NETWORK INTEROFFICE TRANSMISSION MEASUREMENT PLAN DESCRIPTION

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1. GENERAL

1.01 The Network Interoffice Transmission (NIT) Measurement Plan is designed to indicate the general performance of all trunk plant in the message network in the connected condition. It is thus affected by the transmission performance of all trunks involved in local or toll connections and the transmission performance of all required switching equipment. Figure 1 shows the position of the Message Telecommunication Service (MTS) network being measured and its relation to the grade-of-service model.

1.02 This section is reissued to change the title to Network Interoffice Transmission Measurement Plan. The title change is due to a complete revision, update, and consolidation of the section on connection appraisal. These changes invalidate all comparisons to previous connection

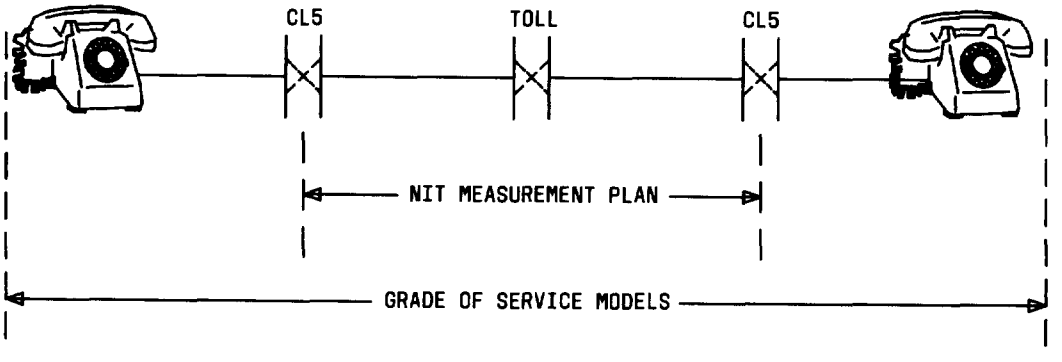


Fig. 1—Network Interoffice Transmission Measurement Plan

appraisal results, due to the extremely different methods of quality evaluation. The following sections are canceled following the reissue of this section:

301-200-300	301-210-100
301-201-300	301-210-101
301-201-500	301-210-500
301-202-100	301-210-501
301-202-300	301-210-502
301-202-500	301-210-504

Since this is a general revision, change arrows have been omitted.

1.03 The measurement plan is based on the loss and message circuit noise performance as observed in the receiving direction on samples of actual connections. Other transmission characteristics, such as attenuation frequency distortion, echo return loss, envelope delay distortion, etc, are not included. Components covering these characteristics may be added at a later date.

1.04 The NIT Measurement Plan is divided into two sampling categories. These plans are based on local sample calls and toll sample calls from each "originating entity". An originating entity is defined as an outgoing marker group, decoder group, single office, or combination of offices which share all outward trunks. Sample calls are made to test lines in other central offices to measure loss and noise in the connections sampled. Fifty sample calls, thus fifty pairs of loss-noise measurements, make up a local or toll sample.

2. TRANSMISSION EVALUATION SYSTEM (TREST)

2.01 The NIT Measurement Plan makes use of the Transmission Evaluation System (TREST). TREST is a time-shared computer system designed to perform all data handling and report generation for Bell System transmission performance results measured at the central office level. Its present form includes only the NIT Measurement Plan. Future measurements will be included as they are developed.

2.02 The TREST data base has basically a hierarchical structure. It uses a structure that directly corresponds to the division/area/company structure of the network operations departments in the Operating Companies. TREST is administered by the Network Services, Transmission Methods and Measurements organization at AT&T.

2.03 Information flows two ways in TREST. First, the computer is told which originating entities are to be tested in each quarter. TREST then generates, for each originating entity, worksheets listing 50 toll and/or 50 local test calls to terminating entities. AT&T mails these observation worksheets to the operating telephone companies.

2.04 The operating telephone companies send their observers to the field to conduct the test calls. The observation data they gather are transmitted to the TREST computer. TREST then computes a statistical survey of level and noise results and calculates the transmission performance.

2.05 Reports are available to the operating telephone company as the information is received by TREST. After every quarter, AT&T generates a performance report for each company and one for the entire system.

2.06 Details of TREST are given in the TREST Users Manual available from AT&T.

3. PHILOSOPHY

A. General

3.01 Customer opinions of their ability to hear and be heard on their calls are predictable from the mathematical model for grade-of-service. This opinion of transmission quality is a quality measurement of an important part of voice communication services. The ability to gauge this opinion on the basis of objective measurements and to pinpoint service weak spots will allow the use of our resources to provide good service at an economical cost.

B. Transmission Impairments

3.02 Signal transmission is degraded by practical limitations of the connection, and by existence of various types of impairments in the connection. The channel imperfections include interferences induced from external sources, interferences that

are signal-dependant and caused by nonlinear channel input/output characteristics, and distortion by connection transmission characteristics. Message signals are affected by three major impairments: loss, noise, and echo. Other impairments exist, but are not discussed in this section.

3.03 Loss may be expressed as a ratio of output signal to input signal. In normal operation, a connection between two telephones may involve as little as two loops. On the other hand the connection may be substantially more complex. It may contain several trunks and may be routed through several switching machines. If the loss in a connection is high, the received signal is low in volume and the listener either loses some of the transmitted information or is annoyed because he cannot easily understand. However, if the loss is too low and the received signal is high in volume, the listener may be annoyed again.

3.04 Noise in message transmission is, in the most general sense, any unwanted signal present in a connection other than the desired message signal. The unwanted signals referred to as message circuit noise may be either noise orginating from various components of the transmission path or the interference produced by one transmission channel being coupled to another. Regardless of their nature and origin, these unwanted signals can be annoying to the telephone user. Because of this annoyance, noise should be controlled to limits judged to be acceptable.

3.05 Message circuit noise is a weighted average of the noise within a voice circuit as measured by the 3-type noise measuring set equipped with a frequency weighting called "C-message weighting".

3.06 The use of loss and noise statistics as separate parameters in evaluating transmission quality, as the customer sees it, is a distortion of the loss and noise contribution to that quality. For example, a customer might rate the transmission quality of a telephone call with low noise and high loss equivalent to a telephone call with high noise and low loss. The grade-of-service model takes this into consideration.

3.07 Echo is the energy which has been reflected in some manner from the primary speech path. The impairing effects of echo are a complex combination of echo amplitude and the amount of delay difference between the signal and its echo. Echoes constitutes one of the most serious forms of impairment in telephone connections. The phenomenon is more difficult to control in switched networks, where terminating impedances may change with every new connection.

C. Grade of Service

3.08 Transmission management of the MTS network involves the establishment of transmission objectives, the measurement of transmission performance, and the measurement of customer opinions of the quality of service rendered. All these objectives, tests, requirements, and limits reflect an overall philosophy of a compromise between the customer's service needs, the customer's concept of performance, and the economic aspects of achieving this performance.

3.09 In recent years the review process for performance objectives has been achieved through computer simulation models which allow examination of the interrelationship between the various parameters. These simulation models are based on surveys of plant performance, data set evaluations, and subjective tests. The data set evaluations relate the effects of various parameters to error rates. Subjective tests relate to parameters to customers opinion of the quality of service.

3.10 Transmission grade of service is a measure of the expected percentage of telephone user who rates the quality of telephone connections excellent, good, fair, poor, or unsatisfactory when the connection includes the effects of a given class of transmission impairments. It combines the distribution of customer opinions with the distribution of plant performance parameters to obtain the expected percentage of customer opinions in a given category or categories. While the term is usually applied to overall communications service, the grade-of-service concept can be applied to one aspect of communications such as transmission; to one specific impairment such as noise, loss, or echo; or to various combinations of these impairments. It is usally expressed in terms such as ***a loss-noise grade-of-service (GOS) of 95 percent good or better (GOB) or a loss grade of service of 3 percent poor or worse (POW).***

3.11 The grade-of-service models will be used in the NIT measurement plan. The models however express transmission quality in terms of end-to-end evaluation (see Fig. 1). This requires

an adaptation to class 5 to class 5 central office entity measurements. Currently the class 5 to customer transmission paths are assumed to be characterized by system average loops. In later developments of the NIT measurement plan, each class 5 central office entity will have its local loop distribution characterized and these characterizations used in the grade-of-service models.

D. Transmission Performance Rating

3.12 As discussed, grade of service can be applied to one specific impairment (such as loss, noise, or echo) or to combinations of these impairments. One important combination of impairments is reflected in the combined loss-noise grade of service. The loss-noise grade of service has been recognized for some time as a valuable element in the evaluation of transmission performance. Therefore, loss and noise were first treated together as a step toward the larger result of a loss-noise-echo grade of service.

3.13 In the analysis of subjective test results, it was recognized that different tests yielded somewhat different results even when the same impairments were tested. This complicated the combining of results from different tests into a composite model of subjective opinion and led to the concept of a general transmission rating scale. A single number is computed from the measurement results. This number expresses the weighted relationship of the impairments considered. The general symbol used for this number is R. R is a scalar number expressing transmission quality. The rating values are such that most telephone connections will have positive ratings between 40 and 100, with the higher rating denoting higher quality. Part 4 describes how the rating is determined.

E. Transmission Performance Bands

3.14 Loss/noise transmission performance will be in one of the three performance bands. The band is determined by comparing current results to historical results. Both current results and historical results are rated for comparison in terms of customer evaluation of transmission quality. The historical results are recent and based on a large number of loss and noise observations. These performance bands are:

O—objective

L—lower than objective

U—unsatisfactory.

F. Range of Percent Good or Better

3.15 Loss/noise transmission performance will also be reported as Range of Percent Good-or-Better grade of service. This will tell us how far our performance is from the ultimate. The range will only be reported for the smallest reporting segment (the central office entity) of the plan. The control of the range (or spread) of the transmission quality is necessary to achieve the best transmission feasible.

4. CUSTOMER TRANSMISSION EVALUATION

A. General

4.01 The block diagram shown in Fig. 2 illustrates the flow of information necessary to express objective transmission measurements in terms of customer subjective transmission evaluation.

4.02 Loss, noise, and echo are example of impairments we can measure. Procedures for measurements of loss and noise are presented in Part 6.

