SWITCHING SYSTEMS MANAGEMENT
NO. 2 ELECTRONIC SWITCHING SYSTEM
TRANSITION MANAGEMENT
METHOD OF PROCEDURE (MOP)

CONTENTS PAGE

1. GENERAL 2
2. DEPARTMENTAL RESPONSIBILITY . . . 2
NETWORK ADMINISTRATOR 2
NETWORK MAINTENANCE 3
ENGINEERING DEPARTMENT 3
WESTERN ELECTRIC COMPANY . . . 3
3. DEVELOPMENT OF MOP 4
4. MOP CONSIDERATIONS 5
MEETINGS 5
SERVICE PROTECTION 6
NETWORK DESIGN 6
DATA COLLECTION 6
SERVICE AND LOAD MEASUREMENTS . 7
SERVICE CEILINGS 7
EQUIPMENT QUANTITIES 7
IN-SERVICE REQUIREMENTS 7
LOAD BALANCE AND LINE TRANSFERS . 8
5. OFFICE GROWTH 8
BASIC CONCEPTS 8

CONTENTS PAGE

MAJOR OBJECTIVES 8
JOB COORDINATION 9
TESTING 9
DOCUMENTATION 9
SEQUENCE OF FRAME ADDITIONS . . 9
GROWTH ACTIVITIES 10
6. GROWTH MEMORY CHANGES 10
7. GENERAL TRANSITION CONSIDERATIONS 11
ADVANCE COMPLETION 11
MONITORING THE TRANSITION . . . 11
RECORDED ANNOUNCEMENTS 11
SPECIAL CIRCUIT REQUIREMENTS . . . 11
NEW FEATURES 12
8. NETWORK TRANSITION CONSIDERATIONS 12
LOAD BALANCE 12
TRUNK BALANCE 12
EQUIPMENT CAPACITIES 12
PARTIAL NETWORKS 13

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CONTENTS PAGE

JUNCTORS 13

9. PROCESSING TRANSITION CONSIDERATIONS 13

TRANSLATIONS 13

ESSENTIAL SERVICE 14

10. RECOMMENDED DOCUMENTS 14

11. REFERENCES 14

Figures

1. Block Diagram—Sequence of Events Leading to Preparation of MOP 16

2. Flowchart—Sequence of Additions . . 17

Tables

A. Transition—MOP Checklist 18

B. General Division of Responsibility Between the Telephone Company and Western Electric Company on No. 2 ESS Additions 20

C. Operating System Requirements to Add New Frames or Equipment . . . 21

D. Comparison of Memory Update Methods 22

1. GENERAL

1.01 The purpose of this section is to provide the network administrators with recommended guidelines and procedures for No. 2 ESS office administration when additions, changes, and/or transitions are anticipated.

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

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

1.04 When it becomes necessary to add, rearrange, or modify equipment in a working central office, the effect on service will vary according to the way in which the work is performed.

1.05 Successful transitions require good communication, interdepartmental involvement, planning, scheduling and coordination. The most important function of accomplishing the work involved is the method of procedure (MOP). Knowledge of traffic engineering principles, network administration procedures, and switching functions of the No. 2 ESS are essential.

1.06 Part 2 of this section lists the responsibilities normally assumed by each department in the preparation of a MOP.

1.07 Parts 3 and 4 outline MOP preparation procedures and considerations.

1.08 Parts 5 and 6 describe growth procedures in both the equipment and memory portions on the No. 2 ESS.

2. DEPARTMENTAL RESPONSIBILITY

NETWORK ADMINISTRATOR

2.01 The network administrator is responsible for ensuring enough equipment has been provided by the network design engineer to ensure a satisfactory grade of service to the customer.

2.02 Load charts and capacity charts can be used by all departments involved in planning the growth job. They are useful guides in determining amount and duration of equipment outage. The charts should generally reflect loads and capacities for the average days when the Western Electric Company (WECo) will be removing equipment from service, thereby reducing capacity. Capacities should be shown for all components involved in WECo installation activity (only when capacity will be limited). These capacities should be matched against estimates of load for varying periods of time, to determine the most suitable time for reducing capacity in the office, and to determine quantities of equipment which may be safely removed from service.

2.03 Equipment involved in transitions, rearrangements, or relocation work that is service affecting should be identified at the first

growth (interdepartmental) meeting. Arrangements should be made as necessary to clear this equipment so that service is not adversely affected. Consideration must be given to other groups and departments in establishing dates for this work; ie, initiating trunk rearrangements requires considerable time and effort to prepare trunk orders. The availability of outside plant facilities and associated equipment orders must be coordinated, and manpower must be scheduled in various departments.

2.04 Plan ahead for proper machine balance, ie, schedule line equipment transfer to maintain necessary load balance, if not obtainable via line assignments. Utilize new trunk equipment as necessary to achieve an even balance over all switches. Evaluate the load before, during, and after the change.

2.05 WECo and/or the network maintenance personnel require information in order to properly input the necessary translation data associated with trunks and lines. Coordination of the assignment and translation information is the responsibility of the network administrator. Dates must be established and schedules initiated to ensure proper departmental cooperation.

2.06 A transition-MOP checklist is provided in table A.

NETWORK MAINTENANCE

2.07 System evaluation tests must be performed by the network maintenance personnel prior to the start of a growth job. These tests establish the status of the office and assure WECo that this office is in excellent operating condition. The results of the system evaluation tests are furnished to the Western Electric installer in the form of teletypewriter (TTY) printouts. These tests are also made after completion of the growth job to ensure that the system can operate trouble free in all possible configurations of the central processors, call stores, and program stores.

2.08 Network maintenance personnel maintain a "log of all equipment out of service" for any reason. During periods of WECo activity, they also maintain a running record of the WECo installer's working location, and what equipment is involved. This record is very useful when trouble is encountered. The equipment out-of-service record log should be retained near the maintenance TTY. The TTY must be constantly monitored for interrupts to ensure continuity of customer service.

2.09 The network maintenance department has the responsibility for physically removing equipment from service, testing, restoring equipment to service and accepting added equipment. This department also has the responsibility of inputting all recent change messages required for the growth job.

