

American Telephone and Telegraph Company

BELL SYSTEM PRACTICES  
Outside Plant Construction  
and Maintenance

TRIAL INSTRUCTIONS  
SECTION G74.941.4  
Issue A, 5-1-55  
Long Lines Department  
Dist. Class.210

CABLE MAINTENANCE

LOCATING GAS LEAKS IN CABLE SHEATH

WITH A SPRAYER

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1. GENERAL

1.01 This section describes the equipment used and the operating procedure for locating gas leaks in cable sheath with either a roll sprayer or a hand sprayer and pressurized tank.

2. DESCRIPTION

2.01 The equipment consists of a pressurized tank containing a bubble forming fluid, which is fed through a hose to either a roll sprayer or a hand sprayer. The roll sprayer rides on the cable messenger strand and as it is moved along, two nozzles on the roller unit saturate the cable with fluid; it is raised into position and operated by means of tree pruner handles. The hand sprayer replaces the roll sprayer when hunting leaks in manholes, at load points or on aerial cable which can be reached by a workman. Long lasting bubbles are formed by the escaping gas, which can be observed from the ground.

2.02 Figure No. 1 shows a picture of the roll sprayer being used on lashed cable.



Figure 1

2.03 Figure No. 2 shows a picture of the sprayer being used on cable supported in rings.

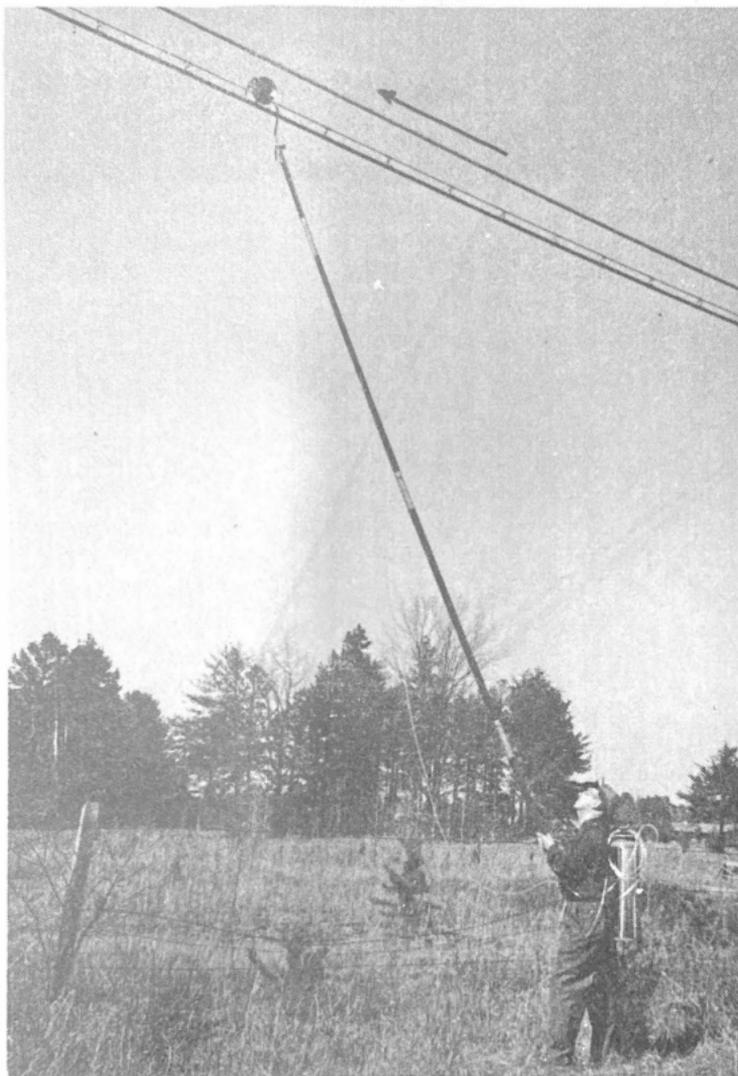


Figure 2

### 3. MATERIALS AND TOOLS

3.01 Figure No. 3 shows a general view of the roll sprayer with associated equipment.

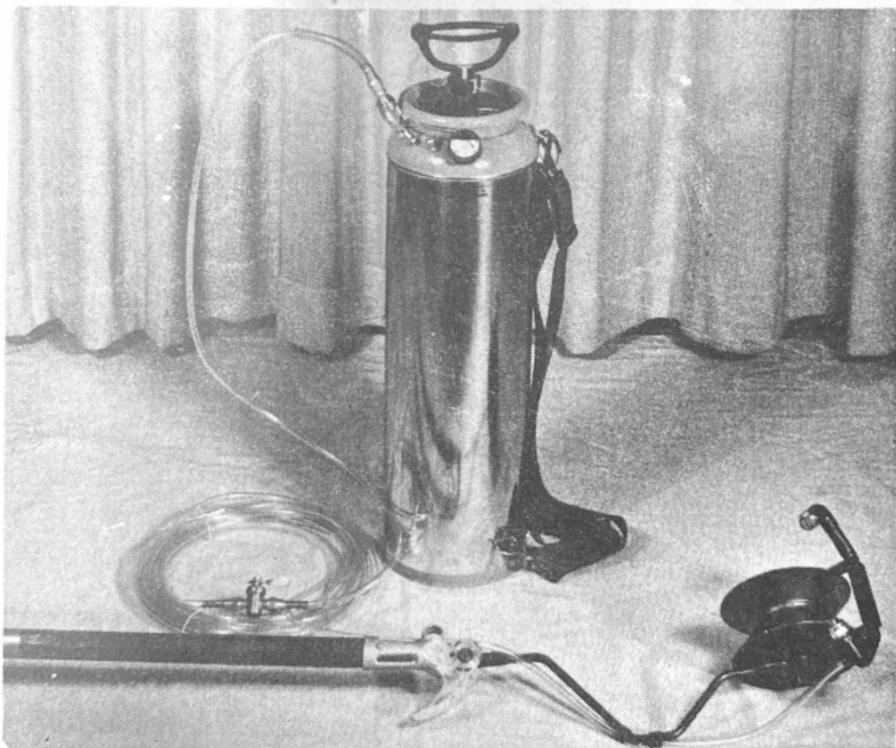


Figure 3

3.02 Figure No. 4 shows a view of the various parts including the hand sprayer.



Figure 4

3.03 The tank and hose are common to both units.  