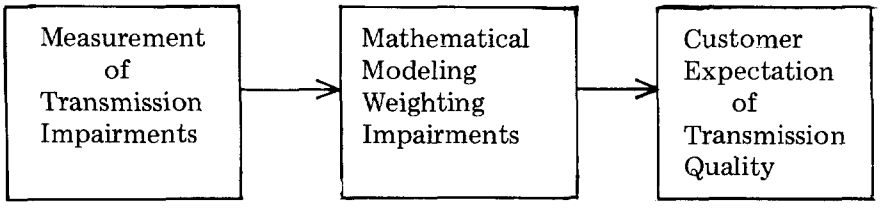


Fig. 2—Customer Transmission Evaluation

B. Mathematical Modeling Weighting Impairments

4.03 The transmission rating is computed from the measurement results. This number (R) expresses the weighted relationship of the impairments. The equation (1) used currently, expresses the loss and noise rating based on class 5 to class 5 central office measurements including constants reflecting average system local loops.

$$R_{L\text{-}N} = 147.76 - 2.257 \sqrt{(L_m + 1.6)^2 + 1} - 1.8297\, N_F + .02037 L_m\, N_F$$

$R_{L\text{-}N}$ = loss-noise rating

L_m = measured loss in dB (class 5 to class 5)

N_F = the power summation of 27.37 dBrnc and $(N_m - 1.7)$

N_m = measured noise in dBrnc (class 5 to class 5)

4.04 In later developments of the NIT measurement plan, the equation (2) expresses the loss-noise rating based on each class 5 central office entity's own local loop characteristics.

$$R_{L\text{-}N} = 147.76 - 2.257 \sqrt{(L_E - 7.2)^2 + 1} - 2.009 N_F + .02037 L_E\, N_F$$

L_E = End-to-end 1000 Hz loss (900Ω + 2.16μF terminations), composed of originating local loop loss (L_o), class 5 to class office loss (trunking facilities and office loss), and terminating local loop loss (L_T)

N_F = The power summation of 27.37 dBrnc with $(N_m - L_o + 2.7)$, N_{LO}, and $(N_{LT} - L_T + 2.7)$

N_{LO} = Noise of the originating loop measured at the station in dBrnc with a 900 ohm + 2.16μF termination

N_{LT} = Noise of the terminating load measured at the station in dBrnc with a 900 ohm 2.16 μF termination

4.05 Also in later developments of the NIT measurement plan the expression for echo rating is given in equation (3).

$$R_E = 95.01 - 53.45 \log \frac{1 + D}{\sqrt{\left(1 + \frac{D}{480}\right)^2}} + 2.277E \quad (3)$$

R_E = echo rating

D = echo path delay in milliseconds

E = echo path loss

4.06 The loss-noise-echo transmission rating is expressed in equation (4).

$$R_{L\text{-}N\text{-}E} = \frac{R_{L\text{-}N} + R_E}{2} - \sqrt{\left(\frac{R_{L\text{-}N} - R_E}{2}\right)^2 + 10^2} \quad (4)$$

4.07 Results expressing customer expectation of transmission quality are derived from the value of R. The results are good-or-better (GOB) and poor-or-worse (POW) grade-of-service results. Figure 3 exhibits the relationships between GOB, POW, and R. For example, a value for R of 60 will have a GOB of 42 and a POW of 32. This means that 42 percent of the customers would rate a call with a value for R of 60 as GOB. it also means that 32 percent of the customers would rate that same call as POW. A second example, a value for R of 80 will have a GOB 82 and a POW of 5. In this example 82 percent of the customers would rate that R value call as GOB and 5 percent would rate that R value call as POW.

C. Transmission Performance Evaluation

4.08 Transmission performance evaluation results are presented from two perspectives. One is performance banding described in paragraph 3.14. This evaluates the real network potential for transmission quality; or, in other words evaluating what we are doing with what we have. The second perspective is the range of percent good-or-better prformance described in paragraph 3.15. This evaluates the actual customer satisfaction with the transmission quality of the call; or, in other words, evaluating what we are doing compared to a standard.

4.09 There are two categories of transmission performance evaluation, local and toll. Each category is assigned one of the performance bands; O, L, or U, discussed in paragraph 3.14. Sample calls are assigned a performance band for quality control. Central office entities are assigned a performance band for quality assurance. Each of the categories will be assigned GOB or POW grade-of-service, based on the probability of customer ratings of transmission quality.

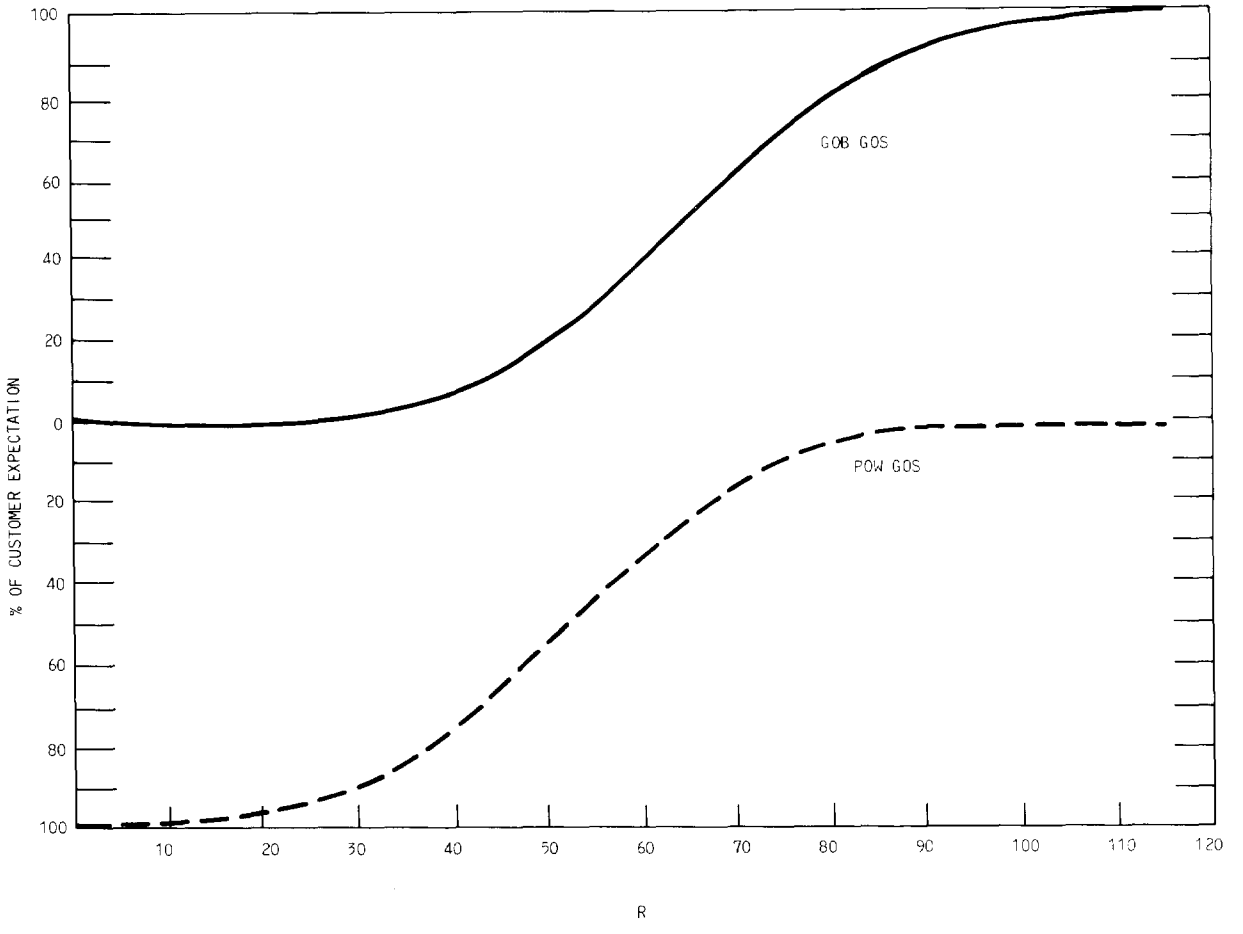


Fig. 3—Transmission Quality Ratings

4.10 The loss-noise transmission rating (R_i) will be computed for each sample call using equation (1) in paragraph 4.02 or, with later developments, equation (4) in paragraph 4.04. The value of R_i for each local call will be compared to the average value R_H, based on local data for 1977-1978 in the system. The comparison yields a single number which is indicated by the symbol z and computed as follows:

$$z_i = \frac{R_i - R_H}{\omega_H}^2$$

If $R_i > R_H$ then $z_i = 0$

If $\frac{R_i - R_H}{\omega_H}^2 \geqslant 100$ then $z_i = 100$

The value of R_i for each toll call is compared to the average value R_H for the mileage band of the sample call. The R_H for each mileage band is based on the toll data for 1977-1978 in the system. The values for R_H and σ_H are given in Table A.

TABLE A

BELL SYSTEM AVERAGE TRANSMISSION RATINGS
1977-1978 DATA

CATEGORY	R_H	σ_H
Local	86.599	2.265
Toll-Mileage Band		
0-40	83.130	2.535
40-80	82.013	2.723
80-150	80.532	2.781
150-300	79.201	2.857
300-600	77-657	3.046
600-1200	75.793	3.206
1200-2400	74.599	3.613
over 2400	74.446	3.786

4.11 Each sample call is assigned in a performance band depending on its category and its z value as follows:

PERFORMANCE BAND	LOCAL	TOLL
O	$z \leqslant 1.517$	$z \leqslant 1.755$
L	$1.517 < z \leqslant 3.90$	$1.755\ z \leqslant 3.90$
U	$3.90 < z \leqslant 100$	$3.90 < z \leqslant 100$

This assignment of performance bands is used for diagnostic reports providing quality control (see Part 7).

4.12 To determine the central office entity's performance band, the average "z" from the sample calls is computed.

$$Z = \frac{1}{n} \sum_{i=1}^{n} z_i$$

where: n = number of samples.

Z determines the entity performance band using the same values for the bands of z given in paragraph 4.09.

4.13 For grade-of-service results, the loss-noise transmission rating (R) computed for each call will be used to derive the customer opinion of performance. All the Rs computed for the entities sample in each category will be averaged and the standard deviation computed. A range of R is determined by $R_{L\text{-}N} \pm 2\sigma_{LN}$. This determines the lowest R ($R\text{-}2\sigma$) to highest R ($R+2\sigma$) that 95 percent of the customer would give their call for a given loss-noise impairment. From the lowest and highest values of R computed, the range of percent good-or-better grade-of-service will be derived. This result will indicate the lowest

percentage to the highest percentage of entity customers who would consider the loss-noise transmission quality of their calls good-or-better.

5. ADMINISTRATION

5.01 An administrative structure is necessary to achieve the intent of the plan. That is, administrative lines are to be set up to see that the following objectives are met:

(a) NIT surveys for each central office are made in a timely fashion

(b) Observation data is inputted into the centralized data base of TREST, as and when required

(c) Transmission weak spot analysis is accomplished when the data for the weak spot is current and the resulting corrections required are viable

(d) Corrective action based on weak spot analysis is initiated within an appropriate time frame.

