

 **Safety
Section**

Safety

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Part A - Marine Products and the Safety of People Who Use Them

Enjoyable boating is the goal of people who design and build marine products. To reach this goal, manufacturers are careful to make sure . . .

- Product user is informed . . .
- Products are safe and reliable . . .

It's up to you, the people who . . .

- Rig Boats
- Fix Machinery
- Maintain Equipment

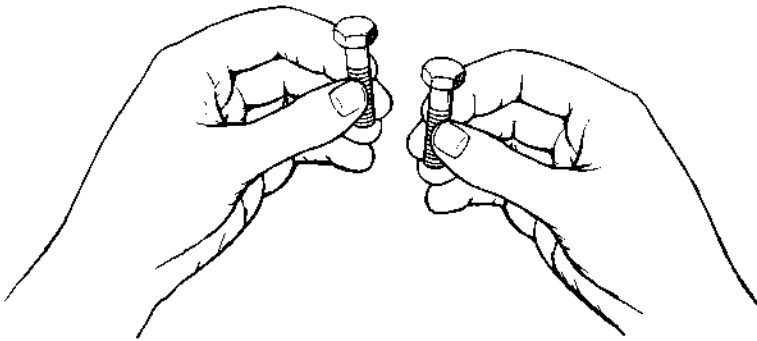
. . . to keep the products safe and reliable.

This section talks about safe boating and how you can help make it safe. Some items you may know . . . but others you may not.

First!

A word about parts . . . plain parts . . . special parts . . . all parts!

Do Not Substitute Parts



They look the same, but . . . are they the same?

Same Size?
Same Strength?
Same Material?
Same Type?
Standard Thread? Metric?

Don't substitute unless you know they are the same in all characteristics.

Second!

- Special locking bolts and nuts are often used to hold steering, shift, and throttle remote control cables to the engine.
- When you take the vertical drive off the engine or any parts off the stern drive unit, keep track of special nuts and bolts. Don't mix with other parts.
- When engine or vertical drive is returned to boat, use only the special nuts and bolts to hold remote steering, shift, and throttle cables to the engine.

This service manual covers *OMC Cobra™* stern drive models and is divided into sections concerning *OMC Cobra* systems and assemblies. Refer to the contents below to locate the section covering the item requiring service. Each section title page has an additional listing that will describe the section's contents in more detail. Be sure to read the **Safety Section** at the start of this manual, and pay special attention to all safety warnings as they appear throughout the text. Since models are subject to change at any time, some photos may not depict actual product.

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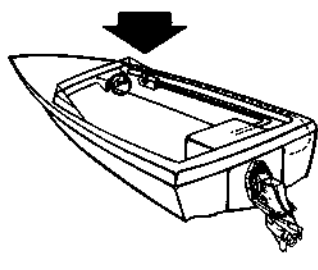
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How to Use This Book

The Table of Contents, found on the first page of each section, enables the reader to locate information by giving the page number on which each topic begins. General information, including troubleshooting, lubrication, and winterization is given in **Section 2**. **Sections 3 through 17** provide illustrated, detailed, step-by-step repair procedures.

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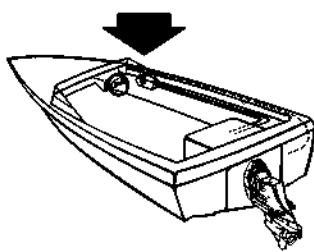
Stern Drive Shift System



The stern drive Shift System starts here . . . at the remote control lever . . .

. . . and ends here . . . at the propeller.

What's Most Important?

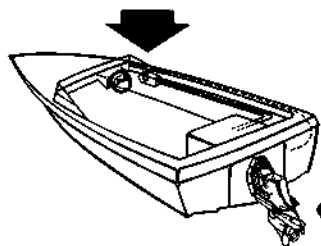


When control lever is in Forward, Neutral or Reverse "position"

Shift linkage must match control lever "position"

What Could Happen?

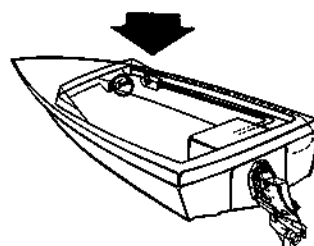
- If . . . Neutral



Forward or Reverse

. . . propeller is still powered (turning) unknown to operator, or engine will start in gear, boat will move suddenly.

- If . . . Forward



Reverse

. . . boat will move opposite to direction wanted by operator.

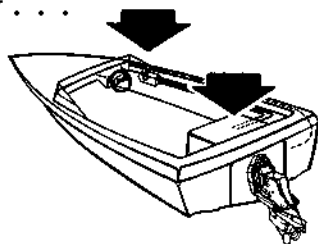
How Can Loss of Shift Control be Minimized?

In pre-delivery inspection and when servicing

- Read, understand, and follow manufacturers instructions.
- Closely follow the warnings marked with this symbol,  . . .
- Assemble parts carefully . . .
- Make adjustments carefully . . .
- Test your work. Don't guess. Make sure propeller does just what the operator wants and nothing else.
- Do not shift gears when engine is stopped. Adjustments can be lost and parts weakened.

Stern Drive Throttle Control System

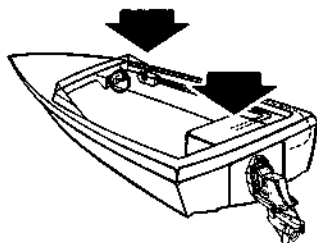
The stern drive Throttle Control System starts here at the remote control lever . . .



. . . and ends here on the engine . . .

What's Most Important?

When control lever is moved from Forward (or Reverse) to Neutral . . .



. . . engine speed must slow down enough to allow operator to shift into Neutral

Operator must be able to stop propeller.

What Could Happen?

If Operator can't slow down the engine or shift into Neutral gear, (stop propeller), operator could panic and lose control of boat.

How Can Loss of Speed Control be Minimized?

