

Feeding the Barbarian

***Running your Onan generator on propane or today's
crap gas at the flip of a switch***

Text and photos by Jerry Work
GMCWS rally
Coos Bay, Oregon, 2016

Today's gasoline is killing our Onans as surely as if we filled the tank with sugar.

- The alcohol in the gasoline causes sludge and varnish to form any time this stuff sits for any extended period of time.
- The sludge and varnish will build up in the fuel tanks, in the solenoid gas shut off valve if you have one, in the inlet screen on the fuel pump, in the fuel pump itself, in the carb bowl and in the jets.
- The alcohol also destroys the fuel lines, O rings and gaskets over time.
- These things can make the Onan hard to start, run rough, die frequently and generally make your life miserable.
- No wonder they are called "Onan the Barbarian"

- Even worse, when you adjust your carb and the governor linkage to offset all this sludge and varnish.....
-you never know when the sludge might wash away or build up even more and your adjustments now make the Onan rough all over again, or too fast and produce too much AC voltage.
- It can be a never ending battle.
- ***The stock ignition system uses points activated by a push rod. Timing is all over the place so do yourself a favor and install one of the solid state ignition systems so the timing is fixed and steady no matter what else you do.***

But, there is an alternative. Running on propane will solve all these issues quickly, but is not always the right choice.

- If you run your generator mainly to charge batteries and run the microwave, coffee pot or AC for a few hours a day, propane offers many advantages - but you carry less of it than you do gasoline (~15 gal of propane vs 40+ gal of gasoline).
- If you run your generator for hours at a time to power your roof AC while going down the road or while dry camped in a hot area, stick with gasoline - 'cause you carry more of it.

Wouldn't it be nice if you could run on either fuel?

- The good news is, you can!
- If your Onan runs now, you can easily, quickly and inexpensively add the ability to run on propane or gasoline with just the flip of a toggle switch.
- This conversion will not magically fix a broken Onan that does not now run at all, but if your Onan starts and runs, even poorly or only for a short time now, there is hope as it will run far better on propane if your ignition system works properly.

Why propane?

- Propane has less heat content than gasoline, but it burns more completely so is cleaner and offers the same effective generator power output.
- it takes about the same number of gallons of either for a given electrical output.
- your oil, the Onan engine and the spark plugs will last far longer burning propane - likely the Barbarian already in your coach will outlive you.
- the engine will not carbon up the way it does with crap gas and propane will not go bad between trips.
- on propane your Onan will start nearly instantly without cranking, hot or cold, no matter how long your generator has been sitting idle or how old the propane is.
- you will never know whether the crap gas in your Onan generator is ok, or will prevent starting, or will run poorly, or will simply die under load without warning, but propane will always be your friend in need as well as your friend in deed!

Some useful consumption estimates when running your Onan on propane

The GMC finished coaches and the Royales have 62 pound propane tanks. Propane weighs 4.2 #/gal so **a full tank will hold 14.8 gallons of propane if properly filled**. The tanks are marked 20 gallons, but that is the capacity if filled with water. The tanks are designed to run less than 80% full of propane.

KW generated by the Onan	Gal/hr of propane consumed	Hrs/gallon of run time	Hrs/full tank of propane
1	0.2	5	74
2	0.4	2.5	37.5
3	0.6	1.6	23.7
4	0.8	1.2	17.8
5	1.0	0.96	14.2
6	1.2	0.8	11.8

Normal battery charging takes 40 to 50 amps DC initially but tapers down quickly to 10-20 amps. That averages around 3-4 amps AC, or less than 1kw for an average of 3 hours so will consume less than 0.6 gallons of propane per day.

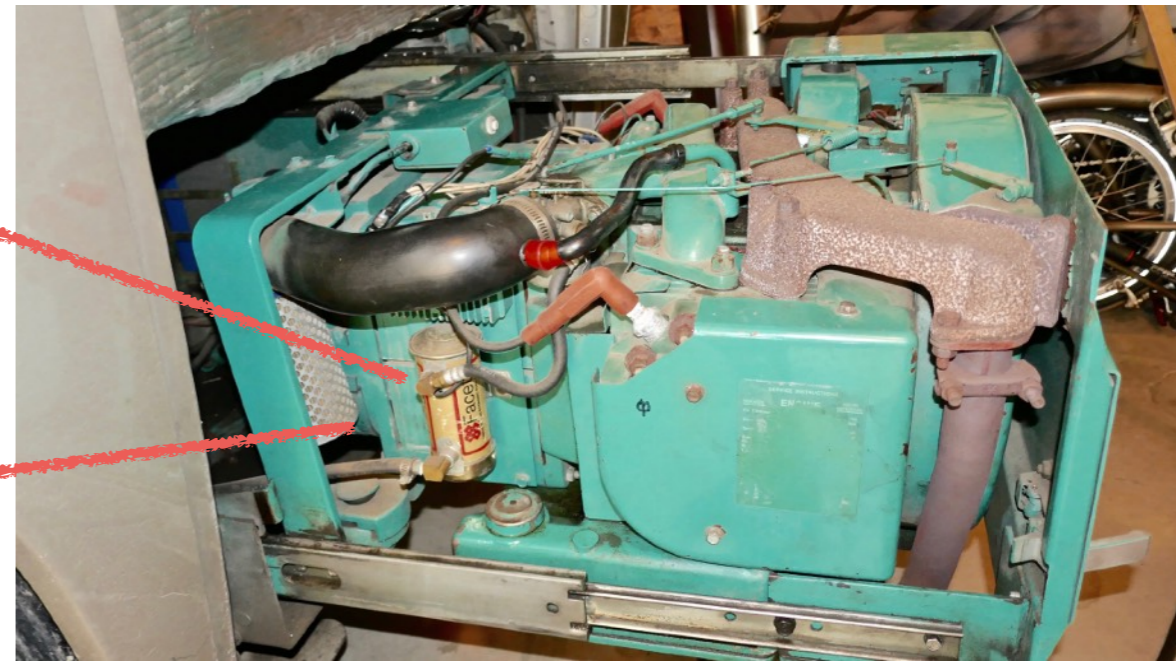
Running one typical roof air conditioner will take less than 2kw. Starting will take nearly twice that but only for a few seconds. If the air conditioner draws 8.3 amps at 120vac it will consume 1kw, if 16.6 amps, 2kw.



What does it take to install this duel fuel option?

- Very little, actually. Thanks to event sponsor US Carburetion of Summersville, WV, most everything you need will come in an easy to install package designed specifically for our Onan generators. This package contains an “Integrated Fuel Management System” (my term) which includes the demand regulator, solenoid safety shut off valve and automatic cold start solenoid all in one slick unit that will mount on the side of your Onan using existing screw holes. The package will also include the propane injector, hoses, clamps, etc.
- You are going to tie a 12’ long 1/2” diameter low pressure propane line to the output of either the existing regulator on your existing propane tank, or to a new two stage regulator if you wish to have a separate regulator just for the Onan (what I did).
- That line will run over to the “Integrated Fuel Management System” mounted on the Onan which will automatically supply the correct amount of propane for the load the Onan is under at any given time.
- The output from the “Integrated Fuel Management System” will go to a propane injection unit mounted in such a way as to not disturb anything to do with your existing carburetor.
- There is only one DPDT toggle switch to hook up to make it all work. 12vdc from the positive post on the existing Onan coil hooked to the center post on one side of the DPDT toggle switch will power the fuel pump when you want your Onan to run on gasoline or the propane solenoid safety shut off valve when you want your Onan to run on propane. The existing Onan choke wire will be on the center post on other side of the DPDT switch to power the propane cold start injector or the Onan choke while starting.

Remove/replace or relocate the stock fuel pump, air cleaner and voltage regulator



Install the demand regulator, solenoid safety shut off valve and the automatic prime system ("Integrated Fuel Management System - IFMS") in place of the original Onan fuel pump, air cleaner and voltage regulator

Install the propane injector, wire up the DPDT toggle switch as explained a bit later and you are ready to go dual fuel!

