

How To Provide LIVE HYDRAULICS

for all

FORD N-TRACTORS

by

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If the filter wasn't there, you might not notice the pump and hoses tucked under the edge of the hood.

1 - PUMP MOUNT

There are several ways to mount an engine-driven hydraulic pump on these tractors as well as the earlier front distributor engines found on Ford 9N, 2N, and early 8N tractors. Tractors with loaders will already have a front pump driven directly off the crank pulley. Loader pumps mount in front and many require removing the grill or hacking a fairly ugly hole in it. Properly-engineered accessories should bolt-on without damage. Several years ago a fellow named Zane Sherman sold me a live hydraulics kit. The kit came with a well-designed pump bracket that shared the same mounting studs as the original generator bracket. Sadly, anyone looking for this kit today is out of luck, Zane no longer sells his kit. The only other offering available is a great live hydraulics kit for the older front distributor engines sold by The Old Hokie (<http://mysite.verizon.net/oldhokie/windyridge/id11.html>). Sadly, his kit will not work on the side distributor engines.

MY COMBINATION BRACKET



This is a prototype bracket designed to mount a hydraulic pump to the 8N side-distributor block. It replaces the original generator bracket. This bracket will not fit the front-distributor

engines. They do not have the two studs on the LEFT side of the block for the generator bracket.

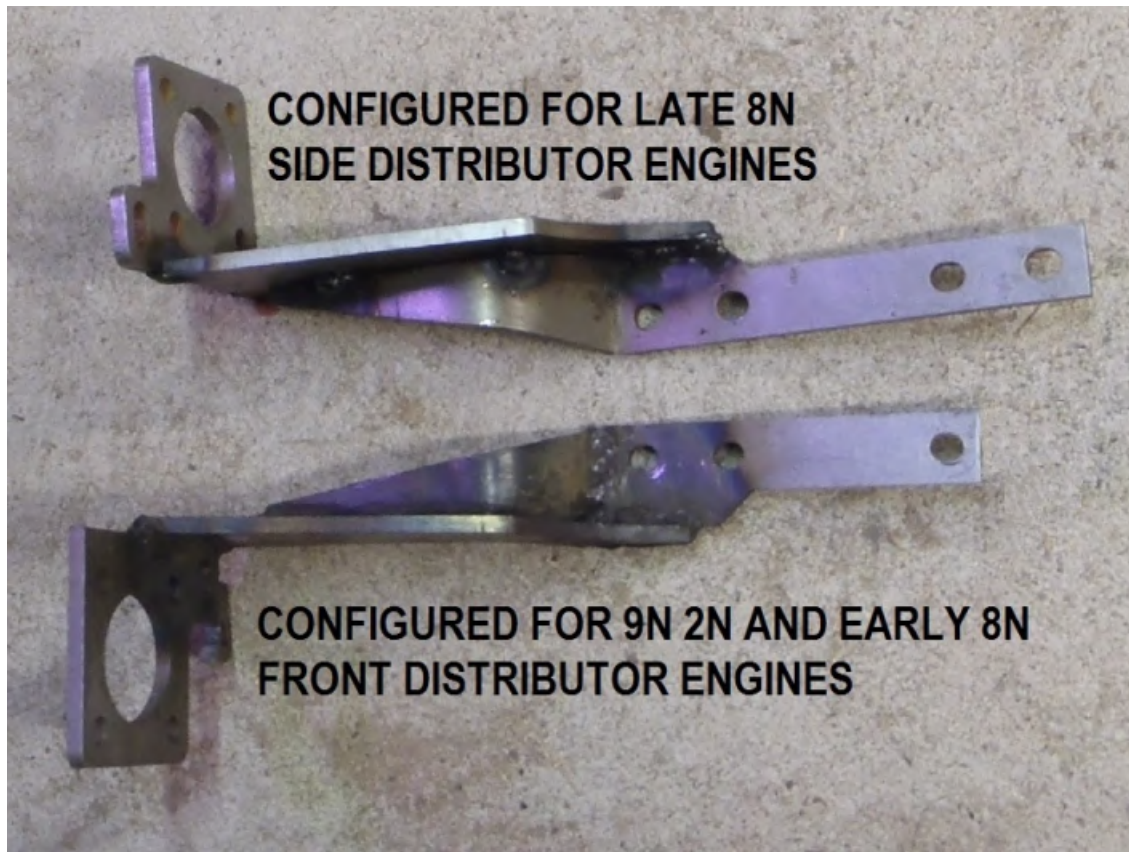


Here's a close-up showing the bracket with alternator adapter, and curved adjuster. The loose red bracket is a link that can be used to tie the top of the bracket to a cylinder head bolt. I am not using this bracket on my tractor yet, but it seemed like a good idea. If your tractor still has the original generator, it bolts directly to the legs of this bracket, without the alternator adapter, and uses the original generator belt tension adjuster behind the water pump. I do not generally include the alternator adapter, most people who have an alternator, will already have this adapter. I do include the curved adjuster with all brackets.

