

CARMEL FIRE DEPT.

**TELE
Squirt™**

**OPERATION, MAINTENANCE,
AND REPAIR PARTS
MANUAL**

SNORKEL FIRE EQUIPMENT COMPANY

Lake Avenue and Arizona

St. Joseph, Missouri

PRINTED IN U.S.A.

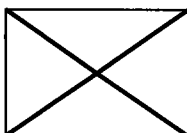
BUYER'S GUIDE

IMPORTANT: Spoken promises are difficult to enforce. Ask the dealer to put all promises in writing. Keep this form.

VEHICLE MAKE Dodge MODEL Sprinter YEAR 1975 VIN NUMBER F1180

DEALER STOCK NUMBER (Optional) 712

WARRANTIES FOR THIS VEHICLE:



AS IS-NO WARRANTY

YOU WILL PAY ALL COSTS FOR ANY REPAIRS. The dealer assumes no responsibility for any repairs regardless of any oral statements about the vehicle.



WARRANTY

FULL

LIMITED WARRANTY. The dealer will pay _____ % of the labor and _____ % of the parts to the covered systems that fail during the warranty period. Ask the dealer for a copy of the warranty document for a full explanation of warranty coverage, exclusions, and the dealer's repair obligations. Under state law, "implied warranties" may give you even more rights.

SYSTEMS COVERED:

DURATION:

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

SERVICE CONTRACT. A service contract is available at an extra charge on this vehicle. Ask for details as to coverage, deductible, price, and exclusions. If you buy a service contract within 90 days of the time of sale, state law "implied warranties" may give you additional rights.

PRE PURCHASE INSPECTION: ASK THE DEALER IF YOU MAY HAVE THIS VEHICLE INSPECTED BY YOUR MECHANIC EITHER ON OR OFF THE LOT.

SEE THE BACK OF THIS FORM for important additional information, including a list of some major defects that may occur in used motor vehicles.

Below is a list of some major defects that may occur in used motor vehicles.

Frame & Body

Frame cracks, corrective welds, or rusted through
Dogtracks - bent or twisted frame

Engine

Oil leakage, excluding normal seepage
Cracked block or head
Belts missing or inoperable
Knocks or misses related to camshaft lifters and push rods
Abnormal exhaust discharge

Transmission & Drive Shaft

Improper fluid level or leakage, excluding normal seepage
Cracked or damaged case which is visible
Abnormal noise or vibration caused by faulty transmission or drive shaft
Improper shifting or functioning in any gear
Manual clutch slips or chatters

Differential

Improper fluid level or leakage excluding normal seepage
Cracked or damaged housing which is visible
Abnormal noise or vibration caused by faulty differential

Cooling System

Leakage including radiator
Improperly functioning water pump

Electrical System

Battery leakage
Improperly functioning alternator, generator, battery, or starter

Fuel System

Visible leakage

Inoperable Accessories

Gauges or warning devices
Air conditioner
Heater & defroster

Brake System

Failure warning light broken
Pedal not firm under pressure (DOT specs.)
Not enough pedal reserve (DOT specs.)
Does not stop vehicle in straight line (DOT specs.)
Hoses damaged
Drum or rotor too thin (Mfgr. Specs)
Lining or pad thickness less than 1/32 inch
Power unit not operating or leaking
Structural or mechanical parts damaged

Steering System

Too much free play at steering wheel (DOT specs.)
Free play in linkage more than 1/4 inch
Steering gear binds or jams
Front wheels aligned improperly (DOT specs.)
Power unit belts cracked or slipping
Power unit fluid level improper

Suspension System

Ball joints damaged
Structural parts bent or damaged
Stabilizer bar disconnected
Spring broken
Shock absorber mounting loose
Rubber bushings damaged or missing
Radius rod damaged or missing
Shock absorber leaking or functioning improperly

Tires

Tread depth less than 2/32 inch
Sizes mismatched
Visible damage

Wheels

Visible cracks, damage or repairs

Exhaust System

Leakage

DEALER

ADDRESS

SEE FOR COMPLAINTS

Receipt of copy Acknowledged _____
(Transferee's Signature - Buyer)

IMPORTANT: The information on this form is part of any contract to buy this vehicle. Removal of this label before consumer purchase (except for purpose of test-driving) is a violation of federal law (16 C.F.R. 455).



Kruse International



732

Saturday

**1975 Crown Squirter
Firetruck**



Detroit Diesel engine. Allison transmission. Used in Carmel, CA. Was just certified in 2007 as service ready. Everything works. Restoration completed in 2007.

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Section III - Repair Parts

See Page 3-2. for List of Illustrations

Options:

See Page 3- for List of Illustrations

Section IV

Component Manufacturer's Data Appendix

Note: All communications concerning this equipment will be handled with the greatest efficiency and speed if the Serial Number - Model Number - and Date of purchase or delivery are given.

INTRODUCTION

Because the "Tele-Squrt" is a personnel-lifting aerial device, it is essential that it be properly operated and maintained throughout its useful life. It is the intent of this manual to guide "Tele-Squrt" operators and mechanics and all personnel associated with the unit in the proper operation and maintenance in order to reach these intended goals.

A copy of this manual should be kept in a weather-proof location with the unit so that it will be available for immediate ready use at all times. Every person who operates, maintains, inspects, tests, or repairs the unit, and every person supervising any of these functions should read and understand this entire manual and refer to it often.

THE ENTIRE MANUAL IS A SAFETY MANUAL.

Your "Tele-Squrt" unit has been designed to incorporate many advances in mechanical and hydraulic technology and has been built and assembled under the highest standards of material and workmanship. Therefore, the unit should not be modified in any way without the advice and written consent of Snorkel Fire Equipment Company Engineering Department.

Information contained in this manual concerns only current model "Tele-Squrt" units and the right is reserved to make changes at any time without obligation.

This manual consists of three major sections: Section I is OPERATOR'S SECTION and includes information relative Capabilities and Limitations, Operating Procedures, Emergency Operation and General Safety Precautions.

Section II is the MAINTENANCE SECTION and contains Field Inspection Check List, Lubrication Instructions, Hydraulic and Mechanical Maintenance and Adjustment Procedures and Recommendations for Periodical Inspections, Tests, and Maintenance. The procedures set forth here are minimum standards for safe and efficient performance.

Section III is the REPAIR PARTS SECTION and contains drawings of all major installations and sub-assemblies. Sub-assemblies and detailed parts are identified by index numbers on the drawings which correspond to the item numbers on the parts list. When requisitioning any part, always specify complete part number, description, and MODEL and SERIAL NUMBER of the "Tele-Squrt" unit. Reference is also made to these illustrations from time to time in the Maintenance Section.

MANUFACTURER'S DATA on purchased items are located in the appendix of the manual and should be referred to where necessary to supplement the information in the basic manual.

All correspondence relative to this unit, such as field reports, discrepancy reports, requests for service information, etc., should be directed to: Snorkel Fire Equipment Company, Lake & Arizona, St. Joseph, Missouri, 64504 -- Attention: Service Manager.

MANUFACTURER'S WARRANTY

We warrant each new "Tele-Squrt" fire fighting telescopic water tower and aerial ladder manufactured by us to be free from defects in material and workmanship under normal operation and service for one year after delivery to the customer. Our obligation under this warranty is limited to making good at our factory any parts, or part, of said "Tele-Squrt" (including all equipment or trade accessories, but excluding electric lamps, storage batteries and other devices subject to normal deterioration) which upon being returned to us with transportation charges prepaid and from our inspection and examination shall be found to our satisfaction to be defective, normal wear and deterioration excluded, provided that such parts, or part, shall be returned to us immediately after replacement.

This warranty shall not apply to any "Tele-Squrt" which has been modified or altered outside of our factory without our prior written approval in any way so as, in our judgment, to affect its stability or reliability, nor which has been subject to misuse, negligence or accident, nor to any "Tele-Squrt" manufactured by us which has been operated or loaded beyond the factory rated load capacity and speeds or shall not have been maintained and lubricated in accordance with factory recommendations in the operation and service manual and other published written information.

This warranty does not apply to normal maintenance service adjustments and replacements including, but not limited to, hydraulic fluid, hydraulic filters and other allied maintenance associated with the "Tele-Squrt" hydraulic system.

This warranty is expressly in lieu of all other warranties, obligations or liabilities on our part, either express or implied, and we neither assume nor authorize any other person to assume for us any other liability in connection with the sales of our "Tele-Squrt" fire fighting telescopic water tower and aerial ladder.

SNORKEL FIRE EQUIPMENT COMPANY
ST. JOSEPH, MISSOURI
U.S.A.

BOOM

Aluminum two (2) section hydraulically extendable telescopic boom. Each section welded from high strength aluminum alloy extrusions. Boom equipped with two (2) section ladder mounted on top with 1 5/16" diameter hand rail. Ladder rungs covered with corrugated rubber. Length - 26 ft. 0 in. pin to pin (closed)
Extension - 16 ft. 0 in.
Topping Travel - 90° above to -10° below horizontal.

