

**SWITCHING SYSTEMS MANAGEMENT**  
**STEP-BY-STEP**  
**METHOD OF PROCEDURE**

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**1. GENERAL**

**PURPOSE**

**1.01** This section of the Dial Facilities Management Practices contains procedures to be followed by personnel responsible for the network administration of step-by-step offices when additions to existing facilities are required, when certain modifications and/or improvements are planned, or when changes and/or transitions are anticipated to change capacity or improve service.

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

**1.03** Familiarity with Dial Facilities Management Practices, Division H, Section 1b(8), is essential, as is a knowledge of the switching functions of the Step-By-Step System.

**INVOLVEMENT**

**1.04** Generally, periods of activity involving equipment additions, transitions, and/or modifications require the involvement of groups other than the network administrator. Such areas

of mutual responsibility are identified to the extent necessary for network administration personnel to participate effectively in the development of methods of procedure (MOP).

**1.05** The network administrator must work with network design during the design stage of a job to ensure orderly implementation and guidance to implement transitional or regrade jobs.

**RECOGNITION OF ORGANIZATIONAL STRUCTURE**

**1.06** Due to differences in organizational structures, specific titles of individuals, groups, and departments are avoided. Instead, general descriptive or functional names are used. This type of format permits the individual company to identify the particular organizational level (or sequence of organizational levels) responsible for the procedures described in this section.

**1.07** For the purposes of this section the following designations are used:

(a) The telephone company representative actually performing the functions and producing the output (writing the authorization, placing the order, coordinating the jobs, etc) is referred to as the equipment engineer.

(b) The telephone company representative normally responsible for the administration of the Step-By-Step System is referred to as the network administrator.

(c) The telephone company representative normally responsible for the maintenance of the Step-By-Step System is referred to as network maintenance.

(d) The Service Division of Western Electric Company (WECO) does the major portion of equipment installation work for Bell System Companies. The installation force is therefore designated WECO.

(e) The telephone company representative actually performing the function of writing the traffic order is referred to as network design.

(f) The MOP in its final form is a written plan concurred in and signed by WECO and the telephone company defining:

- (1) ***What has to be done:***
  - Changes or additions involved
  - Sequence of additions or changes.
- (2) ***How the job will be done with provision for:***
  - Continuity and quality of service
  - Efficiency in WECO installation effort
  - Minimum interference with normal network maintenance routines
  - Emergency restoral procedures.

(b) In an early Job Contact Committee meeting, the plan is evaluated by the telephone company.

- (1) The network administrator assesses the impact on service.
- (2) Network maintenance evaluates the maintenance effort and test requirements.
- (3) The equipment engineer examines the cost aspect as well as the sequence of addition to ensure that the MOP is in agreement with requests included in the specification.
- (4) 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 in the departments involved.

**2. OBJECTIVES OF METHOD OF PROCEDURE**

**GENERAL**

**2.01** The MOP is normally prepared by WECO; it will include appendices containing in-service requirements, due dates for cross-connection lists, dates for advance turnover, testing, etc.

**2.02** An MOP is required whenever WECO activities can be service-affecting. The following are examples of work activities which require MOPs:

- (a) Selector or rotary out trunk rearrangements
- (b) Intraoffice or interoffice trunk regrouping
- (c) Relocation of existing selectors or connectors to other new or existing shelves
- (d) Equipment additions.

MOPs are required for all work activities covered by a traffic order or which require down-time on service-affecting equipment.

**2.03** A proper MOP involves the following processes.

- (a) WECO develops a proposed plan.

District level approval is recommended especially in network administration.

**CONTINUITY OF SERVICE**

**2.04** The network administrator is the telephone company representative with the primary responsibility for continuity and reliability of switching service. When there is any WECO activity in an office, efforts related to this responsibility must be intensified.

**2.05** 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 the telephone company and WECO. The attainment of 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 as a function of the Job Contact Committee prior to any installation activity of items such as the following:

- (a) Equipment to be added or modified
- (b) Line equipment affected

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- (c) Choice of periods for taking working equipment out of service
- (d) Whether a change in working hours may be necessary because of service-affecting work
- (e) Method of accomplishing transitional work
- (f) Amount and duration of equipment outages
- (g) Assignment and cross-connecting information required
- (h) Tests to be performed.

**2.06** Continuing attention beginning with the preparation of the traffic order is required to ensure protection of customer service. It is necessary that network design and network administration concur not only with the equipment requirements but also the configuration of equipment and the methods for placing these facilities in-service. An appropriate statement regarding any portion of the work involved may be included in the traffic order to serve as a guide to the WECO planner.

### ROLE OF THE NETWORK ADMINISTRATOR

**2.07** It is the basic responsibility of the network administrator to ensure that sufficient equipment is properly arranged to meet the requirements for effective administration over the life of the job while rendering service at or better than objective levels.

**2.08** Major contributions to the development of the MOP may be made in the following areas.

- (a) Develop load service charts depicting the percentage of dial tone over 3 seconds versus CCS per line finder group and other capacity charts as necessary prior to the first job contact or MOP committee meetings. These may then be used to determine in-service requirements for MOP purposes with proper applications of recommendations contained in the Traffic Facilities Practices.

- (b) Arrange for monitoring the various load service barometers to ensure that sufficient equipment quantities are available.

- (c) Establish due dates for cross-connect lists for selectors, connectors, traffic registers, traffic usage recorders, trunks, etc.

- (d) Participate in determining and scheduling interdepartmental tests in which the network administrator would be involved.

- (e) Plan ahead for line transfers from existing line finder groups to newly added ones.

- (f) The MOP must include connection of load and service measurement devices.

- (g) Determine in advance the preferred time frame for service-affecting operations such as:

- (1) Equipment turn-down
- (2) Selector level changes
- (3) Trunking and/or rotary out trunk arrangements
- (4) Modifications.

### SERVICE PROTECTION FROM EQUIPMENT FAILURES

**2.09** The MOP must provide for absolute optimum protection of service. The following items are pertinent.

- (a) The specific location of WECO activity.
- (b) The specific equipment activity with which WECO is involved. Of particular interest would be the down-time of any facility.
- (c) Service and load devices must be kept in service during WECO activity. Manual readings may be necessary for immediate analysis and corrective action, hence proper personnel must be trained and provided.
- (d) A formalized plan for equipment restoral to service in cases of emergency or unusually high call and/or load volumes.