The hose is equipped with Kwik-change couplings for ready attachment to the tank at one end and either to the roll sprayer or the hand sprayer at the other end.

3.04 The names and weights for the various parts are as follows:

Winton Roll Sprayer (includes hose, valve and couplings)  
2-1/8 lb.  
Winton Hand Sprayer (includes nozzle, valve and coupling)  
12 oz.  
Silicon-Bronze 4 Gallon Tank 11 lbs. empty,  
36-1/4 lbs. charged  
Sherlock Cable Leak Concentrate (24 four oz. bottles per case)

3.05 Winton Roll Sprayer See Figure 3. The roller is an aluminum casting with a rubber tread in the groove. Two nozzles are mounted on a yoke which swivels on the roller shaft and can be adjusted to direct the sprays onto cables of various sizes. Two sizes of tips are available, either of which can be installed in the nozzles to provide different fluid volumes. Large nozzle tips (which each deliver 1/2 pint per minute-Tee Jet No. 65015) should be used on cables of 2" diameter or larger; small nozzle tips (which each deliver 1/4 pint per minute-Tee Jet No. 650067) are adequate for small cables. Both sizes of nozzle tips are furnished with the equipment. The roller is mounted on the roller bearing shaft, threaded portions of which extend out beyond the roller on each side. A shaped metal stem can be attached to either side of the shaft by means of wing nuts; the other end of this stem attaches to a short section of tree pruner handle by means of a spring-loaded swivel, which permits the handle to be canted at various lateral angles without changing the vertical position of the roller. See Figure 5 for a close-up view of the roll sprayer unit assembly in place on messenger strand.

