

**ALTERNATE FULL PERIOD TELETYPEWRITER  
PRIVATE LINE SERVICES  
DESCRIPTION AND OPERATION**

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4.02 Remote Transfer . . . . .	2	1.02 This section describes the operation of an Alternate Full Period Teletypewriter Service using customer equipment as shown on drawing WA-14135-SD. The equipment is arranged so that the customer may use either the full period or the teletypewriter circuit on an alternate basis by operation of a switch. The practice also covers the procedures for central office testing and maintenance using a central office test arrangement as shown on drawing WA-14274-SD.	
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5.01 Transfer Key and Lamp (Transferring) . . . . .	2	2.01 This alternate service is designed to operate on standard four-wire facilities and requires the use of four-wire loops. The levels are those required on any average full period circuit. In cases where it is necessary to use echo-suppressors, it is required that they be located in a central office location serving a terminal point. The customer equipment provides a control lead which may be extended to the central office on one of the simplex leads (SX) to disable the echo-suppressor. At each location serving a customer location, a bridge leg to the telegraph testboard is required. In cases where the telegraph test center and the private line telephone test center are not in the same location, it will be necessary to provide switching relays on each leg and terminations on	
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the bridge as covered by Fig. 2, on the multipoint services only. The normally open contacts should be extended to the telegraph testroom. Several of these may be tied to a common trunk.

**2.02** In those cases where the Serving Test Center (S.T.C.) is a location which is not a toll testroom, the bridge leg and switching relays should be added at the nearest testroom on the circuit. Coils which have a simplex tap should be used on the customer loops.

**2.03** Fig. 1 illustrates a typical customer installation, Central Office arrangement, and the central office teletypewriter test arrangement.

### 3. CUSTOMER EQUIPMENT

**3.01** The customer equipment is made up of a full period termination and a teletypewriter set utilizing a 130C1 subscriber set equipped with a 43A1 telegraph carrier channel unit. The full period termination and the line coils of the telegraph carrier channel are connected to the four-wire loop through a switch. The operation of the switch allows either the full period or the teletypewriter equipment to be connected to the loop. The 43A1 channel of the 130C1 subscriber set operates in both directions on the same frequency (1955 cycles) which requires the standard channel 10 networks. The channel send switch shall be set "HM" and the receive switch shall be set "H+". The standard telegraph level as measured at the line coils shall be -8DBM, and the receiving gain shall be set at maximum.

**3.02** Included on the teletypewriter machine is an assembly of keys and lamps, which allows the customer to manually or remotely control the teletypewriter circuit as well as providing a visual guard.

### 4. TELETYPEWRITER EQUIPMENT FEATURES

**4.01 Manual Transfer:** At each customer location a manual nonlocking transfer key is provided. In order for a subscriber to transfer from telephone to telegraph service, the transfer key must be held operated for approximately four seconds, at which time the associated transfer lamp will light indicating a transfer to telegraph. Manual transfer must be done at all customer locations. In order to transfer back to telephone service, the customer

must momentarily operate the RLS key at all locations.

**4.02 Remote Transfer:** For remote control service the transfer key is operated for approximately four seconds at the originating station only. After the four-second interval, all remote control stations will be connected to the line for telegraph service. Remote control service operated full duplex is limited to point-to-point operation. To transfer back to telephone service the originating station sends an end-of-transmission code (upper case "H"), transferring all stations on the line back to telephone service.

**4.03 Central Office Test Equipment (Teletypewriter):** The central office test equipment is basically the same as the customer teletypewriter equipment; however, it includes a switch to cause the loop-back feature to operate in the customer equipment. The loop-back feature is omitted in the central office test equipment. The central office equipment as shown on WA-14274-SD should be in the kneewell of a Moder 28KSR teletypewriter which should be located in a convenient location in the telegraph test center. The larger testrooms which are equipped with the Atlantic Research Private Line Automatic Test Cord should have one test cord wired into a convenient location for use in testing the teletypewriter equipment on the alternate service.

