

# How to build a weather-proof portable diesel heater:

*Is this project for you?*

This project is not overly technical however, it does involve some basic wiring, some basic fabrication (cutting, drilling, bolting etc.) patience **TAKE YOUR TIME** and a healthy respect for **SAFETY**.

My total cost was about 700\$ Canadian, but that can vary depending on parts availability, whether or not you break anything during the build or if you want to make further modifications/changes to the design.

*What can you expect out of this project?*

An almost endless supply of heat! A weatherproof design, that you can keep outside, transport on your roof, use for your tent, your boat or your X.

## **First major point:**

**\*\*\* caution \*\*\***

***Safety Safety Safety!***

**YOUR LIFE AND THOSE OF YOUR LOVED ONES IS MORE IMPORTANT THAN BEING WARM - FAILURE TO FOLLOW INSTRUCTIONS/USE COMMON SENSE CAN KILL YOU.**

I am not an engineer; I have used mine for hours and hours and hours with no problems but that doesn't mean its fool-proof or a perfect design. Diesel heaters are widely used in the camping/van-dwelling/marine world and are considered to be a safe and economical way to heat your space (when used properly) that being said - **PROCEED AT YOUR OWN RISK AND BENCH TEST YOUR BUILD.**

Here are the main safety considerations that I am aware of:

1. **Fire risk:** the exhaust side of these units get quite hot! If anything touches your exhaust it will be hot enough to cause a fire. Take your time with the exhaust part of this build I believe its one of the most dangerous aspects. Also, for that reason I also recommend running the unit AWAY from your vehicle. Just a few feet could save your life in the one in a million chance something goes wrong. Hope for the best -prepare for the worst. Its also a good idea to keep a fire extinguisher on hand. DO NOT put anything in front of the Exhaust port! The exhaust gasses are over 400 degrees and will melt/burn anything in front of them. An additional fire risk is from the wiring, if you wire this incorrectly or don't use fuses and put them on the BATTERY side of the wiring you could create a fire just by having a problem with your wiring.
2. **Burn risk:** as mentioned above things get HOT on the exhaust side, if you, your dog or your kids touch the exhaust or go anywhere near it they **WILL** get a 3<sup>rd</sup> degree burn.
3. **Asphyxiation risk:** You are dealing with combustion which creates toxic gasses that need to be respected CO<sub>2</sub> (carbon dioxide) and CO (carbon Monoxide), the burner unit itself contains essentially an Air/Air heat exchanger which means the combustion air side is totally separated from the air side that enters your cabin. -That being said – ALWAYS USE A

CARBON MONOXIDE DETECTOR and make sure it has batteries and it WORKS.

4. **Power consumption risk** : The unit itself (5kw version) will draw approximately 60 watts of power during nominal operation = 5 amps at 12Volts and 11 amps during start up and shutdown. The reason it pulls more amps at startup and shutdown is because it diverts more power to the glow-plug to essentially burn off any residue that might gum up the internals during normal operation. **DO NOT** unplug the unit until it has completed the shutdown sequence and the fan is no longer running. While this doesn't pose a direct safety risk It will cause premature failure and you might freeze to death the next time you try to fire it up.

The Average car battery shouldn't have a problem pulling 5 amps for 8 hours, that being said cold weather can affect battery performance so **ALWAYS** have a backup plan to start your battery if you are in the middle of nowhere. Either run this on a separate battery, have a buddy there with jumpers or have an additional back up power source to start your vehicle in the morning.

**Now that we have gotten that out of the way, lets dive in:**

### **Tools required:**

Dremel (or some other way to make clean holes in plastic)

Drill with bits and holesaws

Various Screwdrivers

Basic Electrical (crimpers, strippers etc)

Sockets pliers or some way to fasten bolts.

Welder (optional but if you have access to one it will come in handy)

## **PARTS Required:**

(this is not a complete list, there may be bolts screws and other various small details you will have to source but the major parts are here)

Diesel heater unit

-Here is where you will hit your first fork in the road your option is either a 2kw unit or a 5kw unit.

