CENTRAL OFFICE EQUIPMENTS
PERFORMANCE REQUIREMENTS
GENERAL EQUIPMENT REQUIREMENTS
NO. 1 CROSSBAR SYSTEM

1. GENERAL

1.01 This section covers the performance requirements for No. 1 crossbar dial office equipment per BSP Section 816-007-181, Issue 4, December 1964.

1.02 Reference shall be made to the general equipment requirements section, Preformance Requirements - General, for additional information necessary for the proper application of the requirements listed herein.

2. ROUTINE AND SUPPLEMENTARY TEST REQUIREMENTS

2.01 Routine Test Performance: This requirement specified in the following tables under the heading "Performance" apply as follows:

(a) For equipment on which concentrated load tests are applied (see Part 4), the requirement shall be met at the time the concentrated load tests are started. The tests shall then be made at the minimum frequencies specified.

(b) For equipment on which no concentrated load tests are applied, the requirements shall be met at time of turnover.

2.02 Table of Requirements

ROUTINE								SUPPLEMENTARY		
				Performance						
Routine No.	Name of Test	Paragraph No.	Frequency in Working Days Min.	Frequency in Working Days Max.	Max. Cum. % Failure	Over Last No. of Cycles	See Note No.	Name of Test	Paragraph No.	Interval In Weeks Before Load Tests
(A)	Line Link Originating Equipment									
2701	Line Link Controller	3.01	1-3	1-1	Clear	2	1	Misc. Test	3.02	-
(B)	District Junctors & Associated Equip.									
2710	District Junctors	3.03						District Junctors	3.05	-
2710-A	Charge Calls		1-5	2-1	0.2	4	2	Zone Registration Common Control Ckts.	3.06	-
2710-B	Early Disconnect		1-10	3-2	0.2	3	-	Coin Link Controllers	3.07	-
2710-C	Operator Call & Cond. Test		1-10	1-1	0.2	2	3			
2710-D	Coin Overtime		1-10	1-1	0.2	2	-			
2710-E	Local Overtime		1-10	1-1	0.2	2	-			
2710-F	Non-Charge Call	3.03	1-5	2-1	Clear	2	-			
2711	Zone Registration Ckts.	3.04	1-5	3-1	0.2	5	-			
(C)	District and Office Links							Operation Test of Dist. and Office Links	3.08 to 3.14	3 - - -
(D)	Subscriber Sender Link							Operation Test of Subscriber Sender Link	3.15 to 3.18	5 - - -

ROUTINE								SUPPLEMENTARY		
			Frequency in Working Days		Performance					
Routine No.	Name of Test	Paragraph No.	Min.	Max.	Max. Cum. % Failure	Over Last No. of Cycles	See Note No.	Name of Test	Paragraph No.	Interval In Weeks Before Load Tests
(E)	Originating Senders									
2720	Subscriber Senders	3.19								
2720-A	Full Selector		1-1	5-1	0.3	10	4	Miscellaneous Tests	3.20	-
2720-B	Panel Call Ind.		1-1	10-1	0.3	15	5			
2720-C	Register Control		1-5	2-1	0.2	4	6			
2720-D	Late Release - Full Selector		1-10	1-1	0.2	2	-			
2720-E	Late Release - P.C.I.		1-10	1-1	0.2	2	7			
2720-F	Special Service Operator		1-10	2-1	0.2	4	-			
2720-G	3 Digit Opr.		1-10	1-1	0.2	2	8			
2720-H	Office & Incoming Overflow		1-5	3-1	0.2	6	9			
2721	"A" Oper. Senders						10			
2721-A	Full Selector	3.21	1-1	5-1	0.3	10	4			
2721-B	Panel Call Ind.		1-1	10-1	0.3	15	5			
2721-C	Operator's Error		1-5	1-1	0.2	2	-			
2721-D	Late Release - Full Selector		1-10	1-1	0.2	4	-			
2721-E	Late Release - P.C.I.		1-10	1-1	0.2	2	7			
2721-G	3 Digit Oper.		1-10	1-1	0.2	2	8			
2721-H	Office and Inc. Ofl.		1-5	3-1	0.2	6	9			
(F)	Originating Markers and Marker Connectors									
2730	Originating Markers	3.22	1-5	1-1	Clear	2	-	Miscellaneous Tests	3.23	-
(G)	Incoming Trunks									
2740	Incoming Trunks	3.24						Miscellaneous Tests	3.25	-
2740-A	Test Line		1-3	2-1	0.3	4	-			
2740-B	Tip Party		1-10	1-1	0.3	2	11			
2740-C	Busy Line and Ofl.		1-10	1-1	0.3	2	3			
(H)	Terminating Sender Links							Operation Test of Term. Sender Links	3.26 to 3.29	-
(I)	Terminating Senders and "B" Position Ckts.									
2750	F.S. Senders	3.30	1-5	1-1	Clear	2	12& 13	Misc. Tests of Term. Senders	3.33	-
2751	"B" Senders	3.30	1-5	1-1	Clear	2	14	Misc. Tests of "B" Pos. Ccts.	3.34	-
2752	D.P. Senders	3.31	1-5	1-1	Clear	2	6			
2753	M.F. Senders		1-5	1-1	Clear	2				
2760	"B" Position Circuits	3.32	1-5	1-1	Clear	2	-			

