ROUTING VERIFICATION—CROSSBAR TANDEM SWITCHING SYSTEMS

ADMINISTRATIVE PRACTICES

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1. GENERAL

INTRODUCTION

1.01 This section sets forth administrative and testing procedures to ensure proper machine routing and access to the message network by Crossbar Tandem (XBT) Switching Systems. It relates to verification of day-to-day and periodic activities involving routing changes, trunk additions, rearrangements, and removals. This section is being issued jointly as BSP Section 220-041-010 and as Dial Facilities Management Practices, Division H, Section 12D(1) because it covers interrelated responsibilities of the network maintenance and administration groups.

1.02 Whenever this section is reissued, the reason for reissue will be listed in this paragraph.

1.03 The content of this section covers the job functions of several groups, ie, Routing Supervisor, Dial Administrator, and Maintenance Supervisor. This has been done to provide the Maintenance Supervisor and the Dial Administrator with background information of the entire routing order process. The intent is to highlight the need for day-to-day coordination between the maintenance and administration groups; their interrelated efforts are necessary to keep routing and translation errors to an absolute minimum.

1.04 Organizational structures, division of responsibilities, and titles may vary considerably among the companies; therefore, the functional responsibilities as they relate to this routing verification procedure are given below:

(a) ***Circuit Provision Engineer:*** Plans future traffic routes and determines quantities of trunks required to accommodate forecasted traffic loads. Issues requests for additions, changes, or removal of trunks to meet current load requirements.

(b) ***Routing Supervisor:*** Interprets the current and future Long Lines Routing Plan (LLRP) or the Operating Telephone Company (OTC) equivalent, the Traffic Routing Guide (TRG) and designs the routing structure (ie, class of service screening, alternate route and trunk subgroup arrangements) for a given switching system. Issues routing assignment orders (RAOs) which assign route relays and classes of services. These orders also care for miscellaneous assignments that determine the number of digits to be outpulsed, type of signaling and pulsing, as well as route transfer arrangements, etc.

(c) ***Dial Administrator:*** Assigns trunk relay equipment in accordance with trunk type and office balance requirements. Assigns traffic registers and accumulates traffic measurement data. Monitors the switching system's performance and investigates irregularities and initiates corrective measures.

(d) ***Maintenance Supervisor:*** Maintains the switching system and ensures its proper operation. Implements and coordinates trunk additions, changes and removals, as well as machine routing changes.

SCOPE OF ROUTING VERIFICATION

1.05 To be meaningful, all work activities must be verified, starting with the interpretation of approved routing plans (LL and OTC) up to and including testing of the XBT machine's ability to switch as directed.

1.06 These work activities include:

(a) Imparting logic to the switcher (routing and assignment orders written, worked, and tests made).

(b) Establishing trunks (trunk orders written, worked, and tests made).

Routing verification will address these activities.

1.07 Through records verification, routing information is checked with the approved routing plans and by means of machine verification, the information is compared with actual machine routing and trunks accessed for all routes. Procedures vary between day-to-day verifications and those of periodic verifications, but the principles are the same. Both frequencies will be treated in detail in later paragraphs.

1.08 It is recognized that machine logic encompasses items other than those required just to route the calls. (Example: Traffic separation peg count, trunk group peg count, and overflow.)

It may be desirable to include in day-to-day verifications, all items that appear on both the Routing Assignment Order and on the trouble indicator/recorder card or COMAS (Computerized Maintenance and Administrative Support System) printout. Verification of these items on a periodic basis should be performed in accordance with local instructions.

CAUSES AND EFFECTS OF TRANSLATION ERRORS

1.09 Most translation irregularities are the result of work errors in the various steps involved in code changes and the addition or rearrangement of trunks or trunk groups.

1.10 The ability to access all trunk groups in a specified alternate routing sequence is of utmost importance in providing good customer service. Improper routing results in inefficient use of the circuits and equipment provided. Frequently, idle capacity exists in trunk groups not accessed, while overloads are created on other groups receiving the misrouted traffic. Routing irregularities may create unnecessary ineffective machine attempts such as NC, reorder, and vacant code—all of which are deterrents to call completion and cause customer dissatisfaction.

1.11 The establishment of checks at certain points to verify the accuracy of work performed will minimize work errors. In order to establish specific checkpoints, it is necessary to understand the flow process of routing assignment orders.

ROUTING ASSIGNMENT ORDER FLOW

1.12 Routing changes are created whenever trunk groups are added or removed, NNXs rehomed, or office rearrangements made (including items such as Inward WATS changes and class of service screening changes). Activity in establishing new OTC trunk groups would be initiated by the Circuit Provision Engineer based on Circuit Provision Schedules or other special request actions. Activity relating to new LL trunk groups would be initiated by receipt of the Routing Change Order (LL Form T-306) by the Circuit Provision Engineer and the Routing Supervisor. (While specific forms and administrative procedures may vary among the companies, basic Bell System routing concepts are adhered to in the planning of the routes.) A flowchart, Typical Routing and Trunk Order Flow, Fig. 1, outlines the order process.

1.13 The Circuit Provision Engineer issues trunk orders to the field for establishing new trunks. Incoming and Office Link Frame assignment information appears on the order, supplied by the Dial Administrator.

1.14 Closer to the service date, the Routing Supervisor issues a routing assignment order to the XBT Maintenance Supervisor. Completion of the cross-connections must be coordinated with service dates and times.

1.15 Routing Supervisors, Dial Administrators, and Maintenance Supervisors must establish control procedures to ensure the accuracy of the work activities in the trunk addition or rearrangement process. These control procedures are outlined in Part 2.

2. DAY-TO-DAY CHECKS AND CONTROLS

2.01 The Routing Supervisor, the Dial Administrator, and the Maintenance Supervisor share the responsibility for accurate routing in the switching system. Their respective work forces must be adequately trained and motivated.

2.02 Each of the steps in the Typical Routing and Trunk Order Flow, Fig. 1, offers opportunities for errors that will affect the end product.

2.03 There are several problem areas that appear to be major contributors to routing errors:

(a) Discrepancies between approved routing plans (LLRP or OTC equivalent) and Routing Assignment Orders

(b) Routing Assignment Order not issued

(c) Routing Assignment Order not received

(d) Routing Assignment Order incorrect

(e) All markers or pairs of translators not wired correctly

(f) GB Relays not functioning as required.

Suggested checks and controls for minimizing these errors are listed in 2.04 through 2.11.

2.04 The Routing Supervisor must make certain that the Routing Assignment Orders (Forms E-4346, E-4913 or equivalent, see Fig. 2) agree in all respects with the current routing plan. If the Dial Administrator detects an apparent inconsistency in the routing pattern, the Routing Assignment Order should be reviewed with the Routing Supervisor and the inconsistency resolved. Should the Maintenance Supervisor question an order, the question should be referred to the Dial Administrator for review with the Routing Supervisor. This surveillance will assist in detecting occasional routing errors and will broaden the knowledge of the groups in relation to routing patterns.

2.05 The Routing Supervisor is responsible for the issuance of Routing Assignment Orders in sufficient time to meet required service dates. Controls should be devised to ensure that no scheduled changes are missed. To assist in the early identification of all scheduled TRG changes which require issuance of Routing Assignment Orders, LL has developed a computer program known as ***A***dvance ***R***outing ***G***uide ***I***nformation ***S***ystem (ARGIS). ARGIS will give abbreviated listings in several sequences, including one by due dates. The Users Guide for this program was transmitted by GL 74-03-177. Examples of printouts available from this program are shown in Fig. 3.

2.06 The Routing Supervisor is responsible for ensuring that all Routing Assignment Orders issued have been received by the Maintenance Supervisor. The Routing Supervisor should establish procedures, verbal or written, requiring a positive reply from the maintenance group as notification that orders have been received. Typical forms for this type of control are shown as follows:

Fig. 4—Typical Marker Cross-Connection Log (for status of chronologically numbered orders)

Fig. 5—Typical Cross-Connection Transmittal Letter (to be signed and returned by Maintenance Supervisor upon receipt)

Fig. 6—Typical Routing Change Reminder.

2.07 The Routing Supervisor is responsible for ensuring the accuracy of all items assigned by the routing group. Where possible, a person other than the assignor should verify the assignments. Also, the Routing Supervisor should personally institute a program of sampling completed Routing Assignment Orders for errors or omissions. These checks will provide an insight into the overall quality of the assignment work and will highlight areas where additional training is required.

2.08 The Maintenance Supervisor is responsible for ensuring that cross-connection work is completed accurately in all markers and pairs of translators. BSP Sections 220-121-501 and 220-121-503, tests H, N, and O, describe procedures for verification of cross-connections with the office records. These

tests should be performed after completion of Routing Assignment Orders and so noted on the orders. The Maintenance Supervisor should establish controls to ensure that these tests are being made consistently.

2.09 The Maintenance Supervisor is responsible for ensuring that trunk busy (TB) relays and group busy (GB) relays are wired properly to permit access to all trunks in a subgroup and give proper indications when all trunks in a subgroup are busy. When trunks are added or removed from a group, appropriate tests should be made from the testboard or the outgoing test jack bay (OGT), accompanied by visual inspection of the TB and GB relays. A marker test should also be made to verify that trunks added can be selected by the marker.

2.10 The addition of trunks and trunk groups and the associated work in establishing new routes or rearranging existing routes involves a considerable number of work steps (records, cross-connections, and testing). Many offices have developed local checklists on which all necessary work may be identified and checked off as completed. A Typical Trunk Order Progress Chart—Crossbar Tandem is shown in Fig. 7.

2.11 It is desirable to have one person responsible for coordinating the completion of all these work items as scheduled. This designated coordinator may be in the maintenance group or in the dial administration group depending on local organization structure. The appropriate supervisor shall make periodic sample checks to assess the thoroughness and accuracy of this control.

3. DAY-TO-DAY MACHINE ROUTING VERIFICATION TESTING

GENERAL

3.01 Day-to-day activities such as additions, removals, or rearrangements to existing trunk groups, additions of new trunk groups, addition of Inward WATS number series, rehomings, and other routing changes require that machine routing verification tests be made. These tests are in addition to the trunk order tests mentioned in BSP Section 660-450-301 which deal primarily with signaling, transmission, and operation testing.

3.02 The purpose of day-to-day routing tests are to ensure that all codes involved will route to all intended trunk groups and trunk subgroups and that the switching system can access all trunks in these groups.

3.03 Types of day-to-day activities that require routing verification are shown in table form in Fig. 8.

DAY-TO-DAY XBT ROUTING VERIFICATION PROCEDURES

3.04 Day-to-day routing verification procedures are subdivided into two categories of activities. These are:

(a) ***Marker Route Verification:*** Verifies the translator's and marker's ability to route traffic via the proper trunk group or subgroups and alternate routes in accordance with the routing assignment order.

(1) This verification can be performed at the marker test frame as outlined in BSP Sections 220-121-501 and 220-121-503, tests H, N, and O. In most instances, this testing can be done during normal working hours.

(2) The Maintenance Center will verify each marker for each class of service for each code point being verified. Test cards for all markers and translators should be identical—unless specified differently in the routing assignment order. (Example: multiple routing.) All test card items shall agree with the routing assignment order.

(b) ***Trunk Access Verification:*** Verifies that all trunks in the trunk group specified in the trunk order can be selected and a connection established by the marker.

(1) This verification can be performed at the marker test frame as outlined in BSP Sections 220-121-501 and 220-121-503, test A, and sequentially making each trunk in the group busy at the testboard or OGT after it has been selected by the marker. Subsequently, the next trunk should be selected.

(2) In those cases where TB and GB relays are assigned to the trunk group being tested, their operation shall also be verified.

Testing procedures for TB and GB relays are outlined in 4.27.

(3) Trunk access verification of in-service trunk groups should be performed during periods of light traffic.

3.05 In offices equipped with COMAS III, extensive routing changes may warrant testing the affected codes via COMAS All Codes Test out of hours.

4. PERIODIC ROUTING VERIFICATION—OFFICES NOT EQUIPPED WITH COMAS

GENERAL

4.01 Routing verification is required at regularly scheduled intervals in order to evaluate the switching system's continued overall ability to route traffic according to routing plans. Careful analysis of the results should bring to light any deficiencies in current day-to-day administrative procedures. A major objective should be the continuing improvement of the entire routing process.