CYLINDERS

*Topping - 4 1/2" dia. x 29" stroke - 2 1/4" rod
*Extension - 3 1/2" dia. x 96" stroke - 2 1/4" rod
Outrigger - 2 1/2" dia. x 26 1/2" stroke - 1 1/2" rod
Nozzle sweep - 1 1/2" dia. x 1 5/8" stroke - 3/4" rod

*Pilot holding valves provided on both boom and extension cylinders for control and safety.

PINS

Hollow tube, nickel plated construction to allow water flow through swivel joints and provide adequate bearing capacity and corrosion resistance.

HYDRAULIC SYSTEM

Primary System - Operation of Boom Elevation, Extension and Rotation:

1. Main hydraulic pump - driven from S.A.E. power take off.
2. Boom control valve - 3 spool open center type - 3000 PSI maximum pressure.
3. Outrigger control valve - two (2) spool open center with pressure beyond and relief valve set at 3000 PSI.

Secondary System - Nozzle Operation

1. Closed center - 4 way Solenoid operated valve, operating at 600 PSI maximum.

WATER SYSTEM

4 in. nominal water system from midship pump to TELE-SQURT nozzle. Water passages to nozzle are two (2) identical hard anodized aluminum telescopic (2 1/2" min. I.D.) pipes attached to boom. Pipes sealed at telescopic joint to prevent leakage. A 4 in. gate valve is furnished within pedestal at rear control station for flow adjustment and/or shut off.

Two (2) 2 1/2 in. inlet/outlets at rear panel can be used to supply TELE-SQURT from external source of water or as rear discharges when TELE-SQURT is not in use.

NOZZLE

Vertical Travel - 250°
Horizontal sweep - 90°
Flow capacity - 300 GPM to 1000 GPM (Automatic pressure adjustment 85 to 100 PSI).

NOZZLE (Continued)

Stream pattern - Variable from straight stream to full fog.

All the above functions are remotely, hydraulically controlled from rear control station.

OPERATING SPEED

Outriggers - Set	8-14 sec.
Retract	7-12 sec.
Boom Elevation - -10 to +90°	24-32 sec.
+90 to -10°	19-24 sec.
Boom Extension - Extend	25-33 sec.
Retract	30-38 sec.
Boom Rotation - CW or CCW	80-86 sec.

COMPONENT SPECIFICATIONS

Hydraulic Reservoir Capacity.....8 gallon

Total Capacity of Hydraulic System.....Approx. 15 gallon

Recommended Hydraulic Oil.....Mobil DTE-11 or DTE-13

Hydraulic Pump.....Racine PFG-A1A0-07FL or FR
Racine PFG-A1A0-09FL or FR

Hydraulic Rotation Motor.....Racine MAB-16 Torqmotor

Relief Valve.....One (1) Pilot Operated Integral
In Outrigger Valve Set at 3000 PSI

Oil Filters.....Suction: Pall Magnetic Strainer
HC-7000-140-H16-100
Mesh

Pressure Line: Pall HH9020A-12-UPSBSA
3 Micron Absolute

Element No.: Pall HC-9020F-UP8HA
SFEC P/N 508-9021

Boom and Rotation Control Valves.....Parker Model VDSP20 - 3 Spool
4 way Open Center w/Spring
Return to Neutral

Outrigger Valve.....Parker Model VDSP20 - 2 Spool
4 way Open Center w/Pressure
Beyond and Relief Valve

Monitor Control Valve.....Parker 4MD-OIE-C 4 way - 3
Position Spring Centered - Double
Solenoid - Closed Center Valve
Mounted on Parker Manifold
4MD-3M-400X0622 (3 Station)

Fluid Power Systems
51-11-11-11-12VDC-1GS
4 way - 3 Position Spring
Centered - Double Solenoid -
Closed Center Valve
(3 Station)

Monitor Elevation Motor.....Char-Lynn Model A5K

Regenerating Valve.....Racine: 989738
SFEC: 003-0411

Flow Regulator.....Fluid Controls Inc. Part No.
2FSXP1012-005 Flow Control-
Sequence-Reducer Package
(Refer Dwg. 601-1203 - Section III)

Turntable Gear Box.....Morse 40V-20 (Modified)
Single Reduction Worm Gear
Reducer

Nozzle.....Elkhart SM-100H

SECTION I

OPERATOR'S SECTION

The "Tele-Squrt" 50 is of the latest design, incorporating built-in safety features, and has been thoroughly factory tested. Only a minimum of training is required for a person of average skill to become proficient and safe in the operation of the equipment. At the same time, because it is a personnel lifting device, it is potentially dangerous in the hands of untrained or careless operators. Training should be thorough and carefully supervised; the initial phase should include a comprehensive study of the manual, the last phase should include practice under simulated conditions which might be encountered in actual work. After a while, operation of the controls will become second nature, resulting in smooth, accurate positioning. This will enable the operator to concentrate on the more important purposes of the water tower.

Observance of the few following RULES will help to assure maximum safety to personnel and help to prevent needless "down" time because of damaged equipment.

1. Only "Assigned Operators" should be permitted to operate the equipment.
2. "Assigned Operators" should undergo a thorough training period and a period of supervised practice in an open area before operating at scene of a fire or with maximum loads.
3. "Assigned Operators" should undergo a thorough training period of supervised practice throwing water, and with maximum rated loads under simulated conditions, prior to operating equipment at scene of fire.
4. "Assigned Operators" must be thoroughly familiar with operating instructions and equipment capabilities and limitations.
5. ALL SAFETY PRECAUTIONS must be strictly adhered to.
6. Repairs and adjustments should be made only by qualified, trained personnel.
7. No modification to equipment without prior written consent from SNORKEL engineers should be made.

CHARACTERISTICS AND LIMITATIONS

CAPACITY - WATER TOWER AND LADDER

It is important for the operator to have a clear understanding of the manufacturer's rated capacities of the "Tele-Squirt" boom and ladders under varying operation conditions. The following capacities are applicable when the unit is operated on firm, level ground with outriggers extended and properly set.

1. The unit, fully extended, tip unsupported, will support and resist the reaction of the nozzle in any normal position of operation, discharging up to 1000 GPM with the boom at any angle from 10° below horizontal up to 90° above horizontal without any men or load on the ladder.
2. At any angle between 45° - 75°, fully extended, tip unsupported, the unit may carry the reaction of the nozzle discharging up to 1000 GPM plus a tip load of 300 lbs. or a uniformly distributed load of 600 lbs. evenly distributed over the length of the ladder.
3. With the ladder only in use, between 0° - 45° (no water delivery) and tip unsupported, the boom may carry a tip load of 400 lbs. or a uniformly distributed load of 800 lbs. evenly distributed over the length of the ladder.
4. With the ladder only in use, between 45° - 75° (no water delivery) and tip unsupported, the boom may carry a tip load of 800 lbs. or a uniformly distributed load of 1600 lbs. evenly distributed over the length of the ladder.
5. At any angle above horizontal with tip supported, the boom and ladder may be used to carry any load not to exceed 1600 lbs. uniformly distributed over the length of the ladder.

DO NOT DIMINISH THE SAFETY FACTOR OF YOUR UNIT BY OVERLOADING!!!

STABILIZATION

It is ABSOLUTELY NECESSARY to set the outriggers properly before making any movement of the "Tele-Squirt" from the roading position to insure safe operation. The outriggers provide the necessary expanded chassis supporting base and when properly set, shifts the chassis spring supported weight to the outrigger pads.

Important factors when setting the outriggers:

1. If the truck is on a level hard surface, extend all outriggers to firm and positive contact with the ground. Outriggers should be alternately extended after contacting the ground to produce a raise of the rear step of 2 to 3 inches approximately.
2. If the truck is on a level soft surface, or surface that may become water soaked, bearing pads are required under each outrigger pad and the outriggers extended as outlined in number one above. The bearing pads are to be of sufficient size to keep the outriggers from penetrating the soft surface.
3. If the truck is on a slight side sloping surface, extend the outriggers on the low or down hill side first until the truck is approximately level. Then extend the high or up hill side outriggers to firm contact with the ground.
4. If the truck is on uneven terrain where one or more outriggers can not be extended far enough to give proper lift, place a suitable block under those outrigger pads.
5. When it is necessary to set an outrigger leg or legs on a curb, etc., take into account the shortened fulcrum point which reduces the "Tele-Squirt" stability. The reduced stability can be compensated for by any one or combination of the following.
 - a. 1. Where possible, limit the use of the "Tele-Squirt" to operation over the rear or front of the truck, not exceeding 45° either side of the centerline through the truck.

