SWITCHING SYSTEMS MANAGEMENT
NO. 2 ELECTRONIC SWITCHING SYSTEM
ADMINISTRATION RESPONSIBILITIES

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1. GENERAL

1.01 This section outlines the primary administration responsibilities of the network administrator in the No. 2 Electronic Switching System (ESS) office. It should serve as an aid to the network administrator in ensuring the optimum loading, balancing, and utilization of the installed central office equipment.

1.02 When this section is reissued this paragraph will contain the reason for reissue.

1.03 This section should not be interpreted as an all-inclusive listing of the network administrator's responsibilities. There may be other specific tasks predicated on company organization, geographical considerations, and local company requirements.

1.04 The title of each figure includes a number(s) in parentheses which identifies the paragraph(s) in which the figure is referenced.

2. DESCRIPTION

2.01 The network administrator is generally responsible for the administration and efficient utilization of switching entities. The administrator is also responsible for network call completion as affected by end office performance.

2.02 The responsibilities of the network administrator can be broadly classed as the following:

(a) Data administration

(b) Office status evaluation

(c) Service problem analysis and corrective action

(d) Transition management

(e) Personnel administration

(f) Equipment utilization.

Each of the these areas of responsibility will be discussed in detail in this section.

3. DATA ADMINISTRATION

3.01 The network administrator is responsible for scheduling, collecting, validating, and disseminating data. An additional responsibility is the administration of traffic measuring devices and the management of data inputs in the mechanized environment (ie, Engineering Administrative Data Acquisition System [EADAS]). The network administrator must identify and obtain data required for network administration, engineering, trunk servicing, trunk forecasting, division of revenue, marketing, etc.

TRAFFIC MEASURING DEVICE ADMINISTRATION

3.02 The traditional data collection tool for most switching systems has been the traffic register. ESS registers differ significantly in makeup from those used in the electromechanical systems. They occupy a dedicated area in call store and, under program direction, accumulate peg count, usage, overflow, and maintenance busy count measurements. Except for weekly usage measurements, which are scored when scheduled, all traffic registers are scored or accumulated continuously. Whenever a printout of a particular register is scheduled at the end of a collection interval, the accumulating register is read, its contents transferred to a teletypewriter (TTY) buffer, and it is then set to zero. This means that the measurements for a specified interval are available only for an instant and are then erased. For this reason it is impossible to retrieve any measurements lost in the printing process due to machine or TTY irregularities, line facility failure, TTY paper outage, etc. During any collection interval it is possible to manually request a printout of any measurement(s). When this action is taken the contents of the accumulating registers are not reset. However, the readings obtained will include the counts from the last scheduled print time to the time of the current print. This type of printout will usually have little significance due to the varying time intervals during which the counts have been collected.

SCHEDULING AND COLLECTION

3.03 Traffic measurements provided in the No. 2 ESS include standard measurements required to engineer equipment and trunks, to administer for maximum effectiveness of the equipment installed in the office, to furnish the data required prior to implementing special procedures during overload conditions, and to monitor the general grade of service being furnished to the customer. The measurements are collected and stored by the generic programs. Some measurements are collected continuously while others are collected according to a prearranged schedule. Scheduling of these measurements is under the control of network administration personnel.

3.04 There are six separate traffic measurement schedules in the No. 2 ESS machine. These include the quarter-hourly, (Q), hourly (C and H), daily (D), load service measurements (LSMs), and weekly (W) schedules. The Q, D, and W schedules are fixed in that they contain fixed measurements which cannot be changed. The H-schedule differs from the C-schedule in that hourly counts can be scheduled for one, two, or three different collection periods per day (HA, HB, HC) and for as many hours as desired per period. These collection periods may be scheduled for any nonoverlapping quarter-hour. The LSM schedule contains the same measurements as the Q-schedule except that it is automatically printed whenever transient call store records are cleared and reinitialized. The H- and C-schedules are variable in that the measurements which are desired in these schedules must be assigned in translations. Each of these individual schedules is described in Bell System Practices Section 232-120-301, Traffic and Plant Measurements, and Division 10, Traffic Measurements, of the No. 2 ESS Translation Guide (TG-2H).

3.05 The measurement schedules may be assigned or cancelled using appropriate input messages to the system via the network administration (traffic) TTY. No single measurement can simultaneously appear on two schedules. When certain items are required on two schedules (ie, quarter-hour and busy hour) two registers must be provided for the item.

3.06 The traffic work table (TWT) is an area in memory used to specify the time of day by clock-hour, half-hour, and quarter-hour and the day or days of the week on which certain traffic work operations are to be performed by the system. It is used to control the collect and the print times of traffic and plant measurement schedules. In addition, it is used by the maintenance forces to schedule automatic maintenance routines.

3.07 Two memory locations are used in the No. 2 ESS to record TWT information. A copy of the table in call store is used by the system to perform scheduled work. The contents of this temporary table may be changed at any time via either the local or remote network maintenance TTY or the network administration TTY. A TWT is also kept in program store memory. The program store memory is updated to agree with the call store table via TTY instructions and card-writing procedures. In addition, the program store table is used as a backup for the temporary call store TWT. In the event of loss of call store data, an audit program will automatically transfer the contents of the program store TWT to the call store TWT so that measurement and maintenance schedules will be continued.