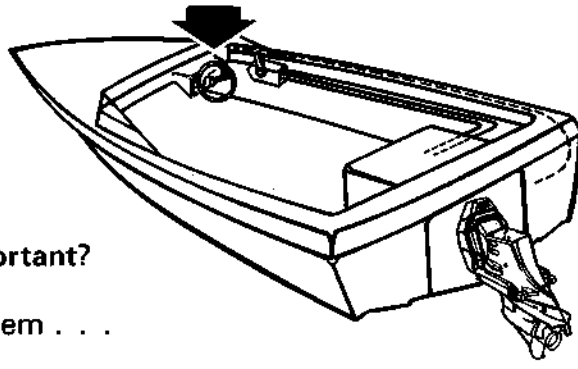
In pre-delivery inspection and when servicing



- Read, understand, and follow manufacturers instructions.
- Closely follow the warnings marked with this symbol  . . .
- Assemble parts carefully . . .
- Make adjustment carefully . . .
- Test your work. Don't guess. Make sure engine changes speed smoothly, quickly.
- Make sure full throttle can be obtained so operator won't overload parts.

Stern Drive Steering System

The stern drive Steering System starts here at the steering wheel . . .



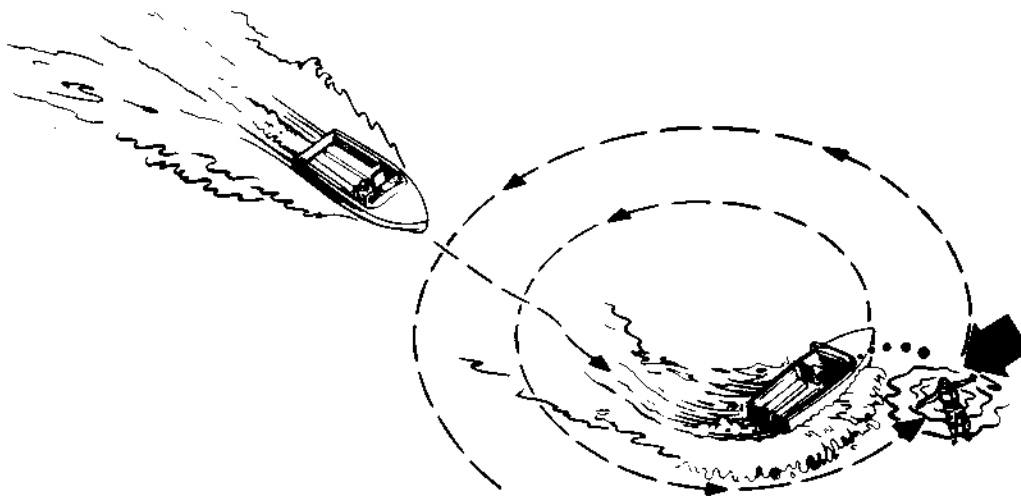
What's Most Important?

The Steering System . . .

- must not come apart
- must not jam
- must not be sloppy or loose

What Could Happen?

- . . . if steering system comes apart, boat might turn suddenly and circle . . . persons thrown into water could be hit.



- . . . if steering jams, operator may not be able to avoid obstacles. Operator could panic.
- . . . if steering is loose, boat may weave while operator tries to steer a straight course. With some rigs (at high speed) loose steering could lead to loss of boat control.



How Can Loss of Steering Control be Minimized?

When
rigging . . .
or after
servicing

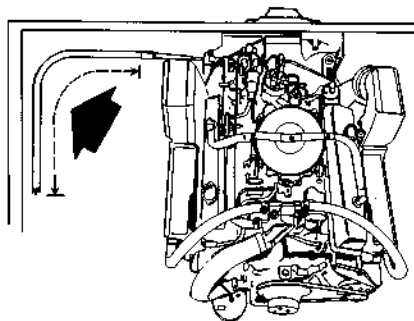
- Choose steering system which meets marine industry (BIA/ABYC) standards.
- Read, understand, and follow manufacturers instructions.
- Closely follow the warnings marked with this symbol  . . .
- Assemble parts carefully
- Make adjustments carefully . . .
- Keep parts moving freely . . . lubricate parts as shown in manuals
- Use the bolts, nuts, and washers supplied with steering attachment kits
. . . they're a special locking type that won't loosen, rust, or weaken.

When power or mechanical steering systems are used, check to uncover possible trouble!

- Cable movement in this area must not be restricted

Why?

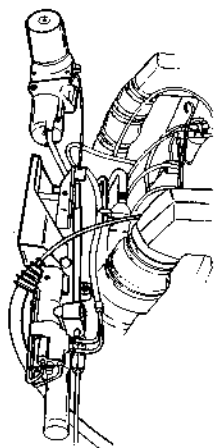
Unit may go to full turn without turning steering wheel (power steering models)



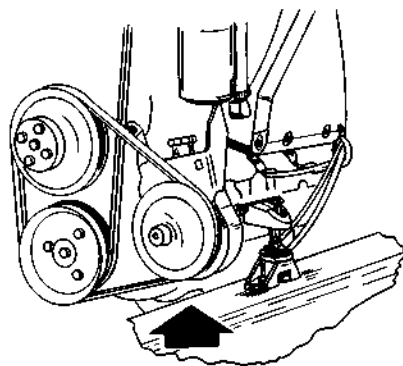
- Steering parts must not bind

Why?

