Critical Home Power

Economical Manual start
Whole House AC Power
For Amateurs

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Goal of presentation

Show how one amateur supplied all the critical loads
in the home with minimal temporary wiring
A pre-wired 240v system ...
$$ less than the expense of a whole house installation

This system ran for 5.5 days – 24 hours a day during the
December 2008 ice storm

“Critical” loads defined as all those circuits that need to
Be activated to allow family to function in the house
During a prolonged power failure.
(heating system)(refrigerator)

“Necessary” loads are defined as those that allow family life
To continue w/o too much sacrifice [not just the ham shack]
More than one or two lights + (TV set)(garage door opener)
(fish tank?)

First things first

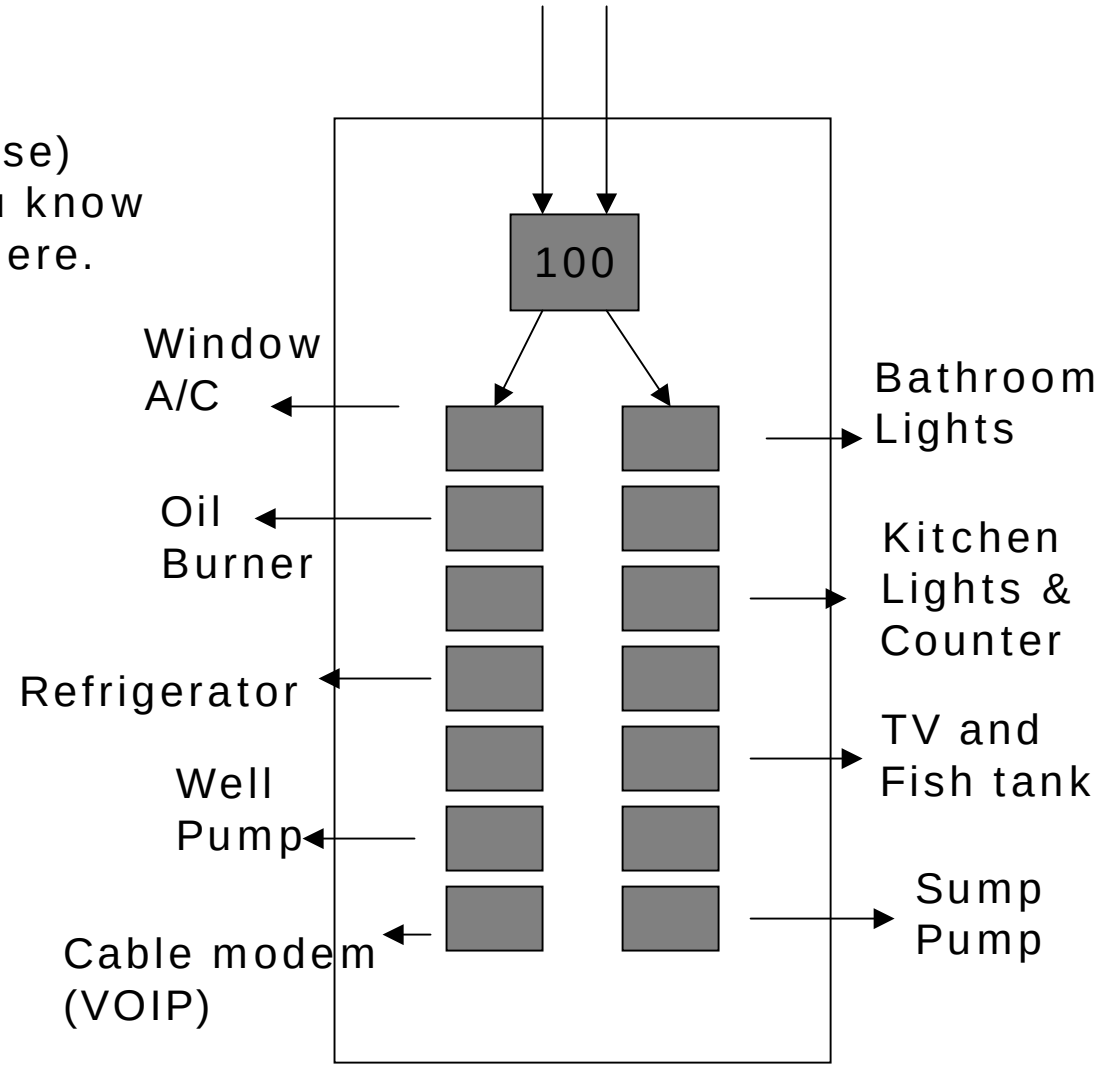
Open your home's breaker (fuse)
Panel and make sure that you know
What loads are connected where.

