PRIVATE LINE TELEPHONE SERVICE
FOUR — WIRE SWITCHING PLAN USING NO. 5 CROSSBAR
SERVICE MAINTENANCE

CONTENTS PAGE

1. GENERAL

1.01 This section outlines the testroom responsibilities for a switched private line network using a 4-Wire, No. 5 Crossbar Switching System. Also included is information pertaining to the initial line-up and maintenance tests to be performed and other information pertaining to these tests.

1.02 The information contained in this section pertains to large customer services which use switched private lines to carry out the normal conduct of their business. On an overflow or emergency basis, these private lines may be interconnected to the normal switched message network for completion.

2. OFFICE RESPONSIBILITIES

2.01 A switching system (plan) such as this section covers, may involve many Telephone Company offices. For instance, each system will have a Network Control Office, Circuit Control Offices, Section Control Offices, Serving Test Centers (STC's) and Contact Offices. The definitions and responsibilities of these offices are covered in other Bell System Practices.

2.02 The private line service order specifies the Network Control Office and the Circuit Control Office. The Network Control Office is required to work closely with the Customer Control Office, the Government Communications Manager's or the Account Manager's office to keep them informed of the status and condition of the system. The network and other control offices are not responsible for the maintenance of customer-owned and maintained station equipment.

2.03 Each control office should keep the Network Control Office informed of the general condition of the subscriber lines and trunks under its control. They should inform the Network Control Office immediately of any loss of facilities to any station location. The report should include the circuit numbers, station location, the cause of trouble, if known, the action taken and prospects for restoration of service.

2.04 An Emergency Transfer Circuit (SD-56514-01) may be provided at the 19A Testboard to transfer dial subscriber lines and trunks to manual operated lines and trunks. Manual operation will permit the 5D Switchboard to bypass the "homing" 4-wire switching office and complete calls manually.

2.05 The decision to use the Emergency Transfer Circuit is delegated to the Network Control Office. When a switching center failure requires the use of the Emergency Transfer Circuit, the Network Control Office should be informed of the pertinent facts. The Network Control Office may then evaluate the information along with any other facts available and determine if it is desirable to use the transfer feature.

3. RELEASE OF CIRCUITS

3.01 When testing circuits prior to the cut-over of a new system or establishment of new circuits, it may be necessary to obtain a release on existing circuits for a short period of time if spare facilities are not available. As much work as possible should be done on the new circuit before removing a working circuit from service. In some cases the circuit removed from service may be a private line which will be discontinued when the new service is put in use. Private lines should be removed from service only by the mutual consent of both the customer and the circuit control office.

3.02 ***Subscriber Lines.*** The Circuit Control Office is responsible for obtaining a release of the subscriber line for test purposes and other work which may be required. The release should be obtained from the customers' authorized contact for the circuit involved. The loop Jack should be opened, the drop monitor (DM) Jack patched to an Intercept trunk and the 5D operator informed as to the directory number for the circuit and why it is on intercept.

3.03 ***Trunks:*** All releases on trunk circuits should be obtained from the Circuit Control Office. This office will obtain approval from the customers control.

3.04 Releases should be short in length and at a time concurred in by the customer. When obtained, the circuit should, if possible, be made good with a spare facility. If the circuit is not made good, it should be kept in such condition that it can be restored to service immediately upon request, if possible.

3.05 At the end of any release period, the following steps should be taken to restore service to the subscriber:

(1) Subscriber Lines

(a) At the subscriber's terminal, verify that all station equipment has been restored to its normal working condition.

(b) At the switching center or intermediate office, verify that testing equipment and test terminations are removed from all jacks.

(c) Make signaling and talking tests between the switching center and the subscriber. Notify the subscriber that service is restored to him.

(d) The switching center should remove the circuit from intercept and notify the 5D operator that service is restored to the customer.

(2) Trunks

(a) At each switching center, verify that all equipment is restored to its normal working condition (equalizers, SF's, pads, etc).

(b) At each switching center, verify that test equipment and test terminations are removed from all jacks.

(c) Each switching center should originate 102 and 103 test code calls. If all test satisfactory, the circuit should be restored to service.

(d) The switching center that controls the trunk should notify the Network Control Office that the trunk is restored to service.

4. TESTS TO BE PERFORMED

4.01 The following transmission and pulsing tests should be performed on the service order for the circuits associated with a 4-wire private line switching system:

I. Switching center to switching center trunks:

(a) Net loss

(b) Frequency response

(c) Noise — White (random) and impulse

(d) Envelope delay

(e) Percent break and signaling

II. Switching center to station (subscriber lines)

(a) Voice circuits

(1) Net loss

(2) Frequency response

(3) Noise — White (random)

(4) Pulsing — (not required if only E type signaling is used between switching center and P.B.X.)

(b) Data circuits and Secure Voice (Encryption)

(1) Net loss

(2) Frequency response

(3) Noise — White (random) and impulse

(4) Envelope delay

(5) Pulsing

(c) Dual Service

(1) Tests should be performed in accordance with the above to insure satisfactory operation of data or secure voice or both.

5. TESTING INTERVALS

5.01 The Circuit Control Office (trunk or subscriber line) will be responsible for coordinating the completion of the tests. Table I shows the system tests which should be performed on a routine basis. The table also indicates the interval at which the routine tests should be performed.

