BELL SYSTEM PRACTICES
Outside Plant Construction and Maintenance

SECTION G97.586.1
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AT&T Co Standard

FLEXIBLE SEWER-ROD DUCT RODDER

Contents **Page**

1. GENERAL

1.01 The Flexible Sewer-Rod Duct Rodder is used to rod underground conduit. It consists of a set of 3-foot lengths of flexible steel rods which may be coupled together to form a continuous rod of any desired length. The assembled rod has sufficient flexibility to permit its being coiled and stored on a reel. Various hand tools and accessories are provided to assemble, push, pull and turn the rod and to facilitate rodding an obstructed duct. A small gasoline engine driven power unit is also provided to rotate the rod when hand turning becomes difficult. A flexible duct rod guide inserted in the duct being rodded projects out of the manhole above the surface of the street and permits rodding the conduit from street level.

2. SAFETY PRECAUTIONS

2.01 Always use the flexible duct rod guide when rodding a duct from the surface of the street.

2.02 When rotating the flexible duct rod with the power drive the operator should take care to avoid being struck by the end of the rotating rod projecting from the rear of the driving mechanism.

2.03 When starting the engine of the power drive with a rope starter observe that the rope is properly wound on the starter pulley and that there are no objects in the vicinity

which will interfere with free movement when pulling the starter rope. The starter rope has a tendency to "whip" after it leaves the starter pulley. Accordingly, be sure that all other persons are at a sufficient distance to avoid being struck by the end of the rope.

2.04 When inserting a flexible duct rod in the drive mechanism of the power drive or otherwise working around the engine after it has been run, care should be exercised to avoid burns from contact with heated parts, especially the exhaust pipe and muffler.

2.05 When refueling the engine, avoid spilling gasoline on the engine because of the fire hazard. The fuel tank should be filled only when the engine is stopped. Only approved safety cans should be used for transporting or storing gasoline.

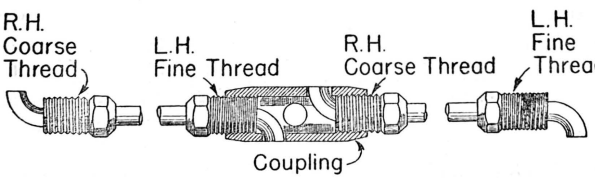
2.06 When making adjustments on the idler pulley or changing the belt on the power unit the engine should be stopped.

2.07 When filling the fuel tank or the engine crankcase, precautions should be taken to avoid entrance of foreign matter which might cause trouble or result in damage to the engine.

2.08 When using the power drive to rotate rods, the rods should not be rotated continuously in one position but should be moved in or out. Rotation at one spot over a long period may result in rod breakage.

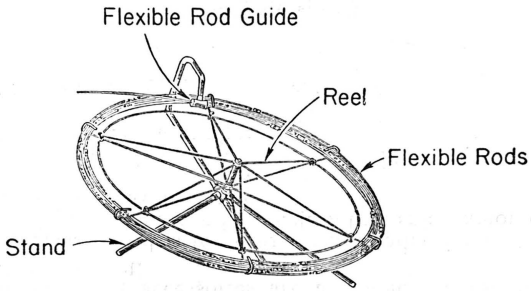
3. DESCRIPTION

3.01 The assembled flexible duct rod consists of a number of three-foot lengths of round tempered steel rods about 5/16 inch in diameter. Each rod is equipped with two hollow nuts and the two ends of the rod are bent at a right angle to the rod. A coupling is supplied to connect the rods.

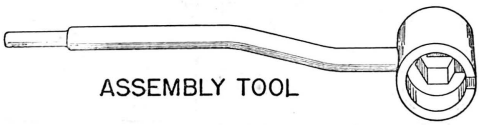


RODS AND COUPLING ASSEMBLED

3.02 The reel for mounting the rods is about 5-1/3 feet in diameter and has a capacity of 600 feet of assembled rods. It is mounted on a reel stand which is equipped with a pivot pin so that the reel may be rotated as the rods are coiled or uncoiled.