3.08 The network administrator should enter the days, hours, and quarter-hours for all traffic schedules on the TWT form. The network administrator should be aware that the data collected for a period of time will not be reset to zero until a schedule is printed.

> ***Note:*** A traffic register is recycled to zero when an output of that register is scheduled by the TWT. Traffic registers can also be recycled or set to zero because of register overflow or system initialization (refer to Dial Facilities Management Practices, Division H, Section 10d(6), Initialization). If a register overflows at a count of 65,536, the overflow is lost and is irretrievable; the remaining count is then invalid. Measurements with a high probability of high scorings on one register are provided with two registers: an accumulating register and an overflow register. To obtain the total value of the measurement, the contents of the overflow register must be multiplied by 65,536 and that result must be added to the contents of the accumulating register.

3.09 In the No. 2 ESS office, most traffic registers are permanently assigned to the measured traffic items. The traffic registers are dedicated to measure specific groups of traffic items. A

limited number can be reassigned by the network administrator to different items of the same group by recent change TTY input messages. In all cases, the Input Message Manual, IM-2H200, should be used as the official source document for message formats.

3.10 Scheduling of data by the network administrator requires a yearly plan which considers all major study requirements, recognizes collection limitations, and meets the needs of the data recipients.

3.11 It will be necessary to publish the schedule for collection of data and administer the collecting, posting, processing, and distributing of that data. Concurrent with these responsibilities, the network administrator must develop a system for the retention, storage, and maintenance of TTY outputs.

VALIDATION

3.12 The network administrator is responsible for comparing actual data against theoretical or expected values. This would include reviewing the data items of the traffic order and comparing them with the data received (refer to Dial Facilities Management Practices, Division H, Section 10p, Data Management).

3.13 The network administrator is responsible for ensuring the accuracy of the traffic registers and referring discrepancies to maintenance personnel. By reviewing data outputs, the network administrator must determine if measurement capabilities are being fully utilized (ie, general-purpose registers, subscriber line usage studies, etc).

> ***Note:*** The attempted correlation between two or more traffic registers on one traffic schedule can produce erroneous results, attributable to skew. Skew is caused by the following:
>
> (1) Holding registers are not used for most of the traffic registers. When it is time to print out the contents of a register, the value of that register at that particular instant must be printed. Therefore, the value of the traffic registers at the beginning of a schedule, and the values of other traffic registers at the end of the schedule, may not have the proper relationship due to the time taken to print the schedule.
>
> (2) Quasi-holding registers are provided for OFT 1-10 and OFT 51-60. These registers are incremented every 15 minutes by adding the values of Q 1-10 and Q 11-20, respectively. This is done on the exact quarter-hour, even though the OFT section may not print for some time. Thus, when the OFT 1-10 and OFT 51-60 do print, they do not represent real-time measurements. Additionally, if a traffic schedule is delayed for some reason, one or more of the OFT 1-10 and OFT 51-60 registers could contain data covering five quarter-hours.
>
> (3) Traffic registers are scored at the time the event occurs. (For example, Q5 is pegged when a valid line off-hook is received; Q6 is pegged after one digit is dialed.) If the Q-schedule is printed between these events, the counters will not correlate on the schedule that was printed.
>
> The error due to skew will become smaller if the interval during which measurements are stored increases. Correlation cannot be totally achieved, due to skew, in an office that is in service. An attempt to correlate is best achieved if the end points of the correlation period occurred during a period of very light traffic. If more than one printout is scheduled to occur at the same clock time, they are performed in the sequence indicated on the TWT. Since printouts cannot occur simultaneously, schedules can be delayed. For this reason it is recommended that no two printouts be scheduled on the same clock quarter-hour.

PATROL

3.14 The mechanized process called the Program for Administrative Traffic Reports On-Line (PATROL) aids the network administrator in validating data. PATROL is a time-shared program for processing and managing No. 2 ESS traffic data. It is implemented on the American Telephone and Telegraph Company (AT&T) VM/370 time-sharing computer. PATROL accepts H-schedule data, performs validation checks, flags and reports suspect items, and stores processed data items in history files. It generates, on request, a variety of

engineering and administrative reports. Since PATROL is an on-line system it provides a number of advantages to the user. These advantages include on-demand access to all processed data in the history files, direct control over data storage and reports, and the capability to flag or unflag data after they have been entered into PATROL (refer to Dial Facilities Management Practices, Division H, Section 10p, Data Management).

3.15 The operating company's time-sharing computer coordinator must assign each person who wishes to utilize the PATROL program a user identification number (user ID) and a unique password. A PATROL user has read/write access only to data files associated with his or her user ID. The network administrator has the prime responsibility for managing data once it has been entered into the data or history files. The network administrator must validate the data in the history files and decide which data should be kept and how long they should be kept. Prolonged storage of data which are of no further value produces unnecessary storage space costs. Before data are deleted, however, all items which need to be flagged or unflagged must be completed. Otherwise, incorrect data will remain in the files.

3.16 For administrative and cost control purposes, the network administration and network design groups are usually assigned different user ID numbers. ***The history data are maintained on the network administrator's ID.*** When the network designer wants to access the history data to produce reports, the network administrator's ID is attached and allows the network designer to access data on a read-only basis. The network administrator and the network designer should agree on which data the designer should receive as well as the form in which it should be received (ie, actual or summary).

