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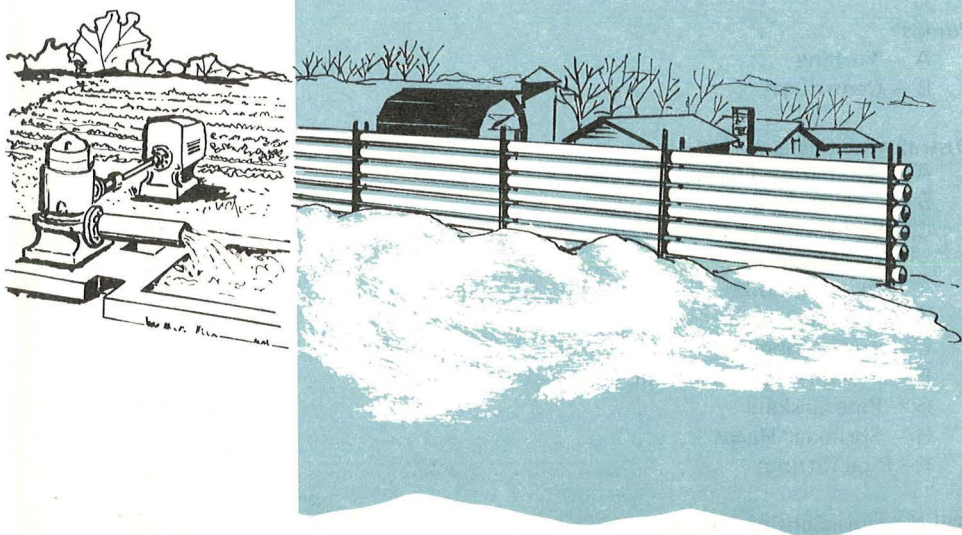
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# Off Season Care of IRRIGATION EQUIPMENT



Cooperative Extension Service, University of Nebraska  
College of Agriculture and Home Economics,  
and U.S. Department of Agriculture Cooperating  
E. F. Frolik, Dean; J. L. Adams, Director

## INTRODUCTION

Idle irrigation equipment should be protected to increase its life and reduce maintenance costs. Care while it is not being used is as important as maintenance during use. This circular discusses how to protect equipment when shutting down in the fall and/or starting up in the spring.

Check your owners manual for more specific recommendations.

*Avoid delay. Get repairs made in the fall or winter before the summer rush.*

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# OFF SEASON CARE OF IRRIGATION EQUIPMENT

by  
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## INTERNAL COMBUSTION ENGINES

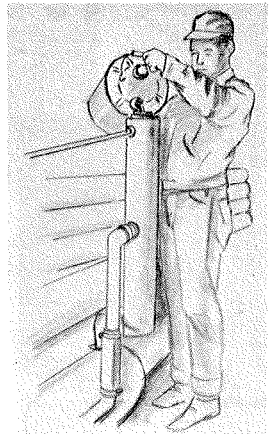
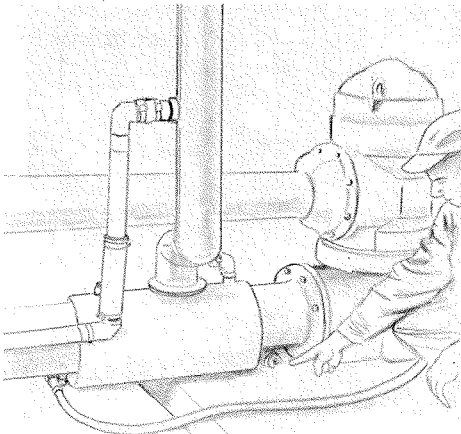
Special attention should be given to:

1. Lubrication
2. Cooling system
3. Ignition
4. Engine openings
5. Fuel system

While the engine is warm drain oil from crankcase, drain and flush the cooling system. Refill crankcase with new oil and replace oil filter. Refill cooling system with water, rust inhibitor and antifreeze. If the unit will not be used during the winter, a low priced methanol type antifreeze may be used. If you use your unit during winter months, permanent type antifreeze is best. Run the engine a few minutes until fresh oil has reached all parts and antifreeze and water have mixed.