4.02 Routing should be verified annually. The magnitude of verifying all 3-digit and 6-digit translated codes justifies performing this on a sampling basis although consideration should be given to performing an initial 100 percent verification if this has never been done.

4.03 Local conditions such as development of tools to assist in performing these verifications, organizational structure, personnel scheduling, etc, may vary among the companies. This part describes procedures that would apply at XBTs not equipped with COMAS and in an environment where Routing Assignment Orders are written by a centralized group handling this function.

ROUTING VERIFICATION PROCEDURES

4.04 Periodic routing verification procedures are subdivided into four categories of activities. These are:

(a) ***Record Verification:*** Verifies that the records (RAOs) route traffic as intended by the TRG, LLRP, and/or OTC routing plan. Record verification also includes the comparison of the Routing Supervisor's copy of RAOs with the Maintenance Supervisor's copy. The verification may be done on a sample basis or on a 100 percent basis. Record verification is independent of verification activities (b), (c), and (d) listed below and may be done before, during, or after those activities.

(b) ***Marker Route Verification:*** Verifies the marker's ability to route traffic via the proper trunk group or subgroups and alternate routes in accordance with the office records (RAOs). Each assigned route relay/route number, for all classes of service, is tested in all markers for selection of the proper trunk group and route advance. Marker route verification shall be done on a 100 percent basis and prior to activity (c) below.

(c) ***Code Verification:*** Verifies that the marker and translator properly translate 3-digit and 6-digit translated codes and that they direct traffic to the proper route. All 3-digit codes shall be verified in a sample "test" marker. A sample of 6-digit translated codes shall be verified in both translators (A and B). Code verification shall be performed subsequent to Marker Route verification described in (b) above.

(d) ***Route Transfer, TB and GB Relay Test:*** Verifies that assigned RT, TB and GB relays operate correctly. These relays shall be tested on a 100 percent basis and the tests may be performed independently of activities (a) to (c) above.

ROUTING VERIFICATION—SAMPLING

4.05 The complete verification of the treatment of all codes, in all records, and in all markers, for all classes of service on a manual basis presents a formidable work load. This section describes sampling procedures which are designed to substantially reduce the number of verifications required (both in record verification and code verification). These sampling techniques, if carefully applied, can predict error rates in the untested portions of the records and the switching system with a greater than 90 percent confidence level. Given the predicted error rate and an analysis of the troubles found, mangement can logically decide what further action may be required.

4.06 Sampling techniques are described in BSP Section 220-001-010. Strict adherence must be paid to rules of random number selection and

the results must be understood if the sampling tests are to be meaningful. Routing verification sampling procedures seek to identify instances where troubles exceed a 1.5 percent rate. The Sample Size Table in BSP Section 220-001-010 was developed for use where approximately 10 percent defects are anticipated; it should ***not*** be used for routing verification. Instead, refer to the Sample Size Table in Fig. 9 of this section. From this table, it can be seen that sampling is less efficient for smaller universes than it is for larger ones.

4.07 Sampling procedures as they apply to the four categories of periodic routing verification activities are given below:

(a) ***Record Verification:*** For purposes of record verification, a sample number of codes shall be drawn from the universe of all 3-digit (ABC digits 000 to 999) and 6-digit (DEF digits 000 to 999) translated codes.

(1) The sample of 3-digit translated codes will include HNPA NNXs, FNPAs which are not 6-digit translated, toll center codes, vacant codes, and other special codes.

(2) The sample of 6-digit translated codes will include FNPA NNXs, FNPA toll center codes, vacant codes, as well as other special codes for each FNPA that is 6-digit translated.

(3) In cases where the office translates Inward WATS 800 Special Area Codes (SAC), the 800 SAC may, for routing verification purposes, be treated as an FNPA, but consideration should be given to verifying these codes on a 100 percent basis. If this is done, the 800 SAC should be excluded from the sample.

(4) As an example, consider an office which translates five FNPAs. The HNPA and each FNPA contain 1000 codes (both working and nonworking) for a total universe of 6000 codes. Referring to the Sample Size Table, Fig. 9, we see that the sample size required is 858 codes selected randomly from the universe of 6000 codes.

(5) It is permissible to draw an equal number of random codes from each of the NPAs that are translated. This deviation from random selection will simplify the development of the lists of random codes and should not significantly distort the results of the sampling procedure.

(6) The Summary Report—Annual Crossbar Tandem Routing Verification, Fig. 10, provides a formula for determining the predicted error rate for untested portions of the record.

(b) ***Marker Route Verification:*** Because of the number of variables involved, all routes (assigned route relays/route numbers) are tested for each class of service, in all markers, for proper operation. Sampling procedures, therefore, are not applicable and should not be used.

(c) ***Marker Code Verification—3-Digit Codes:*** For purposes of the verification of 3-digit codes, a sample marker shall be tested for ***all*** 3-digit (ABC digit) codes. For the initial verification, select the highest numbered marker as the "test" marker. For subsequent periodic verifications, select the test marker on a random basis. When a discrepancy is found to exist in the wiring of the test marker, all other markers shall be tested for that same discrepancy. If the discrepancy occurred in only the test marker, that discrepancy shall be classified as a "random error." If the discrepancy occurred in one or more additional markers, that discrepancy shall be classified as a "group error."

(1) It is necessary to classify discrepancies (wiring errors) as random errors or group errors for the results of the sampling procedure to accurately predict error rates in untested markers. The test marker random error rate can be expected to occur in other markers as well. However, the group error rate must be weighted by the number of group errors found and cleared in order to accurately establish an overall predicted error rate for untested markers.

(2) The Summary Report—Annual Crossbar Tandem Routing Verification, Fig. 10, provides a formula for determining the predicted untested marker wiring error rate for 3-digit codes.

(d) ***Translator Code Verification—6-Digit Translated Codes:*** For purposes of the verification of 6-digit translated codes, a sample

number of codes shall be verified. The universe from which the sample codes shall be drawn consists of all 6-digit translated codes. For example, consider an office which translates five FAs. Each FA contains 1000 codes (both working and nonworking) for a total universe of 5000 codes. Referring to the Sample Size Table, Fig. 9, we see that the sample size required is 833 codes, selected randomly from the FAs.

(1) It is permissible to draw an equal number of random codes from each of the FAs that are translated. This deviation from random selection will simplify the development of the lists of random codes and should not significantly distort the results of the sampling procedure.

(2) The same treatment should be given the 800 SAC (eg, sample or 100 percent verification) as elected in Record Verification (a) above.

(3) The Summary Report—Annual Crossbar Tandem Routing Verification, Fig. 10, provides a formula for determining the predicted translator wiring error rate for untested foreign area translated codes.

(e) ***Route Transfer, TB and GB Relay Tests:*** Because they are relatively few in number, all assigned route transfer, TB and GB relays are tested for proper operation. Sampling procedures, therefore, are not applicable and should not be used.

4.08 The development of the lists of sample codes can be done on a manual basis, if necessary, but computer programs can save time in generating lists of random numbers for this purpose. Some companies have already developed such programs, and these should become known through listings in the Catalog of Time Shared Programs.

ROUTING VERIFICATION—RESPONSIBILITIES

4.09 A procedural outline should be formalized to ensure complete understanding of the annual routing verification program by all those participating in the project. A typical procedural outline, including functions and assigned responsibilities, is shown in Fig. 11.

4.10 As indicated in the outline, an appropriate Staff Coordinator should set up an overall schedule for routing verifications of all switching systems within the staff's area of responsibility upon consultation with the Dial Administrators, Maintenance Supervisors, and Routing Supervisors. Consideration should be given to planned activities in the switching systems to be verified and also to the work loads imposed on the various groups involved (routing, dial administration, and maintenance forces).

4.11 Once the overall schedules have been determined, the Dial Administrator shall be responsible for the scheduling of each step of the program and ensure that all activities are completed as scheduled.

RECORD VERIFICATION PROCEDURES

4.12 It is essential to the overall project that basic documents (LLRP, TRG, and OTC Routing Plan) be used in developing the intended routings for the sample codes. This task should be assigned to someone other than the person who normally prepares Routing Assignment Orders for the specific switching system.

4.13 Using the basic documents mentioned above, a routing tree (Example: Fig. 12) may be developed or updated at this time. It should show the hierarchical routing from the XBT by trunk group listing all the working 3-digit codes designated to first route on each trunk group. Codes requiring 6-digit translation will be shown as xxx FAT.

4.14 The routing tree will be useful in determining the intended routings for this verification, and it also will be a handy reference document for the Network Service Center (NSC) in day-to-day trouble investigations. Therefore, consideration should be given to NSC personnel assisting the routing group in preparation of the routing tree. The routing tree should indicate the latest revision date.

4.15 After the routing tree is completed, the routing Supervisor shall compare the tree with the Routing Assignment Orders for concurrence. Where discrepancies are noted for codes on the sample list, the correctness of the routing tree should be confirmed. Where necessary, correcting orders should be issued. The magnitude of these orders will determine the need to review them with

both the Dial Administrator and Maintenance Supervisor prior to their issuance.

4.16 In those cases where the RAOs are found to be in error (including planned deviations not documented in writing), the discrepancies shall be listed as record verification errors on the Summary Report—Annual Crossbar Tandem Routing Verification (see Fig. 10). At the conclusion of the record verification, the predicted error rate for untested portions of the record should be calculated using the formula provided on the Summary Report. If the error rate exceeds the 1.5 percent level, a 100 percent record verification should be made.

4.17 The Routing Supervisor should also, for all codes in the sample, compare his copy of the RAOs with the Maintenance Supervisor's copy. Items to be checked include issue number, corrections, and write-ins. Any discrepancies between the two records should be resolved and, where necessary, corrective action taken.

MARKER ROUTE VERIFICATION—TESTING PROCEDURES

4.18 Marker route verifications shall be performed to determine that all assigned route relays/route numbers in all markers for all classes of service route traffic in accordance with the office records.

4.19 The marker test circuit and trouble recorder frame can be used to verify marker and translator cross-connections as specified in BSP Sections 220-121-501 and 220-121-503, tests H, N, and O. The use of a Route Advance and Class of Service Checklist, similar to the one illustrated in Fig. 13, will aid in performing these tests. The checklist should be prepared using the office records for source data.

4.20 The following items shall be verified for each route (assigned route relay/route number):

(a) For each trunk group or subgroup, the "K-" recorded on the trouble record corresponds to the GS and GE on the office records.

(b) Trunk subgroups can be accessed in accordance with the office record.

(c) The correct alternate route can be accessed in accordance with the office record.

(d) The correct classes of service can access the route in accordance with the office record.

(e) That test cards for each marker are identical unless specified differently in the office record (Example: multiple routing).

4.21 The following general outline of testing steps provides a description of the logic employed in marker route verification.

(a) In one marker, draw a test card on the first route tested using the lowest numbered assigned class of service.

(b) Repeat the test in (a) for remaining markers. Verify that all test cards are identical and correspond in all details to the office record.

(c) Repeat tests (a) and (b) to the alternate route.

(d) Repeat the tests in (a) and (b) for the next class of service.

(e) Repeat test steps (a), (b), (c), and (d) for each assigned route relay/route number and all classes of service. If the route involves route transfer (RT) or group busy (GB) relays, both sides of these relays shall be tested.

4.22 Where discrepancies are noted during the performance of tests (a) to (e), the correctness of the office record shall be confirmed. If the error is found to exist in the office record, it shall be scored as a "Record Error." If the error is found to exist in one or more markers, it shall be scored as a "Wiring Error." In either case, the discrepancy shall be resolved and corrected.

4.23 Record the marker route verification errors on the Summary Report—Annual Crossbar Tandem Routing Verification, Fig. 10.

CODE VERIFICATION—TESTING PROCEDURES

4.24 Code verifications may be performed on a sampling basis, which will establish predicted error rates for the untested portions of the machine. Different techniques are prescribed for 3-digit codes that are translated in the markers and 6-digit codes that are translated in the foreign area translators. The codes will be tested to verify that the traffic for a given code is directed to the

proper first route. Alternate routing and class of service treatment need not be tested since these features were tested in the Marker Route Verification process described in 4.18 through 4.23.

4.25 The trouble indicator or trouble recorder frame can be used to verify marker and translator cross-connections as specified in BSP Section 220-121-501 or 220-121-503, tests A and N.