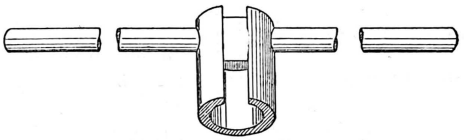
3.03 The Assembly Tool, a socket wrench, is used to tighten or loosen the flexible rod connecting nuts when coupling or uncoupling the rods.



3.04 The Turning Bar Handle is used to turn the rods by hand or to prevent the coupling from turning when using the assembly tool to tighten the connecting nuts.

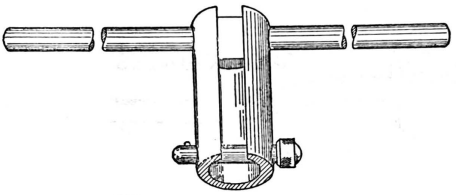
TURNING BAR HANDLE

3.05 The Pull-Out Tool is used for pulling or pushing the rods through the ducts. It is not locked to the rods and so it can be used for pushing or pulling while the rod is turning.



PULL-OUT TOOL

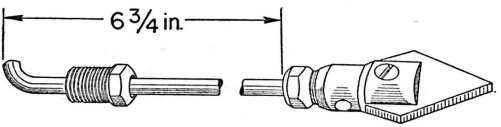
3.06 The Pull-Out and Turning Handle is similar to the Pull-Out Tool except that it may also be used to turn the rods in addition to pulling or pushing. It is locked to the coupling by a pin.



PULL-OUT AND TURNING HANDLE

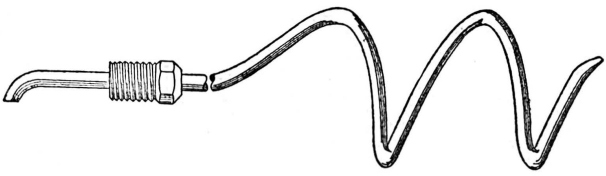
3.07 The following accessories are available for use when rodding a duct.

(a) The Spear Head is to be used as a leader for the rods in a clean duct or one in which only a small amount of sand, mud, etc., may be found.



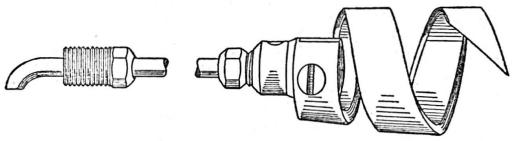
SPEAR HEAD

(b) The Cork Screw is to be used as a leader where it may be necessary to bore a hole through hard packed sand, mud, etc. It is available in diameters of 1-1/2, 2-1/2, 3, and 3-1/2 inches.