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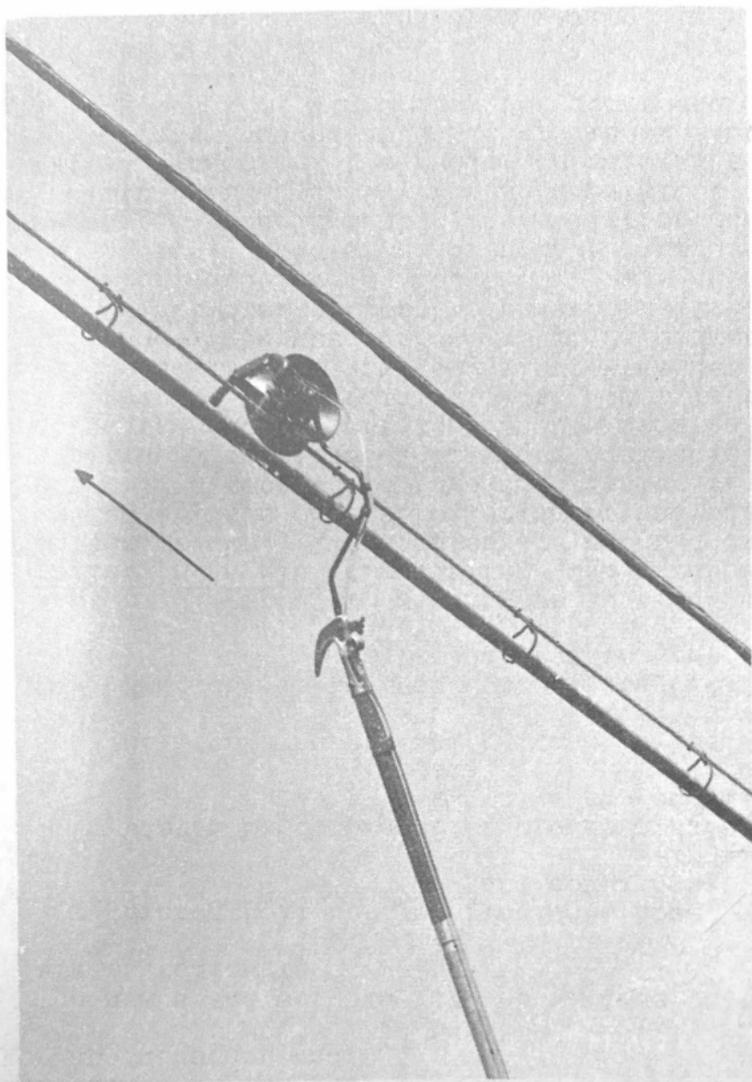


Figure 5

3.06 Hose Assembly The hose assembly consists of a 40 ft. length of transparent 1/4" I.D. Transflex tubing, equipped with a Kwik-change coupling at each end and a quick-acting hand valve adjacent to the tank.

3.07 Pressurized Tank See Figure 3. A 4 gallon Silicon Bronze tank is used. It is equipped with a removable top for filling and a hand pump for pressurizing the unit. A valve is also available for charging the tank from a nitrogen cylinder and regulator. A pressure gauge and 35 psi pressure safety release valve as well as a Kwik-change hose feed coupling are installed in the head of the tank. These control items are so arranged that they do not protrude beyond the elongated top shoulder of the tank, which affords protection against damage during transportation.

3.08 Winton Hand Sprayer See Figure 4. This unit consists of a spray nozzle, quick acting hand valve, 6 inches of tubing and a Kwik-acting coupling. It is attached to the discharge end of the feed hose. The hand sprayer provides a ready means for leak hunting under close observation at load points, terminals, involved cable layouts, in manholes or on aerial cable which can be reached by workmen.

3.09 Sherlock Cable Leak Concentrate The specially prepared fluid is furnished in concentrated form in 4 oz. bottles (24 bottles to a case). One 4 oz. bottle is poured into the tank containing 3 gallons of water and mixed by movement of the tank. Do not put concentrate into tank before adding the water. The mixture freezes at 32° F. If the mixture freezes it does not deteriorate but may be thawed out and reused. The same general precautions should be used with this solution as are used with present soap and pressure testing solution. It is understood that the mixture has no bad effects on paint and is not injurious to skin,

clothes or eyes. It contains no grease, oil or soap and dries clean. The 4 oz. container of concentrate can also be mixed with 1 gallon of water for brushing or squeeze-bottle applications, in place of soap solution.