4.26 The following testing procedures apply where code verification is performed on a sample basis:

(a) ***For 3-Digit (ABC Digit) Codes:***

(1) Select a test marker. For the initial periodic verification, the highest numbered marker shall be selected. For subsequent periodic verifications, select the test marker randomly.

(2) Using the test marker, select a valid class of service for the code to be tested and verify that each code of code fields LA, EA, NA in service is routed to the correct trunk group in accordance with the office record. In cases where revertive pulsing (RP) is employed for a given NNX, verify the RP code point.

(3) Where a discrepancy is noted, confirm the correctness of the office record. If the discrepancy exists in the wiring of the test marker, test all markers for that same discrepancy.

(4) Where the discrepancy is found to exist in the office record, it shall be classified as a record error. Where the discrepancy is found to exist in only the test marker, it shall be classified as a random error. Where the discrepancy is found to exist in one or more markers in addition to the test marker, it shall be classified as a group error.

(5) The discrepancy shall be resolved and the error corrected.

(6) Record the following data on the Summary Report—Annual Crossbar Tandem Routing Verification, Fig. 10:

(a) The number of 3-digit codes tested

(b) Each code or trunk group affected

(c) The number of record errors

(d) The number of test marker random errors and group errors

(e) The number of group errors found in other markers.

(7) The predicted error rate for untested markers should be calculated using the formula provided on the Summary Report, Fig. 10. If the computed error rate exceeds the 1.5 percent level, perform a 100 percent 3-digit code verification in all remaining markers.

(b) ***For 6-Digit Translated Codes:***

(1) Select a valid class of service for each of the sample codes and verify that the proper Foreign Area Tens and Units relays are indicated on the trouble record. Both Foreign Area translators (A and B) shall be tested for each sample code.

(2) Where a discrepancy is noted, confirm the correctness of the office record. If the discrepancy exists in the office record, it shall be classified as a record error. Where the discrepancy is found to exist in one or more translators, it shall be classified as a wiring error. In either case the discrepancy shall be resolved and the error corrected.

(3) Record the codes affected and enter the number of record errors and wiring errors on the Summary Report—Annual Crossbar Tandem Routing Verification, Fig. 10.

(4) The predicted error rate for untested 6-digit translated codes should be calculated using the formula provided on the Summary Report, Fig. 10. If the computed error rate exceeds the 1.5 percent level, perform a 100 percent verification of 6-digit translated codes.

ROUTE TRANSFER, TB AND GB RELAY TEST PROCEDURES

4.27 Following are suggested procedures for testing the operation of route transfer, TB and GB relays:

(a) Electrical test of route transfer (RT) relays

(1) Operate RT key in the Traffic Supervisory Cabinet.

(2) Observe that the correct RT relay operates in each marker and also check that no extra RT relays operate. Restore RT key to normal.

(3) Repeat steps 1 and 2 for all assigned RT relays.

(b) Electrical test of TB and GB relays (requires two persons)

(1) Determine the span of trunks connected to GB relay 0.

(2) Insert make busy plug in first trunk of span at the OGT.

(3) Determine that the proper TB, and only that TB, operates.

(4) Remove the make busy plug.

(5) Repeat steps (2) through (4) for each trunk associated with GB relay 0.

(6) Block all associated TB relays nonoperated.

(7) One at a time block each of the TB relays operated, observing that the GB relay does not release until the last TB relay has been blocked operated.

(8) Check that the GB and SR relays in each marker will now operate when a test call, through that GB, is initiated from the marker test frame.

(9) Remove all blocking tools.

(10) Repeat steps (1) through (9) for each assigned GB relay.

4.28 Correct all troubles encountered. Record the trunk group affected and the troubles on the Summary Report—Annual Crossbar Tandem Routing Verification, Fig. 10. Only one error per trunk group affected shall be scored.

ROUTING VERIFICATION—EVALUATION OF SAMPLE RESULTS

4.29 The Dial Administrator will analyze all the discrepancies found during sample record and code verification to determine if additional tests should be made.

4.30 Generally, a 100 percent verification should be made if the predicted error rate of untested portions exceeds the 1.5 percent level.

4.31 When excessive trouble rates are predicted, evaluation of probable causes by sample group may indicate that 100 percent testing is not required in all the sample categories.

4.32 Record errors discovered while performing Marker Route Verification, as well as Marker and Translator Code Verification, are not part of the statistical base for determination of predicted error rates for untested portions. These record errors, however, should be closely examined to determine their probable cause and to develop the necessary administrative procedures to prevent the recurrence of similar type errors.

4.33 The Dial Administrator should conduct a review of the verification results with all groups concerned to determine what corrective administrative procedures might be implied.

4.34 The Dial Administrator should retain a copy of the Summary Report and of all data used in the Routing Verification process for a period of two years.

5. PERIODIC ROUTING VERIFICATION—OFFICES EQUIPPED WITH COMAS

GENERAL

5.01 Routing verification is required at regularly scheduled intervals in order to evaluate the switching system's continued overall ability to route traffic according to routing plans. Careful analysis of the results should bring to light any deficiencies in current day-to-day administrative procedures. A major objective should be the continuing improvement of the entire routing process.

5.02 Routing should be verified annually. Using COMAS III, all codes are tested. The magnitude of manually verifying all 3-digit and

6-digit translated codes contained in the COMAS III All Codes Test (ACT) printout justifies performing this on a sampling basis. Consideration, however, should be given to performing an initial 100 percent verification if this has never been done.

5.03 Local conditions such as development of tools to assist in performing these verifications, organizational structure, personnel scheduling, etc, may vary among the companies. This part describes procedures that would apply at XBTs equipped with COMAS and in an environment where Routing Assignment Orders are written by a centralized group handling this function.

ROUTING VERIFICATION PROCEDURES

5.04 Periodic routing verification procedures are subdivided into four categories of activities. These are:

(a) ***Record Verification:*** Verifies that the records (RAOs) route traffic as intended by the TRG, LLRP, and/or OTC routing plan. Record verification also includes the comparison of the Routing Supervisor's copy of RAOs with the Maintenance Supervisor's copy. The verification is independent of verification activities (b), (c), and (d) listed below and may be done before, during, or after those activities.

(b) ***Marker Route Verification:*** Verifies the marker's ability to route traffic via the proper trunk group or subgroups and alternate routes in accordance with the office records (RAOs). The COMAS ACT program is used to print an exception report and trunk map, listing discrepancies between markers and translators and overlapped trunk groups. These discrepancies are then resolved. Next, the ACT program is run for one marker and one translator in each pair, and a complete printout is prepared listing all codes and unique routes. Each unique route is verified against the RAOs, for all classes of service, for selection of the proper trunk group and route advance. Marker route verification shall be done on a 100 percent basis and prior to activity (c) below.

(c) ***Code Verification:*** Verifies that the marker and translator properly translate 3-digit and 6-digit translated codes and that they direct traffic to the proper route. Code verification may be performed on a sample basis or on a 100 percent basis. In either case, the ACT printout prepared in (b) above shall be compared with the RAOs to verify that the treatment of specific 3-digit and 6-digit translated codes is in agreement with the RAOs.

(d) ***Route Transfer, TB and GB Relay Test:*** Verifies that assigned RT, TB and GB relays operate correctly. These relays shall be tested on a 100 percent basis and the tests may be performed independently of activities (a) to (c) above.

ROUTING VERIFICATION—SAMPLING

5.05 The complete verification of the treatment of all codes, in all records, for all classes of service on a manual basis presents a formidable work load. This section describes sampling procedures which are designed to substantially reduce the number of verifications required (both in record verification and code verification). These sampling techniques, if carefully applied, can predict error rates in the unverified portions of the records and the switching system with a greater than 90 percent confidence level. Given the predicted error rate and an analysis of the troubles found, management can logically decide what further action may be required.

5.06 Sampling techniques are described in BSP Section 220-110-010. Strict adherence must be paid to rules of random number selection and the results must be understood if the sampling tests are to be meaningful. Routing verification sampling procedures seek to identify instances where troubles exceed a 1.5 percent rate. The Sample Size Table in BSP Section 220-001-010 was developed for use where approximately 10 percent defects are anticipated; it should ***not*** be used for routing verification. Instead, refer to the Sample Size Table in Fig. 9 of this section. From this table it can be seen that sampling is less efficient for smaller universes than it is for larger ones.

5.07 Sampling procedures as they apply to the four categories of periodic routing verification activities are given below:

(a) ***Record Verification:*** For purposes of record verification, a sample number of codes shall be drawn from the universe of all 3-digit (ABC digits 000 to 999) and 6-digit (DEF digits 000 to 999) translated codes.

(1) The sample of 3-digit translated codes will include HNPA NNXs, FNPAs which are not 6-digit translated, toll center codes, vacant codes, and other special codes.

(2) The sample of 6-digit translated codes will include FNPA NNXs, FNPA toll center codes, vacant codes, as well as other special codes for each FNPA that is 6-digit translated.

(3) In cases where the office translates Inward WATS 800 Special Area Codes (SAC), the 800 SAC may, for routing verification purposes, be treated as an FNPA, but consideration should be given to verifying these codes on a 100 percent basis. If this is done, the 800 SAC should be excluded from the sample.

(4) As an example, consider an office which translates five FNPAs. The HNPA and each FNPA contain 1000 codes (both working and nonworking) for a total universe of 6000 codes. Referring to the Sample Size Table, Fig. 9, we see that the sample size required is 858 codes selected randomly from the universe of 6000 codes.

(5) It is permissible to draw an equal number of random codes from each of the areas that are translated. This deviation from random selection will simplify the development of the lists of random codes and should not significantly distort the results of the sampling procedure.

(6) The Summary Report—Annual Crossbar Tandem Routing Verification, Fig. 14, provides a formula for determining the predicted error rate for untested portions of the record.

(b) ***Marker Route Verification:*** Because of the number of variables involved, all unique routes are verified for each class of service for proper operation. Sampling procedures, therefore, are not applicable and should not be used.

(c) ***Marker Code Verification—3-Digit Codes:*** For purposes of the verification of 3-digit codes, a random sample of codes shall be drawn from the universe of all 3-digit (ABC digits 000 to 999) translated codes in the LA, EA, and NA areas. Refer to the Sample Size Table, Fig. 9, to determine the sample size. As an example, consider an office which translates the LA and EA. Each area contains 1000 codes (000 to 999) for a total universe of 2000 codes. Referring to the Sample Size Table, we see that the sample size required is 667 codes selected randomly from the LA and EA. The codes shall be verified by comparing their treatment, as shown on the COMAS ACT printout, against the RAOs.

(1) It is permissible to draw an equal number of random codes from each of the FNPAs that are translated. This deviation from random selection will simplify the development of the lists of random codes and should not significantly distort the results of the sampling procedure.

(2) The Summary Report—Annual Crossbar Tandem Routing Verification, Fig. 14, provides a formula for determining the predicted marker wiring error rate for untested 3-digit codes.

(d) ***Translator Code Verification—6-Digit Translated Codes:*** For purposes of the verification of 6-digit translated codes, a sample number of codes shall be verified by comparing their treatment, as shown on the COMAS III ACT printout, against the RAOs. The universe from which the sample codes shall be drawn consists of all 6-digit translated codes. For example, consider an office which translates five FNPAs. Each FNPA contains 1000 codes (both working and nonworking) for a total universe of 5000 codes. Referring to the Sample Size Table, Fig. 9, we see that the sample size required is 833 codes, selected randomly from the FNPAs.

(1) It is permissible to draw an equal number of random codes from each of the FNPAs that are translated. This deviation from random selection will simplify the development of the lists of random codes and should not significantly distort the results of the sampling procedure.

(2) The same treatment should be given the 800 SAC (eg, sample or 100 percent verification) as elected in Record Verification (a) above.

(3) The Summary Report—Annual Crossbar Tandem Routing Verification, Fig. 14, provides a formula for determining the predicted translator wiring error rate for untested foreign area translated codes.

(e) ***Route Transfer, TB and GB Relay Tests:*** Because they are relatively few in number, all assigned route transfer, TB and GB relays are tested for proper operation. Sampling procedures, therefore, are not applicable and should not be used.

