

Small Engine Repair

Developed and Presented by

Scott McFarland

On behalf of

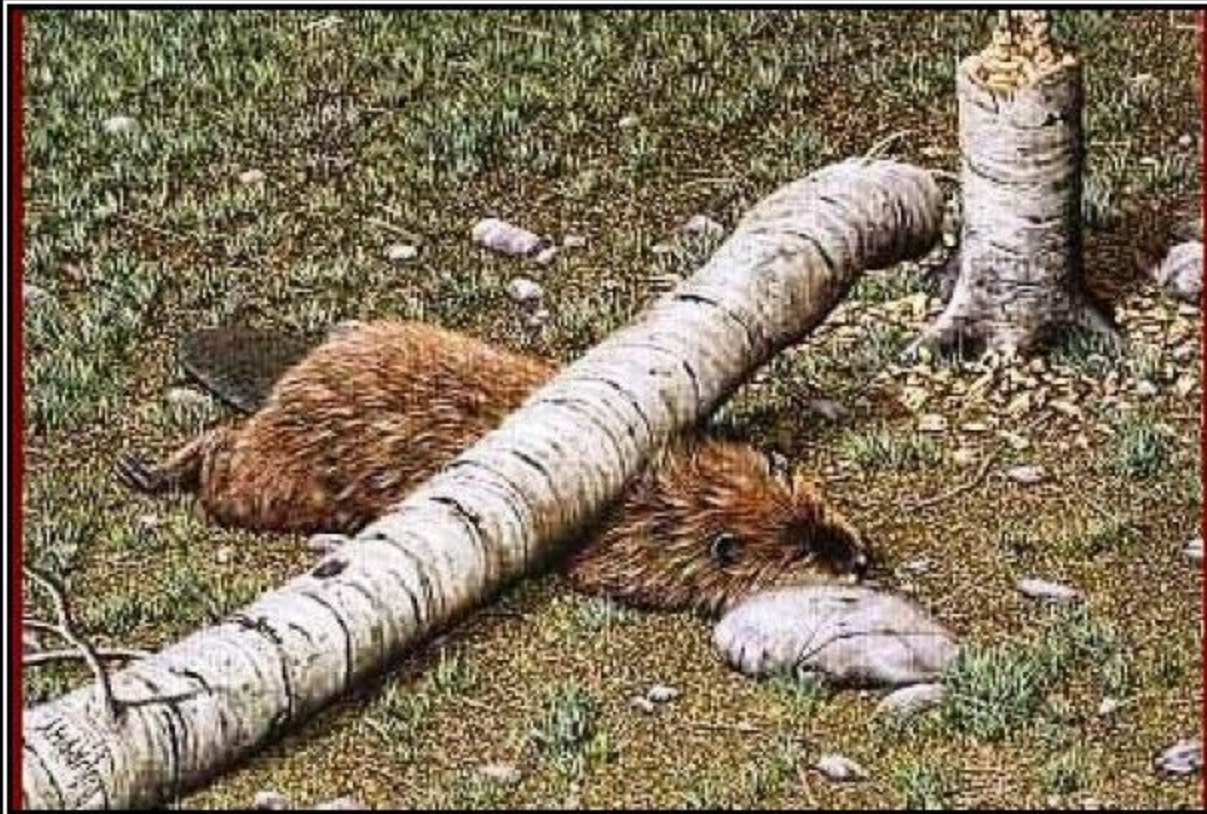
Gateway Community College

Safety



Chapter #1





HEALTH AND SAFETY IN THE WORKPLACE

You never know when you might need it.

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Personal Protection Equipment

- Proper/protective clothing
- Safety glasses – required by OSHA for certain activities
- Face shield
- Hearing protection
- Respiratory protection - chemical/dust



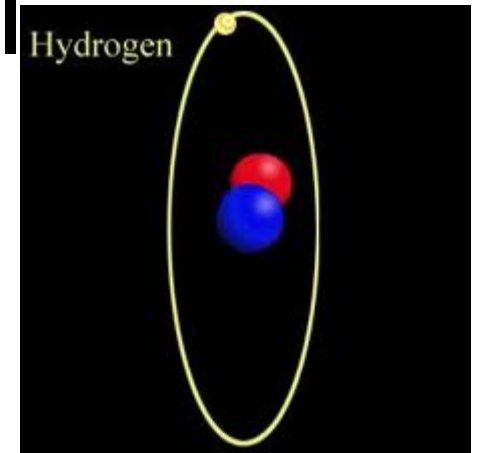
eye wash station?