NEW UNIVERSAL BRACKET

I have also designed a universal pump-only bracket that will work for front or side distributor engines. The universal bracket is a new design that slips behind the oil filter bracket. The side distributor engine moved the oil filter back, so like the replacement cylinder heads, this bracket has two sets of holes, and has adequate clearance for either configuration. The late 8N generator and bracket have been removed for these photos, but will install and work normally. Most alternator brackets should work, but you will likely want to use the much better, gracefully-curved, alternator adjuster that is supplied with this bracket. It isn't shown in these photos, but is essentially identical to the arrangement shown on my universal bracket.





This shows how the brackets are configured for each engine. Two configurations are necessary for the belt to work.



This is the other configuration of the bracket mounted on my 2N. Obviously, the 8N type molded lower radiator hose will have to be used to clear the pulley and belt. The generator pulley on this engine is only slightly lower than the water pump pulley, so the new hydraulic pump must also sit lower than the water pump pulley or the belt may slip or miss the water pump entirely. That would not be good. The curved alternator adjuster is an extra part on this engine. It might be used to replace the straight one furnished with most of the alternator kits for these tractors. Another detail is the breather tube. The tube may need to be turned slightly to the rear to clear the back of the pump.

Complete Drawings for both bracket parts are at the end of this document. Even with parts cut by a machine shop, both brackets still require correctly bending, fitting, and welding 1/4" steel plate. I can place bulk orders, and have the basic steel parts from a machine shop in about a week. I may even be able to set it up so people can order the parts direct from the machine shop. Cost for the parts is under \$50. It costs between \$50 and \$75 for me to bend and weld them together. If you add shipping charges to my house, bending/fitting/welding time, plus shipping the finished brackets, you begin to see why I am not planning to go into business selling these.

Once we have a belt-driven pump mounted and ready to go, everything else needed is standard hydraulic parts that are available locally or by mail-order. What follows is hopefully an easy to follow shopping list and instructions.

2 - V-BELT

These tractors use a type "B" V-belt that is wider than the typical type "A" automotive V-belts. The original belt is too short, but many replacements are slightly longer and may work. The actual length needed depends on the size pulleys used. Generally, 48 to 52 inches in length is the range.

3 - THE PUMP



BARNES Model# 1003044

I am using a BARNES Model# 1003044 SAE 8 CW
This may also be found as a Haldex 10564 pump
0.194 cu in displ, 3000 PSI, 4000 RPM max,
3 GPM @ 3600 RPM, CW rotation, Mount 4F17,
Shaft 1/2" dia x 1-1/2", IN and OUT Ports = SAE 8 (3/4-16),
Where To Buy:
www.surpluscenter.com
Item# 9-4199

You can use a bigger pump if you want to add external valves and hydraulics like a modern tractor. However, I don't think it's a good idea to try and do much more than 2 GPM with a V-Belt drive. This system is limited because it is impossible to get a very good belt "wrap" on the hydraulic pump pulley. A smaller displacement pump will also work, the lift will just move a little slower. I'm using the Haldex #10563 on my 2N for about \$30 less.

(Haldex 10563 High Pressure Hydraulic Gear Pump - .129 Cu. In., Model# 1002964)
(Haldex 10562 High Pressure Hydraulic Gear Pump - .097 Cu. In., Model# 1002963)
(Haldex 10561 High Pressure Hydraulic Gear Pump - .065 Cu. In., Model# 1002962)

4 - PUMP PULLEY



1-BK24-A

The pump shaft is 1/2" Diameter.
I am using a 2" Diameter pulley for a type "B" V-Belt
A 3" Diameter might be a better match, see caution below.
Where To Buy
www.surpluscenter.com
Item# 1-BK24-A

This is cheating a bit. This pulley is smaller than the crank pulley, so the hydraulic pump will be turning more RPM than the engine. This means we will get a little more than the rated GPM at our normal working engine speed of 1500 RPM. **Be careful!** If you routinely run your engine at higher RPM, you will be overspeeding the hydraulic pump. This 2" pulley = 3750 RPM for the pump, when the engine is at 1500 RPM.