5.08 The development of the lists of sample codes can be done on a manual basis, if necessary, but computer programs can save time in generating lists of random numbers for this purpose. Some companies have already developed such programs, and these should become known through listings in the Catalog of Time Shared Programs.

ROUTING VERIFICATION—RESPONSIBILITIES

5.09 A procedural outline should be formalized to ensure complete understanding of the annual routing verification program by all those participating in the project. A typical procedural outline, including functions and assigned responsibilities, is shown in Fig. 15.

5.10 As indicated in the outline, an appropriate Staff Coordinator should set up an overall schedule for routing verifications of all switching systems within the staff's area of responsibility upon consultation with the Dial Administrators, Maintenance Supervisors, and Routing Supervisors. Consideration should be given to planned activities in the switching systems to be verified and also to the work loads imposed on the various groups involved (routing, dial administration, and maintenance forces).

5.11 Once the overall schedules have been determined, the Dial Administrator shall be responsible for the scheduling of each step of the program and ensure that all activities are completed as scheduled.

RECORD VERIFICATION PROCEDURES

5.12 It is essential to the overall project that basic documents (LLRP, TRG, and OTC Routing Plan) be used in developing the intended routings for the sample codes. This task should be assigned to someone other than the person who normally prepares Routing Assignment Orders for the specific switching system.

5.13 Using the basic documents mentioned above, a routing tree (Example: Fig. 12) may be developed or updated at this time. It should show the hierarchical routing from the XBT by trunk group listing all the working 3-digit codes designated to first route on each trunk group. Codes requiring 6-digit translation will be shown as xxx FAT.

5.14 The routing tree will be useful in determining the intended routings for this verification, and it also will be a handy reference document for the Network Service Center (NSC) in day-to-day trouble investigations. Therefore, consideration should be given to NSC personnel assisting the routing group in preparation of the routing tree. The routing tree should indicate the latest revision date.

5.15 After the routing tree is completed, the Routing Supervisor shall compare the tree with the Routing Assignment Orders for concurrence. Where discrepancies are noted for codes on the sample list, the correctness of the routing tree should be confirmed. Where necessary, correcting orders should be issued. The magnitude of these orders will determine the need to review them with both the Dial Administrator and Maintenance Supervisor prior to their issuance.

5.16 The Routing Supervisor should also, for all codes in the sample, compare his copy of the RAOs with the Maintenance Supervisor's copy. Items to be checked include issue number, corrections, and write-ins. Any discrepancies between the two records should be resolved and, where necessary, corrective action taken.

5.17 In those cases where the RAOs are found to be in error (including planned deviations not documented in writing), the discrepancies shall be listed as record verification errors on the Summary Report—Annual Crossbar Tandem Routing Verification (see Fig. 14). At the conclusion of the record verification, the predicted error rate for untested portions of the record should be calculated using the formula provided on the Summary Report. If the error rate exceeds the 1.5 percent level, a 100 percent record verification should be made.

MARKER ROUTE VERIFICATION—VERIFICATION PROCEDURES

5.18 Marker route verifications shall be performed to determine that all unique routes, in all markers, for all classes of service, route traffic in accordance with the office records.

5.19 The COMAS III ACT printout shall be used to verify each route by comparing the ACT printout with the RAOs.

5.20 The Marker All Codes Test Operating Procedures—COMAS III are described in BSP Section 220-422-302 and in the Program Application Manual PA-25334-01.

5.21 It is suggested that the All Codes Test be performed in the following manner:

(a) Run ACT, requesting exceptions only, for all markers, translators, classes of service, and areas LA, EA, RP, NA, FA.

(b) Resolve any exceptions which are not valid. Manually test any wiring changes made using the marker test circuit.

(c) Request a trunk map printout.

(d) Resolve any overlaps which are not valid. Manually test any wiring changes made using the marker test circuit.

(e) Rerun the ACT requesting a full printout for one marker, one translator in each pair, all classes of service, and areas (LA, EA, RP, NA, FA).

(f) Verify each unique route shown by comparing the ACT printout with the RAOs.

5.22 The following items shall be verified for each unique route:

(a) For each trunk group or subgroup, the GS and GE recorded on the printout corresponds to the GS and GE on the office records.

(b) Trunk subgroups can be accessed in accordance with the office record.

(c) The correct alternate route can be accessed in accordance with the office record.

(d) The correct classes of service can access the route in accordance with the office record.

(e) If the route involves route transfer (RT) or group busy (GB) relays, the "B" sides of these relays should be tested manually as described in 4.21.

5.23 Where discrepancies are noted during the verifications in 5.21 and 5.22, the correctness of the office record shall be confirmed. If the error is found to exist in the office record, it shall be scored as a "Record Error." If the error is found to exist in one or more markers, it shall be scored as a "Wiring Error." In either case, the discrepancy shall be resolved and corrected.

5.24 Record the marker route verification errors on the Summary Report—Annual Crossbar Tandem Routing Verification, Fig. 14.

5.25 The ACT printout used for marker route verification shall also be used for code verification described in 5.26 and 5.27.

CODE VERIFICATION—VERIFICATION PROCEDURES

5.26 Code verifications may be performed on a sampling basis, which will establish predicted error rates for unverified portions of the machine. The selected codes will be verified to determine that traffic for a given code is directed to the proper first route. Alternate routing and class of service treatment need not be verified since these features were verified in the Marker Route Verification process described in 5.22 and 5.23.

5.27 Using the lists of sample codes described in 5.07(c) and (d), verify that the treatment shown on the ACT printout agrees with the RAOs. In cases where revertive pulsing (RP) is employed for a given code, verify the RP code point.

5.28 Where a discrepancy is noted, confirm the correctness of the office record. If the discrepancy exists in the wiring of the marker or translator, it shall be classified as a wiring error. Where the discrepancy is found to exist in the office record, it shall be classified as a record error.

5.29 Record the following data on the Summary Report, Fig. 14:

(a) Each code or trunk group affected

(b) The number of record errors and wiring errors discovered during marker 3-digit code verification

(c) The number of record errors and wiring errors discovered during translator 6-digit code verification

(d) The number of sample codes tested during marker 3-digit code verification and translator 6-digit code verification.

5.30 The predicted error rate for unverified codes should be calculated using the formulas provided in the Summary Report, Fig. 14. If the computed error rate exceeds the 1.5 percent level, perform a 100 percent code verification for the equipment (markers and/or translators) affected.

ROUTE TRANSFER, TB AND GB RELAY TEST PROCEDURES

5.31 The operation of the route transfer, TB and GB relays shall be tested as described in 4.27.

5.32 Correct all troubles encountered. Record the trunk group affected and the troubles on the Summary Report—Annual Crossbar Tandem Routing Verification, Fig. 14. Only one error per trunk group affected shall be scored.

ROUTING VERIFICATION—EVALUATION OF SAMPLE RESULTS

5.33 The Dial Administrator will analyze all the discrepancies found during sample record and code verification to determine if additional tests should be made.

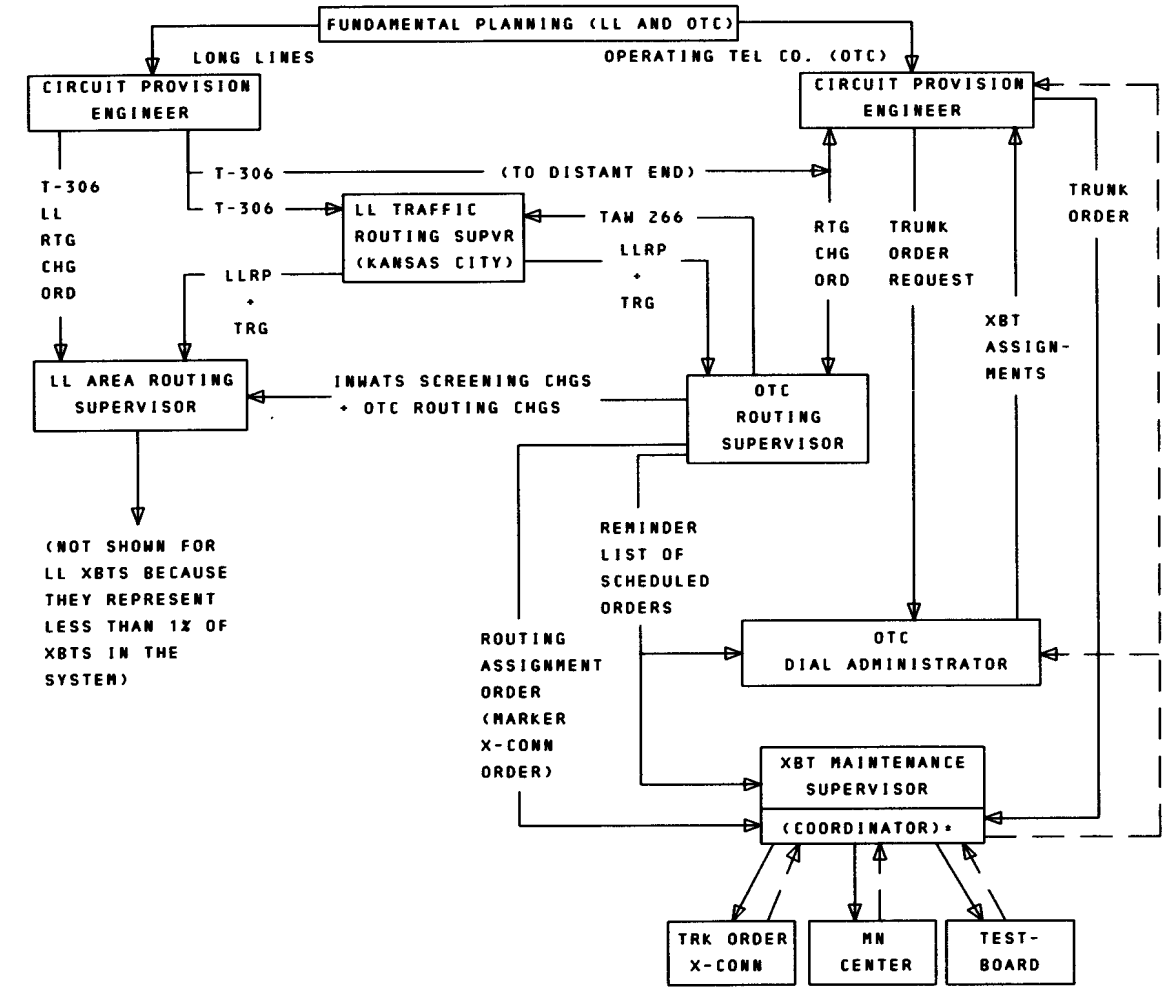
5.34 Generally, a 100 percent verification should be made if the predicted error rate of untested portions exceed the 1.5 percent level.

5.35 When excessive trouble rates are predicted, evaluation of probable causes by sample group may indicate that 100 percent testing is not required in all the sample categories.

5.36 Record errors discovered while performing Marker Route Verification, as well as Marker and Translator Code Verification, are not part of the statistical base for determination of predicted error rates for untested portions. These record errors, however, should be closely examined to determine their probable cause and to develop the necessary administrative procedures to prevent the recurrence of similar type errors.

5.37 The Dial Administrator should conduct a review of the verification results with all groups concerned to determine what corrective administrative procedures might be implied.

5.38 The Dial Administrator should retain a copy of the Summary Report and of all data used in the Routing Verification process for a period of two years.



COORDINATOR TO ENSURE THAT ALL PHASES OF ORDER HAVE BEEN WORKED AND TESTED.

——→ ORDER FLOW.

— — → COMPLETION NOTICE FLOW.

LLRP (LONG LINES ROUTING PLAN) - PUBLISHED MONTHLY - CONTAINS 1ST ROUTE AND 1ST ALTERNATE ROUTE FOR LL TRAFFIC FROM EACH CLASS 4 OR HIGHER MULTIOUTLET OFFICE.

TRG (TRAFFIC ROUTING GUIDE) - UPDATED DAILY - LISTS EVERY NNX REACHED ON A FINAL BASIS FROM EACH CLASS 4 OR HIGHER OFFICE. THIS INFORMATION IS FURNISHED BY THE OPERATING TELEPHONE COMPANIES.

TAW-266 OPERATING TELEPHONE COMPANY INPUT TO TRG.