2.10 Network maintenance departmental personnel are responsible for WECo adherence to the MOP.

ENGINEERING DEPARTMENT

2.11 Most telephone companies assign engineering departmental representatives to coordinate WECo installation activities. The engineering departmental representative is normally responsible for:

(a) Providing the equipment specifications

(b) Scheduling job meetings between WECo and the Telephone Company (TELCO)

(c) Providing liaison between WECo and TELCO

(d) Ensuring WECo adherence to MOP

(e) Economical aspects of the job, ie, overtime, unusual transition methods, etc

(f) Arranging for advance turnover of equipment.

WESTERN ELECTRIC COMPANY

2.12 The WECo installation supervisor is responsible for preparing the MOP. Adherence to the prescribed MOP by WECo is necessary to ensure proper coordination by all groups.

2.13 Removing equipment from service, testing, restoring equipment to service, etc, should be in accordance with WECo handbook instructions and established procedures, and coordinated with the network maintenance personnel.

2.14 Transitions, rearrangements, replacements, etc, should be accomplished with a minimum interval of reduced capacity and with a minimum probability of service interruption, but consistent

with reasonable job efficiency. WECo is responsible for determining the work operations that will be service affecting. These work operations should be grouped together in the MOP and identified as service affecting.

3. DEVELOPMENT OF MOP

3.01 The MOP is a detailed step-by-step plan for the installation of a particular job which has been agreed upon and signed by both TELCO and WECo representatives.

3.02 Normally, the preparation of the MOP is done jointly by WECo and TELCO. The MOP may be a very formal document, or somewhat informal, depending upon the magnitude of the job.

3.03 Methods of procedure are required whenever WECo activity involves:

(a) Hardware changes (Class A)

(b) Equipment additions

(c) Equipment modifications

(d) Equipment removal

(e) Program changes (Class A)

(f) Program changes (conversion, retrofit).

3.04 Installation events which warrant defining responsibilties are those dealing with:

(a) Equipment to be added

(b) Line equipment affected

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

(d) The determination of whether special working hours are required because of service affecting work.

3.05 A proper MOP involves the following process:

(a) WECo develops and proposes the plan

(b) The plan is evaluated by TELCO, ie, the network administrator assesses the impact on service. The maintenance supervisor evaluates the maintenance effort and test requirements. The engineering department examines the cost aspect, and other departments are consulted as necessary

(c) Adjustments in procedures are made based upon the participation of the groups involved

(d) A final MOP is agreed upon

(e) The MOP is prepared in writing and is signed by management representatives in the departments involved. District level approval is recommended especially in the network and maintenance departments.

3.06 It is recommended that the network administrator have the prime administrative responsibility in connection with MOP for those responsibilities that normally pertain to the traffic department.

3.07 Administrative personnel having the responsibility at job meetings in connection with MOP must carefully prepare for the meeting. An effective contribution will require thorough knowledge and preparation.

3.08 The network administrator should be satisfied that the WECo job specification agrees with the traffic order, including special instructions and advance turnover.

3.09 The MOP should be discussed at the earliest opportunity, to identify and to resolve any basic differences on how the job should be done. The following list may be used as a guideline for developing a MOP:

(a) Equipment to be added

(b) Time interval for transition or replacement

(c) In-service equipment affected which may require special considerations depending on the work performed

(d) Time of day or night during which the work will be performed

(e) Length of time the equipment will be taken out of service

(f) Allocation of responsibilities

(g) Installation and testing procedures

(h) Translation and parameter update procedures

(i) Where necessary, a detailed step-by-step procedure for doing a transition or a rearrangement

(j) Type of protection and special precautions for each step of the job.

3.10 The work should be done in a logical sequence, each step explained fully and specific responsibility noted. The sequence of progress may be based on the following considerations:

(a) Equipment that will be required first

(b) The sequence of steps that will provide advance equipment when required to meet service needs

(c) The amount of work that can be done while providing a margin of safety for returning released equipment to service within a specified time

(d) Work that can be done without affecting working equipment

(e) Work that must be done on an "in-service" basis

(f) Work that must be done during lightly loaded hours (usually night)

(g) The type of test and test equipment required during, and at the completion of each step.

3.11 The MOP, in its final form, is a written plan agreed to and signed by WECo and the TELCO defining:

(a) What has to be done:

(1) Changes or additions involved

(2) Sequence of addition or changes

(b) How the job will be done with provision for:

(1) Continuity and quality of service

(2) Efficiency in WECo effort

(3) Minimum interference with normal maintenance routines

(4) Emergency restoral procedures.

3.12 The WECo installer, the WECo regional engineer and the TELCO network maintenance personnel shall not deviate from the signed MOP unless it is amended and signed. When a change in the order of procedure of the work is necessary, due to unforeseen circumstances, WECo and TELCO representatives shall be held responsible for determining the extent of the change and its possible effect on the service and the job. If changes are necessary and agreement is reached concerning method of implementing the changes, this agreement shall be indicated on a revised and approved MOP.

3.13 For a typical block diagram of "sequence of events leading to preparation of MOP," see Fig. 1.

4. MOP CONSIDERATIONS

MEETINGS

4.01 Meetings provide a communication between TELCO and WECo representatives. All departments responsible for the success of a given cutover or transition should appoint a representative for attending required meetings.

4.02 The purpose of the meetings is job planning, MOP preparation and follow-up. Suggested meetings are as follows:

(a) ***Pre-MOP meetings:*** may include a field review of the No. 2 ESS equipment questionnaire

(b) ***MOP meeting:*** for the final agreement and approval of the MOP

(c) ***Cutover meetings:*** job status reports may be included at these meetings

(d) ***Subcommittee meetings:*** held when necessary for detailed planning and follow-up. Example: line, trunk, etc.

(e) ***Critique meetings:*** held after cutover to analyze results. This meeting may prove helpful for future cutover.

4.03 Minutes of all meetings should be kept and distributed as the formal record of interdepartmental or intercompany agreements and decisions.

SERVICE PROTECTION

4.04 Responsibility for good service to telephone customers must be shared by all telephone personnel as part of their daily job, but final, overall responsibility rests with the network administrator. When there is WECo activity in an office, the network administrator's effort in connection with this responsibility must be intensified.