Spark plugs should be pulled, cleaned, regapped, and about two ounces of SAE 50 engine oil poured into each spark plug hole. Replace plugs. Distributor cap should be removed and a small amount of oil placed on governor weights. Replace distributor cap and seal with weatherproof masking tape where cap joins the distributor housing. Remove battery, charge, and store in cool dry place.

### DRAIN AND REFILL COOLING SYSTEM

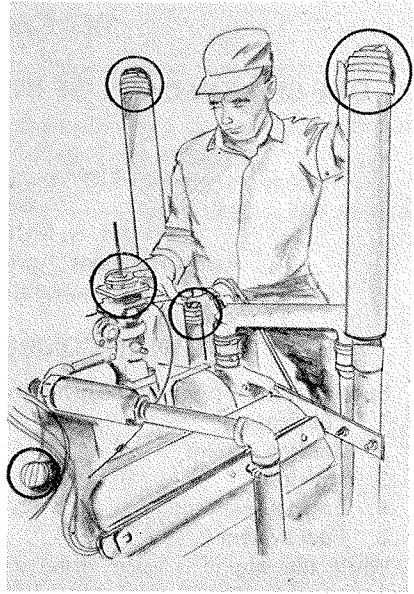


Seal all openings with weatherproof masking tape: exhaust, air cleaner inlet, and crankcase breather tube. Clean air cleaner and refill with proper oil. If possible, remove air cleaner and store inside.

Shut off fuel at the tank. Drain all lines and carburetor. If LP gas is used, drain vaporizer-regulator—both fuel and water lines.

For a diesel engine, add the following procedures: drain fuel tank and filters; refill with about two gallons of a 50-50 mixture of pure white kerosene and SAE No. 10 engine oil; start engine and run at a speed of about 1,000 RPM until it stops from lack of fuel.

Inspect the condition of seals on engine openings once a month.



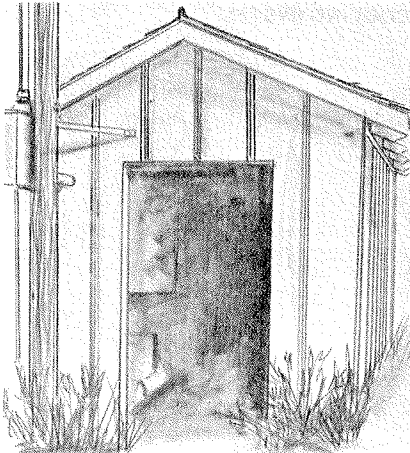
SEAL ALL OPENINGS

## ELECTRIC MOTORS

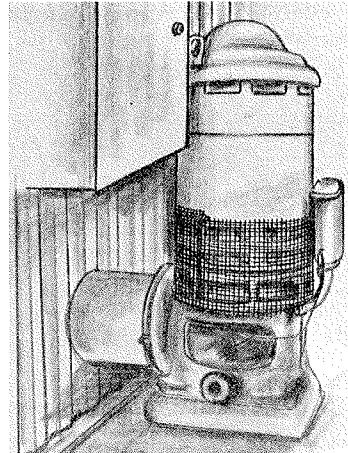
Protect electric motors from water, oil and dirt. Electric irrigation motors are either of weather protected or non-weather protected design. Non-weather protected motors should be in a pump house.

Do not cover motors left out of doors with plastic, canvas, or any material that will shut off air circulation and permit moisture to condense.

Be sure motor is screened from rodents. Check switch boxes for missing knock-out plugs. Mice have entered switch boxes, then followed the conduit into electric motors.



PROTECT MOTORS IN PUMP HOUSE



RODENT SCREEN

For maximum protection, drain oil-lubricated motors just before shut-down. Refill with rust inhibiting oil. Run motor until this oil is distributed over bearings. Next spring drain, flush, and refill with new oil.