Label all circuits

Should be done even if
You are not considering
A generator

It usually is not realistic
to power all the circuits
So pick the needed ones ...

Be sure to identify those
Circuits that you must
Have to function in the house
(In winter or summer)



Critical Loads

- Furnace w/pumps and motors and blowers etc.
- Refrigerator (turn off mullion heaters)
- Freezer
- Well Pump
- Sump Pump
- Ham shack – Radios + heat and light
- Window A/C unit (5000-6000 BTUH)
  - These have very high starting loads
- Fish tank heater
- Your family's needs may be different …

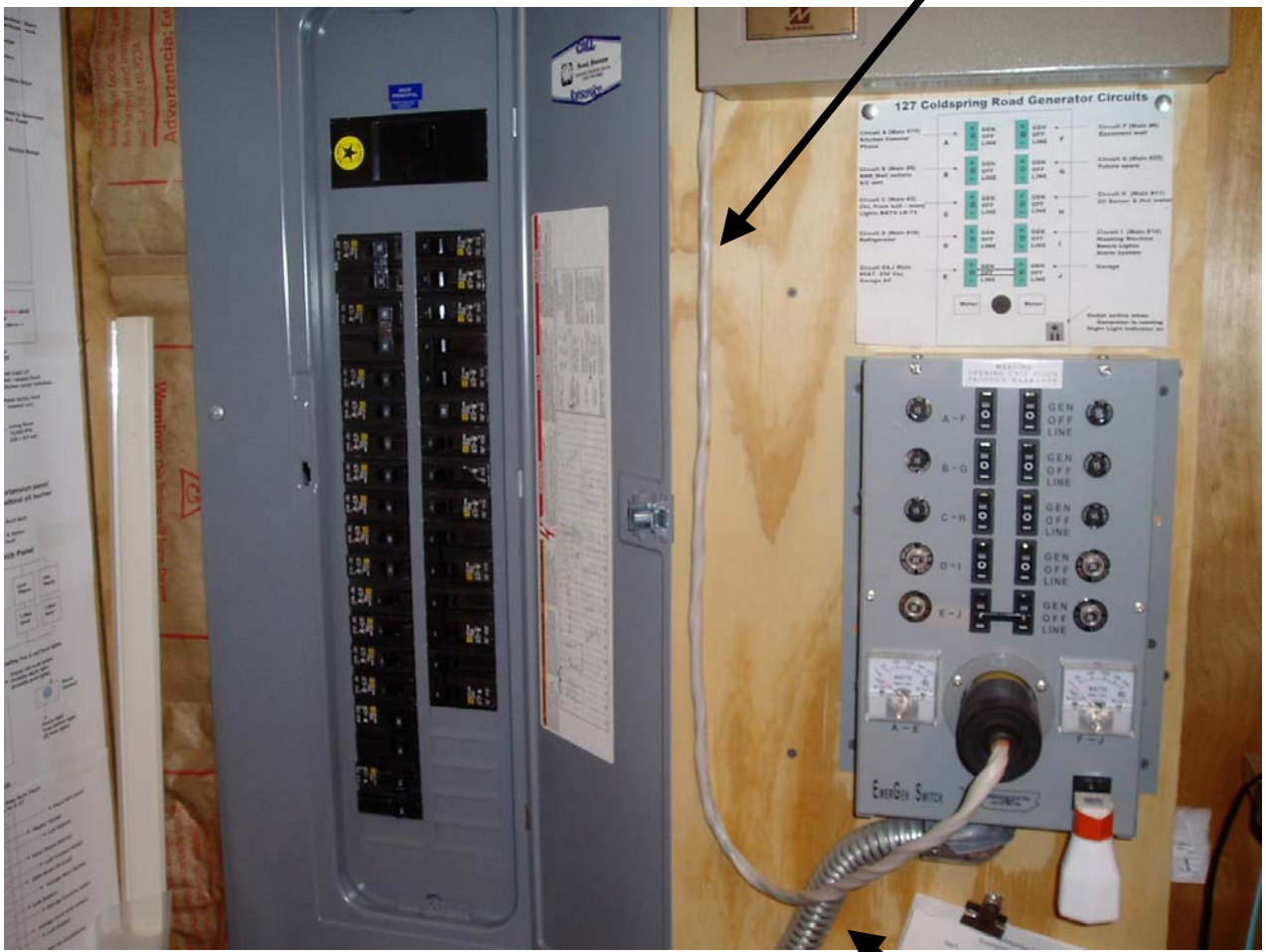
Most Generator web-sites will have lists with wattages ++