Hazardous Material

- Hydrogen gas
- MSDS
- Disposal
- Shop rags
- Fuel storage (cabinet)
- Container labeling
- Poison Control -

(800) 222-1222



1 **2** **3** **4** **5** **6** **7** **8** **9** **10** **11** **12** **13** **14** **15** **16**

FPV scientific
 80 Northwest Blvd
 Newark, NJ 07102
 (201) 255-1790

MSDS No: M10100
Revision Date: April 1, 2008
Approved by: Janet A. Butsch

Section 1: Chemical Product and Company Information
Product: METHYL ALCOHOL
Synonyms: Methanol, Wood Alcohol
OSHA H298 24 Hour Emergency Phone Number (800) 424-9300

Section 2: Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Methyl Alcohol	67-68-1	100%	TWA: 200 ppm; 200 mg/m ³ STEL: 250 ppm; 200 mg/m ³ (ACGIH 2007)

Section 3: Hazards Identification
Emergency Overview
DANGER: FLAMMABLE; POISONOUS
 VAPOR HARMFUL. MAY BE FATAL OR CAUSE BLINDNESS IF SWALLOWED.
 HARMFUL IF INHALED.
 Cannot be made non-hazardous. Keep away from heat and open flame.
 Target organs: Liver, kidneys, heart, central nervous system.

Health	2
Env	2
Reactivity	1
Contact	2

Section 4: First Aid Measures
INHALATION: If mild, remove to fresh air. If severe, remove to a well-ventilated area and administer oxygen. If breathing is difficult, give oxygen. Get medical attention.
INGESTION: Rinse with water. Do not induce vomiting. If swallowing is difficult, give oxygen. Get medical attention.
EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes. Bring upper and lower eyelids occasionally. Get immediate medical attention.
SKIN CONTACT: Remove contaminated clothing. Wash thoroughly with mild soap and water. Irritation occurs. Get medical attention.

Section 5: Fire Fighting Measures
General Information: In fire conditions, wear a self-contained breathing apparatus and self-protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Fires involving a small amount of combustible may be controlled by dry chemical. Vapors formed from this product are heavier than air and may travel along the ground to a distant source of ignition and flash back. Contact with strong oxidizers may cause fire.
Extinguishing Media: Carbon dioxide, dry chemical, alcohol foam. Water may be ineffective.
Flash Point: 11°C (52°F) Closed Cup
Autoignition Temperature: 463°C (867°F)
Explosion Limits: Lower: 7.5% Upper: 30%

Section 6: Accidental Release Measures
 Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Absorb with inert material, sweep or vacuum up and place in a suitable container for proper disposal. Wash up area with soap and water. Avoid runoff into streets, sewers and ditches which lead to waterways.

OSHA EMERGENCY RESPONSE GUIDANCE, HCSA P 5000A GUIDE PAGE NO. 131

Section 7: Handling & Storage
FLAMMABLE STORAGE CODE RED
 Keep closed on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. Use secondary containment. Not for drag, load or hoist use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources. Containers should be appropriately grounded/earthed during material transfer to prevent static sparks.

Section 8: Exposure Controls / Personal Protection
Engineering controls: Facilities storing or using this material should be equipped with an exhaust fan and a safety shower and its surrounding material. Personnel should wear safety glasses, goggles, or face shields. Be out or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.
Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9: Physical & Chemical Properties
Physical state: Liquid
Appearance: Clear colorless
Odor: Pungent odor
pH: N/A
Vapor pressure (mm Hg): 95 mm @ 20°C
Vapor Density (Air = 1): 1.57
Evaporation rate (butyl acetate = 1): 4.6
Refractive Index: N/A
Boiling point: 65°C (149°F)
Freezing / Melting point: -97°C (-144°F)
Decomposition temperature: N/A
Solubility: Complete
Specific gravity (4°C = 1): 0.79
Percent water (%): 100%
Molecular formula: CH₃OH
Molecular weight: 32.04

Section 10: Stability & Reactivity
Chemical stability: Stable
Conditions to avoid: Excessive temperatures, heat, sparks, open flame and other sources of ignition.
Incompatible materials:
Incompatible with other materials: Strong oxidizing agents, strong acids, zinc, aluminum and magnesium, redoxers, aldehydes.
Hazardous decomposition products: Carbon dioxide and formaldehyde.