### MEETINGS

**2.10** Before starting any work, a meeting of the Job Contact Committee will be arranged to discuss the work involved and assign dates and

hours for start and completion of the various operations. These discussions are to be held as frequently as necessary in order to protect equipment and service.

**2.11** Proposals for establishing controls and followup on job progress should be determined at the Job Contact Committee meeting.

**2.12** Minutes of all meetings will be kept and distributed as the formal record of joint agreements and decisions.

**2.13** The frequency of committee and subcommittee meetings should be firmly established and followed for job status reports.

**3. RESPONSIBILITIES ASSOCIATED WITH MOP**

**GENERAL**

**3.01** The preparation of the MOP is usually handled by WECO based upon the job factors previously described.

**3.02** In placing service above all other considerations, it may well be necessary to subordinate departmental routine.

**RESPONSIBILITIES OF THE NETWORK ADMINISTRATOR**

**3.03** It is recommended that the network administrator have the prime administrative responsibility for those areas that normally accrue to the switching departments. These include:

(a) Reviewing the contents of the traffic order to ensure that:

- (1) The installation interval and date of completions are adequate
- (2) The estimate of equipment requirements reflect the latest view of demand predicated upon dialing and routing arrangements (Engineering Administrative Systems, new trunk groups, etc)
- (3) Adequate access is provided to added connector groups from local and incoming trunk groups.

(b) Being familiar with service results since the last job

(c) Determining and evaluating the effect that the proposed MOP will have on service

(d) Familiarity with other demands such as trunking and TOUCH-TONE®

(e) Knowledge of any special studies such as Division of Revenue or trunk base studies

(f) Arranging for, by providing the appropriate coordination, the following information:

(1) Cross-connection lists for:

- Dial tone speed machine
- Traffic usage recorders
- Traffic registers
- Selector regroupings
- Trunk assignments as required

(2) Cross-connections or assignments made by operator services.

(g) Understanding of load-service relationships so that proper in-service requirements can be determined by time frames

(h) Having a detailed knowledge of the proposed transitional procedures for which data and/or cut sheets must be prepared

(i) Having a written transition plan approved by district level supervisor

(j) Preparing a plan prior to the first Job Contact Committee meeting (described in 2.10 through 2.13) which consists of:

- (1) Equipment required first
- (2) Minimum in-service requirements
- (3) Expected service penalties due to overloads and/or equipment outages
- (4) Planned line transfers
- (5) Cross-connection list due dates
- (6) Alternate plan, etc.

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(k) Reviewing as soon as possible all equipment configurations to ensure equitable distribution and sufficient capacity for:

- (1) Line finders/first selectors
  - (2) Selector subgroup trunking
  - (3) Rotary out trunk switch changes
  - (4) Common control equipment
  - (5) Centralized automatic message accounting (CAMA) equipment or access
- (l) Having various documents available for easy reference. These may include:
- (1) Traffic order
  - (2) Job specification
  - (3) MOP
  - (4) Dial Facilities Management Practices
  - (5) Trunk forecasts
  - (6) Data summaries
  - (7) Line and station forecasts
  - (8) Demand and facilities charts
  - (9) Load and service curve.

### RESPONSIBILITIES OF THE ENGINEERING DEPARTMENT

**3.04** Most operating companies assign an engineering department representative to coordinate WECO installation activities. The equipment engineer's duties as they relate to MOPs are covered in Bell System Practices Section 790-100-240 and are accomplished through the Job Contact Committee.

**3.05** The Job Contact Committee is initiated by the equipment engineer. On complex jobs the equipment engineer serves as the chairperson. For minor jobs the engineer retains the overall job responsibility but may delegate the position of chairperson to the network maintenance representative. The first meeting will be held at least one week before the start of installation. This committee will coordinate the work. It will take care of any

problems arising during the progress of the equipment job. It may be desirable to form separate committees or subcommittees to cover the facilities or other portions of a complex job. When more than one Job Contact Committee is active, there should be cross-representation between committees by the respective chairperson. The membership of the committee depends on the complexity of the job. Any member may call a meeting.

**3.06** The responsibilities of the Job Contact Committee include:

- (a) Providing and maintaining a job schedule covering all work items.
- (b) Determining the extent of operating telephone company representation during the installation phase of the job.
- (c) Coordinating the field work of the departments represented.
- (d) When required, establishing a test and analysis committee.
- (e) In the first meeting, reviewing the results of the past three months' network measurement plan for the office. This will establish a basis of comparison during and immediately following completion of the job.
- (f) In the first meeting, reviewing current equipment usage data presented by the network administrator. The data may be used by WECO in preparing MOPs and releasing working equipment.
- (g) Ensuring close coordination and liaison between telephone company representatives and WECO in following the MOP.
- (h) Reviewing all detailed MOPs.
- (i) Establishing dates for cuts, rearrangements, and transitions and arranging for WECO access to working equipment and test facilities.
- (j) Establishing the procedures for removing working equipment from service.
- (k) Ensuring methods of preventing service interruptions.

- (l) Ensuring that dust and dirt control measures are established.
- (m) Ensuring that installation work progresses safely.
- (n) Arranging to get the cross-connect assignments required for the installation work and also the necessary cross-connect information for testing spare or unassigned trunks.
- (o) Reporting the progress of the job to the coordination committee.
- (p) Preparing and publishing the minutes of all meetings.

**RESPONSIBILITIES OF WESTERN ELECTRIC**

- 3.07** WECO is responsible for preparing and following the approved MOP.
- 3.08** Testing of equipment removed from service must be in accordance with WECO Handbook instructions and established procedures contained in various Bell System Practices. Removing and restoring equipment from service by network maintenance may be done with the approval of the network administrator.
- 3.09** Transitions, rearrangements, replacements, etc, must be accomplished with a minimum interval of reduced capacity and with a minimum probability of service interruption but consistent with reasonable job efficiency.