I went with a 5Kw version, I did this because I wanted to use this to heat my boat and my tent etc. The 2kw version does not make enough power to heat a larger space however its will be enough to heat a vehicle. The Cost doesn't really change between the two models but fuel consumption is lower on a smaller unit. I have also heard anecdotally that these units don't really like to be run continuously on a low power setting, I haven't personally run into any issues but you should size your project for your specific situation. This whole guide and the parts mentioned is designed specifically for a 5KW unit, if you do decide to go with a 2KW unit you may have to do some additional research as I believe the hoses are a different size the unit itself is smaller and the exhaust and intake are smaller as well.

This is the unit that I went with, it has great reviews and for me has performed flawlessly – whatever you choose I highly recommend getting one with a wireless remote.



Roll over image to zoom in

Tseipoai 12V 5000W  
Parking Heater Diesel Air  
Heater 10L Tank With  
LCD Monitor Control  
Remote Control Parking  
Fan Heater Defroster for  
Car/Motor-  
Home/Boat/Bus(Suitable  
for high altitude areas)

Brand: Tseipoai  
★★★★★ 373 ratings  
#1 Best Seller in Automotive Replacement Heaters

Was: ~~\$252.00~~  
Deal Price: **\$215.04**  
✓prime FREE One-Day  
You Save: **\$37.95 (15%)**

- PERFECT AIR DIESEL HEATER PARKING PLANAR-12V 5KW Aluminum Alloy Diesel Air Heater with LCD Control, Remote Control, 10L Tank, Silencer and Other Necessary Accessories (shown as the picture).
- The heater can be used for Truck, Boat, Car Trailer, Touring car, Campervans, Motorhomes, Caravans and All Kinds of Other Diesel Vehicles. (Upgraded version) Suitable for high altitude areas.
- Remote control can Preheating. Oil

**\$215.04**

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it, choose **Ship in Amazon  
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Next you will need a case:

This another fork in the road, I built my unit to contain the gas-tank internally. I have tested my unit and I don't think there is a risk of that diesel igniting as I have never recorded an internal case temp above 100 degrees F, you might be better off to get a smaller case that just fits the heater unit itself and place a small Jerry can with a fuel line to the fuel pump outside of the case. Ill let you decide what to do.

This is the case I used:

22-24160

Equipment Case, Weatherproof, Polypropylene, Black, Foam Insert, 22.5" x 15.5" x 12"



Add to compare

<b>DURATOOL</b>	
Manufacturer:	DURATOOL
Manufacturer Part No:	22-24160
Newark Part No.:	8386736
Also Known As:	GTIN UPC EAN: 640522720187
Technical Datasheet	22-24160 Datasheet
	See all Technical Docs

Image is for illustrative purposes only. Please refer to product description.

**Best Seller**

146 In stock [Need more?](#)

Order before 5:45pm EST standard shipping  
Same day shipping

\$94.73  
Price for: Each  
Multiple: 1 Minimum: 1

Quantity	Price
1+	\$94.73
5+	\$90.86
20+	\$86.99

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Product Information

<input type="checkbox"/> Carrying Case Material:	Polymer	<input type="checkbox"/> External Width - Imperial:	15.5"
<input type="checkbox"/> Case Color:	Black	<input type="checkbox"/> External Width - Metric:	-
<input type="checkbox"/> External Height - Imperial:	12"	<input type="checkbox"/> External Depth - Imperial:	22.5"
<input type="checkbox"/> External Height - Metric:	304.8mm	<input type="checkbox"/> External Depth - Metric:	-
		<input type="checkbox"/> Product Range:	-

Delivery & Services

Free Shipping on Orders Over \$200

This case is, cheap, sturdy and waterproof.

I put a skull sticker on the top of mine to remind myself that it is dangerous and to check the fuel lines etc., you might want to do the same.

Next you'll need additional piping, wiring, a thru hull for your exhaust a vent cover and some other bits an pieces.



Roll over image to zoom in

Pipe Connector - 75mm Plastic Air Ducting Pipe Elbow Outlet Connector Air Parking Heater Accessory

Brand: jycous

Price: \$14.37

Get a \$50 Amazon.ca Gift Card instantly, plus up to 5% back for 6 months after approval for the Amazon.ca Rewards Mastercard.  
Pay \$14.37 \$0.00 for this order after approval.