Possible jamming of steering system

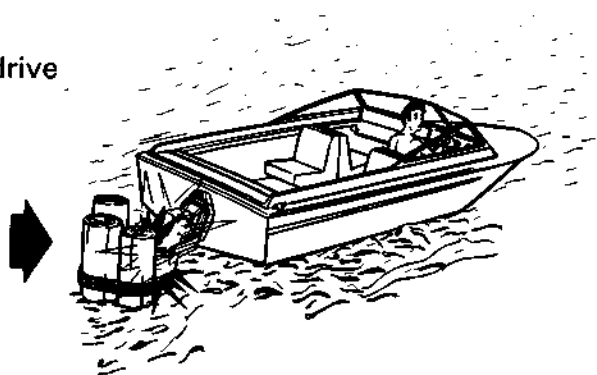
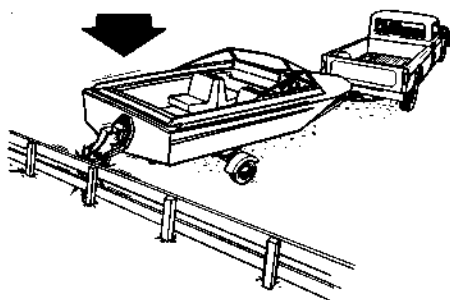


Power steering parts and push pull cable must be free to move in order to actuate power steering valve only when operator turns steering wheel



Engine stringer must not interfere with power steering pump and pulley

- Check for damaged parts . . . blows to the vertical drive unit like this

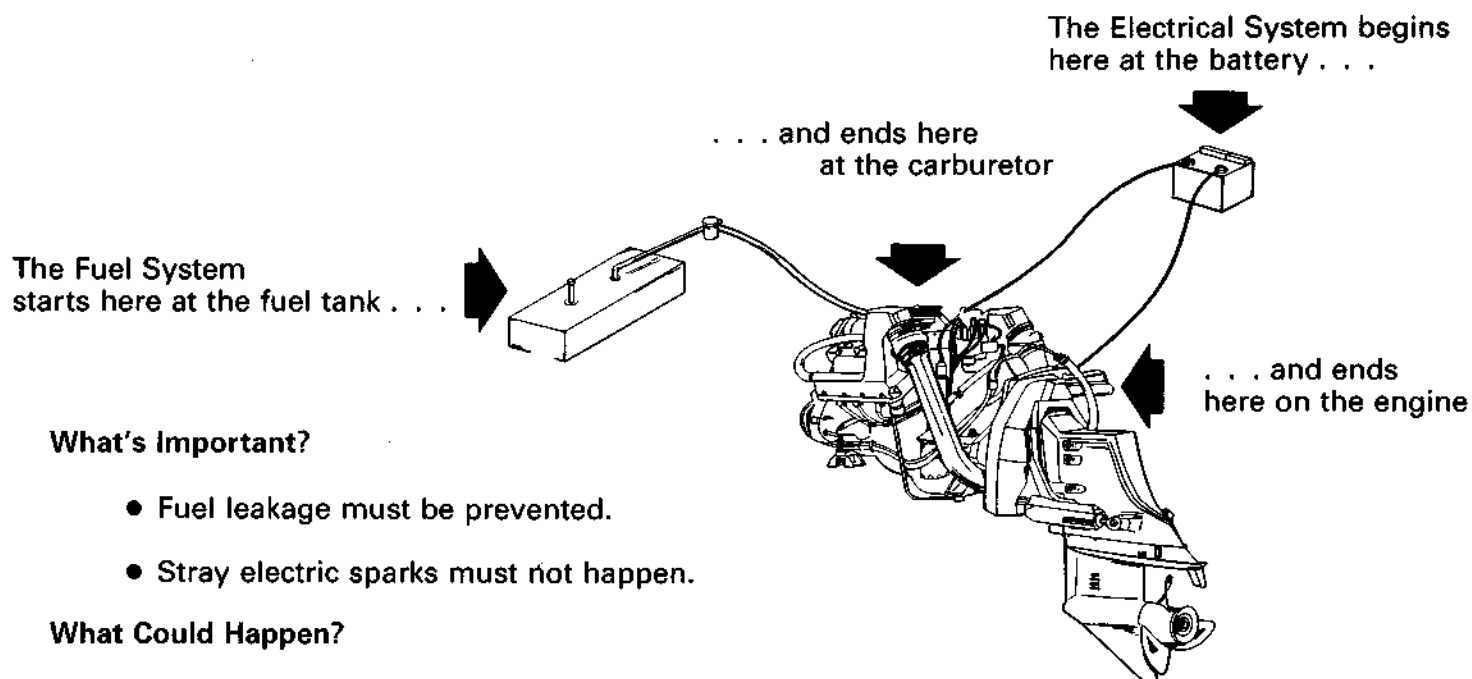


or this . . . or ???
can put heavy loads on steering parts. Look for . . .

- Cracked parts
- Bent parts
- Loose nuts and bolts

Replace damaged parts. If weakened, parts could fail later . . . on the water . . . when least expected.

Stern Drive Fuel and Electrical Systems



What's Important?

- Fuel leakage must be prevented.
- Stray electric sparks must not happen.

What Could Happen?

Gasoline can explode and/or burn easily:

- When boating, fuel leaking in the engine compartment could be ignited by a damaged or deteriorated electrical part (or loose wire connection) making stray sparks.

How Can Fire and Explosion Be Minimized?

- Read, understand, and follow manufacturers instructions.
- Closely follow the warnings marked with this symbol  . . .
- Do not substitute fuel or electrical parts with other parts which may look the same. These parts are designed and manufactured to meet special US Coast Guard safety regulation requirements to prevent fire and explosion.

If you work on stern drive or inboard engines, you must understand these Coast Guard requirements. If you don't have them, write to . . .

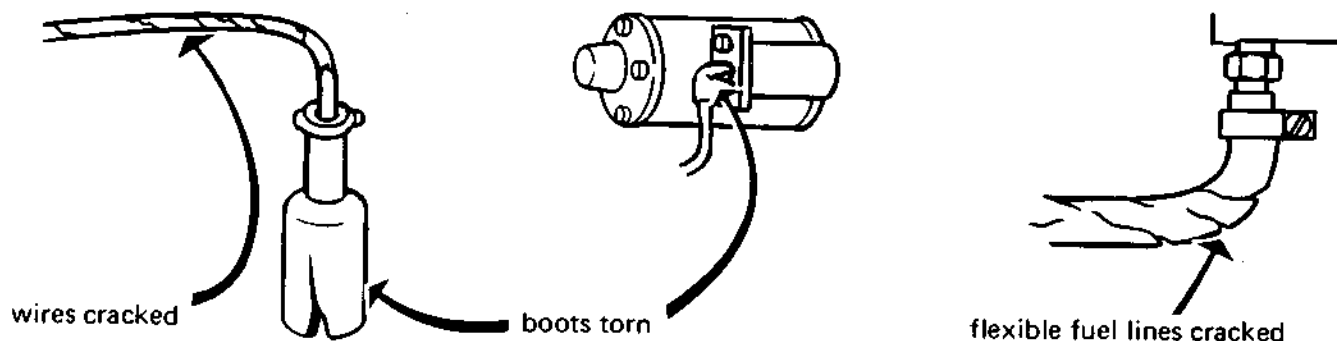
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National Technical Information Service Springfield, Virginia 22161	