Moisture condenses in oil during temperature changes. Turning the motor for a short time once a month during periods of non-use will help redistribute the rust preventative oil. On motors equipped with grease type lubrication, change grease after shut-down. Run motor for a few minutes to relieve bearing of any excess grease.

Before starting the motor next spring, be sure safety switch is in off position. Then clean debris from rodent screens, dirt from switch boxes, clean non-reverse pins with wire brush, and check windings for moisture. Motors suspected of having moisture in windings should be taken to an electric shop for drying; they can be checked with an electrical resistance meter. If resistance is below 2 megohms, the windings should be dried in an oven or circulated with a safe current. Drying time will depend on size of machine and amount of moisture absorbed.

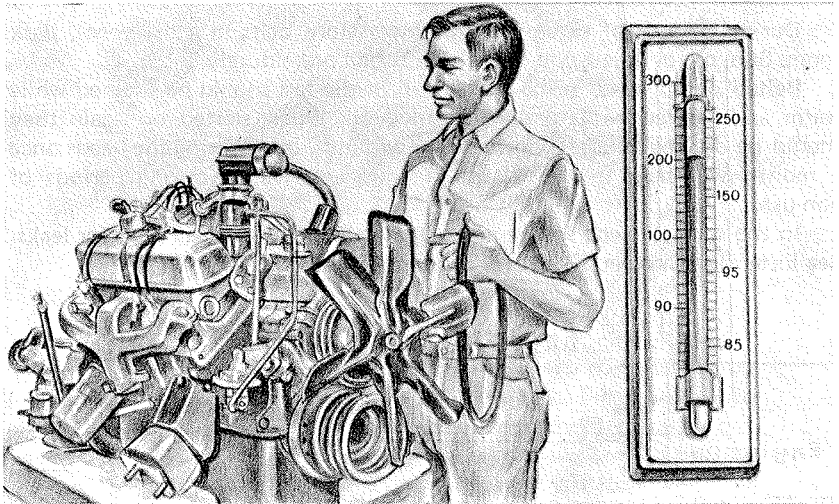
When cleaning dust from windings, use suction rather than compressed air. If grease or oil is present on motor or windings, wipe with a damp cloth which has been moistened in petroleum solvent.

Shading motor from direct, hot rays of the sun during summer operation may be beneficial. If motor has been in use for three years or more, check bearings for wear.

## SAFETY SWITCHES AND CONTROLS

Safety equipment should be inspected before being put back into operation. Replace cracked glass on gauges. Inspect all electric terminals for corrosion and for continuity.

Activate the shutdown devices under adverse operating conditions before putting into use. Water temperatures can be raised by temporarily removing the belt to water pump. Low oil pressures can be brought on by removing the oil drain plugs. Attendant must be standing by at time of test in case the safety switches are not working properly.



ACTIVATE SHUTDOWN DEVICES BEFORE STARTING

## DRIVES

### Gear Heads

Drain gear heads equipped with a water cooling system before they are shut down or freezing weather arrives. Drain oil after last operation, when drive is still warm, and replace with rust preventative oil. Then run drive for a few minutes to insure complete coverage of gears with rust-preventative oil. In spring, drain oil, flush, and refill with new oil.

To avoid possible seizure of the bearings and gears during periods of long shutdown, turn the drive once each month. This helps redistribute the oil to surfaces which may have become exposed and could rust.

Before starting in spring, always turn drive by hand to see that it is operating freely. Clean non-reverse pins with a wire brush.



DRAIN WATER FROM GEAR HEAD

### Drive Shafts

Check nuts for tightness and alignment according to instructions given in Extension Circular 57-701, "Irrigation Turbine Pump Drives." Before operating after shut-down periods, lubricate yokes with grease and the splined slip joint with oil.