3.10 Tree Pruner Handles Sections of tree pruner handles are connected together to raise the roll sprayer to the cable and to push it through the span. These handles come in 6 ft. lengths and in two sizes, i.e., large and small. Due to the weight of the roll sprayer, raising and lowering should be done by adding or removing one section at a time, keeping the handles as nearly vertical as practicable; the handles will not safely support the unit when in a horizontal position where more than one unit of pruner handle is in use. Damage to the unit and breakage of the pruner handles will result if the weight of the roll sprayer gets too far out of vertical and it falls to the ground. Small pruner handles are adequate where not more than two sections are required. When three sections are necessary (or work involves interference from trees with 1 or 2 sections) use the large pruner handles. Cables which are so high that they cannot be reached with three sections of pruner handle are too far away for satisfactory observation of fluid coverage and leak evidence and transfer around poles is very difficult.

#### 4. TESTING PROCEDURE

##### 4.01 General

- (a) Do not use the fluid on cables with polyethylene sheath, or on other adjacent cables where the spray will reach polyethylene sheathed cables. Stressed polyethylene is adversely affected by the fluid.

- (b) Do not attempt to locate leaks on a windy day or when temperatures are below 32° F.
- (c) Work should be limited to cable heights which can be reached with a maximum of three sections of tree pruner handles. See Part 3.10.

4.02 Preliminary Leak Location This tool is not intended for the complete covering of long sections of cable to locate and clear all leaks which may be present. Its function is to find the major leaks after an approximate location has been made by gradient methods. Follow the leak location procedures outlined in Bell System Practices G73.231.2 and then substitute the spraying procedure for the soap test method to locate the actual leak. The gradient break will indicate the size of the leak; if a small one is found, continue hunting until the large one which causes the gradient break is located.

4.03 Spray Action and Leak Evidence The yoke should be so positioned that the sprays from the two nozzles cross and completely envelop the cable. This must be done before the sprayer is raised. If the yoke is too high or too low, much of the spray will miss the cable and complete saturation will not be secured at reasonable forward speeds. This correct setting for various cable sizes must be secured by trial. Figures 1, 2 and 5 provide general views of the cables being sprayed correctly. Forward speeds are determined by observing from the ground that complete saturation is secured. Small leaks form a white foam of small bubbles and larger leaks form a continuous series of large bubbles, which accumulate along the bottom of the cable like a bunch of grapes; they hold this form for some time. Large leaks frequently give only momentary evidence of their presence when cable pressures are high, because they blow through the spray with a type of jet action.

#### 4.04 Operating Steps

- (a) Remove top of tank, add 3 gallons of water (do not fill tank) and then add one 4 oz. bottle of Sherlock Fluid. (The first filling should be done at the storeroom or other source of silt-free drinking water.) Securely lock top of tank by placing the three-pronged spider into its housing and tightening the locking screw by means of the handle. Mix fluid thoroughly by moving tank from a vertical to a horizontal position about ten times. (Extra tap water for refills should be carried to the job in a drinking water cooler or extra metal container.)
- (b) Charge tank with air until 30 psi is registered on the gauge. Charging may be done with a nitrogen cylinder and regulator or by operating the hand pump on top of the tank.
- (c) Place tank on back of operator. Tank may be carried as a back pack with one strap over each shoulder, (See Figure 2) or as a bandolier with both straps over one shoulder and tank on other side. (See Figure 1) Straps are adjustable to provide most comfortable position.
- (d) At location to be tested, as outlined in Bell System Practices Section G73.231.2, position yoke per Part 4.03, attach roll sprayer to first section of tree pruner handle and raise sprayer vertically until the next section of tree pruner handle can be attached. See Part 3.10. Place roller on strand of ringed cable or on lashed cable.
- (e) Open valve on feed hose close to tank and observe fluid discharge. Wait for solid stream to discharge air trapped in feed line.