TABLE I

CIRCUIT	USE	TEST	ROUTINE INTERVAL*
Swg. Center to Swg. Center	Special Grade	1000-Cycle Net Loss	M
" " " " "	" "	Envelope delay	A
" " " " "	" "	Noise (white)	M
" " " " "	" "	Noise (impulse)	M
" " " " "	Voice	1000-Cycle Net Loss	A
" " " " "	"	Frequency response	A
" " " Station	Data Secure Voice	1000-Cycle Net Loss using loop back equip.	M
" " " "	" " "	1000-Cycle Net Loss not using loop back equip.	A
" " " "	" " "	Envelope delay	A
" " " "	" " "	Frequency response	A
" " " "	" " "	Noise (white)	3M
" " " "	" " "	Noise (impulse)	3M
" " " "	" " "	Measure Customer's Signal Level	A
" " " "	Voice	1000-Cycle Net Loss	A
" " " "	"	Frequency response	A
" " " "	Any	Measure Received SF sig.	A
Station Equipment	"	Inspection	3M
Transfer Circuit	Emergency	Operation	6M

*M — Monthly
A — Annually

6. TROUBLE REPORTING PROCEDURES AND REPORTS

(A) Customer Trouble Reports

6.01 The customer will have a special telephone directory which gives him instructions on the proper procedure to use in reporting trouble. There are three types of customer reports received at the switching center and records should be kept on all three. These are:

(a) Customer did not reach number dialed. The customer should hang up and dial "O" for operator. The operator should complete the subscriber call.

(1) When the operator completes the call, she should report the calling number and the called number to the 19A Testboard. The 19A Testboardman should make a first attempt ticket for later analysis.

(b) If the operator originates a call and it does not go direct, she should hold the connection and report the calling number, the called number and the type of trouble experienced to the 19A Testboard. The testboardman should record the information on a ticket and trace the call immediately and clear the trouble so that the originating subscriber can complete the call.

(c) If the customer dials a number and does not reach it and dials "O" and does not get an operator, or gets no dial tone, he should call the serving test center using an outside telephone line and report the trouble. When a report is received by a remote STC, they should call the 19A Switchboard at the switching center and have the circuit removed from service before investigating the trouble.

6.02 The 19A Testboard attendant is responsible for sectionalizing trouble to the station, trunk or switching equipment. He also is responsible for taking steps to clear trouble and restore service. The Network Control Office should be kept informed as to the status of all circuit outages.

6.03 The Network Control Office should prepare a monthly (calendar month) summary of trouble reports, including all outages of trunks and subscriber lines. Any other item of interest which may have caused service outages of consequence to the system should also be included. Close coordination between switching centers and Network Control Offices is required to place all the necessary information in the hands of the Network Control Office so as not to delay the report. The purpose of this report is to inform administrative offices of the performance of the system and distribution should be made accordingly.

7. TROUBLE ANALYSIS AND TROUBLE TICKETS

7.01 The Network Control and Circuit Control Offices should follow standard Private Line Trouble Analysis procedures to detect and clear troubles. AMA tapes, first attempt tickets and customer trouble reports should also be used to establish patterns of trouble so that chronic cases can be cleared.

7.02 Trouble reports by the customer and the 5D Switchboard operator should be handled in the same manner since the 5D Switchboard operator report will pertain to a direct customer complaint. Trouble report forms P-1879A or E4220 are satisfactory for recording the necessary information.

8. PERMANENT SIGNAL TROUBLES

8.01 A "Permanent Signal" (PS) on a circuit or trunk is a condition whereby a trouble causes an off-hook to be falsely transmitted into the No. 5 Machine. When an off-hook signal is received at the switching center, a dial tone connection is set up by the machine to the calling line. The originating register waits for dialing to start.

8.02 The register allows 25 to 30 seconds under normal conditions, for the receipt of the first digit. If it does not receive the first digit in that time, it refers the call to the marker as a permanent signal. The marker then connects the calling line to a permanent signal trunk.

8.03 The permanent signal trunks have appearances at the 5D Switchboard and the master test frame. The 5D operator will challenge the trunk. If no reasonable explanation from the customer is received or no answer at all, the trouble should be referred to the No. 5

Crossbar maintenance center. The attendant at the maintenance center should trace the trunk to the calling subscriber's line and refer the trouble to the 19A Testboard for further action.

9. MAJOR FAILURES

9.01 The first objective in restoring service should be to eliminate any machine tie up so that subscribers not involved may continue to receive service. The second objective should be to eliminate the cause of the failure to the group of circuits involved.

9.02 The circuits in trouble should be made good in accordance with existing priority instructions. The priority classification is stated on the TCLR cord. In order that the circuits may be restored to service promptly, each switching center and STC should plan in advance various ways of making good the sections of a circuit for which they are responsible.

9.03 Transmission on the patched layout should be as near that of the replaced circuit as feasible. The extra time required for detailed adjustments should depend on the customer's need for the circuit at the time of trouble. Temporary patching procedures and the wiring in of patches should be done in accordance with standard practices.

9.04 When major carrier failures occur, it will be necessary to plug open the loop Jack on each subscriber line or the E&M Jack on the trunks as soon as possible. This will prevent each seizure from tying up a register. If many lines are involved in such a failure, it may tie the machine up completely.

9.05 Close cooperation between the master test frame and the 19A Testboard is required. The MTF will be able to trace the troubles to the line link or trunk link frames and give a circuit or trunk number to the 19A Testboard. The testboard attendant should open the loop or E&M Jack to restore the registers to normal operation and "PS" trunks to normal.

9.06 In the event of a major machine failure the Emergency Transfer Circuit will provide partial service on a manual basis by means of the 5D Switchboard operator as discussed previously.

9.07 A Line Load Control feature is available to limit the number of subscribers which have access to the 4-wire machine. This feature is used at the discretion of the Plant Department.

10. TRAFFIC ASSIGNMENTS

10.01 Assignments for crossbar switching frames, usage recorders and registers is a function of the Traffic Department. The actual work involved in connecting to the wiring of frames operation of cameras for reading the registers and forwarding the results in accordance with directions from the Traffic Department is a function of the Plant Department.