**RESPONSIBILITIES OF NETWORK MAINTENANCE**

- 3.10** Network maintenance has the overall responsibility for physically removing equipment from service, testing, restoring equipment to service, etc, during periods of WECO activity. (See 3.08.)
- 3.11** A record of equipment outages is maintained by network maintenance according to their practices (Bell System Practices Section 201-114-001). This log will include information concerning equipment removed from service for any reason.
- 3.12** Certain cross-connection work and/or other rearrangements may be done by network maintenance.

**4. DEVELOPMENT OF MOP**

**GENERAL**

- 4.01** Proper planning and continuing followup in connection with an MOP is of primary importance in ensuring that service risks are held to a minimum and job efficiency is at a maximum.
- 4.02** Planning must begin before the traffic order is prepared. Information regarding transitions, advance turnover, replacement, or rearrangement of any equipment should be included in the traffic order, when possible, because it may affect the way in which the WECO engineer prepares the job specification. Significant information might include:
  - (a) Dates for advanced turnover
  - (b) Time interval for transition or replacement
  - (c) Requested procedure for rearrangement
  - (d) Maximum equipment quantities that may be released for modification (including time of day)
  - (e) Where necessary, a detailed step-by-step procedure for doing a transition or a rearrangement.
- 4.03** The network administrator is responsible for including in the MOP any special instructions, dates of advanced turnovers, or unusual measures.

**FORMAT OF MOP**

- 4.04** Western Electric Handbook 3, Section 5A, describes the MOP to be prepared by WECO and will include a general outline of all equipment affected, work location, and major equipment to be added, modified, or removed. General notes, special instructions, and equipment lists to be performed are also included.
- 4.05** The MOP will contain the dates, start and complete time, the type of protection, and special precautions for each step of the job.
- 4.06** The contents of the MOP are as follows:
  - (1) General notes

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- (2) General MOP
  - (3) Detailed MOP
  - (4) Approvals
  - (5) Appendices.
- 4.07** Care should be taken to ensure that all work done is in logical sequence, each step explained fully, and specific responsibility noted; that is, WEC<sub>o</sub>, network maintenance, network administration, equipment engineer, etc.
- 4.08** The procedures described are standard installations. Be certain that conditions do not exist to prevent their application.
- 4.09** The bases of WEC<sub>o</sub> installation are as follows.
- (a) ***In-Service:*** Equipment cannot be removed from service and extreme caution will be taken during work operation.
  - (b) ***Out-of-Service:*** Equipment will be removed from service for a period of time that may last through an entire shift or more.
  - (c) ***Temporarily Out-of-Service:*** Equipment will be removed from service for a short period of time.
- 4.10** 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 and still provide a major margin of safety for returning released equipment to service within the specified time
  - (d) Work that can be done without affecting working equipment such as erecting, cabling, wiring, etc
  - (e) Work that must be done during lightly loaded (usually night) hours
  - (f) Work that must be done on an in-service basis
  - (g) The type of test equipment required during and at the completion of each step.
- 4.11** When a change in the order of procedure of the work is necessary due to unforeseen circumstances (see 4.08), WEC<sub>o</sub> and the telephone company's representatives shall be held responsible for determining the extent of the change and its possible effect on service and the job.
- 4.12** 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.
- 4.13** All copies of the MOP, original or revised, as described in Western Electric Handbook 3, Section 5A, provide an opportunity for WEC<sub>o</sub> and the telephone company representatives to approve and concur in proposals.
- ### 5. TRANSITIONS AND REARRANGEMENTS
- #### GENERAL
- 5.01** The following paragraphs describe the various methods to be employed in completing transitions and rearrangements in connection with adding equipment to existing facilities. These methods should appear in the MOP and should be followed by WEC<sub>o</sub>. Any changes would require a revision of the MOP as described in 4.11 and 4.12.
- 5.02** Service may be affected by transitions and/or rearrangements because the capacities may be reduced somewhat by decreasing team-size of facilities or removing equipment from service. The Job Contact Committee has the overall responsibility for coordinating any changes and must approve the changes made.
- 5.03** If at all possible, arrangements should be made to clear equipment for WEC<sub>o</sub> activity so that service is not adversely affected. Consideration must be given to other groups and departments in establishing dates for this work.
- 5.04** The various measurement devices discussed later must be kept in service during periods of WEC<sub>o</sub> activity. The MOP should contain instructions ensuring that these devices will not

be turned down during periods of time when data-gathering is imperative.

**LINE FINDER GROUP ADDITIONS OR CHANGES**

**5.05** When new line finder groups are added the network administrator should review all aspects of the additional service to be provided. Some of the items to be considered are as follows.

(a) Check the line finder to first selector cross-connections (T-Drawing XXXX-400) to identify the new line groups. This is particularly important when an advance for a line group has been requested. In some cases the advance is accomplished by providing the new line finder group and associating the added line finders with existing first selectors. This would require reducing by one the line finders per group for several groups to make the first selectors available. The network administrator must project the resulting effect on service before agreeing to take this step. Should a service penalty be estimated, the new line finder group cannot be placed in service until the associated first selectors are available. The network administrator should know in advance the specific line groups that WECO will be installing. The trunking patterns through the office for the groups should be pinpointed as well as the methods for placing it into service.

(b) Establish plans to rebalance the office. Identify overloaded groups requiring priority action.

(c) When an area transfer is involved, it is necessary to prepare assignments and establish coordination.

(d) When common control equipment is involved, it is very important that the register, trunk, and link circuit arrangements be carefully reviewed and that specific plans be developed which outline the methods for placing this equipment into service. Dial Facilities Management Practices, Division H, Section 2b(1) and Traffic Facilities Practices, Division D, Section 4-l, contain detailed information for step-by-step common control arrangements.

(e) Determine the traffic usage recorder and other register changes and arrange for the necessary cross-connection information. Usage

measuring devices and various registers must be available and utilized during periods of WECO activity.

(f) Review the dial tone speed equipment assignment requirements and arrange for necessary cross-connection information.

(g) Be prepared to participate in MOP preparation by having various documents available as discussed in 3.03(l).

**5.06** When existing line finder groups are to be modified or affected by a change in capacity (either adding or removing line finder switches) the network administrator will review in detail the changes involved to ascertain the effect on service. The following items should be considered.