### 5. OPERATION

**5.01 Transfer Key and Lamp (Transferring):** To initiate a remote control transfer from telephone to telegraph service, the TR key must be manually held operated for four seconds, at which time the white TR lamp will light at all locations, and the 43A1 send frequency of the originating station will be connected to the line. The receive side of the 43A1 terminal is connected to the receive side of the voice circuit through a 20DB pad. The 20DB pad limits the sensitivity of the receiving side of the 43A1 terminal to approximately 12DB. This prevents talk-back at the carrier frequency. The receive side of the 43A1 is connected to the line when the transfer is made, at which time the talk-back amplifier and echo-suppressor are removed from the line.

**Note:** Echo-suppressors must be located at a terminal point.

**5.02 Send and Receive Lamps:** The green send lamp will light at the originating station when the TR key is operated and will remain lighted after the transfer from telephone to telegraph service has taken place. The send lamp will remain lighted as long as the station is in the sending condition. At the same time the transfer takes place, a white receive lamp and buzzer will operate at all other stations. The buzzer can be silenced by momentary operation of the buzzer release key. If a receiving station starts to send, its receive lamp will release and the send lamp will light. This indicates the station has seized the circuit and is in the sending condition. The reverse transformation of send and receive lamps takes place at the originating station indicating it is now in the receiving condition, and another station desires to send.

**5.03 Contention:** On normal multipoint telegraph operation, only one sending carrier can be on the line at one time. If two stations start to send simultaneously, both send and receive lamps light and the buzzer will operate at both stations. This will put all other stations on the circuit in a closed-down condition. In this condition the buzzer release key will not silence the buzzer.

**5.04** In order to restore the circuit for normal operation, the CT key must be operated at one of the stations. When the CT key is operated, the buzzer will silence and the send frequency will be removed from the line. The send lamp will release and the receive lamp will remain operated. This indicates that the contention has been cleared and the station that operated the CT key is in the receiving condition. Contention does not affect point-to-point service.

**5.05 Service Restoration to Full Period:** The RLS key is provided in order to restore the circuit from telegraph manual service to telephone service. The RLS key must be operated at all manual stations. This operation is not necessary for remote control service because the end of transmission code (upper case "H") is provided. For remote control service, the RLS key is used to silence the buzzer.

**5.06 Restoration to Full Period After Equipment Failure:** The emergency line release key (EMG) is provided with manual transfer service. In the event of a trouble condition whereby a station cannot normally transfer from telegraph to

telephone service, the transfer to telephone service can be accomplished by operating the locking type emergency line release key. When the EMG key is operated, the red EMG lamp will light and the line is normally transferred back to telephone service. If a trouble condition exists, the key can be left operated until the trouble is cleared.

**5.07 Answer Back:** The answer back feature is provided as a wiring option for point-to-point half duplex service using the remote control transfer arrangement. With this option, when the originating station operates the transfer key, the send lamp lights momentarily and the receive lamp lights indicating that the receive station equipment is on the line. Transformation of the send and receive lamps takes place when the originating station starts to send.

## 6. CENTRAL OFFICE RESPONSIBILITIES

**6.01** The full period testboard control office will be responsible for the overall operation of the alternate telephone-telegraph service. The subscriber will report trouble on the telephone service to the full period board. If the customer experiences trouble on the telegraph service, he will call the telegraph testboard direct. If a trouble report initiated by a customer indicates to the telegraph tester that transmission testing is required, to aid in sectionalizing the trouble, the telegraph tester will request the full period boardman to check the voice circuit. The full period tester will take any necessary action to clear trouble existing on the transmission facilities and will assist the telegraph tester when necessary to expedite service restoration.

*Note:* In no case will the customer be asked to refer a call to the other testboard.

## 7. TESTROOM PROCEDURES

**7.01 Teletypewriter Testing:** The central office test arrangement is wired for *manual service* and is used for testing and monitoring at the telegraph testroom on point-to-point or multipoint service, either manual or remote control, full duplex or half duplex.

