IDENTIFYING CONDUCTORS
MODEL PR25A — CONDUCTOR TAGGER AND ANALYZER

1. GENERAL

1.01 This section covers the description and use of the Perkins Research Model PR25A Conductor Tagger and Analyzer primarily used to identify cable pairs in subscriber loop and trunk plant, of working and non-working lines, while eliminating the risk of disturbance of customer service.

1.02 Whenever this section is reissued, the reason(s) for reissue will be provided in this paragraph.

1.03 The Model PR25A can be used for the same purposes as the 76C Test Set. Its main feature is the automatic sensing circuit which prevents tone from being applied to an in-use working line. The set provides additional features such as an ohmmeter, battery check, variable tone interruption rate, talk circuit, voltmeter, etc.

2. DESCRIPTION

2.01 The Model PR25A Conductor Tagger and Analyzer is a battery-operated solid state tone source, monitoring and resistance-measuring device. It is housed in a heavy-duty leather case with a reinforced plastic body and is equipped with leather straps and clips for hanging from a cable or strand (Figure 1). The set is supplied with three cords (Figure 2) and utilizes three batteries. Optional cords are available for balance testing and simplexing. A battery compartment and storage space for cords is provided at the rear of the leather case (Figure 3).

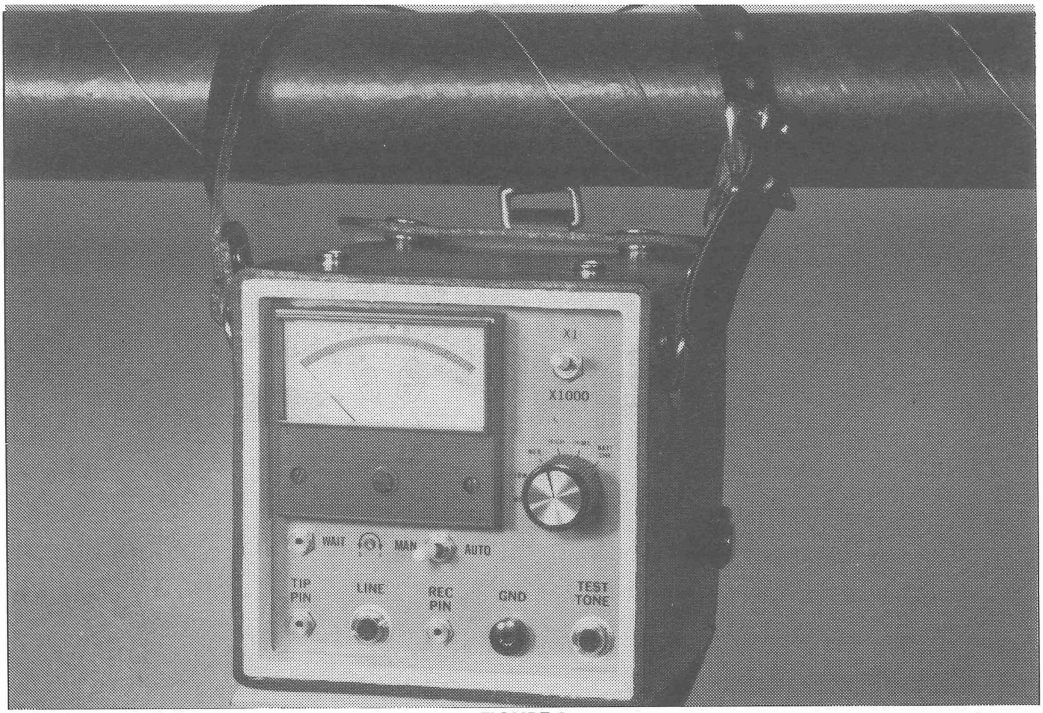

FIGURE 1
Conductor Tagger and Analyzer — PR25A Test Set