(1) If a line finder switch per group is being removed, determine whether reloading of the affected line groups is required. Should reloading be necessary, coordinate this activity with WECO and network maintenance for completion at a time when service will not be affected.

(2) Increasing or decreasing line finder switches in existing groups will affect the first selectors. Review the changes to determine if any subgroup of selectors may be affected more than others. If this situation is detected, establish firm plans for preventing any service deterioration during installation activities.

(3) If a line finder group is to be modified (for example, a flat rate group is to be changed to coin box), it will be necessary to establish plans for unloading the group. Timing is important since the lines must be relocated before the modifications are made.

**5.07** When TOUCH-TONE service is involved, it is imperative that the network administrator carefully plan for the service requirements for the MOP. Common control-type systems can cause serious service problems if plans for changes or additions to the existing configurations are not adequate. Dial Facilities Management Practices, Division H, Section 2b(1) and Traffic Facilities Practices, Division D, Section 4-k, contain detailed information for step-by-step TOUCH-TONE arrangements. The following items are directly

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affected by changes to line finders and must receive careful attention:

- (1) Converter trunks
- (2) Receiver-converters
- (3) Trunk finders (single-stage only)
- (4) Originating registers.

**Note:** In a Step-By-Step Common Control System, dial tone is returned by the receiver-converter or the originating register. Should high dial tone results occur following a transition, the network administrator must examine the TOUCH-TONE equipment as well as the line finder groups to determine the cause of the delays.

### LOCAL AND TOLL SELECTOR GROUP ADDITIONS OR CHANGES

**5.08** Perhaps the most difficult responsibility for the network administrator centers around the voluminous changes that can be required for selectors and the associated trunking. The following paragraphs outline the major conditions generally encountered and detail some of the items that the network administrator should consider when preparing for the MOP.

#### A. Local First Selector

**5.09** All trunks from levels 1 through 0 must be cross-connected by way of the distributing terminal assembly (DTA) to one of the following types of terminations:

- (1) A second, third, fourth, fifth or service code selector
- (2) A rotary out trunk switch
- (3) An extended area service or tandem selector
- (4) A repeater
- (5) A switchboard trunk
- (6) A CAMA trunk
- (7) A 6A, 7A, or operator intercept trunk

- (8) A reverting call selector
- (9) A connector
- (10) A Traffic Service Position System trunk.

**5.10** Using the traffic order and drawings (TXXXX-421) the network administrator should carefully check all trunk subgroups to identify changes (in some companies, cross-connections for selector levels accessing trunks are prepared by a centralized bureau). It is suggested that some form of accountability be instituted. For example, a check mark beside a subgroup in the traffic order would indicate that it was identified on the drawing; a circle around a specific DTA on the drawing would indicate a change from the previous issue of the drawing; a circle around a whole subgroup could indicate that it is new or that it has major DTA changes; a partially drawn circle may indicate a subgroup that is split between two bays requiring tie pairs. Using colored pencils with each color identified to convey action required or some other meaning may be helpful.

**Note:** Any discrepancies or errors noted should be referred to network design or the equipment engineer for resolution. This action should be taken promptly.

**5.11** After all subgroup trunking changes have been identified and accounted for (including correction of errors found), specific plans for items to be included in MOP preparation can be developed. Some of the major items for consideration are as follows.

- (a) Establish a priority list for the trunking subgroups that have DTA changes. This process should identify the most critical subgroups that will need careful planning and coordination to protect service.
- (b) Assemble usage and register data, current and past (covering the period during which installation work is scheduled), to use to project in-service trunk requirements.
- (c) Firmly establish the busy hour for *each* type of trunk group involved. For example, level 1 trunking to CAMA may have a 9 pm to 10 pm busy hour versus the local office busy hour that may be 10 am to 11 am.

(d) For each subgroup, establish the maximum number of trunks that may be taken out of service for specified periods of time.

(e) If a substantial quantity of trunks for a particular subgroup is to be affected by installation activities, then it is very important that the network administrator participate with WECO in choosing the specific trunks to be taken out of service. This coordination activity will provide assurance that the specified trunks to be affected will be distributed as equally as possible throughout the subgroup and that service is not deteriorated.

(f) If trunking from a selector level terminates on rotary out trunk switches and/or repeaters, all changes affecting these trunks should be carefully planned. The following conditions must be avoided:

- (1) Allowing a disproportionate number of direct trunks to be taken out of service
- (2) Indiscriminate choosing of selectors to rotary out trunk switch trunks that results in an unequal access to rotary out trunk switch groups. Drawing T-XXXX-40X, Selector Trunk to Rotary Out Trunk Switch and Repeater Cross Connections, should be utilized.

(g) All changes that affect trunking DTA reversals should be carefully reviewed whenever four or more trunks are involved.

(h) When digit absorbing type selectors are involved, changes in the absorbing arrangements indicate the access to new NNX codes, new trunk groups, or expansion of the switching arrangement serving local calls. In all cases, changes in absorbing arrangements must be monitored to be sure that the necessary equipment changes are ready before the absorption change is made. This is especially important when common control and/or TOUCH-TONE type of equipment is in use.

(i) All trunks and DTAs marked to be changed should be traced forward to determine what effect their change will have both *before* and *after* the installation work is accomplished.

**5.12** Develop a written plan as discussed in Dial Facilities Management Practices, Division

H, Section 1b(8), outlining the changes for the local first selectors and the subgroup trunking and the proposed procedures for accomplishing such changes without affecting service. The written plan should contain sufficient detail so that it can be effective in assisting WECO in the development of the MOP.

**5.13** Establish specific plans for monitoring the installation activities to be performed. The details of these plans should be finalized by the approved MOP. It may be necessary to develop temporary measuring arrangements to follow the progress of installation activities. It is desirable, however, to accomplish the traffic usage recorder and register cross-connection work at the same time the selector and trunking rearrangements are being performed.

**5.14** Arrange for dial tone speed machine assignments.

**5.15** All levels of the first selectors should be reviewed by class of service (coin, measured rate, flat rate) as each type of service will have different trunking arrangements and capacities. In addition, TOUCH-TONE service, particularly in offices partially equipped, requires careful balancing.