. . . and ask for copies of:

- (1) Electrical System Compliance Guideline (AD/A-049-638)
- (2) Fuel System Compliance Guideline (AD/A-047-767)

These are good guidelines - easy to read and understand. They explain what must be done to prevent fire and explosions.

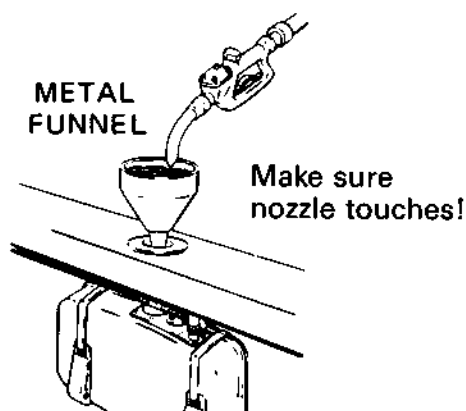
- Always use replacement parts specified by the manufacturer. They meet the Coast Guard requirements. Most automotive parts do not, especially electrical components that must meet ignition protection requirements of Coast Guard regulations.
- When non-metallic parts look to be in poor shape . . . replace them!



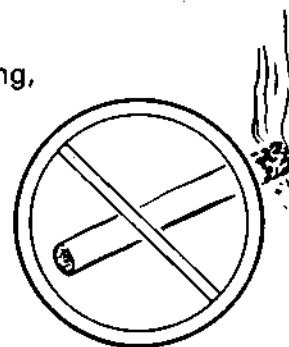
Using parts which meet Coast Guard requirements is only half the job. The other half is your job . . .

. . . it's time for replacement . . .
BEFORE sparks and/or fuel leaks occur.

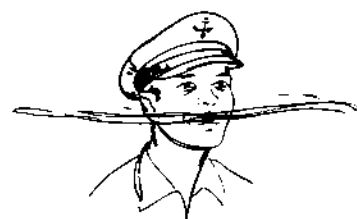
- Replace parts carefully. Make sure nuts and bolts are tight especially where they anchor electrical wires (to prevent sparking). If lockwashers are specified - use them. No short cuts or missing parts with either of these CRITICAL safety related systems.
- When refueling, always ground fuel nozzle to the inlet fitting on the boat to prevent the build-up of electrostatic sparks. If you use a funnel, make sure it's metal and ground the fuel nozzle to the funnel.



When fueling,
NEVER . . .



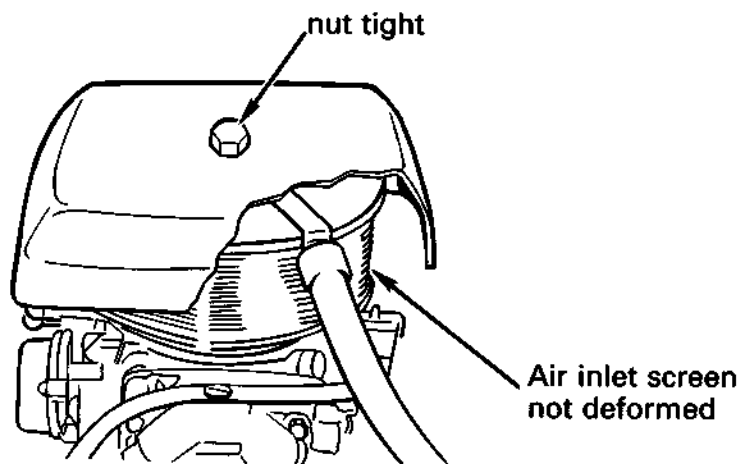
- If you smell gasoline in the engine compartment . . .
find its source and stop the leakage.



- Follow "Starting Procedures" outlined in the operator's manual.

Always make sure there are no gasoline fumes in the engine compartment before starting the engine. Open the compartment and use your nose. Don't gamble.

- Flame arrestor must be in place and securely attached to carburetor.



DR3115

Do not alter the flame arrestor.

If loose, damaged, or altered, an engine "backfire" may pass thru the flame arrestor assembly into the engine compartment. If fumes are present in compartment, fire and explosion could result.

Summing Up

Now you know some things that can take the joy out of enjoyable boating.

No doubt about it . . . it takes time!

- Reading and understanding instructions.
- Re-reading warnings marked with this symbol  . . .
- Putting parts together right . . .
- Making adjustments right . . .
- Testing your work.

and making sure

- Worn or damaged parts are replaced,
- Replaced parts are like originals . . . in every way.
- Customer is told of things which need attention . . .

But, Do You Really Want the Alternative?

Part B - Marine Products and the Safety of People* Who Fix Them

Part A talked about safe boating and how you, the mechanic, can help keep it safe for the boater. But what about you? Mechanics can be hurt while . . .