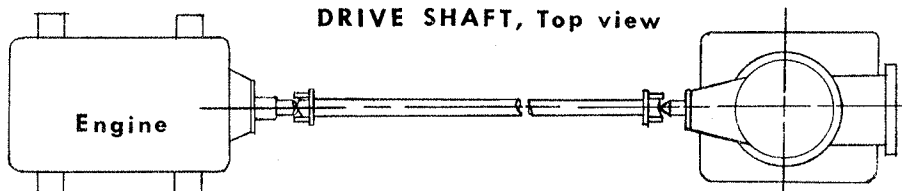
### Belt Drives

During periods of extended shut-down store belts in a dry, cool, dark room. Sun, oil, or grease will cause belts to fail prematurely.

Belted pump heads being shut down in the fall should be drained while warm and refilled with rust-preventative oil. When started up again they should be drained, flushed, and refilled with new oil. Turning the heads once a month will help to redistribute rust-preventative oil during periods of non-use.

In the spring, check sheave and belt alignment and inspect seals for leaks. See Extension Circular 57-701 for proper alignment.

### DRIVE SHAFT, Top view



## BELT ALIGNMENT, Top view

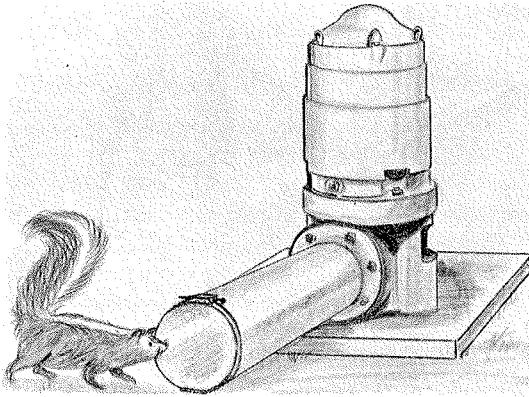


## PUMPS

### Turbine

Cover discharge pipe to prevent animals from getting into pump column. Before starting after periods of long shut-down, oil-lubricated pumps should have the pump shaft lubricated about one week ahead of first pumping operations. One gallon of oil run thru dripper at this time is adequate.

Water-lubricated pumps equipped with prelube tanks must be drained before freezing weather. Before starting again in the spring, water should be injected onto line shaft for about one minute for each 100 feet of pump setting. Packing glands may need cleaning and repacking if excess water is leaking out.



COVER DISCHARGE PIPE

### Centrifugal

Drain water from pump case and priming pump. Keep rodents out by covering both the discharge and suction ends of the pump. Fill bearing with new grease and loosen packing gland. If excessive water has been leaking out packing gland, it should be removed. Remove packing and clean the stuffing box. Replace with new packing and leave packing gland loose for adjustment at time of next operation.