5 - HOSES



High Pressure Supply Hose - 6-Foot (72") Length

Apache Hydraulic Hose - 1/2in. 2-Wire, 3500 PSI - 1/2" NPTM fittings
Northern Tool and Equipment or Tractor Supply Company.

Suction Hose - 8-Foot (96") Length

Apache Hydraulic Hose - 3/4in. 2-Wire, 2250 PSI - 3/4" NPTM fittings
Northern Tool and Equipment or Tractor Supply Company.

Lengths indicated are only a suggestion and should be a bit longer than necessary, especially for the Suction Hose. Measure routes you will use. Try to protect the lines. The original, all internal, hydraulic plumbing on these tractors is a real plus when driving through brush and in the woods. We don't want the new external hoses to become a maintenance nightmare.

The suction hose could be purchased cheaper using a lower quality hose. I used the high pressure hose for durability and to avoid complicating fittings with additional hose types. I try to buy hose assemblies already made up in standard lengths. Buying custom-made hose and fittings is very expensive.

These hoses have standard NPT male ends. NPT is National Pipe Taper thread. You must use a thread sealant on these or they will not seal. NPT is not ideal for hydraulic systems. The fluid power association does not recommend using NPT for hydraulic systems. If you can find or have hoses made with JIC ends you will have a system that is easier to install without leaks. I used NPT because it's what I could find, it's certainly strong enough, and it's less expensive. I used the yellow thread sealant for gas systems and had no problem with leaks. DO NOT use the white Teflon plumber's tape! That is for 300 PSI water systems and will not seal hydraulic fluid working at 2000 PSI.

6 - FITTINGS

Most of these are swivel fittings. They make it a lot easier to assemble hoses to fittings. Even my cheap garden hose has a swivel end. It is best to find a chart that illustrates and describes the various fittings and thread sizes. Sometimes 1/2" means the pipe size, other times it may be referring to the actual thread size. It can be very confusing, so test-fit everything. Make sure it's going to go together before you have the tractor half-done, and find you need another fitting.

6a



1/2 NPTM x 3/4 NPTF 90 SWIVEL Elbow - One (1) required. This fitting replaces the 1/2" pipe plug under the differential. This is where the 3/4" suction hose will connect. **This was recently changed. The elbow on my 8N is a 3/4" x 3/4". The pipe plug hole in that tractor must have been drilled out and tapped to the larger size. Maybe some gorilla stripped the original threads. Watch out for similar non-standard issues on your tractor. Test-fit everything.**

Where To Buy

www.surpluscenter.com

Item# 9-1501-08-12

6b



ORB - SAE-08(M) x 3/4 NPTF 90 SWIVEL Elbow - One (1) required. This fitting goes on suction side of new pump. Other end of 3/4" suction hose connects here. This fits the pump indicated above. Buy a smaller pump and it may have different port sizes.

Where To Buy

www.surpluscenter.com

Item# 9-6901-8-12

6c



ORB - SAE-08(M) x 1/2 NPTF 90 SWIVEL Elbow - One (1) required. This fitting goes on supply side of new pump. High Pressure 1/2" hose connects here. This fits the pump indicated above. Buy a smaller pump and it may have different port sizes.

Where To Buy

www.surpluscenter.com

Item# 9-6801-8-8

6d



ORB - SAE-05(M) x 1/2" Female Pipe (NPTF) 90 Elbow - One (1) required.
This SAE-05 fitting has 1/2"-20 straight thread x (F) PIPE 1/2" NPT
Where To Buy: Good Luck finding this one.

This fitting can be hard to find. For the 2N, I could no longer find the fitting that would adapt directly from 1/2"-20 threaded ORB SAE-05(M) to the 1/2" NPT that my 1/2" supply hose needs to connect to. I had to buy two fittings. What I ended up ordering from Surplus Center is a SAE-05M x 1/4 NPTF Swivel fitting Item # 9-6900-5-4. This fitting is 1/4" NPTF and the hose we want to connect is 1/2", so we also need a 1/4" NPTM to 1/2" NPTF adapter. That one is Item # 9-5405-4-8. These are both straight fittings, so I'm running the supply hose under the footboard like I did for the suction hose on the other side. This allows the hose to turn up and get past the steering arm where there is more clearance.