<b>Material</b>	Plastic
<b>Brand</b>	Jycous
<b>Colour</b>	Black

\$14.37

FREE delivery: Dec 13 - Jan 3

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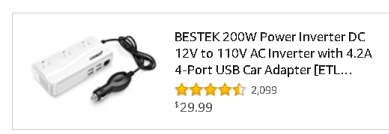
## EPAuto 12V 12' Foot Heavy Duty Extension Cord with Cigarette Lighter Plug Socket

Visit the EPAUTO Store  
 ★★★★★ 6,232 ratings

List Price: \$19.99  
 Price: **\$14.97** ✓prime  
 You Save: \$5.02 (25%)

Get a **\$50 Amazon.ca Gift Card** instantly, plus up to 5% back for 6 months after approval for the Amazon.ca Rewards Mastercard.  
 Pay \$14.97 **\$0.00** for this order after approval.

- Plug directly into Cigarette Lighter Socket. One Male plug to one Female socket.
  - Bring Power to your Cooking appliances, Lights, Cell Phone, Tablet, and other appliances.
  - Extends 12V Power Source From Your Car.
  - 12 Foot High Quality UL Listed Cord (16 AWG).
  - 15A Safety fuse protects your appliances.
- See more product details



**\$14.97**  
 ✓prime

FREE Delivery by **Wednesday, Nov 24** for Prime members  
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## URBEST 5 Pcs Dual Row 4 Position Covered Screw Terminal Strip 600V 25A

Visit the URBEST Store  
 ★★★★★ 486 ratings | 4 answered questions

Price: **\$15.99** ✓prime FREE One-Day

Get a **\$6.50 promotional credit** when you reload **\$100 or more** to your gift card balance (Restrictions apply).

New (2) from **\$15.99** ✓prime FREE One-Day

<b>Current rating</b>	25 Amps
<b>Connector type</b>	Screw
<b>Material</b>	Plastic, Metal
<b>Brand</b>	URBEST
<b>Item dimensions L x W x H</b>	6.6 x 3 x 2 centimeters

### About this item

- Product Name : Barrier Terminal Block;Material : Metal, Plastic
- Rated Value : 600V 25A;Poles : 4P (Dual Row)
- Size : 68 x 30 x 19mm/ 2.7" x 1.2" x 0.75" (L\*W\*H);Color : Black
- Net Weight : 182g
- Package Content : 5 x 3P Barrier Terminal Block

**\$15.99**  
 ✓prime FREE One-Day

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Quantity:

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Sold by **URBEST (R)** and Fulfilled by Amazon.

Return policy: **Extended holiday return window till Jan 31, 2022**

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## Heavy Duty Saddle Style U-Bolt Muffler Clamps with Anti-Rust Coat and Multiple Uses (1 1/8")

Brand: AMAAM

★★★★★ 649 ratings

Price: **\$14.05** + Import Fees Deposit may apply at checkout. ✓prime

New (2) from **\$14.05** ✓prime

Size: 1 1/8"

- 1 1/2"
  - 1 1/8"**
  - 1 3/4"
  - 1 3/8"
  - 2 1/2"
- 2 3/4"
  - 3"
  - 4"
  - 6"

- Heavy duty u-bolt exhaust saddle style clamp
  - Made from steel with anti-rust coating
  - Diameter shown is inside diameter (ID) which fits over the pipe
  - Includes saddle, u-bolt, & two nuts
  - Multiple uses with numerous sizes to choose from
- See more product details



TuxMat Custom Car Floor Mats for Subaru WRX/WRX STI...  
★★★★★ 39  
\$229.99

**\$14.05**

+ Import Fees Deposit may apply at checkout.  
✓prime

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Only **9 left in stock.**

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## 880Pcs M2 M3 M4 M5 Stainless Steel Precise Metric Hex Button Head Cap Self Tapping Screws, Round Flat Socket Bolts and Nuts Set and Washers Assortment Kit +Wrench

Brand: NINDEJIN

★★★★★ 335 ratings

Price: **\$34.99** ✓prime

Get a **\$50 Amazon.ca Gift Card** instantly, plus up to 5% back for 6 months after approval for the Amazon.ca Rewards Mastercard.  
Pay **\$34.99 \$0.00** for this order after approval.

Material type:  
**Stainless Steel**

Size: **Round head** ▾

Round head	Flat head	Hex head
<b>\$34.99</b>	\$32.98	\$36.89

**Material** Stainless Steel  
**Drive system** Internal Hex  
**Head style** Button

**\$34.99**  
✓prime

FREE delivery: **Thursday, Nov 25**  
Order within 13 hrs and 31 mins  
Details

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In Stock.