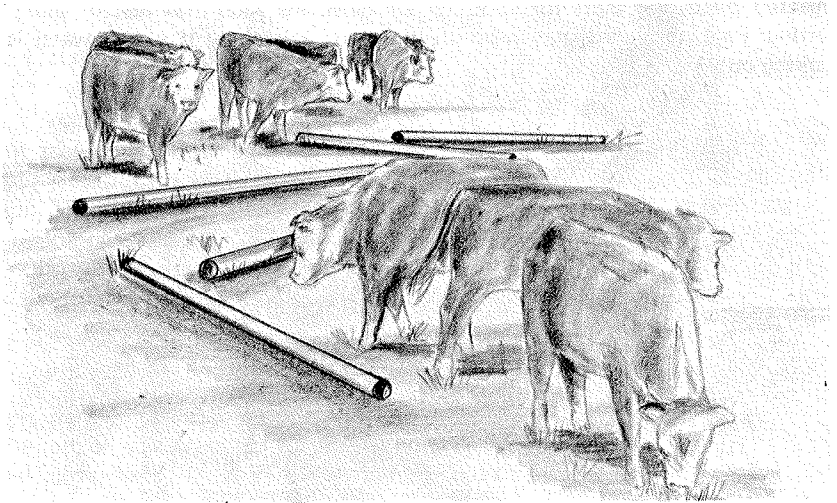
## DISTRIBUTION SYSTEMS

### Aluminum Tubing

Portable aluminum irrigation pipe should be stored on inclined racks above the ground in such a way that they will drain, air can circulate, and they are secure from wind damage. Avoid contact with animal waste, acids, caustic or other chemical fumes or dusts during storage. Mark defective sections and store near top of pile for later repair. Some users store aluminum tubing to form a snow fence in periods of non-use.

### Tractor Tow

Tractor tow lines and other mechanically moved sprinkler pipes should be placed near the edge of the field, or in an out-of-the-way area. They should be completely drained and made secure from wind damage. Keep ends plugged to keep out rodents. If gaskets are leaking it may be necessary to take pipe apart and clean or replace them.

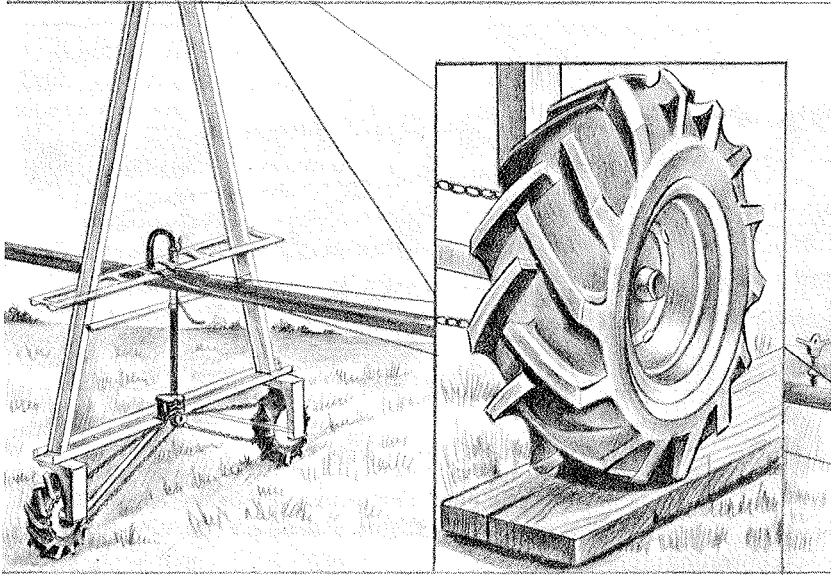


SECURE PIPE FROM LIVESTOCK DAMAGE

### Self-Propelled Center Pivots

Units should be shut down when air temperature reaches 38° to 40° F. The air temperature shut-off device must be protected from sun rays. Before restarting, see that drive wheels or feet are not frozen to the ground and are free from frozen chunks of soil.

When shutting down the system for the season, park it on a well-drained area, keeping the drive mechanism from contacting the soil. Inspect all automatic drain valves to make sure the lines and cylinders are completely free of water.



PARK ON DRAINED AREA

PROTECT DRIVE MECHANISM FROM SOIL CONTACT

Lubricate at all grease points when shutting down and before starting. Remove drive chains and store in diesel fuel. If power train consists of battery or V-belts, remove and store.

### **Electric**

Electric units should have the motors removed during periods of long non-use and stored in a dry area. When re-installing next season, rotate them so that the units having the most wear last year will have the least this year.

Inspect all electrical connections and wiring for corrosion and deterioration. Replace damaged equipment. Check camshafts in the control box mount for freeness of operation. Inspect and check all 24, 110, 220, and 440 volt wires and connections to see that they are safe.

### **Hydraulic**

Disconnect hydraulic hoses and protect fittings from dirt and weather. Before starting, check hydraulic supply tank for moisture and oil level. Observe all hoses and connections for leaks after pressure has been brought up to maximum. Then check safety switches at each transporting unit.