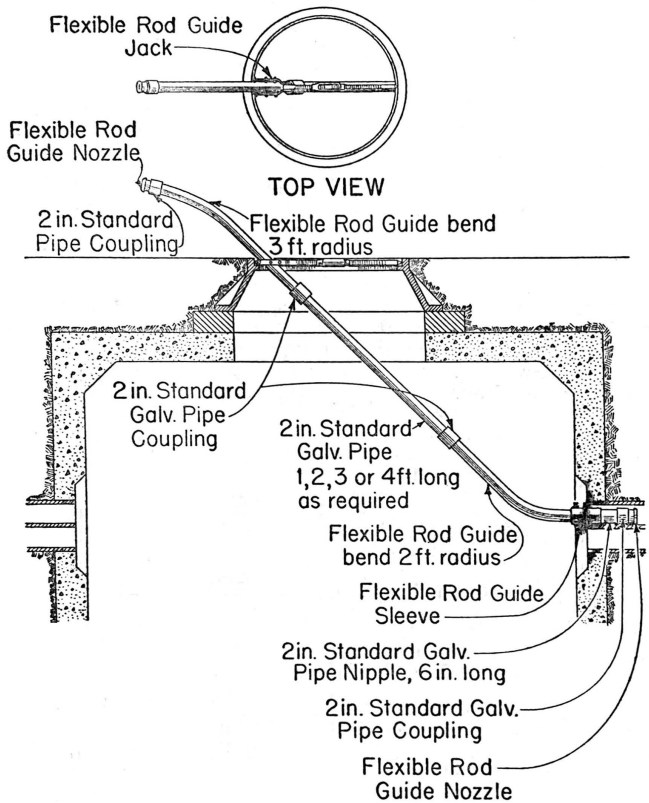
CORK SCREW

(c) The Auger (for four-inch pipe) is to be used as a leader for cutting through roots which may be found when rodding four-inch pipe conduit.



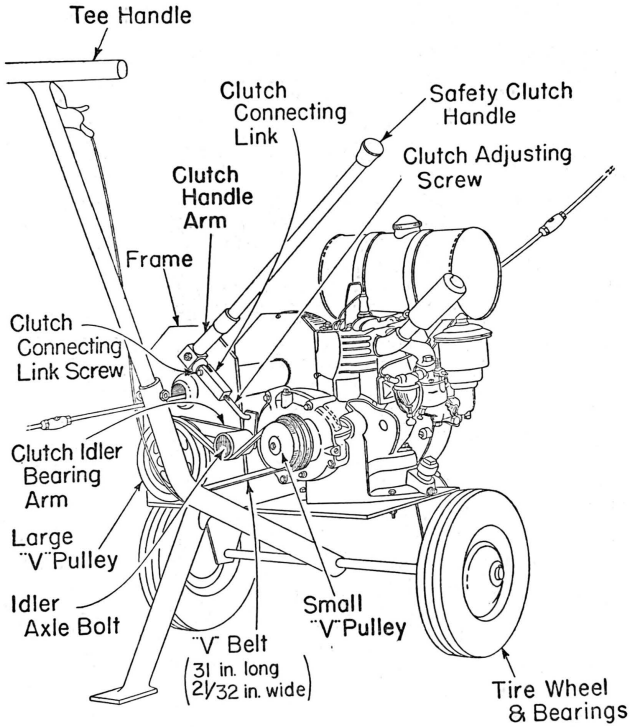
AUGER

3.08 The Flexible Duct Rod Guide is a tube assembled from straight and curved sections of standard two-inch pipe. It is used to guide the flexible rods into a duct when the rods are being pushed from the street. It extends from the duct entrance to a convenient height above and outside of the manhole opening.

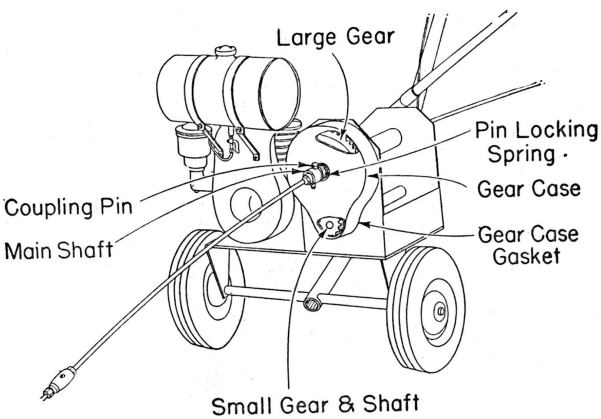


3.09 The Power Drive is a gasoline engine driven machine used to rotate the flexible duct rod. The machine is mounted on a two-wheel, pneumatic tired dolly which is equipped with a "T" shaped handle and a supporting leg. A small lever located on the handle and connected to the engine carburetor by a flexible wire provides a hand throttle for controlling the operating speed of the engine. The flexible duct rod is rotated by a hollow drive shaft which in turn is rotated by the engine through a set of reduction gears driven by a "V"

belt. With the engine running, rotation of the hollow shaft is started and stopped by means of an idler pulley which can be moved by the safety clutch handle to increase or decrease the driving belt tension.



A coupling pin passes through the main shaft and the center hole in the rod coupling to lock the rods to the shaft.