A. AT&T NIT Project Manager

5.02 The AT&T NIT Project Manager is responsible for current policies, furture plans and for enhancements to TREST. The Project manager is also responsible for system-wide investigations requested by operating company coordinators.

B. AT&T TREST Administrator

5.03 The AT&T TREST Administrator is responsible to ensure that the TREST program is maintained and updated. The administrator notifies operating company coordinators of changes and clarifications. The quarterly NIT summaries and reports are generated by the TREST Administrator. Questions concerning TREST, its use, the User's Manual, or problems with TREST interfaces should be handled by the TREST Administrator.

C. Operating Telephone Company NIT Company Coordinator

5.04 The Operating Telephone Company (OTC) NIT Company Coordinator is responsible for implementing and maintaining the measurement plan within the operating company. This individual should be in transmission engineering, or similiar organization responsible for message trunk engineering and/or network performance in loss, noise, and echo. The following is a list of the attributes and specific areas of responsibilities the company coordinator should have.

(a) Know the company organization down to the division and district level

(b) Have a working knowledge of network transmission and switching

(c) Understand the measurement plan, the purposes and uses of its reports, the input requirements for TREST, the weak spot analysis procedures and the corrective action required.

(d) Act as liaison between the areas with the company and AT&T

(e) Provide a company transmission improvement program based on the measurement plan results

(f) Review area NIT results and request weak spot analysis, investigations, and corrective action where needed

(g) Distribute the TREST reports, as needed, within the company

(h) Provide summary reports of area weak spot investigations to the AT&T Project Manager

(i) Work with other company coordinators to provide corrective action for those weak spots of mutual interest.

D. Area NIT Coordinator

5.05 The Area NIT Coordinator is responsible for implementing and maintaining the measurement plan with the area of a company. The following is a list of the attributes and specific area of responsibilities the area coordinator should have.

(a) Know the area organization down to the division and district levels

(b) Have a working knowledge of network transmission and switching

(c) Understand the measurement plan, the purposes and uses of its reports, the input requirements, the weak spot analysis procedures and the corrective actions required

(d) Be an active participant in the company transmission improvement program based on the measurement plant results

(e) Review area NIT results and make weak spot analysis

(f) Open investigations where indicated by weak spot analysis

(g) Initiate requests for corrective action to the appropriate parties at the appropriate organizational level

(h) Provide investigation status reports to the company coordinator on a periodic basis

(i) Train the NIT observers as needed

(j) Supervise the NIT observers' activities

(k) Insure that the NIT observers' equipment is functioning properly and is adequate for the intended job

(l) Provide the necessary liaison to ensure the test position in the central offices are available at the scheduled survey dates and are adequate for making the observations.

E. NIT Observer

5.06 The NIT Observer is responsible for performing the survey when scheduled. The observer is responsible for all data preparation and inputs to TREST. The following lists the attributes and specific areas of responsibilities the observer should have.

(a) Have a working knowledge of network transmission and switching

(b) Understand the measurement plan and the purposes and uses of its reports.

(c) Provide "real time", on site, investigation (with assistance from central office personnel) into trouble areas encountered during the connection appraisal survey

(d) Understand and be able to use the test equipment necessary to perform the surveys

(e) Understand the transmission concept of loss and noise

(f) Be familiar with the TREST User's Manual and be able to use all the TREST commands, and be able to input data as needed

(g) Be familiar with the TEst Line DIrectory Maintenance (TELDIM) User Manual and be able to input, change or delete information as needed in support of the connection appraisal measurement plan

(h) Be able to perform singing repeater surveys in central offices.

6. PROCEDURES

A. Office Selection and Scheduling of Observations

6.01 Originating entities are used as the basis of office selection. In general, an originating entity is any central office unit or groups of units having common outgoing trunk groups. All originating entities, except small offices, are sampled at least once a year. Small offices (less than 2000 total main stations) are sampled at least once every two years.

6.02 The entities are selected by a random sampling process to provide a cross-section of performance each quarter. When an originating entity has been selected, a line is assigned in one of the offices of the entity for observing purposes.

6.03 During the fourth quarter each year, the coordinator reviews the selection of entities and prepares the survey schedule for the next year. This information is assembled on Form E-5838 when required for computer summaries.

6.04 Form E-5838 is used to provide the list of office entities and the survey schedule in the format required for introducing this information into a computer for analyzing and summarizing

data. An example of a completed Form E-5838 is shown in Fig. 4.

6.05 The procedure for selection of originating entities, the preparation of Form E-5838 (see Fig. 2), and entering into the TREST data base is covered per instruction in the TREST users manual.

6.06 The large entities and the small offices selected for observing in any quarter may be scheduled at any time in the quarter as convenient. Consideration should be given to travel requirements. It may be desirable to arrange the schedule so an observer can travel from one office to the next in the most convenient manner.

B. Call samples

6.07 TREST generates two categories of call samples for NIT surveys, toll call samples and local call samples.

6.08 Toll samples are selected on the basis of two data sources. One is the toll traffic calling pattern and the other is the data base in the TELDIM system. TELDIM is described in paragraph 6.18.

6.09 The data stored in the *L*ocal *C*alling *A*rea (LCA) file of TREST is the source for the sample local call selections. NIT measurement plan includes only interoffice local calls to points which can be reached on a non-toll basis by the flat rate subscribers of a sample office. Therefore, local surveys are not conducted in those offices where there is no extended area, or single or multi-message unit calling network.

6.10 For each originating entity selected for study, it is necessary to compile a list of remote offices which can be reached on a local flat rate, or message unit basis. Those connections involving the equivalent of an intertoll trunk should be excluded. They will be included in the toll sample.

6.11 Work sheets (Form E-5439, see Fig. 5) will be generated by TREST for use by NIT personnel in recording their observations of level and noise. Two work sheets are made with 50 toll samples already printed for each originating entity. Two work sheets with 50 local samples are also made for each originating entity. Instructions for filling in the work sheets are given in the TREST users manual.

C. Test Lines

6.12 Test lines are part of the basic maintenance pattern for the maintenance of trunks. Test line and test termination are terms sometimes used interchangeably to name testing equipment, facilities, circuits, or testing communication channels. These include simple passive terminations and relatively complex testing circuits capable of applying marginal signaling tests and transmission tests and of recognizing and replying to specific signals received.

6.13 In general, test lines that send tones provide a 300 ms quiet period to permit the single frequency (SF) signaling units to change supervisory state. Some class 5 offices must furnish continuously repeated supervisory cycles consisting of an off-hook interval followed by an on-hook supervisory interval in order to release the test line.

6.14 The stated frequencies of test line tones are nominal in the case of older design test lines due to the inherent instability of the vacuum tube circuits. New test line designs provide an additional 4 Hz above the desired frequency to avoid the modulation by products (beating problem) which may be produced in PCM type carrier.

6.15 ***Balance (100 Type)*** test line is recommended for industry-wide use to facilitate connection to a termination for balance and noise testing. The requirements for this termination are as follows:

(a) Provides off-hook supervision to calling end as long as trunks are held by calling end. A 5-second milliwatt tone is provided before the balance made on the newer version of the 100-type test line. This allows one-way loss and noise measurements to be made with one dial up.

(b) Provides a termination (600 or 900 ohms plus a capacitance) which simulates the nominal office impedance.

6.16 ***Milliwatt (102 Type)*** test line provides connections to a 1000 Hz testing power source for 1-way transmission measurements. The features of this termination are as follows:

(a) Some early types provide continuous tone through a sequence consisting of a 9-second off-hook signal, during which 1000 Hz test power

FORM E-5838 (9-75)

CONNECTION APPRAISAL SAMPLE IDENTIFICATION

QUARTER/YEAR_____

Page_____ of _____

Company Area Division NPA

SEQ. NUM.	QTR.	ORIGINATING CLLI	OFC. TYPE	WEIGHT FACTOR	SMPL. REQ.	SEQ. NUM.	QTR.	ORIGINATING CLLI	OFC. TYPE	WEIGHT FACTOR	SMPL. REQ.
1						26					
2						27					
3						28					
4						29					
5						30					
6						31					
7						32					
8						33					
9						34					
10						35					
11						36					
12						37					
13						38					
14						39					
15						40					
16						41					
17						42					
18						43					
19						44					
20						45					
21						46					
22						47					
23						48					
24						49					
25						50					

Fig. 4—Form E-5838

FORM E-5439 (9-75)
BSP 301-210-130
301-210-24

CONNECTION APPRAISAL OBSERVATION WORKSHEET

COMPANY ________ QUARTER SCHEDULED ________ NPA ________ PAGE ________ OF ________

AREA ________ DIVISION ________ CAROT ID ________

SAMPLE TYPE ________ OFFICE TYPE ________ TOLL CENTER ________

OBSERVING LINE ________ OBSERVER'S NAME ________

ORIGINATING CLLI [| | | | | | | | | | |]

QUARTER / YEAR [| Q | | |] LOSS CORRECTION FACTOR [— | | . |]

FLAG	SEQ NUM	TERMINATING CLLI	TERMINATING TCC	ACC	NPA	LOSS TEST LINE	NOISE TEST LINE	COMBINED TEST LINE	SEQ NUM	LOSS, dBm	LOSS TYPE	RATE	TRBL CODE	NOISE, dBrnc OBS	NOISE, dBrnc REF	RATE	TRBL CODE	RMKS
	LLL	LLLLLLLLLLL			LLL				TTT	±XX.X			XX	XX			XX	
T	XXX	XXXXXXXXXXX	TTTT	T	XXX					±XX.X			XX	XX	TT		XX	

LOSS OBSERVATION SUMMARY

PAGE ________ NAV ________ LOW ________ MDCR ________ HIGH ________
TOTAL ________ NAV ________ LOW ________ MDCR ________ HIGH ________

NOISE OBSERVATION SUMMARY

PAGE ________ NAV ________ OVER REF ________
TOTAL ________ NAV ________ OVER REF ________

Fig. 5—Form E-5439

is applied, followed by a 1 second on-hook interval with no test power.

(b) Other types provide a 9-second off-hook signal with test power followed by a steady on-hook signal without test power until released.

(c) Provides an idle circuit termination during the on-hook conditions.

6.17 ***Automatic Transmission Measuring Test Line (105 Type)*** provides access to a responder at the far end and permits automatic 2-way transmission loss and noise measurements to be made on trunks from the near-end office when it is equipped with a suitable test frame and an ATMS director or a Remote Office Test Line and responder. The responder is not readily adaptable to manual tests unless the near-end office is equipped with a compatible test unit such as the ATMS director or a Remote Office Test Line and responder unit equipped with an interrogator.