**5.16** Step-by-Step Common Control Systems are relatively new. The network administrator should thoroughly understand how these systems function so that effective participation for MOP requirements can be accomplished. It is recommended that the following reference material be utilized:

- (a) Dial Facilities Management Practices, Division H, Section 1b(8)
- (b) Traffic Facilities Practices, Division D, Section 4-1
- (c) Traffic Facilities Practices, Division D, Section 4-k

**B. Local Selectors — Other**

**5.17** The major conditions generally encountered and the detailed items that the network administrator should consider when preparing for the MOP (as outlined in 5.09 through 5.16) are third, fourth, fifth, tandem, etc, type selectors that are normally found in step-by-step offices.

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**5.18** Like first selectors, all other selectors affected by installation activities must be carefully planned for protection of service. Both intraoffice and interoffice trunking may be involved. Incoming interoffice trunks may terminate on selectors that are part of a subgroup of local selectors and consequently both share common intraoffice trunking. For example, a subgroup may have 60 selectors with 19 trunks and a capacity (P.01) of 354 CCS. However, 20 of the 60 selectors may be assigned to incoming trunks from another office. These incoming trunks should be assigned in multiples of ten, divided as equally as possible above and below the DTA reversal, and provided sufficient access to trunking to meet the requirements of the busy hour for that incoming trunk group. Figure 1 shows how the incoming and local selectors may be assigned by shelf and the trunking to which they have access.

**5.19** Figures 1 and 2 could represent a typical rearrangement to a subgroup. The network administrator, preparing for the MOP, should consider the following items.

- (a) The subgroup increases from a form of 60 on 19 trunks to 80 on 27 trunks resulting in 11 of the original 19 DTAs being changed.
- (b) The shelf assigned to incoming trunks (switches 20 through 30) should be given special attention as six of the ten trunks (DTAs) are to be changed.
- (c) Busy hours for the local and incoming trunk groups must be determined.
- (d) Last trunk usage (LTU) and last trunk busy (LTB) register data should be reviewed to determine if this particular subgroup is balanced compared with the other subgroups.
- (e) Usage data for both local and incoming should be projected into the same time frame as that in which the installations work is to be done. In-service trunk requirements can then be determined.
- (f) Incoming trunk assignments should be reviewed. Reassigning may be necessary in view of selectors being added for additional incoming trunks.

**Note:** Trunk assignments at the distant office should be considered when removing trunk from service during transition.

- (g) Establish plans for monitoring service levels both during and *after* the completion of the installation activities. LTU and LTB are good tools for this.
- (h) Provide cross-connection information as required.

**5.20** Changes in digit-absorbing features, when these type of selectors are utilized, must be carefully implemented. Such changes often affect other offices as to the number of digits to be sent to them.

**5.21** Local and toll may combine to access common trunking. Often, there are different busy hours as well as different busy seasons to be considered. All selector or subgroup trunking rearrangements must be carefully analyzed before preparing the the MOP. The network administrator should advise the toll network manager of any installation activities that would affect the toll network.

**5.22** When WEC0 installation activities involve second selectors through fifth selectors, it should be remembered that the installation activities will be accomplished in a reverse fashion. For example, fifth selector trunking will be rearranged and/or added to connectors as the first step. After the trunking is completed the levels of the fourth selectors will be rearranged in accordance with the subgrouping specified in the traffic order and the DTA assignments to fifth selectors as shown on the T-drawings. This process for the WEC0 installation activities continues on back through third, second, and first selectors. The network administrator must be thoroughly aware of this sequence of installation activities so that a detailed analysis of trunking patterns can be provided to give assurance that the required capacities are available at all times.

**5.23** The sequence of WEC0 installation activities outlined above can be complicated when an advance for line finder terminals is required. Such situations may result in providing only partial rearrangements of trunking from first selectors through to connectors, through the switching train. The network administrator must recognize the

limitations for capacities and adjust offered traffic by controlling the assignments into the new line finder groups.

**CONNECTORS**

**5.24** In most instances, the provision of connectors does not present a serious problem. There are occurrences wherein the network administrator must be aware of what is happening and when.

**5.25** When additional connector terminals are provided on an advance service basis the network administrator must be assured that sufficient switching capacity is available to properly access the new terminals without causing blockage.

**5.26** When new shelves are added to existing rotary connector groups, revised cross-wiring for the rotary terminals is needed to ensure that each shelf of connectors can access its proportionate share of the lines and handle its share of the offered load.

**5.27** There are occasions when rotary connector groups are reduced in size. This usually occurs when a large line group has been relocated and excess switches are installed. The same caution exists with the reduction of shelves as with an increase. Existing cross-wiring arrangements must be examined for changes as needed to ensure proper access.

**5.28** The graded multiple arrangements which are required to serve rotary line groups of 11 or more lines are discussed in Dial Facilities Management Practices, Division H, Section 2b(1). The network administrator should be very familiar with this section.

**CAMA EQUIPMENT**

**5.29** Additions and modifications to CAMA equipment must be thoroughly covered in the MOP.

**5.30** Close attention is needed to ensure adequate switching capacity for the direct distance dialing calls. The emphasis on maintaining adequate switching cannot be overstated. Failure of calls to switch on CAMA may cause these calls to be routed to the operator for handling. There can be instances when rerouted calls to the operator

result in poor service being given to the customer because of the influx of these unexpected calls.

**5.31** As additional CAMA equipment is provided, the network administrator must be aware of the dates for placing the new equipment in service so that any rebalancing of trunk assignments can be coordinated with the equipment provision.

**5.32** Some offices have only a trunk group for level 1 to a switching machine in another building. This trunk group may be equipped with rotary out trunk selectors when it exceeds ten or more trunks. In this request, the same precautions mentioned in 5.11(f) apply and should be followed.

**6. IN-SERVICE REQUIREMENTS**

**GENERAL**

**6.01** Trunks and switching equipment represent considerable capital investment and are provided in amounts such that service ceilings are not exceeded. While it is true that a certain hour may be said to be the busy hour for a given group of equipment or trunks, the load on the equipment during other hours may be almost as heavy. Because of this variation in the load which is carried by the various groups of trunks and equipment, it is the responsibility of the network administrator to determine in-service requirements and the effect that removals might have on service.