Run 1/2" line from the LOW pressure side of regulator on propane tank to the IFM system (I used a second two stage regulator but you can T into the existing regulator if you prefer)



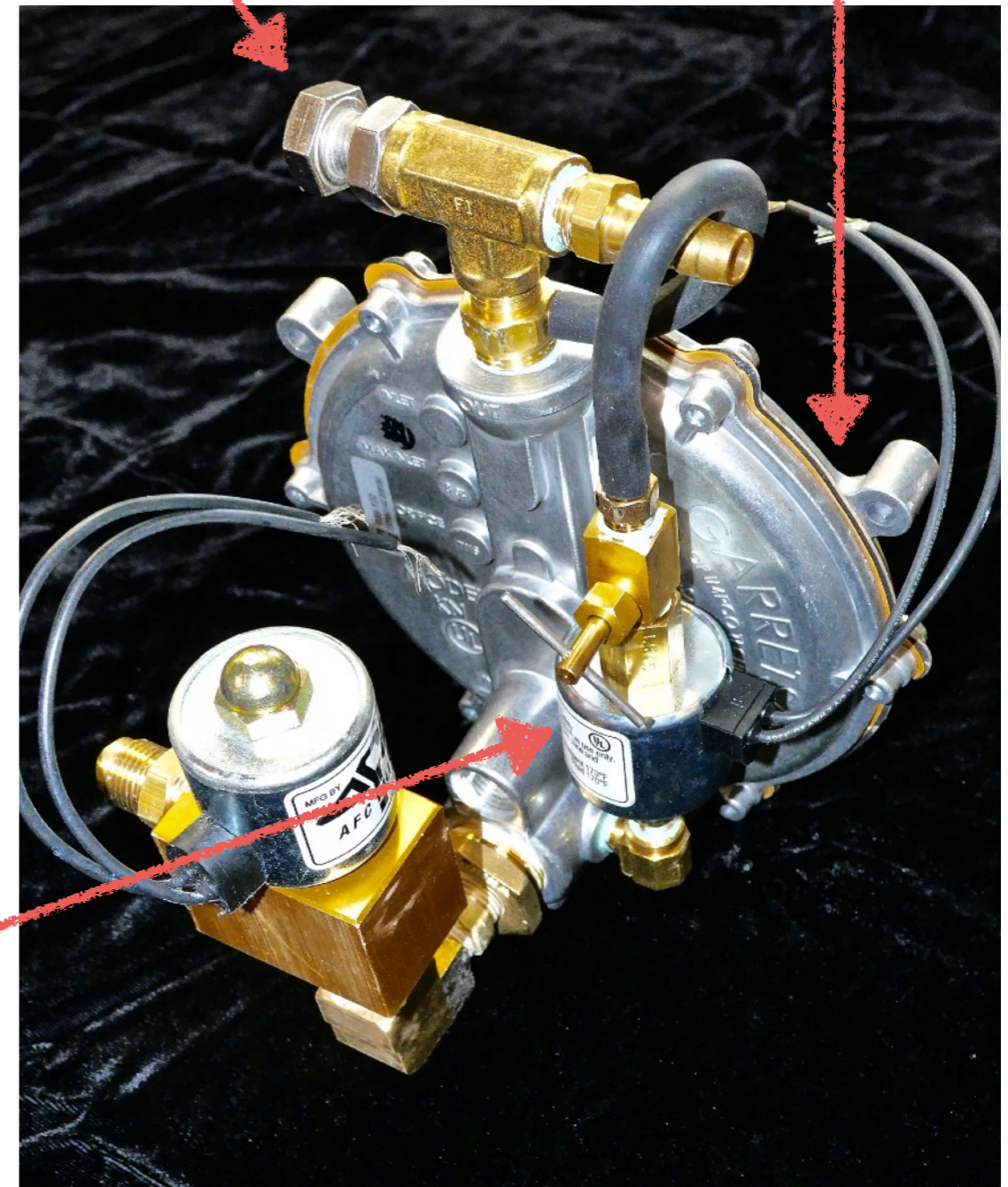
A solenoid safety shut off valve controls whether propane is available to the IFMS or not



The IFMS is made up of four components

Valve allows adjustment of propane richness to insure smooth running at all altitudes.

A demand regulator uses vacuum to supply propane as needed to maintain speed



Propane inlet from tank

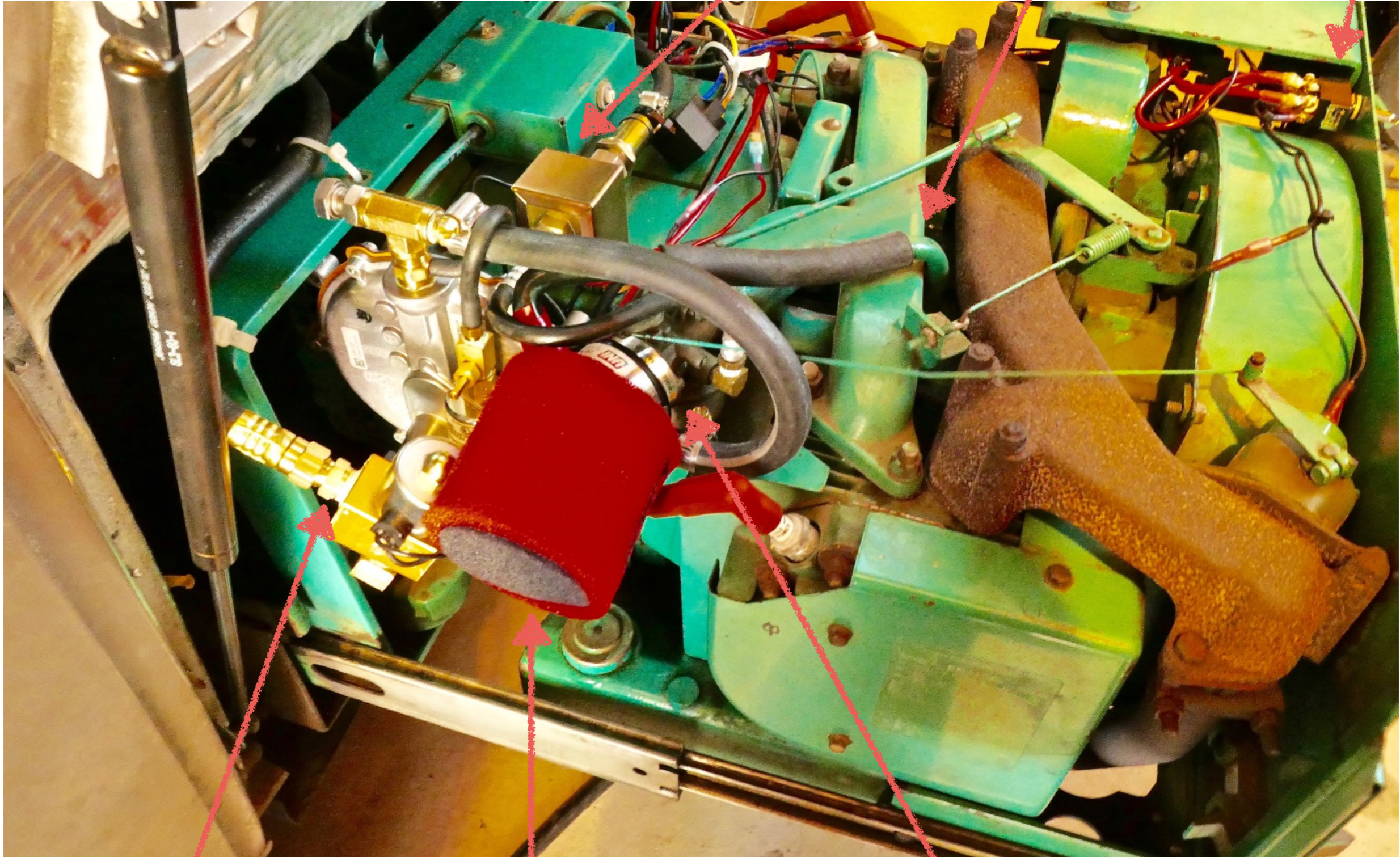
A solenoid valve allows propane to by-pass the demand regulator in metered amounts during cold start

**Here is what it looks like
all installed.**

*New electric fuel
pump*

*Crank case
breather*

*DPDT toggle
switch*



*Integrated Fuel
Management
system*

*New ORV oiled foam
air cleaner on stock carb
and propane injector*

*Propane injector
installs in place of the
stock air cleaner adapter*

- ***It makes no difference if your Onan board is good or not, or if you have a prime circuit or not, or what you or the PO might have done to the wiring. If your Onan will start and run at all now, it will run - and run much better - when you set the switch to propane.***
- You will have an automatic propane shut off safety valve so propane will only flow to the Onan if you set the switch to propane and your Onan is running.
- If the Onan quits, the propane will be automatically shut off (the demand regulator will no longer pass propane even if the shut off valve stays energized).
- You have an automatic propane cold start function to make it easier to start when cold or at high altitudes. Most coaches will start quickly on propane without the cold start function at lower altitudes and mild temperatures, but it is low cost insurance and works like a charm (what I did).