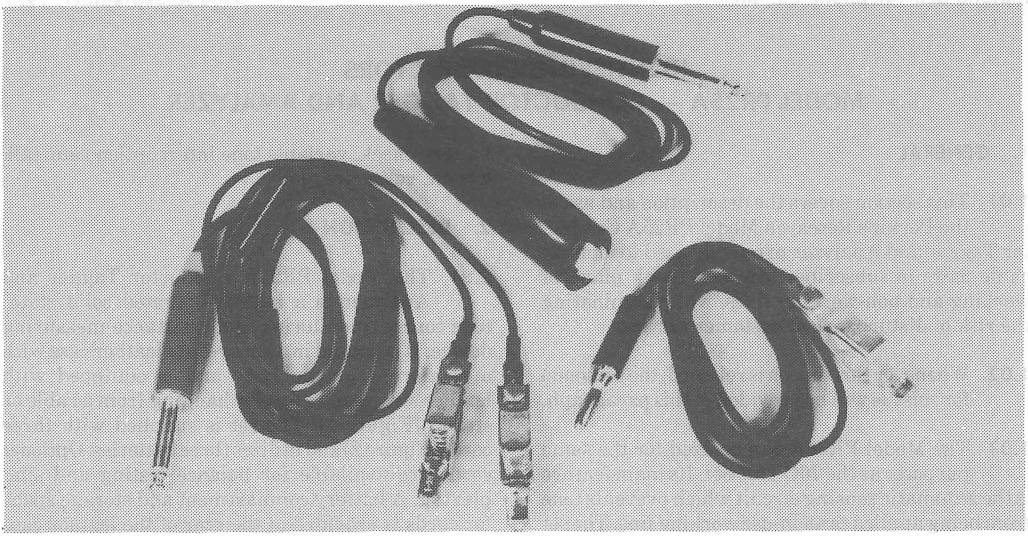

FIGURE 2
PR25A Cords

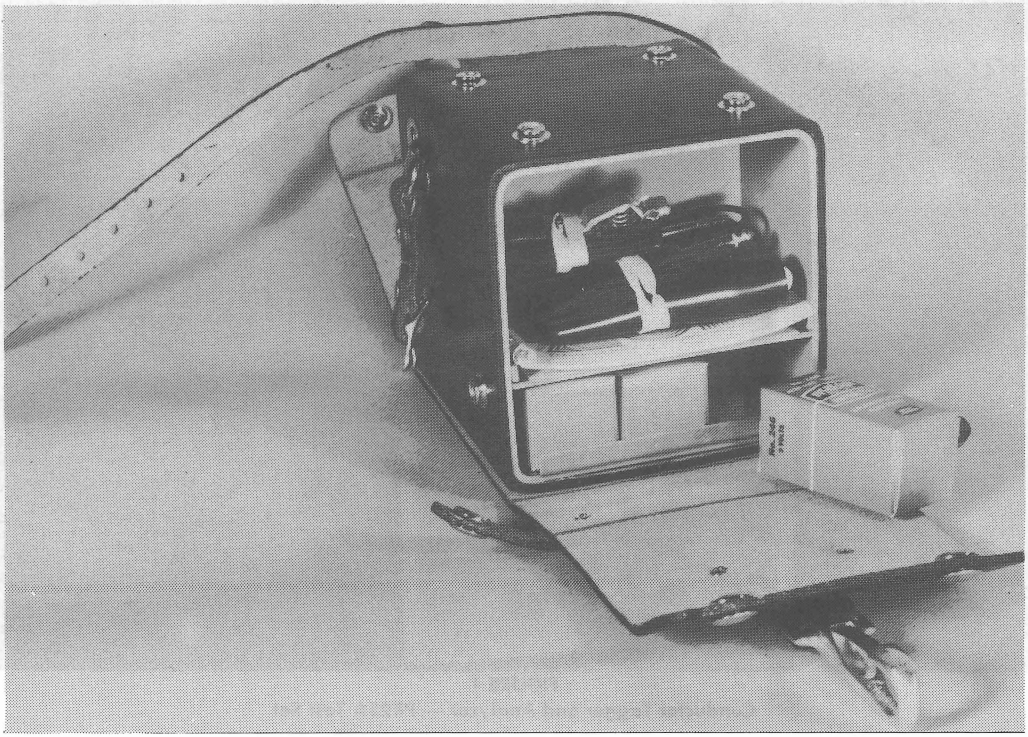

FIGURE 3
Compartment in Rear for Storing Batteries and Cords

2.02 The features of the Model PR25A Conductor Tagger and Analyzer include a tone for tagging purposes, a meter for visual monitoring, an audio signal for establishing a talk circuit, a visual battery check, an adjustable tone interruption rate, a choice of three tone levels, capacity of capacitance checking, balance testing, simplexing (with optional cord), and a voltage sensing circuit that will not allow transmittal of tone when a telephone line is in use. This last feature permits tagging of working lines without the risk of disturbance of customer service.

2.03 The Model PR25A provides a 577.5 Hz interrupted tone.

2.04 The unit comes equipped with a Ground Cord (COM 100B), a Line Cord (COM 200B), and a Test Tone Cord (COM 300B). See Figure 2. An option tone cord is available, designated the COM 300 cord (see Figure 4), which incorporates an in-line switch for those who desire ON—OFF control of the tone at the craftsman's hand. Another available optional cord is the COM 400A (see Figure 5), which can be used for audible balance testing of new cable section pairs, and also simplexing of the tone in cables where many circuits are busy. The COM 400A may also be ordered with a B-transfer clip, rather than individual clips, and in this configuration it is identified as the COM 400B.