Where operation is necessary over the side with outrigger on curb:

- b. 1. Work with less than the maximum payload capacity.
(See capacity limitations, page 1-2)
2. Do not work with the booms in maximum reach position, i.e., keep the booms and ladder weights closer to the centerline of rotation. (See capacity limitations, page 1-2)

CAUTION

VISUALLY INSPECT ALL OUTRIGGERS FOR PROPER EXTENSION BEFORE RAISING BOOM.

CONTROLS AND FUNCTIONS

The primary operating control station is located in the semi-enclosed area at the rear of the pedestal mainframe. A one-hand control handle to control the positioning of the "Tele-Squirt" boom - two (2) levers for positioning the outrigger jacks - three (3) switches to control the individual functions of the nozzle and other electrical switches controlling panel lights - master switch - emergency hydraulic system, throttle, etc.

Placard indicates direction of handle movement for accomplishing the desired boom or rotation movement.

- | | |
|----------------------|--|
| Inner Boom Extension | - To extend, push handle to the right.
- To retract, push handle to the left. |
| Topping | - To raise, lift up on the control handle.
- To lower, push down on the control handle. |
| Rotation | - To rotate clockwise, rotate handle clockwise.
- To rotate counter-clockwise, rotate handle counter-clockwise. |

Control handle should be moved slowly and smoothly into a movement and out of a movement to avoid jerky and erratic boom movement, and to prevent "shock" loads to the unit and its hydraulic systems. A smooth operator is a good operator, and smooth operations by a good operator will add years to the life of the "Tele-Squirt".

The bottom two (2) levers, labelled "Left Jack" and "Right Jack" actuate the outrigger jack on both sides of the truck to stabilize the unit. Placard markings "Retracted" and "Extended" indicate the lever position for similar positioning of the outrigger jacks.

Nozzle:

The remote control nozzle is operated hydraulically through electric solenoid valves controlled by three (3) (momentary contact spring centered to off position) switches mounted on operator's control panel. Each switch controls an individual function with a placard indicating direction of movement.

Elevation: The nozzle can be elevated or lowered with this switch by pressing it in the direction the operator wishes to move the nozzle and holding it until the desired elevation is obtained.

Sweep: The nozzle can be moved right, or left (within 45° either side of the boom centerline) with this switch by pressing it in the direction the operator wishes to move the nozzle and holding it until the desired position is obtained.

Pattern: The nozzle is remotely adjustable to any position between full fog pattern and a straight stream. The operator can change the pattern by pressing the switch in the direction he wishes to change the pattern and holding it until the desired pattern is obtained.

CONTROLS AND FUNCTIONS
(Continued)

Secondary Operating Station is located at the upper end of ladder section and control only the nozzle functions in the same manner as described above.

COMMUNICATION SYSTEM (Optional)

The system consists of a transistorized, audio amplifier, two weatherproof speakers, and a microphone interconnected by cables through a relay box. The amplifier and relay box are not weatherproof and are usually located in a compartment.

The upper speaker, located at tip of upper ladder section (near Secondary Nozzle Control Station), serves as both a speaker and a microphone when the set is energized. The speaker picks up sound in the proximity of the nozzle which is then amplified and reproduced through the lower speaker, located at the ground station. The upper speaker circuit is always open, except when the microphone is depressed for transmitting to the upper control station. The amplifier is completely transistorized and is capable of instantaneous operation.

All operating controls, with the exception of the microphone "Push To Talk" switch, are located on the amplifier front panel. (Master Switch on "Ground" control panel must be energized.) The controls consist of power ON OFF switch marked AUX-POWER and a volume control marked MICROPHONE. Only the MICROPHONE volume control is used with the intercom, as the AUX-POWER should be set at a minimum level as auxiliary inputs are not used.

Refer Section IV for Specifications, Operation and Wiring Schematic of Amplifier.

Refer Section III (Dwg. C-003-0300 or C-003-0301) for overall wiring of complete communication system.

NOTE

The amplifier power switch may be left on at all times and the system be energized and de-energized through the master switch at the control panel.

OPERATING PROCEDURE

1. Position or spot truck to provide most efficient use of "Tele-Squirt" for rescue or water tower operation giving consideration to the following factors:
 - A. Type of terrain to provide maximum stability. Unit should be spotted on level solid ground where possible. If necessary to operate on sloping ground, try to head the unit either up or down the slope. If this is not possible, try to spot the unit so all work will be done from the high side.
 - B. Overhead obstructions which might limit the maneuverability of the boom.
 - C. Overhead electrical installations and/or wires which may be dangerous to operating personnel. Unit is not insulated.
 - D. Boom and ladder capacities as described on page 1-2.
2. Set truck hand brake and/or spring set emergency brake.
3. Engage power take off. (If unit is equipped with standard transmission, place gear shift in neutral position, depress clutch and engage power take off, release clutch slowly. If unit is equipped with an automatic transmission, place transmission shift lever in a forward gear and engage power take off, return transmission shift lever to neutral). Actuate electric throttle switch (if so equipped) to increase engine speed to predetermined RPM.
4. ALWAYS CHOCK WHEELS on both sides of truck.
5. Turn "master switch" to "on" to provide electric power to "Tele-Squirt" system, including nozzle and communication system.
6. Extend outrigger jacks as outlined under Stabilization on page 1-3.
Provide blocks and/or pads if necessary.
7. Operator may then operate boom controls. Elevate the boom approximately 15° clear of boom support. The boom may then be raised, extended or rotated in any sequence to position it into a work position dictated by the job and work area.

CAUTION

DO NOT RAISE OR ROTATE BOOM UNTIL OUTRIGGERS ARE SET PROPERLY, VISUALLY INSPECT ALL OUTRIGGERS FOR PROPER EXTENSION.

OPERATE BOOMS WHILE STANDING ON STEP ONLY.
(See Page 1-13 & 1-14)

CAUTION

ALL CONTROLS SHOULD BE MOVED SLOWLY AND SMOOTHLY INTO AND OUT OF MOVEMENTS TO AVOID JERKY AND ERRATIC OPERATION, AND TO PREVENT "SHOCK" LOADS TO THE "TELE-SQURT" AND ITS HYDRAULIC SYSTEM.

IF LADDER/BOOM MUST BE EXTENDED OR RETRACTED WITH OPERATOR ON LADDER, USE CAUTION TO AVOID INJURY TO OPERATOR'S FEET.

IF OPERATOR IS STANDING AT TOP OF LADDER OPERATING NOZZLE, ATTACH SAFETY BELT.

OPERATING WATER SYSTEM

If unit is equipped with midship pump or other water pump, proper pumping procedures must be followed.

Open proper valves, either pump valves or rear inlet valves to allow water into "Tele-Squrt" water system.

Note: On pumper units, a vernier throttle is generally provided at the rear control station to allow the "Tele-Squrt" operator to control engine speed and pump pressure. Proper boom operating speeds will be obtained anytime engine RPM is in excess of minimum speed shown on front page of this manual.

NOZZLE: Elkhart Model SM-100-H is automatically adjusted for any water flow between 250 GPM and 1000 GPM maintaining a pressure at the nozzle between 85 and 100 PSI. This automatic adjustment of pressure serves to provide an efficient working stream regardless of water supply conditions.

The use of the automatic nozzle removes the requirement for the "Tele-Squrt" operator to be continually monitoring his pressure gauge in order to maintain an efficient stream, thus allowing him to devote more time to the specific function of fire extinguishment. When more water is desired, the operator merely has to advance the engine throttle until the desired stream is reached or request the feed pumper to do the same. Generally speaking, a flow of 1000 gallons per minute can be produced from the tip with boom at maximum elevation with an inlet pressure of 160/165 PSI, or a flow of 250 GPM at 105/100 PSI. With the nozzle at ground level, a maximum flow of 1000 GPM can be produced at 140/145 PSI or a minimum flow of 250 GPM at 85/90 PSI.

USE CAUTION TO NOT EXCEED THE RECOMMENDED WORKING PRESSURE OF 200 PSI.

POST OPERATION

A. STOWING:

Boom should be lowered to a position so that the boom is raised slightly and fully retracted. Then rotated until the boom is aligned with the boom rest, and lower into the boom rest. The nozzle should be folded into the boom. Note that the boom will move more quickly at the end of its travel, (when near the saddle position) and it may be desirable to slow the drive engine to an idle with either the electric throttle or vernier throttle controls. Once boom is in the rest, apply a slight amount of down pressure to assure boom is properly nested.

B. DRAINING:

The "Tele-Squirt" is drained by a single drain valve at the lower end of the centerpost stand pipe. To drain the unit, open the drain valve with the handle located in the lower portion of operator's control panel. For unit to drain, it is necessary to have the butterfly valve open with the water supply shut off or disconnected. Depending on conditions, it may be desirable to drain the unit with the boom in a partially elevated position to assure complete drainage.