Here is what you need on the propane side
- Our event sponsor US Carburetion, Inc.
has packaged all of this for us in GMC
specific kits: GMC12 for \$294.95 if you
want the 1/2" hose and GMC38 for \$247.80
if you want the 3/8" hose.



- **12', 1/2" LP hose and fittings.** I actually used 3/8" hose and it seems to work fine, but the more expensive 1/2" hose is recommended for runs this long.
- The **solenoid propane safety shut off valve** shown upper left is a very high quality unit designed for continuous use. Cheaper ones are available but can be prone to failure!
- The **demand regulator, propane injector and mixture valve** are shown lower left. The proprietary propane injector also shown enlarged above right is what makes the installation so simple!
- The **cold start injection system** is shown to the upper right.



An Onan carb (not part of the kit)

The propane injector makes it all possible

The stock Onan carb has a round aluminum air cleaner adapter screwed to the front.

You will replace that with the propane injector.



You don't do anything to the carb itself

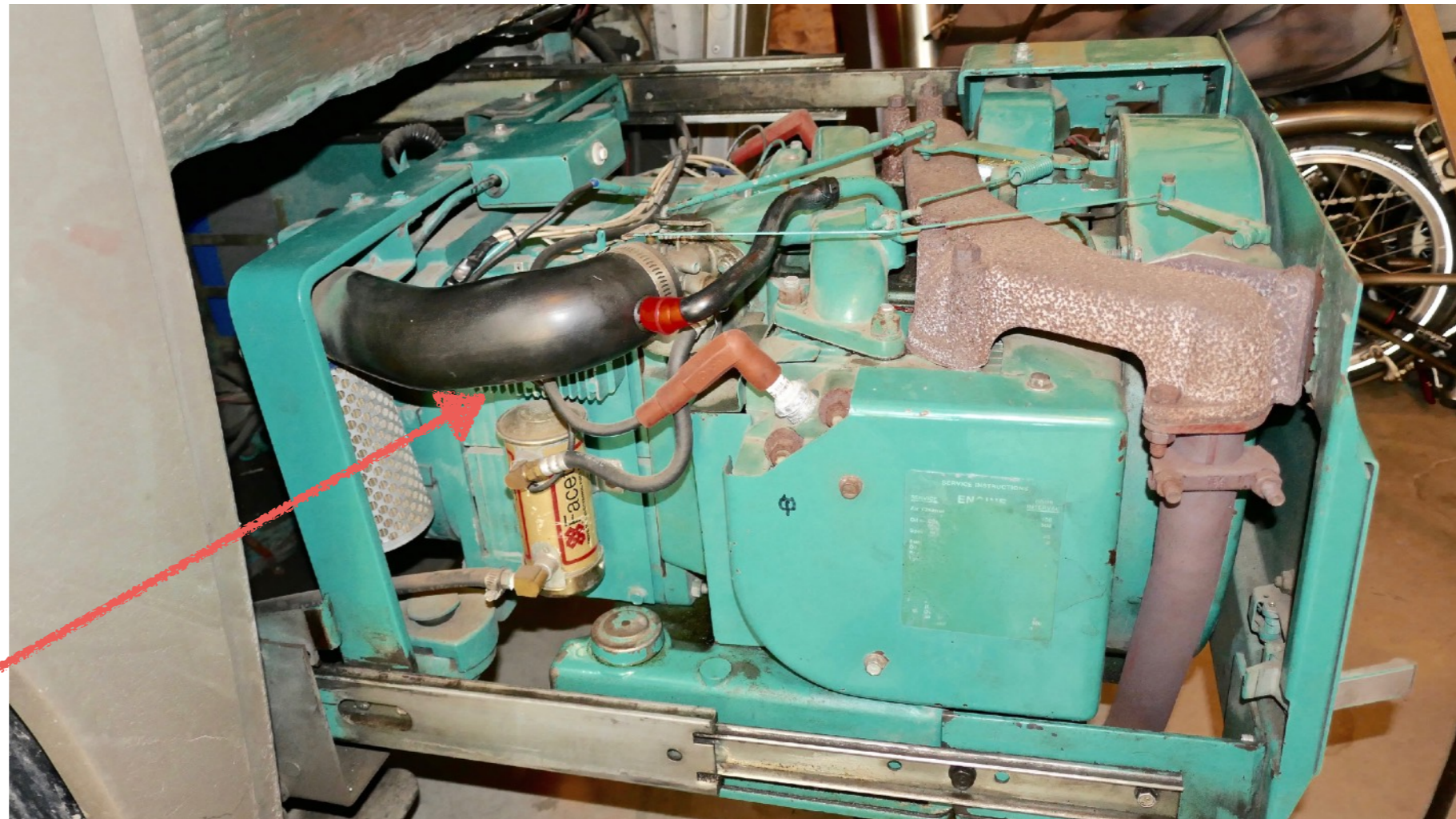


Installation starts by replacing the stock fuel pump and removing the air filter & unused voltage regulator

That is the best place I found to mount the IFMS. I purchased a \$20 small CarBole square fuel pump that I could mount up on top of the Onan, out of the way to replace the stock fuel pump for the rare cases when I want to run on gasoline. I also purchased a \$20 1 3/4" diameter mount oiled foam ORV air cleaner to make plenty of room for the IFMS and still allow the propane hose to fold up properly when the Onan drawer is closed.