4.05 Assuring continuity and reliability of service during periods of activity connected with installation of equipment by WECo is the joint interest and responsibility of both TELCO and WECo. To meet this objective requires full and continued cooperation prior to and during the installation period. A procedure generally found practical for attaining this objective involves a full discussion by all departments prior to installation activity of items such as:

(a) Equipment to be added or modified

(b) Line equipment affected

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

(d) Method of accomplishing transitional work

(e) Amount and duration of equipment outage

(f) Redistribution of trunks and lines

(g) Assignment and translation data required

(h) A contingency plan to protect service in case of emergency or unusually high call and/or load volumes.

These discussions should begin during the initial planning of the addition. Sometimes these early reviews reveal major problems requiring special installation procedures or a redistribution of office load. When this is apparent, a suitable statement should be included in the network design order to serve as a guide to the WECo job planner. These discussions should ultimately result in a MOP agreed to by all departments.

NETWORK DESIGN

4.06 Close coordination with the network design engineer and a thorough knowledge of transitional procedures are required by the network administrator. The effect on service will vary according to the way in which the job is engineered.

4.07 The network design engineer and the network administrator must concur not only with equipment requirements, but also with network configuration. Continuing attention, beginning with the traffic order, is required to ensure protection of customer services.

DATA COLLECTION

4.08 Network administration techniques dictate that usage data be used to develop meaningful load service relationships. The use of these techniques becomes increasingly important during periods of additions to existing facilities because capacities of equipment may be affected by transition work.

4.09 Data obtained from network measurements have many and varied uses; however, during transition, data will be the guiding factor in the daily administration of the office. In order to make appropriate use of the data, it is imperative to know what is included in the data and whether or not the data is valid. Usage results must be checked to ensure an equal grade of service for all subscribers.

4.10 During periods of growth activity, network measurements must be kept current in translations. When a generic program retrofit is made, some network measurements may change. Investigate this possibility prior to the retrofit.

4.11 The Translation Guide (TG-2H) Division 10, Section 1, provides a description of the network measurements. Network administration

measurements (traffic measurements) covered in DFMP, Division H, Section 10i, and DFMP, Division H, Section 1c(5) provide a description of data checks and validation techniques.

SERVICE AND LOAD MEASUREMENTS

4.12 During transitions or capacity reduction periods, service and measured results may be affected in varying degrees, according to the load generated. The broad categories of service and load measurements in a No. 2 ESS are:

- ***Service***

  (1) Dial tone speed (DTS)

  (2) Incoming matching loss (IML)

  (3) Service observing (SOB)

- ***Load***

  (1) Service circuits

  (2) Network components

  (a) Network control junctor switching frame

  (b) Line trunk switching frame

  (c) Junctors

  (3) Traffic sensitive call store areas

  (a) Automatic message accounting (AMA) buffers

  (b) Supervisory coin control circuits

  (c) Etc.

SERVICE CEILINGS

4.13 Experience has shown that our subscribers ordinarily do not expect perfect service. However, they do expect and deserve an excellent grade of service. To ensure rendering this grade of service, service ceilings have been established for the busy season.

(a) Dial tone
1.5 percent ABS-BH (Average Busy Season—Busy Hour)

(b) Incoming matching loss
2 percent ABS-BH

EQUIPMENT QUANTITIES

4.14 Traffic Facilities Practices are the source documents used to provide facilities for central office relief at the exhaust period. They may also be used by the network administrator to calculate current in-service requirements and to prepare requirements for transition purposes.

4.15 It is recommended that the data used to design the relief job be compared to the most recent ESS network measurement data. Estimated main stations on the equipment order should be checked against actual main station records prior to the transition.

4.16 Load records from the past year are useful guides in determining equipment requirements during the transition period. Capacities may be matched against estimates of load for varying periods of time to determine the most suitable time for reducing capacity in the office and to determine quantities of equipment that may be safely removed from service. The estimated cutover traffic load may be compared with the cutover capacity to ensure that the equipment quantities are sufficient.

4.17 The application of equipment capacities and quantities to a transition may be found in the following documents:

(a) DFMP, Division H, Section 10t(2) for the switching network

(b) DFMP, Division H, Section 10c for call processing.

IN-SERVICE REQUIREMENTS

4.18 It is the responsibility of the network administrator to determine in-service requirements and the effect that removal of equipment might have on service. The network administrator needs to know what margin exists in the call carrying capacity at different hours of the day, days of the week or months, etc. When

this is known, capacity reductions during transitions can be gauged more accurately.

4.19 Central office additions and rearrangements are usually planned far in advance of the actual work. The effect such jobs will have on capacity can be assessed early and schedules arranged so that service is not seriously affected. When the network design order for the job is issued, the network administrator's careful analysis should reveal what is needed to maintain call carrying capacity while work is in progress.

4.20 The protection of service during installation periods is the joint responsibility of network administration, network maintenance, and WECo. The quantities of equipment which can be taken out of service and the time in which they may be removed should be agreed upon by all groups involved in the transitional period. These quantities and time frames should be discussed at committee meetings. Plans should be formulated at that time to ensure sufficient work force and to schedule the work force so that the proposals can be followed.

LOAD BALANCE AND LINE TRANSFERS

4.21 Every attempt should be made to prevent unnecessary line and/or trunk transfers. Careful loading plans and follow-up are necessary to meet this objective. Equipment additions may be treated as separate loading divisions for up to six months. This provides an opportunity for balancing the new network addition with new assignments rather than with line and/or trunk transfers.

4.22 Groups which have exceeded the engineered design may require corrective action. Line and trunk transfers should be undertaken if analysis indicates present or imminent service problems. If line and/or trunk transfers are required, the following suggestions will make them more effective:

(a) Make as few transfers as possible to do the job

(b) Plan them in advance

(c) Prepare a plan to spread them over a recommended time interval

(d) Consult the department performing the work for concurrence in the timing and volume of additional work load.

5. OFFICE GROWTH

BASIC CONCEPTS

5.01 When new equipment or equipment frames are added to an ESS office, they are added with minimum telephone service interruption. The duplicate design of the No. 2 ESS permits numerous working configurations among the duplicated system units. After the new equipment is worked into the system, selected parameter and translation updates are made to allow the system diagnostic and fault recognition programs to test the new equipment. This testing takes place without interference to call processing. In fact, the call processing programs are unaware of the new equipment due to parameters and translation updates that have not yet been made.