Quantity: 1 ▾

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Return policy: **Extended holiday return window till Jan 31, 2022**

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## Dynamax 35958 Hardware Muffler Cement

Brand: Walker Exhaust

★★★★☆ 64 ratings

Was: \$22.46

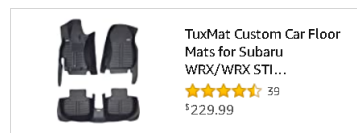
Deal Price: **\$21.26** ✓prime FREE One-Day

You Save: **\$1.20 (5%)**

New (6) from **\$21.26** ✓prime FREE One-Day

- Effective for sealing exhaust joints subject to elevated temperatures
- Ideal for "out-of-round" muffler and pipe connections
- Cures in minutes
- New Walker accessories help to ensure effective exhaust repairs
- Walker supplies all of the accessories you need to do the complete exhaust job

➤ See more product details



Sponsored

**\$21.26**

✓prime FREE One-Day

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Return policy: [Extended holiday return window till Jan 31, 2022](#)

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New (6) from **\$21.26**



## Sinch 4pcs Floating Shelf Brackets Invisible Concealed Wall Mounted Wood Shelf Bracket Stainless Steel

Brand: lumanie

★★★★☆ 51 ratings

Was: \$49.99

Price: **\$18.99**

You Save: **\$1.00 (5%)**

Get a **\$50 Amazon.ca Gift Card** instantly, plus up to 5% back for 6 months after approval for the Amazon.ca Rewards Mastercard.

Pay ~~\$48.99~~ **\$0.00** for this order after approval.

Size : 5inch

3inch \$17.99 ✓prime	4inch \$18.99 ✓prime	<b>5inch \$18.99</b>	6inch \$21.99
----------------------------	----------------------------	--------------------------	------------------

- The invisible brackets will create an illusion that the shelf is floating.
- Wall mounted concealed support, it does not need a slotting, looking very elegant for your shelf and saving much space.
- Suggested wood thickness is 25-30mm as the bracket pole is 12mm diameter.
- The brackets are suitable for home book shelf and decoration support etc.
- Pack of 4 pcs with necessary screws. It is suggested that The width of the board should not exceed 2 times the length of the bracket.

**\$18.99**

\$5.00 delivery: **Dec 13 - Jan 3**

📍 Deliver to Nathan - West Vancouver V7S 2R

**In Stock.**

Quantity: 1

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20 Pack Shelf Brackets 6 inches,



Click to open expanded view

## Pmandgk 4X 75mm Car Heater Ducting Pipe Joiner Air Parking Heater Hose Tube Connector for Webasto Eberspacher

Brand: Pmandgk

**Currently unavailable.**

We don't know when or if this item will be back in stock.

Size	75mm
Material	Plastic
Brand	Pmandgk
Colour	Black
Item dimensions L x W x H	16 x 16 x 5 centimeters
Item weight	130 Grams

### About this item

- A great aftermarket replacement for your old or one.
- Simple design ,Integral solute, sealed leakproof ,Thickening material, strengthen the hardness
- Made of premium plastic material, durable and impact-resistant.
- Suitable for connecting any 75 to 75 ducting.
- For extending 75 internal diameter ducting.

[See more product details](#)

**Currently unavailable.**

We don't know when or if this item will be back in stock.

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Happybuy Diesel Air Heater 8KW Diesel Parking Heater 12V...

★★★★☆ 81  
\$209.99

Sponsored




### Wobekuy 5.5L Plastic Air Parking Heater Fuel Tank Gasoline Oil Storage for Eberspacher Truck Caravan Fuel Oil Gasoline Tank

Brand: Wobekuy  
★★★★★ 2 ratings

**Currently unavailable.**  
We don't know when or if this item will be back in stock.

- Long service life and durability.
  - Corrosion resistant, anti-aging.
  - Application:Car heater disel.
- [See more product details](#)