4. ASSEMBLY

4.01 In general, the flexible rods will be connected together and wound on the mounting reel. If the rods are not connected, assemble them as shown in Paragraph 3.01. The coupling is permanently attached to the rod with a fine left-hand threaded nut. Use the coarse right-hand threaded nut to connect the end of one rod to the coupling of another. Then tighten the nut using the assembly tool and turning bar handle as required.

4.02 The rods may be wound on the reel by feeding the rods through the flexible rod guide onto the reel as it rotates. Normally the rods are carried in this manner.

4.03 The Flexible Rod Guide consists of sections of two-inch pipe, and may be assembled in the length required by threading these sections together. After being assembled the lower end should be inserted in the duct, and the upper end should extend to a convenient height above the manhole opening. The guide should be braced with a Flexible Rod Guide Jack to prevent movement during the operation.

5. OPERATION

5.01 Place the flexible rod guide in the manhole. Place the proper type of leader, for the conditions expected in the duct, on the rods and feed the rods from the reel through the guide and into the duct. If minor obstructions are found, the rod may be pushed by hand using the pull-out tool, or if desired, the rods may be disconnected from the reel and turned with the pull-out and turning handle.

5.02 Ordinarily 200 to 300 feet of rods can be fed by hand into a clean duct, however, when a dirty duct is found or a greater length of duct must be rodded, it will probably be necessary to use the power drive.

5.03 Place the power drive about 50 feet from the manhole and remove enough rods from the reel to reach the power drive. In some cases, a longer length of rods may be used depending on traffic, obstructions, whipping of rods, etc. Feed one rod through the main shaft and place the coupling pin through the hole in the coupling on the flexible rods. Make sure that the coupling pin is in good condition and does not show excessive wear and that it is properly seated.

5.04 Start the engine of the power drive and after warming up, move the safety clutch handle to rotate the rods. Be sure that no one is in the path of the rods as they start to rotate.

5.05 As the rods turn, assist them by pushing with pull-out handle. As the rods go into the duct push the power drive toward the manhole. Do not allow the rods to rotate in the same spot for any length of time, because this may cause breakage of the rods. If the rods do not move in, they should be pulled back a short distance and worked back and forth in order to clear the obstruction.

5.06 When the power drive is about 5 feet from the manhole, move the safety clutch handle to the "off" position and remove the coupling pin, then move the power drive back from the manhole, add another section of duct rods and resume turning. Continue until the job is completed.

5.07 When pulling the rod out of the duct, it may be fed directly on to the reel and stored.

6. ENGINE OPERATION

6.01 Before starting the engine, the crankcase and the engine speed reduction gear case should be filled with a high grade engine oil, as outlined in Part 8 of this practice. The oil bath air cleaner should also be filled to the indicated level with the same grade of engine oil. The fuel tank should

then be filled with a good grade of fresh, clean, regular gasoline. Check to see that vent hole in fuel tank cap is open before replacing.

6.02 To start engine:

(a) Open the gasoline shut-off valve located at the fuel filter.

(b) Close engine throttle.

(c) Completely close carburetor choke by operating the choke lever in a clockwise direction.

(d) Engage the knot on the end of the starter rope in the slot provided in the flange of the starter pulley and then wind the rope around the starter pulley. Before pulling on the starter rope, make sure that no one is in a position where he might be struck by the end of the rope when it leaves the pulley. Pull the rope with a quick steady pull to spin the engine flywheel and prime the engine. Now open the choke about one-eighth turn and repeat operation.

6.03 After engine is started:

(a) Gradually open the choke by turning choke lever in a counterclockwise direction until engine runs smoothly with choke wide open.

(b) Open throttle slowly to avoid stalling particularly when engine is cold.

(c) Allow a cold engine to warm up thoroughly before running at full speed or putting it under load. This will require from three to five minutes.

6.04 If the engine is idling for a considerable period of time it may be necessary to open the throttle for a short period of time during the idling period to clear the cylinder of excess gasoline and rich vapor mixture.