5.02 In some cases, due to changes in office traffic, equipment or equipment frames must be removed from a working office. This is accomplished by using a reverse procedure from that required to add the same equipment or equipment frames to an office. The first step in a procedure of this type would be to remove all translation assignments since these changes were made last.

MAJOR OBJECTIVES

5.03 Major objectives during growth of an office are as follows:

(a) Minimize the possibility of interruption or impairment to customer service

(b) Minimize changes required to normal operating procedures of the TELCO

(c) Permit allowable margins and overlap of installation effort to allow efficient job scheduling and utilization of the workforce.

5.04 These objectives can best be implemented with the following procedures:

(a) Provide a safe and well-defined environment in which growth frames can be tested without interference to the working system

(b) Minimize the interval where simplex operation (no duplication) of equipment is required

(c) Sequence installation procedures to allow growth frames to be integrated into the system in small steps that can be easily verified

(d) Provide several, safe, stopping points in the growth procedures to allow for unforeseen difficulties

(e) Keep the procedures clear and simple

(f) Use computer-generated data, when available.

JOB COORDINATION

5.05 A cooperative effort between TELCO and WECo is absolutely essential when adding equipment frames to an in-service ESS office. During the planning stage of each office addition, WECo installation personnel and TELCO personnel prepare a MOP which specifies the sequence of all activities to be performed. Table B shows the general areas of responsibility for WECo engineering, WECo installation, and TELCO during an office addition.

TESTING

5.06 System evaluation testing must be made prior to, and after office growth, to ensure that the office is in excellent operating condition.

DOCUMENTATION

5.07 Documentation covering growth consists primarily of Bell System Practices and associated growth recent change forms (GRC). This documentation is written to conform with the following objectives:

(a) To prevent office failure and to minimize any interruptions in customer service

(b) To allow growth frames to be added to the system in small steps

(c) To use relatively short procedures

(d) To verify each procedure

(e) To minimize the number of times program store memory cards must be updated.

SEQUENCE OF FRAME ADDITIONS

5.08 Frames and equipment are added to an ESS office in a sequence engineered by WECo. The sequence for each office addition must be made by considering frame interdependencies as well as the hardware and software interrelationships. The general philosophy is to add central processor frames first and then to work outward adding peripheral frames and trunk and service circuit equipment.

5.09 In order to establish the priority in which frames are added, they are classified into four groups. Groups I and II type frames provide the necessary power, memory, and assignments points for the remaining equipment additions. The required frames and equipment are normally added in the following sequence:

- ***Group I***
  Power distributing frame
  Program store frame
  Central processor
  Miscellaneous power

- ***Group II***
  Master scanner frame
  Supplementary central pulse distributor

- ***Group III***
  Automatic message accounting
  Combined distributing frame
  Intermediate distributing frame
  Junctor grouping frame
  Line/trunk switch frame
  Miscellaneous frame
  Maintenance center frame
  Protector frame
  Miscellaneous trunk frame
  Network control junctor switching frame
  Recorded announcement frame
  Ringing and tone power plant frame
  Supplementary call store frame
  Supplementary ringing and tone frame
  Trunk test frame
  Universal trunk and junctor

- ***Group IV***
  Trunk and service circuit equipment

Note: When possible, trunk and service circuit equipment is added in parallel with Group III frames.

5.10 The general list of specific activities to add frames and the sequence given is the most desirable considering all restrictions; however, each office addition is different and each installation sequence is engineered for the specific job by the WECo regional engineer.

5.11 For a flowchart of a typical sequence of additions, see Fig. 2.

5.12 For the operating system requirements to add new frames of equipment, see table C.

GROWTH ACTIVITIES

5.13 When an office addition is required, the necessary activities are normally performed in the sequence listed below. Many of the steps performed by WECo installation are listed to provide continuity to the overall process.

- Steps performed for all frame additions:

  (1) Erection of frames

  (2) Ground testing

  (3) Cable running

  (4) Power verification tests

  (5) Trunk and service circuit equipment (if required) mounted and wired

  (6) Connections (miscellaneous circuits)

  (7) Installation tests (not required for central processor frames)

  (8) Connections (private signal leads)

  (9) Update of translations (performed prior to or in parallel with the above steps).

6. GROWTH MEMORY CHANGES

Note: In the No. 2 ESS, parameter information is included in translations, and is not a separate function as in other systems.

6.01 Individual definition of an office is done through the use of a series of translation tables. The structure of these areas is fixed, but the information stored (office size, line and trunk definitions, routing, charging, etc,) is variable. The arrangement allows the standard generic program to interface with the unique characteristics of each individual office. An arrangement of this type has the advantage of a custom program for each office while retaining the efficiency of a single control program source.

6.02 In the No. 2 ESS, data are stored on magnetic memory cards in the program store. However, since some data must be changed frequently, provision is made to store some changes in the recent change area of call store memory. Recent changes are received as messages from a TTY. When the recent change area approaches its capacity, steps must be taken to transcribe the recent change data to the program store memory cards. The program store memory cards can be updated by using the local or data link update method described in DFMP, Division H, Section 10d(5), memory updates.

6.03 To maintain the system call processing reliability, it is important that the normal operation of the system be affected as little as possible by the updating procedure. The writing of the memory cards using the single card writer does not affect normal operation of the system; but when the cards are being replaced and verified at the off-line program store, the off-line control unit is available for system use, and the on-line control unit is locked on-line. Therefore, the replacement and verification functions, once begun, must be completed as quickly as possible.

6.04 Memory updates can be performed entirely by the local central office or with the assistance of the updating facilities at a remote location. A remote facility update may be used when a large quantity of changes are necessary. An update using the remote facilities can occur by using a data link or by shipment of updated program store card modules. The methods of updating or changing the stored data are outlined below. (For a detailed description, refer to DFMP, Division H, Section 10d(5), memory updates.)

(a) Local memory update methods

  (1) Recent changes

  (2) Updating of program store translation information using the single card writer

(3) Change in program store

(4) Customer dialed translation changes

(b) Memory update methods assisted by data link to a remote facility

(1) Office data administration system

(2) Tape-operated memory update system

(c) Memory update method at a remote facility requiring memory module shipment

(1) Office data administration system

6.05 A comparison of these memory update methods is shown in table D.

7. GENERAL TRANSITION CONSIDERATIONS

7.01 This part contains a brief description of some general items that should be considered during a No. 2 ESS transition.