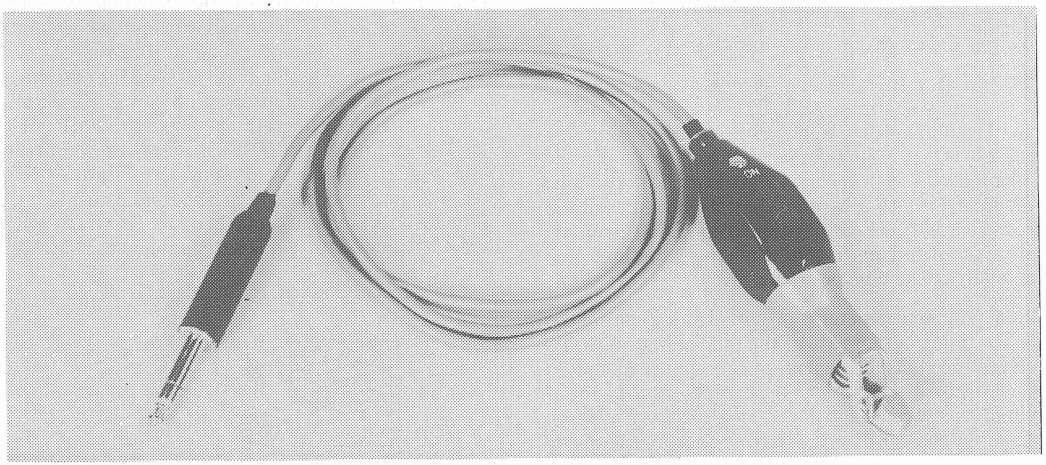

FIGURE 4
COM 300 Cord

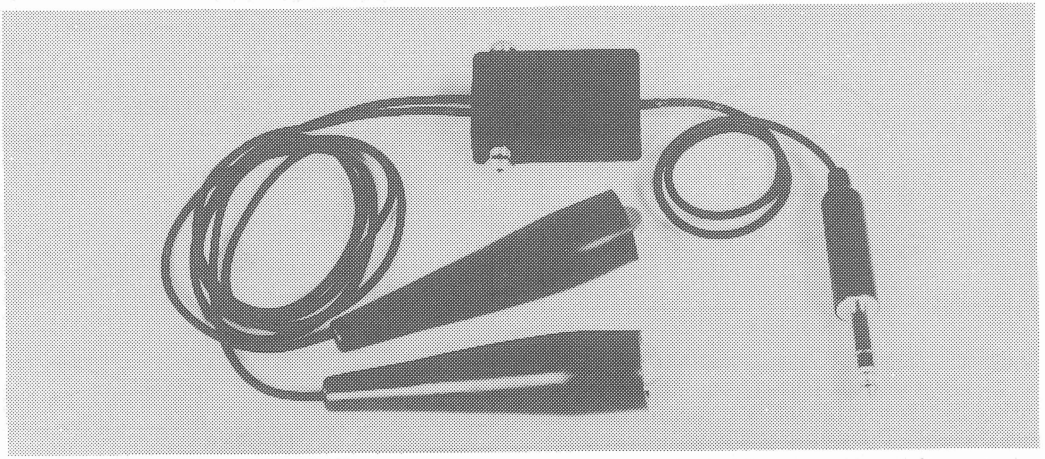

FIGURE 5
COM 400A Balance Test Cord

2.05 The test set requires three identical 9-volt batteries. Normal battery life is in excess of 100 hours of operation. Batteries should be removed prior to long storage of unit at temperatures exceeding 70° F. Standard manufacturer numbers are: Burgess 2N6, Eveready 246, or RCA Vs305. Instructions for battery replacement are on the shelf separating the battery and cord compartments.

2.06 A Function Knob is provided on the face of the test set for selecting any one of three tone positions, LOW, MED, HIGH. The Function Knob also is used to put the test set in the ohmmeter mode. In another position, the line voltage may be monitored without sending tone. Finally, the Function Knob must be set to the BATT CHK position for testing the condition of the batteries.

2.07 The voltage sensing circuit is controlled by the MAN (manual)-AUTO (automatic) control switch on the face of the test set. With the switch in the AUTO position, the tone will transmit when the meter needle is in the green area on the voltmeter; the tone will not transmit when the needle is in the red area. In the MAN position, the sensing circuit is eliminated and tone is sent when the Function Knob is in any of the tone positions.

2.08 A potentiometer is provided for adjusting the interruption rate of the tone being sent. The end of the shaft of the pot appears on the faceplate (see Figure 6) surrounded by an arrow at the ends of which are the letters "S" (slow) and "F" (fast). Turning the shaft in either direction increases or decreases the interruption rate of the tone. This allows more than one unit to operate simultaneously in the same cable without confusion of tones.

