

Preparing For A Safer Emergency Response

*Stay Safe To Help Others During Disaster Response
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Introduction

The following summary of our two-day seminar provides a quick view of how the course came about.

For thirty years I worked in remote areas of Alaska performing heavy equipment repair. Conditions were poor due to foul weather and the long distances involved. This made it difficult to get people and supplies out to the remote jobs. We couldn't work as we would prefer, for example, in Seattle, surrounded by plentiful supplies and infrastructure.

My customers were construction companies, gold miners, and commercial fishers. Just the expense of getting to these jobs was astronomical for the customer. I often traveled by small planes, helicopters, skiffs, and snow machines. At times I hiked in with tools and supplies. All too often, what would normally be a one day job, would take a week due to foul weather preventing timely parts shipments.

On the business side of things, it was very simple: I would not be paid unless the equipment ran well when I left. It took the possibility of going broke to bring about a change in my thinking, to a far more creative perspective.

I began collecting and illustrating self-contained heavy equipment emergency repair techniques for presentation to my ongoing class in Diesel Equipment Repair at Kodiak College. This was adult education. Class members were smart and seasoned. The members included commercial fishers, ranchers, Coast Guard crew members, dentists, doctors, Fish and Game biologists, psychologists, and commercial pilots.

For twenty years I handed out the latest graphical repair tip half way through class. A hush would fall over the room. This was followed by enthusiastic discussions which invariably turned to stories of how to "save our bacon." I realized that beyond actual mechanical techniques, presenting and discussing the more creative material fostered the development of a mindset for preparedness, survival and recovery.

However, as I began to show the material outside the circle of the classroom, I ran into trouble. Often the items were quickly discounted as "Shade Tree Mechanics." More than once, seasoned technicians were offended by the idea of doing anything that wasn't strictly by the book, under any circumstance.

I encouraged people to, instead, think of my alternative techniques as they would the Jaws Of Life that are used to free folks from crushed cars. In fact, my material is quite a bit like the Jaws of Life, except for the fact that the items are carried in the mind. It is for sure that we don't open our car with the Jaws of Life unless it is badly damaged. No, this mindset and these techniques, like the Jaws of Life, are only for emergencies.

In the mean time I continued working to get past the "Shade Tree" perception. I next reorganized each item as shown in the accompanying course text, GET HOME FROM ANYWHERE. On the left

hand side of most pages are the instructions for doing conventional techniques. On the right however, is the emergency technique that will save lives when there just isn't time or resources to do the ideal repair.

Not only are mechanical techniques included; also presented are many ways to better use the limited tools that are available during emergencies.

The Focus

This seminar is designed to help people safely get equipment going and keep it going, immediately after a disaster, natural or man made. Everything presented shows the advantage of cultivating a creative, problem solving mentality on the job site and beyond-before disaster strikes. This training will immediately help your employees moral and also the company's bottom line until an emergency occurs.

When disaster strikes there will often be no technical resources available. Poor telephone communication will be the rule. The Internet will go down. Your favorite mentor won't be there. Few tools will be available. That is not the worst of it though.

One of the first things you notice as a survivor, is thirst. There will be no drinking water available. You will need to purify water within just a few hours.

There you stand. You have your mind, memory, experience, and there are people nearby needing rescue from the rubble. People are crying, or moaning, or worse yet, they are still and silent.

You will find there is no electricity. You need to get dry and keep warm. There is no way to clean a wound. Availability of all the things we've relied on is gone.

There is one more important item: Disaster recovery does require some of the same skills needed for wilderness survival. However, disaster recovery is quite different than just outdoor survival. Disaster recovery in the year 2019 is most often urban survival. While not easy, there are real positives to urban survival in that the damage to cars homes, trucks and infrastructure leaves many basic supplies available, if you know where to look.

DAY ONE

Intro. Story Ken Warner, starting a fire...Water..

1-Personal Survival:

Becoming someone who can help others in emergencies takes forethought for your own safety.

- Keeping dry
- Keeping warm In severe cold
- Fire Safety and Prevention

Here are items that are easy to put in your car ahead of time:

- Water-As a precaution, consider carrying a case of bottled water in your car.
- First Aid kit
- Food items to keep in your car are canned fish and crackers.
- Slicker, or rain coat for sun and wind protection for your skin.
- Dust protection for breathing.
- Extra foot wear, including socks.
- Tent

- Clorox
- Sanitation/Honey bucket
- A knife and flashlight.
- A roll of strong cord.
- Duct tape

At this juncture the trainer divides the available people into three groups: First aid providers\helpers, riggers\lifters, and finally, mechanics\equipment operators.