ADVANCE COMPLETION

7.02 The sequence of adding new frames and equipment to a No. 2 ESS office provides for some flexibility. It may be desirable to have line or trunk terminations, service circuits, or other types of equipment prior to the job completion date. This flexibility may permit advance completion of these items. However, the earlier this requirement is determined and made known to all concerned, the better the equipment sequence can be implemented.

MONITORING THE TRANSITION

7.03 The program for administrative traffic reports on line (PATROL) can serve as a very valuable tool for monitoring a No. 2 ESS transition. These transitions are normally gradual. New frames and circuits are made available to the call processing programs as they are installed and tested. The necessary rearrangements are accomplished in an orderly fashion. However, with this type activity in a working office, the potential for affecting customer service is ever present. The data available on a real-time basis with the No. 2 ESS can provide an immediate indication of any problems. A program for managing and correlating this data on a real-time basis is PATROL.

7.04 The MOP should detail the sequence of adding circuits to the office. As these circuits are added, the PATROL data base must be maintained current. This will require coordination with the installation group to determine when these additional circuits and new arrangements are available to handle traffic.

7.05 By use of the PATROL, the network administrator can see exactly what is happening in the office. Data obtained can be compared to previous data on file for these items. Abnormalities can be immediately identified and corrective action initiated.

7.06 Improvements are continually being made on No. 2 ESS measurements. PATROL should be updated to take advantage of these new measurements when they become available.

7.07 The Translation Guide, TG-2H, Division 10, Section 2 contains the latest information on measurements. This publication should be monitored for changes affecting growth.

RECORDED ANNOUNCEMENTS

7.08 The recorded announcement frame provides for a maximum of six announcements on a small magnetic drum recorder. Each announcement channel has an associated record-reproduce amplifier. Distributing resistors are provided for each announcement channel to isolate the outputs, which may total 120 (20 per channel maximum).

7.09 The supervisory control unit, a 624 telephone set, is used to select the desired channel for recording or monitoring. The units are arranged to be increased in increments of 24 circuits to a maximum of 144 per frame.

7.10 In conjunction with the No. 2 ESS addition, it is suggested that the announcement channel requirements be reviewed.

SPECIAL CIRCUIT REQUIREMENTS

7.11 Customer special communications arrangements are possible because of the flexibility inherent within the stored program concept used in the No. 2 ESS. Frequently, standard circuits can be used in conjunction with relatively simple software changes to provide these services; however, some services require special circuits. Many of these

special circuits are of the type that must be wired in on the miscellaneous trunk frame. If these circuits are not available to meet a customer's special requirement, an undesirable, long delay may be encountered.

7.12 By scrutinizing the requirements of the customers to be served from the No. 2 ESS growth, a majority of these delays may be eliminated. An interdepartmental decision may be necessary to handle some of these special requirements.

NEW FEATURES

7.13 The list of new features available with the No. 2 ESS continues to grow. As the program provision for these features progresses from the conceptual to the reality stage, changes and modifications are made. A new piece of hardware or changes to software may be required.

7.14 During the period from traffic order to cutover, a continual review of all new features available must be made. Any new or revised hardware and/or software requirements must be identified and appropriate action taken.

7.15 Translation Guide, TG-2H provides the latest information on feature requirements.

8. NETWORK TRANSITION CONSIDERATIONS

8.01 This part contains a brief description of some of the switching network items that should be considered during a No. 2 ESS transition.

8.02 Determination of switching network transition requirements is a major consideration. It includes equipment capacity requirements, planning loading strategies, line and/or trunk transfers, and the number and configuration of interim junctor assignment programs. Procedures have been prepared to aid in making these determinations. They are provided in DFMP, Division H, Section 10t(2), switching network.

LOAD BALANCE

8.03 As the office grows, fewer junctor paths are available between the networks. This makes the hundred call seconds (CCS) capacity more critical and increases the probability of service deterioration in relation to the degree of imbalance.

8.04 Unexpected loads can be experienced in conjunction with a line addition. New customer characteristics frequently are different from those of existing customers. A rebalance of the office may be desirable as soon as practicable in connection with the installation of this new equipment.

8.05 While the basic unit of balance on the line side of a No. 2 ESS is the concentrator, attention must be given to the balance on each switch in the concentrators. One switch can be overloaded while the concentrator total usage is underloaded. This can be a major source of blocked dial tone problems and must be considered during any office rebalancing.

8.06 Most line balance is accomplished by line assignments. If line transfers are necessary, it is recommended they be planned and executed as part of the job and included in the MOPs.

8.07 Load balance techniques are provided in DFMP, Division H, Section 10g.

TRUNK BALANCE

8.08 Trunks should be assigned to the networks in a manner which will produce a balanced CCS load. Each individual trunk group should be spread over all line trunk networks in the office. This increases the chance of success for retrials by making a different junctor group available to complete the connection.

8.09 During the process an office addition is an ideal time to review the procedures being used to administer the office trunk balance. As an office grows, a more precise balance becomes necessary to achieve the engineered CCS capacity. Every effort should be made when assigning new trunks, or redistributing existing groups, to improve the office balance.

EQUIPMENT CAPACITIES

8.10 The requirements for equipment items in the No. 2 ESS are determined by the network design engineer. For the equipment items, ringing circuits, receivers, transmitters, etc, worksheets are available in the traffic facilities practices. These worksheets recommend the data base, high day, or average busy season, and the capacity table to be used in determining quantities

required. During transitions, sufficient capacity must be available for service requirements.

PARTIAL NETWORKS

8.11 There are two types of line trunk networks available in the No. 2 ESS. The types are determined by the concentration ratio required. A fully equipped line trunk network with 2:1 concentration ratio consists of two line trunk switching frames (LTS) and a network control junctor switching frame (NCSS). A fully equipped line trunk network with 4:1 concentration consists of four LTSs and one NCSS.

8.12 A partial network is one that is equipped with less than the full complement (two or four) of LTSs. Partial networks are permissible in the No. 2 ESS at the highest numbered and ***only*** at the highest numbered network for administrative reasons.