### **Moving Booms**

Before extended periods of non-use, perform all greasing operations, giving special care to the pivot end of the rotating boom and top of intake tee. Keep unit well painted.

Lower the booms and rest them on supports. Position the supports under each end of the boom as well as under each pipe joint.

## PROVIDE BOOM SUPPORTS



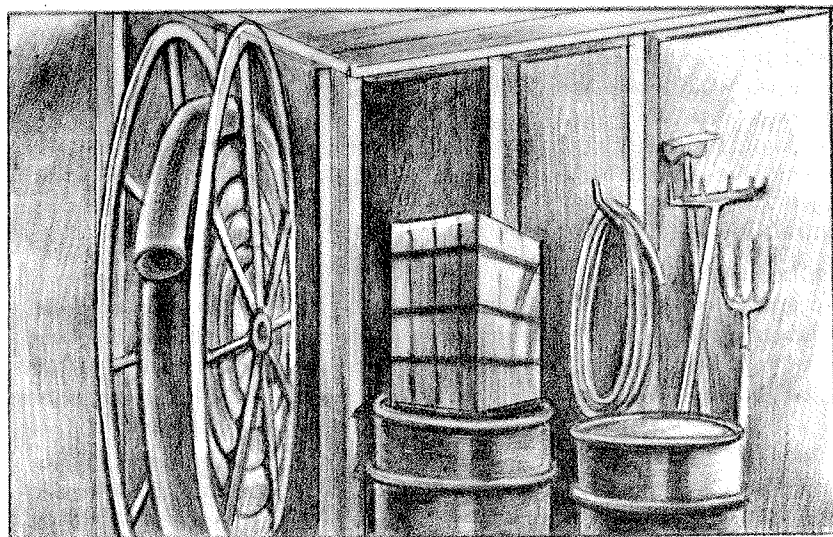
### Buried Pipe Lines

These must be completely drained unless they are below the frost line. They should be capped to keep out rodents and debris. Be sure the drain valve is operating properly.

### Flexible Hose or Mobile Pipe

Keep all hoses out of contact with grease and oil. Store in a cool, dark, clean area, away from rodents. Do not store in building where electric motors are operated. Long lengths should be stored on a reel which is under minimum tension, making sure nothing comes in contact with any part of the hose.

Short sections of hose should not be hung on wall hooks, pegs, or in any way which will bend them sharply.



DO NOT CAUSE HOSE DISTORTION

## Pipe Gaskets

Remove gaskets from pipe. Clean out sand and silt from the pipe seat as well as the gasket. Store in a dry, cool location out of sunlight and away from ozone concentrations. They may be stored in a flat, unstressed position or slipped over a pipe slightly smaller than the inside of the gasket. Do not hang over pegs, nails or small-diameter rods.

## Sprinkler Heads

Before storing, check sprinkler heads for wear and need for replacements. Especially check the bearing washers, spring tension, and bent oscillating arms. Nozzles which have worn  $1/16''$  larger than specified should be replaced. Use drill bit to check size of opening.

## Pipe Fittings

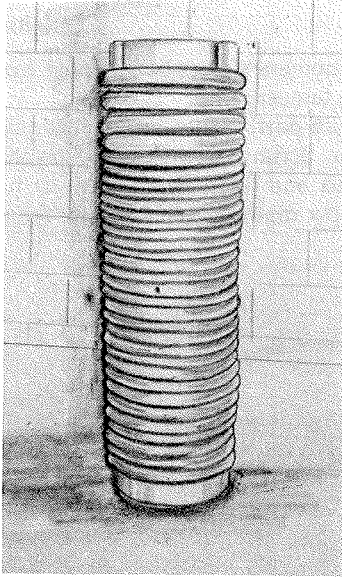
Inspect for wear and store indoors. Clean and lubricate valve shafts.