Necessary loads - you may want to time share but connecting and re-connecting gets old

- Light circuits, several – kitchen and bath especially
- One wall outlet in kitchen – for toaster or coffee pot
  - Assume 1500 watts each (time share)
- “Family” TV circuit
- Cable or Satellite receiver
- Wireless phone circuit
- DSL modem circuit (hard wired phone)
- Cable VOIP equipment
- Garage door opener
- Computer (high quality power more later)
- Portable electric heat (usually 1500 watts each)
- Your family probably has a unique use ...

Most Generator web-sites will have lists with wattages ++

10 Gage 4 wire
From house connector



10 circuits
(Choose at
Time of
Install)

-Line
-Off
-Gen

The author's interior power distribution
225A breaker panel with
10 Ckt. EmerGenSwitch panel

Panel Connection
To Breakers

House External 240 volt input connector

75’ 4 wire 10 gage SOJ ($$) cable

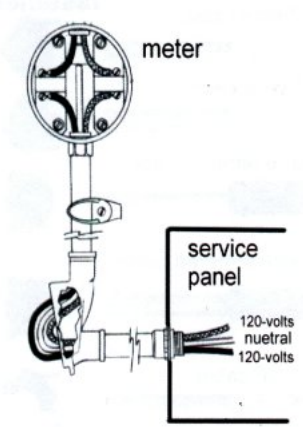
My Generator installation – No modifications to generator

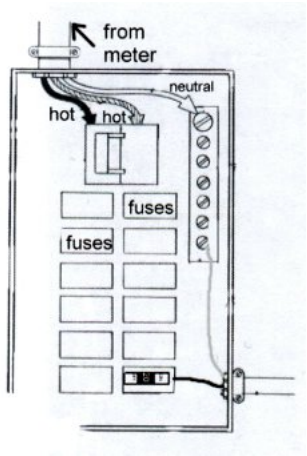
Cost Breakdown (estimate)

Provide for all house critical and some necessary loads with
A pre-wired system that allows for mostly normal lifestyle

Generator – manual start – 4-5Kw	500 - 800
EmerGen & connect boxes	120 - 350
Electrician install labor **	200 - 300
75' – 10GA - cable & connectors	60 - 120
Dedicated extension cords	50 - 100
Misc. – fuel cans etc.	50 - 75
Total	950 – 1600