Star brite 080400NC Boat Wash-3.78L  
\$51.50


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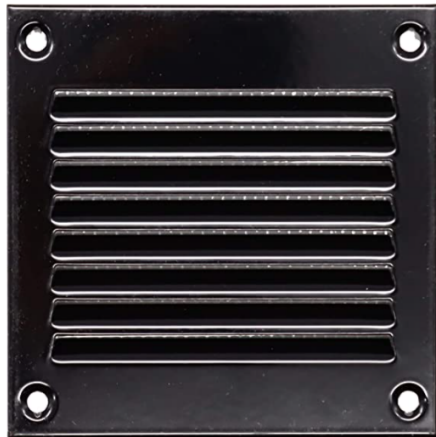
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**BRS**  
BRS Battery LTD  
Recommended Just For You

No More backache/TERAPUMP 4AA Battery Powered Utility...  
★★★★★ 220  
\$69.99

Sponsored



Click to open expanded view



### Vent Systems 4 x 4" inch Air Vent Cover - Black - Metal Air Return Grill with Built in Pest Guard Screen HVAC Vent Cover for Home Improvement Vent Duct Cover 100x100 mm - Pack of (1)

Brand: Vent Systems  
★★★★★ 4 ratings

Price: **\$17.00** + Import Fees Deposit may apply at checkout.

Get a **\$50 Amazon.ca Gift Card** instantly, plus up to 5% back for 6 months after approval for the Amazon.ca Rewards Mastercard.  
Pay \$17.00 **\$0.00** for this order after approval.

Item Parcel Quantity: 1

- Comes With Built-In Durable Insect Protection Screen to keep the insects from entering living spaces.
- Usable for both - indoors and outdoors. Easy to install fresh air vent cap - grill cover.
- Louvered design for better look and better air flow. Helps to keep the wind, rain and snow from entering outdoor dryer vents
- Paintable plastic components contain UV stabilizer to reduce fading due to exposure to sunlight
- Durable Material: Made of High Quality Metal and is rust free. Fits perfectly with other Vent Systems HVAC products.

**\$17.00**  
+ Import Fees Deposit may apply at checkout.

FREE Delivery by **Monday, Dec 13** for Prime members  
[Details](#)

Fastest delivery: **Tuesday, Dec 7**

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Quantity:

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## X AUTOHAUX 75mm Round Car Heater Ducting Warm Air Vent Outlet 360 Degrees Rotatable Black

[Visit the X AUTOHAUX Store](#)

**Currently unavailable.**

We don't know when or if this item will be back in stock.

- **[Compatible]** Suitable for 75mm Warm Air Vent Outlet, please confirm it is right for you before purchase.
- **[Material]** Made of plastic material, the Car Warm Air Vent Outlet is durable and long lasting.
- **[Package Include]** 1 x Warm Air Vent Outlet
- **[Function]** Prevent your car surface from scratches and dust.
- **[Wonderful Replace]** Original and wonderful replace your old or broken one.

[See more product details](#)



Roll over image to zoom in



## Tavot 75mm Car Auto Heater Pipe Duct Warm Air Outlet Vent Hose Clips, Y/T-Shaped Tee Telescopic Hose Extendable Parking Vent Hose for Webasto Eberspacher for Propex Diesel Heater

Brand: Tavot

★★★★★ 6 ratings

Save 7% Lowest price in 30 days

Was: \$38.99 [Details](#)

Price: **\$36.43**

You Save: **\$2.56 (7%)**

Color: **75mm Y-tube Kit**



\$40.99



\$36.43



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## SunplusTrade 2" x 50' Black Exhaust Heat Wrap Roll for Motorcycle Fiberglass Heat Shield Tape with Stainless Ties

Brand: SunplusTrade

★★★★☆ 6,756 ratings | 114 answered questions

Amazon's Choice for "motorcycle exhaust wrap"

Price: \$14.99 + \$10.39 shipping

No Import Fees Deposit & \$10.39 Shipping to Canada [Details](#)

- Package includes one 2 inch X 50 feet Heat Wrap with (pack of 6) 12" Stainless Steel (304) Locking Zip Ties.
- The exhaust heat wrap tape can withstand 1400F direct/2000F radiant heat.
- High resistance to abrasions, oil spills, temperatures and vibration breakdown
- The thermal heat wrap can reduce heat under hood up to 50%

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ding request...

\$14.99

No Import Fees Deposit & \$10.39 Shipping to Canada [Details](#)

Arrives: **Monday, Dec 13**

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In Stock.