2-On Site Water Purification

- Boiling
- Treating With Chlorine bleach
- Making activated charcoal

3-Assessment of the Machinery And Equipment Before You Need Them

Train to become familiar with what lifting machinery may be available, for example, after an earthquake or tsunami.

- How to check the machine's fuel, oil and other vital fluid levels.
- How to find where the ignition key is and how to start each machine.
- Check brake function.
- Check lifting ability of machine.
- Basics of lifting, blocking and rigging

4-Post Emergency Equipment Inspection:

- Is the machine usable?
- Is there enough fuel in the tank?
- Will the engine start?
- What are it's capabilities?
- Overall fluid levels. Too high is as bad as too low.

5-Finding Useful Items

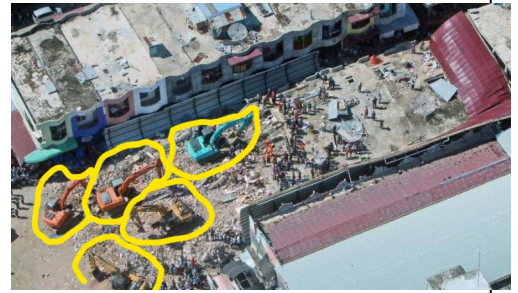
Damaged cars trucks and other machines will have oil, fuel and compressed air. Some will have antifreeze in the radiators. The undamaged radiator from one machine may get another machine going. Many machines will have good batteries. There will be cars with long seat belts that may be gathered and tied together for lifting and pulling. Many cars and trucks will have good jacks available.

Fuel tanks from overturned machines can be removed and used for storage. Gasoline, even with water in it, can help start the fires, on which water can be boiled. Watch for tire tools and other tools, clothing items and gloves, jumper cables. Watch for first aid kits. Tires from derelict trucks have 120 psi of compressed in them. This is all the more useful if you find air hose and an impact wrench.

The boat in the photo is a likely source of supplies. Water and Food!! Fuel, tools, lifting equipment, clothing, a cook stove, lighting, generator set, ropes and lines, and winches, acetylene torch, and a welder. Chlorine bleach (for water purification). Air impact wrenches. Once you get an excavator running you can pull the boat level for more comfortable sleeping. (Possibly a good barrel bottom left. Clean it out and store boiled water in it.)



Five excavators are present in this photo. It would be strange if we can't get one running. Lots of fuel and oil in them. Coolant too, and batteries, spare parts. Watch for cables, slings and ropes.



This boat is the grand daddy of resources: It obviously floated on the wave. It is dry inside. There's likely food, clothing, shelter, power, drinking water, tools, generator set, lifting and rigging equipment, and also first aid kits, flashlights. There is likely an acetylene torch on board, a welder, and beds and bedding.



All you have to do is get it down without hurting yourself. Once you get an excavator running and find a stout line, just pull the bow forward and down. Then tow it out on the level. Notice that all around you is lumber, cable, tools, and fuel.

6-Using Common Chemicals

- Chlorine bleach
- Borax
- Calcium chloride
- Sodium chloride
- Aquarium grade silicone sealer
- Sodium silicate (concrete sealer)
- Downy Fabric softener

<p>Erratic Shifting Automatic Transmissions</p> <p>1-First warm the transmission and drain it.</p> <p>2-Remove the oil pan and install a new filter.</p> <p>3-Re-assemble and refill with the correct oil for the transmission make.</p> <p>4-Add commercially available transmission shift improver additive.</p> <p>5-Run the transmission and check.</p> <p>6-If no improvement check the valve body.</p> <p><small>Copyright 2015 Ben L. Evidge</small></p>	<p>Add Downy Fabric Softener To Hard Shifting Automatics</p> <p>OR</p> <p>Adding one tablespoon of Downy per gallon of fluid capacity will sometimes help the shifting action of poorly maintained automatic transmissions.</p> <div data-bbox="1198 1087 1284 1213"> </div> <div data-bbox="1312 1087 1550 1234"> </div>
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7-Rigging, Lifting and Moving Heavy Objects

- Line, rope and cable
- Levers and rollers
- Blocking
- Carry too long objects with too short vehicles

8-Starting Engines

- In extreme cold
 - Reduce parasitic loads
- Operating in extreme heat
- After submersion in fresh or salt water
- After breakage from coolant freezing
- After a fire
- Start an engine by hand with dimes. (Yes, the coins in your pocket.)