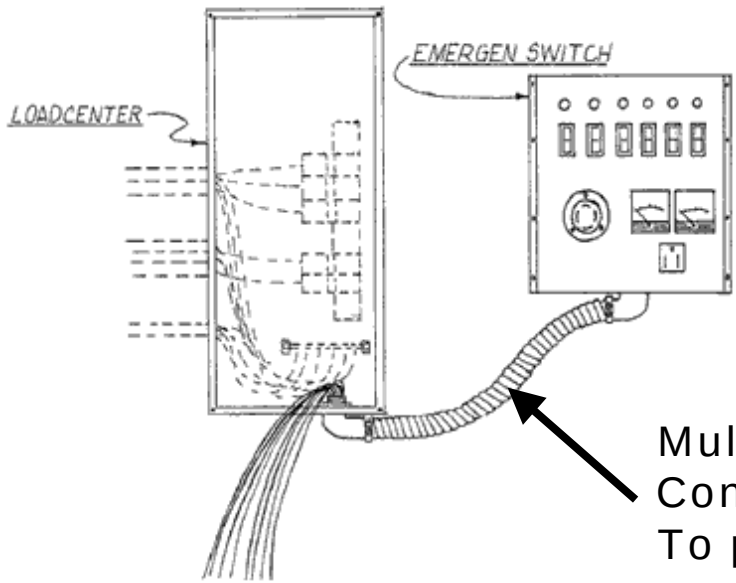
** Electrician necessary to install EmerGen switch box
Other items can probably be done by capable homeowner