Qty: 1

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## TINGZHIGO Thru Hull Exhaust Skin Fitting, Fit for 22mm or 24mm Inner Diameter Hose Pipe, 316 Stainless Steel, with Bolts and Nuts

Brand: TINGZHIGO

★★★★☆ 6 ratings

Price: \$32.99 + \$9.18 shipping

\$13.25 Shipping & Import Fees Deposit to Canada [Details](#)

Style Name: **Fit for 22mm Inner Diameter Hose Pipe**

Fit for 22mm Inner Diameter Hose Pipe

\$32.99

\$13.25 Shipping & Import Fees Deposit to Canada [Details](#)

Arrives: **Monday, Dec 13**

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In Stock.

Qty: 1

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The other parts you will need that aren't on this list:

**A metal plate** to make the base for your heater cage (see photos below)

I had one lying around. Mine is about a 1/16<sup>th</sup> of an inch thick and measures approximately 8 X 15 inches you can go plus or minus a couple inches on that, its not necessary to be exactly the same size, what it does is create a base for your heater unit to stand upon. Building that frame is basically the first step in the fabrication process and it will drop inside your case and be bolted to the bottom of your case.

**An Exhaust elbow** (essentially a pipe elbow, I used a heavy duty copper pipe with a non-threaded 1 1/8 sleeve and used the heavy duty exhaust clamps above to fasten it.

This connects from the Thru Hull to the exhaust port of your heater unit.

This is an area that could be improved! There is quite a gap between the 1 inch exhaust outlet and the 1 and 1/8 elbow I used. I think you might be able to find something that fits better, what I did was used copious amounts of muffler cement, in addition I wrapped my thru hull and my exhaust port on the heater in the heat wrap to get a tighter fit, then I clamped it. It seems to work OK I haven't had any issues but if you could find something that fits tighter it would be a better set-up.

## **OK YOU HAVE THE PARTS NOW WHAT?!**

Your heater will show up in a box with a bunch of parts, don't let that intimidate you, they are VERY simple in operation.

### **STEP 1.**

## **BUILD A MOUNT FOR YOUR HEATER UNIT.**

This what you are going for:



The heater will come with a metal bracket that bolts to the bottom of it, you can see the metal plate I used for a base. You want to make sure that one side is very close to the edge of the metal plate (side opposite of this photo) so that your exhaust elbow will fit to the thru-hull once you drop the frame inside your case.

For stands I used the 5 inch invisible shelf mounting brackets (it's the perfect height) I listed above, this is not a perfect solution because they are solid steel and its hard to screw into solid steel without drilling and tapping, I ended up just drilling and using machine screws. (if you can find something else that works better, or fabricate something – by all means!) Drill through your bottom plate and use the machine screws and bolts to fasten it. If you have access to a welder you could weld this part together, the main point is that it should be a **STURDY** platform for your heater.

What this does is keeps the hot parts away from anything that could catch fire, its very important to do this properly.

## STEP 2.

### MODIFY YOUR CASE.

This is where the Dremel really shines,

You will need to cut some holes,

Holes for:

**-intake AIR**, REAR lower right side of case (SEE PHOTOS)

This one takes some time due to the nature of the case there is a decent amount of plastic to chew through in this area.

**\*\*\*CAUTION\*\* INTAKE AIR NEEDS TO BE AS FAR AWAY AS POSSIBLE FROM YOUR COMBUSTION EXHAUST THEY SHOULD BE ON OPPOSITE SIDES OF YOUR DEVICE OTHERWISE YOU WILL ASPHYXIATE YOURSELF WITH DEADLY GASSES– ALWAYS USE A CO MONITOR/AIR MONITOR.**

Use the intake vent that came in your kit as a template, you need to shave down a considerable amount of plastic, then insert it from the outside and Bolt it to the case and seal it with silicone. You should now have a 75mm tube on the INSIDE of your case to attach your 75mm aluminum INTAKE tube to with a hose clamp.