ROUTINE								SUPPLEMENTARY		
			Frequency in Working Days		Performance					
Routine No.	Name of Test	Paragraph No.	Min.	Max.	Max. Cum. % Failure	Over Last No. of Cycles	See Note No.	Name of Test	Paragraph No.	Interval In Weeks Before Load Tests
(J)	Terminating Markers & Marker Connectors									
2770	Terminating Markers	3.35	1-5	1-1	Clear	2	-	Term. Markers	3.36	-
								Number Group Circuits	3.37	-
								Line Choice Equip.	3.38	-
								Line Cross-connection Tst.	3.39	-
(K)	Incoming & Line Link Terminating Equipment							Operation Test of Incoming & Line Links	3.40 3.41 3.42	3 - -
(L)	"A" Switchboard & Associated Eqpt.									
2780	Cord Circuit	3.43						"A" Swbd. Sender Links	3.45	-
2780-A	Sleeve Relay, non-Marginal		1-5	1-1	0.2	2	-	Cord Circuits	3.46	-
2780-B	Sleeve Relay, Marginal		1-5	1-1	0.2	2	-	Idle Trunk Indicating	3.47	-
2780-C	Supervisory Relay, High Resist. Sleeve		1-5	1-1	0.2	2	-	Outgoing Trunk Circuits	3.48	-
2780-D	Supervisory Relay, Low Resist. Sleeve		1-5	1-1	0.2	2	-			
2780-E	Delayed Charge & Repeated Supervision		1-5	1-1	Clear	1	-			
2780-F	Coin Collect & Return		1-5	1-1	Clear	1	-			
2780-G	Ringing		1-5	1-1	Clear	1	-			
2780-H	Flashing		1-5	1-1	Clear	1	-			
2781	"A" Swbd. O.G. Trunk	3.44	1-5	2-1	0.5	4	-			
2782	"A" Swbd. Dist. Junctor	3.44	1-5	2-1	0.5	4	-			
2783	"A" Swbd. Inc. Trk.	3.44	1-5	1-1	Clear	2	-			
(M)	Outgoing Trunks									
2790	Sub. Rec. Comp.	3.49	1-10	1-1	0.3	2	-	Misc. Tests	3.51	-
2791	Special Service to Centralized "A" Board	3.50	1-10	1-1	0.3	2	-			
2792	Intercept to Centralized "A" Board	3.50	1-10	1-1	Clear	2	-			

ROUTINE								SUPPLEMENTARY		
			Frequency in Working Days		Performance					
Routine No.	Name of Test	Paragraph No.	Min.	Max.	Max. Cum. % Failure	Over Last No. of Cycles	See Note No.	Name of Test	Paragraph No.	Interval In Weeks Before Load Tests
(N)	Miscellaneous Tests							Number Check. Eqpt.	3.52	-
								No Test Eqpt.	3.53	-
								Trouble Ind. Equip.	3.54	-
								Verification of Fusing	3.55	-
								Alarm Circuit Test	3.56	-
								Make Busy Features	3.57	-
								Relay Interrupters	3.58	10
								Contact Protection	3.59	-
								Tone Circuits	3.60	-
								Verification of Jumpers	3.61	-
								Traffic Register Cross-Connections	3.62	-
								Lamps	3.63	-
								Cross Points	3.64	-
								Parallel Wiring	3.65	-
								Multiple	3.66	-
(O)	Transverters and Transverter Connectors									
2793	Transverters	3.67	1-5	1-1	Clear	2	16	Misc. Tests	3.68	-
(P)	Recorders and Recorder Connectors									
2794	Recorders	3.69	1-5	1-1	Clear	2	-	Misc. Tests	3.70 3.71	-
(Q)	Call Identity Indexer									
2795	Call Identity Indexer	3.72	1-5	1-1	Clear	2	17	Misc. Tests	3.73	-
(R)	Master Timer	3.74	1-5	1-1	Clear	2	-	Operation Test	3.75	-
	2796 Master Timer									
(S)	Maintenance Recorder and Printer	-	-	-	-	-	-	Operation Test	3.76	-
(T)	Translators									
2798	Translators	3.87	1-5	1-1	Clear	2	-	Misc. Tests	3.78	-

NOTES

1. (a) The unit of test is the test on one controller with home and mate operation.

   (b) These tests need not be continued during the concentrated load test interval.

2. On 2 party district junctors, alternate the charge calls between the tip and the ring parties. On district junctors associated with zone registration equipment, alternate local charge and zone calls.

3. Make these tests on alternate cycles.

4. Rotate the tests to cover the following conditions:

   (a) The LT key should be operated on alternate tests.

   (b) Use both panel and crossbar codes.

   (c) Use codes to give office and skip office selections.

   (d) Slow and fast revertive pulsing.

   *(e) All dialing conditions distributed as follows:

   15 PPS MIN-BR key for approximately one third of cycles
   26 PPS MAX-BR key for approximately one third of cycles
   Other keys approximately equally over one third of cycles

   (f) Tests of the (MTG) relay. (Marginal trunk guard relay).

   (g) Compensating resistance of 900 ohms and 1600 ohms on alternate cycles.

   *(h) Operate and non-operate test of (TP) relay.

   (i) Alternate route test.

   (j) All district frame and class indications.

   *These tests do not apply on tests of "A" senders..

5. Rotate the tests to cover the following conditions.

   (a) PCI non-tandem call.

      (1) Both regular and fast assignment features.

      (2) Capacity PCI Test.

   (b) PCI tandem.

   (c) Station delay features.

6. Rotate the test numbers to cover the following conditions.

   (a) (RA) relay.

   (b) P1 to P6 relays.

   (c) Release of selecting fingers, including the test of all selecting fingers in both positions.

7. Alternate the tests simulating conditions with and without distant office routings.

8. Use direct and PCI tandem routings on alternate cycles.

9. Rotate these tests as follows: office overflow, incoming overflow with the (MTG) key normal, and incoming overflow with the (MTG) key operated.

10. Rotate the tests to provide for tests of calls originated in approximately equal amounts on "A" operator district junctors, key pulsing incoming trunks and outgoing trunk circuits.