<p>Starter Solenoid Failures</p> <p>OR</p> <p>1-Starter solenoids not only make the high amperage electrical connection to energize the starter, they also move a mechanical linkage inside the starter that pushes the drive gear into the flywheel teeth.</p> <p>2-When a solenoid fails it can mean the starter needs servicing.</p> <p><small>Copyright 2015 Ben L. Evidge</small></p>	<p>Engage The Starter Manually</p> <div data-bbox="1187 1598 1528 1858"> </div> <p>As demonstrated here on the repair bench, push the drive gear in, then energize the starter.</p>
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DAY TWO

Begin with Q&A

9-Keep the Engine Going

- Broken fuel lines and Lennny's loop
- Managing drive belt failure
- V-Belt substitutes
- Cog belt repair
- Cutting out bad cylinders on diesels
- Verify equipment oil pressure with no pressure gauge.
- Making gaskets
- Re-use head gaskets
- Repair Supplies and materials
 - Silicone sealer
 - Cereal boxes
 - Contact cement
 - Copper and aluminum sheet
 - Sheet rock screws

10-Transmissions and Drive Train

- Running with a broken transmission case.
- Substitution of fluids
- No fluids at all

11-Repairing Freeze Damaged Equipment

- Pressure testing
- Repairing freeze broken castings and components.

12-De-watering Submerged Equipment

- Draining and flushing
- Make a temporary compression release to start the engine safely

13-Generator Sets

- Removing salt water contamination
- Flash the field

14-Substitution of Fluids

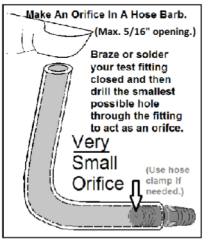
- Substitute diesel fuel for oil in transmissions and hydraulic systems
- Using acetylene welding gas to fuel a gasoline engine
- Substitution for hydraulic brake fluid

15-Tires, Wheels, Tracks and Mobility

- Break the bead on big tires by driving the machine
- Warm tires before repairing them in the cold
- Remove a master track pin after gouging with oxy/acetylene

Verifying Oil Pressure (With a pressure gauge)	Verify Oil Pressure W/O A Gauge
1-When a pressure gauge is available, it is easy to check the oil pressure on any engine or transmission.	1-Most people can hold no more pressure than 10-15 PSI with their thumb over a hose end. If you have no gauge with you but need to verify the presence of oil pressure, this can work to your advantage.
2-Just locate the equipment's pressure port and remove the plug.	2-Doing this with an unrestricted oil hose makes a real mess, fast.
3-Get a threaded adapter to go between the system and the gauge, choosing a gauge in the correct pressure range.	3-Prepare your test fitting as shown here.
4-Start the machine and note the oil pressure, before removing the gauge and replacing the plug.	4-Remove a plug from the oil pressure galley and install the restricted fitting in the hole. Put your thumb over the hose and start the equipment. Be ready to shut it off if needed.
	5-If you cannot hold the pressure in the test hose, then there is close to 15 PSI of oil pressure, and the machine is also likely safe to operate until a new gauge arrives. (Max. 5/16" ID hose.)
	6-If you can stop the flow of oil, turn off the engine. It is not safe to run.

Make An Orifice In A Hose Barb.
(Max. 5/16" opening.)



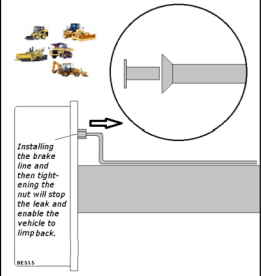
Braze or solder your test fitting closed and then drill the smallest possible hole through the fitting to act as an orifice.

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16-You Will Need Brakes To Have A Safe, Useful Machine

- Water can temporarily replace hydraulic brake fluid
- Turn off faulty wheel cylinders
- Bleeding brakes
- Repairing leaking air brake reservoirs
- Test solenoid magnetism with steel objects

Replacing A Leaking Brake Wheel Cylinder	"Limp" Home By Turning Off A Leaking Wheel Cylinder
<p>1-Proceed according to all of the equipment makers' directions, and begin by blocking the machine safely to prevent rolling.</p> <p>2-Raise the wheel with the leaking wheel cylinder (as evidenced by the wheel wet with brake fluid), and safely block-up the raised axle.</p> <p>3-Remove the wheel, then the brake drum, and finally remove and replace the leaking wheel cylinder.</p> <p>4-Install the new wheel cylinder according to the manufacturer's instructions and replace the brake drum and wheel before lowering the wheel to the ground.</p> <p>5-Next follow directions to fill and then bleed the brake system. Be sure to use the approved brake fluid.</p>	<p>1-To "turn off" a leaking wheel cylinder, locate the cylinder that is leaking.</p> <p>2-Remove the brake line to the leaking cylinder.</p> <p>3-Next get the largest (carpentry) nail that will slide inside the brake line.</p> <p>4-Cut the nail to .75" in length from the head.</p> <p>5-Insert it in the line and install the line back to the cylinder.</p> <p>6-Fill the brake system and bleed the air from it.</p>



Installing the brake line and then tightening the nut will stop the leak and enable the vehicle to limp back.