3.17 A set of user instructions (PATROL lessons) is available and it is recommended that the network administrator have ready access to these lessons.

ENGINEERING ADMINISTRATIVE DATA ACQUISITION SYSTEM

3.18 EADAS consists of a minicomputer and interfacing equipment located at the operating telephone companies. It is designed to:

(1) Collect traffic data from a number of central offices within a geographical area

(2) To supply status and exception reports for these offices to the network administrator

(3) To record the traffic data on magnetic tape in a format so that it can be further processed by other systems in the Traffic Data Administrative System (TDAS) (see 3.20).

3.19 EADAS gathers No. 2 ESS data in juxtaposition to the network administrator's TTY. EADAS then writes reformatted C and H hourly schedules onto its output magnetic tape which may contain data from several types of central offices. The amount of received data written on the magnetic tape is controlled by the EADAS user/operator and may vary with location. A general description of EADAS is provided in Traffic Facilities Practices, Division B, Section 9-a. EADAS is also discussed in Dial Facilities Management Practices, Division D, Section 4.

TRAFFIC DATA ADMINISTRATIVE SYSTEM

3.20 TDAS, a batch processing system which is run on one central operating company computer, functions as an intermediate step between the collection of traffic data and the use of this data by several programs, including PATROL. TDAS separates the No. 2 ESS PATROL data from the data to be used by other downstream programs and writes these data onto an output magnetic tape. The output magnetic tape is then transmitted via the T-TRAN high-speed data network to the AT&T VM/370 computer, where it is processed by PATROL. Each evening, a PATROL input program is run on the AT&T computer. This program reads the magnetic tape data received during the day and separates the data into individual files for each No. 2 ESS H-schedule. Figure 1 outlines the

processing scheme which results in the generation of PATROL data. For additional details concerning the use of PATROL in the No. 2 ESS, consult the PATROL lessons which may be obtained from the PATROL system on a remote basis.

BUSY HOUR DETERMINATION

3.21 The network administrator plans, supervises, and conducts busy hour studies. Busy hours are determined in order that the source level and machine efficiency of the central office can be monitored during peak load periods. (See Dial Facilities Management Practices, Division H, Section 1c(2), Busy Hour Determination.)

3.22 The length of a busy hour study will depend upon the individual office characteristics and, to a large extent, upon the judgment of the network administrator. Sometimes definite busy hours can be determined on the basis of a 5-day study. More often, however, 5-day studies are found to be insufficient because no clear-cut busy hour surfaces.

3.23 In certain instances, such as after cutover of new offices, busy hour determination and basic data collection must be done concurrently. In these cases, the basic data must be collected and reported for all suspected busy hours until such time as a busy hour is determined. In established offices, the busy hour is predicted on empirical data. Basic data are gathered and reported on the predicted busy hour until it is confirmed or changed by busy hour studies.

3.24 The initial step in gathering busy hour data is to identify suspected busy hours. The technique with which to begin busy hour determination studies is to look at all suspected busy hours and then gradually converge on the busiest hour.

3.25 Data for busy hour studies are generally collected in half-hour segments. Although it is possible to have a busy hour begin on the quarter-hour, studies are not usually done that often due to the frequency of collection.

3.26 As mentioned previously, ESS busy hour studies are generally done twice yearly. Additional studies should be scheduled immediately after cutover and when any significant change occurs in office characteristics which may affect calling patterns. The ESS post-cutover determination is usually conducted during the second through the fourth week after cutover. It is advisable to avoid busy hour studies during the first week after cutover for several reasons. First of all, the data will likely be spurious due to customer reaction to a new switching entity and such matters as new dial tone, new services, etc. ***The first week can be used, however, for sampling key data such as originating and terminating peg count and total junctor usage*** (circuit plus wire). These data will assist in determining a starting point in the busy hour determination process. As with other switching systems, data covering all ***suspected*** busy periods are collected for review. ***The hours with the highest average business day usage and calls processed are selected as the busy hours.*** All data for ESS busy hour determination may be collected through use of the H-schedule.

> ***Note:*** Determination of when busy hour schedules will be conducted should be arrived at through agreement between the network administrator and the network designer responsible for the office.

3.27 Five types of busy hours may be generally determined. These include:

(1) Processor busy hour

(2) Network usage busy hour

(3) Call busy hour (outgoing plus incoming)

(4) Component busy hours

(5) Service busy hours (dial tone speed [DTS] and incoming matching loss [IML]).

4. OFFICE STATUS EVALUATION

4.01 The network administrator is responsible for frequent analysis of the overall and local switching network. System analysis incorporates the integrated review of measured service, load and volume. Inherent in this responsibility is the review of traffic orders and recognition that adequate central office equipment and capacity are scheduled to be provided in the future. In addition, the network administrator maintains surveillance of call store, program store, and spare word capacities.

CAPACITY DETERMINATION

4.02 The network administrator must determine how long the present installed equipment will adequately serve customer demands and when relief will be needed. This responsibility is classed as capacity determination and is generally expressed in terms of how many main stations can be served in an office without exceeding system standard service criteria (see Dial Facilities Management Practices, Division H, Section 10h, Machine Capacity Management). Three areas which should be considered for capacity determination are as follows.