Connecting the Breaker Panel to the EmerGen

6 Circuit 240 volt ($120) unit shown

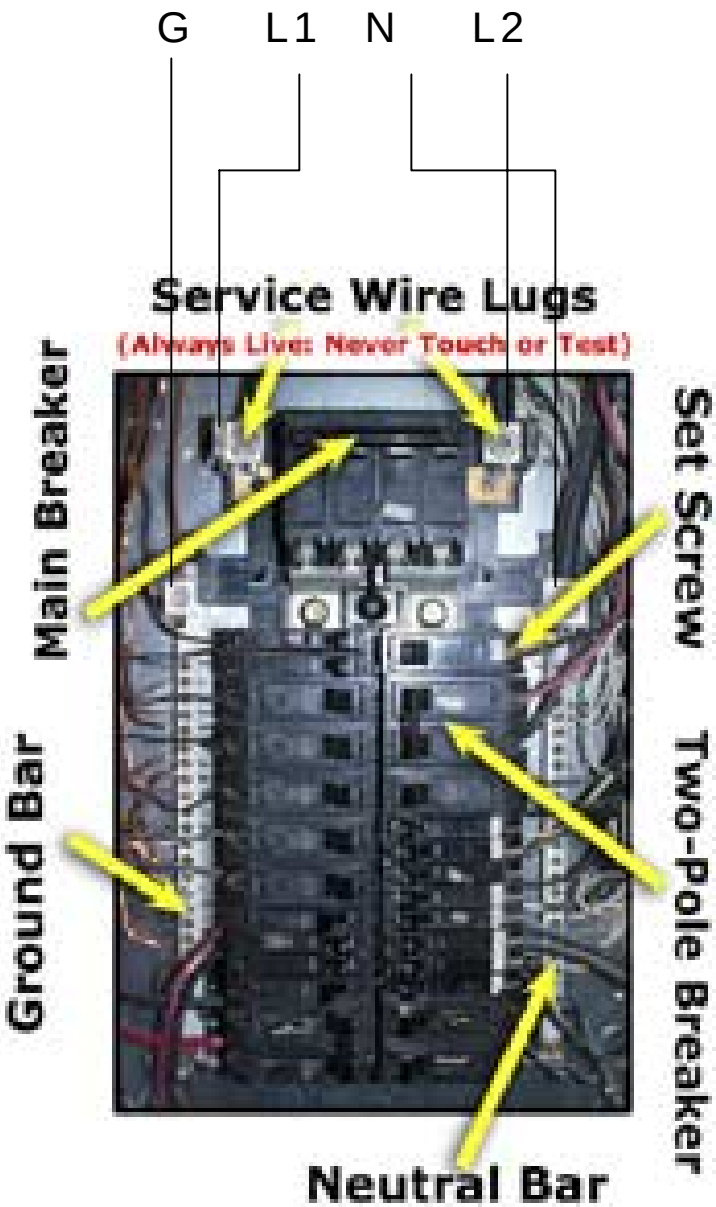


10 Circuit

EmerGenSwitch

$225.00

Note the two
240 volt
Option ties



“Balance” the generator load

Know the existing wiring
Plan for the house

“R” & “L” sides of panel

Mostly 120 volt loads

240 volt generator
Feeds L1 & L2 loads
Connect to both lines
As equally as possible

Selecting a Generator – 3600RPM gasoline ones are most affordable

Size to start the biggest reactive load (motor) I have found the most
Demanding starting load to be a 6-8000 KBTU window air conditioner

A 4000 Watt average / 5000 Watt peak does the trick

Too small and a big load will create quite annoying power drops
at the least - or - cripple the system at worst.

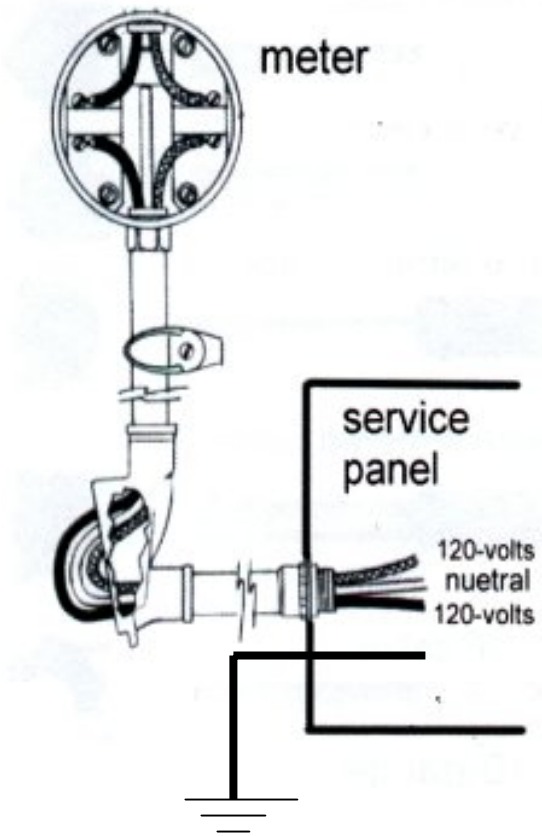
Too big and you simply waste fuel since the average load is often
quite a bit less than 4000watts. (unless you are electric heating)