**6.02** The network administrator needs to know what margin exists in the call-carrying capacity of each office at different hours of the day, days of the week, months, etc. When this is known, the effect on service of equipment failures, capacity reductions during transitions, and reductions for routine maintenance can be gauged accurately.

**6.03** Central office additions, retrunking jobs, changes in office arrangements, etc, 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.

**6.04** When the traffic 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. The protection of service during installation periods is the joint

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responsibility of network maintenance, the network administrator, 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.

**6.05** Because the amounts of equipment have a significant effect on service levels, the recommendations prepared by the network administrator (and agreed upon by other groups) should be included in the MOP. The agreement or disagreement by others in no way changes the network administrator's responsibility to have adequate equipment in service at all times.

**6.06** These quantities and time frames should be discussed at MOP committee meetings (see 2.10 through 2.13) and plans should be formulated at that time to ensure sufficient work force and scheduling of work force so that the MOP proposals can be followed.

**6.07** Deviation from minimum equipment requirements ***should not be tolerated***; facilities removed from service due to circuit trouble must be included in the total outage.

**6.08** Outage times can be determined and held to a minimum by use of control forms. The load and service results during the outage period should be recorded and used for backup data on future jobs of similar design.

### DETERMINATION OF QUANTITIES

**6.09** 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. They become exceptionally useful in preparing requirements for transition purposes.

**6.10** It is strongly recommended that the data that were used to design the relief job be compared to the most recent empirical data. Estimated main stations at job exhaust should also be checked against actual main stations recorded at that period of time; any differences might affect the order of priority in the job installation.

### 6.11 Reference Sources:

- (a) ***Line Finders***: Traffic Facilities Practices, Division D, Section 4-b.

Efficient loading contemplates meeting service standards and proper utilization of the switching train.

- (b) ***Selectors***: Traffic Facilities Practices, Division D, Section 4-c.

Proper subgrouping of selectors ensures equal loading and prevention of switching blockage. Determination of subgroup sizes can be made by use of selector grading tables found in Traffic Facilities Practices, Division D, Section 4-h.

- (c) ***Connectors***: Traffic Facilities Practices, Division D, Section 4-d.

Call completion relies on adequate access being provided through the system to the connector switches. Quantities can be determined using the connector table in Traffic Facilities Practices, Division D, Section 4-h.

Methods for determining in-service requirements for all of the equipment components are explained in the Traffic Facilities Practices references given. The information is so important that it should not be trusted to memory. Reference sources should be consulted when needed.

**6.12** Load charts and capacity charts are useful guides in determining equipment requirements during the transition period. The 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 for determining quantities of equipment that may be safely removed from service. Charts should be made as necessary prior to the MOP and should be made available to all interested groups.

### COORDINATION OF OUTAGES

**6.13** The network administrator is responsible for determining the amount of equipment that can be taken out of service at any given time.

6.14 Network maintenance is responsible for removing equipment from service and returning it to service at a specific time.

6.15 WECO is responsible for adding, relocating, modifying, and removing equipment in keeping with guidelines shown in the MOP.

6.16 The engineering department is responsible for the overall coordination to ensure that proper safeguards are used and necessary practices are followed in developing and implementing the MOP (unless delegated to network maintenance).

**7. DATA**

**SERVICE AND LOAD MEASUREMENTS**

7.01 Service may be affected by transitions, capacities may have to be reduced, and measured results may be affected in varying degrees, according to the loads generated during the period of capacity reductions. One of the purposes of the MOP is to provide for the protection of service while the transition is taking place.

7.02 There are two categories of measurement in a step-by-step office which are as follows:

(1) *Service:*

- (a) Dial tone speed
- (b) Overflows
- (c) Equipment irregularities.

(2) *Load:*

- (a) Peg count
- (b) Usage
- (c) All trunks busy
- (d) Last trunk usage.

The scoring of registers may be measuring the service to the customer or the load on the system. During periods of WECO activity, the devices which produce service results must ***be kept in service.***

7.03 Data obtained from the registers have many and varied uses. However, during transition,

data will be the governing or guiding factor in the daily administration of the office. Usage results must be checked to ensure an equal grade of service for all subscribers and the installation of additional trunks could involve rearranging existing trunks in order to ensure proper service to all customers.

7.04 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 are valid. Dial Facilities Management Practices, Division H, Section 2b(1), Appendix 1, is an easy comprehensive reference for determining what is in the data and when the register operates.

7.05 The network administrator is responsible for providing timely and accurate data. The only way that inaccuracies can be eliminated is through validation. Even on a sample basis the necessity for prompt validation cannot be stressed too strongly. The interval between collection of data and the investigation of questionable data is critical and should be as short as possible. There are several tests which can be made in the office to ensure proper wiring, measuring device operation, and cross-connections. They are:

- (1) Register tests
- (2) Continuity tests
- (3) Detector tests
- (4) False busy and false operation tests
- (5) Dial tone speed tests.

7.06 In addition to these physical checks, it may also be necessary to make validation checks on the actual data gathered. Some of the methods which can be used are:

- (1) Comparison of related sets of registers
- (2) Comparison of usage with service
- (3) Comparison of usage and peg count
- (4) Consistency with past values.

7.07 Although there are many devices that can produce data for dial administration purposes, the principal measurement tool is the traffic usage

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recorder which must be kept in-service during transition periods.

**7.08** In order to ensure that faulty traffic usage recorder operation is recognized with reasonable promptness, data should be checked for reasonableness at least once a week. The following checks can be made.

- (1) **Loading:** Is present loading consistent with past loading?
- (2) **Derived Holding Times:** Using measured usage and actual peg count, check computed holding time against the normal average.

Either of these checks can be made with a degree of precision and results should be in reasonable order of expected range.