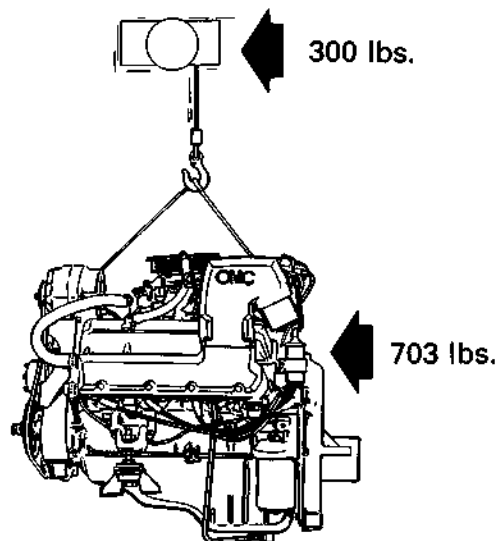
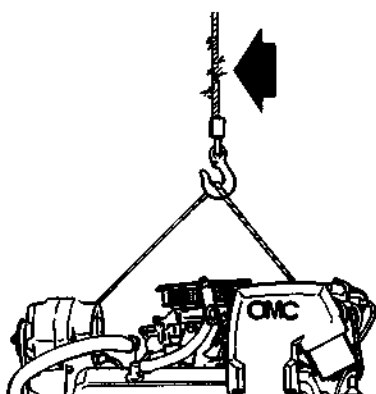
- Rigging boats
- Fixing things
- Troubleshooting problems
- Testing their work

Some items you'll know . . . others you may not.

Handling Engines

When Lifting Engines

- Engine may drop suddenly
If hoist is in poor shape . . . or too small for the job



- Make sure shop aids have extra capacity and keep them in good repair!

When Running Engine with Engine Compartment Cover Removed

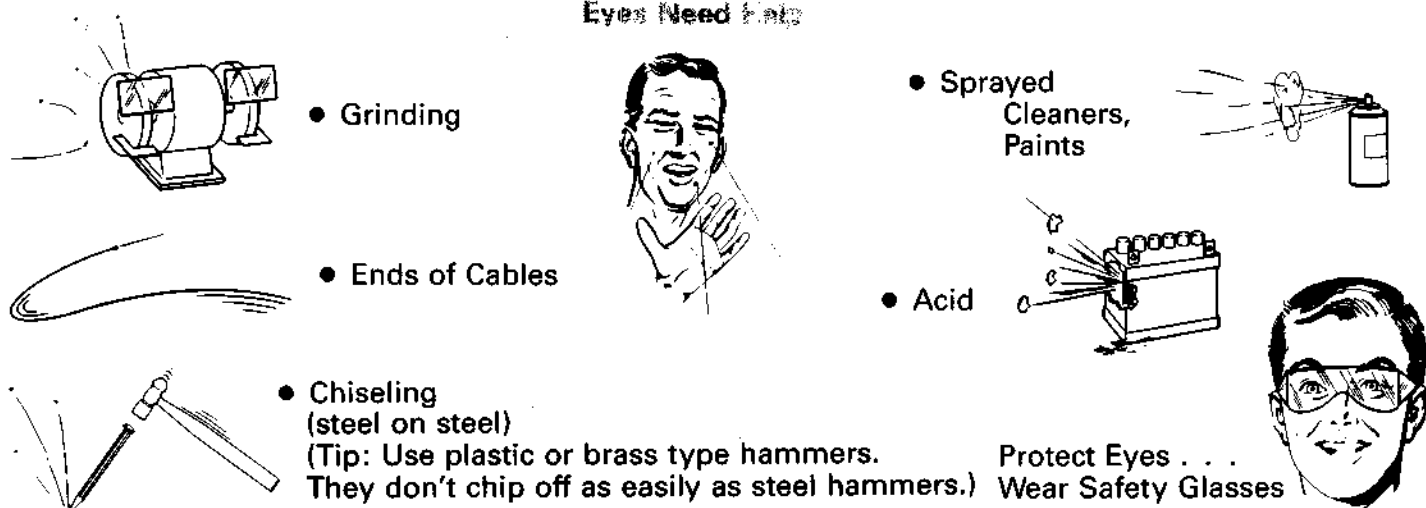
- Engine compartment cover is a guard. When you remove cover/guard to work on the engine remember . . .
- Loose clothing (open shirt sleeves, neckties)
- Long hair
- Jewelry (rings, watches, bracelets)
- Hands, arms, belts . . . can be caught by moving belts or spinning pulleys.
- Handle high voltage parts like spark plugs and coils carefully. They can shock you and may cause you to recoil into moving parts
- Two people working together on running engine must look out for each other . . . Never, ever, hit the key to start engine before signaling your partner. (He may be leaning over the engine with hands on a belt . . . or a "hot" electrical part . . . near the propeller . . . or? ? ?)

* Mechanics, technicians, backyard do-it-yourselfers.

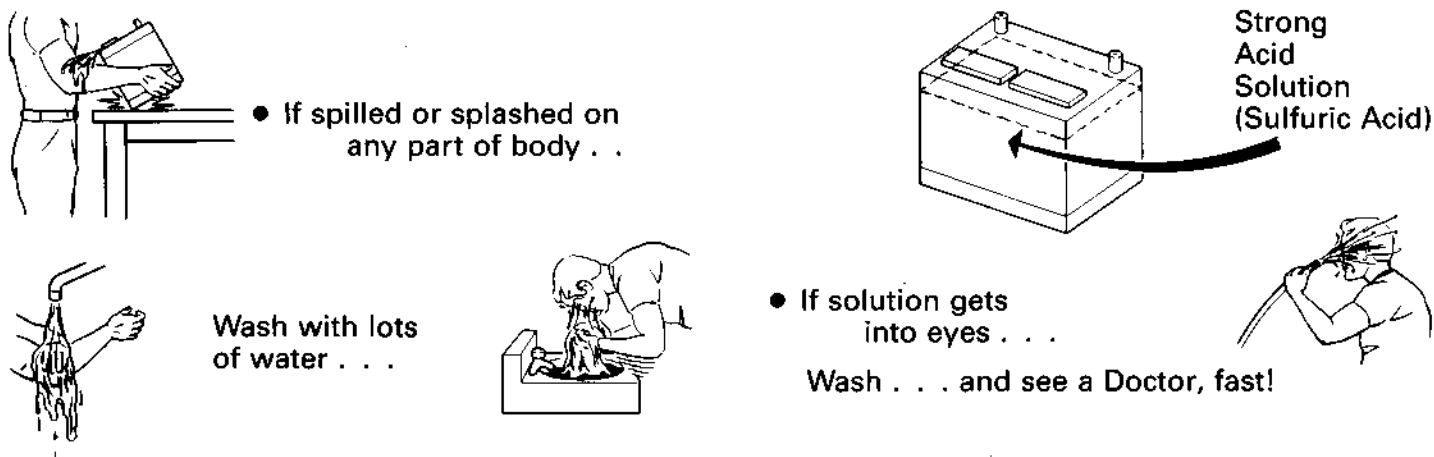
- Exhaust gases of running engines contain carbon monoxide . . . you can't see it . . . you can't smell it . . . you can't taste it . . . but it's there whenever an engine runs . . . and it's deadly!