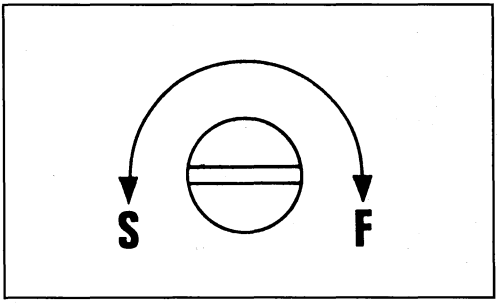

FIGURE 6

2.09 The ohmmeter may be used to read low or high resistance faults by selecting the appropriate scale by operation of the switch marked "X1" and "X1000". This switch is also used for making capacitance checks, such as when attempting to identify the presence of subscriber instrument on the field side during a cable transfer.

2.10 An audible wait feature is provided that utilizes the headset of the craftsman with the PR25A.

3. OPERATION — TAGGING

3.01 The battery check is performed by first testing the condition of the two 9-volt batteries that power the tone circuit. Turn the Function Knob to BATT CHK position (see Figure 7) and insert the COM 300B Test Tone Cord into the TEST TONE jack. If the meter needle fails to indicate within the area marked "TONE BATT OK", both tone batteries should be replaced. The tone batteries may be identified from the schematic diagram on the battery replacement instruction label. To test the condition of the single 9-volt battery that powers the talk circuit, turn the Function Knob to the BATT CHK position andinsert the COM 200B Line Cord into the LINE jack. It is necessary that the TEST TONE jack be vacant for this test. The meter needle will indicate within the area marked "TALK BATT OK" if the battery condition is satisfactory, as shown in Figure 8.

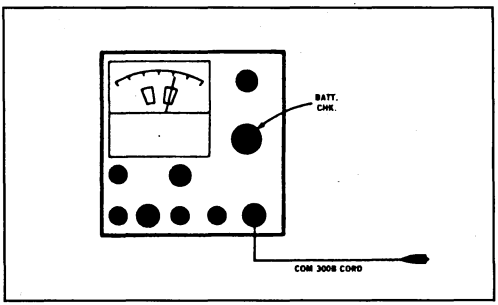

FIGURE 7
TESTING TONE BATTERIES

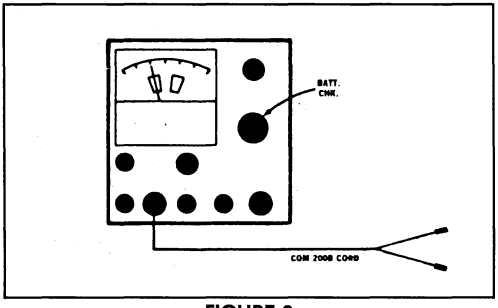

FIGURE 8
TESTING TALK BATTERY

3.02 To establish the talk circuit, send the cord connections and set the switches as shown in Figure 9. The unit will send tone on the pair selected for talking. The craftsman at the far end will search the cable for the pair with the tone, either directly using his headset, or with the aid of an amplifier (not shown). When the pair with the tone has been identified, the far-end craftsman connects his headset directly across this pair. This causes a distinct loud signal from the headset of the craftsman with the PR25A. See Figure 10. On receiving this signal, the craftsman removes the headset clip from the WAIT pin and connects it to the REC pin, which completes the talk circuit. See Figure 11.

