complete these circuits.

### **Aluminum Battery Box**

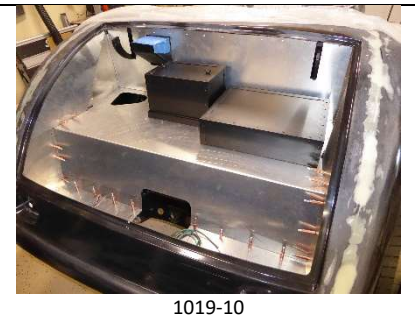
10/06/2019: The all-aluminum amp box looked good. I wanted the battery box construction to be identical and it was redesigned. I felt that the battery box base needed to be in a tray configuration so that, if the battery ever leaked, the battery fluid would be contained. I also designed the cover to be smaller so that it can fit inside the tray (1019-08 to 1019-10).



1019-08



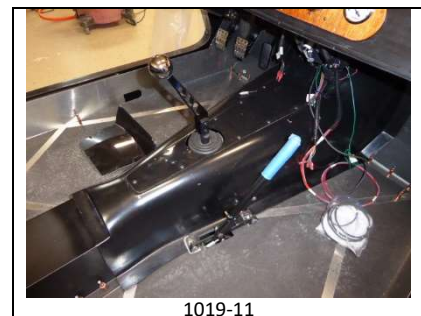
1019-09



1019-10

### **Transmission Tunnel and Center Console Mock-Up**

10/07/2019: First day of cool fall weather, rejoice. The shop door is open, fresh air and sunlight has filled the shop. Time has come for a complete Fall Cleaning of the shop and reorganization of the Cabinet Workbench area. With that done, now back to work.



1019-11

I pulled the transmission cover from the Rod and started to trim the center cover to fit. I concluded that there was no way I could slot the top of the center cover, with any kind of accuracy, to fit the wire harness penetrations with the body in place. So, I just cut the top part off and trimmed the lower portion of the center cover to fit. The next time the body is off the chassis, I will work on fitting the top piece which is shown sitting on the floor in 1019-11.



10/11/2019: I plan to design and build a custom center console that will be placed over the kit supplied fiberglass transmission cover. My design is still a work in progress, but I wanted to get a visual of what is possible. I built a quick crude mockup and used some sketches to get the visual (1019-12). Yep, a lot more thought is required here, but this will be for another day.

### Getting Back to the Body Work

Almost exactly 1 year ago (October 2018), I worked on the major body preliminary fitment of the doors, engine side panels, hood, and nose cone while I waited for the backorder parts to be delivered. So, I went back and started again on Chapter 4 of the Assembly Manual. Reviewing the Body Cut-Outs:

- Door Hinge Cutouts – Previously done in October 2018.
- Door Sill Body Mounts – Previously done in October 2018.
- Pedal Box / Master Cylinder Access Panels – I mounted a three-chamber master cylinder reservoir on the engine side of the firewall. Hence, I do not have a reason at this time to add these cutouts and I am skipping this for now.
- Firewall – Previously done in October 2018.
- Fuel Filler – The new style fuel tank does not require the fuel filler and cap to be mounted on the body. Hence, I cut this out and used body filler to fill in the remaining indentations.
- Taillights – This work was completed as per the Assembly Manual.
- Gauges Door Hinge Slots – Previously done in October 2018.

Next up in the manual is the door fitment. However, I was worried that there may be some unknown clashes with the doors and the cockpit rear cover (waterfall) so I started the fitment of the waterfall.

### Waterfall Fitment

10/15/2019: The waterfall was trimmed to fit the door sill area and hinge cutouts and then placed into position (1019-13). The lower edge was modified to fit the rear speakers and the aft glove box. The upper edge was trimmed to follow the contours of the body and the seat harness cutouts. I plan to install a molding around the hinge cutout but as shown in 1019-14 and -15, the body needs to have some added fiberglass to cover a small gap mismatch. Just another item added to the worklist when the body is next removed. The good news so far: No clashes were discovered with the doors.