C. RETRACT OUTRIGGER JACKS.

D. TURN "MASTER SWITCH" TO "OFF" TO DE-ENERGIZE ELECTRICAL SYSTEM.

E. DISENGAGE POWER TAKE OFF.

CAUTION

MAKE SURE POWER TAKE OFF IS DISENGAGED BEFORE ROADING VEHICLE TO PREVENT DAMAGING HYDRAULIC PUMP BY OVER SPEEDING.

EMERGENCY OPERATION

The boom can be repositioned and lowered to the stowed position in case of engine failure or loss of hydraulic pressure for any reason. An emergency electrically driven hydraulic pump, which will operate the unit at reduced speed is provided, or the unit can be manually rotated and boom bled down.

A. If a power failure occurs - (Engine failure)
The emergency hydraulic system consisting of a 12 volt D.C. electric motor operated hydraulic pump will operate all of the "Tele-Squirt" functions at reduced speeds. Electric power is derived from the truck batteries and turned "on" and "off" at the operator's control panel. Operation using the emergency pump should be limited to twenty (20) minutes to prevent overheating of 12 volt motor.

B. If 12 volt hydraulic system fails to operate due to weak truck batteries or any other reason, the unit can be manually rotated by opening the by-pass valve located on the left side of the "Tele-Squirt" mainframe pedestal, and cranking the rotation mechanism by using manual rotation crank provided.

Rotate boom into a safe position free from any obstructions and preferably where boom can be lowered to road travel position.

C. Boom Extension System is equipped with regenerative/holding valve - located at base of base boom. Opening of this valve will allow boom to retract by gravity (or be retracted) when ground station control valve is moved to retract position.

Note: If unit is elevated at time of total hydraulic failure, retraction should be accomplished to lowering to road travel position to take advantage of boom weight for gravity retraction.

D. Boom can be bled down by releasing the holding valve on boom topping cylinder.

Topping cylinder holding valve is equipped with a manual override and may be bled down without altering the setting of the valve.

To release holding valve, loosen jam nut and turn the manual override screw in until the boom will lower then the topping control valve is actuated. After boom has been lowered to a safe position or into the boom support saddle, turn the manual override screw out as far as possible - lock jam nut.

GENERAL SAFETY PRECAUTIONS

This section is designed to augment safety practices already established by the department and to provide a minimum standard to be followed, especially for the "Tele-Squrt". All personnel assigned to work on or around the "Tele-Squrt" should become thoroughly familiar with this and any other portions of the manual which concern the safety of operation. Review this section often - it affects your personal safety.

1. ROADING THE VEHICLE

- a. Make sure booms are properly stowed in boom support and outriggers are retracted in stowed position.
- b. Keep in mind overall height and overhang beyond front bumper. Always make sure there is sufficient clearance before entering any underpass or moving under any overhead obstructions.
- c. Make sure power take off is disengaged.
- d. Fasten seat belts.

2. GENERAL OPERATING PRECAUTIONS

- a. Do Not position "Tele-Squrt" at job site in such a manner as to jeopardize its stability.
- b. Set truck hand brake and/or spring set emergency brake.
- c. Always chock wheels on both sides of truck.
- d. Set outriggers, check visually.
- e. Use extreme caution when operating in the vicinity of electric wires. Avoid contact with any object where a dangerous electrical potential may exist. Keep ground personnel clear of apparatus when danger of contact with wires is possible. (See page 1-13 and 1-14).
- f. Operate boom controls while standing on rear step only.
- g. Operate controls smoothly - avoid shock loads.
- h. If any equipment trouble is experienced during operation, shut down unit until trouble is located and corrected.
- i. Avoid horseplay.

3. PRECAUTIONS FOR WORKING ALOFT

- a. No unauthorized or unqualified person should be allowed to operate any part of the "Tele-Squrt".
- b. Always look in the direction you are moving the boom or nozzle.
- c. Never exceed the maximum rated load.

- d. Use caution to avoid injury to operator's feet if ladder/boom must be extended or retracted with man on ladder.
 - e. Use safety belt when standing at top of ladder operating nozzle.
4. IN CASE OF PRESSURE BREAK IN HYDRAULIC LINES - Keep clear of break; shut down unit as soon as any leak is detected.

IF A SAFETY PROBLEM IS ENCOUNTERED WHICH IS NOT COVERED IN THIS MANUAL, YOU ARE URGED TO CONSULT THE FACTORY FOR ADVICE AND RECOMMENDATIONS.

CAUTION

ELECTRICAL HAZARD.

An important factor for safe operation of the "Tele-Squrt" in an area of overhead energized conductors is for the operator and persons about the apparatus to understand the potential of electricity and how it can cause injury.

Electricity in an overhead wire of almost any voltage (many exposed wires accessible to the "Tele-Squrt" may carry as high as 33000 volts) can cause personal injury or even death. While the amount of voltage present does play an important part, it is actually the amount of current (amps) passing through the body which determines the amount of injury to a person. It is the voltage present which acts as the driving force in pushing the current through a body. An example of this is an automobile storage battery with high amperage available but not sufficient voltage to push it through a person. This will not cause injury nor will a very high voltage charge with little or no amps available. Most all overhead wire, however, have both the voltage and amperage sufficient to be extremely dangerous.

Below is a list of currents in amperes and mili-amperes with their apparent affect to the human body.

.4 mili-amps	.0004 amps	Tap
1.0 mili-amps	.001 amps	Tingling sensation
6.0 mili-amps	.006 amps	Safe let go (women)
9.0 mili-amps	.009 amps	Safe let go (men)
18.0 mili-amps	.018 amps	Paralysis begins
30-35.0 mili-amps	.035 amps	Nerve tissue damage
80.0 mili-amps	.080 amps	Sure death

The "Tele-Squrt" is constructed of aluminum and other conducting materials and at any time that the ladder or boom is brought into contact with overhead energized wires, the entire apparatus including the chassis and body becomes "Live", that is, assume the same voltage potential as the wire. Any person or persons in contact with the ground who touch the apparatus while it is "Live", are in effect touching the overhead wire and their body becomes a path from the wire to ground for current passage.

It is, therefore, a good suggestion that any time the booms of the "Tele-Squrt" are elevated where there is a possibility of contact with wires, all person on the ground avoid contacting the apparatus unless they are absolutely sure of clearance from the wires.

As a general rule, persons on the apparatus, either on the rear step or on the ladder, will not be affected by the boom coming in contact with the energized wire, so long as they do not touch the wire itself before the unit does or try to step from the unit after the unit is in contact with the wires. The reason why these persons on the unit are not injured is that they are brought to the same potential or voltage as the

conductor, but do not form a path to ground and no current passes through them. This is the same situation as a small bird that can light and rest on an overhead wire with no danger. He is at the same voltage as the wire but the current cannot pass through him to ground, and, therefore, does not injure him.

It should be noted that while this is a general rule, variations in specific conditions could result in changes which might cause personal injury.

With the above in mind, if primary control station operator or others on the apparatus must get off after the unit has become "Live" (in contact with a wire), they should jump so they will not be in contact with both the "Tele-Squrt" and the ground at the same time.

Actually, anytime the "Tele-Squrt" boom is elevated near overhead conductors, it is a good safety practice to not step on or off the apparatus but jump so that no path to ground is created.

It should, therefore, be a specific duty of the "Tele-Squrt" operator or safety operator, to be always aware of overhead wire and possible contact with them. He should also be ready to warn others on the ground of the danger and advise them to stay away from the apparatus unless their specific duties so require.

At the scene of major fires, the local power company most times will disconnect current in and around the scene of the fire. However, even if a person is positive of a wire being "dead", he should still treat it as "live" and give it a wide berth. He should never knowingly contact any wire, even if he is sure that it is dead. Play it safe.

The outriggers of the "Tele-Squrt" do not form a path to ground for the electricity, and thus, protect any individual touching the apparatus. Actually, because of contact of the outrigger shoes on concrete, asphalt, or rocky soil, they are not a good conductor for high voltage electricity and current. While they may carry as much as 95% of the current available to ground, the remaining current would go through the person and may very well cause death. A current of only 80 mili-amps, or .08 amps (as shown above) is sufficient to cause death. In peculiar situations where the outriggers may be resting on very damp terrain, or even sitting in a puddle of water, there is a slight possibility that they could protect against personal injury. However, it should be noted that this would be a rather freak situation and should never be relied upon.

Since grounding rods driven into the soil are not practical nor foolproof, we feel the only way to treat a raised "Tele-Squrt" is with the utmost caution.

In conclusion, the best protection for firemen on and about the "Tele-Squrt" is education as to what can happen and why it happens plus the maximum of precaution when wires are present.

OPERATOR'S MAINTENANCE

The purpose of the Operator's Maintenance is to keep the equipment in readiness during "in service" and "standby" conditions and to detect any signs of equipment malfunctions during normal operations and scheduled maintenance checks.