(1) ***Line Capacity:*** The main station capacity of lines is the maximum number of main stations that can be working on terminal equipment numbers (TENs) at the entity's derived objective percent line fill. Since installed lines include lines, trunks, and service circuits, some subtraction is necessary (refer to Dial Facilities Management Practices, Division H, Section 1b(9), Determination of Line and Number Requirements).

(2) ***Switching Equipment Capacity:*** The main station capacity of switching equipment is the minimum of several equipment capacities since the terminology "switching equipment" (call carrying) is inclusive terminology for various components in the office with the ***exception*** of lines and numbers.

(3) ***Processor Capacity:*** The number of main stations that may be served will also be predicated on call capacity of the processor (see Traffic Facilities Practices, Division D, Section 12f-5 and PATROL lessons dealing with capacity determination [CADET]).

4.03 It is suggested that the equipments considered for capacity determination be grouped in the following manner:

(1) Dial tone equipment: customer digit receivers

(2) Talking channels: network usage

(3) Switching common control: service circuits (individual groups), power ringing, call stores, program stores, processor, automatic message accounting (AMA) equipment, and junctors

(4) Terminations: line trunk network terminations (includes lines, trunks, and service circuits).

4.04 Because assumptions and data change continuously it is necessary to do main station exhaust calculations after each growth job and busy season. This is part of the network administrator's responsibility of continuously monitoring the service and capacity of a switching machine.

4.05 Data reports such as PATROL can do much of the capacity monitoring. Each monthly report from PATROL should be scanned for the percentage-of-capacity trends. In this way potential shortages can be spotted before the complete capacity determination study is done at the conclusion of the busy season. In addition, regular monitoring of Q-schedule data (particularly Q5, Q6, Q11, and Q14 registrations) can serve as a tool to gauge available capacity.

4.06 When an office begins to gather historical data it might be advantageous to develop load-service curves. Load-service curves are graphs of the load of an item versus the service that item directly affects; for example, customer digit receiver ***versus*** dial tone speed or junctor CCS ***versus*** matching loss. To derive a valid load-service curve sufficient service data are required.

4.07 The network administrator is responsible for providing the central office maintenance personnel with component busy season in-service requirements by various hours or load periods. As part of the continuing capacity monitoring of an office the network administrator should ensure that these requirements are met.

4.08 The terminology "busy season profile" is also used at times to describe these in-service requirements. Basically, such a profile is a series of graphs of circuits required to meet anticipated customer demand versus time-of-day.

4.09 The data necessary to assemble busy season profiles can generally be obtained from the last component busy hour determination study. A growth factor can then be used to project these data into the upcoming busy season. By using the appropriate tables, circuit requirements per component per hour can then be obtained. In compiling such an hourly profile, all circuits should be treated on an average busy season basis.

4.10 The busy season profile serves a variety of purposes. First, the preparation of such a

profile is in itself a valuable activity to acquaint the network administrator and management with the characteristics of an office (possibly changing over the years). Secondly, the profile gives maintenance personnel a quantitative list that is useful in determining the time of day to remove circuits from service and in establishing priority time frames to repair out-of-service equipment. Thirdly, the busy season profile is helpful during Western Electric job activity involving taking circuits out of service.

MEMORY AND CALL PROCESSOR

4.11 The No. 2 ESS call processing instructions and necessary memory (either temporary or long-term) are stored in the program store and call store and can be accessed rapidly by the central processor. These three software components also have capacities that should be monitored by the network administrator and design engineer.

CALL STORE

4.12 The major items of call store which might limit the main station capacity of a No. 2 ESS office are the transient call records (TCRs) and originating registers. The engineering of these items is similar to that used for service circuits. A CCS usage value for both items is found in the OFT portion of the H-schedule of traffic measurements (refer to traffic order worksheets in Traffic Facilities Practices, Division D, Section 12L).

PROGRAM STORE

4.13 Program store is engineered by determining how many words of memory are required to define all of the generic and translations areas of the No. 2 ESS. Some items of translations require 2-, 4-, and 6-word blocks of program store; for example, lines with custom-calling features, etc. After all of these program store word requirements are engineered, there may be spare words remaining in the program store which have not been assigned. These words are apportioned by the Office Data Administration (ODA) System to form additional 2-, 4-, and 6-word blocks based on input by the network administrator. As new customers are added these word blocks are consumed and could become the limiting item in the office. The optimal method for administering the capacity of the spare word blocks is to obtain Translation Office Record Generation (TORG) System records on a regular basis; the 2500-5C-R will give the current status of available word blocks.

4.14 To approximate a main station exhaust date, a comparison can be made using increases in current working main station figures versus the decrease in spare blocks available. However, if the class-of-service mix changes (for example, if a surge occurs in the sale of custom calling features) then this relationship may change significantly.

CENTRAL PROCESSOR

4.15 Presently, No. 2 ESS processor capacity can be estimated using precutover call type data in the manner outlined in Traffic Facilities Practices, Division D, Section 12f-4. This method is subject to error due to inaccuracies in obtaining and trending the many input items. Traffic Facilities Practices, Division D, Section 12f-5, includes a method for post-cutover measurement of processor capacity in an existing office using traffic register data. In offices with at least LO-1, Issue 4.2, or EF-1 generics, the Q14 register of the quarter-hourly schedule gives a percentage of processor time spent on activities other than call processing. This is referred to as periodic deferrable time (PDT) and is indicative of available capacity. CADET, an adjunct of PATROL, will be a future aid in capacity determination.