When you smell the other gases in the exhaust, you are inhaling carbon monoxide. Run engines only in well ventilated areas.

Eyes Need Help

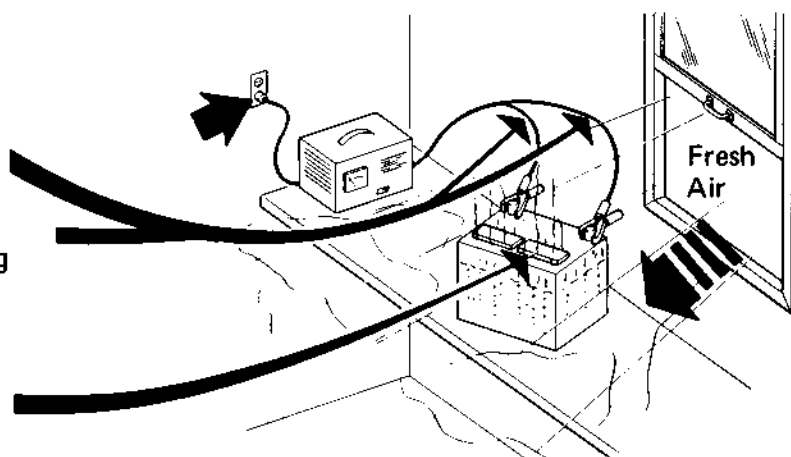


Handling Lead Acid Batteries



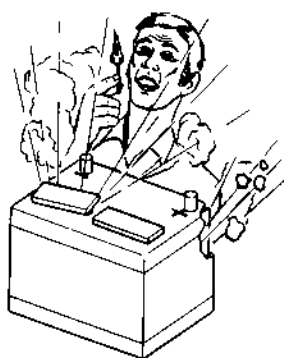
Charging Lead Acid Batteries

- 1 Attach and remove these cables with charger unplugged from 110 volt wall socket. (Prevents shocks if the charger is defective.)
- 2 Observe correct polarity when connecting these charger leads.
- 3 Always charge in a well ventilated area. Charging causes acid solution to give off hydrogen gas thru the vents in the caps . . . Make sure vents are open. If clogged, pressure inside may build . . . battery may explode.



Battery gas is explosive!
While charging or discharging,
remember . . .

No Smoking
No Flames
No Sparks



Never yank cables off
battery posts . . . it's a sure
way to make lots of
sparks . . . surrounded by battery gas.

Don't check battery condition
by placing metal objects
across posts.

You're sure to make sparks
and serious burns are
possible.



After Charging . . .

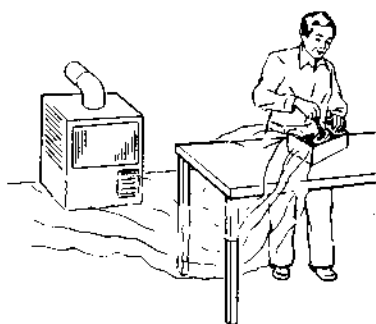
- Shut off charger
- Pull charger plug out of 110V outlet

. . . Then,

- Take charger cables off battery posts

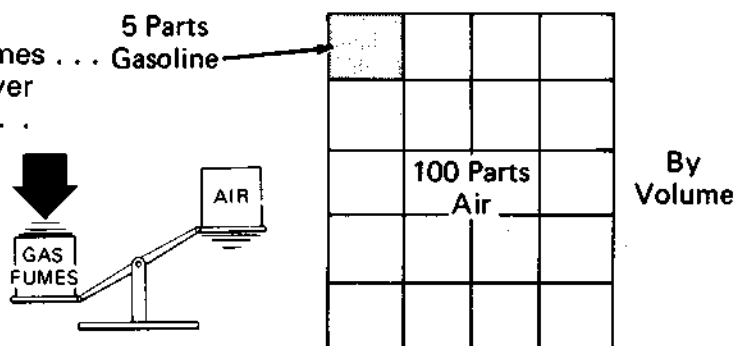
Gasoline! Handle With Care

- When you smell any odor of gasoline,
explosion is possible
- Gasoline fumes are heavy
and will sink to the lowest
point in the boat or room . . .
and will stay there . . . waiting
- If the air around
you is quiet . . . the pilot light in



the heater may
ignite the heavy fumes . . . Gasoline
before your nose ever
smells the fumes . . .

Gasoline explodes easily and violently
when mixed as shown . . .



Store in sturdy,
sealed gas can
. . . and . . .
keep outside



What Can You Do?