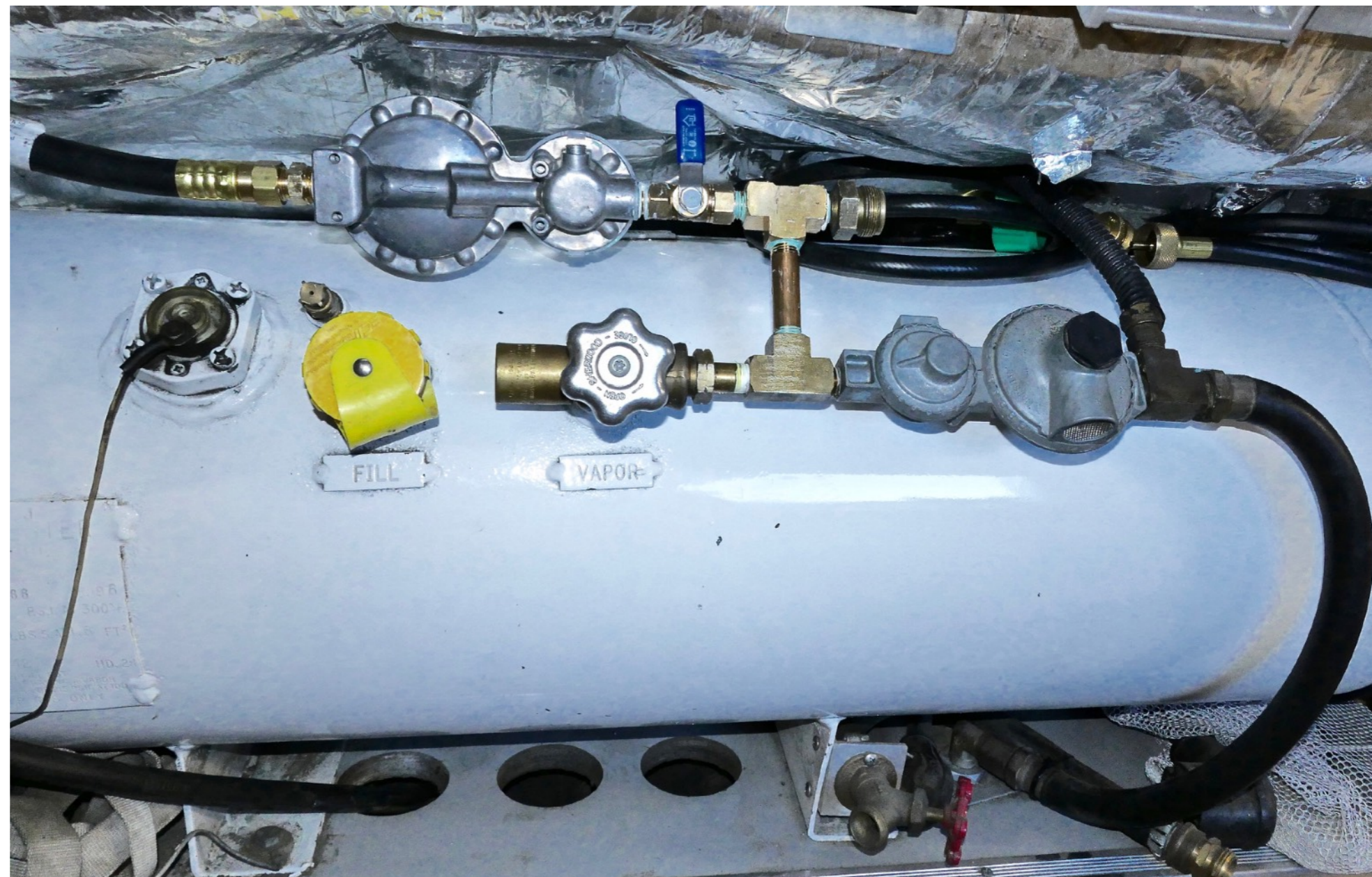


I removed the unused voltage regulator to make more room, too.



You also want to create the space for the low pressure propane line between the tank and the generator

- I did it by putting T between the stock regulator and the tank shut off valve.
- A nipple to another T created the space to add a shut off valve and a new two stage regulator to provide propane to the generator.
- That also allowed the addition of a high pressure tap for outdoor appliances that have their own regulator, like a BBQ and fire pit.



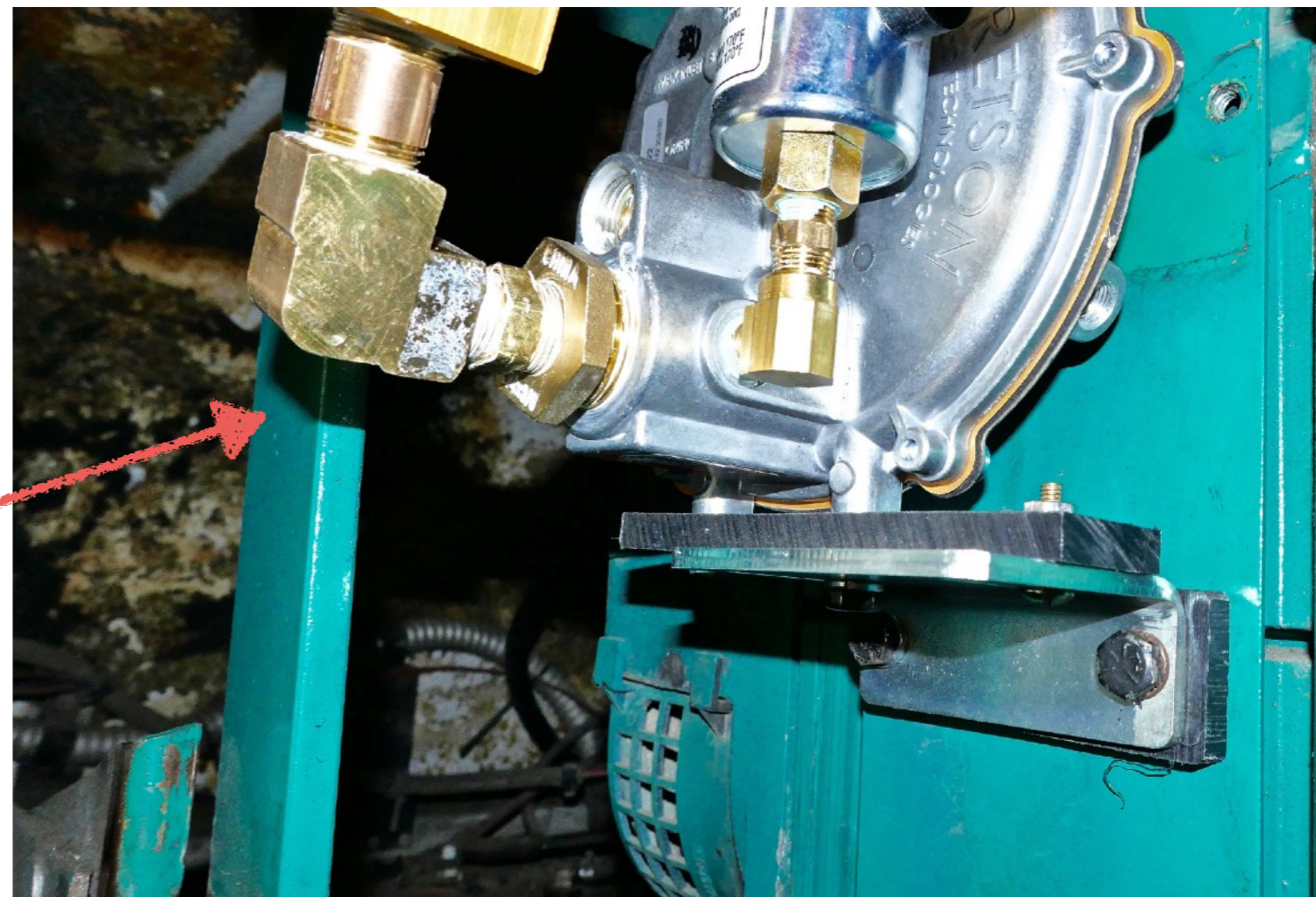
Next, build a mount for the IFMS

***I used a heavy angle I had laying
around and a piece of UHMW
to provide vibration isolation and
heat insulation***

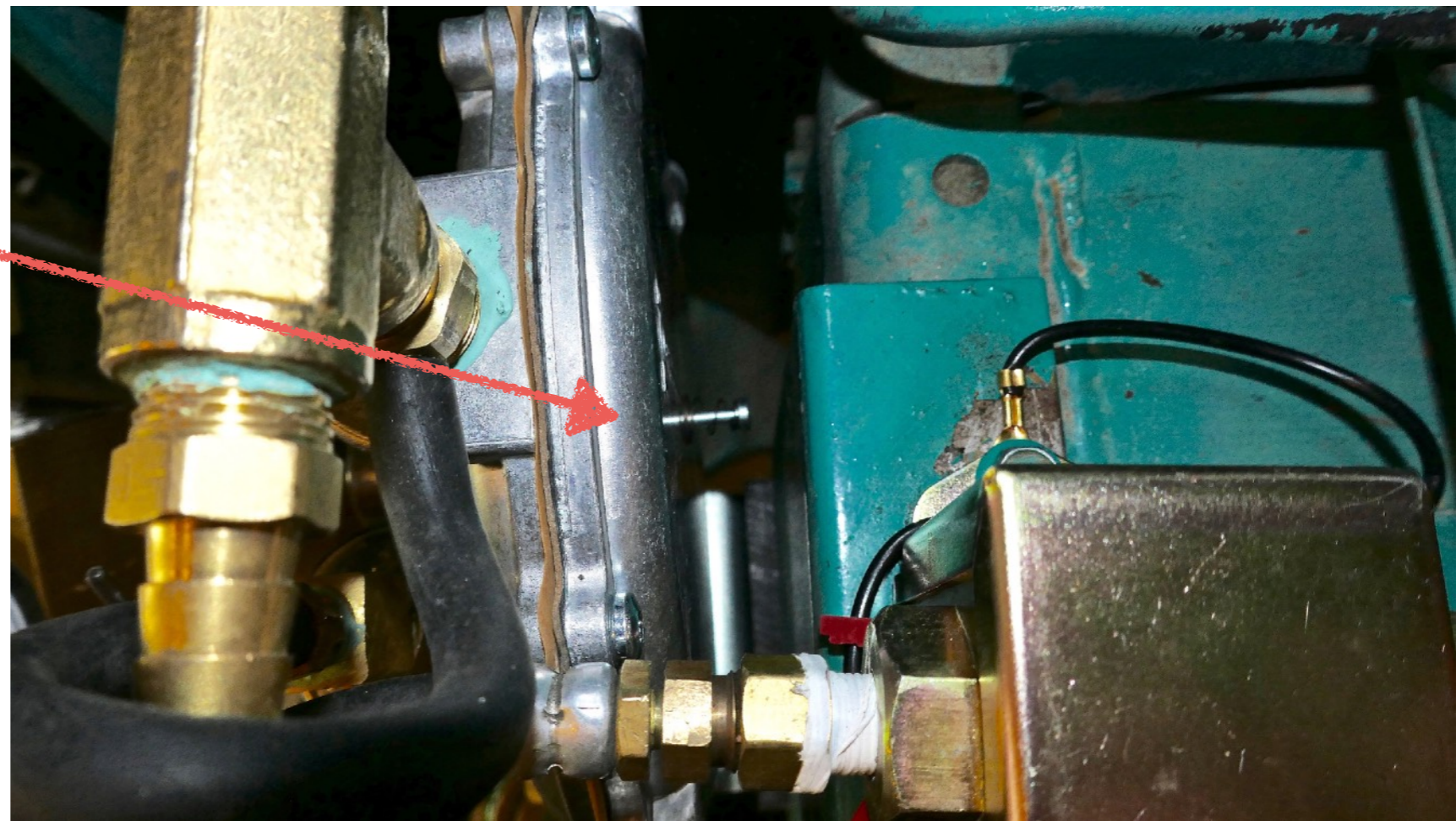
***The hole spacing is the same
as the mount for the stock
fuel pump so it screws to
the bracket on the side of the Onan***

