

RODDING IN DUCTS

*[NOTE:- As this Instruction has been completely revised, individual paragraphs have not been 'starred'. The description and use of the Oscillator No. 138... has now been included]

1. **General.** This Instruction describes the methods and appliances used to rod a duct line in order to pull in a draw rope. Progress may be affected by:-

- (a) grease from previous lead cabling operations
- (b) sharp bends in the duct line
- (c) flooded ducts or boxes
- (d) blockages due to tree roots, broken ducts, abandoned cables etc.
- (e) traffic conditions.

Delays in the past caused by such unforeseen obstacles have necessitated the introduction of the present policy whereby rodding is completed well before cabling is started, so that cabling parties are not waiting for rodding difficulties to be overcome. In certain circumstances, however, rodding and cabling operations should be combined (see B 1003).

Access to ducts may be by manholes, joint-boxes, buried boxes or split-couplings. Ducts to be rodded may be of various sizes, empty or partly occupied. For the conditions under which new cables may be drawn over existing cables, and the space required for rodding see B 1003.

2. **Rodding devices.** The following rodding devices are available:-

- (a) *Rods, Duct, No. 1.* - 9 ft. P.V.C. rods fitted with brass coupling pieces.
- (b) *Rods, Duct, No. 2.* - 6 ft. P.V.C. rods fitted with nylon coupling pieces and intended for use by jointing parties who require to rod short lengths of duct line.
- (c) *Rods, Duct, No. 3, Complete.* - 200 yds. of continuous P.V.C. rod with storage reel for use either by hand or by machine.
- (d) *Rods, Duct, No. 4.* - Similar to, and a replacement for, Rods, Duct, No. 1 but fitted with nylon couplings.
- (e) *Rods, Continuous.* - 200 yds. of $\frac{5}{16}$ in. diameter steel wire with storage reel for use either by hand or machine.
- (f) *Ductmotor.* An air-driven device which pulls its own air line and a draw rope into the duct (see F 3042 when issued).

3. General safety requirements.

(A) Personnel

(i) *Protective clothing.* When engaged in rodding operations the following items of protective clothing must be worn:-

- (a) Helmets, Safety, No. 1
- (b) Jerkins, High Visibility
- (c) Gloves, Leather

(ii) *Guarding.* The openings at either end of the section to be rodded must be guarded in accordance with J 1150 and tests made for gas in accordance with J 1110; if negative tests are obtained, preparation for rodding can proceed.

(iii) *Compressed air precautions.* When using equipment which is operated by compressed air, the precautions detailed in GENERAL, General, S 1019 must be observed and eyeshields must be worn (see GENERAL, General, S 3100). No exposed part of the body should be allowed to come into direct line with the exhaust of a compressor or rodding machine or into contact with the cylinder of a rodding machine.

(iv) *Handling rods.* When disconnecting rods they should be gripped firmly at the coupling pieces and bending stresses kept to a minimum to prevent accidents occurring due to the sudden release of tension causing the rods to fly apart. Similarly, when hand rodding with Rods, Continuous or Rods, Duct, No. 3, grip the leading end firmly until it is in the duct mouth.

(B) Plant

(i) *Protection of existing plant:-* Before commencing rodding, carefully move any existing cables which obstruct the work within the jointing chamber (see WORKS, Execution of Works, S 0502 if the work is being carried out by a contractor). Cables must not be left unsupported even for short periods.

Coaxial cables must not be moved even for short periods. In cases where permission has been given to rod over coaxial cables the method to be used will be indicated by THQ (see B 1003 for Dept. concerned).

When rodding is completed, any cables or joints which were moved should be replaced in their original positions and examined for signs of fracture. Arrangements should be made for a jointer to pressure test these cables and joints (see F 3240). Fractures should be dealt with immediately. Replace any anti-creepage devices which have been moved, with Anchors, Cable, No. 4 or 5 (see F 1901).

(ii) *Protection of existing cables from leading ends of rods.* Serious faults can be caused by rodding operations. Supervising Officers should ensure that rodding parties exercise care, especially when using continuous steel rod operated by a Machines, Rods, Pneumatic (see F 3041) or a Pushers, Rod, Continuous, No. 1 or 2 (see Note). The brass couplings of the coupling-up pieces can be kept away from other cables within a duct by fitting old duct motor bags to the rod immediately behind the coupling-up piece.

NOTE:- Pushers, Rod, Continuous are used in the Midland and North-eastern Regions and in Scotland only.

4. Procedure. The procedure for rodding duct lines is described in F 0011.

The various adapters and attachments available are described in TOOLS & TRANSPORT, Hand Tools, R 1250 (for contract works see E 3909).

5. Coupling-up. Normally lengths of less than 80 yds. of occupied duct can be rodded without the necessity to couple-up. On lengths greater than this, rodding should be carried out using Rods, Continuous, or Rods, Duct, No. 3, machine assisted, or by ductmotor (see F 0011). An indication of the length of rod (in yards) necessary to couple-up can be obtained by subtracting the reading on the recording meter (divided by three) from the overall length, in yards, of the section being rodded. As the male end of a coupling-up piece will have been connected to Rods, Duct, No. 3 (see F 0011) the female end should be connected to the leading rod of the length to be inserted into the duct line at the far end of the section. Prior to pushing this length up the duct line the female end should be enclosed in a thin polythene bag (purchased locally) to prevent the entry of grit and silt.

6. Obstructions. Difficulties are most likely to be met when rodding over existing cables. Various methods may be tried to pass obstructions. The first should be to withdraw the rods a few feet, and then push them forward again. In occupied ductways the rods should not be repeatedly rammed against an obstruction as damage may be done to existing cables.