Section 11: Toxicological Information
Effects of overexposure: Irritation of the respiratory tract, nausea, shortness of breath and headache. Irritation may cause headache, dizziness, weakness, numbness, shortness of breath, vomiting and incoordination. Can also cause blindness and death. Cannot be made non-toxic. Contact with eyes may cause severe irritation, even corneal burns. High concentrations of vapors may cause irritation. Contact with skin may cause moderate irritation, redness, itching and dermatitis. Skin absorption may contribute to overall exposure.
OSHA-DAT L50: 5000 mg/kg
NIOSH L50: 6000 mg/kg
SKN-ADT L50: 15000 mg/kg

Section 12: Ecological Information
 Data not yet available.

Section 13: Disposal Considerations
 These disposal guidelines are intended for the disposal of relatively small quantities only. Federal regulations may apply to empty containers. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contact with a licensed chemical disposal agency.

Section 14: Transport Information
UNNA number: UN1200
Shipping name: Methanol
Hazard class: 3
Packing group: II
Acceptance: UN 311 c 1 LL

Section 15: Regulatory Information
TSCA Reg.: TSCA (2002/03/04), RCRA code U15A

Section 16: Additional Information
 The information contained herein is furnished without warranty of any kind. Customers should use this information only as a supplement to other information published by them and may make independent determinations of safety and compliance of products from a review to assure proper use of these materials and the safety and health of employees. The information is not intended to be used as a substitute for other information published by them and may make independent determinations of safety and compliance of products from a review to assure proper use of these materials and the safety and health of employees.

1. Chemical Product Information
2. Composition/Ingredients
3. Hazards Identification
4. First Aid Measures
5. Fire Fighting Measures
6. Accidental Release Measures
7. Handling and Storage
8. Exposure Controls/Personal Protection
9. Physical and Chemical Properties
10. Stability and Reactivity
11. Toxicological Information
12. Ecological Information
13. Disposal Considerations
14. Transport Information
15. Regulatory Information
16. Additional Information

Ventilation

- Carbon Monoxide (CO) – produced by incomplete combustion of gasoline (HC-based fuels)
- Evaporative emissions
- Silicon & painting
- Recovery systems



Compressed Air

- Compressors
- Nozzles/fittings
- Systems – copper pipe
- Air in bloodstream...



Lifting



- #1 injury on work place – your back...
- Lifting belt
- Lift table
- Lawn tractor lift jack – HF <\$100
- Ramps



Electrical Safety

- Jewelry
- Ground prong on plugs
- GFI
- 120 vs. 240 Volts
- How many high current items per outlet?



Sudden death cause by electrocution
arrow indicates near an electric cord

Fire Extinguishers



- Class A – ordinary combustibles
- Class B – flammable liquids
- Class C – electrical equipment
- Class D – combustible metals



State and local codes may require a scheduled inspection of fire extinguishers



Tools and Measuring Instruments

Chapter #2



Hand Tools

- Tool programs
- Quality
- Specialty



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REG. PRICE \$109.99
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REG. PRICE \$109.99
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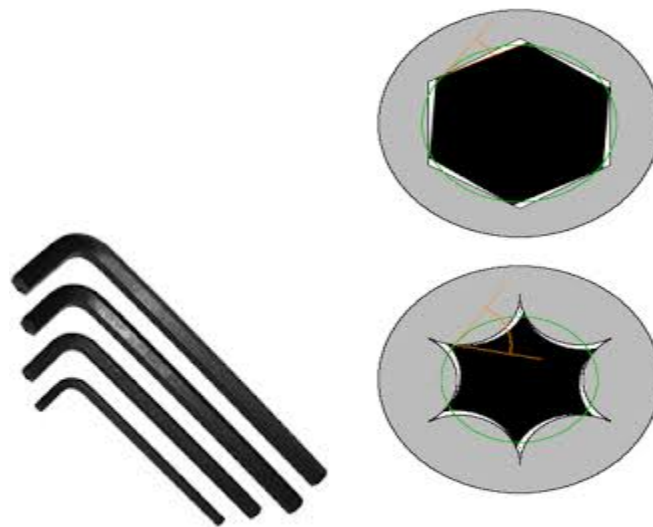
45 WATT SOLAR PANEL KIT
ITEM NO. 99000
REG. PRICE \$109.99
\$159.99 SAVE \$50

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Wrenches



- Open end
- Box end
- Adjustable
- Tubing – fuel/brake line
- Socket
- Allen
- Torx