**7.02 Monitoring (Teletypewriter):** Connect the jacks of the central office test arrangement via patch cords to the telegraph jacks of the bridge appearance of the circuit to be monitored. The

telegraph test equipment is now connected to the four-wire bridge line and could be referred to as another station added to the bridge. This bridge line, when not in use, terminates in 600 OHMS through the normals of the telegraph jack appearance.

**7.03** Operate the duplex key associated with the central office test arrangement to the *monitor* position. This key must be operated to keep the send frequency of the test equipment off the line and avoid interruption to a working circuit.

**7.04** Manually operate the TR transfer key at the telegraph monitoring position. Hold this key operated (approximately four seconds); the TR lamp will light. If the circuit is in the telegraph condition at a customer station, the receive lamp will light. The telegraph equipment is now connected to the line and is in the receiving condition. If the circuit is in the idle telephone condition, the receive lamp will not operate. The receive lamp will flicker, if the telephone circuit is busy.

**7.05 *Testing Half Duplex Circuits:*** In order to make tests with the customer or the maintenance man, proceed as in 7.02. After the TR key has been operated and the equipment connected to the line in the monitor condition, operate the DX key to the HDX position. Two-way tests may now be made. Upon completion of tests, operate the DX key back to the monitor position and then momentarily operate the RLS key. This will transfer the test equipment back to the telephone condition.

**7.06 *Testing Full Duplex Circuits:*** Proceed as in 7.05. It will be noted that the customers will be operating into the four-wire loop on an FDX basis; however, the central office equipment will actually be arranged for HDX. The FDX position on the DX switch is only used for loop-back tests of the 43A1 channel located in the customer teletypewriter gear.

**7.07 *Use of the Automatic Test Cord:*** When the maintenance man calls the testboard for tests required as a result of making a routine or trouble maintenance, a release must be obtained from the control office and then the loop or leg involved must be extended to the telegraph testboard. The teletypewriter test gear should be patched up as described in 7.02, 7.05, and 7.06. The automatic test cord should then be patched into the test terminals associated with the dc output of the channel. When the maintenance man sends toward

the testroom, a special teletypewriter signal will cause the automatic test cord to be conditioned for the proper speed of operation. The maintenance man may then obtain biased fox or unbiased fox from the automatic test cord, and may have the output of his keyboard and/or transmitter checked. At the conclusion of the tests, the maintenance man need only send a 12-second open with his break key to alert the testroom that the tests are completed and the customer leg or loop should be restored to the working circuit. Tests outside the scope of the automatic test cord will still require testroom assistance.

**7.08 *Loop-Back Tests:*** The subscriber set has built into it a loop-back repeater which ties the send and receive sides of the 43A1 channel at the customer location together. The control of the loop-back repeater is tied back to the central office via the SX of one of the loops. The control lead is in turn activated in the central office by operating the DX switch to the FDX position. There will be about a ten-second delay before the loop-back repeater will operate after the DX switch has been operated. This is the warm-up time required by the repeater. Signals may now be sent out through the customer 43A1 channel and received back on the receiving side of the central office test gear. This will enable the testroom to determine if trouble exists in either side of the 43A1 channel. It is suggested that the loop-back feature be activated during the time the maintenance man is making routine tests. During the time fox is being sent to the maintenance man, it can also be measured on the return side of the channel, thus giving an indication as to the quality of the 43A1 channel gear. When testing is completed, the DX key must be operated to the M position before the RLS key can be operated to transfer the test equipment back to the telephone condition.

**Note:** The loop-back feature cannot be used by a remote testroom unless the control lead is extended to the remote testroom.