6.18 ***The TEst Line DIrectory Maintenance*** (TELDIM) system is an on-line system developed to complement the NIT program. TELDIM is a mechanization of the test line numbers, plus the CAROT and ROTL numbers, organized by NPANNX, which TREST uses for each terminating entity called by an originating entity. The TELDIM system is described in the TELDIM Users Manual available as a printout from TELDIM.

D. Preparation For Observations

General

6.19 This subpart describes general work location requirements for NIT surveys physical and transmission requirements of the connection appraisal loop from the central office equipment to work location are covered. Specific transmission tests to be performed in some cases are also covered.

6.20 The required survey lines should be installed, tested, and verified prior to the beginning of the quarter. Wherever possible, survey lines should be left in permanently to assure their availability for follow-up work. When lines are left in permanently they should be retested annually according to the procedures outlined in paragraphs 6.28 through 6.31. The retest should be scheduled within a one-month period prior to the quarter during which the survey will be conducted.

Physical Requirements

6.21 Space must be provided for survey work. Commercial 117 volt ac power should be available. A chair and desk or table are needed. The table should be large enough to hold the apparatus and allow room for forms and sufficient space for writing.

6.22 Whenever possible, the location selected for survey work should be within the central office building, but not within the confines of a switchroom or an equipment room to avoid interfering with the activities within these areas. Some typical locations which might be considered are:

(a) Within the building

(1) Conference room

(2) Administrative office space.

(b) Outside of the building (see paragraph 6.23)

(1) TELCO office space

(2) Motel or hotel room

(3) Any suitable commmercial space that can be obtained for a short duration.

In selecting locations, consider the fact that surveys are repeated annually in large (2,000 or more main stations in the wire center) offices. Surveys are repeated biennially (two years) in small offices.

6.23 Paragraphs 6.26 and 6.27 give the maximum loop length permitted from the main distributing frame of the central office to the location from which the survey is to be conducted.

Line Requirements

6.24 Survey data for an office are gathered from calls originated over a single party telephone line. When the order is issued for this line, a telephone number and associated central office equipment should be assigned. The line should be terminated in a 404B type jack or equivalent to accommodate the 505A plug of the connection appraisal equipment. If the equipment used locally is equipped with some other type of plug, a suitable jack must be provided.

6.25 A permanent telephone set is not required on the survey line. If a telephone set or ringer must be associated with the line to satisfy local requirements, a cutoff key must be provided to remove this equipment during the observations.

Loop Requirements

6.26 The cable facilities associated with a survey line should be as direct and as short as conditions permit and must have no main frame bridges. No transmission tests are required for loops up to 300 feet in length.

6.27 Loops greater than 300 feet in length must meet the following requirements:

(a) Length cannot exceed 4,500 feet

(b) All bridged tap must be removed

(c) Noise metallic measured from the remote end of the loop to a 900-ohm termination at the main distributing frame must not exceed 0 dbrnc.

(d) Noise to ground measured at the remote end of the loop must not exceed 25 dbrnc.

(e) Transmission tests, covered in Part 5, must be performed to verify the integrity of the loop.

Tests

6.28 Whenever the loop length exceeds 300 feet, tests must be performed to ensure that the loop is suitable for NIT surveys. Form E-5444 is used by the tester to record the results of specific measurements. Detailed instructions for the tests to be performed are printed on the reverse side of From E-5444. A sample Form E-5444 is attached as Fig. 6.

6.29 Before sending Form E-5444 to the office where tests are to be made, fill in the following data.

(a) Company

(b) Area

(c) Originating entity

(d) Items 1 through 6

(e) The name and address of the person to whom the form is to be returned

(f) It is advisable to indicate the date by which the form must be returned so that the loop will be tested and ready in time for the scheduled date of the survey.

The tester performs the required tests, completes Items 7 through 11, and signs and dates the form in the spaces provided. The tester then returns the form to the designated person.

6.30 The measured loss should not exceed the computed loss of the loop. If the loss is too high this could indicate bridged tap, or the presence of a saturable reactor. The loop resistance measurement (Item 8) can be used to verify the length and gauge of the loop.

6.31 If the noise metallic (Item 10) exceeds 0 dbrnc, or if the noise to ground (Item 11) exceeds 25 dbrnc it will be necessary to eliminate the cause of excessive noise or select other facilities.

Reports

6.32 The measured insertion loss (Item 7) of the connection survey loop is used as a correction factor in analyzing the data and in computing results. Copies of completed Forms E-5444 should be sent to the engineering coordinator prior to the beginning of each quarter. A summary of correction factors by originating entities can then be prepared directly from the completed Forms E-5444.

E. Survey

6.33 This part describes the procedures for making connection measurements. The procedures are followed at all offices selected for survey.

6.34 Observations of loss and noise on sample toll calls are made and recorded on Form E-5439 prepared as described in paragraph 6.11. Typical forms are shown in Fig. 5. Observations of loss and noise on sample local connections are made and recorded on Form E-5439 prepared in accordance with paragraph 6.11.

FORM E5444
(8-66)

CONNECTION APPRAISAL

LOOP DATA

Company _____

Area _____

Orig. Entity _____

1. OFFICE NAME OR ANC _____	7. LOSS _____ db
2. OFFICE TYPE _____	8. LOOP RESISTANCE (a) _____ ohms
3. CABLE & PAIR # _____	9. LOOP RESISTANCE (b) _____ ohms
4. LOOP LENGTH _____ FT.	10. NOISE METALLIC _____ dbmc
5. TERMINAL _____	11. NOISE TO GROUND _____ dbrnc
6. LOCATION _____	(a) measured to loop cross at main frame
_____	(b) measured to 900 Ω termination at main frame
_____	

Apparatus Required:	B.S.P. Reference
71-B Milliwatt Reference Generator	103-326-100
23-A Transmission Measuring Set or Equivalent	103-223-100
KS-14510 Volt-ohm Meter	100-520-101
3-A Noise Measuring Set	103-611-100
(C-message weighting network)	
900-ohm ± 10% Resistor	

Return Completed Form To: _____

_____

_____

Tester _____

Date _____

Fig. 6—Form E-5444

6.35 All calls are placed and observed at observing stations using observing equipment described below.

Observing Equipment

6.36 Either of two equipment arrangements or equivalent may be used. Both are described in the following paragraphs. Equivalent meters or digital display sets may be used.

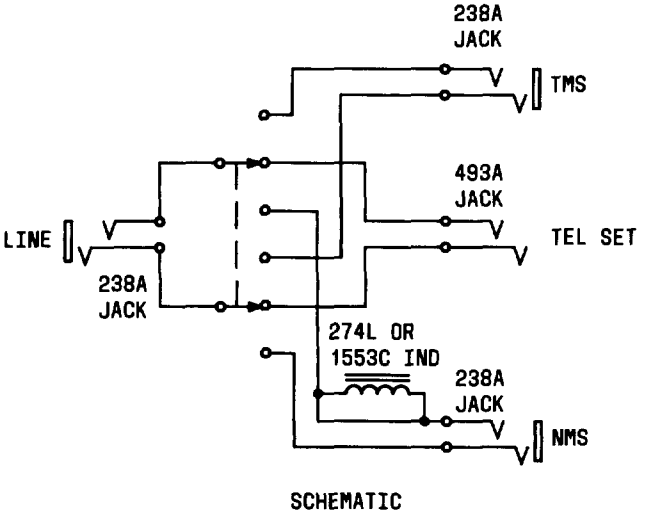
6.37 An arrangement of the 514B telephone set may be used. A switch is required to interconnect the telephone set with the observing equipment. Figure 7 furnishes information on a switch box which can be developed locally.

6.38 The 514B set is arranged for use with a headset. A 52-type headset may be furnished. The line cord of the telephone set should be equipped with a 283B plug for connection to the switch box. The arrangement is connected as in Fig. 8.

6.39 An arrangement of the 565GK telephone set, modified per Section 331-350-505, may also be used. The modification includes provision of jacks for connection to the observing equipment. This set may also be arranged for headset operation, if desired. The modified version of this set may be furnished by arrangement with the Western Electric Distributing House. This set provides pushbutton operation with DIAL, TMS, NMS, and RElease positions. The equipment arrangement is shown in Fig. 9.

6.40 A P3E cord (8'), equipped with a 310 plug and a 283B plug, is required to connect either arrangement to the observing line.

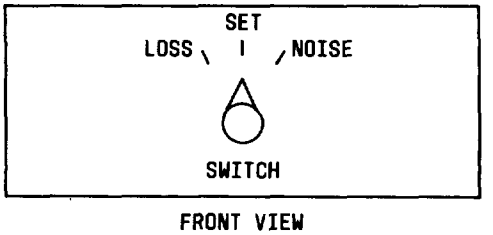
6.41 A 23A Transmission Measuring Set (TMS), or equivalent, is required for loss observations. A 3P7A cord is necessary to connect the set to either arrangement.



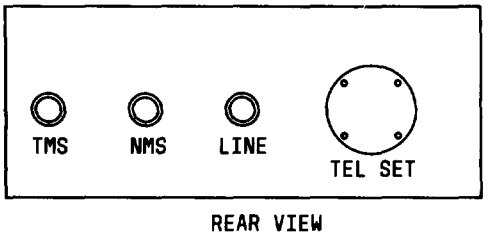
SCHEMATIC

PARTS LIST
1 - BOX - 3" X 6" X 9" OR LARGER
1 - SWITCH - 2 POLE 3 POS. WAFER TYPE
1 - JACK, 493A
3 - JACK, 238A
1 - INDUCTOR, 1553C OR 274L
MISC. HARDWARE AND WIRE

NOTES
1. ARRANGE BOX TO PERMIT TEL SET TO SIT ON TOP
2. INDUCTOR CONNECTIONS
   A. 274L - TERM. 1 & 4, STRAP 2 & 3
   B. 1553C - TERM. 1 & 2
3. NOT DRAWN TO SCALE