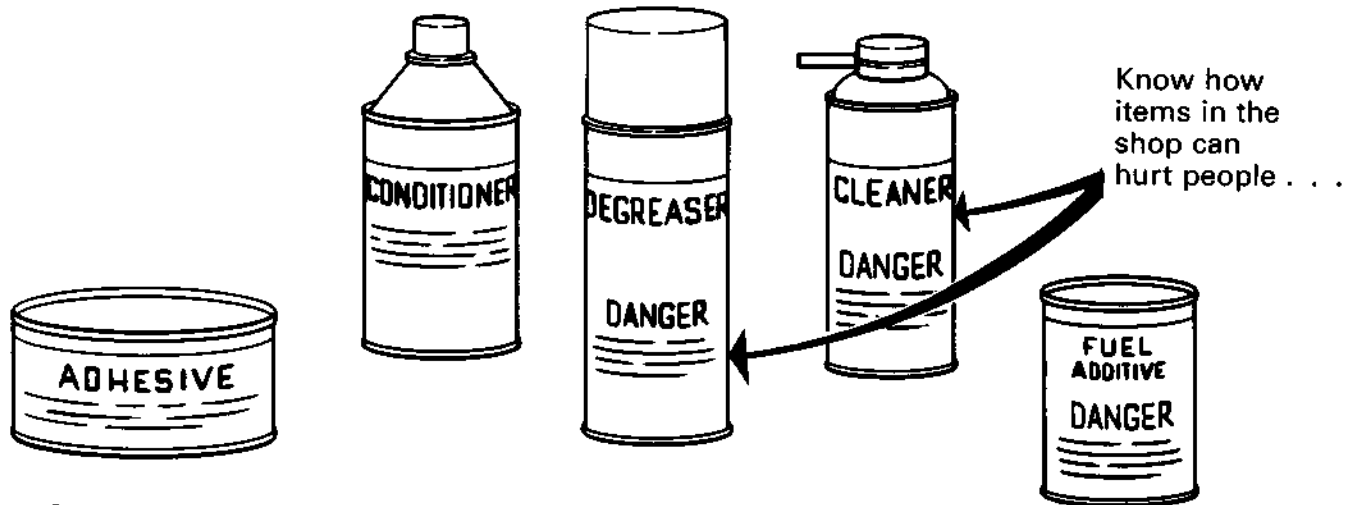
- Store right . . .
- Fill portable tanks outside of boat.
Spillage will collect in bottom of boat.
- Use fuel for fuel . . . not for a cleaner, degreaser
- If fumes are smelled (in shop, basement, garage), immediately:
- Put out open flames, cigarettes, sparking devices
- Wipe up spill or leak.
- Get towels, rags outside fast
- Open doors or windows
- Check lowest area for fumes.

- Know items in and around repair area which can ignite gasoline fumes . . . Control them if fumes are smelled.

- Matches, cigarettes, blow torches, welders
- Electric motors (with unsealed cases)
- Electric generators (with unsealed cases)
- Light switches
- Appliance pilot lights (furnace, dryer, water heater)
- Loose wires on running engines
- ?????????

How many of these are in your area?

Hazardous Products



- Read
- "How, and where, to use,"
- "How to give First Aid," and have "recommended" first aid materials on hand - should an emergency arise
- "How to dispose of can,"

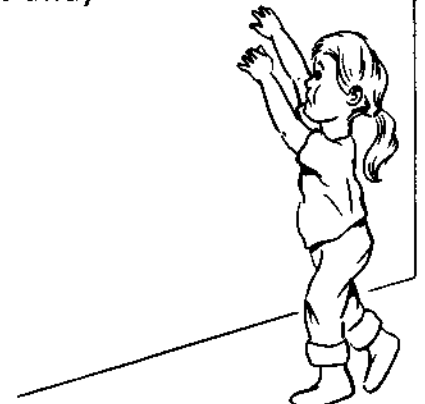
. . . it's all on the back of the can or bottle
and remember . . .

Little children are very curious and will try to taste everything, so . . .

. . . mmmmmmmmm



► Keep containers away from children



Section 1

Introduction

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Safety Warning

Before working on any part of the *OMC Cobra*® stern drives, read the section called Safety at the beginning of this manual.

Preparation for Service

Proper preparation is extremely helpful for efficient service work. A clean work area at the start of each job will minimize tools and parts becoming misplaced. Clean an engine that is excessively dirty before work starts. Cleaning will occasionally uncover trouble sources. Obtain tools, instruments and parts needed for the job before work is started. Interrupting a job to locate special tools or repair kits is a needless delay.

Use proper lifting and handling equipment. Working on stern drives without proper equipment can cause damage and personal injury.

Always use clean fresh fuel when testing engines. Often, troubles can be traced to the use of old or dirty fuel.

Service Policy

Whether within or following the warranty period, OMC has a constant interest in their products.

It is OMC's policy to provide dealers with service knowledge so they can give professional service demanded by today's consumer. The OMC Training Centers, frequent mailing of Service Bulletins, Letters and Promotions, Special Tools and this Service Manual represent OMC's efforts to assist dealers in giving consumers the best and most prompt service possible. This Service Manual covers all phases of servicing the *OMC Cobra®* stern drive unit. If a service question does not appear to be answered in this manual, you are invited to write to the OMC Service Department for additional help (for address, see rear cover of this manual). Always be sure to give complete information, including engine model number and serial number.

Be sure that you are familiar with the Warranty. If you have any questions, write the OMC Service Department.

Replacement Parts and Product References



When replacement parts are required, never use parts of unknown quality on your *OMC Cobra* stern drive. Insist on only genuine *OMC*® replacement parts. Failure to do so may result in product malfunction and possible injury to the operator and/or passengers.

When reference is made in this manual to a brand name, number, product or specific tool, an equivalent product may be used in place of the referred-to product unless specifically stated otherwise. To avoid hazards, equivalent products which are used must meet all current U.S. Coast Guard Safety Regulations and ABYC standards.

Parts Catalog

Parts Catalogs contain exploded views showing the correct assembly of all parts as well as a complete listing of the parts for replacement. These catalogs are helpful as a reference during disassembly and reassembly, and are available from *OMC SysTeMached™* Parts and Accessories in Beloit, Wisconsin.