6.05 To stop the engine, press the stop switch mounted on the cylinder head, against end of spark plug. Hold until the engine stops.

6.06 After stopping engine, close fuel shut-off valve located at fuel filter to avoid spilling gasoline out through the carburetor when handling the power drive.

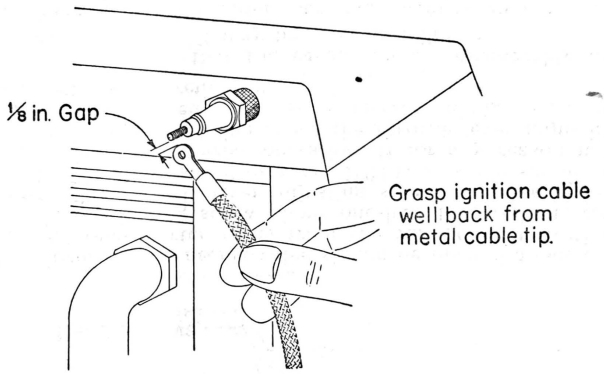
7. ENGINE ADJUSTMENTS

7.01 The operation and maintenance manual issued by the engine manufacturer should be used as a guide in all engine service and maintenance not covered by this practice.

7.02 The spark plug for igniting the fuel-air mixture is a Champion J-8 14 millimeter or the exact equivalent.

7.03 When difficulty is experienced in starting the engine or in adjusting the carburetor in order to obtain a smooth running engine two check tests may be made on the ignition system.

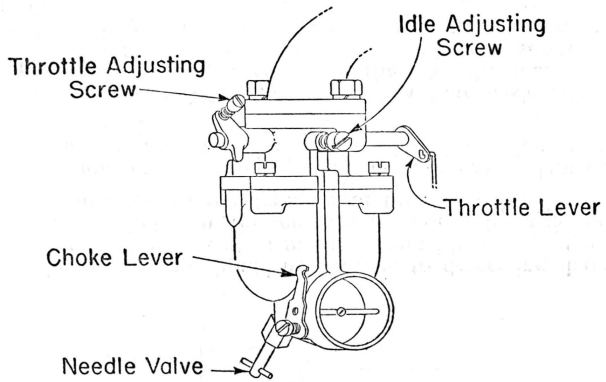
7.04 The spark may be checked by removing the ignition cable from the spark plug and holding the ignition cable terminal about 1/8 inch away from a metal part of the engine such as the cylinder head. Do not make this test near the carburetor. In order to protect against electrical shock the cable should be grasped well back from the terminal. By means of the rope starter rotate the engine flywheel. If the spark jumps the 1/8-inch gap the engine ignition system up to the spark plug is in good condition.



7.05 The spark plug should be checked to determine that it is of the type specified in Paragraph 5.03 and that it is clean. The gap between the electrodes should be .025 inch which is about one-half the diameter of the electrode.

7.06 Ignition cable with cracked or otherwise damaged insulation will interfere with good ignition. Such cable should be replaced.

7.07 The carburetor for the engine has four basic adjustments. The main needle valve, the idle adjusting screw for the idling mixture, the throttle lever adjusting screw for the speed of idling and the choke lever for starting and warm-up period.



7.08 Normally the needle valve should be opened about one and one-quarter turns from the fully closed position, and the idle adjusting screw about one-half to three-quarters of a turn. The throttle lever adjusting screw is preset at the factory for an idling speed of about 1600 rpm which should be satisfactory for power drive operation. If for any reason it is desired to change this idling speed the throttle lever adjusting screw should be turned clockwise to increase idling speed and counterclockwise to reduce it.

7.09 If it appears that the carburetor is considerably out of adjustment, it may be reset as follows:

(a) Turn needle valve and idler adjustment screw clockwise until they both rest lightly against the valve seats. Do not force screws tight against seats or valves may be damaged.

(b) From closed position open needle valve one and one-quarter turns, turning it counterclockwise.

(c) Open idler adjusting screw one-half turn by turning it counterclockwise.