## Back to the Doors

10/17/2019 to 10/31/2019: Having thought about the door installations for over a year now, I decided to mount the strikers as shown in 1019-16. Now the striker head is slightly more aft, both of the doors required a little more fitment work. This mainly consisted of trimming the door aft edge slightly and extending the front edge slightly. Starting with the passenger door, the front edge shape was determined using a cardboard sheet taped to the door and tracing the door sill outline. This was cut to shape and the front edge was built up with layers of fiberglass and epoxy resin. A little body filler was necessary but after some trimming, the door fit well with a 1/8" gap all around.



However, the passenger door-body interference that was referenced in 1018-25 (yep, last October's entry) still existed. The only way I determined to correct this was to move the hinge rotation point outboard. I added 1/8" washers between the door hinge standoff brackets and the chassis (1019-19 and 1019-20) and now the door opens without interference. While the door epoxy was curing, I worked a little bit on the trunk lid fitment. Picture 1019-21 shows the lid in place, but a little more work is required along the bottom edge.





I am currently working on the driver door. Basically, followed the same process for the passenger door. The fitment was a bit easier as the striker placement did not require very much orientation adjustment. I discovered (and already knew from last year's work) the door



(or body in this area) was slightly warped or out of plane after altering all the door edges for a pretty good fitment. This resulted in the forward bottom edge of the door to be slightly outboard of the body cutout area (1019-22). If I put one of those small rubber bumpers on the body in the area where the door seal will eventually be attached up top (1019-23), the top of the door is pushed out resulting in the bottom of the door to pull back into alignment with the body. I want to find a permanent way to align the front edge of the door with the body prior to primer and paint and not rely on the door seal gasket to accomplish this. I will play with the hinge brackets to see if this helps later, but the aft edge of the door is aligned with the body now. Current fitment of the driver door is shown in 1019-24 and 1019-25.

### Trunk Lid

I now understand why all build blogs usually go silent when the body work gets down to the detail work. It is because all one does is remove, sand a little, replace, try a fit, mark, repeat, over and over again. Incredibly time consuming. I think I am fairly lucky as my trunk lid fit fairly well with respect to what I have studied in the forum. Final fitment is shown in 1019-26. Now onto the hinge installation.

The only way to mark the hinge mounting brackets onto the bottom of the trunk lid is to get under the Rod and reach up through the cutouts in the trunk floor panel. I put the Rod up onto the jack stands and scooted underneath to discover the obvious that there is absolutely no way a person can reach up far enough to mark the lid, unless you are Stretch of the Fantastic Four. My solution was to take a marker onto an 18" long aluminum angle and use it to make the marks (1019-27). 1019-28 illustrates the marker and the marks on the lid.

I installed the brackets onto the lid using rivnuts and 1/4" button heads as described in the assembly manual. I mounted the brackets to the hinge links loosely and closed the lid, centering the lid with the 1/8" gap spacers. Using that aluminum angle again, I taped a hex driver onto the angle and reached up from underneath and tightened everything as tight as I could. Now with the lid open, everything was made tight. But now I discovered a slight interference between the hinge link and the gas tank even when I positioned the bracket as far outboard as possible in the bracket slots with the rivnuts I installed in the lid.

I did not want to redo the rivnuts locations, so I just ground off a small portion of the link to provide the necessary clearance (1019-29 and 1019-30). I will clean the links up and re-powder coat them when I pull the body off for primer. 1019-31 illustrates the final fitment of the trunk. Trunk latch to come later.



**October Ends – Halloween candy and a glass of wine would be appropriate.**

October goal completion summary:

- The Rod can go-cart again.
- The all-aluminum battery box is powder coated and installed.
- The Dashboard Mockup II is installed.
- The transmission cover is installed, and a couple of console mockups were made for visual inspiration.

In addition, the following was also completed during October:

- The cockpit waterfall was fitted.
- The doors were fitted.
- The trunk lid was installed.

Just for fun, I placed the engine side panels into place, installed the seat harnesses and seats and stood back to take a look. By golly, it is really starting to look like a Hot Rod, Barb and I need to take a ride around the block.

For November, it is time to tackle the engine side panels and hood.