Fig. 1—Typical Routing and Trunk Order Flow

Form E-4346

ROUTING AND ASSIGNMENT ORDER FOR Chattanooga, Tenn.

1. ROUTE RELAY NO. 0-053 FIRST ALTERNATE — IN GROUND SUPPLY 2

2. ORDER NO. 105 Page 1	5. GROUP Nashville, 1-Way Out
3. REPLACES ORDER NO.	6. NO. OF TRUNKS 40
4. REPLACED BY ORDER NO.	7. EFFECTIVE DATE Cutover

8. CODES CONNECTED TO THIS RELAY

CODE	DESTINATION	CLASS	CODE	DESTINATION	CLASS
203+	Connecticut Area	0-12	717+	Pennsylvania Area	0-12
518+	New York Area	0-12	401+	Providence, R.I.	0-12
302+	Wilmington, Del.	0-12	817+	Ft. Worth, Tex.	0-12
705+	Canada Area	0-12	802+	Burlington, Vt.	0-12
613+	Canada Area	0-12	552+	Bluefield, W.Va.	0-12
514+	Montreal, Que.	0-12	304+	Charleston, W.Va.	0-12
609+	New Jersey Area	0-12	214+	Dallas, Tex.	0-12
915+	Texas Area	0-12	610+	Huntington, W.Va.	0-12

9. ROUTE RELAYS ADVANCING TO THIS RELAY

RELAY NO.									

ASSOCIATED ROUTE RELAYS	(A) GROUP	(B) R. RELAY NO.	(C) GRD. SUP. NO.	(D) SKIP	(E) REPLACE	(F) PREFIX	(G) NO. OF TRUNKS	(H) GROUP SPAN
10. FIRST	Nhvl 1-W	0-053	2	0	-	-	28	40
11. FIRST ALT.								
12. SECOND ALT.	Nhvl 2-W(grp 1)	095	3				40	40
13. FINAL	Nhvl 2-W(grp 2)	096	C	0	-	-	30	40
14. OVERFLOW	NC	000	5	X	X	X	26	26
15. ARRANGEMENT NO. 18								

CODE CONVERSION

16. SKIP 0 — 17. REPLACE - — 18. PREFIX

ROUTE RELAY CROSS CONNECTIONS

19. OFFICE FRAMES	4 & 5	25. SENDER CLASS	
20. TRUNK LEVEL	0	26. TR. SEP. PC	Yes -B
21. GROUP START	0	27. TRK. GRP. PC	Yes
22. GROUP END	39	28. TRK. GRP. OFL.	Yes
23. TWO-WAY	NO	29. TUR	Yes
24. TYPE OF OUTPULSING	MF	30. GB Relay	05

GROUP	INITIALS	DATE	GROUP	INITIALS	DATE
TR. ROUTING			PLANT		
TR. ASSIGNMENT					

Fig. 2—Forms E-4346 and E-4913: Routing and Assignment Orders (Sheet 1 of 2)

Form E-4913

ROUTING AND ASSIGNMENT ORDER FOR New Orleans, La. TANDEM

1. ROUTE NUMBER 124 FIRST ROUTE-ADV.

2. ORDER NO. 58
3. REPLACES ORDER NO.
4. REPLACED BY ORDER NO.
5. GROUP Crowley, La.
6. NO. OF TRUNKS 6
7. EFFECTIVE DATE Cutover

8. CODES CONNECTED TO THIS ROUTE NUMBER

CODE	DESTINATION	CLASS	CODE	DESTINATION	CLASS
318+783+	Crowley, La.	0-16			
318+779+	Iota, La.	0-16			
318+824+	Jennings, La.	0-16			
318+774+	Lake Arthur, La.	0-16			
318+334+	Ravne, La.	0-16			

9. ROUTE NUMBERS ADVANCING TO THIS ROUTE NUMBER

ROUTE NO.										

ASSOCIATED TEST SPANS	GROUP (A)	ROUTE NUMBER (B)	CODE CONVERSION			NO. OF TRUNKS (F)	GROUP SPAN (G)
			SKIP (C)	REPLACE (D)	PREFIX (E)		
10. FIRST	Crowley, La.	124	3	-	-	2	6
11. ROUTE ADVANCE	Lafayette, La.	123	3	-	-	18	28
12. TONE OR ANN.			X	X	X		
13. ROUTE ADVANCE							

ROUTE NUMBER CROSS CONNECTIONS

14. OFFICE FRAMES	0&1 Ext	20. SENDER CLASS	
15. TRUNK LEVEL	11	21. TR. SEP. PC REG.	Yes - A
16. GROUP START	10	22. TRK. GRP. PC REG.	Yes
17. GROUP END	15	23. TRK. GRP. OFL. REG.	Yes
18. TWO-WAY	NO	24. T.U.R. REG.	Yes
19. TYPE OF OUTPULSING	MF	25. FA-O, U&T Relay 01 26, GB Relay 26	

GROUP	INITIALS	DATE	GROUP	INITIALS	DATE
TR. ROUTING			PLANT		
TR. ASSIGNMENT					

Fig. 2—Forms E-4346 and E-4913: Routing and Assignment Orders (Sheet 2 of 2)

ARGIS PRINTOUT (EXAMPLES)

Showing General, Option 2, and Option 5 Formats

```
THE PRINCIPAL CITY FOR NPA 608 IS CHANGING FROM
MADISON TO MADISON#1 EFFECTIVE 06-22-74.
THE PRINCIPAL CITY FOR NPA 312 IS CHANGING FROM
CHICAGO#3 TO CHICAGO#6 EFFECTIVE 10-19-74.
EFFECTIVE 06-22-74 NPA 717 WILL CENTRALIZE 131.
THE PRINCIPAL CITY FOR NPA 305 IS CHANGING FROM
ROCKDALE TO ORLANDO EFFECTIVE 11-16-74.
```

```
OPTION*
?
2

ENTER NPA OR CODE
?
412

FILE SEARCH IN PROGRESS.
```

```
PAGE  1
STATE  NPA-NXX FROM SWITCHER      TO SWITCHER        DUE DATE ENTERED

PA      412-022 TST CODE          CONNELLSVILLE      06-20-74 06/20/74
PA      412-361 PITTSBURGH#1      PITTSBURGH#2       06-22-74 03/29/74
PA      412-441 PITTSBURGH#1      PITTSBURGH#2       06-22-74 03/29/74
PA      412-661 PITTSBURGH#1      PITTSBURGH#2       06-22-74 03/29/74
PA      412-873 NEW CODE          WASHINGTON         06-22-74 03/29/74
PA      412-367 NEW CODE          PITTSBURGH#2       10-05-74 06/20/74

*PRINTOUT OF REQUESTED DATA COMPLETE
 YES

 DO YOU HAVE ANY MORE REQUESTS?
 ?
 YES
```

```
OPTION*
?
5
```

```
PAGE  1
NPA SWITCHING OFFICE PRESENT CSP      NEW CSP          EFF DATE ENTERED

415 PITTSBURG        CONCORD          OAKLAND#3        06-22-74 01/16/74
518 CHATHAM          ALBANY#1         ALBANY#2         06-22-74 06/26/74
602 BISBEE           TUCSON           TUCSON#2         06-22-74 11/13/73
608 BARABOO          MADISON          MADISON#1        06-22-74 04/04/74
608 BOSCOBEL         MADISON          MADISON#1        06-22-74 04/04/74
608 DODGEVILLE       MADISON          MADISON#1        06-22-74 04/04/74
```

Fig. 3—ARGIS Printout (Examples)

STAMFORD XBT PAGE 4

RAO #	REQ FOR CHG RECVD	DUE DATE	RAO ISSUED TO FIELD	RECEIPT CONFIRMED	FIELD COMPL	ASSGND BY
67	6/12/73	6/24/73	6/18/73	6/19 NRH	6/24/73	EWJ
68	6/14/73	6/23/73	6/18/73	6/19 NRH	6/23/73	EWJ
69	6/14/73	6/30/73	6/18/73	6/19 NRH	6/30/73	EWJ
70	6/14/73	6/24/73	6/18/73	6/19 NRH	6/24/73	EWJ
71	6/15/73	6/24/73	6/18/73	6/19 NRH	6/24/73	EWJ
72	6/15/73	6/29/73	6/19/73	6/20 FB	6/29/73	EWJ
73	6/15/73	6/30/73	6/18/73	6/19 NRH	6/30/73	EWJ
74	6/19/73	6/19/73	6/19 VERBAL 6/20/73	6/21 FB	6/19/73	EWJ
75	6/27/73	11/23/73	10/15/73	10/16 GAF	11/23/73	EWJ
76	6/30/73	7/1/73	7/1 VERBAL 7/5/73	7/9 FB	7/1/73	EWJ
77	6/30/73	7/1/73	7/1 VERBAL 7/5/73	7/9 FB	7/1/73	EWJ
78	6/30/73	7/1/73	7/1 VERBAL 7/5/73	7/9 FB	7/1/73	EWJ
79	6/30/73	7/1/73	7/1 VERBAL 7/5/73	7/9 FB	7/1/73	EWJ
80	7/2/73	7/3/73	7/2 VERBAL 7/5/73	7/9 FB	7/3/73	EWJ
81	7/2/73	7/3/73	7/2 VERBAL 7/5/73	7/9 FB	7/3/73	EWJ
82	7/6/73	7/14/73	7/11/73	7/14 NRH	7/14/73	EWJ
83	7/12/73	11/11/73	7/18/73	7/19 NRH	11/11/73	EWJ
84	7/12/73	11/11/73	7/18/73	7/19 NRH	11/11/73	EWJ
85	7/14/73	7/23/73	7/18/73	7/19 NRH	7/23/73	EWJ

Fig. 4—Typical Marker Cross-Connection Log

TYPICAL

CROSS-CONNECTION TRANSMITTAL LETTER

DATE: 10-19-72

ATTENTION: FOREMAN – CENTRAL OFFICE REPAIRMAN: DON DELANEY
WESTERN ELECTRIC INSTALLER:
TEL. CO. NO.:
W.E. CO. NO.:

TRAFFIC CHANGE NO.: 178
C.O.A. NO.:
C.O.R. NO.:

Make cross connection changes at the BPT central office in accordance with attached sheets.

Changes are required in the:

SXS	ESS	5XB	(AMA)	XBT	(AMA)
ITT DIR. DTA ROTS		MKR PRT FAT TV TL IRL IR OSL OS NG TEST FR. CTV TFC. REG. SERV. OPT.	CBI CAMA Billing Indexer *See NOTE Below*	MKR RT TV FAT SADR GB VLMN	BI Billing Indexer *See NOTE Below*

OTHER (SPECIFY)

REMARKS
EST NEW CODE 371
FOR BPT NO ON M-56

Coordinate with C.O.R. 0515 to follow

DATE FIELD WORK SHOULD BE COMPLETED: 11-5-72
EFFECTIVE DATE: 11-5-72
TIME (MILITARY): 00:30

ENGINEER: B. ROBERT
TELEPHONE EXT.: 771 - 3260
NOTED BY:
DATE RECEIVED: * 10-19-72
FMN. C.O. /MN./W.E. DIO. SUPV./DDD BUREAU/DATA SYSTEMS/DTS-TOLL/AMA COORD.: D.F. Delaney

* Please date and sign this form upon receipt and return to:
(Circle Title or Department)
Records Clerk
SNET
Box 261 / 272 / 241
11-02-08

(130 Leeder Hill Drive
Hamden, Conn. 06517)

or
Message Group – FAC
Box 9A1 10-02-08

NOTE

When changes involve the Billing Indexers, the engineer shall distribute Xerox copies of this form (with MBI form attached) as follows:

Data Systems – G.B.S.
D.D.D. Service Bureau – AMA
Dial Traffic Supervisor – Toll
Equipment Engineer – Coord. Const. Service
(AMA – Coord., Box 235 11-02-08 Ext. 2358)

[The AMA – Coord. must be notified of any reason that alters the completion date or time of this AMA change.]

Fig. 5—Typical Cross-Connection Transmittal Letter

Routing Change Reminder

District Switching Systems Managers
Wire Chiefs (Toll)
District Dial Traffic Supervisors
Foremen C.O. Repairmen (XBT & #5XBT)

The marker cross-connection changes shown below for your office have been forwarded to you recently. They must be implemented by 2:00 PM on Saturday, 2-16-74, unless otherwise indicated on the Cross-Connection Transmittal Letter.