## SOIL MOISTURE SENSING DEVICES

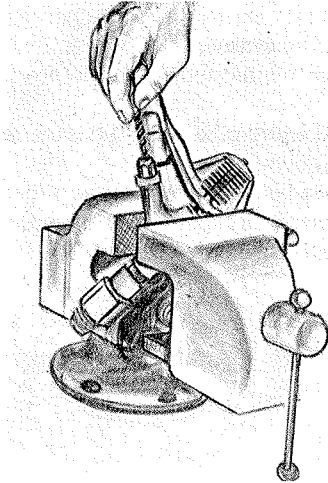
### Electrical Resistance

In periods of non-use batteries must be removed from the meter. Clean battery contact points of meter before installing new batteries in the spring. Store the instrument in a clean, dry place and give it the care of any other precision instrument.

In cultivated land best results will be obtained by using new blocks each year. In pasture or alfalfa crops the electrical leads should be protected and the blocks left in the soil and used for a period of two or more years.



STORE GASKETS CAREFULLY

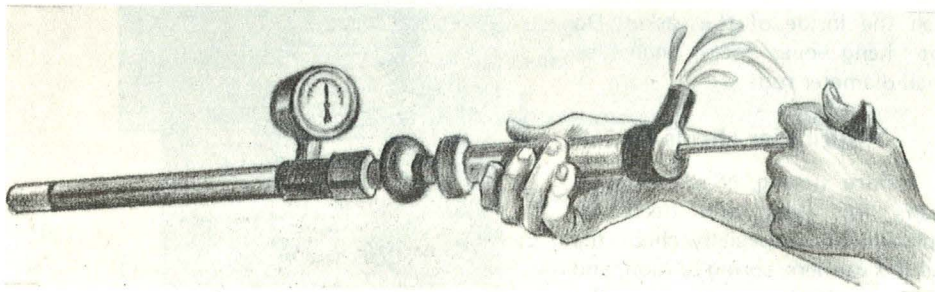


CHECK SPRINKLER NOZZLE

## Tensiometers

Tensiometers must be removed from the soil before they are damaged by freezing temperatures.

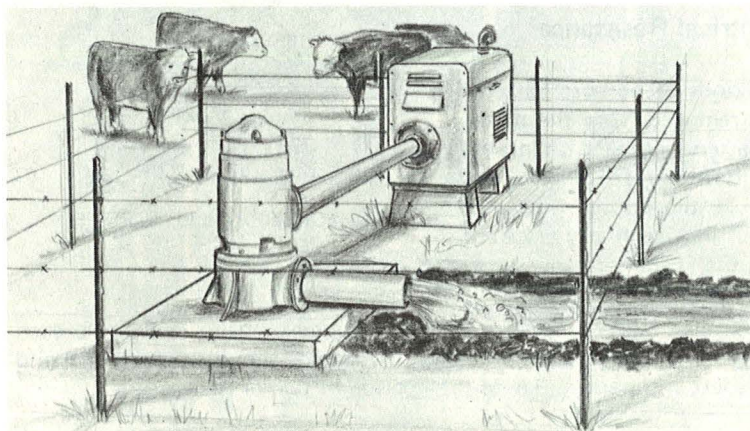
Before putting into dry storage, clean all surfaces thoroughly and remove all water. Scrub tips with a stiff brush and wash all plastic surfaces with soap and water and rinse. Evacuate water from the gauges with a vacuum pump or some other method. Replace caps loosely and store upright in a rack.



REMOVE ALL WATER FROM TUBES AND GAUGES BEFORE STORING

## PUMPING INSTALLATION USE IN FREEZING WEATHER

1. Protect electric motors against moisture from blowing snow. A shed is best for this purpose.
2. Use winter lubricant for electric motors, gear heads, and pumpline shafts.
3. Make sure pipe and fittings are self draining; or drain them immediately after shutdown.
4. Keep belts at proper tension for various temperatures.
5. If water circulates in gear head, make sure it is self draining.
6. Protect from livestock.



PROTECT EQUIPMENT FROM LIVESTOCK