## Progress During November – Baby, its cold out outside.

November will be a short month with respect to the work on the Rod. We are looking forward to personal trips, Thanksgiving feasts, family time, and just plain good old fashion fun. Fall cool weather lasted about 10 days and by mid-November it became cold (for Texas that is).

My goals for November include:

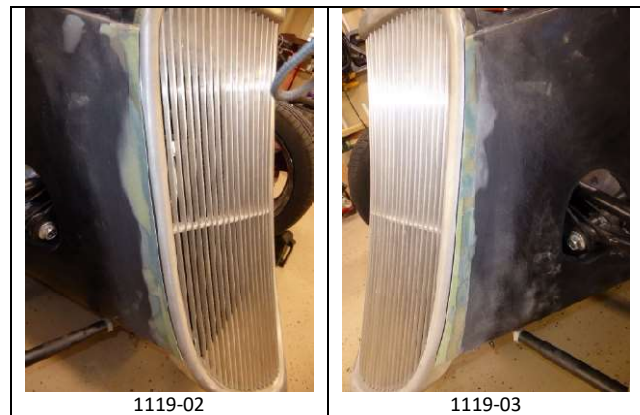
- Engine side panel fitment.
- Removable engine side panel design and hardware installation.
- Hood fitment.
- Hood hinge and latch installation.



1119-01

## Starting with the Engine Side Panels

I placed the side panels onto the body and, of course, the grill position is slightly off compared to where I placed it during the work last year. This is because I previously installed the grill without the radiator, condenser, and cooling fan. The result is, with the components added, that the grill is leaning a bit farther aft. Time to re-work the panel to grill fitment edges again. Let's see, what is that process, oh yea, remove, sand a little, replace, try a fit, mark, repeat, over and over again. Final fitment is shown in 1119-02 and 1119-03.



1119-02

1119-03

The next step, which will come after the hood installation, is to create a means for these panels to become easily removable while maintaining the headlight installations. I thank everyone in the forums for sharing their ideas and solutions as I design my panel attachments.