FRONT VIEW



REAR VIEW

Fig. 7—Key Arrangement for Use With 514B Set

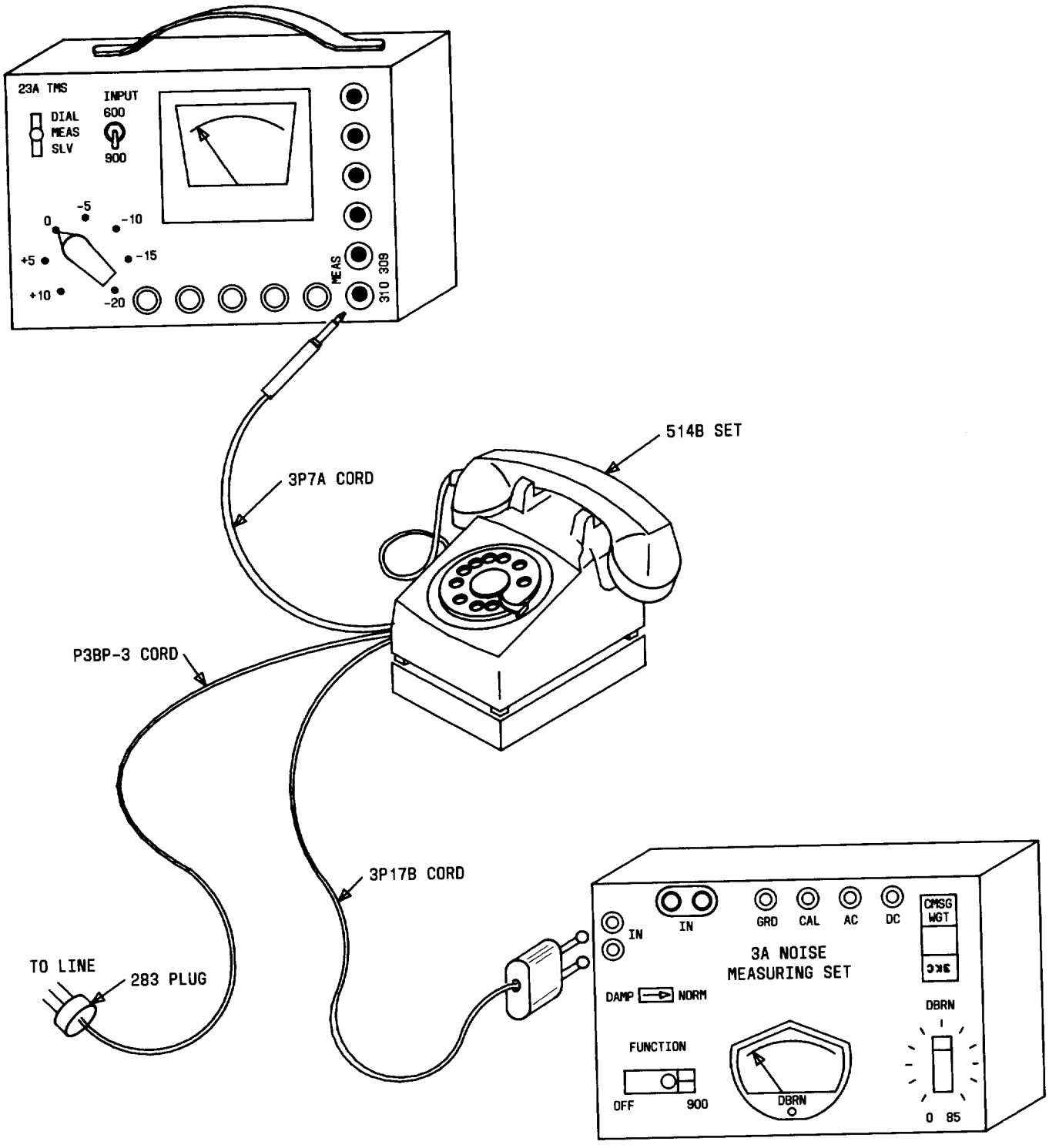


Fig. 8—514B Telephone Set Arrangement

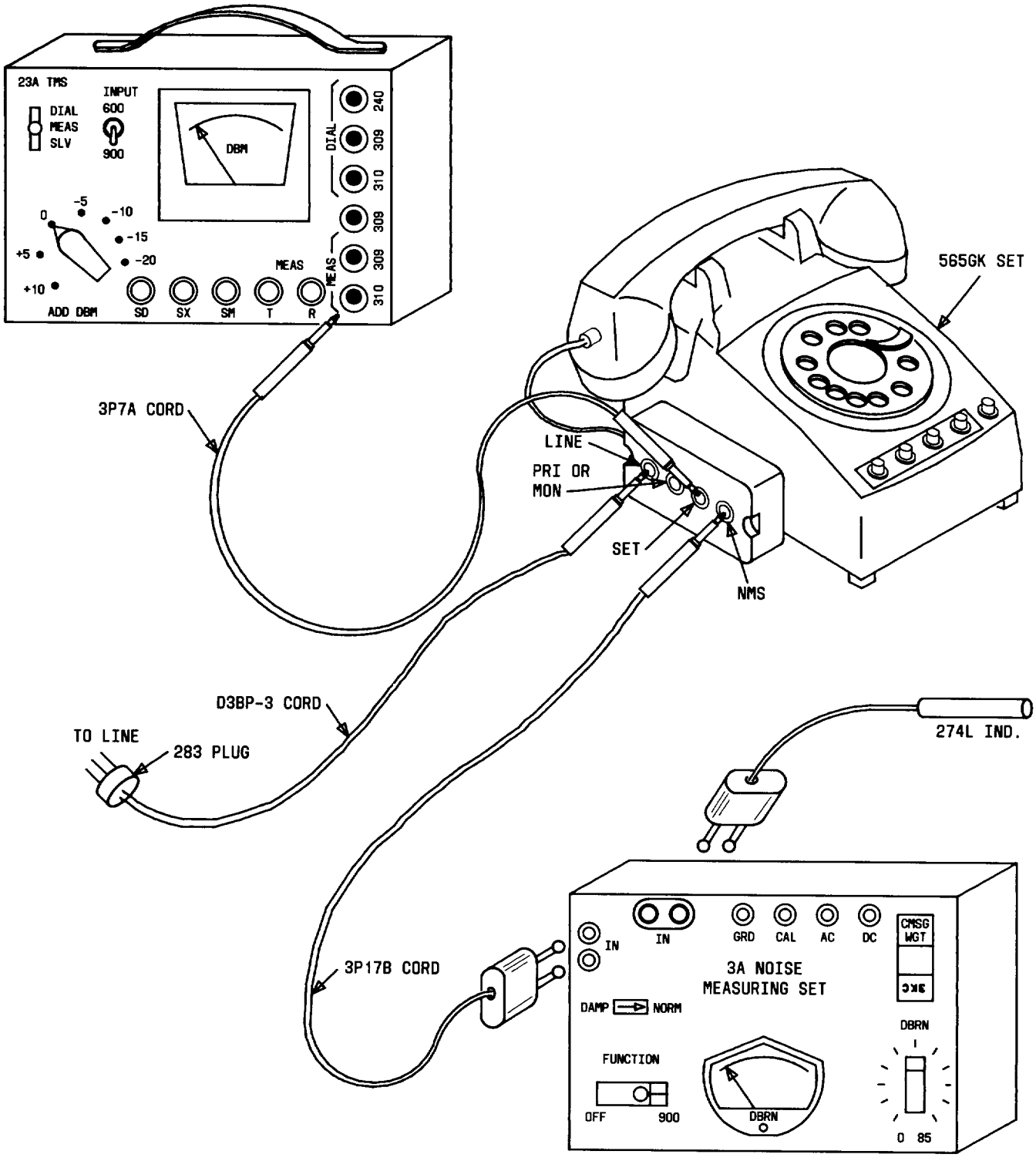


Fig. 9—565GK Telephone Set Arrangement

6.42 A 3A Noise Measuring Set (NMS), or equivalent, is required for noise observations. A 3P17B cord is required to connect the NMS to either arrangement. When used with the 565GK set, a 274L inductor terminated in banana plugs must be connected to the NMS to hold connections during noise observations.

6.43 A 71B Milliwatt Reference Generator (MRG) may be used to check the calibration of the TMS or NMS. The MRG should have been calibrated with a 22A Milliwatt Reference Meter as specified in Section 103-222-100. A 3P6A cord is required to connect the MRG to the observing equipment.

6.44 When using the arrangement of 514B set and switch box, the equipment is interconnected for observing purposes as shown in Fig. 2. When using the modified 565GK set, the equipment is interconnected as shown in Fig. 3.

6.45 When an equivalent test set is used in place of the 23A TMS and 3A NMS, different patch cord arrangements may be required and should be covered by local instructions. If card dialers, "Magicall" sets or other dialing arrangements are used, local instructions should be provided to cover interconnections.

6.46 Various types of automatic dialers may be used to assist in placing calls. Where these are used, modified patch cord arrangements are required, and local instructions should be followed.

Calibration

6.47 The observing equipment should be checked at regular intervals, using the 71B MRG. In normal use, however, the equipment is sufficiently stable, that the MRG does not have to be carried to every office to be observed. (For use of the 71B MRG, refer to Section 103-222-100.)

6.48 Calibrate the 23A TMS in accordance with Section 103-223-100. A 3P6A cord is required for connection to the 71B MRG when used in calibration.

> ***Note:*** Be sure to remove the cord from the 71B to save its batteries.

6.49 The 3A NMS may be checked in accordance with Section 103-611-100.

6.50 It may be necessary to replace the battery in the field. Suitable replacements are listed in Section 103-611-100.

Observations

6.51 Observations are made by placing calls to the test line numbers in the order that they appear on the data forms. When both local and toll connections are to be observed, observations should be made alternately on toll and local connections so that both samples are distributed throughout the observing hours.

6.52 A call is placed to a milliwatt number and the loss is observed. Then another call is immediately placed to the balance number for the same terminating point, and a noise observation is made.

6.53 If a milliwatt or balance number is busy, it should be tried again in a few minutes. If a customer or an operator answers, or any other difficulties are encountered, an attempt should be made to obtain a new telephone number. If it is found that a number has been changed, the data form is corrected and the call is placed again. If the trouble cannot be cleared, or if the number is still busy after three attempts, it is then necessary to abandon the call. Further efforts should be made to reach busy lines, however, if the abandoned calls exceed 10 percent.

6.56 If a combined test line is provided, there is no balance number on the data form and the number is dialed once for both observations. As soon as the tone is heard, a loss observation is made. When the tone disappears, the connection is immediately transferred to the NMS to make a noise observation.

To Make Loss Observations

6.57 Dial the milliwatt number as recorded on the data form. When ringing stops and the distant tone is heard, operate the key for the 514B set to TMS, or operate the TMS button on the 565GK set. Adjust the ADD DBM switch on the TMS to bring the meter reading between 0 and -5.0. Add the switch setting and meter reading to the nearest 0.1 to obtain the indicated tone power level. For example, if the ADD DBM switch is a -5 and the meter reads -1.2, the indicated tone

power level is -6.2. If a digital meter is used, read the first display obtained.

To Make Noise Observations

6.58 Dial the balance number listed on the data form. When ringing stops, operate the key for the 514B set to NMS, or operate the NMS key on the 565GK set. Adjust the DBRN switch on the NMS to bring its meter reading between +2 and +9. Observe the meter for 10 to 30 seconds and establish the point at which the meter needle appears most of the time (disregard occasional high peaks). The noise observation is the sum of DBRN switch setting and the meter reading. Determine the noise to the nearest whole number. If a digital meter is used, read the first display obtained.