DETERMINING EXHAUST DATE

4.16 The limiting item in the office is the one which will exhaust first. The exhaust date can be determined by comparing the main station capacity computed with the most current commercial forecast. If the main station capacity indicates an exhaust date somewhere between two of the yearly forecast figures, a main station growth per month can be approximated by dividing the difference between the two forecasted figures by 12.

CAPACITY ADMINISTRATION

4.17 The main station and exhaust data calculations should be done after each busy season and after each job addition. In addition, network administrators with offices on PATROL can monitor component capacities using the capacity (CAP) figures on the monthly report or CADET. A final item of capacity administration is preparing the busy season profile information to ensure that there will be sufficient components in-service when needed.

Additional information concerning capacity administration may be obtained by consulting Dial Facilities Management Practices Division H, Section 10h, Machine Capacity Management.

DEMAND AND FACILITIES CHARTS

4.18 One of the main tools used by the engineer and network administrator is the demand and facilities (D&F) chart. The prime objectives for which the D&F chart has been designed are:

(1) To provide a Bell System standard of interdepartmental local central office relief planning and job management resource by:

(a) Recording an up-to-date graphic portrayal of working main stations and actual usage rates and the current view of future gains in working main stations and usage rates

(b) Recording the capacity of existing equipment and the current picture of the planned capacity additions

(c) Recording various service criteria.

(2) To provide a recording vehicle to report consistent data (using standardized terminology and definitions) for planning, program review, and evaluation purposes.

4.19 The D&F chart has been designed in recognition of the various types and uses of the current operating company D&F charts. To allow for these differences the pages of this chart require only a minimum amount of basic information and provide many blank spaces for additional information that an individual company may desire to record. This standard D&F chart consists of three portions; Parts A and B should be prepared for all local wire centers and Part C is an optional page that may be prepared on either selected or all wire centers. Parts A and B are to be considered job management tools, but are formatted to include sufficient data so that, collectively, they may be used for planning and program review purposes (refer to Dial Facilities Management Practices, Division G, Section 4a, Demand and Facilities Charts—Local).

5. SERVICE PROBLEM ANALYSIS AND CORRECTIVE ACTION

5.01 The network administrator monitors and reviews all possible service problem indications to identify irregularities. The network administrator studies traffic data, initialization printouts, service observation failure summaries, and maintenance data summaries in an effort to uncover the cause(s) of problems and originate corrective action.

TRAFFIC DATA ANALYSIS

5.02 Inherent in the network administrator's responsibility to schedule and collect traffic data is the analysis of that data. Service-level indicators such as dial tone delays, IML, and overflow counts are available from the various traffic schedules.

SERVICE OBSERVATION SUMMARY

5.03 The Network Services Performance Plan (Dial Line Index Plan) will identify poor service. The network administrator is responsible for two portions of the plan: the dial tone speed (BH) and IML (BH) results. Dial tone speed and IML results are based on data obtained from H-schedule traffic registers. The equipment irregularities and NC or reorder components of the index are obtained from traffic dial line service observations.

A. Engineering Service Criteria

5.04 Certain criteria have been established to gauge the grade of service. They are as follows:

(a) ***Percentage of Dial Tone Delay Over 3 Seconds:*** The percentage of dial tone delay (% DTD) over 3 seconds is a measurement of those selected calls that did not receive dial tone within 3 seconds.

(1) The Bell System ***average busy season*** objective for an ***entity*** in the ***busy season of exhaust*** is a maximum of 1-1/2 percent dial tone delay.

(2) In addition, the following ***maximum*** dial tone delay engineering ceilings for an

entity are to be included in the equipment design:

- ***Highest Annually Recurring Day:*** Not over 20 percent. This maximum is to be applied to all types of offices.

- ***Average 10 High Day:*** There are no plans to do average 10 high day studies in No. 2 ESS offices.

The above objectives for dial tone delay are ceilings which generally apply to the ***busy season of exhaust.*** The objective may be somewhat lower in one time frame so that the ceiling would not be exceeded in another.

(b) ***Percentage of Incoming Matching Loss:*** The percentage of IML (% IML) is a measurement of incoming calls unable to complete to a line equipment because of the lack of an available path between the incoming trunk (or junctor) and the called line.

- The engineering objective ceiling to be included in the equipment design for most dial systems is 2 percent IML in the ***busy season of exhaust.*** In No. 2 ESS, total matching loss (outgoing matching loss, IML, total matching loss, incoming and outgoing, etc) should be considered because of the folded network.

RECORDED ANNOUNCEMENT

5.05 The recorded announcement machines in No. 2 ESS offices provide announcements for calls which cannot be completed. A machine has six channels, each of which can be used to supply a specific announcement. A new announcement may be recorded on a channel through a CALL DIRECTOR® telephone supplied for this specific purpose.

5.06 The network administrator supervises the preparation and maintenance of good quality recorded announcements.

6. TRANSITION MANAGEMENT

6.01 The hardware/software concept of No. 2 ESS makes the method for adding equipment to this system different from that of other systems. Not only are changes in hardware (equipment) involved, but changes in software (stored program) are also involved. The gradual transition of the added equipment entails detailed step-by-step procedures. Success of the addition is dependent upon the stored program's acceptance of the added equipment.