Torque wrenches

- Beam
- Click
- Dial
- Torque to yield
- + Degree
- Foot/inch pounds



Pliers

- Gripping, pulling, cutting
- Vice-grips
- Strippers
- Retaining Ring
 - Inside
 - outside



Screwdrivers

- Slotted
- Phillips
- Offset



Hammers/punches

- Ball peen
- Rubber mallet
- Plastic mallet
- Center punch
- Pin punch



Seal Drivers





Assorted

- Hacksaw
- Reamers
- Files
- Chisels
- Picks/probes/pickup



Vise/Bench Grinder



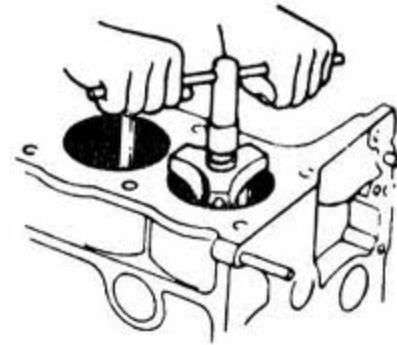
Pullers/holders

- Flywheel puller and holder
- Starter clutch wrench



Ridge Reamer

- Useful?



Ring Spreader

- Useful?



Ring compressor

- Must have!
 - Sized for small pistons
 - Get a **decent** one



Cylinder Hone

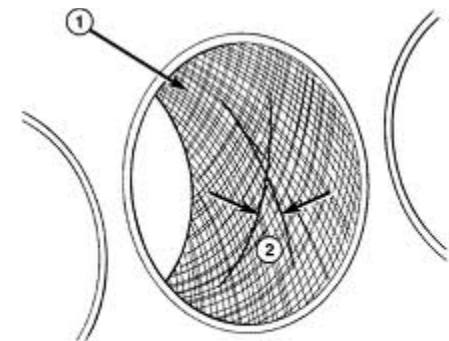


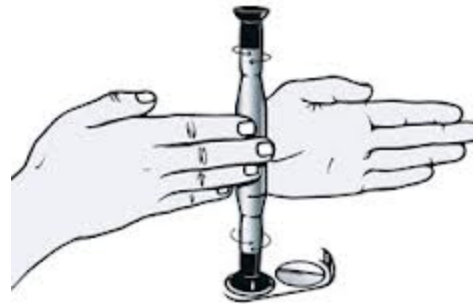
Fig. 1 Cylinder Bore Cross-Hatch Pattern

1 - CROSS-HATCH PATTERN
2 - 40°-60°

Valve Spring Compressor



Lapping stick



Engine Test Instruments

- Tachometer
- **Spark Tester** - a must...
- Compression Tester
- Leak Down Tester