***I cut another piece of UHMW to put
between the angle bracket and the
side of the Onan for the same
reasons.***

***You want the IFMS to sit so the low
pressure propane line will come
outside the Onan frame piece at the
forward end of the generator***



But, you also want to be sure to keep the IFMS far enough away from the bracket on the Onan so the manual prime pin on the back of the demand regulator does not get pressed against that bracket.

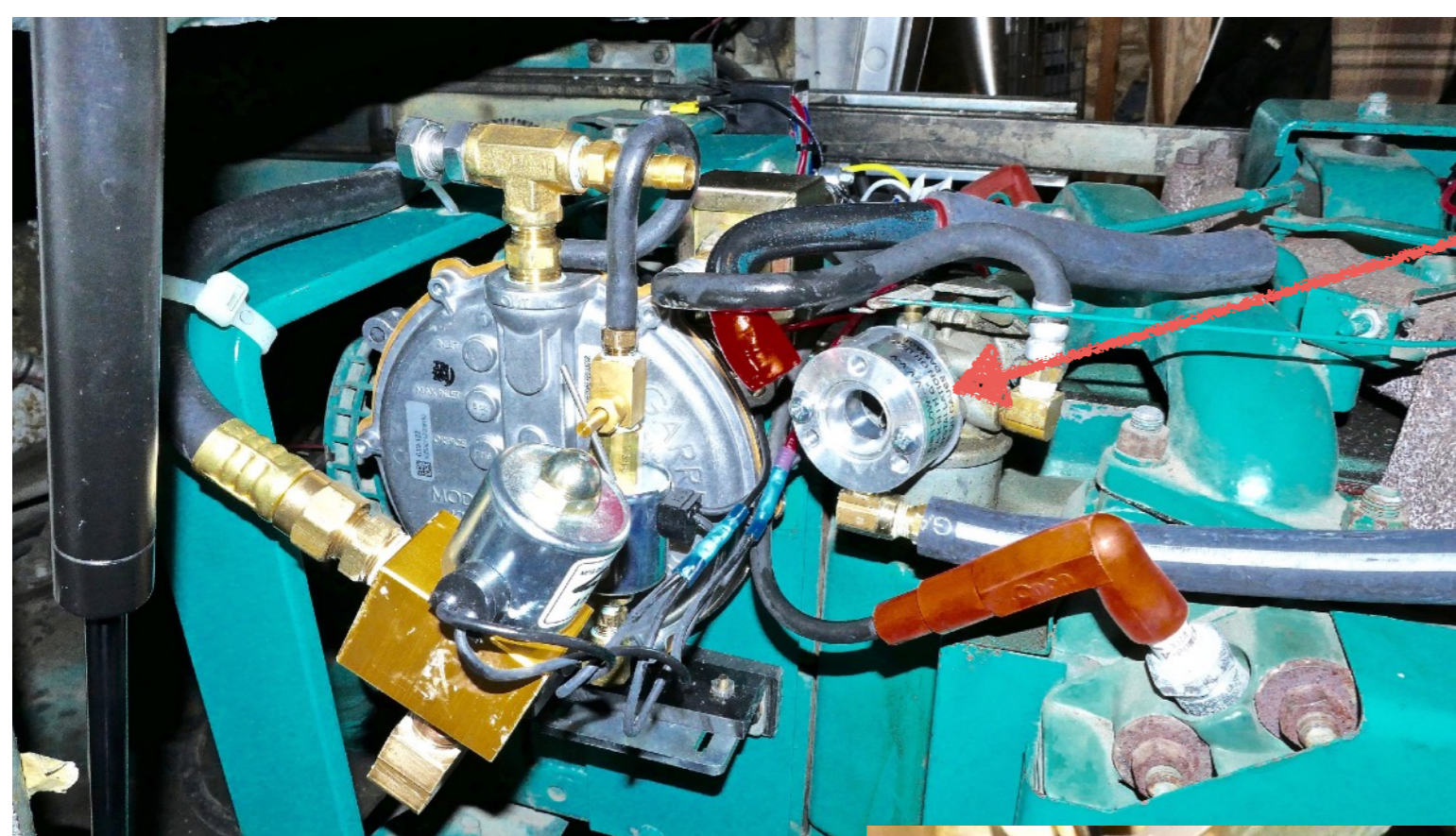


Keep the outlet from the IFMS above the rear frame hoop on the back of the Onan. There is plenty of room above to allow the Onan to easily slide back in place.

Tilt the solenoid shut off switch forward so the propane hose will attach to the input at a slight incline so the hose will fold up properly behind the Onan as you slide it in.

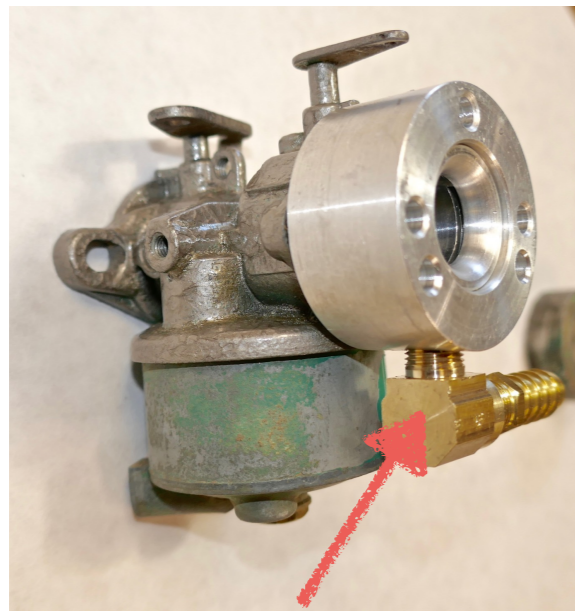


Installed this way you will have plenty of room to check oil (which you want to do frequently), or change oil.