11. This routine test applies only when the line cross-connections provide for party line service.

12. When testing terminating senders with the testing equipment mounted on the outgoing trunk test frame, use a minimum compensating resistance of 900 ohms and a maximum of 2700 ohms on alternate cycles. A long loop incoming trunk shall be used in conjunction with this test.

13. Arrange the various test calls so that during the test period the following tests are applied; light load test (LT key), maximum loop and leak test (L key), long selection test (LST key), STP relay operate test (STP-OPR key) and long reverse battery test (LRB key).

14. Arrange the various test calls so that during the test period the following tests are applied: light load test (LT key), tone test (TT key) and reorder test (RO key).

15. Senders are to be tested with all frame indications. On multi-office terminating equipment, senders and "B" position circuits are to be tested with all office indications.

16. Rotate the test codes and numbers so as to cover the following conditions:

   (a) Permanent signal.

   (b) Line service order verification.

   (c) Calls to local and extended areas.

   (d) Calls originating from party stations.

   (e) Calls to busy recorder.

(f) Calls to each recorder including emergency recorder.

(g) Line observation.

17. Originate calls so as to select at least one junctor in each group of ten junctors and a different unit in each group.

3. DESCRIPTION OF ROUTINE AND SUPPLEMENTARY TESTS

(A) Line Link Originating Equipment

3.01 Routine No. 2701 Line Link Controller: Originate calls so as to employ each LT relay, each V relay, each HG relay and in offices arranged for automatic message accounting each district group connector. Two complete tests shall be made, one using the home controller and the other the mate controller.

3.02 Supplementary Tests of Line Link Controller

(a) Line relay test using test conditions imposed by the line verification test trunk in offices arranged for automatic message accounting and the miscellaneous circuit of the message register rack in offices not arranged for automatic message accounting.

(b) Check message register leads for continuity and freedom from crosses and grounds.

(c) Check all features of the line link and control circuit including all chain, lock-out, preference, throwover, alarm, and disconnect features in conjunction with regular and mate operation.

(d) Check for crosses and false ground of the SH leads on other frames. This shall include a check for crosses between SH leads and the core of the associated DA and DB relays.

(e) Check the line observing feature through each district group connector.

(f) Check for transposition and continuity of line identification leads.

(g) Check for the proper class of service cross-connections.

(B) District Junctors and Associated Equipment

3.03 Routine No. 2710 District Junctors

(a) Check all features covered by the automatic district junctor test circuit when set for the particular class of call 2710-A to 2710-F, inclusive.

(b) When making a test of coin district junctors check each coin control circuit for all features that are covered by the district junctor test circuit.

3.04 Routine No. 2711 Zone Registration Circuits

(a) Check all features covered by the zone registration test circuit except the timing features.

(b) Use a different zone on successive cycles.

3.05 Supplementary Tests of District Junctors

(a) Check all wiring and all operating features of district junctors not covered by routine tests.

(b) Automatic time release feature.

(c) Presence in the circuit of the 650 ohm non-inductive winding of the (F) relay (not applicable to district junctors used with automatic message accounting).

(d) Presence of the 10 ohm resistance in the sleeve lead to the line link and group control circuit.

(e) Proper operation of alarms on the charge interrupter circuit.

(f) Cancellation of disconnect entry due to delay in making disconnect entry.

3.06 Supplementary Test of Zone Registration Common Control Circuits

(a) Proper overtime period and overtime registration on each zone registration circuit.

(b) Proper operation of each zone registration common control circuit in connection with each associated district junctor.

(c) Proper operation of each registration circuit with each marker.

3.07 Supplementary Tests of Coin Link Controllers

(a) All features in conjunction with the "A" and "B" group operation.

(b) Test the coin supervisory equipment for its operating features in conjunction with the coin control link frame as well as each district junctor.

(c) An operation test as required to use each link.

(d) Verify wiring between coin supervisory circuits and each link appearance at the horizontal multiple.

(C) Supplementary Test of District and Office Links

3.08 Check all district links, office junctors and office links to verify the continuity of the T, R, S and S1 leads. The test shall verify that all

paths are available for use and check that all select and hold magnets in use operate satisfactorily.

NOTE: This test may be made in conjunction with the concentrated load tests.

3.09 Check that T, R, S and S1 leads are free from crosses and grounds.

3.10 Marker lock-out control alarm and throwover to the emergency lock-out control circuit.

3.11 Proper "split group" and "non split group" indications to marker.

3.12 All connector features on district link and office link frames including wiring to associated markers.

3.13 Permanent signal overflow feature.

3.14 Continuity of DK, DK1 and ZK leads on district links.

(D) Supplementary test of Subscriber Sender Link

3.15 All control features in conjunction with regular and emergency control circuit operation.

3.16 Test sender selector equipment for its operating features in conjunction with each subscriber sender link frame associated with this equipment.

3.17 (a) Operation test as required to use each link.

(b) Check of line identification leads for continuity and transposition.

3.18 Verify wiring between senders and each sender link appearance at the horizontal multiple.

(E) Originating Senders

3.19 Routine No. 2720 Subscriber Senders

(a) Check all features as covered by the subscriber sender test circuit when set for the particular class of call 2720A to 2720H, inclusive.

(b) On senders arranged for automatic message accounting, rotate the calls so as to provide for the operation of each calling line register in all combinations of 2 leads, each used message billing index condition and line observing feature.

3.20 Supplementary Tests of Originating Senders

(a) Test sender timing and sender lamps by means of the sender test circuit.

(b) All wiring and all operating features not covered by the routine and other supplementary tests of originating senders.

(c) Load control features.

3.21 Routine No. 2721 "A" Operator Senders: All features as covered by the subscriber sender test circuit when set for the particular class of call 2721-A to 2721-H inclusive.

(F) Originating Markers and Marker Connectors

3.22 Routine No. 2730 Originating Markers: Test of each route relay, checking all features that can be checked by the trouble indicator.