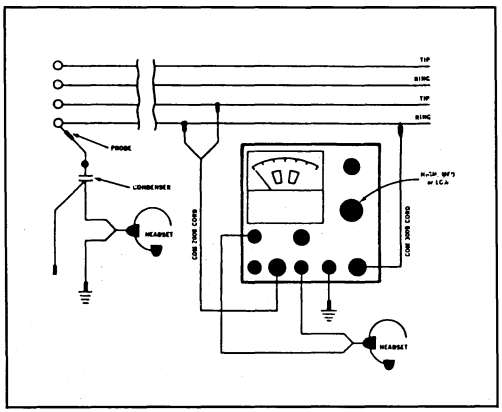

FIGURE 9
ESTABLISHING A TALK CIRCUIT STEP 1

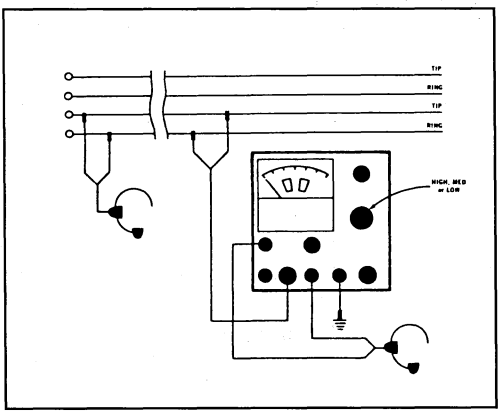

FIGURE 10
ESTABLISHING A TALK CIRCUIT STEP 2

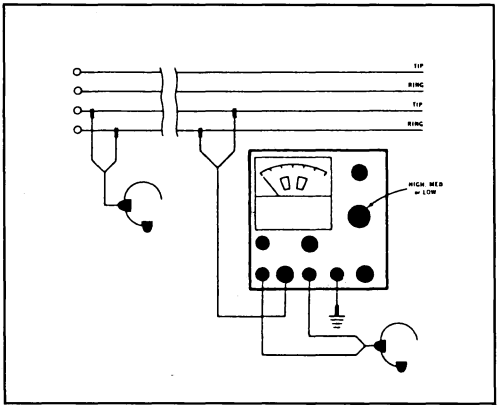

FIGURE 11
ESTABLISHING A TALK CIRCUIT STEP 3

3.03 For the standard tagging method, the cord connections and switch positions are shown in Figure 12 for automatic tagging, which is recommended. In this AUTO position of the Function Knob, tone will be sent when the COM 300B cord is connected to one side of a vacant pair (no voltage, or less than five volts on pair) or a working line not in use (between 45 and 56 volts). The test set recognizes a working line in use by sensing the presence of a voltage between approximately 5 and 45 volts on the conductor; as long as this condition exists, no tone will be sent. If the unit is sending tone and the customer comes on the line (goes off-hook), the tone will imemdiately cease. On sensing a ringing voltage from an incoming call, the test set is designed to stop sending tone and to lock off until reset. Resetting is accomplished by temporarily removing the COM 300B cord from the line or by moving it to another pair. The condition of the line can always be determined by observing the meter indication. The red area indicates the voltage level at which the test set does not send tone in the AUTO mode; in the green area, tone is being sent.

3.04 In some instances, where tone is being sent in the AUTO mode of operation as last described, it may be necessary to send tone at an otherwise restricted voltage (for example, a 24-volt PBX line). This can be done by switching from the AUTO to the MAN mode. The recommended procedure would be to monitor the condition of the line with the Function Knob in the monitor position and, if the line is not in use, to turn the knob to one of the tone positions.

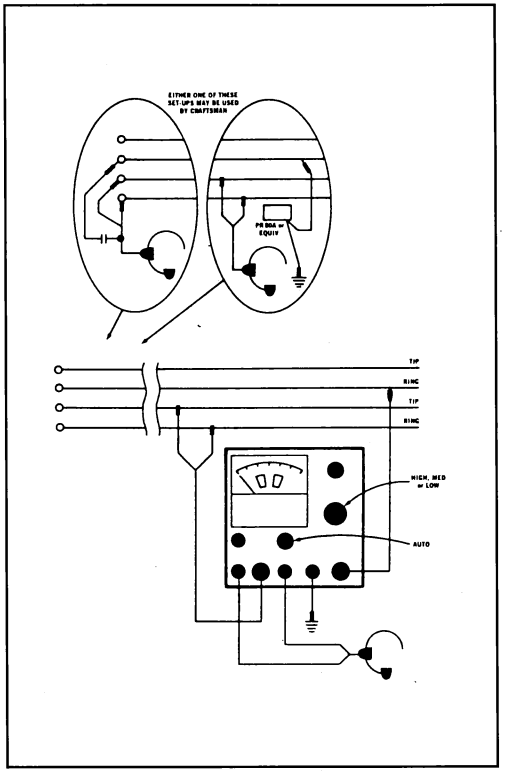

FIGURE 12
TAGGING — STANDARD METHOD

3.05 The level of tone, i.e., LOW, MED, HIGH, as selected through the Function Knob, will depend upon the particular tagging operation and line conditions. For normal tagging operations, tone should be sent with the Function Knob in the MED position. This will optimize the battery life while permitting ease of tone pickup at the far end. On very short cables, where the tone may spread so it becomes hard to identify the conductor carrying the tone, the Function Knob should be set in the LOW position. On extremely noisy and long-length cables, the HIGH position may be required.

3.06 A special cord connection may be desirable when tagging very short cable or in unusual cases where the tone is exceptionally hard to hear. In Figure 13, an acceptable mode of operation is shown, although the automatic tone cut-off feature cannot be used since the switch must be in the MAN position.

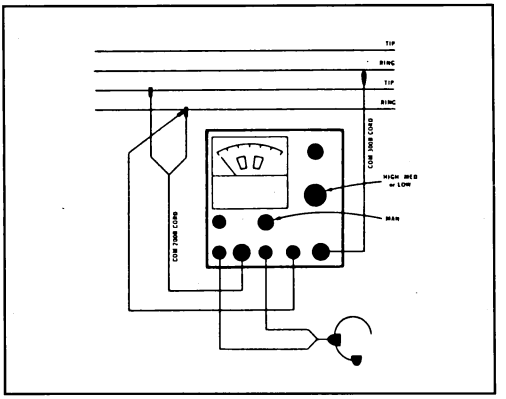

FIGURE 13
SHORT CABLE TAGGING (MANUAL ONLY)