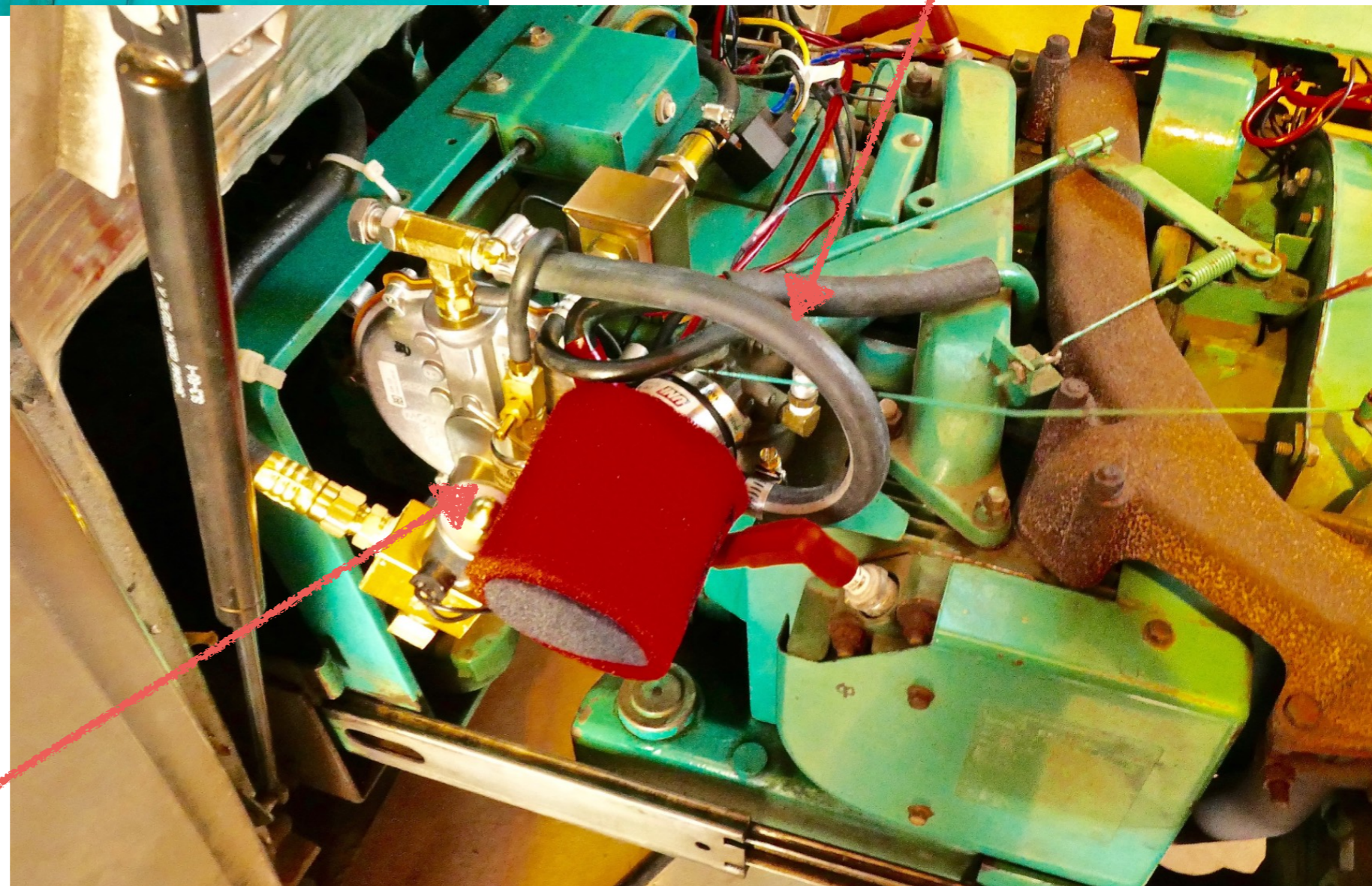
Remove the two screws holding the air cleaner adapter to the carb and replace it with the propane injector.

Cut the hose to length and slip it over the barb fitting on the injector and the outlet on the IFMS.



Orient the ORV oiled foam air cleaner to clear and mark the inlet to the injector. Notch the air cleaner mount and clamp to clear that inlet.

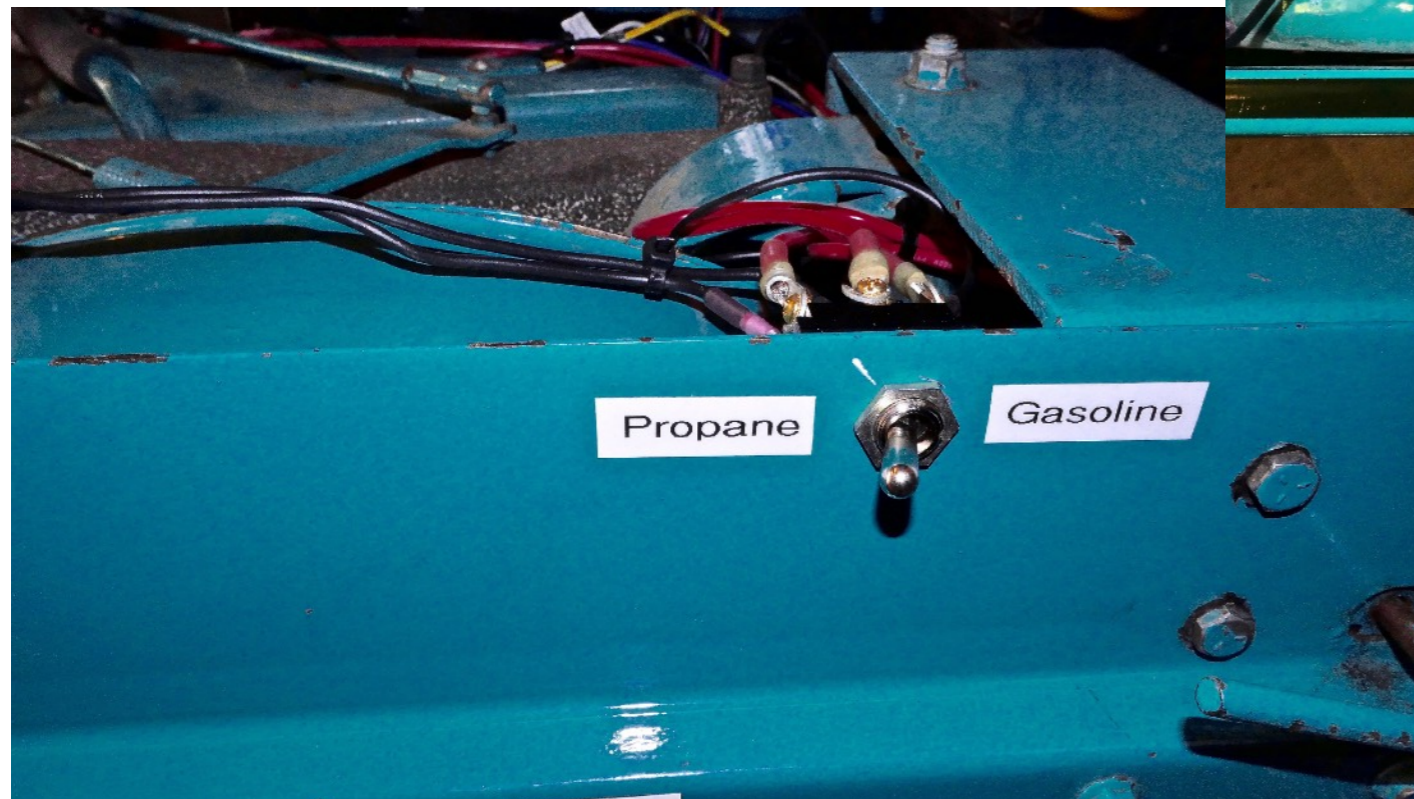
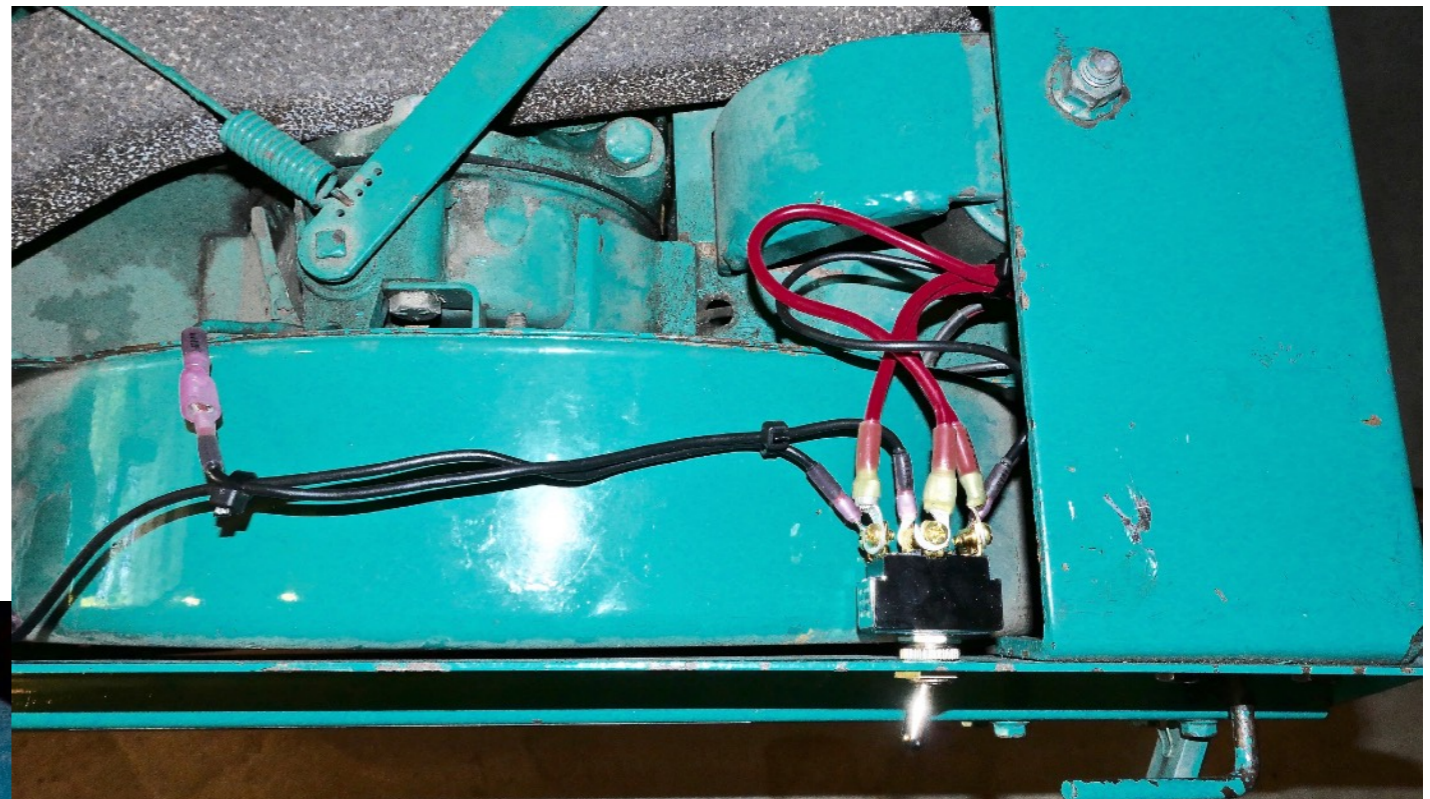
Also mark where you can mount the stock fitting for the crank case breather.