**-Exhaust AIR** –LEFT LOWER REAR side of case (SEE PHOTOS)

(This is where the air that heats you and you breathe comes out)

Use the round car heater ducting warm air vent outlet (2) as a template for your hole. Basically, you are taking two of these things, popping off the front piece, filing them down flat (Dremel) then installing them one on each side of the case, you then drill through and BOLT them together, it's a good idea to SILICONE them when you do this for a good seal. The inside one you will attach your 75mm



exhaust AIR hose with a hose clamp to with your 75mm aluminum hose once you drop the frame in. (SEE PHOTOS)

## **-Combustion Intake vent**

The square black 4 inch vent listed above, I put this on the LEFT LOWER FRONT side of the case. (SEE PHOTOS) Basically you just cut a square hole then bolt that vent on.

(this is what draws cool outside air in for the combustion of your heater, by placing it on that side and your heaters combustion intake tube on the lower right side you will draw cool air in and across your hot exhaust to help keep inner case temps down.)

*At this point before I bolted anything down inside the case, I Bench tested the heater using the components that it came with, this is a good time to familiarize yourself with its operation, wiring, ensure everything is working properly BEFORE you bolt it inside the case , clamp down your exhaust and deal with the thru hull.*

*I'm not going to go over the instructions for the heater itself, that's all contained within your unit and its outside the scope of this article. If you have problems here you need to do some research.*

## **-Thru Hull (combustion exhaust)**

This is done absolutely LAST, do NOT cut this hole until you have dropped the frame into the unit



, lined everything up perfectly with your ELBOW and taken measurements at least 4 times. All other holes you have SOME flexibility with This is probably the HARDEST part of the build so do take your time here. I can't give you exact measurements because peoples plates etc. will be different thicknesses.

**\*To mount my thru hull I cut it off with an angle grinder and a cut off wheel where it bends at about a 25 degree angle\***

**\*\*\*CAUTION\*\*\***

**WHEN YOU PUT YOUR THRU HULL IN, IT MIGHT END UP BEING THE HEIGHT OF YOUR HANDLE ON THE CASE, IN WHICH CASE THE HANDLE WILL CATCH FIRE SO REMOVE THE FRONT HANDLE – MINE DID NOT HAVE THIS ISSUE BUT BE CAREFUL!**



**-A hole to pass through your wiring**

Pretty self-explanatory, see photos.

**\*\* If you have made it this far congratulations! You're ¼ of the way done!\*\***

Kidding, almost there.

**At this point your heater is in the case, the thru hull is mounted and your exhaust elbow can be connected.**

**Refer to:**

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There is quite a gap between the 1 inch exhaust outlet and the 1 and 1/8 elbow I used. I think you might be able to find something that fits better, what I did was used copious amounts of muffler cement, in addition I wrapped my thru hull and my exhaust port on the heater in the heat wrap to get a tighter fit, then I clamped it. It seems to work OK I haven't had any issues but if you could find something that fits tighter it would be a better set-up.

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You can then drill through the metal plate and bottom of the case and bolt down your frame when everything is aligned perfectly.

At this point mount the fuel lines, hose ducting, combustion intake pipe, Fuel tank( secure it down where it CANT MOVE I used zip ties and zip tie fasteners) fuel pump(at a 35 degree angle) on the COLD side of you case, (RIGHT SIDE) and bolt it in.

**\*\*\*CAUTION\*\*\***

**MAKE SURE YOUR FUEL LINES ARE AS FAR AWAY FROM THE HOT EXHAUST AS POSSIBLE AND USE A ZIP TIE TO FASTEN THEM DOWN, ALSO MAKE SURE YOUR CONNECTIONS ARE SOLID AND THEY ARENT LEAKING FUEL, I CHECK MINE QUICKLY EVERY TIME I USE THE UNIT**



Complete the wiring. (I am not going to explain how to do the wiring ask a friend who's good with electronics if you're not sure, just make sure that your wires aren't loose and zip tie them away from the hot exhaust.) You should already be familiar with the wiring if you bench tested it above.

That's it, you should have a fully contained heater unit in working order, Bench test it for at least 10 hours to make sure everything is operating properly.

PHOTOS:





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***Hey man.. You wanna hurt me? Go right ahead if it makes you feel any better. I'm an easy target. Yeah, you're right, I talk too much. I also listen too much. I could be a cold-hearted cynic like you... but I don't like to hurt people's feelings. Well, you think what you want about my Xterra; I'm not changing. I like... I like my Xterra. My wife likes my Xterra. My dogs like my Xterra. 'Cause Its the real article. What you see is what you get.***