8.13 In all cases (where less than four LTSs are equipped in a 4:1 concentration ratio line trunk network) each LTS must be engineered and administered as if it were a 4:1 concentration ratio.

JUNCTORS

8.14 Junctors are the paths used to connect line trunk networks to themselves and to other line trunk networks. There are two types of junctors: wire junctors and circuit junctors. A wire junctor consists of a metallic path from a network control junctor switching frame to the junctor grouping frame and back to the same or another network control junctor switching frame. A circuit junctor path is constructed in a similar manner except that a universal circuit called a circuit junctor circuit is inserted into the path. The junctor pattern of paths to be interconnected at the junctor grouping frame is generated by a junctor assignment program (JAP-2) at the Western Electric Regional Center.

8.15 Wire junctors are used for all line-to-trunk, trunk-to-line, trunk-to-trunk, and line-to-service circuit connections. The circuit junctor is required on all line-to-line (intraoffice), line-to-tone circuits and line-to-announcement connections. This circuit is used to provide talking battery, audible ring, and supervision to lines when a trunk circuit is not required in the connection.

8.16 When new networks are added to an office, a new arrangement of interconnecting these networks must be made. Each network has a maximum of 64 subgroups. With existing networks requiring connections to the new networks, some of the existing groups will have to be reduced in size. However, the new junctor groups will not be carrying an equal share of the CCS load. The existing groups, now reduced in size, may not be able to handle the existing load. Should this be the case, it may not be possible to go from the existing junctor arrangement to the new desired arrangement without one or more intermediate arrangements. This may require (line and/or trunk transfers and) one or more interim junctor assignment program (JAP-2) runs.

9. PROCESSING TRANSITION CONSIDERATIONS

9.01 This part contains a brief description of some of the data processing items that should be considered during a No. 2 ESS transition.

9.02 Call processing requirements are a major consideration and include translation requirements. Additional information and procedures are found in DFMP, Division H, Section 10c.

TRANSLATIONS

9.03 A detailed plan and timetable should be established and followed in order to have all translations available when required for input into the ESS memory. This will require the establishment of committees to formulate this plan.

9.04 It is recommended that special consideration be given to translations changes required by a new generic program. Existing translations should be reviewed and all necessary changes made at the appropriate time during the translation sequence.

9.05 In the No. 2 ESS, translation data is stored on magnetic memory cards in the program store. However, since the nature of the information provided by the translations requires that translation data be changeable, provision is made to store changes in an area of call store memory. This area is called the recent change area. Translation changes are received as messages from a TTY and are stored in the recent change area. Sequentially, the changes are transcribed into the program store from the call store by using the single card writer.

9.06 For a more detailed discussion on translation see Translation Guide, TG-2H, Division 3.

ESSENTIAL SERVICE

9.07 Dynamic service protection (DSP) is a feature designed to provide preferential service to certain lines during extended overloads on the switching system by preferentially giving dial tone access to those lines during overload conditions. DSP is a standard feature in the No. 2 ESS with either the LO-1 or EF-1 generic program.

9.08 A customer line assigned as class A (essential) is given preferential treatment during line scanning and for connection to dial tone when DSP is activated by the system. DSP does not deny service to any line. It assures class A customer line preferential service while serving all other lines as rapidly as equipment becomes available. Class A lines may comprise one-eighth (4 out of 32 terminals in each concentrator) of the lines in an office and are assigned to special terminal equipment numbers on the line trunk network; the only terminal equipment numbers which receive class A service are level 0 of even number switches on all concentrators in a network. All lines not assigned as class A are considered to be class B.

9.09 For a more detailed discussion on DSP, refer to DFMP, Division H, Section 10d(1).

9.10 For additional information on translation and the translation program refer to TG-2H, Division 3 and 7.

10. RECOMMENDED DOCUMENTS

10.01 The following documents are recommended for a No. 2 ESS network administrator.

(a) ***Dial Facilities Management Practices (DFMP):*** These documents outline the network administrator's responsibility and provide methods for the administration of No. 2 ESS.

(b) ***Traffic Facilities Practices (TFP):*** These documents outline the traffic engineering criteria for the equipment order. It is necessary for the network administrator to have a copy of this publication to properly review and evaluate the office capacity.

(c) ***Translation Guide, TG-2H:*** This publication furnishes the latest instructions concerning preparation and maintenance of No. 2 ESS translations and record forms.

(d) ***Input Manual—IM-2H-200:*** This document contains the TTY input messages valid for communicating with the No. 2 ESS.

(e) ***Output Manual—OM-2H-200:*** This document contains the output messages used by the No. 2 ESS for communicating through the various TTY channels available.

(f) ***Junctor Assignment Program Printout:*** This document provides the junctor configuration for each interim and final junctor arrangement. It is necessary for the network administrator to have a copy of each junctor assignment program required for the transition to evaluate service requirements.

11. REFERENCES

11.01 The following documents will provide further information in related areas.

DFMP, Division H

SECTION	TITLE
1b(8)	Method of Procedure
10b	System Descriptions
10c	Call Processing
10g	Load Balance
10h	Machine Capacity Management
10i	Network Administration Measurements
10j	Service Results
10p	Data Management
10t(2)	Transition Management—Switching Network

SECTION	TITLE

Bell System Practices

SECTION	TITLE
232-019-101	General Growth Description

TFP, Division D

SECTION	TITLE
12a	General
12b	Traffic Order Preparation
12c	Service Circuits
12d	Trunk, Miscellaneous Circuits and Frames
12e	Line Trunk Network
12i	Traffic Measurement

SECTION	TITLE

TG-2H, Division 8

SECTION	TRANSLATION PREPARATION
1	ESS 2100 R-Series—Lines
2	ESS 2200 R-Series—Trunks and Service Circuits
3	ESS 2300 R-Series—Routing and Charging
4	ESS 2400 R-Series—Traffic Measurements
5	ESS 2500 R-Series—Office Features and Options