Office	Traffic Change Number
Bridgeport XBT	#5, #1
Hartford XBT1	#2, #240
Hartford XBT2	#2, #21, #260
Meriden XBT	#6
New Haven XBT	#1, #9
New London XBT	#3
Norwalk XBT	#3
Stamford XBT	NONE
Waterbury XBT	#4
Danbury 5XBT	
Danielson 5XBT	

Please refer questions on this subject to D. F. McKay at New Haven Extension 2373.

Network Design Supervisor-Tandem

Fig. 6—Typical Routing Change Reminder

TYPICAL
TRUNK ORDER PROGRESS CHART
CROSSBAR TANDEM

OFFICE _____

ORDER NO. _____
DATE DUE _____
NO. OF TRKS. _____

CONN □ TO □ DISC □ FROM □ TRANS □ THRU □ CROSS-CONNECTIONS	√	DATE	BY	MAN HRS
MDF (TRK – REP)				
IDF				
CDF				
TDF				
TUR				
TRDF				
TIE CABLE				
GB – TB				
RELAY RACK				
ITT				
ITTC				
FAT				
OPTIONS (INC REL CKT)				
MKRS				
"Z" PCHG – TLF				
PIN JACKS				
CLASS AMA/NAMA				
BILL INDEXER				
REPEATER SET				
DB PADS				
IMP COMP				
NETWORKS				
TERM. SETS				
EQUALIZERS				
E SIG				
CARRIER				

TESTS	√	DATE	BY	MAN HRS
MKR. ROUTE VERIFICATION				
TRUNK ACCESS				
7D/10D CALL THROUGH				
NC LAMP				

TESTS (CONT)	√	DATE	BY	MAN HRS
GB – TB				
VERIFY (INC – TUR)				
TEST LINE (CF – SUP)				
TRANSMISSION				
NOISE				
OFFICE BALANCE				
CENTREX FEATURE				

RECORDS AND/OR DESIGNATIONS	√	DATE	BY	MAN HRS
TRUNK CARD				
OGT (DES – LOC)				
OLF				
EQUIP FR (RST & PCIT)				
TLF				
ITT				
TUR – TRF REG				
CAMA TST FR				
GB – TB				
MARKER				
CLASS				
FAT				
TIE CABLE				
EQUIP. BOOK (INC)				
REPEATERS				
DB PADS				
IMP COMP				
NETWORKS				
TERM.SETS				
EQUALIZERS				
E SIG				
CARRIER				
CONTROL BOOK				
X-CONN WK COPY				
TRANS – NOISE – BAL				
OK COPY RETURNED				

PROGRESS

DATE	TIME	ACTION TAKEN			REMARKS
		BY	R/R TO	AT	

SCHEDULING

OFFICE	DATE	INITIALS	REMARKS

DATE COMPLETED _____ TOTAL HRS _____

Fig. 7—Typical Trunk Order Progress Chart

DAY-TO-DAY XBT ROUTING VERIFICATION REQUIREMENTS		
ACTIVITY	TYPE OF TEST	
	MARKER ROUTE	TRUNK ACCESS
1. Trunk Additions		X
2. Trunk Removals		X
3. Add or Discontinue Trunk Groups	X	X
4. GB Relay Changes	X	X
5. OLF Changes	X	X
6. FAT Changes	X	
7. INWATS Changes — Interstate terminating band screening	X	
8. INWATS Changes — Originating translation (all routes)	X	

Note: See 3.04 and 3.05 for a description of testing procedures.

Fig. 8—Day-to-Day XBT Routing Verification Requirements

SAMPLE SIZE TABLE

Sample size is dependent upon several factors such as size of universe, expected number of codes with trouble found, and accuracy (assurance level and range) desired. This table represents sample sizes required to detect errors of approximately 1.5 percent with a 90 percent assurance.

SIZE OF UNIVERSE	SAMPLE SIZE
1000	500
1500	600
2000	667
3000	750
4000	800
5000	833
6000	858
7000	875
8000	890
9000	900
10000	909
11000	916
12000	922
13000	928
14000	932
15000	936
16000	941
17000	944
18000	947
19000	950
20000	953

When the universe size is different from any of the sizes shown, use a sample size for the nearest universe size in table.

Fig. 9—Sample Size Table

THIS FORM IS TO BE REPRODUCED LOCALLY

SUMMARY REPORT - ANNUAL CROSSBAR TANDEM ROUTING VERIFICATION
(OFFICE NOT EQUIPPED WITH COMAS)

NO. OF MKRS. (A)	RECORD VERIF. - NO. CODES SAMPLED (B)
TRANSLATOR CODE VERIFICATION - NO. CODES SAMPLED	(C)

OFFICE _____
DATE _____
PREPARED BY _____

CODE/TRK. GRP.	NUMBER OF ERRORS FOUND										SERVICE AFFECT.		NOTES
	RECORD VERIF.	MARKER ROUTE VERIF.		MKR. & TRANS. CODE VERIFICATION						RT, TB, GB TESTS			
				MARKER 3-DIGIT CODES				TRANS 6-D CODES					
		RECORD ERRORS	WIRING ERRORS	RECORD ERRORS	WIRING ERRORS: TEST MARKER RANDOM ERRORS	WIRING ERRORS: TEST MARKER GROUP ERRORS	WIRING ERRORS: OTHER MKR.GRP. ERRORS	RECORD ERRORS	WIRING ERRORS		Y	N	
(D)	(E)	(F)	(G)	(H)	(J)	(K)	(M)	(N)	(P)	(R)	(S)	(T)	(U)
TOTAL													

PREDICTED ERROR RATES FOR UNTESTED PORTIONS:	
RECORD ERRORS (RECORD VERIFICATION) = $\frac{E}{B} \times 100 =$	%
MKR. WIRING ERRORS (3-DIGIT CODES) = $\left[\frac{(J+K) - \frac{K+M}{A}}{W}\right] \times 100 =$	%
TRANS. WIRING ERRORS (6-DIGIT CODES) = $\frac{P}{2C} \times 100 =$	%

3-DIGIT CODE VERIFICATION TEST MARKER	(V)
MKR. 3-DIGIT CODE VERIF. NO. CODES TESTED	(W)

PAGE ____ OF ____

INSTRUCTIONS FOR THE PREPARATION OF THE SUMMARY REPORT – ANNUAL CROSSBAR TANDEM ROUTING VERIFICATION (Office Not Equipped With COMAS)

SPACE OR COLUMN	DATA TO BE ENTERED
(A) No. of Mkrs.	Enter the Number of Markers in Service.
(B) Record Verif. — No. codes sampled	Enter the Number of 3-digit and 6-digit codes sampled for purpose of Record Verification.
(C) Translator Code Verification — No. of codes sampled	Enter the Number of 6-digit codes sampled for purpose of translator Code Verification.
(D) Code/Trk. Grp.	Enter the code or name of the trunk group affected by an error.
NUMBER OF ERRORS FOUND	
(E) Record Verif.	Enter the digit 1 for each record error discovered during Record Verification. Only one error per code shall be scored.
MARKER ROUTE VERIF.	
(F) Record Errors	Enter the digit 1 for each record error discovered during Marker Route Verification. Only one error per code or trunk group shall be scored.
(G) Wiring Errors	Enter the number of markers having wiring errors affecting a given code or trunk group. For example, if 3 markers failed to alternate route to the Beta trunk group, 3 errors would be scored. If class of service screening errors are involved, score a single error per marker even though more than one class of service may be affected.
MKR AND TRANS. CODE VERIFICATION	
MARKER 3-DIGIT CODES	
(H) Record Errors	Enter the digit 1 for each record error discovered during marker 3-digit code verification. Only one error shall be scored per code.
(J) Test Marker Random Errors	Enter the digit 1 for each test marker random wiring error discovered during 3-digit code verification. By definition, random wiring errors are those that occur in *only* the test marker. Only one error shall be scored per code.
(K) Test Marker Group Errors	Enter the digit 1 for each test marker group wiring error discovered during marker 3-digit code verification. By definition, group wiring errors are those that occur in other markers as well as in the test marker. Only one error shall be scored per code.
(M) Other Marker Group Errors	Enter the number of markers (excluding the test marker) containing the group error for a given 3-digit code. For example, if the test marker and three other markers misroute code 582, enter the digit 3.
TRANS. 6-D CODES	
(N) Record Errors	Enter the digit 1 for each record error discovered during translator 6-digit code verification. Only one error per code shall be scored.
(P) Wiring Errors	Enter the number of translators having wiring errors affecting a given code. For example if translator "A" routed code 674 to the proper FA, Tens and Units but translator "B" did not, enter the digit 1.
RELAY TESTS	
(R) RT, TB, GB tests	Enter the digit 1 for each trunk group affected by an RT, TB, or GB wiring error. Only one error shall be scored per trunk group.
SERVICE EFFECT	
(S) Service Affecting Y	Enter a check mark if the error recorded on a given line is service affecting. For purposes of this summary, an error is service affecting if it: 1. Affects customer service 2. Directs the call to the wrong trunk group (even though the call may be completed) 3. Results in failure to access all trunks in a group or subgroup 4. Results in failure to alternate route.
(T) Service Affecting N	Enter a check mark if the error does not cause any of the four failures described in (S) above.
(U) Notes	Enter any pertinent notes concerning special arrangements or trouble encountered. If additional space is required, enter a note identifier number in this column and enter the note on an attached supplemental page.
(V) 3-Digit Code Verification Test Marker	Enter the number of the marker selected as the test marker for purposes of 3-digit code verification.
(W) Mkr. 3-Digit Code Verif. No. Codes Tested	Enter the number of codes that were tested during marker 3-digit code verification.

CALCULATION OF PREDICTED ERROR RATES

FOR UNTESTED PORTIONS OF THE RECORDS AND THE MACHINE

Total the quantity of errors in each column. Enter the quantities in spaces A to C and W, and the totals of columns E, G, J, K, M, and P in the formulas given. Compute the predicted error rates for untested portions of the records, markers, and translators.

Fig. 10—Summary Report—Annual Crossbar Tandem Routing Verification (Office Not Equipped With COMAS) (Sheet 1 of 3)

ILLUSTRATION OF THE USE OF THE SUMMARY REPORT - ANNUAL CROSSBAR TANDEM ROUTING VERIFICATION.

THIS FORM IS TO BE REPRODUCED LOCALLY

SUMMARY REPORT - ANNUAL CROSSBAR TANDEM ROUTING VERIFICATION
(OFFICE NOT EQUIPPED WITH COMAS)

OFFICE Champaign
DATE 3/14/75
PREPARED BY EWJ

NO. OF MKRS.	(A) 5	RECORD VERIF. - NO. CODES SAMPLED	(B) 835
TRANSLATOR CODE VERIFICATION - NO. CODES SAMPLED			(C) 668

CODE/TRK. GRP.	NUMBER OF ERRORS FOUND										SERVICE AFFECT.		NOTES
	RECORD VERIF.	MARKER ROUTE VERIF.		MKR. & TRANS. CODE VERIFICATION						RT, TB, GB TESTS			
				MARKER 3-DIGIT CODES				TRANS 6-D CODES					
					WIRING ERRORS								
		RECORD ERRORS	WIRING ERRORS	RECORD ERRORS	TEST MARKER RANDOM ERRORS	TEST MARKER GROUP ERRORS	OTHER MKR.GRP. ERRORS	RECORD ERRORS	WIRING ERRORS		Y	N	
(D)	(E)	(F)	(G)	(H)	(J)	(K)	(M)	(N)	(P)	(R)	(S)	(T)	(U)
312-770	1											√	
312-858	1											√	
312-946	1											√	
403	1											√	
618-228								1			√		Wrong Route
618-274								1			√		" "
618-282								1			√		" "
421					1						√		Routed to 411 (Non-WK Code)
365				1								√	
550				1								√	
551				1								√	
TOTAL	4	2	1	6	1	–	–	3	–	1	7	11	

PREDICTED ERROR RATES FOR UNTESTED PORTIONS:	
RECORD ERRORS (RECORD VERIFICATION) = $\frac{E}{B} \times 100 =$	.48%
MKR. WIRING ERRORS (3-DIGIT CODES) = $\left[\frac{(J+K) - \frac{K+M}{A}}{W}\right] \times 100 =$	.1 %
TRANS. WIRING ERRORS (6-DIGIT CODES) = $\frac{P}{2C} \times 100 =$	0 %