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17-Hydraulics

- De-watering hydraulics
- Substituting diesel fuel for hydraulic fluid
- Pressure testing with no pressure gauge

18-Batteries

- Salvaging batteries
- Electrical testing without an electrical meter
- Battery charging methods



19-Fasteners, Tubes, Hoses & Fittings

- Repairing stuck and damaged fasteners and fittings
- Alternative penetrating oil formulas
- Repairing leaks

20-Mechanical Procedures

- Power air tools with air from large tires on derelict vehicles
- Power Lithium ion tools from a 12 V battery
- Drilling
- Cutting
 - Alternative cutting oil formula
 - metal
 - wood
 - concrete
- Bending and straightening metal
- Coupling and connecting
 - Pipes
 - Wires and cable
 - Hoses
- Welding
 - With battery power
 - Make welding electrodes from commonly available material
- Clamping objects
- De-carbonize gas engines that don't want to run
- Effectively using a sledge hammer
- Replace a hammer handle
- Make a hammer handle
- Identifying metal (and other materials)
- The Acetylene Torch-Survivor's best friend

Battery Powered Tools	OR	Make A Jumper
<p>1-Lithium batteries start degenerating the day they are manufactured.</p> <p>2-For the best life, run them real low on power before re-charging and remove them from the charger when fully charged.</p> <p>3-Keep the battery contacts clean as well as those in the battery bay.</p> <p>4-Using compressed air, gently blow the dust from the charger now and then.</p>		<p>It is easy to make an adapter to replace the battery on most battery powered tools.</p> <p>All it takes is a pair of electrical contacts that duplicate the shape of those on the battery. Attach the contacts to a wooden dowel shaped to fit in place of the battery. Next connect a 20' cord and a pair of alligator clips.</p> <p>Why would you want to do this? When you are without AC power, the drill can now be powered by a vehicle battery, such as a four wheeler or motorcycle.</p>



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Suggested Reading List:

To Build A Fire-Jack London
Army Rigging Manual (FM 5-125 C1)
AR 11-34 The Army Respiratory Protection Program
OSHA 3079 Respiratory Protection
ST 9-189 Metal Body Repair and Blacksmithing
TB 9-2300-247-40 Tactical Wheel Vehicles: Repair of Frames
TC 9-510 Metal Body Repair and Related Operations
TC 9-515 Shop Mathematics
TM 9-243 Use and Care of Hand Tools and Measuring Tools
TM 750-254 Cooling Systems: Tactical Vehicles
FM 5-480 Port Construction and Maintenance
FM 55-501 Marine Crew Members Manual
NBC Decontamination Procedures
FM 3-5 Electrical Power Generator Field Operations
TM 750-244-3 Processing and Inspection of Gasoline and Diesel Engines for Storage
TB SIG 222 Preservation of USAMECOM Mechanical Equipment for Shipment and Storage
TB 740-97-2 Maintenance of Equipment: Army Test, Measurement and Diagnostic Equipment

Practical Boat Mechanics-Ben L. Evridge
Diesel Mechanics-Ben L. Evridge
Get Home From Anywhere-Ben L. Evridge

Each Summary Is Presented In Two Perspectives:

Left Side:
Preferred
Solution

Replacing a Broken Reciprocating Saw Blade

- 1-Drive to the nearest store and pick the suitable tooth count.
- 2-Fewer teeth per-inch for wood or aluminum, More teeth per inch for steel or brass. Choose the most teeth per-inch for sheet metal.
- 3-Carry them back to the job and go to work.

However, when you can't buy or borrow a blade.....

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OR

Refurbish A Broken Sawzall Blade

When your last Sawzall breaks miles from town....

...regrind the broken end to the right contour.

To drill the new hole, you must first soften the area to be drilled, by annealing it.

To do so, cut the head from a 1/4 inch diameter bolt. The bolt needs to be about two inches long. Now chuck the threaded end into a drill chuck. Continue by laying the saw blade flat on a block of wood and place the blunt steel bolt shank against the place where the hole must be drilled.

Next, bear down and turn the drill at top speed to let the friction of the blunt bolt turning against the saw blade heat the blade. Turn it until it is super hot, then let the blade cool.

Now, drill the tab the appropriate diameter.

This tip works because the blade hardness was annealed by heating it with friction.

Right Side:
Alternative
Solution