6.02 When it becomes necessary to add equipment to a working central office, the effect on service will vary according to the way in which the work is done (refer to Dial Facilities Management Practices, Division H, Section 1b(8), Office Additions—Method of Procedure).

6.03 The assurance of reliable and continuous service during installation activity is the joint interest and responsibility of Western Electric and the telephone company. Reliable service requires full and continued cooperation prior to and during the installation period. A practical procedure for attaining this objective involves a full discussion by all departments prior to installation activity of items such as:

(1) Equipment to be added or modified

(2) Line trunk equipment affected

(3) Choice of periods for taking equipment out-of-service

(4) Method of accomplishing transitional work

(5) Amount and duration of equipment outage

(6) Redistribution of trunks and lines

(7) Assignment and translation data required.

These discussions should begin during the initial planning of the addition. This is often before the traffic order is started. Sometimes these early reviews foresee major problems that require special installation procedures or a redistribution of office load. When this is apparent, a suitable statement should be included in the traffic order to serve as a guide to the Western Electric job planner. These discussions should ultimately result in a method of procedure.

6.04 As with additions to other systems, installation activities which warrant methods of procedure

defining responsibilities are those dealing with the following:

(a) The equipment to be added

(b) Live equipment affected

(c) Choice of periods for taking equipment out of service

(d) Who shall remove fuses where necessary

(e) The determination of whether special working hours are required because of service-affecting work

(f) The individuals performing the functions.

In adding to the ESS office, additional consideration should be given to the responsibility of system input via TTY and memory card loading during method of procedure discussions.

6.05 It is recommended that the network administrator have the prime administrative responsibility for methods of procedure for those responsibilities that normally pertain to network administration.

RECENT CHANGE

6.06 The network administrator should be aware of the necessity for keeping an accurate record of all recent changes made during the "recent change freeze" interval required for the update process. This will require all existing recent change information to be updated and written in the program store memory area by using the single card writer located in the office. The card writing update should be completed immediately prior to the data link of the program store image to the regional data center. All recent changes entered into the machine after the program store update must be retained on tape. After the new translations are activated, the recent changes must be reentered into the machine using the tape or tapes which have been saved during the recent change freeze.

OFFICE DATA ADMINISTRATION SYSTEM

6.07 No. 2 ESS translation information for a new installation is furnished to the telephone company and Western Electric. The telephone company enters the data on prescribed forms which are forwarded to Western Electric. The data are then entered on cards which are fed to a computer at a regional data center. The data center processing system (ODA System) transforms the inputs into a form suitable for the magnetization of program store cards. The ODA System also produces a set of computer-printed office records for use by the telephone company; this is an ODA subprogram called TORG which may be used regularly to produce line, number, trunk, records, etc.

6.08 For a more detailed discussion of the ODA System see the No. 2 ESS Translation Guide, TG-2H, Division 3, Office Data Administration System.

6.09 Although several telephone company employees may be involved in the assembly of translation information, the network administrator should retain overall responsibility for coordinating the information for Western Electric. The network administrator's name and telephone number should be included on the transmitted notice each time any translation forms are submitted by the telephone company (initial or update).

6.10 The final ODA run should be limited, where possible, to final line translations only. The telephone company should be aware of additional time required for ODA error-check corrections, installation, and testing of new translations.

6.11 At turnover, the office contains the generic program and translation structure that will be in the machine until a subsequent retrofit or update. The day-to-day changes in customer lines and some trunk definitions are incorporated by recent change messages under control of the network administrator. Consult the Input Message Manual, IM-2H200, for input formats.

7. PERSONNEL ADMINISTRATION

7.01 The network administrator is responsible for developing and evaluating subordinates, both management and nonmanagement, in the administrative and technical aspects of their jobs. The network administrator usually determines the work force requirements and training needs and administers company practices and policies.

FORCE MANAGEMENT

7.02 Because of the diversity of the responsibilities of network administrators, adequate and economical staffing is a prime consideration. The force management plan, as outlined in Dial Facilities Management Practices, Division B, Section 2, Network Administration Force Management, has been designed to:

(a) Provide a format for forecasting workload and, therefore, the vocational force required to accomplish the forecasted workload

(b) Provide a method for categorizing the vocational work activities and, therefore, distributing network administration payroll expense over the appropriate subaccounts

(c) Provide reports to middle- and upper-level managers to assist in evaluating the adequacy of vocational forces and the appropriateness of work effort

(d) Provide a system for followup to establish controls and facilitate goal setting.

7.03 The basis for the force management plan is the recording, by vocational employees, of the work time spent on accomplishing vocational tasks. Procedures for recording work time are provided to minimize the effort required to develop data on which to project force requirements. The forms required for recording work time data are included.

7.04 For some activities, such as line and number administration, average work times are developed to use in forecasting vocational force requirements. To develop average work time, the quantity of work items accomplished must be recorded. Definitions of work items and procedures for counting and recording them are included.

7.05 After sufficient work time data are collected, forecasts of vocational force requirements can be made. Average work times developed for certain vocational tasks are calculated and used in conjunction with projected work items to provide estimates of future workload. Workloads for vocational tasks for which average work times cannot be calculated are estimated based on judgment, using historical data and knowledge of future activities required.