Another option = SAE 5M x 1/4 NPTF Adapter Item# 9-6405-5-4 plus the 1/4 NPTM TO 1/2 NPTF Adapter Item# 9-5405-4-8.

This fitting or fittings replace the hex plug at the test port on the tractor's hydraulic pump flange so you can connect the other end of the High Pressure 1/2" hose. You will want the male (NPTM) version of the adapter fitting to attach directly to the optional check valve explained in the next section.

THAT's ALL YOU NEED !

You now have working live hydraulics any time the engine is running, even with the PTO disengaged. With the PTO engaged, both pumps drive the implement up. This can flow more than the relief valve was designed to flow. With no implement mounted, the lift arms may rise up. Moderate hand pressure should override this when hooking up an implement with the engine running. Heavy implements seem to go up and down normally, but a light blade may rise twice as fast as it will drop. If this is undesirable, switch PTO off and run the system with the front pump.

7 - OPTIONAL - But highly Recommended

The pump used is a gear pump. When this pump stops turning, hydraulic pressure will bleed back through the pump. The lift will not stay up with the engine off. To fix that, simply add a check valve near where the high-pressure line connects to the test port. Make sure you install this fitting with the flow arrow pointing towards the tractor hydraulic pump (down in this case).



1/2" NPT 18 GPM CHECK VALVE 5 PSI CRACKING

Where To Buy

www.surpluscenter.com

Item# 9-7933-8-5



This is the correct fitting to attach directly to the check valve. You could add a 1/2" pipe close nipple, but it is better to minimize the number of fittings and possible leaks. See notes under Item 6D above for issues regarding this difficult to find fitting.

8 - ADDITIONAL OPTIONS

Additional accessories are certainly possible. I added a suction-line strainer, and quick-disconnect fittings.

Some folks have used larger pumps and added valve assemblies to run other external hydraulic accessories. Don't ask me how that is done. Hydraulic systems can be very dangerous if you don't use the correct valves and accessories.

9 - HOSE ROUTING

The following photos show the routes I used on my 52. Accessories such as the foot throttle may have pushed some hoses into less than ideal locations. Watch out for areas like the steering arms. Anything that rubs a hose will quickly make a hole. Hot hydraulic fluid is not fun when it gets loose.



First Photo is looking at the back of the new front pump. Yellow arrows are the larger Suction hose coming from the bottom of the tractor sump. White arrows are the high pressure Supply going to the Test Port on the belly pump.



This and the next photo shows most of the route for the Suction Hose (Yellow Arrows). The Suction hose ducks up under the hood near the battery momentarily, just because there was a good place for a tie wrap.



Yes, I used tie wraps as temporary hose hangers, and they are still there. If the tie wraps ever become a problem, they will be replaced with something sturdier.



This photo was taken looking through the battery door. It shows both hoses from-to the front pump. The High Pressure Supply (White Arrows) is looping around behind the dash to get to the other side of the tractor.



This is looking from the other side, you can see another tie wrap doing double duty as a hose hanger and battery door bumper.



This and the next photo shows the rest of the route I used for the High Pressure Hose (White Arrows). Pay close attention where the hose passes behind the steering arm. On some tractors, there may not be enough room. The hose might have to run a little higher, by the steering box, or drop this run down under the footboard like we did for the suction hose on the other side.



My check valve and a quick disconnect are the shiny fittings above the foot board. The quick disconnect allows me to un-plug this line with no mess. Both ends are sealed when the fitting is pulled apart.

I hope the first question that comes from this page isn't something like, "Where can I buy hoses with the Yellow and White arrows?", GRIN.

Please Note: These routing photos are only a suggestion, you might easily find a better way to install hoses on your tractor. The intent is that these external hoses not become a reliability issue. A broken hose will leak or pump all the fluid out of your sump. That's expensive. If you've been working a while, the fluid will also be quite hot.



Do not use cast pot metal or unrated brass fittings from the local hardware store! Of course, I had to learn this the hard way. I see these fittings being used on hydraulic systems all the time, so I used an unrated street elbow where the hose connects to my test port. The fitting lasted several years, but when it broke, hot oil went everywhere. It seemed like at least a quart ended up in my boot. That was uncomfortable.