NOTE: Check the GS and the GE cross-connections on alternate cycles.

3.23 Supplementary Tests of Originating Markers and Marker Connectors

(a) Verify proper decoding of all possible office codes including:

(1) Alternate routings.

(2) Special routings due to different classes of service.

(3) Outgoing trunk assignments.

(4) Office discrimination signals with office brush and incoming group selections.

(5) Official reroute.

(6) Originating load control routing.

(b) Check overlap operation.

(c) Check all wiring to district and office link frames.

(d) Check the cross, false ground and open circuit detecting features on the leads to the sender, district link, office link, zone charging circuits and on the wiring within the circuit.

(e) Check for the rotation of the choice of outgoing trunk sub-groups on succeeding calls where there are two or more sub-groups.

(f) Check for the change in the preference of testing outgoing trunks when even or odd numbered district frames are calling. Also the reversal of this preference when alternate route or second trial is used.

(g) Check for the change in the preference of channels on alternate route or second trial calls.

(h) Check for falsely grounded and crossed leads to the windings of trunk test and channel test relays.

(i) Check that the long time-out feature operates when the short time-out feature fails.

(j) Operating test of all features of the marker connector including a complete check with each originating marker.

(k) Check for signal to trouble indicator on permanent signal overflow calls.

(l) Reroute on terminating load signal.

(m) Check DC, RO, RL and TRL leads for high resistance crosses to ground and to relay cores and to adjacent springs on relays.

(G) Incoming Trunks

3.24 Routine No. 2740 Incoming Trunks: All features covered by the incoming trunk test equipment and associated test lines when set for the particular class of call 2740-A to 2740-C, inclusive.

3.25 Supplementary Test of Incoming Trunks

(a) Automatic time-out test and condenser test.

(b) Check for the presence in the circuit of the non-inductive winding of the (T) relay.

(c) Check for the presence of the 10 ohm resistance in the sleeve lead to the incoming link and connector circuit.

(d) Where the line cross-connections provide for party line service, check each type of ringing signals and codes.

(e) Check all wiring and all operating features not covered by routine and other supplementary tests.

(f) Operating test of trunks not provided with ringing and subscriber supervisory features.

(H) Supplementary Test of Terminating Sender Links

3.26 Test all control circuit features in conjunction with regular and mate control circuit operation.

3.27 Test sender selector equipment for its operating features in conjunction with each terminating sender link frame.

3.28 Operation test as required to use each link.

3.29 Verify wiring between senders and each sender link appearance at the horizontal multiple.

(I) Terminating Senders

3.30 Routine Nos. 2750 and 2751 Full Selector and "B" Senders: All features checked by the "B" sender and position test circuit (except the time alarm test) or the outgoing trunk test frame.

3.31 Routine No. 2752 - Dial Pulsing Senders: Maximum and minimum loop dialing conditions as imposed by jack testing facilities.

3.32 Routine No. 2760 "B" Position Circuits: All features checked by the "B" sender and position test circuit.

3.33 Supplementary Test of Terminating Senders

(a) Check all senders for their ability to properly handle all digits.

(b) On full selector senders check time alarm features and for cross on the select magnet.

(c) On "B" senders check time alarm, reorder and register reset features.

(d) Tell-tale test on terminating senders when the routine test of senders is made with the testing equipment mounted on the outgoing trunk test frame.

(e) Test with each marker circuit.

(f) Connection to special markers on calls from special incomings.

3.34 Supplementary Test of "B" Position Circuits: All features not covered by routine test.

(J) Terminating Markers and Marker Connectors

3.35 Routine No. 2770 Terminating Markers

(a) A call to each hundred block. In the case of split hundred blocks, a call to each cross-connected twenty block in addition. Select a different twenty block on successive cycles.

(b) Distribute calls so that each line choice is used by each marker.

(c) Overflow test.

(d) Plugging-up line operation.

(e) Busy line test.

(f) Intercept calls on toll and local.

3.36 Supplementary Test of Terminating Markers

(a) Proper number group circuit identification for each line group for which a hundred-block is provided.

(b) Rerouting of calls for numbers for, which block relays are not provided.

(c) Proper operation for all types of cross-connected lines as follows: tip party, ring party, first or intermediate terminal hunting, coin and free lines.

(d) Incoming mate frame operation.

(e) Check that all features of terminating markers will function with each number group and each line choice connector.

(f) Check the cross, false ground and open detecting features on the leads to senders, incoming trunks, incoming links, number group and line choice circuits and on the wiring within the circuit.

(g) Change of preference of channels on second trial calls.

(h) Check the feature for cancelling continuity test on coin lines.

(i) Check that the long time-out feature operates when the short time-out feature fails.

(j) Check functions of pattern relays.

(k) Check for falsely grounded and crossed leads to the windings of line test and channel test relays.

(l) Operating test of all features of the marker connector in conjunction with all markers.

(m) All special features of number checking markers which are not checked on other tests.

(n) All terminal hunting features.

(1) Check terminal hunting on all of the twenty line test circuits.

(2) Terminal hunting retest on all of the twenty line test circuits.

*(3) Jump hunting.

*(4) Block-end hunting.

*(5) Allotted terminal hunting groups.

*If Telephone Company cross-connections do not provide for these features, temporary cross-connections shall be employed to check these features.

(o) Check of FC, RO, RL and TRL leads to check for high resistance crosses to ground and to relay cores and to adjacent springs on relays.

(p) Line load control features.

3.37 Supplementary Test of Number Group Circuits

(a) Verify wiring between number group circuits and associated markers.

(b) Terminal hunting number checking.

(c) Number checking test on all cross-connected terminal hunting lines that require the use of extra group (XG) relays.