4. OPERATION — OHMMETER

4.01 To verify the presence or absence of a ground on a vacant pair, make the cord connection and position the switches and Function Knob as shown in Figure 14. Always start with the Range switch in the X1000 position. If no constant deflection of the meter needle is encountered, this indicates the absence of ground on that side of the pair. Move the COM 300B cord to the opposite side of the pair. If a constant meter deflection occurs, determine the amount of resistance by adding three zeros to the reading on the scale. For example, a meter reading of 10K Ohms (10,000) becomes 10 Megohms (10,000,000). If the meter needle is deflected constantly to the far right of the scale, move the range switch to X1 and read the meter directly.

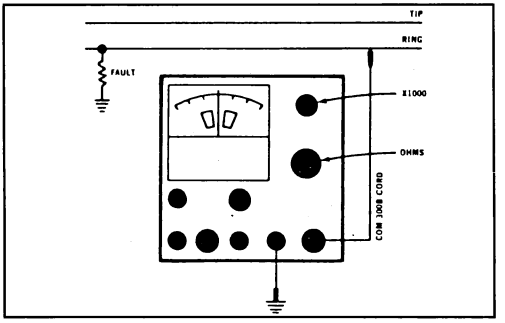

FIGURE 14
TESTING FOR GROUNDED CONDUCTOR

4.02 To check for a short on a vacant pair, make the cord connections as shown in Figure 15. Follow the procedure for determining the amount of resistance as described above in Paragraph 4.01 for detecting grounds.

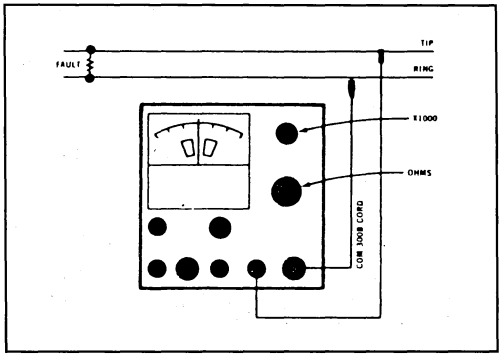

FIGURE 15
TESTING FOR SHORTED PAIR

4.03 To use the capacity check feature, the cord connections are made and the switches and Function Knob are set as in the resistance measuring mode (see Figure 16). To obtain a momentary meter deflection (kick), operate the Range switch from X1 to X1000 and observe the maximum point of deflection. It is not necessary to rapidly flip this switch back and forth (as with older test sets) to produce a significant deflection.

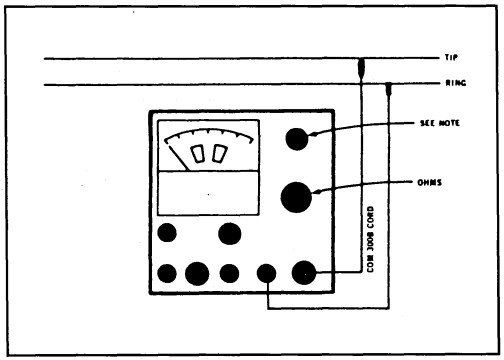

FIGURE 16
CAPACITY CHECK ACROSS PAIR
NOTE: Operate Range Switch from X1 to X1000 and observe meter deflection.

4.04 A particular type of capacity measurement may be made to determine the presence of an instrument connected across a pair. This is done by connecting the clips of the COM 300B cord across the pair as described above in Paragraph 4.02 (see Figure 15), used for checking for shorts. When the Range switch is operated from X1 to X1000, an exceptionally large kick will occur due to the presence of a capacitor in the ringer circuit of the subscriber's instrument.

4.05 The capacity balance of a pair can be visually determined (an audible capacitance balance test may be performed with the optional COM 400 cord, described below) by connecting the COM 300B cord clips as shown in Figure 17. Operate the Range switch from X1 to X1000 and carefully note the exact maximum point of deflection. Move the clip ofthe COM 300B cord to the other side of the pair and again operate the Range switch from X1 to X1000 and compare the deflection. On a good balance pair, the readings will be identical.

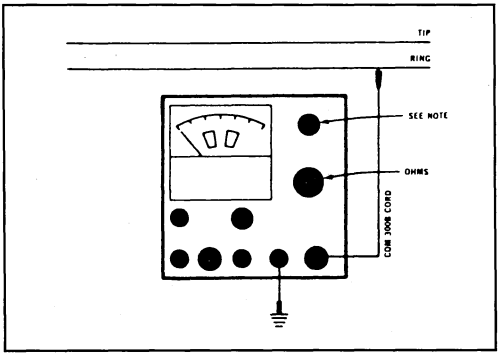

FIGURE 17
CAPACITY TEST OF PAIR
ONE SIDE TO GROUND
NOTE: Operate Range Switch from X1 to X1000 and observe meter deflection.