This is the fitting that broke. As you can see, there's a big difference in this fitting and the correct hydraulic fittings.

COST ESTIMATE

This is an estimate of probable costs. Prices for individual parts are constantly changing and usually headed UP in price. Shop around, and see what you can find. Surplus is perfectly ok. Beware the China logo. For some things the quality is first rate, for other items, not so good.

ITEM	DESCRIPTION	COST
1	PUMP MOUNT	\$125
2	V-BELT	\$ 15
3	PUMP	\$140
4	PULLEY	\$ 5
5	HOSES	\$120
6	FITTINGS	\$ 35
7	MISC HARDWARE & HOSE BRACKETS	\$20
	TOTAL	\$460

Add for options such as: CHECK VALVE, SUCTION STRAINER, QUICK DISCONNECTS, LARGER PUMP, VALVES, BY-PASS, ETC. Those usually run me another \$75 or so.

If you dabble in hydraulics, you already have most of this stuff around the shop. Hose brackets, and even the pump mount, are not that hard to make, if you have the tools.

As time permits, I will improve this web page, and pull part numbers for some of the accessory items I added to my setup. I will be welding-up and testing the new universal bracket on my 2N in the next few weeks. Stay Tuned. When you start adding valves and external connections, you are on your own. I built a backhoe, but I'm a long ways from being a hydraulics guru. This stuff can be dangerous if you don't know what you are doing. I trust myself to think things through, and ask questions when I get in over my head. I don't feel qualified to advise others how to design hydraulic systems any more complicated than the basic system as shown.

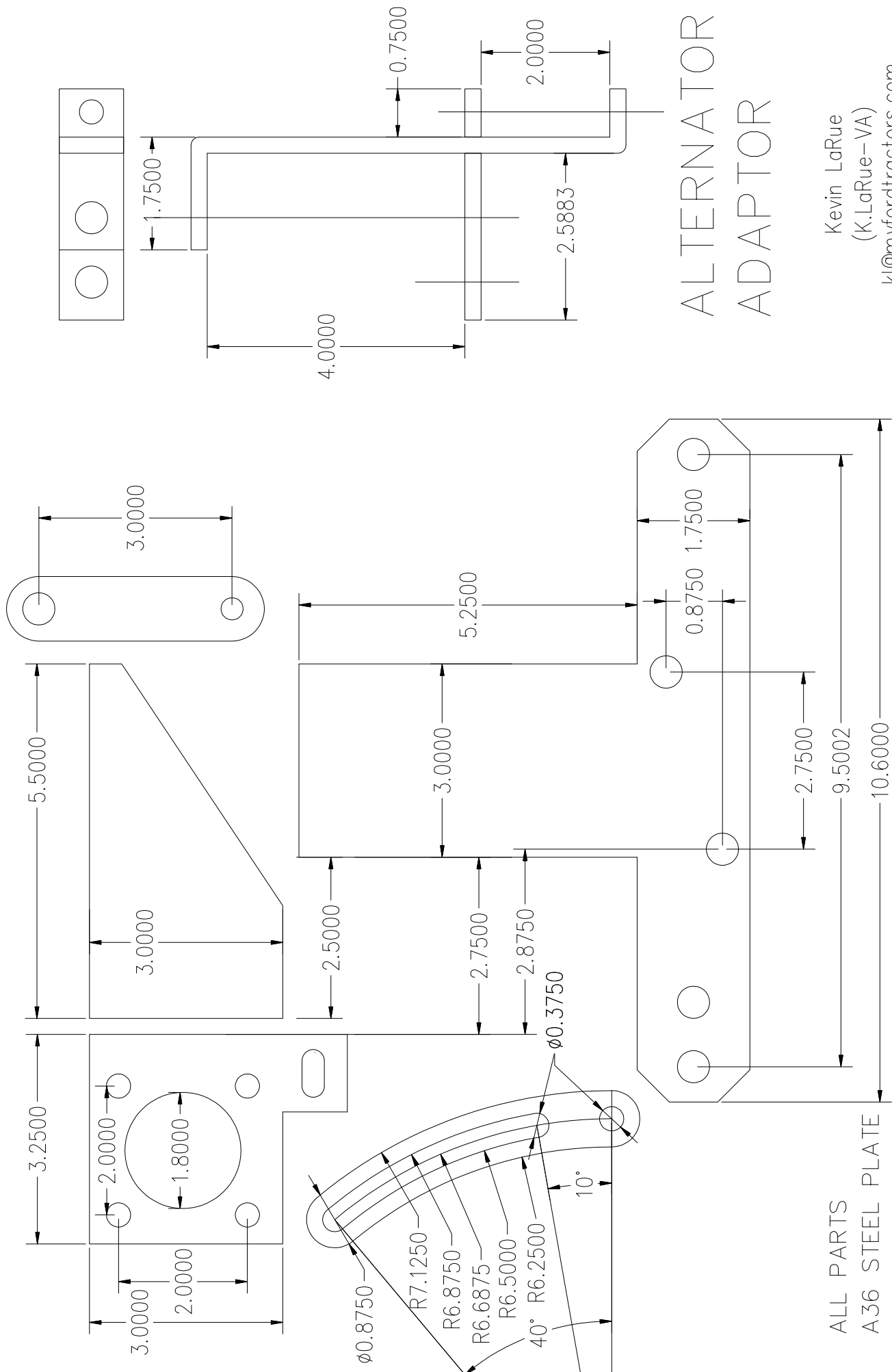
Enjoy!