$\frac{4}{835} \times 100 = .48\%$

$\frac{1}{1000} \times 100 = .1\%$

3-DIGIT CODE VERIFICATION TEST MARKER	(V) 4
MKR. 3-DIGIT CODE VERIF. NO. CODES TESTED	(W) 1000

PAGE 1 OF 2

Fig. 10—Summary Report—Annual Crossbar Tandem Routing Verification (Office Not Equipped With COMAS) (Sheet 2 of 3)

ILLUSTRATION OF THE USE OF THE SUMMARY REPORT - ANNUAL CROSSBAR TANDEM ROUTING VERIFICATION

THIS FORM IS TO BE REPRODUCED LOCALLY

SUMMARY REPORT - ANNUAL CROSSBAR TANDEM ROUTING VERIFICATION
(OFFICE NOT EQUIPPED WITH COMAS)

OFFICE Champaign
DATE 3/14/75
PREPARED BY EWS

NO. OF MKRS. (A)	RECORD VERIF. - NO. CODES SAMPLED (B)
TRANSLATOR CODE VERIFICATION - NO. CODES SAMPLED	(C)

CODE/TRK. GRP.	NUMBER OF ERRORS FOUND										SERVICE AFFECT.		NOTES
	RECORD VERIF.	MARKER ROUTE VERIF.		MKR. & TRANS. CODE VERIFICATION						RT, TB, GB TESTS			
				MARKER 3-DIGIT CODES				TRANS 6-D CODES					
					WIRING ERRORS								
		RECORD ERRORS	WIRING ERRORS	RECORD ERRORS	TEST MARKER RANDOM ERRORS	TEST MARKER GROUP ERRORS	OTHER MKR.GRP. ERRORS	RECORD ERRORS	WIRING ERRORS		Y	N	
(D)	(E)	(F)	(G)	(H)	(J)	(K)	(M)	(N)	(P)	(R)	(S)	(T)	(U)
552				1								✓	
911				1							✓		Wrong Ann.
959				1								✓	
Bloomington			1								✓		No RTE. ADV. 1 MKR
SPFD 4A		1									✓		Wrong Gnd Sup, Failed to RP
CHAMP. 4A		1										✓	
Marion										1		✓	
TOTAL													

PREDICTED ERROR RATES FOR UNTESTED PORTIONS:

RECORD ERRORS (RECORD VERIFICATION) = $\frac{E}{B} \times 100 =$	%
MKR. WIRING ERRORS (3-DIGIT CODES) = $\left[\frac{(J+K) - \frac{K+M}{A}}{W}\right] \times 100 =$	%
TRANS. WIRING ERRORS (6-DIGIT CODES) = $\frac{P}{2C} \times 100 =$	%

3-DIGIT CODE VERIFICATION TEST MARKER	(V)
MKR. 3-DIGIT CODE VERIF. NO. CODES TESTED	(W)

PAGE 2 OF 2

Fig. 10—Summary Report—Annual Crossbar Tandem Routing Verification (Office Not Equipped With COMAS) (Sheet 3 of 3)

TYPICAL PROCEDURAL OUTLINE
ANNUAL ROUTING VERIFICATION ON A SAMPLING BASIS OF XBT NOT EQUIPPED WITH COMAS

STEP	FUNCTION	RESPONSIBILITY
1.	Establish a schedule of routing verification of all XBTs in the area served by a given routing group.	Appropriate Staff Coordinator
2.	Prepare lists of sample codes for Record Verification and Translator Code Verification.	Dial Administrator
RECORDS VERIFICATION		
3.	Using LLRP, TRG, and OTC Routing Plan, prepare routing tree for all working 3-digit codes and identify FATs where 6-digits are translated.	Routing Supervisor
4.	Develop the intended routes (first and alternates) for the sample codes. Use the LLRP, TRG, and OTC Routing Plan.	Routing Supervisor
5.	Compare intended routings with Routing Supervisor's copy of the Routing Assignment Orders. Also check all other information on the RAOs.	Routing Supervisor
6.	Compare RAOs (Routing Supervisor and Maintenance Supervisor copies) for issue date, corrections, and write-ins to ensure that both records agree in all details on sample codes.	Routing Supervisor
OFFICE VERIFICATION		
7.	Establish testing schedule.	Maintenance Supervisor
8.	Perform machine testing (a) Verify all routes (b) Verify all 3-digit codes in sample marker (c) Verify sample 6-digit translated codes (d) Test all assigned RT, TB, and GB relays (e) Refer questionable routings to Dial Administrator (f) Correct troubles and record irregularities.	Maintenance Supervisor

Fig. 11—Typical Procedural Outline—Annual Routing Verification on a Sampling Basis of XBT Not Equipped With COMAS (Sheet 1 of 2)

STEP	FUNCTION	RESPONSIBILITY
	ANALYSIS OF RESULTS	
9.	Evaluate results to determine need for additional verification.	Dial Administrator
10.	Prepare Final Summary Report of Routing Verification.	Dial Administrator
11.	Evaluate the implications of the verification, conduct a review session with all groups concerned, and determine the need for corrective day-to-day procedures.	Dial Administrator
12.	Retain all data used in verification procedures for a period of two years.	Dial Administrator

Fig. 11—Typical Procedural Outline—Annual Routing Verification on a Sampling Basis of XBT Not Equipped With COMAS (Sheet 2 of 2)

TYPICAL ROUTING TREE

NEW LONDON XBT
INTERSTATE TRUNK ROUTING PATTERN – 4/71

TRUNK GROUP	CODE POINTS
New Haven 4A (2w trks) (Final)	
New Haven 4A (1w trks)	FNPA code group — A
Washington DC 3	301 FAT, 703 FAT
Washington DC 1	202
Chicago 3	312
Springfield, Mass	413 FAT
Portland	207
Providence	401 FAT
Narragansett	401 FAT
Fall River	617 FAT
Boston	617 FAT
Worcester	617 FAT
New Brunswick	201 FAT
Newark	201 FAT
Rochelle Park	201 FAT
New York — Boro 3	212
Albany	518, 607
Syracuse	315
Suffolk	516 FAT
Hempstead	516 FAT
Buffalo	716
Philadelphia	215 FAT
Harrisburg	717
Arlington	703 FAT
Baltimore	301 FAT
White Plains 2	FNPA code group — B

Fig. 12—Typical Routing Tree—Crossbar Tandem Office (Sheet 1 of 5)

TYPICAL ROUTING TREE

NEW LONDON XBT
INTRASTATE TRUNK ROUTING PATTERN – 4/71

TRUNK GROUP	CODE POINTS
New Haven 4A (2w trunks) (Final)	
New Haven 4A (1w trunks)	HNPA CG14
Bridgeport XBT	HNPA CG1
Danielson 5XB	774, 923, 935, 077
Putnam-Main	928
Plainfield	546, 564
Hartford 2 XBT	HNPA CG2
Manchester SST	HNPA CG3
Meriden ITT	HNPA CG4
Middletown ITT	HNPA CG5
Moodus	873
New Britain ITT	HNPA CG6
New Haven XBT	HNPA CG7
New Haven — Main 1	562
New Haven — Main 1	776, 777, 787
New Haven — Main 1	865
New Haven — Main 2	771
New Haven — Main 2	772
New Haven — East	467
New Haven — East	568, 569
New Haven — Hamden	248, 288
New Haven — West	932, 933, 934
New Haven — Westville	387, 389
Branford — Main	488
Guilford — Main	453
Madison — Main	245
Norwalk SST	HNPA CG8
Norwich ITT	HNPA CG9
Jewett City	376
Ledyard	464, 848
Old Saybrook ITT	388, 399
Clinton	669
Essex	767
Lyme	434
Deep River	526
Stamford XBT	HNPA CG10
Waterbury XBT	HNPA CG11
Willimantic ITT	HNPA CG12
Storrs	429
Colchester	437
Windsor Locks ITT	HNPA CG13

Fig. 12—Typical Routing Tree—Crossbar Tandem Office (Sheet 2 of 5)

TYPICAL ROUTING TREE

NEW LONDON XBT
ROUTING TO TRIBUTARY OFFICES – 4/71

TRUNK GROUP	CODE POINTS
NC (reorder tone)	
New London — Main	442
New London — Main	443
New London — Main	447
New London — Groton	445
New London — Groton	446
New London — Groton	449
Niantic	739
Mystic — Main	536
Mystic — Stonington	535
Pawcatuck	599

Fig. 12—Typical Routing Tree—Crossbar Tandem Office (Sheet 3 of 5)

TYPICAL ROUTING TREE

NEW LONDON XBT
FNPA CODE GROUPS – 4/71

CODE GROUP A

205 Alabama
907 Alaska
602 Arizona
501 Arkansas
209 California
213 California
408 California
415 California
707 California
714 California
805 California
916 California
303 Colorado
302 Delaware
305 Florida
813 Florida
904 Florida
404 Georgia
912 Georgia
808 Hawaii
208 Idaho
217 Illinois
309 Illinois
618 Illinois
815 Illinois
219 Indiana
317 Indiana
812 Indiana
319 Iowa
515 Iowa
712 Iowa
316 Kansas
913 Kansas
502 Kentucky
606 Kentucky
318 Louisiana
504 Louisiana
301 Maryland FAT
617 Massachusetts FAT
413 Massachusetts FAT

CODE GROUP A (Cont)

313 Michigan
517 Michigan
616 Michigan
906 Michigan
218 Minnesota
507 Minnesota
612 Minnesota
601 Mississippi
314 Missouri
417 Missouri
816 Missouri
406 Montana
308 Nebraska
402 Nebraska
702 Nevada
603 New Hampshire
201 New Jersey FAT
609 New Jersey
505 New Mexico
704 North Carolina
919 North Carolina
701 North Dakota
216 Ohio
419 Ohio
513 Ohio
614 Ohio
405 Oklahoma
918 Oklahoma
503 Oregon
215 Pennsylvania FAT
412 Pennsylvania
814 Pennsylvania
803 South Carolina
605 South Dakota
615 Tennessee
901 Tennessee
214 Texas
512 Texas
713 Texas
806 Texas

CODE GROUP A (Cont)

817 Texas
915 Texas
801 Utah
802 Vermont
703 Virginia FAT
804 Virginia
206 Washington
509 Washington
304 West Virginia
414 Wisconsin
608 Wisconsin
715 Wisconsin
307 Wyoming

506 New Brunswick
709 Newfoundland
902 Nova Scotia
416 Ontario
613 Ontario
705 Ontario
807 Ontario
418 Quebec
514 Quebec
819 Quebec
519 Toronto

809 Bahamas
903 Mexico

CODE GROUP B

914 New York
403 Alberta
604 British Columbia
204 Manitoba
306 Saskatchewan
905 Mexico

Fig. 12—Typical Routing Tree—Crossbar Tandem Office (Sheet 4 of 5)

TYPICAL ROUTING TREE

NEW LONDON XBT
HNPA CODE GROUPS – 4/71

CG1	255, 259, 261, 268 333, 334, 335, 336 366, 367, 368, 372 374, 375, 378, 874 878, 377, 877, 384
CG2	232, 233, 236, 242, 243 246, 247, 249, 289, 244 522, 523, 524, 525, 527 528, 529, 653, 658, 677 688, 693, 673, 521, 278 277, 987, 273, 563, 568 565, 547, 566, 561, 549 569, 022
CG3	633, 643, 644, 646, 067 647, 649, 684, 872, 875
CG4	235, 237, 238, 265, 269 621, 628, 634
CG5	267, 295, 342, 345 347, 349, 344, 026
CG6	223, 224, 225, 229, 098 666, 747, 828, 667
CG7	239, 393, 481, 484 497, 551, 624, 795 799, 899, 432, 436 397, 281, 221, 321
CG8	226, 227, 438, 544 762, 838, 846, 847 853, 866, 002
CG9	822, 887, 889, 859
CG10	322, 323, 325, 325, 327 329, 348, 637, 655, 966 356, 359, 972, 057
CG11	753, 754, 755, 756 757, 758, 759, 456 457, 458, 263, 264 266, 274, 283, 272 729, 879, 723, 573 084
CG12	523, 455, 456, 642, 485 328, 742, 068
CG13	623, 688, 745, 749, 073
CG14	354, 364, 379, 792, 355 426, 435, 482, 489, 542 567, 582, 583, 584, 589 552, 531, 672, 661, 734 735, 736, 743, 746, 748 775, 824, 868, 888, 869 927, 929, 938

Fig. 12—Typical Routing Tree—Crossbar Tandem Office (Sheet 5 of 5)

CROSSBAR TANDEM MARKER ROUTE VERIFICATION
ROUTE ADVANCE AND CLASS OF SERVICE CHECKLIST
(THIS FORM IS TO BE REPRODUCED LOCALLY)

OFFICE _____
DATE _____
TESTED BY _____

A	B					C	D		E		F		G		H																					J		K
RTE. REL./ RTE. #	ROUTE/TRUNK GRP.					VALID CODE	GB		RTE. ADV. OK		OLF TL OK		GS-GE-OK		ACCESS BY CLASS OF SERVICE																					CLS. SERV. OK		NOTES
	1ST	2ND	3RD	4TH	5TH		Y	N	Y	N	Y	N	Y	N	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Y	N	

(A) RTE. REL./RTE #
Enter, in numerical sequence, each assigned Route Relay number or Route number.