E. To Make Combined Observations

6.59 Dial the number listed as the milliwatt number. When the distant tone is heard, make a loss observation as described in paragraph 4.10. When the tone disappears make a noise observation as described by transferring the connection to the NMS.

Recording Observations

6.60 Observations are recorded on the work sheet according to instructions in the TREST Users Manual. Observation measurements of level and noise recorded on the work sheets are inputted to the TREST computer. Once all such observations for a quarter have gone into the data base of the NIT entities, the computer is able to determine the NIT results and generate the various TREST Connection Appraisal reports. A complete form is shown in Fig. 10.

7. REPORTS

GENERAL

7.01 TREST generates a number of reports which are described in detail in the TREST User's Manual. Every class 5 central office entity's survey results will be reported every month whether the entity is surveyed that month or not. This provides a total system performance view every month with approximately 8 to 9 percent of the measurement data changed. In the quarterly reports, a total system view will be given with approximately 25 percent of the measurement data changed. Most reports are generated in a batch process and mailed to the operating companies. Some reports are generated on line/on demand.

7.02 Positive reporting of transmission quality at each hierarchical levl is accomplished by the following:

REPORTS	RECIPIENTS
Division Summary by Originating Entities	Area NIT Coordinators
Area Summary by Division	Area NIT Coordinators
Company Summary by Areas	Company NIT Coordinators
Company Summary by Regions	Company NIT Coordinators upon special arrangement
System Summary by Companies	Company and AT&T NIT Coordinators
Management Exception Report	Selected Managers, Company and AT&T NIT Coordinators
Company Loss and Noise Summary	Company NIT Coordinators upon special arrangement

Transmission weak spots can be traced through the hierarchy from system to company, to region or area, to division to originating entity. It will be shown on the report if an entity is delinquent, insufficient, or not tested. These categories are defined in the TREST users manual, and are reported unsatisfactory in the transmission performance band.

DIVISION SUMMARY

7.03 The Division Summary by originating entity is generated quarterly. It reports, by originating entity, the following (see Fig. 11).

QTR TESTED	The quarter the entity was last tested.
QTR TO DO	The quarter the entity is scheduled to be tested
NETWORK TRANSMISSION PERFORMANCE BAND	The transmission performance and, O - objective, L - lower than objective, and U - unsatisfactory in each category

FORM E-5439 (9-75)
BSP 301-210-130
301-210-240

CONNECTION APPRAISAL OBSERVATION WORKSHEET

PAGE 1 OF 4

COMPANY ES
QUARTER SCHEDULED 1Q76
NPA 201
CAROT ID
AREA BM
DIVISION BM
TOLL CENTER 5613
OFFICE TYPE T
SAMPLE TYPE TOLL
OBSERVER'S NAME J. TREST
OBSERVING LINE 746-0000
ORIGINATING CLLI MTCLNJMC746
QUARTER / YEAR 1076
LOSS CORRECTION FACTOR —0.0

FLAG	SEQ NUM	TERMINATING CLLI	TERMINATING TCC	ACC	NPA	LOSS TEST LINE		NOISE TEST LINE		COMBINED TEST LINE	
	LLL	LLLLLLLLLLL			LLL						
	1	NWPVNJMH464	5613	1	201	464	9971	464	9966		
	2	SMMTNJSM635	5613	1	201	635	9971	635	9966		
	3	SMMTNJSM273	5613	1	201	273	9971	273	9966		
	4	BKWDNJBW227	1104	1	609	227	9971	227	9966		
	5	EHCYNJEH965	0343	1	609	965	9971	965	9966		
	6	PSVLNJPL641	0343	1	609	641	9971	641	9966		
	7	ALBYNYSS434	0057	1	518	434	1000	434	1990		
	8	BKWDNJBW227	1104	1	609	227	9971	227	9966		
	9	DNLNNJDU752	5613	0	201	752	9971	752	9966		
	10	PSWYNJPI981	5643	1	201	981	9971	981	9966		
	11	PSWYNJPI463	5643	1	201	463	9971	463	9966		
	12	PSWYNJPI885	5643	1	201	885	9971	885	9966		
	13	HMTNNJHA561	0343	1	609	561	9971	561	9966		
	14	SMMTNJSM635	5613	0	201	635	9971	635	9966		
	15	SMMTNJSM273	5613	0	201	273	9971	273	9966		
	16	BKWDNJBW227	1104	1	609	227	9971	227	9966		
	17	EHCYNJEH965	0343	1	609	965	9971	965	9966		
	18	PSVLNJPL641	0343	1	609	641	9971	641	9966		
	19	ALBYNYSS434	0057	1	518	434	1000	434	1990		
	20	BKWDNJBW227	1104	1	609	227	9971	227	9966		
	21	DNLNNJDU752	5613	1	201	752	9971	752	9966		
	22	PSWYNJPI981	5643	1	201	981	9971	981	9966		
	23	PSWYNJPI463	5643	1	201	463	9971	463	9966		
	24	PSWYNJPI885	5643	1	201	885	9971	885	9966		
	25	HMTNNJHA561	0343	1	609	561	9971	561	9966		
T	XXX	XXXXXXXXXX	TTTT	T	XXX						
S	9	NWPVNJMH464	5613	1	201	464	9971	464	9966		
		BKWDNJBW227	1104	1	609	227	9971	227	9966		

SEQ NUM	LOSS, dBm	LOSS TYPE	RATE	TRBL CODE	NOISE, dBrnc OBS	NOISE, dBrnc REF	RATE	TRBL CODE	RMKS
TTT	±XX.X			XX	XX			XX	
1	-05.0	S	0	0	20	26	0	0	
2	-04.0	S	0	0	28	26	1	0	
3	-03.6	S	0	0	16	26	0	0	
4	-05.3	S	0	0	20	26	0	0	
5	-23.9	S	1	0	24	26	0	0	
6	-04.5	S	0	0	18	26	0	0	
7	-04.6	S	0	0	20	26	0	0	
8	-05.5	S	0	0	26	26	0	0	
9	-05.9	S		0	23	26		0	
10	*	S	0	20	42	26	1	0	
11	-04.0	S	0	0	24	26	0	0	
12	-05.8	S	0	0	27	26	1	0	
13	-05.1	S	0	0	15	26	0	0	
14	-04.7	S	0	0	21	26	0	0	
15	-05.0	S	0	0	22	26	0	0	
16	-05.4	S	0	0	25	26	0	0	
17	-04.5	S	0	0	18	26	0	0	
18	-04.6	S	0	0	22	26	0	0	
19	-05.8	S	0	0	21	26	0	0	
20	-04.2	S	0	0	16	26	0	0	
21	-05.1	S	0	0	17	26	0	0	
22	-06.9	S	0	0	20	26	0	0	
23	-04.4	S	0	0	13	26	0	0	
24	-04.6	S	0	0	18	26	0	0	
25	-03.3	S	0	0	14	26	0	0	
	±XX.X			XX	XX	TT		XX	
9	-08.0	S	1	0	23	26	0	0	
		S				26	0	0	

LOSS OBSERVATION SUMMARY

PAGE 24 NAV 1 LOW 0 MDCR HIGH 2
TOTAL NAV LOW MDCR HIGH

NOISE OBSERVATION SUMMARY

PAGE 25 NAV 0 OVER REF 3
TOTAL NAV OVER REF

Fig. 10—Form E-5439 Completed

	LOCAL and TOLL for each entity
RANGE OF PERCENT GOOD OR BETTER	The lowest to highest percentage of entity customers who would consider the transmission quality of their call good-or-better grade of service

AREA SUMMARY

7.04 The Area Summary by Division generated quarterly will report the PERCENT OF ENTITIES IN EACH PERF BAND in each of the categories. It will also report in each division the PERCENT OF ENTITIES IN THE AREA (see Fig. 12).

COMPANY SUMMARY

7.05 The Company Summary by Area generated quarterly will report the PERCENT OF ENTITIES IN EACH PERF BAND in each of the categories. It will also report in each area the PERCENT OF ENTITIES IN THE COMPANY (see Fig. 13).

7.06 The Company Summary by Region generated quarterly will report the PERCENT OF ENTITIES IN EACH PERF BAND in each of the categories. It will also report in each region the PERCENT OF ENTITIES IN THE COMPANY (see Fig. 14).

SYSTEM SUMMARY

7.07 The System Summary by Company generated quarterly will report the PERCENT OF ENTITIES IN EACH PERF BAND in each of the categories. It will also report in each company the PERCENT OF ENTITIES IN THE SYSTEM (see Fig. 15).

ORIGINATING ENTITY SUMMARY MANAGEMENT EXCEPTION REPORT

7.08 The Management Exception Report will report those entities that are in the L or U transmission performance band for either local or toll (see Fig. 16).

ORIGINATING ENTITY REPORTS

7.09 There are three forms of the Originating Entity Reports that are on line and generated on demand. One is a summary, another is a detail report and summary and, a third report contains weak spot anaylsis and entity statistics. The TREST user manual has instructions for obtaining these reports.

7.10 The Originating Entity summary (ORIGENT) is shown in Fig. 17. It reports the entity performance band, percent of calls in each band, and the range of percent good-or-better for local and for toll.

7.11 The Originating Entity detail report (ORIGENT LONG) is shown in Fig. 18. It reports by call; terminating entity the mileage band on toll calls, the call performance band, loss, noise, trouble indications, and percent good-or-better grade of service. The summary described in paragraph 7.07 is also presented in this report.

7.12 The Originating Entity weak spot analysis and statistics report (WEAK SPOT) is shown in Fig. 19. The weak spot anaylsis for toll and local, reports those calls rated U and L. The call is identified by sequence number and terminating entity. An indication to whether the problem is loss, noise, or both and the percent good-or-better grade of service.

7.13 The entity statistics reports by mileage bands, the number of calls, the mean loss and standard deviation, the mean noise and standard deviation and the mean Loss-Noise rating and standard deviation. The objective mean rating and standard deviation is also shown for each mileage band. The same information is also given for local calls.

LOSS AND NOISE SUMMARY

7.14 These reports are generated on a company or area basis. The local loss shows the number of offices surveyed, the mean loss and standard deviation, and number of calls. The local noise shows the number of offices surveyed, the mean noise and standard deviation, and number of calls. The toll loss and noise means and standard deviation are reported by mileage band. The number of calls in each band is also shown. An example of this report is shown in Fig. 20.