3.38 Supplementary Test of Line Choice Equipment

(a) Verify all wiring between line choice connectors and line links which is not checked in conjunction with subscribers line cross-connection tests.

(b) Operation with all horizontal line groups with (CE) and (CR) relays independently.

(c) All operating features with each marker.

(d) All operating features with each line link group and control circuit.

3.39 Supplementary Test of Line Cross-Connections: Call to each line for which block relay frame and LDF cross-connections are specified checking for proper identification as follows.

(a) Connection to proper primary line switch hold magnet.

(b) Tip party, ring party, first or intermediate terminal hunting, last line of terminal hunting group, free line or coin line. Ten party line circuits shall be checked at each twenty-block cross-connection for operation of the proper sleeve relay.

(K) Incoming and Line Link Terminating Equipment

3.40 Supplementary Test of Incoming and Line Links: Check of all channels between incoming trunks and line link secondary switches to include continuity of T, R and S leads. This test shall verify that all paths are available for use and check that all select and hold magnets in use operate satisfactorily. It shall include odd and even appearances of a channel on the line choices and the regular incoming and the incoming build-out appearances.

NOTE: This test may be made in conjunction with the concentrated load tests.

3.41 Supplementary Test of T, R and S Leads: Check that T, R and S leads are free from crosses and grounds.

3.42 Verification of all wiring from marker connector relays to their associated markers.

(L) "A" Switchboard & Associated Equipment (Except Senders)

3.43 Routine No. 2780 Cord Circuits

(a) All features for special service, intercepting and combined intercepting and special service cords as covered by the cord testing circuit when set for the particular test 2780-A to 2780-H, inclusive.

(b) Flashing recall (where provided).

3.44 Routine Nos. 2781, 2782 and 2783, "A" Switchboard Outgoing Trunk, District Junctor and Incoming Trunk Circuit: Operating test on "A" switchboard trunks arranged for key pulsing using outgoing trunk test frame.

3.45 Supplementary Test of "A" Switchboard Sender Links

(a) Check all operating features in conjunction with the "A" and "B" group operation with calls using each link circuit from each primary switch.

(b) Verification of wiring between link circuits and each sender appearance at the horizontal multiple.

3.46 Supplementary Test of Cord Circuits

(a) All wiring and all operating features of all cord circuits which are not tested by the cord testing circuit (such as recording completing, emergency completing etc.)

(b) All wiring and all operating features of special service cord circuit not covered by the routine test.

(c) Crosstalk (circuit induction) test.

(d) AC continuity test including the key tapping test.

3.47 Supplementary Test of Idle Trunk Indicating: Check that idle trunk indicating circuits are cross-connected in accordance with the Telephone Company specifications.

3.48 Supplementary Test of Outgoing Trunk Circuits

(a) Verify wiring at each appearance.

(b) All features of "A" switchboard trunks not checked on the routine test including check for correct compensating resistance.

(c) All wiring and operating features of miscellaneous outgoing trunks.

(M) Outgoing Trunks

3.49 Routine No. 2790 Recording Completing Trunks: Test of trunks using outgoing trunk test frame.

3.50 Routine No. 2791 - Special Service Trunks to Central "A" Board and No. 2792 - Intercept Trunks to Centralized "A" Board: Test of trunks using outgoing trunk test frame.

3.51 Supplementary Test of Subscriber Recording Completing and Special Service Trunks: All wiring and all operating features not covered by the routine test including operation with coin control and number checking circuits.

(N) Miscellaneous Tests

3.52 Supplementary Test of Number Checking Equipment

(a) Check the number checking senders for their ability to properly handle all digits, for time-out features and all other operating features.

(b) Make a number checking test on each recording completing trunk, operators trunk and operators cord circuit.

These tests shall be distributed so as to bring into use all associated senders. On operators trunks and on operators cord circuits the tests shall be distributed so as to bring into use the associated markers arranged for number checking.

(c) Make a number checking test, failure and OK call, on each number checking trunk.

3.53 Supplementary Test of No Test Equipment

(a) No test calls to busy lines in conjunction with each marker arranged for no test call completion. The no test hold magnet on each horizontal line link sub-group should be tested.

(b) Make a no test call for a busy line condition, an idle line condition and a no test junctor busy condition.

3.54 Supplementary Test of Trouble Indicator Equipment: A check shall be made to verify all operating features and all wiring to the connecting circuits.

3.55 Supplementary Test of Verification of Fusing: A check shall be made to verify all fusing.

3.56 Supplementary Test of Alarm Circuits: Each alarm or signal circuit shall be checked for correct operation in connection with the equipment with which it is used.

3.57 Supplementary Test of Make Busy Features: A check shall be made to verify the make busy features of all circuits.

3.58 Supplementary Test of Relay Interrupters: A check shall be made of the percent break, speed and timing requirements specified for all relay interrupters.

3.59 Supplementary Test of Contact Protection and Surge Absorption Features: Where a condenser, resistance (except non-inductive resistance which is part of an assembled coil), retard coil or combination of these is used in a circuit for contact protection or surge absorption, a check shall be made of these features.

3.60 Supplementary Test of Tone Circuits: A test shall be made on all tone circuits for foreign battery and ground, and for crosses with other tones.

3.61 Supplementary Test of Verification of Jumpers: A test shall be made to verify all jumpers not tested during the routine or supplementary tests.

3.62 Supplementary Test of Traffic Register Cross-Connection: A check shall be made to verify that each traffic register is associated with the proper circuit or circuits.

3.63 Supplementary Test of Lamp Circuits: A check shall be made of the proper functioning of all lamps and the lamp operating paths in the circuits involved.

3.64 Supplementary Test of Cross Points: Check each cross point on each crossbar switch to verify all switch strapping. This requirement does not apply on those crosspoints of terminating sender link secondary switches which are not used in service.