- The final step is to wire up the DPDT toggle switch.
- Bring a wire from the + terminal on the coil over to the center tab on one half of the DPDT toggle switch. Run a wire from one switched tab over to the gasoline fuel pump. Run a second wire from the other switched tab over to the propane shut off solenoid.
- Cut the existing Onan choke wire. Run the part of the choke wire exiting the Onan over to the center tab on the the other half of the DPDT toggle switch. Run a wire from one switched tab over to the wire going to the existing Onan electric choke. Run a wire from the other switched tab over to the demand regulator by-pass solenoid on the IFMS to provide cold start enrichment when running on propane.
- When the toggle switch is thrown one way the fuel pump and existing choke are energized so the Onan will run on gasoline. When thrown the other way the propane shut off solenoid and cold start enrichment solenoid are energized when running on propane. You are done!

You can mount the DPDT toggle switch anywhere in your coach. Since I plan to run on propane most of the time, I mounted it on the front of the Onan.

When it all tests out, cover the wires at the switch.



Avoid using a DPDT toggle switch with a center off position as you might forget you turned it off and then wonder why your Onan won't start on either propane or gasoline!

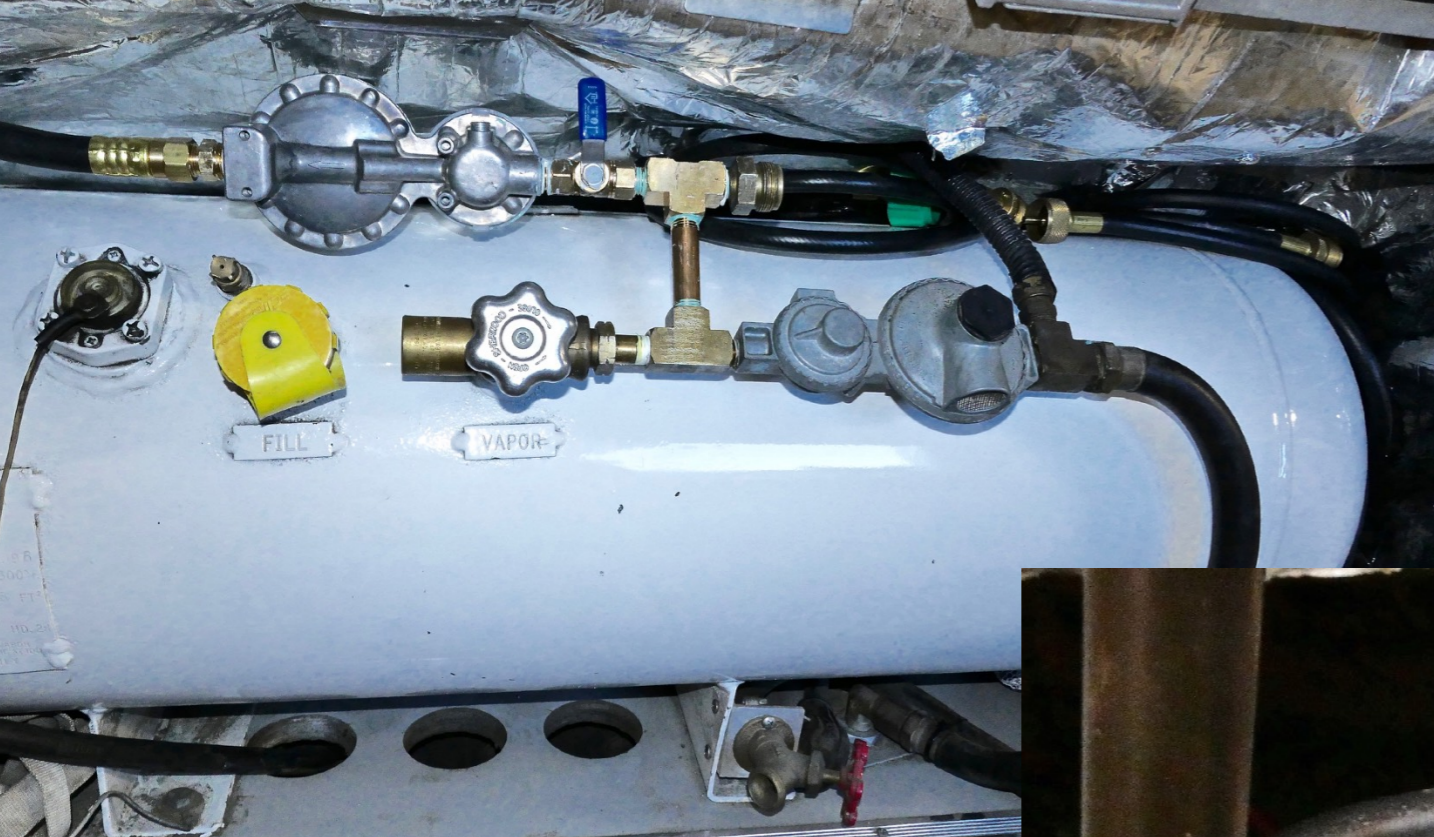
- ***Before you try to start the Onan, use soap and water or a gas leak detector fluid to test all propane connections to make sure there are no leaks!***
- Flip the switch to run on propane and start the Onan. It may take a few tries as you purge air out of the 12' long low pressure propane hose and the demand regulator.
- Once it starts adjust the output valve on the top of the demand regulator to get smooth running and lock it down. This is like the richness adjustment on the carb when running on gasoline.
- From there the demand regulator will supply whatever propane the Onan needs to maintain the speed set by the governor for any given load.
- You can also adjust the amount of propane injected at cold start using the needle valve on the cold start solenoid valve. Set it for the minimum needed as you can easily flood the Onan on propane if you give it too much propane during a cold start. 1/4 to 1/2 turn out from the off position is all it took on mine.

- ***After a short run in on propane, stop the Onan and check all connections for leaks again!***
- Now flip the switch over to run the Onan on gasoline and restart. It should run as well, or as poorly, as it did on gasoline before you began this dual fuel conversion. **No adjustments are necessary. If your Onan was running at the correct speed on gasoline it will run at the correct speed on propane.**
- Enjoy all the propane benefits plus the longer run time on gasoline when you really need that by simply selecting which fuel you want when you next start the Onan.