NETWORK INTEROFFICE TRANSMISSION
DIVISION SUMMARY (1Q78) .
BY ORIGINATING ENTITIES
COMPANY CB REGION CB AREA CB DIVISION SW

			LOCAL		TOLL	
ORIGINATING ENTITY	QTR TESTED	QTR TO DO	NETWORK TRANSMISSION PERFORMANCE BAND	RANGE OF PERCENT GOOD OR BETTER*	NETWORK TRANSMISSION PERFORMANCE BAND	RANGE OF PERCENT GOOD OR BETTER*
CNCNOHSP941	1-78	1-79	U	NOT TESTED	0	64 - 90
CVTNKYCN291	1-78	1-79	U	NOT TESTED	0	66 - 88
CVTNKYCN431	1-78	1-79	U	NOT TESTED	0	68 - 89
MTHTOHMH521	1-78	1-79	U	NOT TESTED	0	66 - 88
MTHTOHMH522	1-78	1-79	U	NOT TESTED	0	64 - 88
CHVTOHCH574	4-77	4-78	0	88 - 94	0	63 - 92
CNCNOHWD661	4-77	4-78	0	87 - 93	0	64 - 92
CNCNOHWS241	3-77	3-78	0	87 - 93	0	59 - 90
CNCNOHWS381	3-77	3-78	0	86 - 93	0	62 - 89
CNCNOHWS421	3-77	3-78	0	85 - 94	0	62 - 91
CNCNOHSW721	3-77	3-78	0	88 - 94	0	63 - 88
LKPKKYLP341	3-77	3-78	L	83 - 92	0	61 - 88
UNINKYUN384	3-77	3-79	U	INSUFFICIENT	0	66 - 89
BURLKYBN586	2-77	2-78	0	84 - 94	0	70 - 93
CNCNOHPH251	2-77	2-78	0	88 - 93	0	63 - 88
CNCNOHPH921	2-77	2-78	0	88 - 93	0	66 - 91
FLRNKYFL371	2-77	2-78	0	88 - 94	0	64 - 89
INDPKYIN356	2-77	2-78	0	85 - 90	0	69 - 90
WLTWKYWT824	2-77	2-78	0	91 - 91	0	75 - 92
BTLRKYBR472	1-77	1-79	0	90 - 91	U	NOT TESTED
CRTDKYCT428	1-77	1-79	0	91 - 93	0	77 - 93
ALXNKYAL635	4-76	4-77	U	DELINQUENT	U	DELINQUENT
CNCNOHCD922	4-76	4-77	U	DELINQUENT	U	DELINQUENT
CNCNOHNS541	4-76	4-77	U	DELINQUENT	U	DELINQUENT
FLMOKYFM654	4-76	4-77	U	DELINQUENT	U	DELINQUENT
FTTHKYFT441	4-76	4-77	U	DELINQUENT	U	DELINQUENT
GRSBOHGR385	4-76	4-77	U	DELINQUENT	U	DELINQUENT
GLCOKYGC643	3-76	3-78	0	94 - 94	L	71 - 90
WLTNKYWL485	3-76	3-78	L	82 - 92	0	59 - 95
MMTPOHMM353	2-76	2-78	0	85 - 94	0	69 - 91

* FOR 95% OF THE SAME CALLS

Fig. 11—Division Summary

NETWORK INTEROFFICE TRANSMISSION
AREA SUMMARY (1Q78)
BY DIVISIONS
COMPANY NY AREA RN

08/23/79

DIV	LOCAL				TOLL			
	PERCENT OF ENTITIES IN EACH PERF. BAND			PERCENT OF ENTITIES IN THE AREA	PERCENT OF ENTITIES IN EACH PERF. BAND			PERCENT OF ENTITIES IN THE AREA
	O	L	U		O	L	U	
EL	100	0	0	3.6	50	50	0	4.8
NB	90	0	10	18.2	50	17	33	14.3
PL	80	20	0	9.1	100	0	0	7.1
RZ	100	0	0	12.7	100	00	0	11.9
SO	67	17	17	10.9	50	33	17	14.3
SR	100	0	0	14.5	100	0	0	16.7
SU	100	0	0	16.4	86	14	0	16.7
WB	100	0	0	14.5	100	0	0	14.3
AREA	93	4	4	17.5	81	12	7	15.8

Fig. 12—Area Summary

08/23/79

NETWORK INTEROFFICE TRANSMISSION
COMPANY SUMMARY (1Q78)
BY AREAS
COMPANY MS

AREA	LOCAL				TOLL			
	PERCENT OF ENTITIES IN EACH PERF. BAND			PERCENT OF ENTITIES IN THE COMPANY	PERCENT OF ENTITIES IN EACH PERF. BAND			PERCENT OF ENTITIES IN THE COMPANY
	O	L	U		O	L	U	
AZ	11	4	85	14.8	63	13	23	15.5
CO	63	19	18	30.1	60	12	28	27.6
ID	45	31	24	14.8	70	22	7	10.1
MT	61	22	16	10.2	56	21	22	16.4
NM	46	10	44	12.7	60	13	27	10.6
TX	86	7	7	2.9	93	7	0	1.7
UT	86	3	10	12.1	83	11	6	11.1
WY	92	8	0	2.5	57	32	11	7.0
COMPANY	54	15	30	5.4	64	16	20	8.0

Fig. 13—Company Summary by Area

NETWORK INTEROFFICE TRANSMISSION
COMPANY SUMMARY (1Q78)
BY REGIONS
COMPANY OB

08/23/79

REGION	LOCAL PERCENT OF ENTITIES IN EACH PERF. BAND O	L	U	LOCAL PERCENT OF ENTITIES IN THE COMPANY	TOLL PERCENT OF ENTITIES IN EACH PERF. BAND O	L	U	TOLL PERCENT OF ENTITIES IN THE COMPANY
EA	64	30	6	22.3	78	16	6	23.5
NO	67	26	7	22.3	85	9	6	23.5
SW	75	16	9	55.5	74	19	7	52.9
COMPANY	71	22	8	3.5	78	16	7	2.9

Fig. 14—Company Summary by Region

NETWORK SERVICES INTEROFFICE TRANSMISSION MEASUREMENT
SYSTEM SUMMARY (1Q78)
BY COMPANIES

08/23/79

LOCAL					TOLL				
COMPANY	PERCENT OF ENTITIES IN EACH PERF. BAND 0	L	U	PERCENT OF ENTITIES IN THE SYSTEM	COMPANY	PERCENT OF ENTITIES IN EACH PERF. BAND 0	L	U	PERCENT OF ENTITIES IN THE SYSTEM
NJ	91	6	3	3.5	SN	99	0	1	1.5
SN	90	9	1	1.7	LB	91	6	3	3.6
NE	85	8	7	7.6	CP	88	8	5	6.6
SW	77	12	12	10.5	PN	86	8	6	3.1
PN	76	13	12	2.8	NE	85	10	5	6.9
SB	76	16	9	7.1	NW	84	8	7	6.8
PD	75	21	4	5.4	NJ	84	11	5	2.6
PT	73	18	9	8.6	NY	83	11	6	7.1
SC	72	18	10	9.8	SW	79	12	9	13.3
NW	71	15	14	6.6	OB	78	16	7	2.9
OB	71	22	8	3.5	SB	77	7	15	6.6
CP	70	21	9	7.1	PT	77	9	14	7.9
LB	66	28	6	3.9	SC	77	12	11	10.2
WT	60	10	30	1.6	CB	71	5	25	0.6
MS	54	15	30	5.4	PD	68	9	23	4.8
NB	50	13	37	1.9	WT	65	7	28	1.4
CB	49	10	40	0.7	MS	64	16	20	8.0
NY	42	45	12	7.1	NB	32	18	50	1.7
MB	30	3	68	5.0	MB	27	2	72	4.4
SYSTEM	69	17	14	100.0	SYSTEM	76	10	14	100.0

Fig. 15—System Summary

NETWORK INTEROFFICE TRANSMISSION
COMPANY LOSS AND NOISE SUMMARY

COMPANY NB (3Q79 SURVEYS) 09/9/79

LOCAL LOSS

NO. OFCS.	MEAN	ST.DV.	NO. CALLS
163	-04.1	01.9	7519

LOCAL NOISE

NO. OFCS.	MEAN	ST.DV.	NO. CALLS
163	+14.6	07.6	7436

TOLL LOSS

MILEAGE	MEAN	ST.DV.	NO. CALLS
0 - 40	-6.2	2.4	3466
41 - 80	-6.5	2.0	1302
81 - 150	-7.0	2.3	1096
151 - 300	-7.2	2.4	855
301 - 600	-7.7	2.2	501
601 - 1200	-8.1	2.4	369
1201 - 2400	-8.5	2.3	141
2400+	0.0	0.0	0
ALL	-6.7	2.4	7730

TOLL NOISE

MEAN	ST.DV.	NO.CALLS
+18.9	6.4	3499
+21.6	6.0	1292
+25.4	4.6	1100
+27.5	3.8	840
+29.2	4.3	489
+29.6	3.3	362
+31.7	3.2	143
0.0	0.0	0
+22.6	6.9	7725

Fig. 16—Company Loss on Noise Summary

NETWORK INTEROFFICE TRANSMISSION
MANAGEMENT EXCEPTION REPORT (1Q78)
COMPANY CB

			LOCAL TRANSMISSION PERFORMANCE BAND	TOLL TRANSMISSION PERFORMANCE BAND	QUARTER TESTED
COMPANY RESULTS:	55.3% OF	65 ENTITIES			
REGION CB:	55.3% OF	65 ENTITIES			
AREA CB:	55.3% OF	65 ENTITIES			
DIVISION NE:	57.1% OF	35 ENTITIES			
CNCNOHAV861			U	—	1Q78
CNCNOHAV961			U	—	1Q78
CNCNOHHP321			U	—	1Q78
CNCNOHHP871			U	L	1Q78
EVDLOHEV554			U	—	1Q78
EVDLOHEV733			U	—	1Q78
RSMYOHRO791			U	—	1Q78
RSMYOHRO793			U	—	1Q78
STBROHSB242			U	L	1Q78
NWMDOHNR553			L	U	3Q77
SHNDOHSH738			—	U	3Q77
BETHOHBE734			L	U	2Q77
RELYOHRE757			L	—	2Q77
GLDLOHGD771			U	U	4Q76
SVMLOHSM726			L	—	4Q76
TBSCOHTO752			U	U	4Q76
WLBGOHWB724			L	U	3Q76
CNCNOHAV281			U	U	1Q76
CHGVOHCG474			U	U	—
WCHSOHWC777			U	U	—
DIVISION SW:	53.3%	30 ENTITIES			
CNCNOHSP941			U	—	1Q78
CVTNKYCN291			U	—	1Q78
CVTNKYCN431			U	—	1Q78
MTHTOHMH521			U	—	1Q78
MTHTOHMH522			U	—	1Q78
LKPKKYLP341			L	—	3Q77
UNINKYUN384			U	—	3Q77
BTLRKYBR472			—	U	1Q77
ALXNKYAL635			U	U	4Q76
CNCNOHCD922			U	U	4Q76
CNCNOHNS541			U	U	4Q76
FLMOKYFM654			U	U	4Q76
FTTHKYFT441			U	U	4Q76
GRSBOHGR385			U	U	4Q76
GLCOKYGC643			—	L	3Q76
WLTNKYWL485			L	—	3Q76

39.2% OF 10,366 ENTITIES IN TREST DATABASE ARE ON THIS QUARTER'S MANAGEMENT EXCEPTION REPORT.