If it is thought, from local knowledge, that the obstruction is due to silt, water can be passed through the Rods, Duct, No. 3 in an attempt to disperse the blockage. If several attempts to rod a length of duct fail, the track will have to be opened up at the point of obstruction, the blockage removed and the duct line repaired. Ducts broken in the course of the above operations should be restored by inserting the appropriate split-duct. Alternatively, if a track exceeding nine ways is concerned consideration should be given to building a joint-box or manhole. When split-ducts are used it is important that they are bound by means of Clips, Binding and Strips, Binding (see D 3150 and D 3156) and well sealed with Compound, No. 10 to prevent the entry of silt. Split ducts are preferable to couplings but when the latter have been fitted their positions should be indicated by markers and shown on the records (see General, D 6001).

7. Rodding oscillator.

(a) *General description.* The Oscillator 138... is a miniature transistorized oscillator with self-contained power supply. It is designed to fit inside a non-metallic housing which can be screwed on to Rods, Duct or Rods, Continuous. The principal use of the oscillator is to locate blockages in non-metallic ducts, but it is also a useful aid for track location. Two types of oscillator are available the only difference between them being in the frequencies generated which are as follows:-

Type 138A. 800 Hz \pm 25 Hz interrupted at 5 pulses per second

Type 138B. 1400 Hz \pm 25 Hz interrupted at 2 pulses per second

At one end is a compartment which holds one 'Ever-Ready B 154 15V battery which should be obtained by local purchase.

The range of the oscillator is about 12 ft. when used with standard receiving equipment (see par. 8).

(b) *Battery test.* Because of the very low power consumption, the oscillator functions continuously for approximately three months before the battery becomes exhausted. For this reason, it is not necessary to remove the battery when the oscillator is not in use.

As a battery becomes exhausted, the interrupted pulse rate increases until the radiated signal becomes a continuous tone. Before using the oscillator check the signal generated and if this is a continuous tone change the battery as detailed below:-

- (i) Remove the screw in one end of the oscillator capsule and extract the old battery
- (ii) Slide a new battery into the capsule, negative end first
- (iii) Replace the screw ensuring that it is in contact with the positive battery terminal
- (iv) Check that the oscillator now emits an interrupted signal.

(c) *Housing.* The rodding oscillator slips into a non-metallic housing (Attachment, Rods, Oscillator Housing No. 1) which has a male thread at one end and a female thread, suitable for direct attachment to Rods, Duct, Nos. 2, 3 and 4 and Rods, Continuous at the other end. By using an Adaptors, Rod, No. 2 the housing can also be attached to a Rods, Duct, No. 1.

8. *Receiving equipment.* The following equipment is required to detect the signal radiated by the oscillator:- (see A 1901).

Amplifier No. 109B
Cord Test, No. 2/72 AM
Handle, Extension, No. 1A, 32 in.
Receiver, Headgear, No. 16T Black - 1
Search Coil No. 2A

This equipment is a part of the Locator No. 2A, but if this is not available, the items may be requisitioned separately and carried in a Case No. 116A.

9. *Method of locating the oscillator.* After the oscillator has been fitted to the rods and propelled along the duct, the receiving apparatus is used to obtain a two-dimensional location of the radiated signal as follows:-

(a) Hold the search coil with the side marked MAXIMUM uppermost and with the long sides at right angles to the duct track. Walk along the approximate route of the duct until the maximum signal is heard in the headset. Adjust the amplifier volume until the point of maximum signals can be accurately located. Mark a line on the ground passing through this point so that it is at right angles to the duct track.

A more accurate location can sometimes be obtained by turning the search coil to have the MINIMUM mark uppermost, keeping the long sides at right angles to the track. In this case, the signal rises to a maximum as before, then drops off sharply to a minimum or null signal before rising sharply again to a maximum as the operator walks along the duct route. The position of the null indication should be noted and a line marked as above.

(b) Hold the search coil with the side marked MINIMUM uppermost and the long sides at right angles to the track. Move the search coil along a line parallel to and three ft. from the line marked in (a). Search for the maximum signal and again adjust the amplifier volume so that the point of this maximum signal can be precisely located. Draw a line through the point along the line of the duct track. The oscillator position is directly below the point where this line cuts the first line.

10. Uses.

(a) *Blockages.* The oscillator is fitted to the leading end of the rods and pushed up to the obstruction. The oscillator is then located and hence the exact position of the blockage is found.

(b) *Coupling up.* An oscillator 138A is fitted to the leading end of one set of rods behind the coupling piece and the rods inserted into the duct-line. From the opposite end, a set of rods, similarly equipped, but using an oscillator 138B, are pushed along the duct towards the first set. Since the signals sent out by the two oscillators are easily distinguishable, the leading ends of both sets of rods can accurately be located and hence, the operation of coupling up is made more precise.

(c) *Track location.* The oscillator is pushed a reasonable distance along the track (say 15 yds.) and its position located. It is then moved further along and located again. This procedure is repeated until the whole length of the track has been located.

11. *Limitations of use.* The oscillator cannot be used in metallic ducts as these completely screen the radiated signal. Because of the low power consumption, the range of the oscillator is unlikely to exceed 12 ft. Good results are likely to be obtained from ducts up to 6 ft. deep only.

References:- A 1901, B 1003, D 3150, D 3156, E 3909, F 0011, F 3041, F 3042,
 (TD8.3.1) F 3240, J 1110, J 1150
 General, D 6001
 GENERAL, General, S 1019, S 3100
 TOOLS & TRANSPORT, Hand Tools, R 1250
 WORKS, Execution of Works, S 0502

E N D