4.06 To estimate the location of an open on one side of a pair, perform the balance test described in Paragraph 4.05 and compare the readings. The greater the difference between the readings, the closer the open is to the craftsman.

5. OPERATION — AUDIBLE BALANCE TESTING

5.01 The optional COM 400A cord may be used for audible balance testing. Balance testing is a

term used to describe a method of determining whether or not a vacant cable pair or a group of vacant pairs contains any significant physical faults. The preferred method is to compare one conductor of a pair with its mate and subsequently all other conductors in sequence. Balance testing each pair individually may result in the failure to detect short circuits, opens on both sides of the pair, or punchbacks. Basically, the test set is used to provide a grounded tone source which the cord splits over two equal resistive paths to each clip of the cord. If these clips are connected individually to separate conductors in the cable and the conductors are electrically equal, the tone will be split equally over both conductors. If a listening device is placed across the conductors, it would pick up the tone only if one conductor contained a fault that was not present on the other conductor, i.e., an unbalance.

5.02 Connect the cords and set switches and Function Knob as shown in Figure 18. Now connect either one of the clips (designated as the first clip) to one of the conductors desired to be tested. The tone should be heard significantly loud. Connect the second clip to one of the other conductors in the same group. the tone should reduce down to an almost imperceptible level when both hands are clear of the clips. Be removing the second clip from the conductor and placing it on each of the other conductors in sequence, letting go of the clip each time, the condition of the pairs can be verified. Faulty conductors will produce a higher level of tone. If the majority of conductors appear faulty, it may be due to the first clip having been placed on a faulty conductor. Selecting another conductor for the first clip should correct this condition.

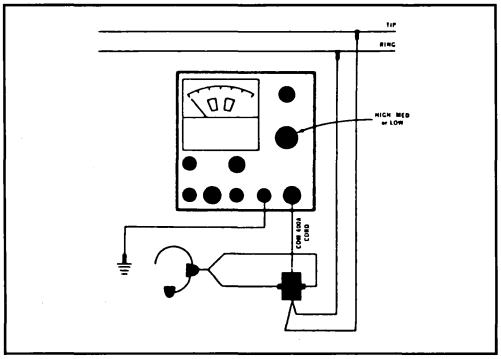

FIGURE 18
BALANCE TESTING USING COM 400A CORD

6. OPERATION — SIMPLEXING WITH COM 400A OR 400B CORD

6.01 Simplexing is normally used to provide an almost inaudible tone on a line so that tone may be sent even while the line is working and in use. In most tagging operations, the most efficient and speedy manner of tagging would be to use the automatic tagging procedures outlined in Paragraph 3.03. However, in some extremely busy cables where most circuits are in use, it may be desirable to tag in the simplex mode rather than to "pass" busy lines and later pick them up as required with the automatic tagging method of operation.

6.02 Connect the cords as shown in Figure 19. Place the toggle switch in the MAN position and the Function Knob in the MON position. It is important that the Function Knob be in the MON position each time the COM 400A or B clips are connected or disconnected from a pair. With the Function Knob set to MON, clip on to each side of the pair. Care should be taken not to allow the clips to touch each other or contact any exposed conductive surface. When good contact with both sides of the working pair (in use or idle) have been made, the meter will indicate a reading of 25 volts ±2.5 volts. This section of the meter face has a thicker, boarder line to aid in rapid recognition of the safe zone. When applying simplex at the extreme outer loop limits of a central office, it is recommended that the meter indication be observed when the first clip is applied to the pair. If the meter indicates 22.5 to 27.5 volts, verify that the reading changes when the other clip is applied to the opposite side of the pair.

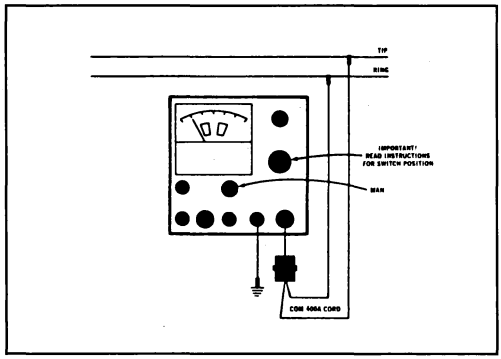

FIGURE 19
SIMPLEXING USING COM 400A CORD
IMPORTANT — SEE INSTRUCTIONS

6.03 When the proper indication is observed on the meter in accordance with the set-up as described in the preceding paragraph, turn the Function Knob to one of the send tone positions, LOW, MED or HIGH (the LOW position is preferred). After the pair has been identified, turn the Function Knob back to MON, prior to removing the COM 400A or B clips.