3.65 Supplementary Test of Parallel Wiring: Verify the continuity and proper connection of all parallel wiring providing it is not necessary to disconnect any shop wiring.

3.66 Supplementary Test of Multiple: The multiple shall be free from crosses and from foreign grounds and shall have the proper continuity. The multiple shall also be free from false continuity at relay contacts.

(o) Transverters and Transverter Connectors

3.67 Routine No. 2793 Transverter: Check all features as covered by the subscriber sender test circuit. In making these tests, calls shall be originated so as to provide for the operation of each calling line location in combination of 2 leads, tip and ring party, each used message billing index condition, line observing, selection of each recorder, first and second trial.

3.68 Supplementary Tests of Transverter and Transverter Connector

(a) Operation test of all features of the transverter connector including a complete check with each transverter and with each sender.

(b) Operation test of all features of transverter and transverter connector with the maintenance recorder.

(c) Preference features.

(d) Condenser timed relay time-out feature including recycling when required recorder is busy, when recorder is engaged and after each perforation.

(e) Signal to trouble indicator when the recorder fails to check 1 out of 3 or 2 out of 5 leads. This check should be made from each transverter to each recorder, checking also that trouble entries are perforated on the tapes.

(f) Cross, false ground and open detecting features.

(g) Timing and alarm features.

(h) All wiring and operating features not covered by routine and other supplementary tests.

(i) Check wiring to the transverter trouble indicator, recorder connector, translator and sender.

(p) Recorders and Recorder Connectors

3.69 Routine No. 2794 Recorder: Check all features of the recorder as covered by the test portion of the master timing circuit.

3.70 Supplementary Test of Recorder Connector

(a) Operating test of the recorder connector, including a complete check with each transverter and each perforator magnet lead.

(b) Preference features.

(c) Operating features including proper tape records in conjunction with both regular and emergency recorder operation, transverter trouble indicator, master timing circuit and call identity indexer.

(d) Make busy feature and restoral to service of recorder and emergency recorder, resulting from no tape, damaged tape and make busy plugs.

(e) Transfer of call identity indexer from regular recorder to emergency recorder and vice versa including tape record.

(f) Check for disabling of transfer feature when emergency recorder is in use or out of service.

(g) Alarm features.

(h) Check wiring to transverter trouble indicator and call identity indexer.

3.71 Supplementary Tests of Recorder

(a) Check all wiring and operating features of recorder not covered by routine test.

(b) Check splice, no tape, and hour features.

(c) Minute timing features including synchronization check and synchronizing.

(d) Timing and alarm features.

(e) Check that a call cannot be registered when timing selectors are in process of movement and that timing selectors cannot move when recorder is engaged on answer or disconnect record.

(f) Check that CH leads are opened by operation of TVM1 relay in the recorder, and by the operation of the MB and MBR relays in the recorder connector.

(g) Check the cross-detecting features.

(h) Check wiring to transverter trouble indicator and master timing circuit.

(i) Recorder number recording.

(j) Check of presence of ground on frame of the perforators.

(k) Out of service feature.

(Q) Call Identity Indexer

3.72 Routine No. 2795 Call Identity Indexer: Operation test of the call identity indexer using the district junctor test circuit.

3.73 Supplementary Test of Call Identity Indexer

(a) Operation test to check proper district identification on all district junctors associated with the call identity indexer.

(b) Timing and alarm features.

(c) Check cross, false ground and open detecting features including a check of the TK and BU leads.

(d) Preference and lockout features.

(e) Presence of 1000 ohm resistance in the UK lead in the call identity indexer.

(R) Master Timer

3.74 Routine No. 2796 Master Timer: Operation test of all features of each master timer including a complete check in conjunction with each odd, even and emergency recorder.

3.75 Supplementary Test of Master Timer:

(a) Alarm features.

(b) Check of exercise circuit for round month, day and hour switches.

(c) Synchronizing features including a synchronizing check from the odd and even master timers.

(d) Check ability to synchronize any recorder or master timer after it has been out of synchronism.

(e) Seizure of each recorder at 03 hour to enter end of tape record.

(f) Check splice and no paper feature with each recorder.

(g) Seizure of the transverter trouble indicator in case of trouble on make busy, transfer, end of tape and splice.

(h) Check make busy features to each recorder.

(i) Check for proper "out of synchronism" indication on make busy and transfer.

(j) Check of cross detection features.

(S) Maintenance Recorder and Printer

3.76 Supplementary Test of Maintenance Recorder and Printer: A check shall be made of all operating features and wiring to connecting circuits.

(T) Translators

3.77 Routine 2798 Translators: Check all features as covered by the originating sender test circuit. In making these tests, calls shall be originated so as to provide for an operation and non-operation test of each tube in each digit and the proper transmission of the translation to the transverter.

3.78 Supplementary Tests

(a) Check all features of the translator connector and control circuits including all chain, lockout and preference features of both the regular and emergency chain, throwover, alarm and disconnect features. The operating test shall include a complete check with each transverter.

(b) Check for translation of each cross-connected line.

(c) Alarm features.

(d) Overflow tests.

(e) Cross, ground and open detecting features.

4. CONCENTRATED LOAD TESTS

General

4.01 Circuit changes affecting the circuits to be tested shall be completed before the concentrated load tests specified herein are started. Any other tests being made during this interval should be made in such a manner that they do not interfere with these tests.

4.02 Trouble Conditions: If a trouble indicator is summoned, if any alarms occur or if any call fails to complete satisfactorily, every effort shall be made to clear the trouble. At least twenty five repeat tests without trouble shall be made in cases where the cause of the failure cannot be found. Where trouble is found, sufficient tests shall be made to insure that the trouble has been cleared.