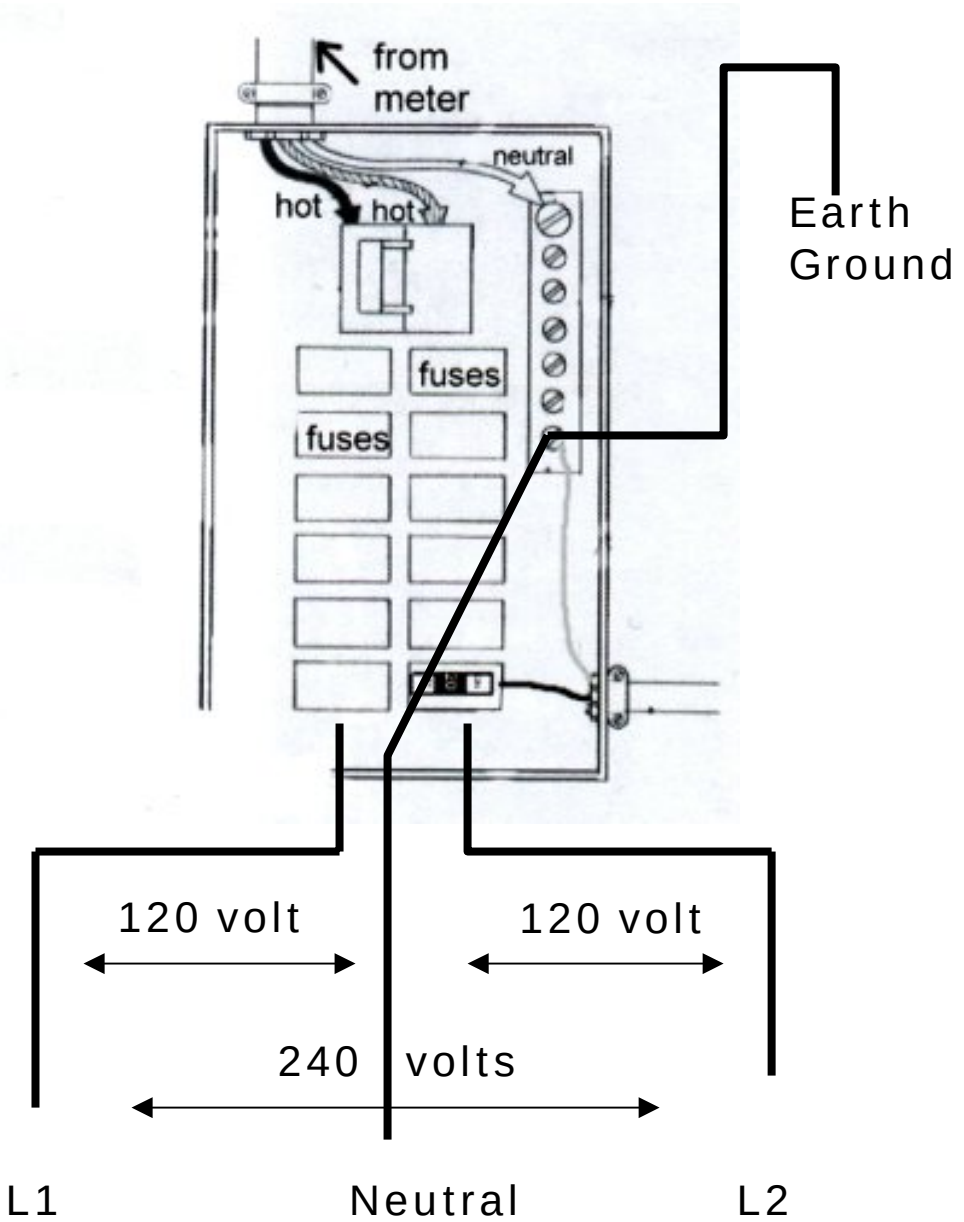
Quiet – economical – reliable – 12+ hour (overnight) run on fuel load
Means a high quality unit is needed (low oil shutoff) (idle down circuit)

Figure-out where it will be stored – get wheels – heavy about 160#

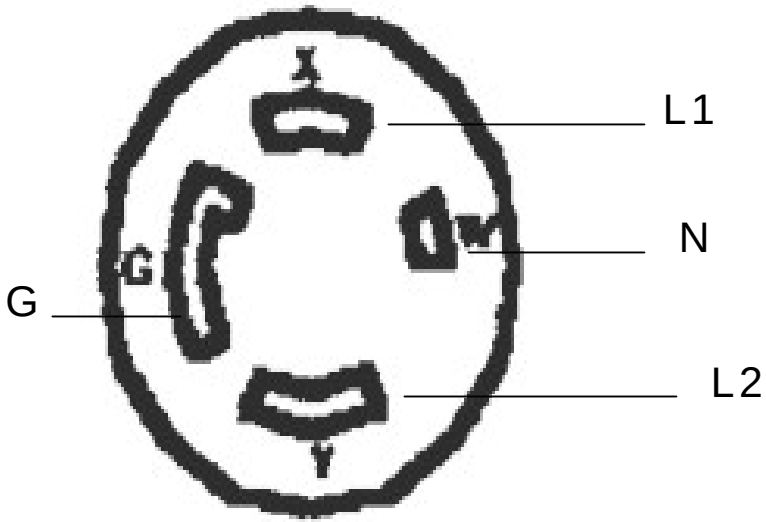
Plan where it will be run during use – more on noise later –
heavy duty (10Ga minimum) extension cord(s)