**Reference:**

Alternate Telephone-Telegraph Private Line Service

WA-14135-SD SWT, CD, ED

130C1-130B2 Subscriber Set—SD-70847-01 (BSP 570-303-XXX)

43A1 Channel Terminal—SD-70552-01 (BSP 312-700-XXX)

Central Office Test Arrangement—WA-14274-SD-SWT, CD, ED

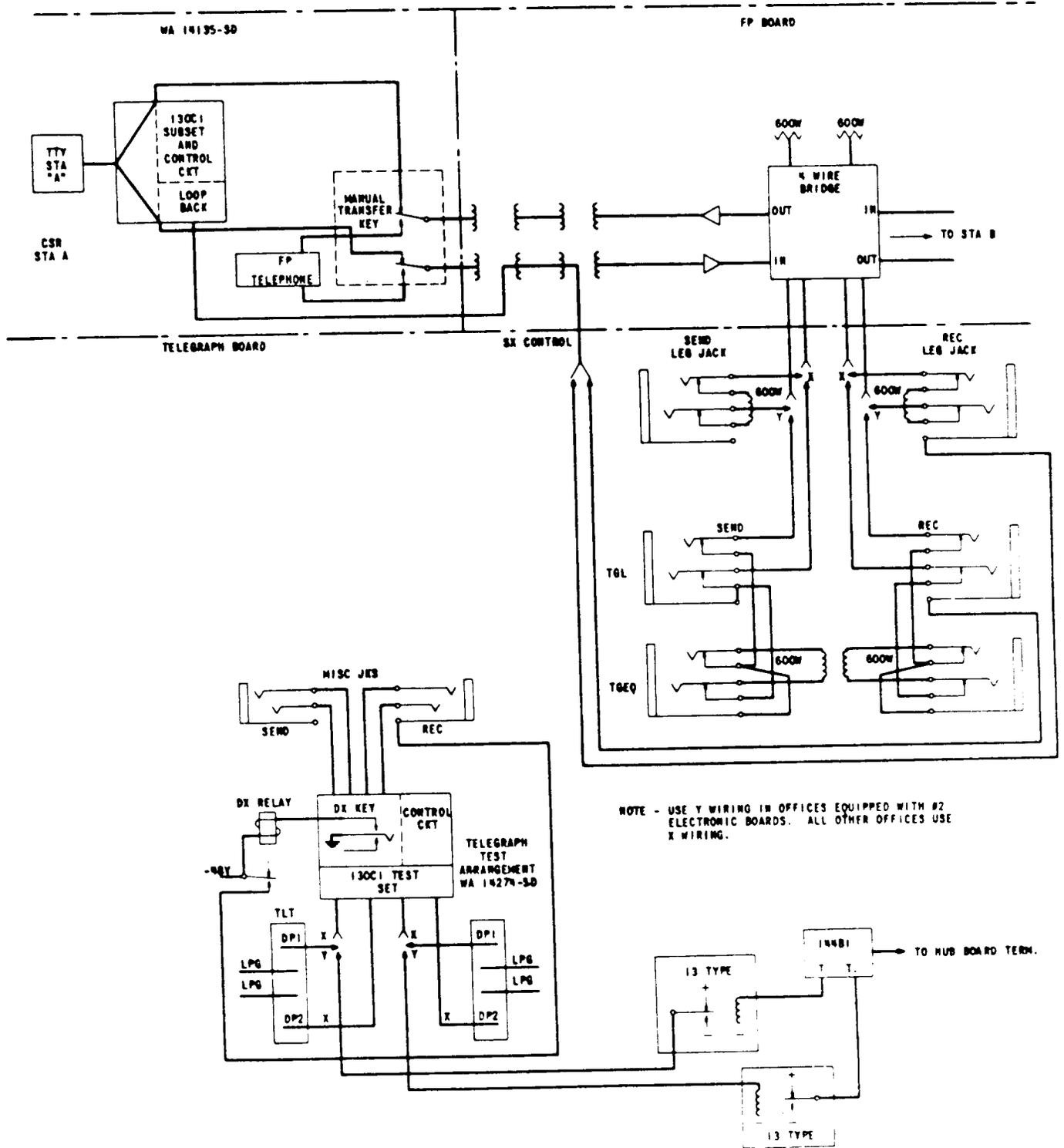


FIG. 1

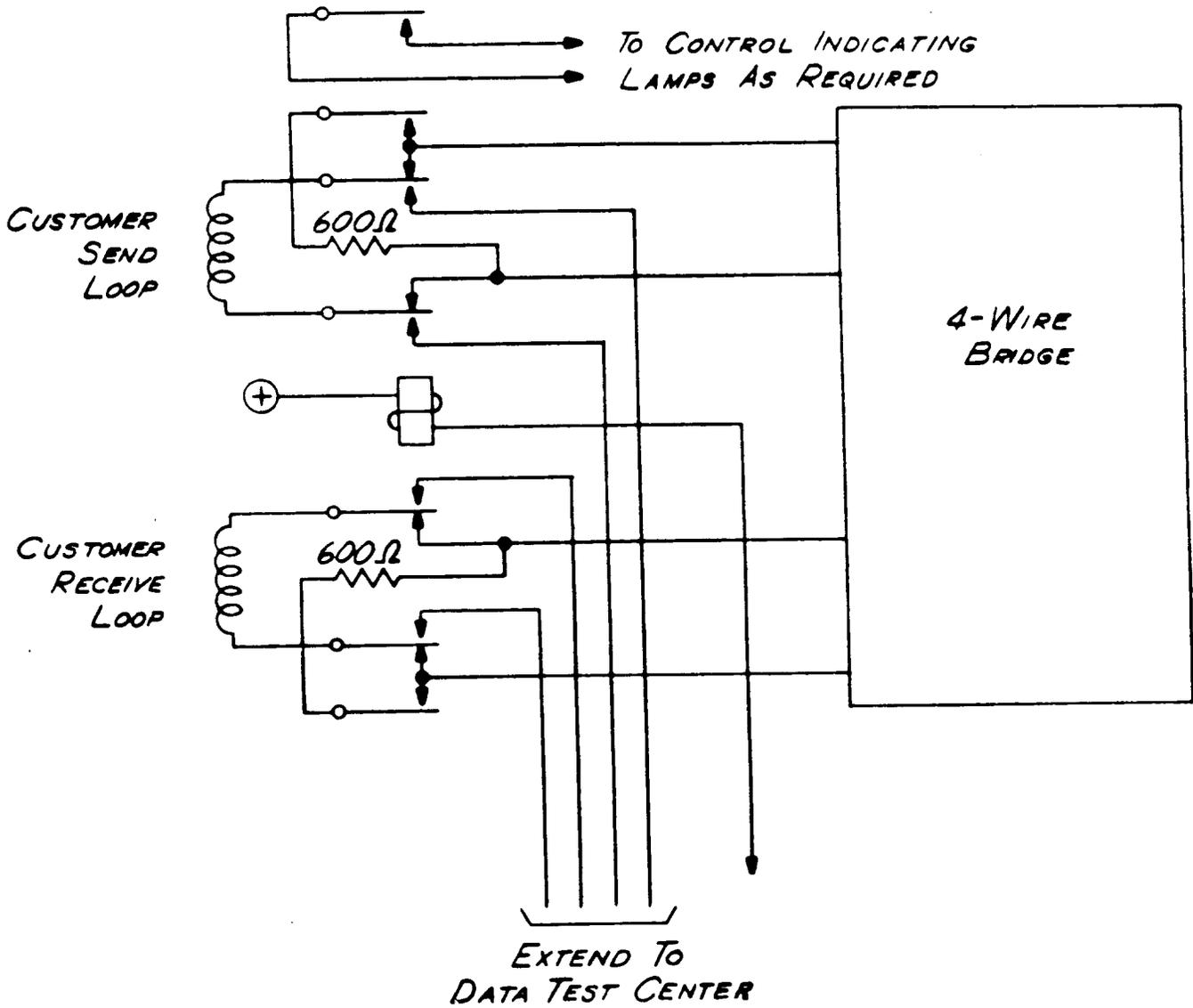


FIG. 2