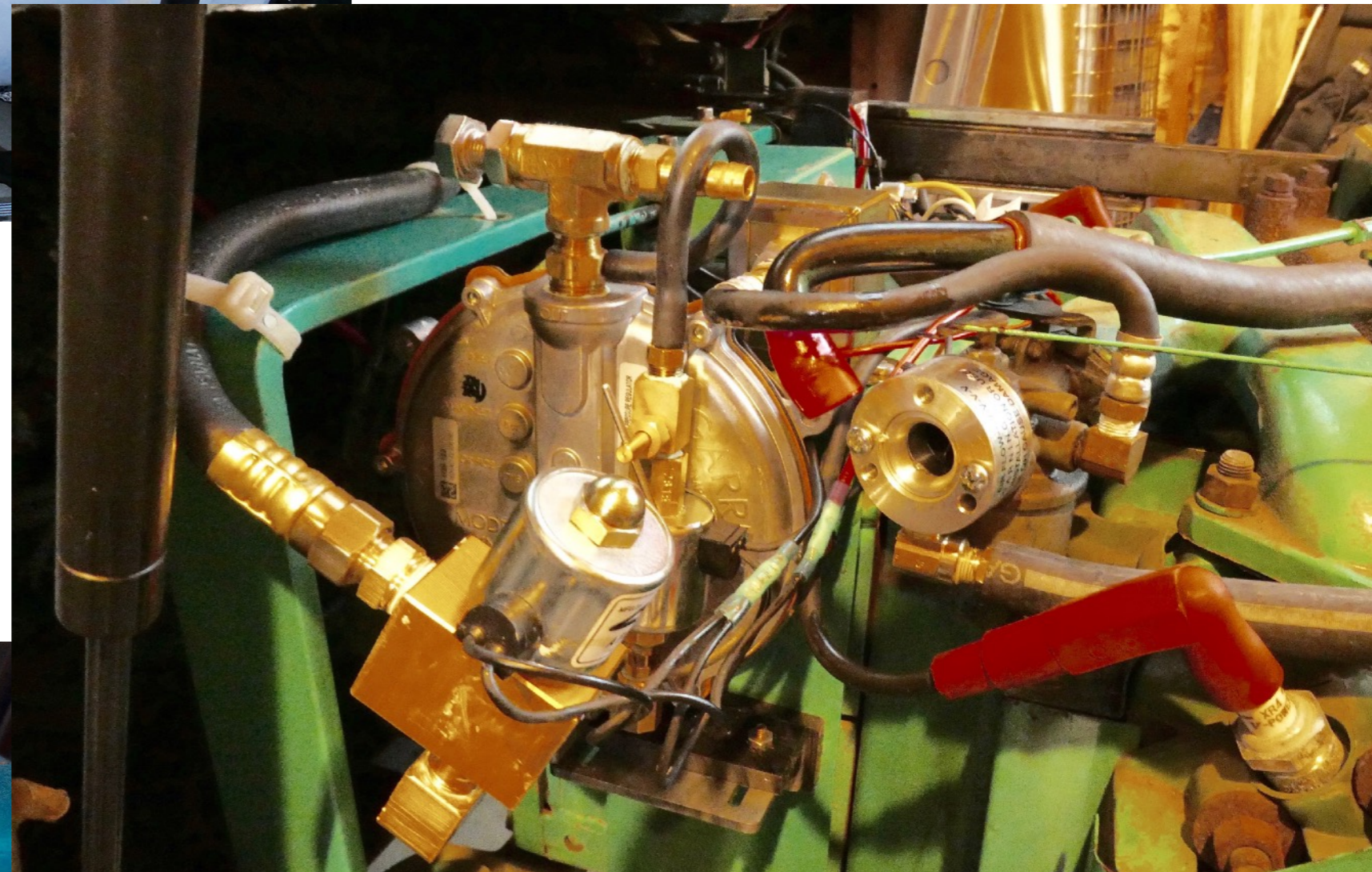
Now I will open it up for questions and comments from the audience.

Remember - this is just what I did and it works for me. Just like no two 40 year old GMC coaches are the same any more, I have no way of knowing for sure whether this dual fuel conversion will work for you on your Onan or not.

Only you can determine your implementation skills and determine how safe this dual fuel conversion might be for you.



All you need to supply is the DPDT switch and wire, the bracket, ORV air cleaner and any fittings you need to connect the hose to your existing propane tank.



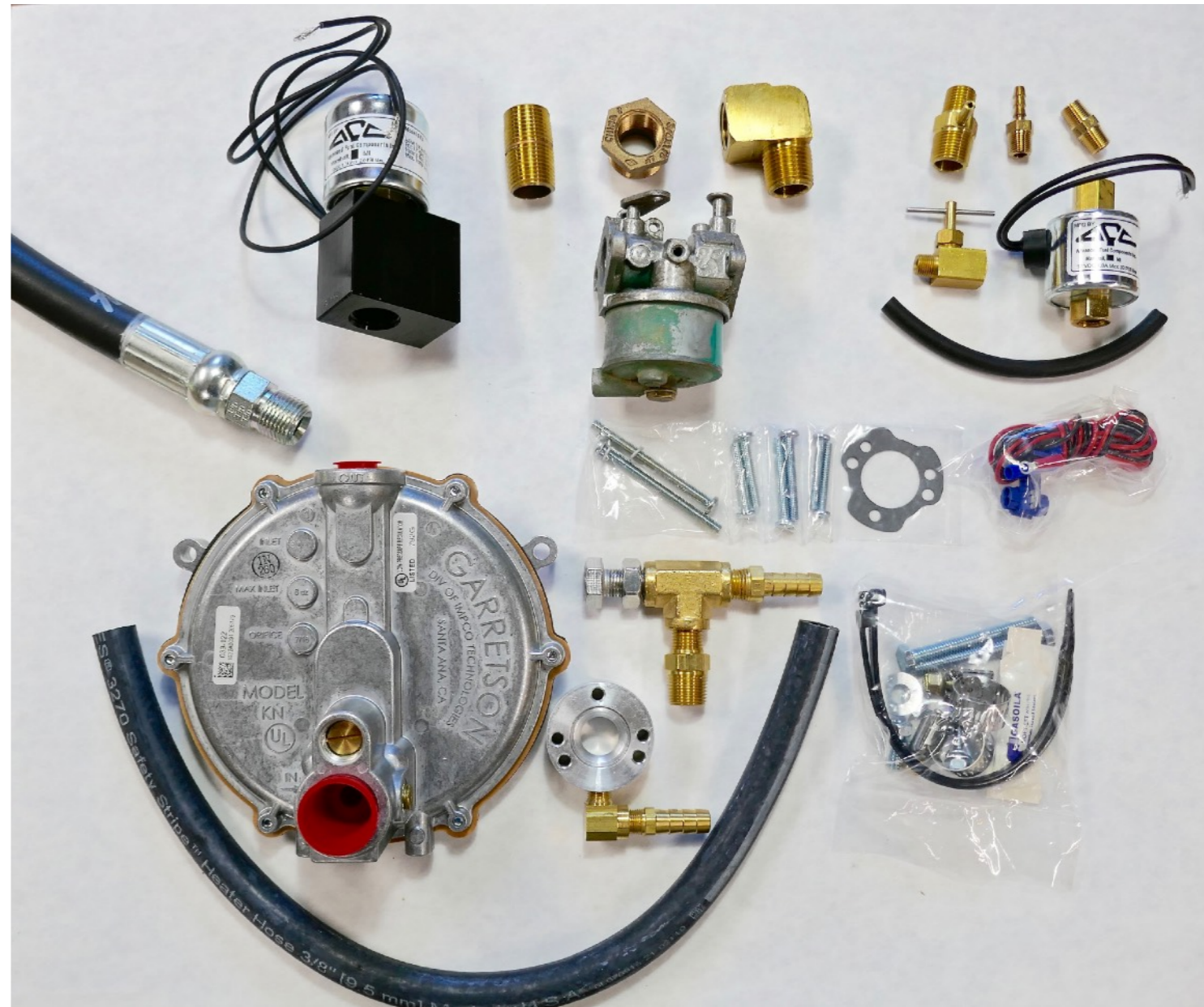
All the propane components designed specifically for our Onan generators are now available as a special kit from event sponsor US Carburetion



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**Components supplied by
event sponsor US Carburetion**

*Onan Dual Fuel system design
and display by Jerry Work
The Dovetail Joint
Kerby, OR 2016*

1978 Royale
1977 Clasco