Fig. 17—Management Exception Report

QTR TESTED: 784
ORIGINATING ENTITY -------- ATHNTNMA745

SUMMARY

LOCAL					TOLL				
ENTITY PERF. BAND	% OF CALLS O	L	U	RANGE OF PERCENT GOB	ENTITY PERF. BAND	% OF CALLS O	L	U	RANGE OF PERCENT GOB
0	100	0	0	91 - 96	0	98	0	2	76 - 94

REQUEST

Fig. 18—ORIGENT Report

RUN ORIGENT, OMAHNE9039C, LONG:

QTR TESTED: 774
ORIGINATING ENTITY - - - - - - - - OMAHNE9039C

SEQ. NUM.	TERM ENTITY	TERM NPA	UPPER LIMIT MILE BAND	CALL BAND	LOSS LEVEL	LOSS TRBL	NOISE LEVEL	NOISE TRBL	%GOB GOS
1	Z1VLIN01873	317	600	O	-6.4	0	27	0	81.0
2	VRMLSDCO624	605	150	O	-5.3	0	23	0	86.3
3	WCHTKSTP26A	316	300	O	-7.6	0	31	0	71.8
4	WSPLMNWS45M	612	300	O	-7.7	0	26	0	78.6
5	TOOLUTMA882	801	1200	O	-5.9	0	29	0	79.9
6	SXFLSDCO335	605	300	O	-5.5	0	18	0	87.2
7	SXCYIADT27X	712	150	O	-6.3	0	19	0	85.3
8	NYCQNYLN52A	212	1200	O	-8.5	0	27	0	75.2
9	PCHNIZCO335	712	150	L	-9.5	0	25	0	74.2
10	NEOLIACO485	712	40	O	-6.3	0	8	0	86.2
11	NRFLNENW37A	402	150	O	-7.3	0	20	0	82.8
12	NYCOMNYBSMG1	212	1200	O	-8.5	0	21	0	79.4
13	NRTWNJMRMG0	201	1200	U	-10.8	0	31	0	61.2
87	OMAHNEOS73A	402	-	O	-4.0	0	11	0	90.7
88	OMAHNEIZ55A	402	-	O	-3.2	0	9	0	91.9
89	OMAHNEHA89A	402	-	O	-5.4	0	13	0	88.2
90	CNBLIAMW366	712	-	O	-2.5	0	1	0	92.9
91	OMAHNE3045A	402	-	O	-3.1	0	15	0	91.8
92	GRETNENW332	402	-	O	-5.0	0	1	0	89.1
93	OMAHNENW34A	402	-	O	-4.9	0	2	0	89.3
94	SPFDNENW253	402	-	O	-4.9	0	13	0	89.1
95	OMAHNEFO49A	402	-	O	-3.0	0	14	0	92.0
96	OMAHNEOS73A	402	-	O	-3.2	0	13	0	91.8
97	OMAHNEIZ55C	402	-	O	-2.4	0	1	0	93.0
98	GRETNENW332	402	-	O	-3.3	0	13	0	91.6
99	CNBLIAWA32X	712	-	O	-3.3	0	16	0	91.4
100	OMAHNE8433A	402	-	O	-3.4	0	11	0	91.6

SUMMARY

LOCAL					TOLL				
ENTITY PERF. BAND	% OF CALLS O	L	U	RANGE OF PERCENT GOB	ENTITY PERF. BAND	% OF CALLS O	L	U	RANGE OF PERCENT GOB
O	100	0	0	89 — 95	O	88	8	4	68 — 91

REQUEST

Fig. 19—ORIGENT-Long Report

QTR TESTED: 784
ORIGINATING ENTITY -------- ATHNTNMA745

WEAKSPOT ANALYSIS - TOLL

SED. NUM.	TERMINATING ENTITY	NPA	NPA	PROBLEM LOSS	PROBLEM NOISE	PERCENT GOB	CALL BAND
23	YNTWOH7979S		216	*	*	63.2	U

WEAKSPOT ANALYSIS - LOCAL

NO LOCAL IN THE U OR L BAND.

ENTITY STATISTICS

TOLL MILEAGE BAND (UPPER LIMIT)	NO. OF CALLS	LOSS MEAN	LOSS ST.DV.	NOISE MEAN	NOISE ST.DV.	LOSS-NOISE RATING MEAN	LOSS-NOISE RATING ST.DV.	OBJECTIVE LOSS-NOISE RATING MEAN	OBJECTIVE LOSS-NOISE RATING ST.DV.
40	19	-5.6	1.0	15.0	5.2	84.15	1.69	7.3	23.3
80	16	-6.0	0.9	14.3	4.9	83.41	1.68	7.6	25.6
150	6	-6.7	0.3	22.5	1.4	81.26	0.63	7.9	27.6
300	1	-6.2	0.0	32.0	0.0	75.61	0.0	8.1	29.0
600	7	-8.2	1.3	27.4	3.2	76.08	3.61	8.6	30.1
1200	1	-7.6	0.0	28.0	0.0	77.07	0.0	9.3	31.1
2400	0	0.0	0.0	0.0	0.0	0.0	0.0	8.8	33.7
2400	0	0.0	0.0	0.0	0.0	0.0	0.0	7.3	35.6
ALL	50	-6.3	1.3	18.0	6.9				
LOCAL	50	-2.6	1.0	13.7	4.2	89.29	1.85	5.3	19.3

REQUEST

Fig. 20—WEAK SPOT Report

8. ANALYSIS OF RESULTS

GENERAL

8.01 This section describes the general procedure for analysis and application of results of connection appraisals. This work consists of analysis of data forms and summaries for possible detection of weak spots common to the originating office as well as detection of weak spots common to terminating points.

8.02 The source of information are Forms E-5439 and printouts resulting from TREST computer programs. Performance computations and general reviews are based on the division and area summaries and are not a part of these procedures.

ANSLYSIS OF WORKSHEETS, FORM-5439

8.03 A sample of completed connection appraisal data on Form E-5439 is shown in Fig. 10. The data forms should be reviewed as soon as they are completed. If the pattern of measurements appears to indicate troubles or design deficiencies common to the originating office, a print of the data form with appropriate notes should be reviewed with the appropriate area network personnel for possible investigation. In some cases trouble in specific connections may be fairly obvious, and it will be desirable to retest and trace these connections.

ANALYSIS OF TREST PRINTOUTS

8.04 Summaries of data by originating entity are prepared by TREST and are available on demand. This report may be generated immediately after entering the observation data into TREST.

8.05 Summaries of loss and noise are prepared to aid the coordinator in deciding whether investigations are warranted and to help in narrowing the area of investigation.

8.06 ***Originating Entity Summary Report (ORIGENT)*** is an on-line entity-level report in three forms. All forms present toll and local data as appropriate. The short form is a summary of the observations indicating the percent of calls in each performance band. The entity performance band and range of percent GOB grade of service is given. The GOB has been designed to alert the user to ***patterns*** of inadequate transmission at the entity level. It is ***not*** a valid yardstick for comparing entities to each other.

8.07 The long form presents the identical information, but preceded by a per-observation breakdown. Included in the breakdown is the mileage band, call transmission performance band, and the percent good-or-better grade of service.

8.08 The WEAK SPOT presents a weak spot analysis with a listing of toll and local observations that are rated low (L) or unsatisfactory (U). Included in the listing is an indication whether the problem is loss and/or noise. Entity statistics are also given in this report listed by mileage band and local. Included is the loss-noise transmission rating of each mileage band or local and the objective loss-noise transmission rating.

8.09 Use of the Centralized Automatic Reporting on Truck (CAROT) printout and other maintenance data can be useful in analysis of loss and noise problems. Traffic routing information is helpful in determining which facility routes are causing transmission problems.

9. INVESTIGATIONS

GENERAL

9.01 When results analyses indicate there are problems which can have an effect on service, investigations should be requested. Decisions should be made whether to direct investigations through line or staff organizations, depending primarily on the apparent scope of the problem.

9.02 Investigations will be effective only if some administrative process is established to insure that they are completed and corrective action taken. The administrative procedures should be established locally to fit the local organization.

9.03 The Company Coordinator should keep a brief summary of investigations and corrective actions to ensure that they are not being neglected. ***This is the most essential part of the entire Connection Appraisal program, since it can result directly in transmission improvements.*** Figure 12 contains a sample of a brief form that may be adapted for local use.

REQUESTS FOR INVESTIGATION

9.04 A request for investigation of sub-standard results shall be originated:

(1) To gain immediate transmission improvements where possible.

(2) To uncover those problems which are not under direct control of local supervisors, but are affecting transmission service.

(3) To document trunk design problems and program corrective action as transmission improvement items until design changes are actually implemented.

9.05 A request for investigation of Connection Appraisal results shall be originated by the Connection Appraisal Company or Area Coordinator.

(1) Before requesting an investigation, the design of the trunk group(s) should be conducted.

(2) The coordinator, after confirming that the trunk design is correct will prepare an investigation request.

(3) File a copy of the request form as a record of the pending investigation.

9.06 The organization responsible for carrying out the investigation and funishing a reply to the coordinator will complete the request by the date shown on the request.

9.07 Pending investigations that become overdue shall be followed up by the coordinator. Overdue cases should be referred to the appropriate manager in order to obtain reasonable and mutually agreeable commitment dates from field supervisors and to provide assistance when needed.

VERIFYING IMPROVEMENTS

9.08 When an investigation report is received by the coordinator, the office involved will be scheduled for resurvey to verify the reported maintenance or design improvements.

9.09 Data obtained from reappraisal of an entity shall be used only to verify that a weak spot has been corrected and ***will not become a part of the current connection appraisal results*** for summary purposes.

9.10 When the reappraisal indicates that the condition causing a weak spot has ***not*** been corrected, the coordinator should forward a report of the results with a request for additional investigation.

9.11 When the reappraisal indicates that the condition causing a weak spot has been corrected, a report of the results will be forwarded to the organization making the investigation and the case moved to the completed file.

MAINTENANCE OF RECORDS

9.12 The following records shall be maintained as indicated below:

(1) Connection Appraisal Results

(2) Investigations Originated

(3) Investigations Pending

(4) Reappraisal Results

(5) Completed Investigations.