DAILY

Visually inspect the "Tele-Squrt" for any signs of hydraulic leaks and for obvious external damage to structure - especially if accidental collision has occurred during operation or road travel. Check fluid level in hydraulic oil reservoir. If oil is low, fill to proper level. This operation should be accomplished with all operating cylinders in retracted position. (See Lube Chart, Page 2 - 2 for type oil.)

If the unit includes an auxiliary power pack, keep the tank of the engine filled. Fuel level and crankcase oil level should be checked periodically during extended periods of operation.

WEEKLY

Perform an operational test of the "Tele-Squrt" to complete at least two entire cycles of all functions. Refer to the Operating Speeds portion of this section. Check actual operation against these speeds - this will help you in determining if your engine speed is set to operate at the right speed. If your unit has an Electric Throttle you can determine if it has been set properly or is in need of adjustment. Check to see if the boom maintains position without power with the boom in elevated position. If abnormal operation is observed or a malfunction detected, report the condition at once. Trouble shooting and procedures for making adjustments are located in the Maintenance Section.

LUBRICATION

Proper lubrication is the most important factor in assuring long service life from your equipment. With the exception of checking the hydraulic fluid level, lubrication is a weekly requirement in most instances. Complete lubrication instructions are provided at the beginning of the Maintenance Section.

Proper care of the hydraulic system should go hand in hand with the physical cleanliness and orderly condition of the apparatus. While it is not the operator's normal responsibility to perform mechanical maintenance, they should be aware of what causes a hydraulic circuit to operate and what should be done to care for it properly. Many more costly maintenance jobs can be prevented by the observation of the following by the "Tele-Squrt" operators.

1. Maintain hydraulic fluid at proper level in the hydraulic oil reservoir. If the machine is continuously operated low on hydraulic fluid, the system can become filled with entrapped air (bubbles) which can result in cavitation of the hydraulic pump with accelerated and abnormal pump wear. This can also cause erratic motion of the unit and noisy operation of the hydraulic pump. Oil level in the reservoir should be maintained to proper level on dip stick with all hydraulic cylinders retracted in the normal road travel position.
2. Maintain hydraulic fluid in system clean and free of contamination. Keep reservoir filter vent cover in place and clean. Anytime fluid must be added to system, use only new, clean oil.
3. Know the unit and its capability. Report any unusual operation. Unusual operating characteristics may be exhibited in any of the following:
 - (a) Erratic motion of boom while being operated.
 - (b) Excessive and unusual noise during operation.
 - (c) Slow operation.
 - (d) Faster than normal operation.
4. Inspect hydraulic components regularly for sign of external leak or damage. Report any new or excessive leaks.
5. Over center holding valve on boom cylinder should be regularly checked to support the boom without hydraulic power and with appropriate valve operating in DOWN position. This is to prevent boom dropping in case of loss of pressure and to prevent unit from creeping down from an elevated position.

SECTION II

MAINTENANCE

This section contains a field inspection check list, general lubrication instructions, trouble shooting procedures, operational adjustments, and special instructions, when required, for disassembly and reassembly of components.

Maintenance can generally be broken down into two (2) general categories: preventive and repair maintenance. Preventive maintenance can be further broken down into "preventive inspection maintenance" and "preventive mechanical maintenance".

Preventive "inspection" maintenance is generally the responsibility of the crew who operate and care for the "Tele-Squrt" while in service. This maintenance is described under "Field Inspection Check List," pages 2-1 and 2-2, as well as under "Operator's Maintenance," pages 1-15 and 1-16, Section I.

Preventive "mechanical" maintenance is the responsibility of the master mechanic or person or persons designated to perform such duties. Costly repairs and replacements can many times be saved by regular preventive mechanical maintenance program. Many of the suggestions for preventive maintenance may sound time consuming and expensive. This is, however, not the case, as they are tried and proven ways of protecting your "Tele-Squrt" and its hydraulic systems and if followed will result in a savings of down time on the unit and many more costly repairs.

"Repair maintenance" covers general repair work required to fix or repair broken or malfunctioning item on the unit.

Defective components or equipment malfunctions jeopardize the safety of the crew and can cause extensive damage to the unit. Remember, a poorly maintained unit could become the greatest operational hazard you may encounter.

FIELD INSPECTION CHECK LIST

This field inspection check list provides for a systematic inspection of the equipment to detect any defective, damaged or improperly secured parts. This inspection should be conducted at least every six months or more often if subjected to extensive use within short period of time. The list pinpoints the items to be inspected and the conditions to be checked. These items can be located by referring to the appropriate drawing in the repair parts section.

1. Mainframe

- A. Check mainframe for visible damage such as weld cracks, dents or bends.
- B. Visually check pins holding outrigger cylinders and shoes for proper installation.
- C. Check bolts securing rotation mechanism for tightness.
- D. Check bolts holding rotation gear to mainframe for tightness. If loose, check torque rating before tightening.
- E. Check mainframe tie down bolts for tightness. (shear plates)
- F. Check outrigger valves for free working spools and any oil leaks.
- G. Check all hydraulic fittings for leaks and tightness.
- H. Check centerpost manifold for hydraulic leaks and make sure securing bolts are tight.

2. Turntable

- A. Check turntable for visible damage such as weld cracks, dents or bends.
- B. Check bolts holding rotation gear to turntable for tightness. If loose, check torque rating before tightening.
- C. Check hydraulic hoses for leaks, cuts, abrasions, etc.
- D. Check centerpost for hydraulic leaks.
- E. Check water pipe victaulic couplings for tightness.
- F. Check pins securing lower cylinders and securing bolts for proper installation and tightness.

3. Booms

- A. Check booms for visible damage such as weld cracks, dents or bends.
- B. Check all boom pivot pins for proper installation and fasteners for tightness.
- C. Check pin securing lower cylinder and securing nuts for proper installation and tightness.
- D. Check all hydraulic hoses and connections for leaks.
- E. Check water pipe victualic couplings for tightness.

4. Monitor and Monitor Controls

- A. Check entire monitor area for hydraulic leaks.
- B. Check elevation roller chain for wear and proper tightness.
- C. Check sweep cables for wear and proper tightness.
CAUTION - DO NOT OVER TIGHTEN.

PREVENTIVE MECHANICAL MAINTENANCE

GENERAL LUBRICATION INSTRUCTIONS

The illustration locates the lubrication points on the unit:

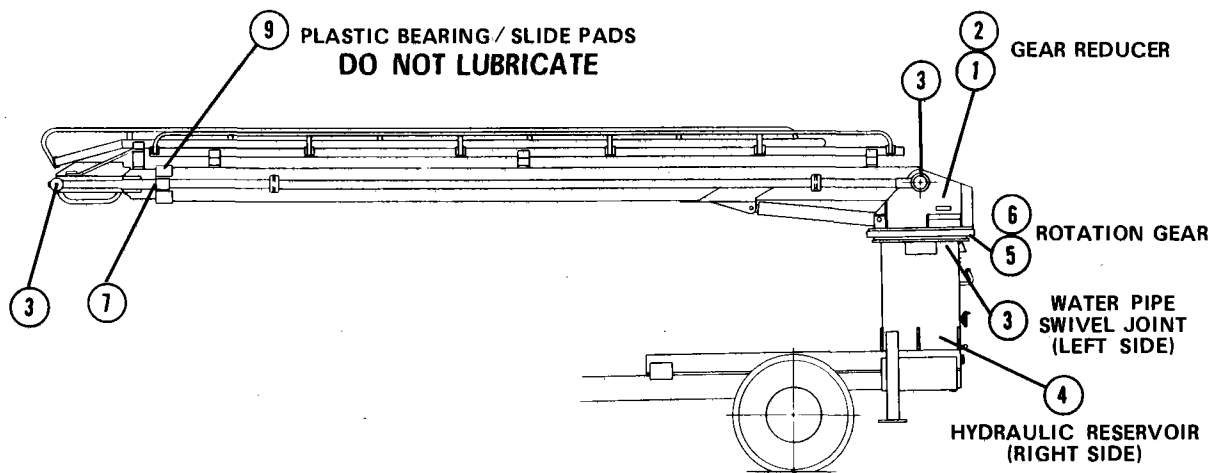
1. Gear reduction unit (one fitting)
2. Gear reduction unit (check oil level - both upper and lower section)
3. Water pivot joints
4. Hydraulic oil reservoir
5. Rotation bearing (one fitting)
6. Rotation gear teeth and pinion
7. Telescoping water pipes
8. Minor hinge or bearing points
9. Plastic bearing/slide pads (DO NOT LUBRICATE)
10. Pivot pins

Pressure Gun Application:

Service all fittings as indicated in the lubrication instructions and wipe away all excess lubricant from exposed surfaces. Lubrication of accessory equipment should be in accordance with the manufacturer's recommendations.

Engine - Auxiliary Power Package - etc.:

Detailed lubrication instructions contained in appropriate manufacturer's literature.