4.03 Office Code and Line Cross-Connections: The calls shall use the office code and line cross-connections and features provided for the office at the time of turnover. Where the omission of cross-connections or features does not permit applying any of the following requirements, such requirements are waived.

4.04 Simultaneous Calls: Simultaneous calls are to be construed to mean the simultaneous operation of the subscriber line relays or incoming trunk A relays. Where office codes only are dialed, the last digits thereof are to be dialed simultaneously; where both office codes and numerical digits of subscriber numbers are dialed, the last numerical digits are to be dialed simultaneously.

4.05 Origination of Calls on Originating Equipment: Unless otherwise specified ten calls shall be originated simultaneously.

4.06 Termination of Originating Calls: Unless otherwise specified hereafter, only ten terminations shall be made available at a time. Correct termination will be considered satisfactory if the proper sleeve leads are grounded at the outgoing test frame. At the same time a check shall be made that none of the calls has terminated on an overflow trunk.

Line Links and Subscriber Sender Links

4.07 Horizontal Line Group: Ten simultaneous calls shall be originated to check for double connections on the line link and sender link frames, under the following conditions:

(a) Lines are to be selected so as to employ each LT (line test) relay in the controller.

(b) Lines are to be selected out of each column on the line link frame.

(c) On one horizontal group, the mate controller is to be used.

These tests shall be applied at least two times on each horizontal group.

4.08 Secondary Switch: Ten simultaneous calls shall be originated to check for double connections on the line link and sender link frames. These tests shall be applied at least two times on each secondary switch.

4.09 D Relay Chain: Calls shall be originated simultaneously at all line link appearances of a group of twenty district junctors. The number of simultaneous calls is to be equal to the

number of appearances. These tests are to be applied two times for each district junctor subgroup.

4.10 Lock Out of Subscriber Senders: Simultaneous calls shall be originated under the following conditions:

(a) Calls are to be originated simultaneously on each sender link frame which has access to the subgroup of senders under test. Where the number of appearances of the sender subgroup exceeds the number of sendersin the subgroup, tests are to be repeated from the remaining appearances.

(b) The senders available are to be confined to one sender subgroup.

(c) On one subgroup, the emergency sender link controller is to be used.

These tests shall be applied so that tests will be made at least five times on each subscriber sender subgroup.

District Frames, Recorder Connectors and Recorders

4.11 Simultaneous Calls on District Junctor Subgroup: Ten simultaneous calls shall be originated under the following conditions.

(a) The calls are to be confined to one subgroup of ten district junctors and in the case of automatic message accounting, shall utilize all transverter connectors available to the district junctors.

(b) All markers are to seek the district frame approximately simultaneously.

(c) On AMA district junctors all ten calls shall be answered simultaneously.

The tests shall be applied at least two times on each subgroup of the subscriber district junctors with at least two calls being completed through each district link frame secondary switch.

4.12 Markers Testing for Access to District Frame with Marker Overlap Operation: Ten simultaneous calls shall be originated under the following conditions:

(a) The ten calls are to be distributed over all subgroups of subscriber district junctors on the district frame. These tests shall be applied at least five times on each district frame.

(b) On one district frame, the senders are to be selected so as to provide for marker overlap operation and approximately one half of the markers are to seek the district frame approximately simultaneously.

4.13 All Markers Testing for Access to District Frames: Ten simultaneous calls shall be originated under the following conditions:

(a) Calls are to be originated on each of the district frames.

(b) All markers are to seek the district frames approximately simultaneously.

(c) Emergency marker preference circuits are to be used for at least two tests.

These tests shall be applied so that each district frame is used for at least five tests. Where there are more than ten district frames, additional tests shall be made as required.

Office Frames

4.14 Markers Testing for Access to Office Frames: Ten simultaneous calls shall be terminated on the office frames of a pair under the following conditions:

(a) Trunks are to be made available on each office frame of a pair.

(b) All markers are to seek the pair of office frames approximately simultaneously.

(c) Emergency marker preference circuits are to be used for at least two tests.

These tests shall be applied at least ten times on each pair of office frames.

Originating Markers

4.15 Class of Service: Ten simultaneous calls shall be made for each class of subscriber service (IMR, Flat Rate, etc.) These tests shall be applied five times for each class of service.

4.16 Types of Trunks: Ten simultaneous calls shall be made for each of the following types of trunks; P.C.I. direct, P.C.I. tandem, panel, crossbar, zero operator, vacant code, restricted code, 3 digit operator and overflow. These tests shall be applied at least five times on each type of trunk.

4.17 Trunk Grouping Arrangements: Ten simultaneous calls shall be made using all types of original and alternate route trunk codes under the following conditions:

(a) One trunk is to be made available in each trunk subgroup, for original and alternate routes. However, where there are three or more subgroups of trunks in an original or an alternate route, only one trunk is to be made available and this is to be in the common subgroup of trunks.

(b) One overflow trunk is to be made available.

(c) The remainder of the ten calls are to be set up with no connection on the district link.

These tests shall be applied five times for each type of trunk grouping.

Originating Marker Connectors

4.18 Lock-Out of Senders: Simultaneous calls shall be originated on all senders in a connector. These tests shall be repeated ten times on each marker connector.

4.19 Lock-Out of Markers: Ten simultaneous calls shall be originated, with the calls distributed over all marker connectors. These tests shall be repeated five times with one marker available. Additional groups of five tests shall be applied with the remaining markers available one at a time.

Coin Control Link

4.20 When concentrated load tests are being applied to coin district junctor equipment, a maximum of nine coin supervisory circuits are to be made available. Where more than nine circuits are installed, the circuits are to be rotated, so that all supervisory circuits are used.

Zone Registration Equipment

4.21 Ten simultaneous zone calls shall be made from each subgroup of ten district junctors arranged for multiple registration.