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Updated DEC 2012 by KL

MERRY CHRISTMAS !



ALTERNATOR ADAPTOR

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ALL PARTS
A36 STEEL PLATE

COMBO BRACKET FOR LATE 8N ONLY

USES HEAD
BOLT



BRACE
OPTIONAL

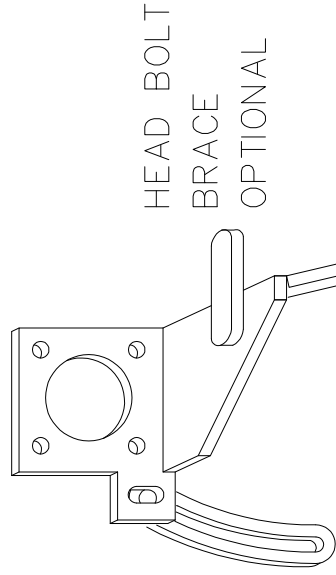
DRILL HOLE FOR
BRACE

BEND UP 1"
FROM FLAT

1.0000

BEND BOTH LEGS
UP 90 DEGREES

4.0000



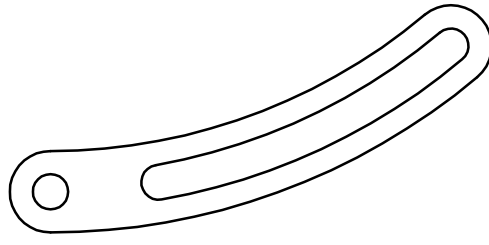
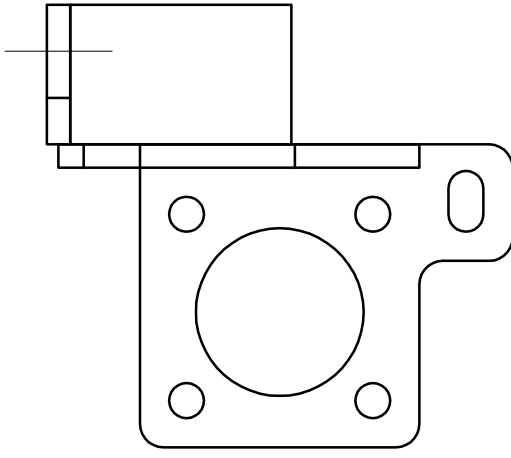
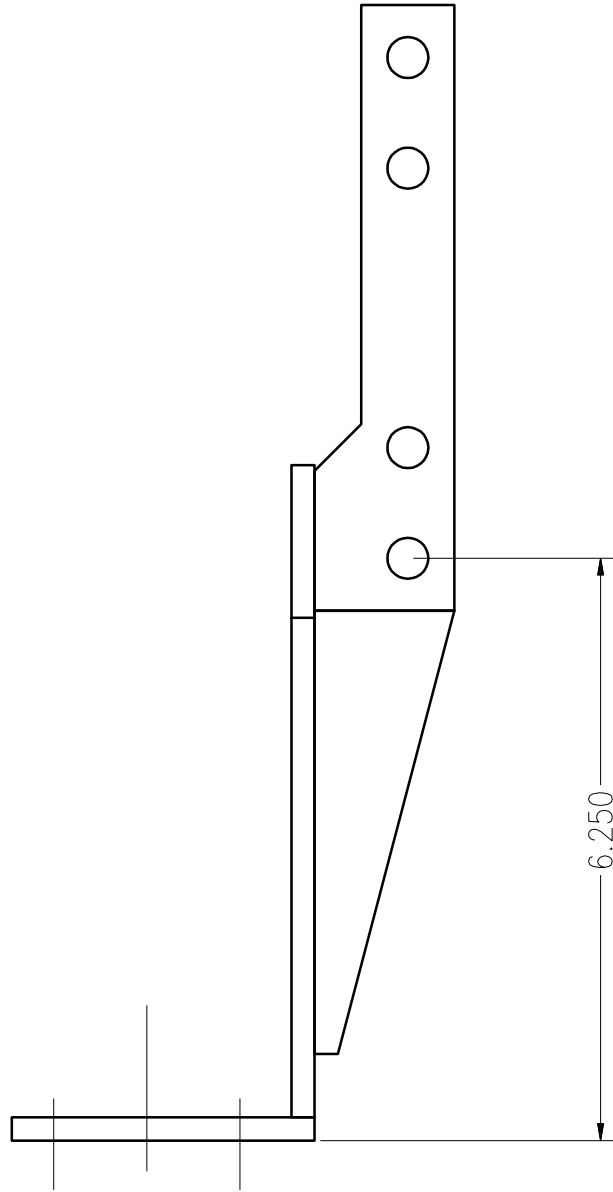
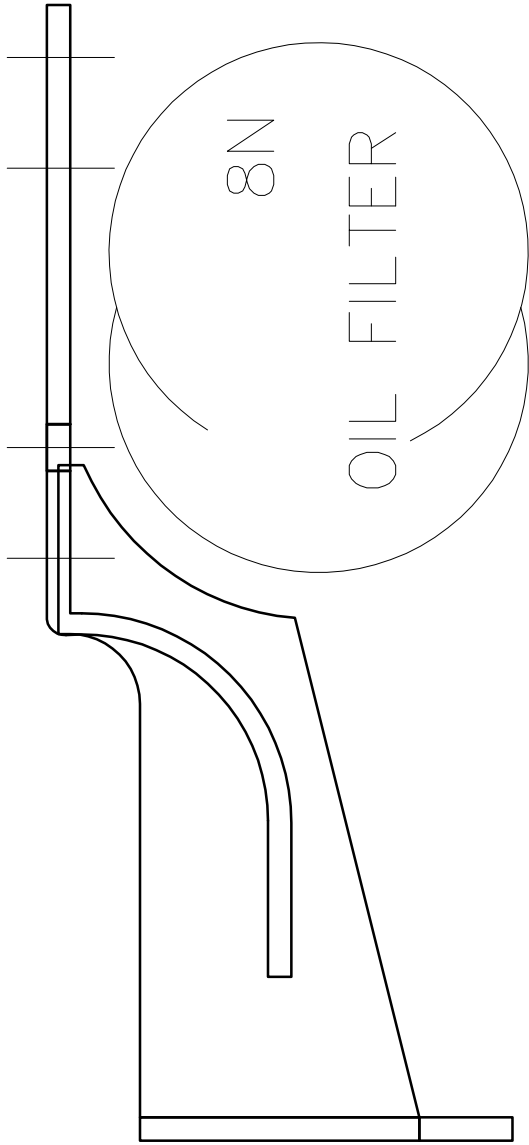
HEAD BOLT
BRACE
OPTIONAL

ASSEMBLY

THIS 1/4" PLATE IS DIFFICULT TO BEND WITHOUT A PRESS BRAKE. YOU CAN CUT PART-WAY THROUGH BACK SIDE, BEND, THEN WELD.