TG-2H, Division 6
TG-2H, Division 7
TG-2H, Division 10

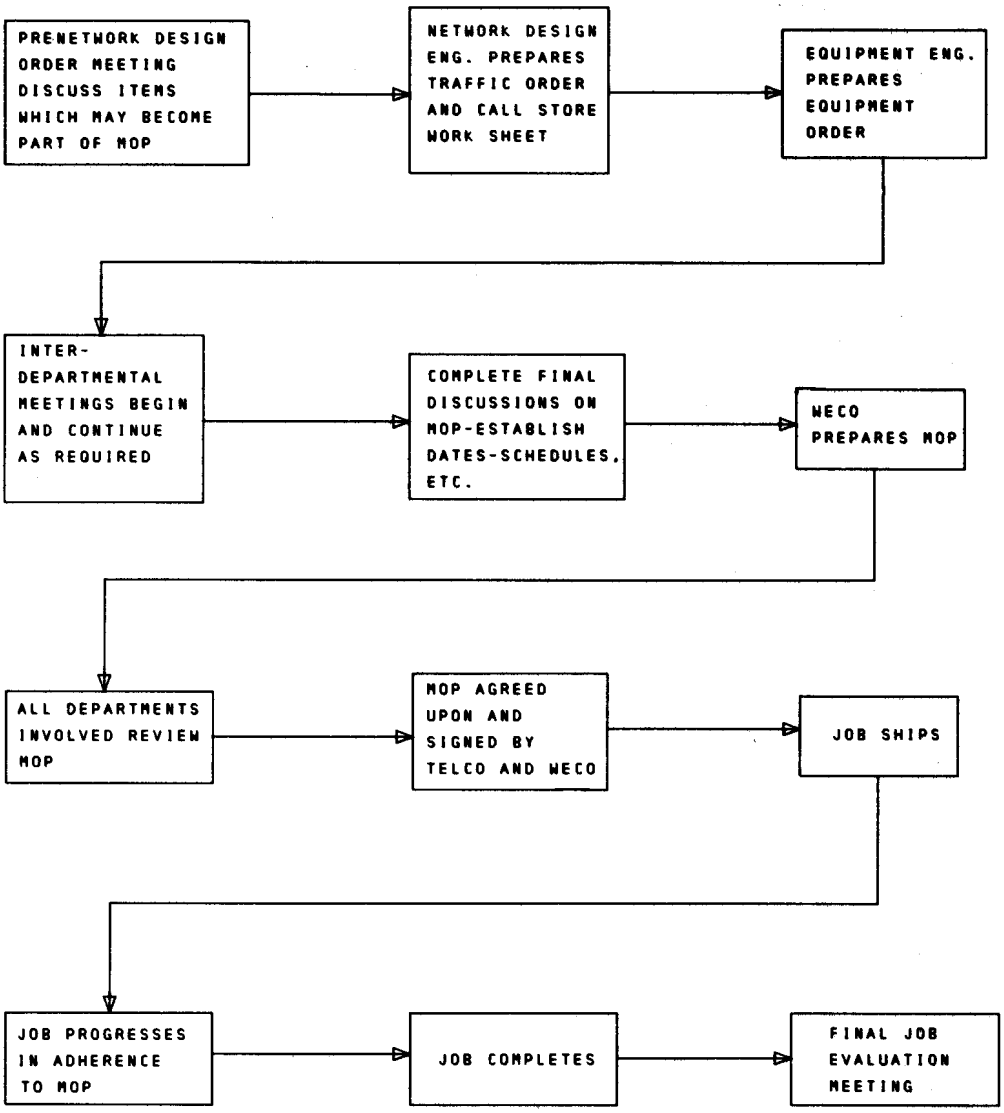
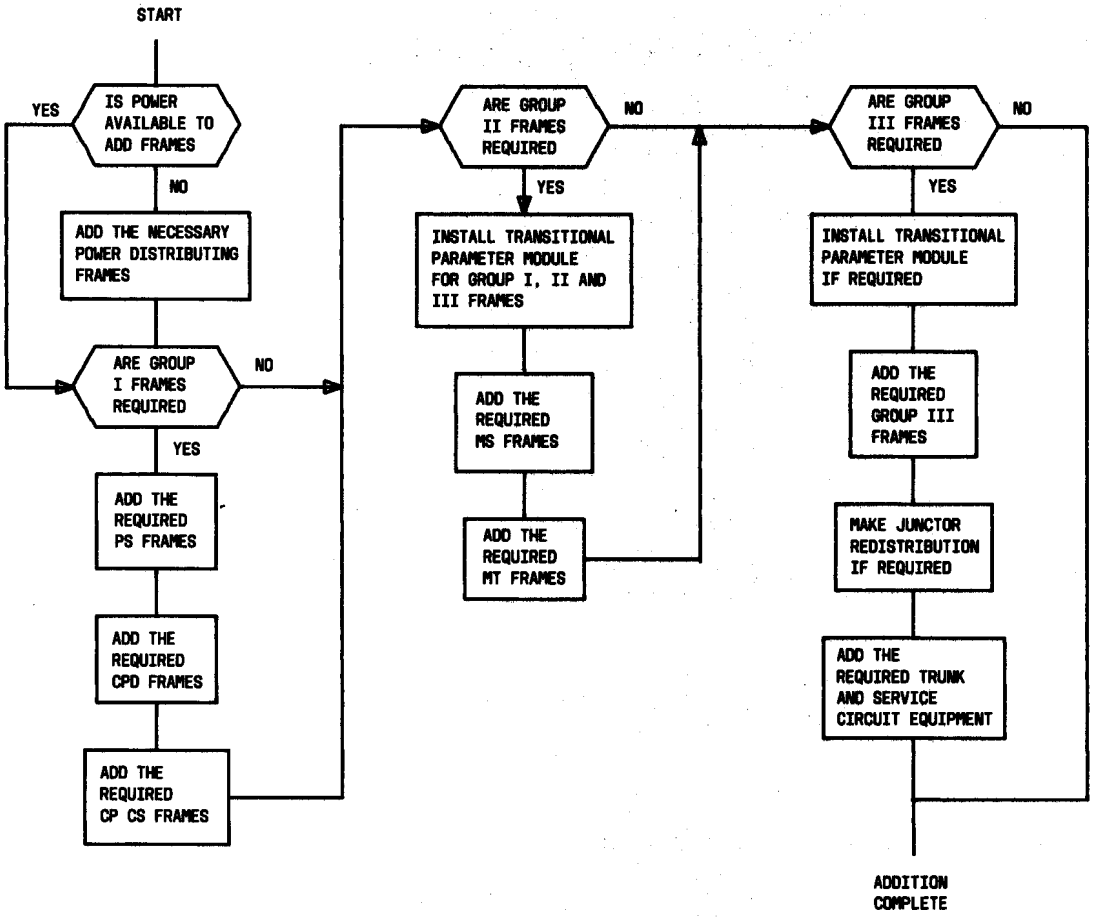


Fig. 1—Block Diagram-Sequence of Events Leading to Preparation of MOP (3.13)



NOTE:
A TRANSITIONAL PARAMETER MODULE FOR CATEGORY III FRAMES IS NOT USUALLY REQUIRED IF A TRANSITIONAL PARAMETER MODULE WAS REQUIRED FOR CATEGORY II FRAMES.