(a) Only five registration control circuits are to be made available.

(b) All zones are to be used.

This test shall be applied two times the number of zones provided unless there is less than three zones in which case the tests shall be applied five times.

4.22 Ten simultaneous zone calls shall be made with one call in each subgroup of ten district junctors arranged for multiple registration. The tests shall be applied so that tests will be made at least five times on each subgroup.

4.23 Origination of Calls on Terminating Equipment: Unless otherwise specified ten calls shall be originated simultaneously.

4.24 Termination of Terminating Calls: Correct termination will be considered satisfactory if the proper subscriber line sleeves are grounded and no failures are indicated by the terminating marker on continuity test. A check shall be made that, on simultaneous disconnection, the sleeve lead ground is immediately reremoved from the called lines.

Terminating Sender Link

4.25 Lock-Out of Senders: Simultaneous full selector calls shall be originated under the following conditions:

(a) Calls are to be originated simultaneously on each sender link frame which has access to the subgroup of senders under test. Where the number of appearances of the subgroup exceeds the number of senders in the subgroup, tests are to be repeated from the remaining appearances.

(b) The senders available are to be confined to one sender subgroup.

(c) A check shall be made for double connections on both primary and secondary switches.

(d) Regular and mate controllers are to be used.

These tests shall be applied so that tests will be made at least five times on each sender subgroup.

4.26 Tests on Terminating Sender Links: Three full selector simultaneous calls shall be originated under the following conditions:

(a) Calls are to be on three trunks within a trunk subgroup.

(b) These tests shall be applied two times on each subgroup of ten trunks.

Incoming Frames

4.27 All Markers Testing for Access to Same Incoming Frame: Ten simultaneous calls shall be originated under the following conditions:

(a) The calls are to be spread over all subgroups containing full selector trunks on the incoming frame.

(b) All markers are to seek the incoming frame approximately simultaneously.

These tests are to be applied ten times on each incoming frame. At least two calls shall be completed through each secondary switch.

4.28 Markers Testing for Access to Incoming Frames: Ten simultaneous calls shall be originated under the following conditions:

(a) The calls are to be originated on each of the incoming frames.

(b) All markers are to seek the incoming frames approximately simultaneously.

(c) Emergency marker preference circuits are to be used for at least two tests.

These tests shall be applied so that each incoming frame is used for at least five tests. Where there are more than ten incoming frames, additional tests shall be made as required.

Number Group Connectors

4.29 Ten simultaneous calls shall be originated under the following conditions:

(a) All markers are to seek the connectors approximately simultaneously.

(b) One test is to be made with a plug in the marker XT jack.

(c) Subscriber line numbers are to be chosen so as to use each of the twenty line test circuits in the marker.

(d) The line choices in which the line terminates may be made busy.

(e) Emergency marker preference circuits are to be used for at least two tests.

These tests shall be applied five times on each number group connector.

Line Choice Connectors

4.30 Ten simultaneous calls shall be directed to each line choice under the following conditions:

(a) All markers are to seek the line choice approximately simultaneously.

(b) One test is to be made with a plug in the marker XT jack.

(c) The line choice may be made busy.

(d) Emergency marker preference circuits are to be used for at least two tests.

These tests shall be applied five times on each line choice connector.

4.31 Ten simultaneous calls shall be terminated on a line choice with markers seeking the line choice approximately simultaneously. The lines used for the test shall be distributed over all line link frames in the line choice.

These tests shall be applied at least five times on each line choice connector.

Terminating Markers

4.32 Type of Calls

(a) Ten simultaneous calls of the following types shall be made:

(1) Individual line busy.

(2) Overflow with all channels busy. Five of calls are to be originated on each incoming frame of a pair and the numbers selected are to appear in two different number groups and two different line choices.

(3) All lines busy for all terminal hunting arrangements (end of block hunting, jump hunting, allotted terminal hunting, etc.)

(4) Local intercept on individual line. The line is to be in a different number group than the intercept lines and this second number group is to be made busy.

(5) Terminal hunting retest.

(b) The senders are to seek the markers approximately simultaneously.

(c) These tests shall be applied ten times for each of the above types of calls.

Terminating Marker Connectors

4.33 Lock-Out of Senders: Simultaneous calls shall be originated on all senders in a connector. These tests shall be repeated ten times on each marker connector.

4.34 Lock-Out of Markers: Ten simultaneous calls shall be originated with the calls distributed over all marker connectors. These tests shall be repeated five times with one marker available. Additional groups of five tests shall be applied with the remaining markers made available one at a time.

Combined Originating and Terminating Traffic on Line Links

4.35 Five simultaneous calls shall be completed on the line link at the same time five simultaneous calls are being originated. These tests shall be applied five times on each line link frame, using regular and mate controllers.

Transverter Connectors

4.36 Lock-Out of Senders: Simultaneous calls shall be originated on all senders in a transverter connector. These tests shall be repeated five times on each transverter connector.

4.37 Lock-Out of Transverter: Ten simultaneous calls shall be originated, with the calls distributed over all transverter connectors. Where more than ten transverter connectors are furnished in an office, it will be satisfactory to originate calls on ten transverter connectors at one time, but calls shall be made on all transverter connectors with overlap operation for two of the transverter connectors in each case. For example, if tests are made on transverter connectors 0-9, the overlap operation would necessitate originating calls subsequently on transverter connectors 7-16, etc.

No arrows are shown due to extensive changes.

These tests shall be repeated five times with one transverter available. Additional groups of five tests shall be applied with the remaining transverters available one at a time.

4.38 Translators: Simultaneous calls shall be originated under the following condition:

(a) Simultaneous calls distribute over all transverters and directed to the same translator. This test shall be repeated 10 times to each translator.

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To update Section to be in agreement with BSP 816-007-181, Issue 4.