(3) Water Pivot Joints

These joints form a hinge pin through which there is a water passage at both ends of the telescopic boom. They are sealed with "O" rings lubricated at the factory and equipped with bearings and should require no further lubrication unless disassembled. If disassembled, before installing pins, they should be lightly lubricated with Dow Corning Moly Kote "G" Paste and wiped dry on the joint at either end of turntable. Pack with Dow Corning silicone based grease number 33 or 111.

The swivel joint located inside the mainframe pedestal (to allow turning of the turntable) is lubricated through a grease fitting located on right side of mainframe pedestal. This joint should be lubricated monthly or every 40 hours operating time, whichever occurs first, with a good grade of chassis lubrication.

(5) Rotation Bearing

Lubricate bearing through fitting located on bottom side of gear monthly or every 40 hours operating time. Above 32° F. use number 2 grade, extreme pressure grease. (Example: Mobilplex EP #2) Below 32° F. use number 1 grade. Rotate while greasing.

- (6) Gear teeth and pinion are greased at the factory with OGG #5 gear grease and should need no further lubrication unless unit is disassembled.

(7) Telescoping Water Pipes

The seals on the telescoping water pipes will require lubrication in addition to what is used for initial assembly.

Lubricate these seals by extending the boom to maximum reach and applying a light coat of motor oil or hydraulic oil to the inner pipes. This should be done once or twice a month.

(8) Minor Hinge or Bearing Points

(Such as outrigger valve linkage) Should be lightly lubricated periodically with SAE 10W motor oil, unless equipment is operating in extremely dusty or sandy environment, in which case the components should remain dry.

(9) Plastic Bearing/Slide Pads

DO NOT LUBRICATE.

Keep area where slide pads travel as clean as possible.

PREVENTIVE MECHANICAL MAINTENANCE

1. Truck Engine - Auxiliary Power Package - Etc.:

For any information concerning the procedure in operating, maintaining or adjustments on the components not described in this manual, refer to detailed instructions contained in appropriate manufacturer's literature.

2. Hydraulic System Components:

The "Tele-Squrt" is a hydraulically operated machine designed for fighting fires and effecting rescues. Since all operations of the unit are performed hydraulically, the hydraulic system is a most important part of the overall unit, and due importance should be given to its care.

Proper care of the "Tele-Squrt" hydraulic oil system during the first hours of operation can and will greatly improve the life of system components.

The initial start up of a hydraulic system and the period through the first 75 to 100 hours of service is probably the most critical, so far as contamination is concerned. It is during this period that any contamination remaining in valves, cylinders, steel tubing, hose and other components can break loose from its trapped location and pass into the flow stream of the fluid. It is most important these particles are prevented from continuing their journey about the system until they damage some closely machined and fitted hydraulic component such as the hydraulic pump. Keep reservoir filter vent cover in place and clean. Any time fluid must be added to system, use only new, clean oil. Maintain filters and reservoir on a periodic schedule as outlined below.

A. Hydraulic Reservoir: Located on the right side of mainframe pedestal.

Fluid level in the reservoir should be maintained between the full marks on the dipstick with the boom fully retracted in stowed position and all outriggers fully retracted to road travel position.

Hydraulic oil in the reservoir (approximately 8 gallon) should be drained and replaced with new oil once a year or every 500 hours service, whichever occurs first. The interior of the reservoir should also be cleaned each time the hydraulic oil is changed, and the vented cap should be washed in a cleaning solvent and blown out with air.

It is absolutely necessary that the new hydraulic oil is clean.

B. Filters;

The Importance of Hydraulic Filters:

Every hydraulic system is contaminated, and that's because in every component - i.e., motor, valve, pump, pipe, etc. - particles of dirt are present before the system is even put together; and still more particles of dirt are generated in the process of assembly.

Contamination is further generated by abrasive and cavitational wear as the system operates. It is also sucked into the system from surrounding air, through reservoir breathers, and through cylinder rod seals.

More contamination is added when a component fails, or when components (such as tube and hose fittings) are opened for routine maintenance, or even when new and supposedly clean hydraulic fluid is added to the system.

Contaminants cause failures, and there are actually two types of failures which apply to components in a fluid system: catastrophic and degradation.

A catastrophic failure occurs when the component suddenly fails to function - as with the jamming open of a check or relief valve, the binding or jamming of a pump or motor.

A degradation failure is a function of time, and it occurs when the performance of a component is impaired to an extent that it must be replaced - as with an increase in pump internal leakage.

It is the ultrafine particles - invisible to the unaided eye - entrapped in fluid systems, that are the primary cause of wear. These particles abrade and erode moving surfaces, increasing leakage and causing further contamination, whereas larger particles essentially cause catastrophic failure.

It is the ultrafine particles which are the primary cause of wear, and wear costs you money in down time, equipment failure, maintenance costs and the expense of replacing worn components.

How Small is a Micron?

1 Micron = Meter/1,000,000

Resolving power of the unaided human eye is approximately 40 microns, or 0.0016

Diameter of average human hair = 75 microns.

Diameter of red corpuscle of human blood = 7.5 microns.

Particles in the ultrafine 1 to 5 micron range have been proven most harmful in causing wear and generating new contaminants as they work their way into the moving clearances and act as a lapping compound to grind away at the surfaces.

1. A suction line filter (100 mesh magnetic strainer) is located inside the tank, filtering the pump suction flow. This strainer is cleanable and should be cleaned on the same periodic schedule as described under reservoir above, carefully cleaning screen.
2. A pressure line filter is located inside mainframe on lower right side behind operator's control panel and is also accessible from beneath chassis frame without removal of control panel. This is a full flow type filter with a disposable element (3 micron absolute rating). The filter has an overload by-pass valve by-passing fluid should the element become clogged. Also, a red tattler light is provided on the operator's panel to indicate that the element is clogged and requires attention. The light will remain lit while the hydraulic system is in operation and the element is in need of change. This indicator light is of the "press to test" type and should be checked daily or whenever unit is operated to insure it is functional.

This filter element should be changed any time the light is lit during operation. When changing the filter element, the old element and the inside of the filter can should be examined for excessive deposits of metal cuttings which, if present, could indicate excessive wear in some of the system components.

C. Hydraulic Fluid:

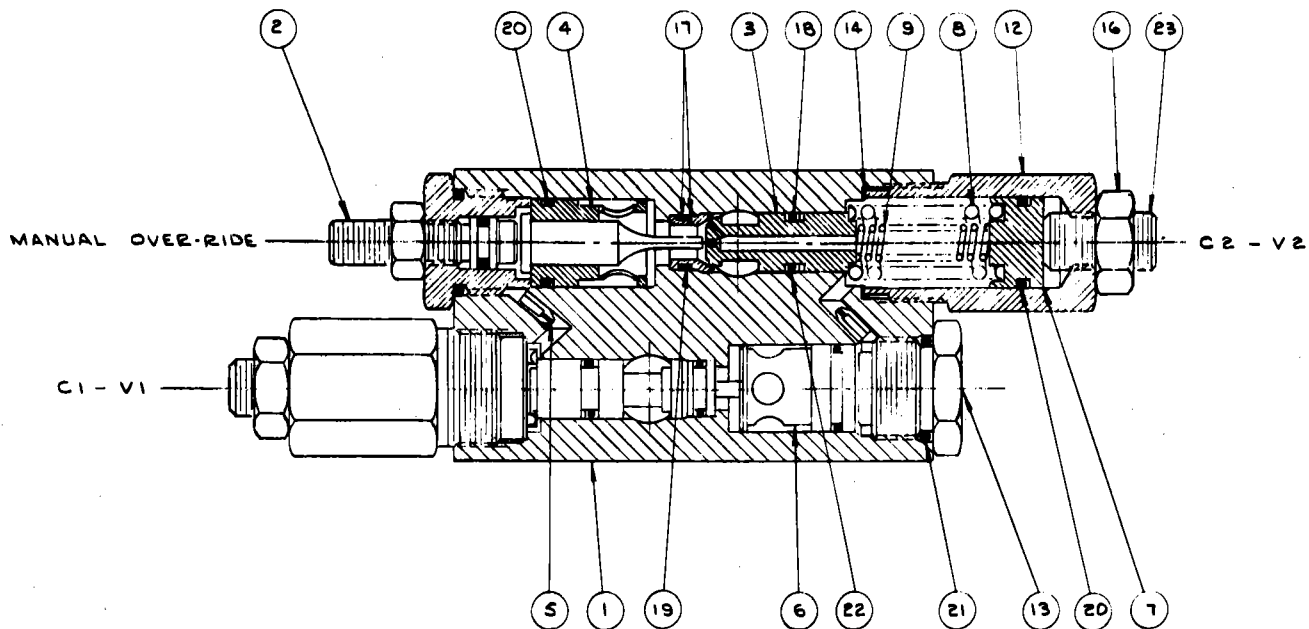
The recommended fluids for this system are Mobil DTE-11 or DTE-13.