- (f) Stand about four feet back of the roll sprayer and move it forward by pushing on tree pruner handle. See Figures 1 and 2. Operator can adjust handle to permit him to walk on one side of cable, by jerking down on handle, which operates swivel near the sprayer. See Part 3.05. This permits better cable observation. Also the metal stem vertical support may be attached to either side of the roller to permit operation from either side of cable, thus keeping the operator out of spray, provide best footing along hedge rows or ditches, keep sun out of eyes, etc.
- (g) The forward speed is governed by the speed at which full wetting of the cable is secured, as observed from the ground. Figure 6 shows the roll sprayer going over a span splice.

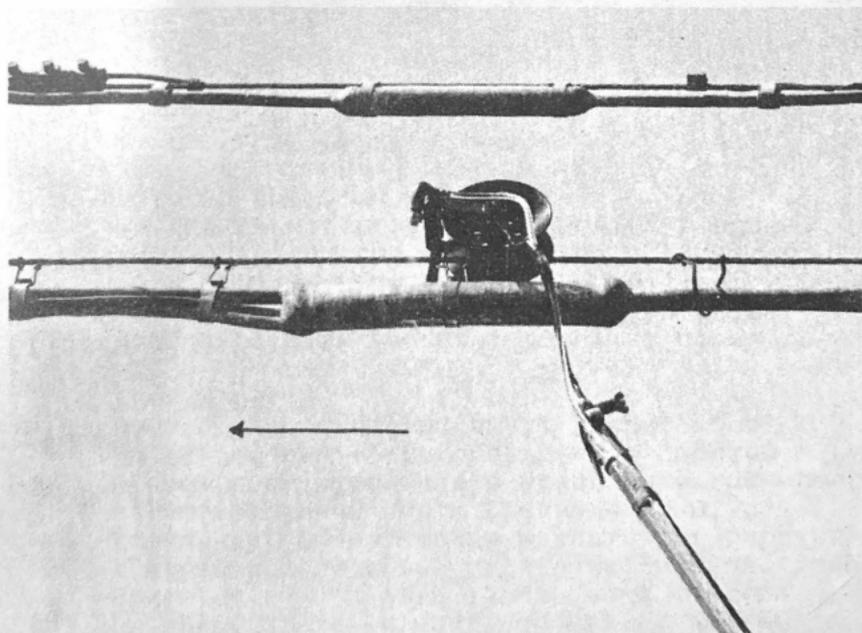


Figure 6

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- (h) Observe for leaks continuously as roller moves forward. Very large leaks must be spotted as the spray hits them, because they frequently do not cause a series of bubbles - especially when cable pressure is high. Glance back along cable after covering about 20 ft. of cable, to observe for bubbles caused by medium and small leaks. See Part 4.03.
  
- (i) When a pole is reached, spray as close to pole as possible; then vertically raise roll sprayer from strand or cable and transfer it around the pole, spraying the cable as the transfer is made. Moving around a pole is shown in Figure 7.



Figure 7

- (j) Observe pressure gauge and recharge when pressure drops below about 17 psi. With roller remaining on strand or rings, turn off valve in hose, lower tank and recharge to 25 psi. As fluid level in tank lowers, the interval between recharge increases.
- (k) When tank is empty, refill it. One tank full (3 gal.) will permit covering three to four 130 ft. spans on full sized cable using large nozzles, at a rate of about 5-6 minutes per span. Small nozzles will cover 6-8 spans at the same rate of progress.

4.05 Hand Sprayer Tests The hand sprayer can be substituted for the roll sprayer for leak hunting at close quarters. See Figure 4.

## 5. PRECAUTIONS

- 5.01 Extreme care must be exercised when traversing a section of cable containing power crossings or drops. For the present the tool should not be used on cables occupied jointly with power lines. Do not permit the unit to contact plant of power companies.
- 5.02 Exercise care in raising, lowering or transferring the roll sprayer. If it gets too far out of vertical it will drop to the ground and may be permanently damaged. The pruner handles may also break and injure a workman. See Paragraph 3.10.
- 5.03 Plan the job carefully to get the full benefit of the best available footing, since it is necessary to move forward while observing the cable for leak evidence.