6.04 In some operations it may be desirable to only monitor the line voltage. Examples are section throws or cutovers where pairs have been previously identified and it is only necessary to determine whether a line is in use prior to cutting or swinging. This may be done by setting the Function Knob to the MON position where the pair voltage status may be visually checked on the meter (see Figure 20). In this mode of operation, there is no drain on the test set batteries.

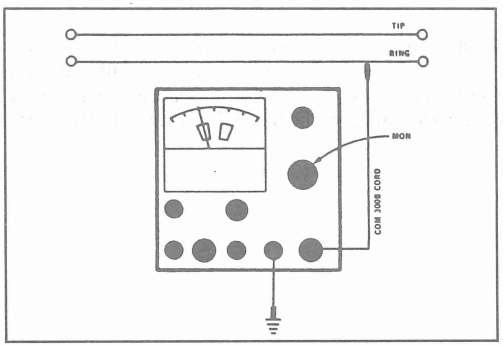

FIGURE 20
MONITORING ONLY

6.05 After the proper cord connections have been made, monitoring and identification may proceed.

6.06 The COM 300B test tone cord is used for monitoring and tagging purposes.

6.07 When monitoring to determine the status of a cable pair, the needle point clip is placed on the ring side of the pair. Meter readings observed indicate the following circuit activity:

(a) 0 Volts- Spare pair, dead or defective pair, reversed pair. (Figure 21)

(b) 24 Volts- Working line in use. There may be a slight variation of split voltage. However, both sides of the line will total 48 volts. (Figure 22)

(c) 48 Volts- Idle working line. (Figure 23)

(d) 0-10 Volts-Generator pair (vibrating needle).

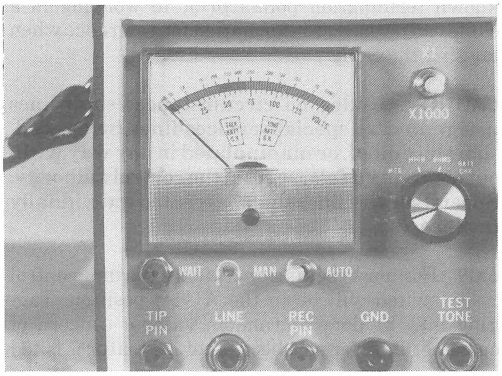

FIGURE 21
Vacant Pair

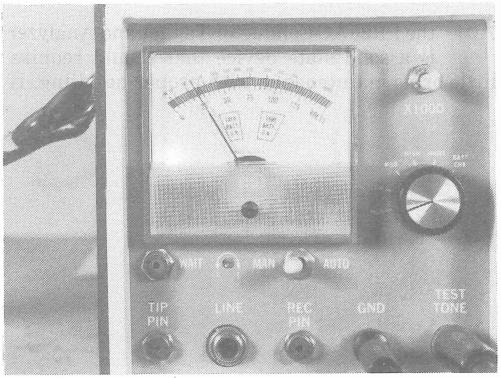

FIGURE 22
Working Lines in Use

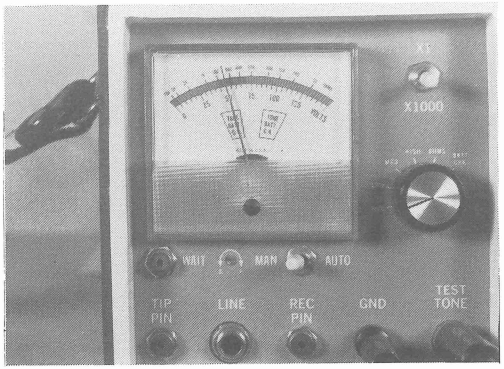

FIGURE 23
Working Lines Not In Use

6.08 Special circuits will give indication of various voltages. Readings taken and recorded at known termination points prior to working in a cable can be used as information for reference when tagging the cable.

CAUTION: Under no circumstances shall lines designated as special services lines be opened, short circuited, or manipulated in any way without obtaining a release from the control authority. Special service lines shall be treated individually in all cases.

6.09 For most tagging operations, the unit control switch will be in the AUTO posiiton. Tagging may be done at random without concern of customer interference because of the features lsited in 3.03.

7. MAINTENANCE

7.01 the PR25AC Conductor Tagger and Analyzer is a solid state device that should require little or no maintenance with proper handling. If maintenance is required, the PR25A should be returned to:

Perkins Research & Mfg. Co., Inc.
6635 Independence Avenue
Canoga Park, California 91303

It is suggested that United Parcel be used for the least expensive type of shipment and for the fastest service.

7.02 When not in use, it should be stored in a safe, dry location.

7.03 Replacement cords or optional accessory cords may be ordered separately through Construction Staff.

7.04 Battery replacement can be obtained from Ameritech Services Regional Distribution Center (RDC) as a stock item. See Paragraph 2.05 for a description of the batteries which may be used.