A 240 volt 4 wire connection is needed because your house wiring
Splits all the 120 volt circuits between 2 inputs.


meter
service
panel
120-volts
nuetral
120-volts


from
meter
neutral
hot
hot
fuses
fuses
Earth
Ground
120 volt
120 volt
240 volts
L1
Neutral
L2

NEMA type receptacles L14-30R & L14-30P



Female Receptacle

30 amp. 125/250 volt
3-Pole
4-Wire Grounding
2 hp rating.
7500 watt generator plug

Note: these connectors can be
Quite expensive ($15-$20 each)

Male Plug

HBL2711

Now .. How well do you get along with your neighbors?

Your generator is liable to be running for some time & overnight
Especially in the winter when you need to keep furnace running
You want to minimize the noise to both yourself and your
Neighbor (you will never eliminate it)

Pick a spot outside for safety, away from the house if possible
Most generators are weatherproof & made to run outdoors ...

A tool shed is a good spot – store the generator and its fuel and
Maintain it and run it in the same spot (leave the door open)
Regular maintenance during a multi-day outage is necessary

... this what I chose to do

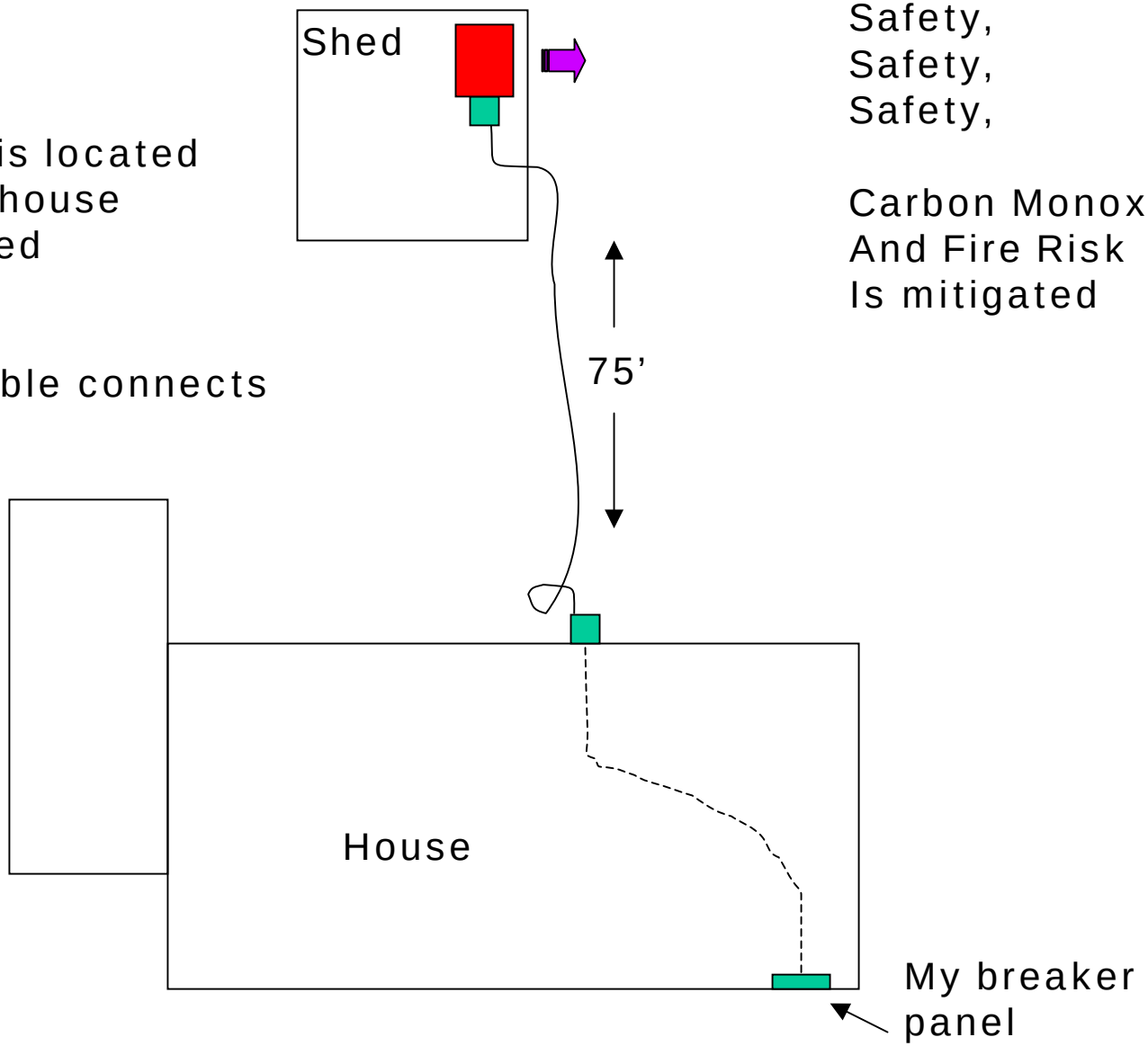
My Generator installation – inside a tool shed – exhaust is Vented outdoors