LEGEND

CP - CENTRAL PROCESSOR
CPD - CENTRAL PULSE DISTRIBUTOR
PS - PROGRAM STORE
MS - MASTER SCANNER
MT - MISCELLANEOUS TRUNK FRAMES

Fig. 2—Flowchart—Sequence of Additions (5.11)

TABLE A

TRANSITION – MOP CHECKLIST

A. REVIEW THE CONTENTS OF THE NETWORK DESIGN ORDER TO ENSURE THAT:

(1) The installation interval and date of completion are adequate.

(2) The estimate of equipment requirements reflect the latest view of demands.

(3) The departmental representative responsible for the toll, directory assistance, and intercept facilities concur on equipment provision and arrangements.

B. BE AWARE OF LOAD-SERVICE RELATIONSHIPS

(1) Arrange for monitoring the various load service barometers to ensure sufficient equipment quantities are available during the transition.

(2) Understanding of load-service relationships so proper in-service requirements can be determined.

C. DETERMINE AND EVALUATE THE EFFECT OF THE PROPOSED MOP ON SERVICE. PARTICIPATE IN DETERMINING THE PREFERRED TIME FRAME FOR SERVICE AFFECTING OPERATIONS SUCH AS:

(1) Junctor pattern changes.

(2) Trunking and/or equipment rearrangements.

D. TRANSLATION CHANGES

(1) Participate in determining and scheduling interdepartmental translation record verification in which the network administrator would be involved.

(2) Arrange for line, trunk and related translation changes. Provide the appropriate coordination.

(3) Arrange for changes to traffic register assignments (ie, obsolete measurements or new measurements).

E. HAVE VARIOUS DOCUMENTS AVAILABLE FOR EASY REFERENCE. THESE MAY INCLUDE:

(1) Network design orders

(2) Job specification

(3) MOP

(4) Various traffic practices

(5) Trunk forecasts

(6) Data summaries

(7) Line and station forecasts

(8) Demand and facility charts

TABLE A (Cont)

TRANSITION – MOP CHECKLIST

F. PLANS

(1) Equipment required first

(2) Minimum in-service requirements

(3) Expected service penalities due to overloads and/or equipment outages

(4) Planned line or trunk transfers

(5) Alternate plan, etc

G. TRANSITION ITEM CHECKLIST

(1) Ground start

(2) Line and trunk balance

(3) Master head table

(4) Partial networks

(5) Network ratio changes

(6) Junctor rearrangement and JAP runs

(7) Percent essential service

(8) Recorded announcements

(9) Master scanners

(10) Special circuit requirements

(11) New features

(12) Traffic measurement changes

H. SUGGESTED MEETINGS

(1) Field review of equipment order

(2) Pre-MOP meetings

(3) MOP meetings

(4) Status of job meetings

(5) Cutover meetings

(6) Critique meetings

TABLE B

GENERAL DIVISION OF RESPONSIBILITY BETWEEN WECO AND TELCO OF NO. 2 ESS ADDITIONS

OPERATION	RESPONSIBILITY		
	WECO ENGINEERING	WECO INSTALLATION	TELCO
Project development	Sequence equipment installation	Joint preparation of method of procedure	
Base line test		Monitor system evaluation testing	Do system evaluation testing
Insertion of recent changes	Assignment data	Coordinate activity	Do message inputs
Insertion of new or changed office data magged on site via data link		A joint effort	
Insertion of new or changed office data magged off site	Assignment data	Coordinate activity and insert office data	Do message inputs
Testing added frames		Perform prescribed tests on added frames and monitor office reaction	Operate central office
		Joint interpretation of output messages	

TABLE C

OPERATING SYSTEM REQUIREMENTS TO ADD NEW FRAMES OR EQUIPMENT

FRAME GROUP	FRAME OR EQUIPMENT ADDED	TRANSITIONAL PARAMETER REQUIRED	AVAILABILITY REQUIRED IN OPERATIONAL FRAMES			
			PROGRAM STORE SPACE	CENTRAL PULSE DISTRIBUTOR POINTS	CALL STORE SPACE	MASTER SCANNER POINTS
I	Program store		X	X		X
	Central pulse distributor		X			X
	Call store		X	X		X
	Master scanner	X	X	X	X	X
II	Miscellaneous trunk	X		X		X
III	*Peripheral	X	X	X	X	X
IV	*Trunk and service circuit equipment	X	X	X	X	X

* Some peripheral frames and trunk and service circuit equipment do not require all items listed.

TABLE D

COMPARISON OF MEMORY UPDATE METHODS

	UPDATE METHOD	INPUT VIA	MEMORY UPDATED	REQUIRES USE OF CARD WRITER	CLEARS RECENT CHANGE AREA OF CALL STORE
1	Recent change	Teletypewriter	Call store	No	No
2	Updating program store translation information using the single card writer	Teletypewriter	Program store	Yes	Yes
3	Change in program store	Teletypewriter	Program store	Yes	No
4	Customer dialed translation changes	Rotary dial or TOUCH-TONE ® telephone	Call store	No	No
5	Office data administration system data link	Data link/ supplemented with completed forms	Program store	Yes	No
6	Office data administration system module shipment	Module shipment/ supplemented with completed forms	Program store	No — update performed at remote facilities	Yes — when performed in a timely manner
7	Tape operated memory update system	Data link (card module shipment necessary for remote offices)	Program store	TOMUS procedure uses the module card writer (No. 2 ESS single card writer is not used)	Yes — when performed in a timely manner