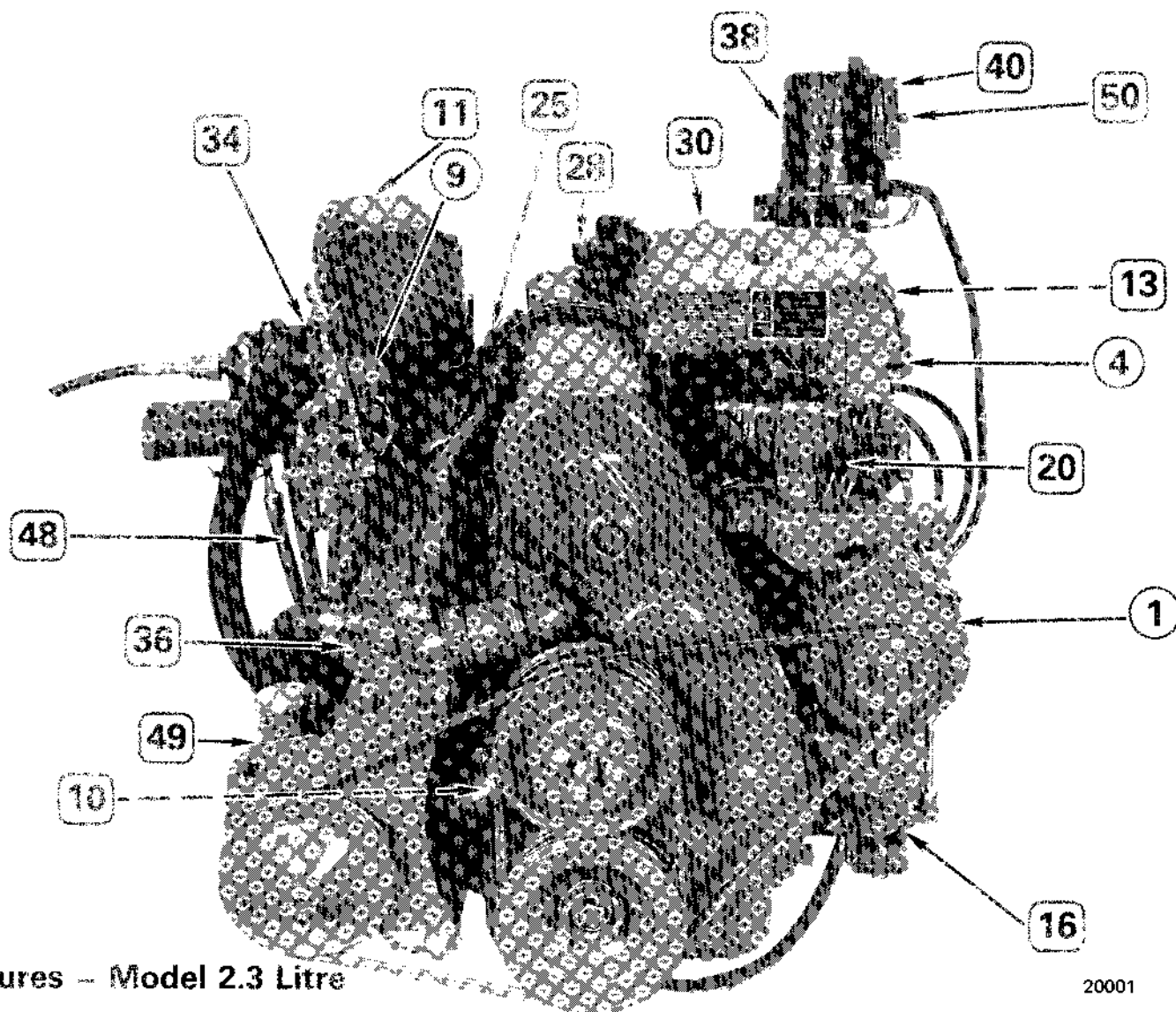
Special Tool Catalog

The Special Tool Catalog contains listings of specially designed service tools which are available to simplify certain operations. In addition to showing tools, the catalog contains complete descriptions and ordering instructions.

Product References, Illustrations & Specifications

All information, illustrations and specifications contained in this manual are based on the latest product information available at the time of printing. The right is reserved to make changes at anytime without notice.





Features – Model 2.3 Litre

20001

- | | |
|--|--|
| ① Alternator | ②⑤ Motor Mount, Front |
| ② Anodes | ②⑦ Motor Mount, Rear |
| ③ Anti-Ventilation Plate | ②⑧ Motor Oil Fill Cap |
| ④ Carburetor | ②⑨ Oil Filter |
| ⑤ Distributor | ②⑩ Oil Level Dipstick |
| ⑥ Drain (Engine) | ②⑪ Oil Pan |
| ⑦ Drain (Manifold) | ②⑫ Oil Withdrawal Tube |
| ⑧ Electrical Cable Connector | ②⑬ Propeller, SST II® (Optional) |
| ⑨ Electronic Shift Assist Module | ②⑭ Shift Bracket & Cable |
| ⑩ Engine Water Circulation Pump | ②⑮ Starter Motor |
| ⑪ Exhaust High Rise | ②⑯ Thermostat Housing |
| ⑫ Exhaust Relief Vents | ②⑰ Thru-Hub™ Exhaust |
| ⑬ Backfire Flame Arrestor | ②⑱ Trim/Tilt Pump Assembly |
| ⑭ Trim/Tilt Cylinders (Port and Starboard) | ②⑲ Transparent Fuel Pump Overflow Hose |
| ⑮ Fuel Filter | ②⑳ Trim/Tilt Relays |
| ⑯ Fuel Pump | ②㉑ Water Drain Plug |
| ⑰ Fuses | ②㉒ Trim Tab |
| ⑱ Lower Gearcase (Vertical Drive) | ②㉓ Water Cooled Exhaust Manifold |
| ⑲ Upper Gearcase (Vertical Drive) | ②㉔ Water Intake |
| ⑳ Ignition Coil | ②㉕ Water Pump |
| ㉑ Gimbal Housing | ②㉖ Battery Ground Terminal |
| ㉒ Pivot Housing | ②㉗ Throttle Bracket & Cable |
| ㉓ Model & Serial Number (Engine) | ②㉘ Power Steering Hydraulic Lines |
| ㉔ Model & Serial Number (Vertical Drive) | ②㉙ Power Steering Pump |
| ㉕ Model & Serial Number (Transom Mount) | ②㉚ Circuit Breaker |