These fluids were selected for use in the "Tele-Squrt" hydraulic system because of their good lubricating qualities in high pressure systems. A substitute should not be used without approval from Snorkel Fire Equipment Company's Engineering Department.

Both of these fluids are classified as all weather oils for general summer and winter usage. DTE-13 is used for factory fill. DTE-11 is recommended in the event continued operation and/or start up is contemplated below 10° F.

D. Pilot Operated Holding Valve:

Your unit is equipped with dual over center holding valves on elevating cylinder to provide a positive lock and prevent any boom movement due to loss of hydraulic pressure from engine failure or line breakage.



The holding valve is equipped with a manual release screw. This enables you to bleed the boom down without altering the adjustment of the holding valve.

1. To bleed down the boom, loosen jam nut or manual release screw. Using Allen wrench, screw protruding stem FULL IN. The holding feature of the valve is now overridden.
2. When the boom has been bled down, turn adjusting screw FULL OUT and tighten jam nut, thus returning holding valve to operational condition without altering setting.

The holding valves are adjusted at the factory and should not, barring malfunction, require any further adjustment.

Should it become necessary to adjust one of these valves, you must remove from unit and take to a hydraulic test bench where a steady gauged pressure can be applied.

The dual over center valve is two separate valves in one body so both sections must be checked.

Section I (C₁) Rod End

1. Connect the pressure line from the bench to the cylinder side of the valve.

2. Apply pressure until holding valve just starts to pass fluid out of corresponding valve port. (This is the cracking pressure.)
3. Adjust section to crack at 1900 to 2100 PSI.

Section II (C₂) Base End

1. Repeat Operation 1 above.
2. Repeat Operation 2 above.
3. Adjust section to crack at 3900 to 4100 PSI.

Refer to Drawing 601-0025 in Parts Section 3 for internal construction and hydraulic function of this valve.

E. Regenerative - Holding Valve

A combination holding valve and regeneration valve is provided on the boom extension cylinder, controlling safety of boom extension operation as well as increasing extension speed.

The single holding valve section is adjusted at the factory and should not, barring malfunction, require any further adjustment.

Should it become necessary to adjust this valve, you must remove entire package from unit and take to a hydraulic test bench where a steady gauged pressure can be applied.

1. Connect the pressure line from the bench to the cylinder side of valve (C₁).
2. Apply pressure until holding valve just starts to pass fluid out of corresponding valve port (V₂). (This is the cracking pressure.)
3. Adjust section to crack at 2200 to 2500 PSI.

This valve is also equipped with a thermal relief valve section factory set to a cracking pressure of 2200 PSI and should require no further adjustment.

Refer to Drawing 003-0411 in Parts Section 3 for internal construction and hydraulic functions of this valve.

F. Lock Valves - Outriggers

Pilot operated check valves are provided on each of the outriggers only to prevent retraction of legs until hydraulic pressure is applied. There is no adjustment of these valves. Any malfunction will require repair or replacement.

HYDRAULIC SYSTEM
Operating Pressures And Adjustments

A. Primary System - Boom Controls

1. The primary system pressure is limited by an integral pressure relief valve in the outrigger control valve.

To adjust valve, attach a 5000 PSI test gauge on test port provided on outrigger valve inlet. Place the hydraulic system in operation. Bring engine up to minimum operating speed. Lift one of the outrigger handles, and hold valve open with outrigger completely retracted; adjust the relief valve to maintain a pressure of 3000 PSI.

Note: A gauge kit 002-0432, should be ordered from factory for making this adjustment. This relief valve is set at the factory and should require no further adjustment unless a valve is repaired or replaced.

2. Rotation: Cushion Valve

The turntable rotation circuit has a cushion valve. This valve functions primarily the same as a holding valve, except that it also functions as a cross-over relief valve, thereby limiting the circuit to the relief setting of this valve, instead of the system relief pressure of 3000 PSI. The cracking pressure on this valve is 2500 PSI. This valve is pre-set at the factory and should not, barring malfunction, require any further adjustment.

3. Outriggers: Pilot Operated Check Valves

Pilot operated check valves are provided on each outrigger cylinder to prevent retraction of legs until hydraulic power is applied. There is no adjustment required for these valves. Any malfunction will require replacement.

B. Secondary System - Nozzle Control

The secondary system pressure is controlled by a pressure control valve assembly located inside the mainframe on the left side. This valve consists of a flow control valve, a sequence valve, and a pressure reducing valve.

1. Flow regulator maintains a flow of 4 GPM to the primary circuit when the pump output is between 4 and 19 GPM.
2. Sequence valve maintains 500 PSI back pressure on all systems connected between the pump and the sequence valve when the system pressure is below 500 PSI.
3. Pressure reducing valve maintains the pressure on the secondary circuit at 600 PSI maximum when the pressure on the primary circuit is above 600 PSI.

Adjustment Procedure: Pressure Control Valve Assembly

1. Install 0-5000 PSI gauge in test port at outrigger control valve, 0-1000 PSI gauge in test port at pressure control valve.

Adjustment Procedure: (Continued)

2. Place hydraulic system in operation at minimum specified operating speed (see front of this manual); boom in road travel position.
3. Retract boom full in and hold until system pressure reads in excess of 2000 PSI - hold this pressure, adjust pressure reducing (PR) valve to maintain 600 ± 20 PSI on 0-1000 PSI gauge.
4. Place all controls in neutral, adjust sequence valve (SQ) to maintain $500 \pm \begin{matrix} 20 \\ 0 \end{matrix}$ PSI on 0-1000 PSI gauge.
5. Adjust flow control (FC) valve to obtain one (1) revolution of turntable in 80 seconds.

Refer Hydraulic Schematic, Page 2 - , for exact location of test ports.

The sequence valve of this assembly has a small orifice, which if clogged, will result in a loss of the secondary system pressure. Should this orifice become clogged, it can be cleaned by removing the sequence valve cartridge (refer to Hydraulic Schematic and Dwg. 601-1203) from the assembly and blowing it out with air. Follow adjustment procedure above after replacing cartridge in body.

C. Operating Temperature

The operating temperature of the system should not exceed 80° F. above the ambient outside temperature. (Example: With the machine operating on a day when the outside temperature is 100° F., the fluid in the system should not exceed 180° F.)

If it is suspected that the temperature of the system is high, it may be checked by inserting a thermometer into the fluid in the reservoir. High temperature could be caused by a badley worn pump, or one of the pressure control valves improperly adjusted.

Hydraulic Pump Speed Setting:

The unit is equipped with a power take-off and pump arrangement to supply hydraulic pressure to the respective cylinders, motors, and functions of the unit. See the front of this manual for the specific P.T.O. and pump used on your unit.

The minimum engine speed required for normal "Tele-Squirt" operation is determined at the factory. This minimum speed is noted in the front of this manual and on the P.T.O. shift placard located on the truck dash.

Engine speed is controllable from the ground control operator's station by a vernier throttle control to facilitate controlling pump pressure during water delivery operation. Excessive oil flow from engine speeds above minimum is controlled within the pressure control valve, preventing overspeeding of respective movements.

A variable speed governor must be supplied on some diesel units to control truck engine speed during periods when the hydraulic system is in use without water pump in operation. A control switch mounted in cab and at the ground control station controls the governor operation through an electric solenoid air valve operating a cylinder attached to the governor.

On Detroit Diesels this cylinder actuates a plunger inside the governor controlling the high idle speed of the engine. Adjustment is accomplished by removing cylinder mount and placing shims over plunger shaft. High idle RPM is reduced at the rate of 25 RPM for each .010 shim added.

This solenoid air valve is also equipped with a manual override in order to engage governor control in case of electrical failure. Refer Section III, Page 3 - Electric Governor Control.

NOISE DURING OPERATION

If the "Tele-Squrt" emits excessive noise with accompanying jerky movements, the cause may be cavitation in the pump, which is traceable to a low hydraulic fluid supply or a loose fitting in the suction line to pump, causing it to draw air. The remedial actions for low fluid supply and loose fittings in suction line are obviously simple; therefore, these possible causes should be the first things checked when cavitation is suspected.

REPAIR MAINTENANCE

This part of the maintenance section is devoted to the more extensive problems which occur less frequently than others and usually after the unit has been in service for a considerable length of time.

MECHANICAL ADJUSTMENTS

Pinion and Rotation Gear Adjustments:

Erratic turntable operation may be traced to excessive looseness in the gear box or backlash between the pinion and rotation gear. Necessary adjustments should be made to correct these conditions when they occur.

CAUTION

If pinion is too tight against rotation gear, rough operation will occur.

If too loose, it will cause excessive backlash.

After satisfactory adjustment is made, tighten bolts and jam nuts on adjustment screws.

DISASSEMBLY AND REASSEMBLY PROCEDURES

The topping cylinder, extension cylinder and outrigger cylinders will require disassembly and overhaul when the internal seals become worn to the extent that the cylinder leaks internally, causing the boom to creep when static, or outrigger legs will drift out from the retracted position.