### SERVICE CEILINGS

**7.09** Experience has shown that subscribers do not expect perfect service. However, they do expect and deserve an excellent grade of service. To ensure rendering this grade of service, ceilings have been established from the busy season at exhaust. They are:

(1) **Dial Tone Speed:**

Average busy season-busy hour—1.5 percent  
3 seconds

ATHD-busy hour—5 percent 3 seconds

(2) **System Overflow:**

Average busy season-busy hour—4 percent

(3) **Trunk Group Overflow:**

Average busy season-busy hour—1 percent

**7.10** Dial tone speed is normally controlling, insofar as the load the Step-by-Step System can carry is concerned. When the dial tone speed ceilings are not exceeded, experience indicates that the other ceilings are not exceeded.

### LOAD AND CAPACITY CHARTS

**7.11** Load and capacity charts or load service curves are tools to assist in predicting future service after projecting future load.

**7.12** Network administration techniques dictate that usage data, after proper validation, can 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.

**7.13** It is strongly recommended that the usage data be obtained coincident with the service data described in 7.01 through 7.08 for reconciliation purposes.

**7.14** In the process of developing load service curves, questionable data indications will show up on the curves. There are two types of curves: actual and theoretical. The type to use depends upon the data being checked. For certain types of components, it is known that all offices operate very close to the table values and the theoretical curve can be used with confidence. For other types of components, there are many reasons for a particular office to differ from the average values of another office.

**7.15** In both methods, any plot that falls fairly close to the line is assumed to be reasonable. Any plot point that is isolated from other results and the line is assumed to require investigation. However (because of some recent experience), unusual days that might not be included for engineering purposes might, in the judgment of the network administrator, be included. The effect of the occurrence and not the occurrence itself might be recurring.

**7.16** When using a theoretical curve, if almost all points fall on one side of the line, the data may be valid and the office unbalanced. However, the cause for this type of distribution should be thoroughly investigated.

**7.17** The load service for Step-by-Step Systems is line finder group usage versus dial tone speed (theoretical). The use of load service curves is covered in Traffic Facilities Practices, Division D, Section 1-b.

7.18 During transition periods, for daily applications, *average busy season load service curves should not be used.*

**8. OTHER CONSIDERATIONS**

**LINE EQUIPMENT TRANSFERS**

8.01 The network administrator is responsible for the loading of new line finder groups. Prompt and appropriate utilization of new equipment will ensure optimum service.

8.02 Line equipment transfers necessary to balance an office before, during, and after an addition must be planned well in advance.

8.03 A plan should be prepared showing the required transfers spread over a recommended time interval.

8.04 Network maintenance should be consulted for concurrence in the timing and volume of additional work load.

**EQUIPMENT TESTING**

8.05 The results of tests conducted by network maintenance, ensuring equal access and equitable distribution, should be furnished to the network administrator.

**DAILY ADMINISTRATION**

8.06 Network administrators must advise network maintenance of the equipment situation in each office before, during, and after transition. Information showing the minimum amount of equipment needed to maintain good service at various load levels, related to hours of the day, should be available to network maintenance forces at all times. It should be noted that this will be based on averages and will not be adequate if the load exceeds the average.

8.07 The procedures recommended for transition purposes can be easily applied to daily administration. However, *before any capacity reduction in minimum amounts specified is permitted, a release should be requested from the network administrator.*

**9. CONCLUSION**

9.01 The most effective method that can be used for a successful transition is good communication and group involvement. Areas of mutual responsibility have been identified to the extent necessary for network administration personnel to clearly recognize them.

9.02 It is not the intent of this section to assign responsibility to other groups or departments or to dictate changes in their existing practice or procedures. It is intended that this information be used to simplify the transition, reduce work effort, protect equipment, and maintain good service.

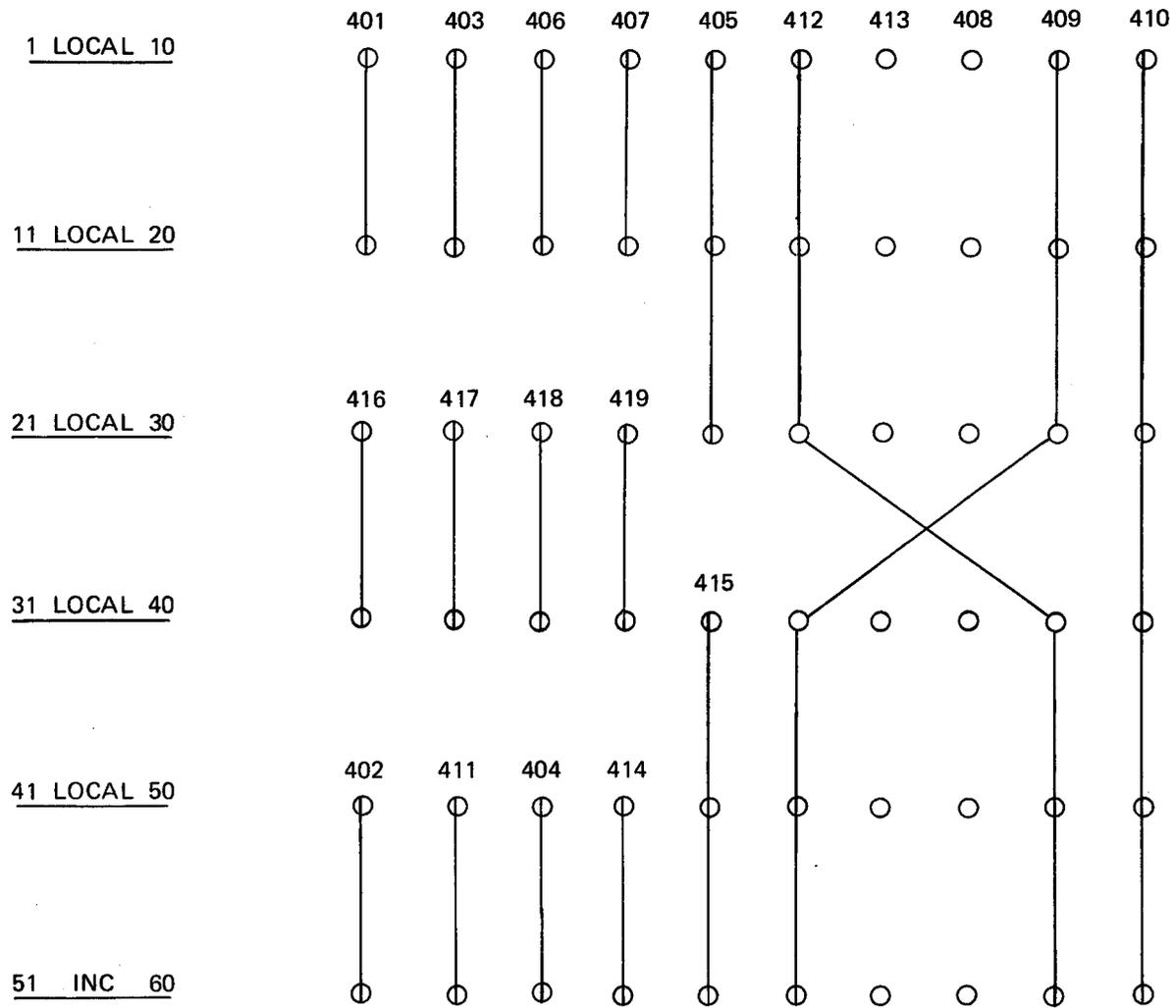
9.03 No amount of written material can describe or anticipate every condition that might occur. In addition to good planning, good *judgment* will be the most valuable tool that the network administrator will use in the final analysis.