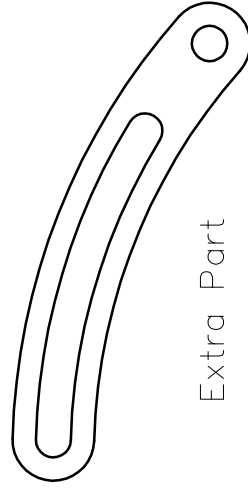
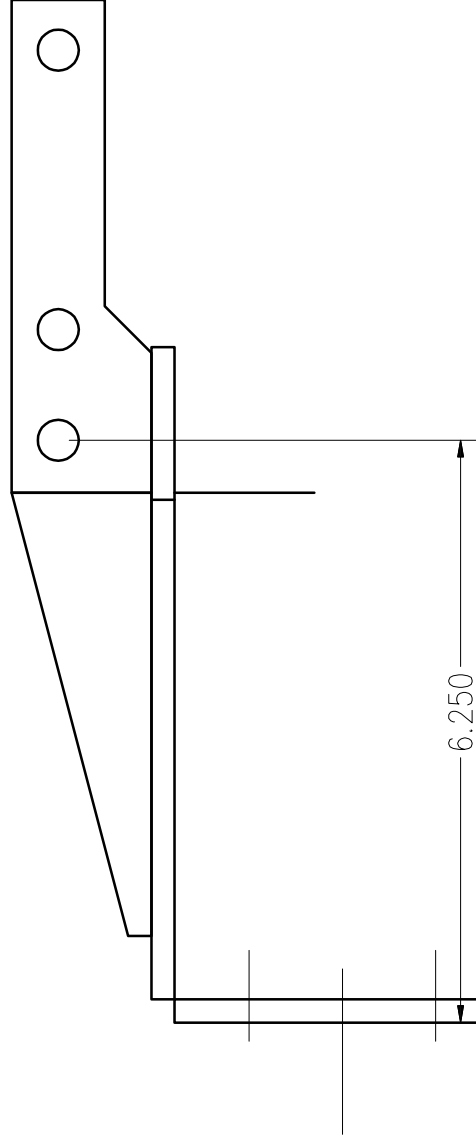
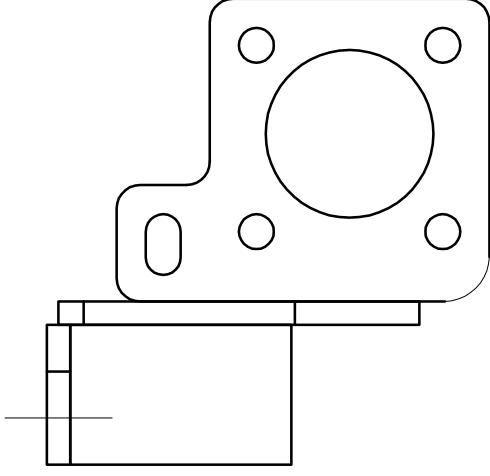
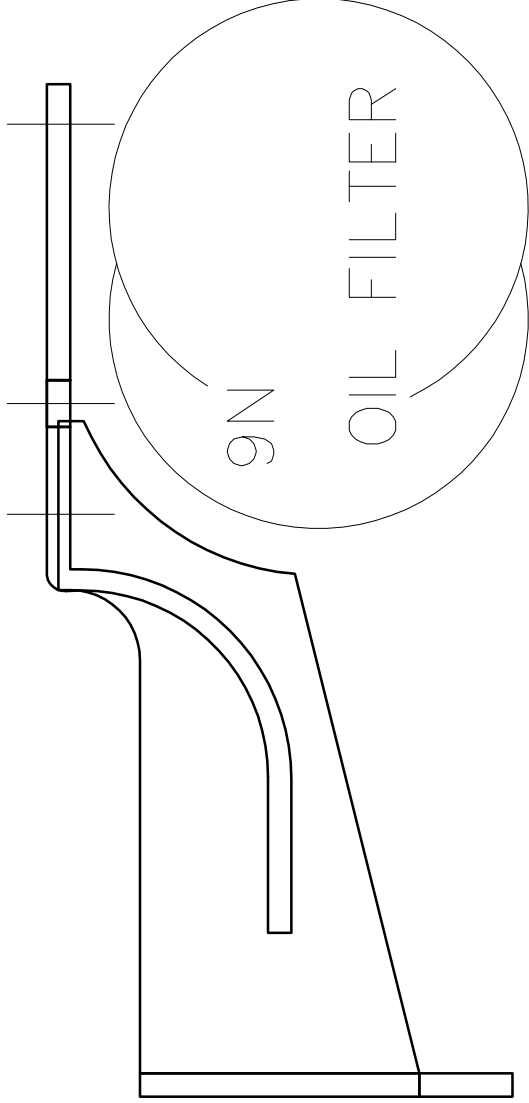
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COMBO BRACKET



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LATE-8N Assembly



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9N-2N-Early 8N Assembly