(B) Route/Trunk Group
Enter each first-route and the subsequent alternate routes, through final announcement for the Rte. Rel./Rte # entered in Column (A). Use the office record as source data.

(C) Valid Code
Enter for each first-route a valid working code for that route.

(D) GB Y;N
Enter a check mark in the appropriate (Y or N) column to indicate whether GB relays are assigned to the first-route.

(E) Rte Adv. OK Y;N
Upon completion of the marker route verification of a given first-route and its route advances, enter a check mark in the appropriate (Y or N) column to indicate either satisfactory or unsatisfactory route advance.

(F) OLF TL OK Y;N
Upon completion of the marker route verification of a given first-route, enter a check mark in the appropriate (Y or N) column to indicate whether the correct office link frame and trunk level were indicated by the test.

(G) GS- GE- OK Y;N
Upon completion of the marker route verification of a given first-route, enter a check mark in the appropriate (Y or N) column to indicate whether the correct group start and group end were indicated by the test.

(H) Access by Class of Service
Enter check marks in the appropriate columns (0 — 20) to identify classes of service having access to each first-route.

(J) CLS SERV OK Y;N
Upon completion of the marker route verification of a given first route, enter a check mark in the appropriate (Y or N) column to indicate whether class of service screening is in conformance with the office record.

(K) Notes
Enter any pertinent notes concerning special arrangements or troubles encountered. If additional space is required, enter a note identifier number in this column and enter the note on an attached supplementary page.

INSTRUCTIONS FOR THE PREPARATION OF THE CROSSBAR TANDEM ROUTE VERIFICATION — ROUTE ADVANCE AND CLASS OF SERVICE CHECKLIST

COLUMN | DATA TO BE ENTERED

Fig. 13 — Crossbar Tandem Marker Route Verification — Route Advance and Class of Service Checklist (Sheet 1 of 2)

ILLUSTRATION OF THE USE OF THE CROSSBAR TANDEM MARKER ROUTE VERIFICATION - ROUTE ADVANCE AND CLASS OF SERVICE CHECKLIST

CROSSBAR TANDEM MARKER ROUTE VERIFICATION
ROUTE ADVANCE AND CLASS OF SERVICE CHECKLIST
(THIS FORM IS TO BE REPRODUCED LOCALLY)

OFFICE Champaign
DATE 3/14/75
TESTED BY EWJ

A	B					C	D		E		F		G		H																				J		K
RTE. REL. / RTE. #	ROUTE/TRUNK GRP.					VALID CODE	GB		RTE ADV. OK		OLF TL OK		GS-GE-OK		ACCESS BY CLASS OF SERVICE																						CLS. SERV. OK		NOTES
	1ST	2ND	3RD	4TH	5TH		Y	N	Y	N	Y	N	Y	N	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Y	N	
00	BLTN	CHMP 4A	NCIT			309-365	✓			✓	✓		✓		✓				✓			✓			✓		✓			✓					✓		MKr 4 fails to route advance
01	CRBL	"	"			618-357		✓	✓		✓		✓		✓				✓			✓			✓		✓			✓					✓		
02	CHCG 6	NRWJ	CHMP 4A	NCIT		312-434	✓		✓		✓		✓		✓				✓			✓			✓		✓			✓					✓		
04	DANV	CHMP 4A	NCTC			431		✓	✓		✓		✓		✓	✓			✓		✓														✓		
06	KKK ESS	"	NCIT			815-238		✓	✓		✓		✓		✓				✓			✓			✓		✓			✓					✓		

Fig. 13—Crossbar Tandem Marker Route Verification—Route Advance and Class of Service Checklist (Sheet 2 of 2)

THIS FORM IS TO BE REPRODUCED LOCALLY

SUMMARY REPORT - ANNUAL CROSSBAR TANDEM ROUTING VERIFICATION
(OFFICE EQUIPPED WITH COMAS)

RECORD VERIFICATION - NO. CODES SAMPLED	(A)
TRANSLATOR CODE VERIFICATION - NO. CODES SAMPLED	(B)

OFFICE _____
DATE _____
PREPARED BY _____

CODE/TRK. GRP.	NUMBER OF ERRORS FOUND								SERVICE AFFECT.		NOTES
	RECORD VERIF.	MARKER ROUTE VERIF.		MKR. & TRANS. CODE VERIFICATION				RT, TB, GB TESTS			
				MARKER 3-D CODES		TRANS. 6-D CODES					
		RECORD ERRORS	WIRING ERRORS	RECORD ERRORS	WIRING ERRORS	RECORD ERRORS	WIRING ERRORS		Y	N	
(C)	(D)	(E)	(F)	(G)	(H)	(J)	(K)	(L)	(M)	(N)	(P)
TOTAL											

PREDICTED ERROR RATES FOR UNTESTED PORTIONS:	
RECORD ERRORS (RECORD VERIFICATION) = $\frac{D}{A}$ X 100 =	%
MKR. WIRING ERRORS (3-DIGIT CODES) = $\frac{H}{Q}$ X 100 =	%
TRANS. WIRING ERRORS (6-DIGIT CODES) = $\frac{K}{B}$ X 100 =	%

MKR. 3-DIGIT CODE VERIF. NO. CODES SAMPLED	(Q)

PAGE ____ OF ____

INSTRUCTIONS FOR THE PREPARATION OF THE SUMMARY REPORT – ANNUAL CROSSBAR TANDEM ROUTING VERIFICATION
(Office Equipped With COMAS)

SPACE OR COLUMN	DATA TO BE ENTERED
(A) Record Verif. — No codes sampled	Enter the number of 3-digit and 6-digit codes sampled for purpose of Record Verification.
(B) Translator Code Verification — No. of codes samples	Enter the Number of 6-digit codes sampled for purpose of Translator Code Verification.
(C) Code/Trk. Grp.	Enter the code or name of the trunk group affected by an error.
NUMBER OF ERRORS FOUND	
(D) Record Verif.	Enter the digit 1 for each record error discovered during Record Verification. Only one error per code shall be scored.
MARKER ROUTE VERIF.	
(E) Record Errors	Enter the digit 1 for each record error discovered during Marker Route Verification. Only one error per code or trunk group shall be scored.
(F) Wiring Errors	Enter the digit 1 for each wiring error discovered during Marker Route Verification. Only one error per code or trunk group shall be scored, even though more than one class of service may be involved, or more than one marker in error.
MKR AND TRANS. CODE VERIFICATION	
MKR 3-D CODES	
(G) Record Errors	Enter the digit 1 for each record error discovered during Marker 3-digit Code Verification. Only one error shall be scored per code.
(H) Marker Wiring Errors	Enter the digit 1 for each marker wiring error discovered during 3-digit code verification. Only one error shall be scored per code, even though more than one marker may be in error.
TRANS. 6-D CODES	
(J) Record Errors	Enter the digit 1 for each record error discovered during Translator 6-digit Code Verification. Only one error per code shall be scored.
(K) Wiring Errors	Enter the digit 1 for each translator wiring error discovered during 6-digit code verification. Only one error shall be scored per code, even though, more than one translator may be in error.
RELAY TESTS	
(L) RT, TB, GB tests	Enter the digit 1 for each trunk group affected by an RT, TB, or GB wiring error. Only one error shall be scored per trunk group.
SERVICE EFFECT	
(M) Service Affecting Y	Enter a check mark if the error recorded on a given line is service affecting. For purposes of this summary, an error is service affecting if it: 1. Affects customer service 2. Directs the call to the wrong trunk group (even though the call may be completed) 3. Results in failure to access all trunks in a group or subgroup 4. Results in failure to alternate route
(N) Service Affecting N	Enter a check mark if the error does not cause any of the four failures described in (S) above.
(P) Notes	Enter any pertinent notes concerning special arrangements or trouble encountered. If additional space is required, enter a note identifier number in this column and enter the note on an attached supplemental page.
(Q) Mkr. 3-Digit Code Verif. No. Codes Sampled	Enter the sample size used for marker 3-digit code verification.

CALCULATION OF PREDICTED ERROR RATES

FOR UNTESTED PORTIONS OF THE RECORDS AND THE MACHINE

Total the quantity of errors in each column. Enter the quantities in spaces A, B, and Q and the totals of columns D, H, and K in the formulas given. Compute the predicted error rates for unverified portions of the records, markers, and translators.

Fig. 14—Summary Report—Annual Crossbar Tandem Routing Verification (Office Equipped With COMAS)

TYPICAL PROCEDURAL OUTLINE
ANNUAL ROUTING VERIFICATION ON A SAMPLING BASIS OF XBT EQUIPPED WITH COMAS

STEP	FUNCTION	RESPONSIBILITY
1.	Establish a schedule of routing verification of all XBTs in the area served by a given routing group.	Appropriate Staff Coordinator
2.	Prepare lists of sample codes for Record Verification, Marker 3-digit Code Verification, and Translator 6-digit Code Verification.	Dial Administrator
	RECORD VERIFICATION	
3.	Using LLRP, TRG, and OTC Routing Plan, prepare routing tree for all working 3-digit codes and identify FATs where 6-digits are translated.	Routing Supervisor
4.	Develop the intended routes (first and alternates) for the sample codes. Use the LLRP, TRG, and OTC Routing Plan.	Routing Supervisor
5.	Compare intended routings with Routing Supervisor's copy of the Routing Assignment Orders. Also check all other information on the RAOs.	Routing Supervisor
6.	Compare RAOs (Routing Supervisor and Maintenance Supervisor copies) for issue date, corrections, and write-ins to ensure that both records agree in all details on sample codes.	Routing Supervisor
	OFFICE VERIFICATION	
7.	Establish testing schedule.	Maintenance Supervisor
8.	Perform Machine testing	Maintenance Supervisor
	(a) Run ACT, request exceptions only.	
	(b) Print Trunk Map.	
	(c) Resolve discrepancies, refer questionable routings to Dial Administrator.	
	(d) Run ACT for one Marker, one Translator of each pair.	
	(e) Using printout from (d) above, verify corrections of all unique routes.	
	(f) Using printout from (d) above, verify sample 3-digit and 6-digit codes.	

Fig. 15—Typical Procedural Outline—Annual Routing Verification on a Sampling Basis of XBT Equipped With COMAS (Sheet 1 of 2)

STEP	FUNCTION	RESPONSIBILITY
	(g) Resolve all discrepancies, refer questionable routing to Dial Administrator.	
	(h) Test all assigned RT, TB, and GB relays.	
	(i) Correct troubles and record irregularities.	
	ANALYSIS OF RESULTS	
9.	Evaluate results to determine need for additional verification.	Dial Administrator
10.	Prepare Final Summary Report of Routing Verification.	Dial Administrator
11.	Evaluate the implications of the verification, conduct a review session with all groups concerned, and determine the need for corrective day-to-day procedures.	Dial Administrator
12.	Retain all data used in verification procedures for a period of two years.	Dial Administrator

Fig. 15—Typical Procedural Outline—Annual Routing Verification on a Sampling Basis of XBT Equipped With COMAS (Sheet 2 of 2)