(d) Start engine (Paragraph 4.02) using choke if required and **permit it to warm up thoroughly.**

(e) After engine is warmed up, if necessary further adjust the idle adjustment screw to secure smooth idling condition.

(f) With the engine warmed up readjust the needle valve to a point where the engine operates most smoothly with the idler pulley operated to rotate the hollow drive shaft. This will apply a partial load on the engine.

(g) If it is necessary to keep the choke partially open several minutes before engine runs smoothly, fuel mixture is too lean and needle valve should be opened slightly by turning counterclockwise. Later when full load is applied to the engine it may be necessary to make further adjustment of the needle valve.

Note: Change in the needle valve setting will usually affect the idling mixture and will require further adjustment of the idling screw.

7.10 The engine is equipped with a governor which automatically maintains a constant engine speed regardless of load conditions within the power limitations of the engine. It has been carefully adjusted at the factory and should not be readjusted unless absolutely necessary.

8. ENGINE SERVICING AND LUBRICATION

8.01 The engine fuel tank has a capacity of one gallon and should be filled at the beginning of each day's operation and at other times as required.

Note: On some older models the fuel tank capacity was one-half gallon.

The engine is provided with an efficient lubrication system which supplies oil to all of the internal parts. DO NOT ADD OIL TO THE GASOLINE.

8.02 The crankcase should be filled with engine oil to the level of the filler opening in the base of the engine. On a new engine the oil should be changed after the first five hours of operation. Thereafter, the oil should be changed after every twenty-five hours of operation. The oil may be completely drained from the crankcase by removing the oil drain plug located at the end of the engine base and draining into a pan or other receptacle. Do not flush with kerosene. After draining replace drain plug and refill crankcase to filler hole level with a suitable high grade engine oil. Additional oil to maintain this level should be added after every five hours of operation For operation at temperatures of 32°F. or above, oil having a viscosity of not heavier than S.A.E.—20 should be used. For temperatures below 32°F. oil not heavier than S.A.E.—10W should be used. Similarly, the engine speed reduction gear case located at the pulley end of the engine should be filled through the filler hole in the top of the case until the oil level reaches the level of the inspection plug opening in the lower part of

the case. Use the same viscosity oil as is being used in the engine. After each 100 hours of engine operation check the oil level in the gear case. If it is below the inspection plug opening, oil should be added until it is again level with the plug opening.

8.03 The engine is equipped with an oil bath air cleaner. It is important that it be cleaned and refilled to the indicated level with the same grade of oil used in the engine. Normally this should be done after every twenty-five hours of engine operation. However, under very dusty operating conditions it should be cleaned daily. For method of cleaning see engine manual.

8.04 The rotating mechanism of the power drive is equipped with three Zerk lubrication fittings and should be lubricated at regular intervals.

8.05 When the engine is operated in locations where the air entering the cooling system contains heavy dirt or other foreign matter the cooling system should be cleaned frequently as clogged air passages will result in overheating with possible serious damage to the engine.

8.06 When the power drive will not be in use for some length of time the engine should be completely drained of fuel to prevent gum deposits forming on the essential parts such as the carburetor, fuel filter, fuel lines and tank. Such deposits may affect the proper operation of the engine when the power drive is again used. To drain fuel system proceed as follows:

(a) Close fuel shut-off valve.

(b) Remove filter bowl by loosening the thumb screw at the bottom of the fuel bowl yoke.

(c) Open fuel shut-off valve and completely drain fuel tank into suitable container.

(d) Operate engine until it stops from exhaustion of fuel.

(e) Replace filter bowl.

(f) Leave shut-off valve open.

(g) Remove spark plug and pour one ounce of S.A.E.-20 engine oil into the cylinder. Slowly crank engine to spread the oil. A small amount of graphite grease on the threads of the spark plug will facilitate future removal of the plug.

8.07 After completion of the rodding operations wipe the rods reasonably clean and apply a thin coat of light oil using an oily rag. Particular attention should be taken to oil the thread and interior surface of the couplings.