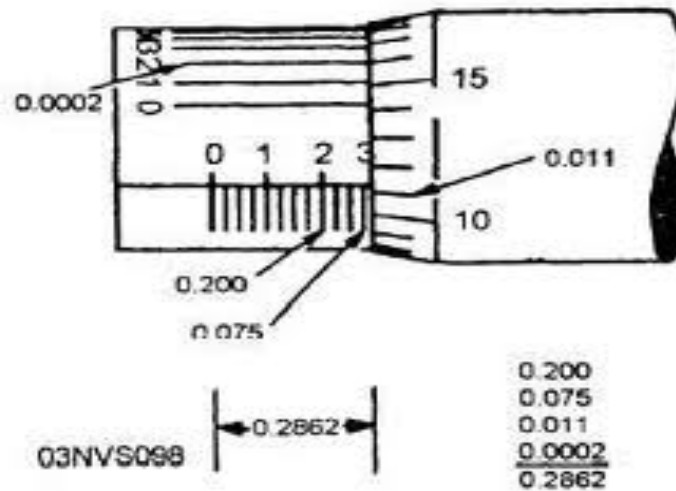
Cleaning Equipment

- Parts washer/Fluid
 - A must have item



Measuring Instruments

- Micrometers



Measuring Instruments

- Vernier Caliper



Measuring Instruments

- Dial Indicator



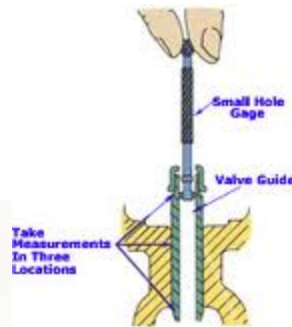
Measuring Instrument

- Telescoping Gauge



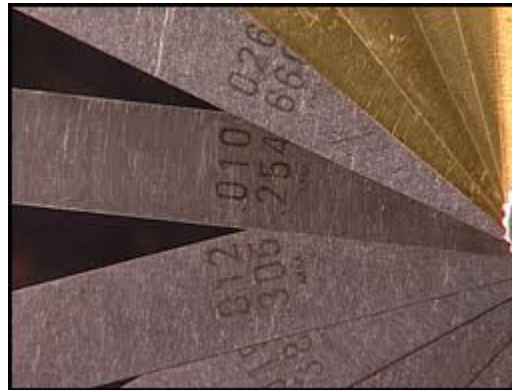
Measuring Instrument

- Small Hole Gauge



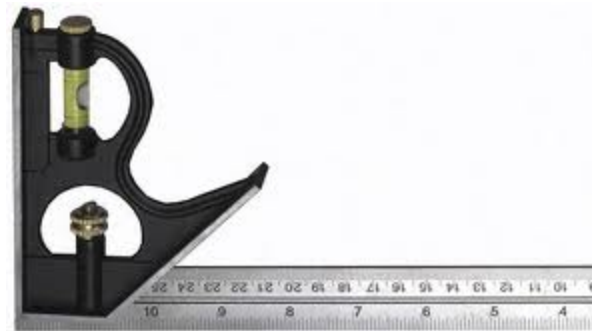
Measuring instrument

- Thickness Gauge or Feeler Gauge



Measuring Instrument

- Combination Square
 - Measuring valve height
 - Straight edge



Screw Gauge

- How about an assortment of hardware???





Fasteners, Sealants, and Gaskets

Chapter #3



Threaded fasteners

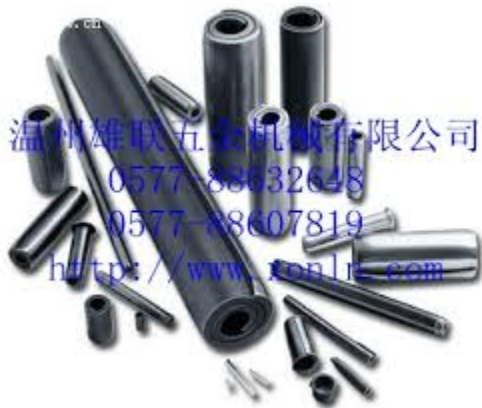
- Bolts
- Nuts
- Washers



Tap/Die



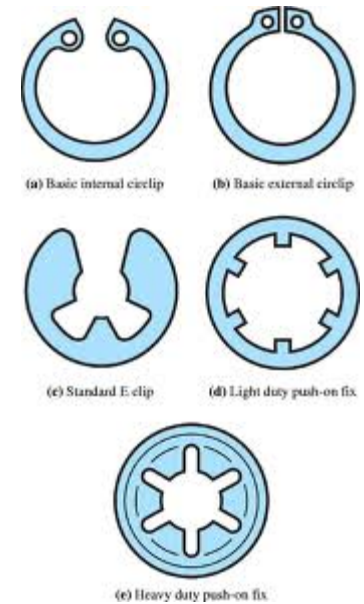
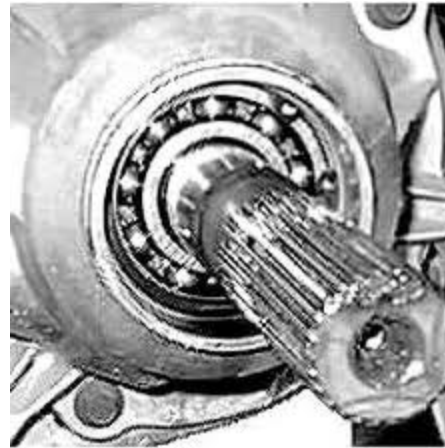
Pins



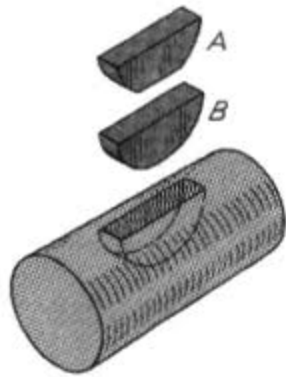
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0577-88607819
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Retaining rings



Keys



Thread Adhesives



Sealant

- Form in Place
- RTV
- Anaerobic Sealant



Antiseize Compounds



Gaskets





Gateway Community College, 2014

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