Shed outside wall – Cable port & Exhaust Port

Location.
Location,
Location,

The Generator is located
Away from the house
And noise baffled

10Ga 4 wire Cable connects
To the house



Safety,
Safety,
Safety,

Carbon Monoxide
And Fire Risk
Is mitigated

External 240 volt input connector to house

Outside

Inside

75’ 4 wire 10 gage cable

EmerGen panel is made
To connect directly to
Generator – ok – if located
In garage etc.

Generator Key Features

4,000avg 5000peak watts
Manual start
OHV engine
Idle-down
Low oil shutdown
Fuel gauge

Quiet Operation

4 gallon fuel tank
12-15 hour run time

Lifting Handle

240 volt 4 wire
outlet

Wheels!
(about 160#)

Safety First ...
Frame of Generator
Ground to earth

Maintenance & Testing & Accessories

Good maintenance will pay dividends in reliability ...

In general keep a small amount of fuel on the tank and run
It every 2 months or so. Use the fuel shutoff and run the fuel
Out of the carburetor.

Do a complete all loads on test periodically – let furnace, pumps and refrigerators cycle.

Don't forget fuel storage – modern gasoline does not "keep" well (keeps better in the winter)
Don't keep it much more than 6 months – use stabilizer
NOTE: have a siphon on hand to get fuel from your car(s) if needed

Emergency power and Computers

Emergency generators can easily provide recharge power
For laptops – don‘t forget that you will need to power your
Cable / DSL modem ....

Emergency generators can provide power for a home
Office / desktop computer ... but ...

Care must be given to generator stability, voltage, and
Frequency. Generator must be sufficiently sized so as to
Not dip voltage dramatically during reactive load starts.
(If you are serious about computer need get dedicated
Generator for that application)

A UPS can remain and is a help during times when reactive
(motor) loads start and line voltage drops briefly – know the
Low voltage trip points.

Conclusion

A solution that uses portable generating equipment
Without lots of extension cords

Requires a 4-5Kw - 240vac - generator

Does require pre-planning

Reasonable but measurable cost involved

Allows family to continue most of daily lifestyle

Could make your neighbor jealous (save one long
Extension cord to send him a little)