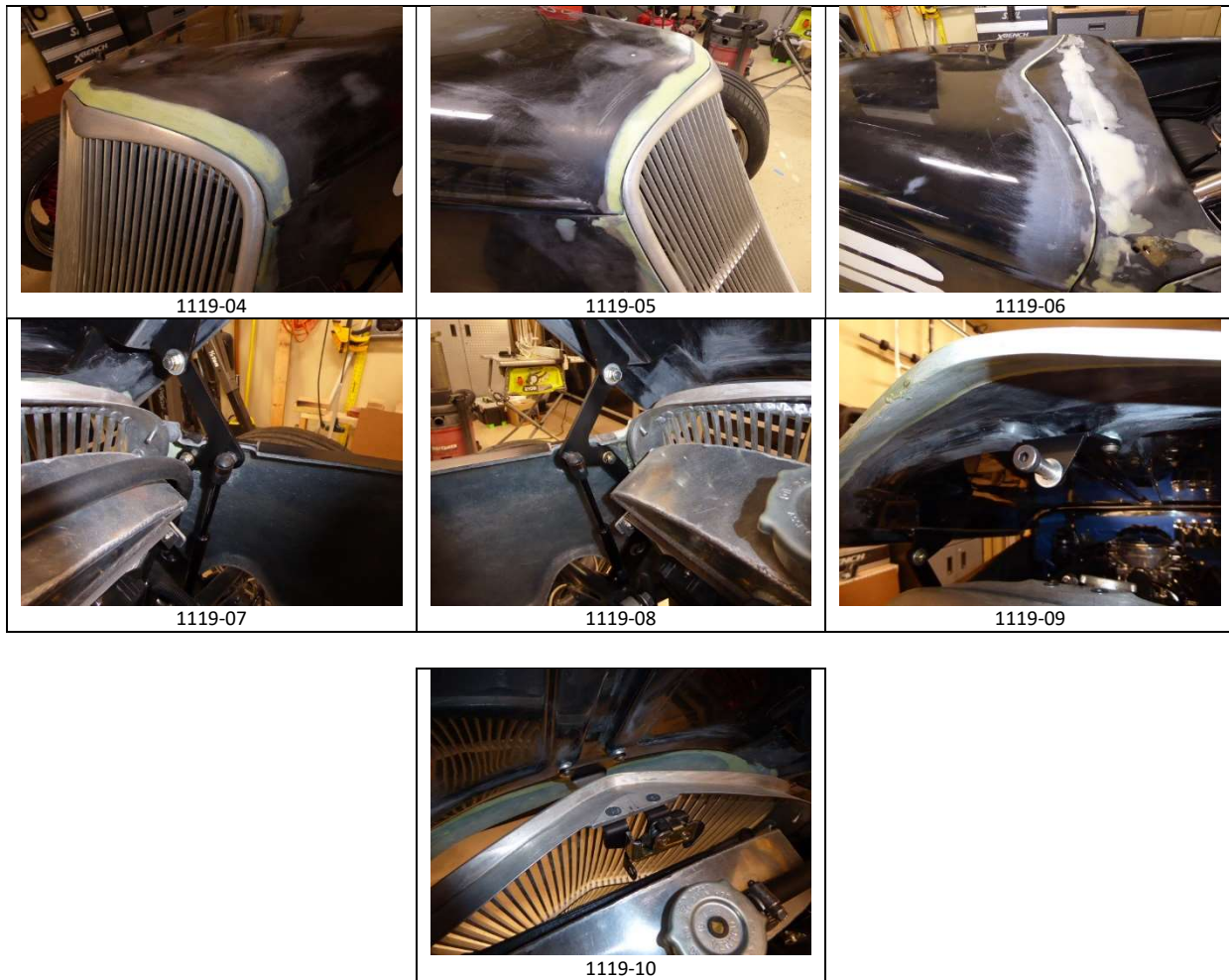
## Engine Hood Installation

The engine hood also needed re-fitting because of the new grill location. Yep, you guessed it, remove, sand a little, replace, try a fit, mark, repeat, over and over again. Pictures 1119-04 to 1119-06 illustrates the hood fitment at this point in time. This took a lot of time and the hood to grill interface still requires some additional fitting, but fitment was close enough to be able to install the hinges and latch. I elected to install the remote hood latch release after the body is primed, another item for the to-do list.

An interesting observation occurred when I installed the gas spring lift cylinders. When installed according to the assembly manual, ie in the holes on the fixed lower bracket, and when the hood latch was released, the hood popped up and the aft edge skewed towards the driver side. This implied that there was unequal lift coming from the two cylinders. It just did not look good. A new mounting hole was located in the lower fixed bracket after some measurements on the driver side which corrected this, and the hood popped up without skewing. Pictures 1119-07 to 1119-10 illustrates the hood hardware installations.



I installed the firewall pin mount brackets onto the hood. The firewall receiver holes were not drilled out and the prop rod requires installation. These tasks are now additional items on the to-do list.



### Nose Cone Installation

The nose cone as delivered with the kit did not even come close to fitting onto the grill. This fitment was addressed in my 11/14/2018 entries. It has three dimensional curves and it takes a large amount of time to get it to fit. The work I did in 2018 really paid off. The nose cone required some re-fit to the grill due to the new grill position but not too difficult. However, the lower mating faces between the nose cone and the body did require some serious attention. All of this will need to wait as Thanksgiving is upon us.

### November Ends – Turkey and Family coming right up.

Time for another New Orleans run for some great food, friends, and family. Time is flying by, it is difficult to believe I am in my 15 month of this “more fun than a man can have” build.

My November goals were completed plus a little:

- Engine side panel fitment – Side panels fitment is complete and attachment hardware is installed.
- Removable engine side panel design is in conceptual form.
- Hood fitment is 80% complete with the hood/grill interface to be cleaned up.



- Hood hinge and latch installation is complete, firewall receiver pins remain outstanding.
- Initial nose cone refit progressing.