7.06 Network administration vocational personnel perform activities related to the administration and utilization of a specific portion of the switching network. The activities performed are in the areas of serving main station demand, determining and evaluating the usage and performance of the network, and providing adequate network switching and trunking capacity.

7.07 In connection with the administration and utilization of the network, vocational forces perform functions which are divided into seven main categories. These categories are:

(1) Data administration

(2) Line and number administration

(3) Trunk administration

(4) Network administration

(5) Transition administration

(6) Training

(7) Division of revenue.

7.08 Although not included in the recommended categories of work activities, some other functions may be performed in network administration work groups. Such functions as the updating of intercept records, the updating of directory assistance records, and the assignment and administration of customer equipment are sometimes performed in the network administration group.

DISTRIBUTING VOCATIONAL PAYROLL EXPENSE

7.09 To obtain a better breakdown of the expense incurred and to control the expenses of performing network administration functions, the Facilities Administration subaccounts 621-03 and 624-22 are divided into additional subaccounts. Subaccount 621-03 includes the salaries and other expenses of all managers and their immediate staffs engaged in the general supervision of dial facilities administration functions. Subaccount 624-22 includes the salaries of employees engaged in the actual functions of dial facilities administration. These new subaccounts are defined in the Force Management Circular, Division G, Section 1.

TRAINING

7.10 The network administrator should develop the office personnel through training programs and must recognize areas where development is needed. For example, the clerical forces must be trained to summarize and use the load balance data for best assignment advantage and to make necessary moves.

INTERDEPARTMENTAL RESPONSIBILITIES

7.11 It is imperative that rapport be established with the central office maintenance forces to provide for early detection of trouble areas which must be corrected. In addition, the network administrator should maintain positive relations with other departments. The responsibilities of the network administrator require interaction with marketing, commercial, plant assignment, plant test center, and central office maintenance.

8. EQUIPMENT UTILIZATION

8.01 The network administrator is responsible for optimum loading, balancing, and utilizing of installed equipment. The network administrator develops detailed loading plans for use by the assignment force, maintains and monitors on-going assignment activity, maintains complete load balance, and ensures trunk adequacy.

MAIN STATION LOADING PLANS

8.02 Continued practical balance of the office should be maintained with the assignment of customer lines via service orders (perfect balance will not be achieved). A plan should be developed by the network administrator which will accomplish this objective. The loading plan should be designed to improve balance at each opportunity and to assure optimum balance during periods of peak loads. This plan should reflect the needs of the current busy season as well as those of the future when engineered capacities will be reached or exceeded and load balance becomes critical. Increased attention will be required to ensure that service goals will be met in this situation.

LINE AND NUMBER ADMINISTRATION

8.03 For an initial office, the network administrator will make use of the Western-Electric furnished, computer-generated preferential network assignment list (PNAL). The PNAL gives the rules and restrictions which should be followed in making TEN assignments and is organized into the following itemized tables:

- CLASS A AND GROUND START LINES
- LOOP START LINES
- TRUNKS AND SERVICE CIRCUITS

8.04 The computer generating the PNAL has been programmed to respect all requirements and restrictions of lines and trunks to the network. The PNAL is arranged by sector or half-vertical listing, depending upon the type of frame. This arrangement requires that the network administrator obtain the cable pair assignments from plant.

8.05 Consideration should be given to future classes of lines which will be required after initial cutover. These future requirements should be determined jointly by the network designer, the network administrator, and the commercial forecaster. Special attention should be given to such matters as cable transfers, regrades, etc.

8.06 The network administrator must determine the future multiline hunting group (MLHG) growth demand, based on projected need for new service plus the number of series completion groups which will require conversion to MLHGs prior to the next ODA run. This quantity of MLHGs must be established as dummy groups.

8.07 The test line assignments, part of initial translations, are left in translations through cutover. After cutover, the network administrator may choose to reassign them as regular customer lines if required.

8.08 Dummy trunk groups are established for future growth and to hold service circuits and trunks which are not yet placed in service.

8.09 A more detailed explanation of loading plans and procedures for initial and continuing assignments is given in Dial Facilities Management Practices, Division H, Section 10o, Assignment Administration.

LOAD BALANCE

8.10 Load balance involves assigning lines, trunks, and service circuits to the network in such a manner that there will be an equal CCS load offered to all line trunk network units. The objective of network balance is to maintain an equal CCS load on each line trunk network, on each concentrator group within a network, and on each concentrator in all networks.

8.11 As mentioned in 8.04, the PNALs are generated on a distributing frame sector (zone) basis. They are designed to provide a numerically balanced assignment over the network concentrators within each sector. A high percentage of short jumpers (ie, intrasector jumpers) can be realized when the proportion between subscriber lines and network concentrators in each sector is the same and the proportion between trunk and service circuits and network concentrator in each sector is also the same. The resulting degree of CCS balance over these concentrators is further dependent upon the distribution of high- and low-usage types (for subscriber lines and trunk and service circuits) over the various sectors.

8.12 Since CCS balancing is somewhat subjective in an initial office, the objective of the PNAL is to provide the numeric balance. If the distributing frame layout configuration reflects the proportionality and distribution criteria mentioned in 8.11, then any rebalancing to achieve the CCS balance after office cutover should be minimal.