Internal leaks are usually evidenced by extremely slow operation and boom creep when in the elevated position, and careful adjustment of hydraulic components fails to remedy the problem.

The illustrations located in Repair Parts, Section III, are designed for use as a guide for disassembly and reassembly of the "Tele-Squrt" and components as well as for parts replacement. Always refer to the hydraulic system installation drawings and the wiring diagram before removing or disassembling associated parts. Do not attempt to disconnect or remove any hydraulic lines before reading and understanding all text concerning the system hydraulics. In most cases, disassembly of the "Tele-Squrt" will be obvious from illustrations.

WARNING

Always make sure boom is in stowed and fully retracted position, blocked, or the weight removed by a suitable hoist before disconnecting any hydraulic lines to the lift cylinder holding valves.

Make sure truck is leveled before removing boom or turntable.

Parts should be thoroughly inspected before restoring to service at the time of reassembly. Do not alter the contour of any parts. Do not sand or file on plated parts. Burrs, nicks or scratches may be removed from machined surfaces by honing or polishing with #600 Crocus cloth, followed by a thorough cleaning in an approved cleaning solvent and blown dry with compressed air. If this operation does not restore the parts to a serviceable condition, replace the part. Replace all "O" rings, seals and gaskets at reassembly. Use new roll pins or cotter pins. Dip all packing rings and seals in hydraulic fluids before assembling in cylinders and manifold installations. Replace any part having imperfect threads. In general, units that have been disassembled can be reassembled by reversing the order of disassembly.

CYLINDER OVERHAUL

All overhaul of cylinders should be done in a clean, enclosed maintenance facility with personnel familiar with hydraulic system cleanliness requirements.

LOWER CYLINDER

1. With the boom in road travel position, remove the two hydraulic hoses connected to the cylinder holding valves. Break tube connection at cylinder base and rod port (to relieve trapped pressure). It is recommended that the hydraulic hoses be plugged after removing to reduce the amount of fluid lost, and to protect against dirt entering system.
2. Remove cylinder; place on a suitable bench. A bench overhaul is desirable as a closer examination of internal parts is possible, and support and lifting equipment is more readily available.
 - a. Remove lower cylinder piston rod pin attaching the cylinder to boom (refer to Items 8-13 & 21, Dwg. D-003-0131 - Section III).
 - b. Remove lower cylinder base pin attaching the cylinder to the turntable (refer to Items 8-13 & 21, Dwg. D-003-0131 - Section III).
3. Remove holding valve and tubes and position to place the open rod end port over a clean container. Extend piston to the end of its stroke to purge the hydraulic fluid from cylinder. This can be done manually by pulling on the piston rod or by introducing compressed air into base end port.
4. Loosen the countersunk head pipe plug locking device (refer Dwg. D-003-0117 - Section III). Unscrew the thread ring with an adjustable spanner wrench.
5. Remove the entire piston rod assembly by pulling on the piston rod until free from cylinder. Pull assembly out carefully, keeping it concentric with cylinder to prevent marring the inner finish of the barrel. This assembly includes piston rod, end gland, piston nut, and all attached seals and washers.
6. Disassemble the piston rod assembly:
 - a. Remove cotter pin.
 - b. Remove nut with suitable wrench.
 - c. Remove piston from shaft by using the head gland as a bumper or other suitable tool.
 - d. Remove head gland.
 - e. Remove thread ring.

- f. Remove all seals.
7. Examine all components as outlined below:
- a. The cylinder bore should be thoroughly washed with solvent or diesel fuel and carefully inspected for signs of "scoring" or deep scratches. In the event of any defects in the cylinder case bore, the entire cylinder should be reassembled and returned to factory. This type of damage is generally caused by foreign material in the hydraulic system, and there is no satisfactory method of repairing. Cylinder barrel needs to be replaced.
 - b. The cylinder shaft should be carefully washed and inspected for damage such as dents, deep scratches, damaged chrome plating, etc. All sharp edges on piston end of the shaft should be carefully removed with a fine file or whetstone to prevent damage to seals during reassembly. Should the rod show severe damage of any form, it should be replaced.

CAUTION

THE CYLINDER SHAFT SHOULD BE CAREFULLY HANDLED AND PROTECTED TO PREVENT SCORING, SCRATCHING, ETC. NEVER CLAMP CYLINDER SHAFT IN ANY FORM OF VICE UNLESS JAWS ARE PROTECTED BY SOFT MATERIAL SUCH AS COPPER OR LEAD. NEVER LEAVE EXPOSED SHAFT WHERE WELDING SPLATTER OR OTHER SUCH MATERIAL COULD STRIKE THE FINISHED SURFACE.

- c. The piston should be carefully washed and inspected for wear and/or other damage.
 - d. The cylinder head gland should be thoroughly washed and inspected for wear or other damage.
8. Reassemble:
- a. Replace wiper in head gland retaining thread ring.
 - b. Replace "T"-Ring, "O"-Ring, and back-up washer in cylinder head gland.
 - c. Lubricate I.D. of head gland retaining thread ring and head gland and slip the thread ring and then the head gland over piston end of the shaft. A slight oscillating motion should be used to enable the seal lips to slip onto shaft shoulder.
 - d. Replace static "O"-Ring in the piston. Thoroughly lubricate the I.D. of piston and place on end of shaft.
 - e. Replace piston nut and tighten securely (approximately

- f. Reinstall new cotter pin and secure.
- g. Replace piston rings. The new "T" ring must be installed before the piston rings. The "T" ring must be "walked into" the piston ring groove and then into its own groove. Also the piston should be well lubricated to aid in this assembly. Install piston rings carefully in their respective grooves.
- h. Insert rod assembly slowly and carefully into barrel.

Before attempting to install piston and shaft assembly into the cylinder case, both the O.D. of the piston and the mouth of the case should be thoroughly lubricated.

A standard automotive type ring compressor may be used to facilitate installation to prevent damage to cast iron rings and/or seals.

NOTE

Most cast iron piston ring breakage is due to careless or hasty assembly at this point.

- i. Slide head gland into the bore.
 - j. Spin thread ring in until it is tight against head gland, loosen thread ring approximately 1/2 turn.
 - k. Install countersunk head pipe plug locking device into thread ring. Tighten plug until there is some drag on the thread ring when turned with a spanner wrench.
 - l. Tighten thread ring against head gland.
 - m. Tighten countersunk head pipe plug to 20 ft. lbs. torque to effect full thread engagement and to lock the thread ring from rotating.
9. Install the cylinder assembly back on machine reversing procedure 2-a and 2-b.
10. Install the holding valve and tubing back on cylinder and connect all hydraulic lines to proper ports.

CAUTION

IT WILL BE NECESSARY TO PURGE THE CYLINDER OF AIR.

- a. Place hydraulic system in operation.
- b. Raise and lower boom several times through an arc of about 30°.

11. Check the hydraulic fluid reservoir for proper level, and fill to full mark on dip stick with all cylinders retracted.

Maintenance Check:

On a yearly or 500 hour basis, check the expander plug locking device of the threaded ring to be sure a 20 ft. lb. torque is maintained.

Extension Cylinder:

Consult Snorkel Fire Equipment Company - Service Department Manager.

COMMUNICATION SYSTEM MAINTENANCE

This trouble shooting chart is to be used for localizing troubles which can be corrected without special equipment or the services of a technician. If the trouble cannot be detected or corrected, the trouble will probably be in the amplifier, and should be serviced only by a qualified technician.

TROUBLE SHOOTING CHART

TROUBLE	PROBABLE CAUSE	REMEDY
1. Sound is not amplified when platform speaker or microphone is in use.	a. Power Switch "OFF"	Turn Switch "ON"
	b. Master Switch "OFF"	Turn Switch "ON"
	c. Blown fuse	Replace Fuse
	d. Damaged cables	Replace or repair
	e. Grounded speaker wire	Check for frayed insulation, repair as required
2. Ground station will not send - platform station will send but not receive.	a. Defective or unplugged microphone.	Plug jack in or replace.
	b. Loose cable connections.	Check all cable connections, correct as required.
	c. Relay defective	Replace relay
3. Platform speaker inoperative but "ground" speaker works.	a. Defective or unplugged microphone	Plug jack in or replace
	b. Relay defective.	Replace relay.
4. High noise level ("howl") with microphone switch inoperative.	a. Speakers too close together.	Change boom position
	b. MIC volume set too high.	Lower volume.

NOTE: SEE WIRING DIAGRAM AND PARTS LISTING. (SECTION III)



SECTION III

REPAIR PARTS

Note:

Always give the Serial Number and Model Number of your "Tele-Squrt" when ordering parts.

This information is found on the nameplate which is mounted on the Ground Control Station Panel.

Be sure to order all parts by their part numbers, and if possible, specify routing of shipment.

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