### Progress During December – The Magical Holidays are Upon Us

December will be another short month for the Rod Work. The weather is just too nice to be in the shop all day. The Holidays approach with lighting speed with Barb & I are keeping very busy focusing on the holiday spirit.

My goals for December include:

- Finish the nose cone fitment.
- Complete the removable engine side panel design.
- Make a decision on the engine side panel grill design (new).
- Have a Good Christmas Holiday, partake in best cheers activities, and just have plain good old fun.



1219-01

### Continue with the Nose Cone Work

The usual fitment process was followed and after numerous fitment sessions, I was satisfied with the overall assembly. The nose cone is fastened to the Driver's side body by 1 each  $\frac{1}{4}$ " button head to the grill, 2 each  $\frac{1}{4}$ " SS bolts to the forward engine side cover, and 1 each  $\frac{1}{4}$ " SS bolt lower nose cone to body interface. The passenger side also has this configuration.

However, I was not satisfied with the gap between the forward part of the engine side cover and the nosecone. Hence, I spent some time filling this in with body filler. Picture 1219-02 to 1219-07 illustrates the nose cone fitment as well as the final gaps between the engine side covers and body interface.

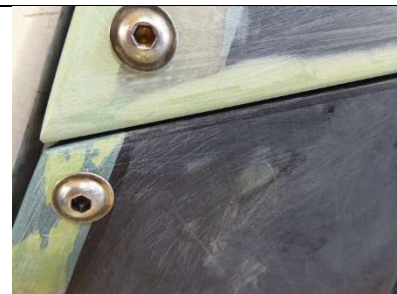
Now that the nose cone fit and attachments are complete, I removed it again and brushed on two coats of black undercoat onto the interior portion of the cone (1219-08). This assembly was then re-mounted back onto the Rod.



1219-02



1219-03



1219-04



1219-05



1219-06



1219-07



1219-08

## Back to the Engine Side Panels

I mocked up and drew out several configurations for the removable side panels searching for an acceptable solution. I also researched the forum to discover how others have done it. As a result, I decided on a hybrid of what I discovered, and I am going to proceed with the cut as shown in Picture 1219-09 which leads from the upper suspension cutout to the grill just above the headlight mounting hole. I plan to fabricate an upper piece that will attach to the grill to be installed when the side panels are removed which will cover up that forward portion of the engine bay/grill area. But this work will need to wait until January as the Holidays are upon us.

Many of the original '33 Ford's had cooling louvers in the engine side panels and I have always had a desire to emulate this feature. However, thinking on how to install actual louvers became a taxing situation for this simple kind of guy. I did find some examples of utilizing grill material and side panel cutouts. I made up several paper mock-ups and taped them to engine side panels. After eight different configurations utilizing two and three slot layouts ([see the layouts here](#)), I went to my friends for their opinions. The comments were all similar, they should be bold but not overbearing, and the three staggered slot configuration stood out as the solution. This solution is shown in 1219-10 and 1219-11. The Perforated Hex Grill Mesh in Gloss Black was selected (1219-12) and purchased from customcargrills.com.



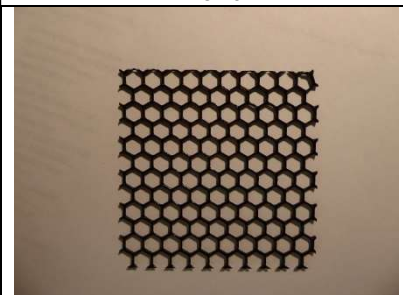
1219-09



1219-10



1219-11



1219-12

Cutting the slots in the side panels and attaching the grill material will hopefully be completed in January.

## December Ends

The Christmas Holidays are upon us. Great friends, good cheer, and great college football bowls make the time just fly on by.

My December goals were achieved which brings us to the conclusion of 2019. To summarize this month's progress:

- The nose cone fitment was finished.
- The removable engine side panel design is understood and should be implemented in January.
- The engine side panel grill design is finalized, and the grill material was ordered and delivered.
- We definitely had a Great Good Christmas Holiday, we did partake in best cheers activities, and had just have plain good old fun.

**MERRY CHRISTMAS TO ALL!**