**10. REFERENCES**

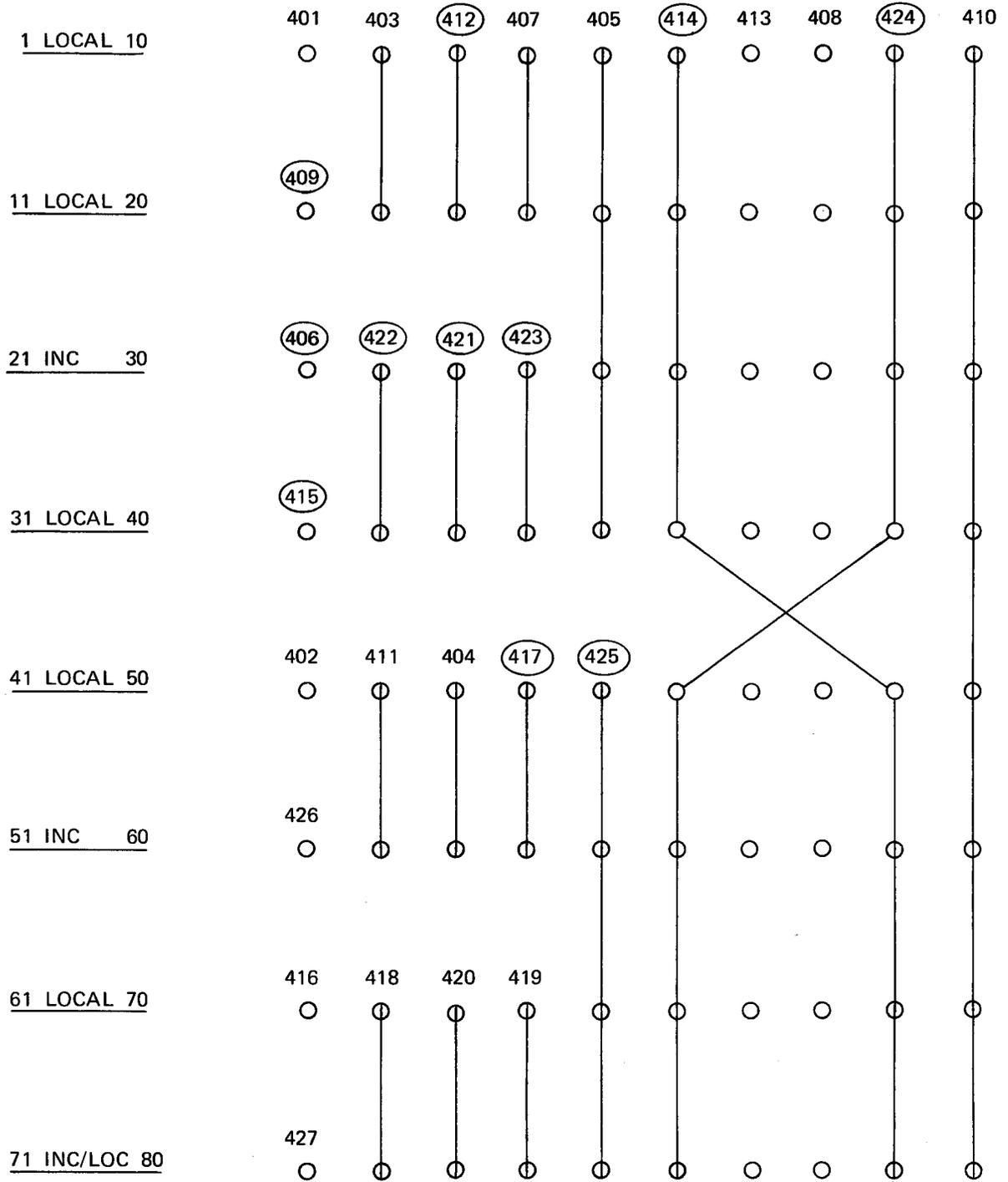
10.01 Reference should be made to other sections of the Dial Facilities Management Practices and Traffic Facilities Practices, as necessary, for the proper preparation of an MOP for a Step-by-Step System.

SECTION	TITLE
1(b)8	General Administration—MOP, Dial Facilities Management Practices, Division H
1(c)5	Facilities Capacity Determination, Dial Facilities Management Practices, Division H
2	Traffic Measuring Devices, Dial Facilities Management Practices, Division G
2(b)1	Step-by-Step General Description, Dial Facilities Management Practices, Division H
4	Step-by-Step, Traffic Facilities Practices, Division D
1-b	Load Service Curves, Traffic Facilities Practices, Division A

**SECTION 2d(8)**



**Fig. 1—Shelf Assignments and Trunking Access of Incoming and Local Selectors (5.18, 5.19)**



○ = DTA'S CHANGED FROM PREVIOUS FORM

Fig. 2—Typical Rearrangement to Subgroup (5.19)