8.13 Acceptable balance in a No. 2 ESS exists when the load generated by lines, trunks, and service circuits is distributed proportionately over the switches of the concentrators within the line trunk switching frames and the networks. Since perfect balance is virtually impossible due to the chance variation of customer offered loads, the network administrator will be responsible for keeping the load within practical limits.

8.14 Within the concept of equal distribution of load and maintaining objective service levels, the network designer will have engineered the particular No. 2 ESS. The network administrator will be responsible for distributing the load if the inherent call-carrying capacity of the office is to be achieved. Because the TENs are assigned items of equipment with varying attempt and holding-time values, acceptable balance becomes more critical as engineered capacities are reached. Refer to the following Dial Facilities Management Practices for additional information:

(1) Division H, Section 10g, Load Balance

(2) Division H, Section 10o, Assignment Administration

(3) Division A, Section 5b, Load Balance Index Plan.

9. REFERENCES

9.01 The following references provide additional information pertaining to a network administrator's responsibilities:

(1) No. 2 ESS Translation Guide, TG-2H

(2) Dial Facilities Management Practices, Division H, Section 1b(8), Office Additions—Methods of Procedure

(3) Dial Facilities Management Practices, Division B, Section 2, Network Administration Force Management

(4) Dial Facilities Management Practices, Division B, Section 2, Exhibit 1, Job Responsibilities

(5) Dial Facilities Management Practices, Division B, Section 2, Exhibit 2, Vocational Force Activities.

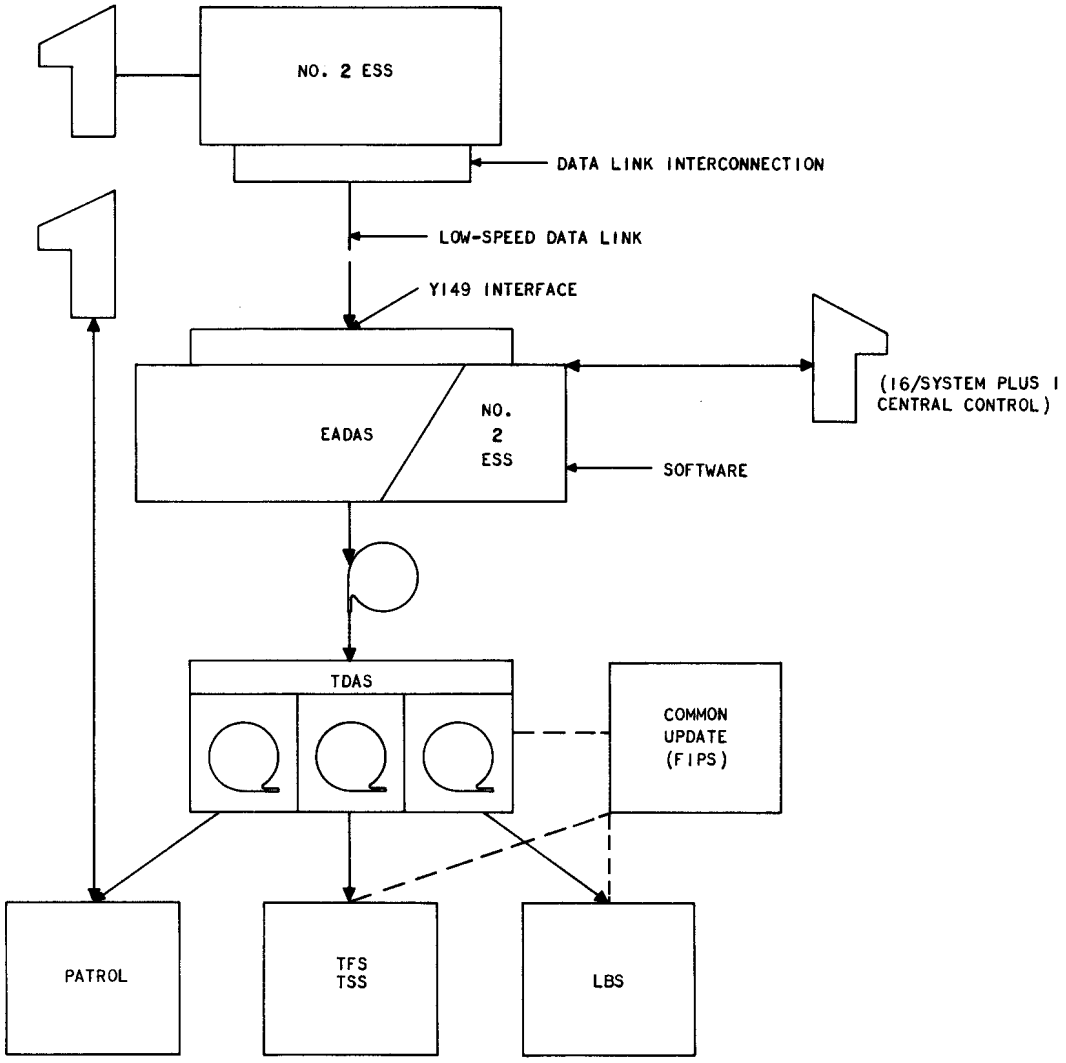

Fig. 1—EADAS/TDAS System Schematic—No. 2 ESS (3.20)