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**GENERAL GROWTH
DESCRIPTION
NO. 3 ELECTRONIC SWITCHING SYSTEM**

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C. Job Coordination	6	1.01 This section provides general information related to the overall growth process for additions of equipment or frames to an operational No. 3 Electronic Switching System (ESS) office. Office growth is necessary whenever a working office must add equipment or frames to increase its call processing capacity or to incorporate new features.
D. System Evaluation Tests	7	1.02 This section is being reissued to include some additions and changes, such as memory requirements for SO-2 and 3E3. Change arrows have been used to indicate changes.
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SECTION 233-160-100

1.03 In the No. 3 ESS, frames can be added to a working system with relative ease due to the modular design of the equipment and connectorized wiring. Translation changes are required when new features are added to the generic and when the office exceeds 2689 terminals.

1.04 During the growth interval of an operating office, certain precautions must be observed to maintain the proper functioning of that office. The objectives while office growth is in progress are as follows:

- Minimize the possibility of interruptions
- Ensure no impairments to customer service
- Minimize changes required in the normal operating procedures of the telephone company (TELCO).

1.05 The No. 3 ESS utilizes a modular design concept which simplifies installation, equipment changes, and growth. The 3A Processor uses a serial busing arrangement and requires very little cabling to the maintenance and test frames or between it and the frame input/output control circuits on the control frame. Communication buses between the control frame(s) and the network frame(s) are connectorized to facilitate growth. The control frames are organized in a manner which provides control for network frames 01 through 07 in a single control frame (0) and controls for network frames 08 through 15 in a second control frame (1). Each network frame contains all of the line attending and control circuits for 384 terminals. Network frames may be provided in any quantity up through 15 frames (5760 terminals) for a maximum size office. The first and second stage switching in the network is also connectorized to facilitate repair and is organized to minimize service interruption during repair. The trunk units are universally wired to accept all of the conventionally (nondirect interface) used circuits.

1.06 In some cases, due mainly to changes in office traffic, equipment must be removed from a working office. This is accomplished by reversing the procedure used to add equipment to the office.

2. GROWTH CONCEPT

2.01 New equipment or frames can be added to a No. 3 ESS office, without interruption in telephone service.

2.02 Basically, the amount of equipment required is dependent on the number of terminals in the office. Other considerations engineered into the frames design which reflect the total growth concept are as follows:

- (a) Each network frame includes all of the network and junctors required for the addition of 384 terminals (approximately 300 lines) to the network.
- (b) The network concentration ratio of 6:1 is fixed.
- (c) The scanner facilities for 512 scan points are included in each network frame.
- (d) The master scanner in the control frame contains another 512 scan points that, when combined with the network scanner, provides ample scan points for the network.
- (e) Space is provided on the network frame(s) for trunks and service circuits to meet normal growth for the circuits. The control frame and miscellaneous frame provide additional space, if needed.
- (f) All trunks, except the local test desk incoming trunk, are designed to be used with the universal trunk circuit unit.
- (g) All peripheral decoder points and most scan points are preassigned on each network frame.
- (h) The peripheral decoder circuit packs are plug-in units since their number is dependent on the number and type of trunks and service circuits.
- (i) Sufficient memory, for systems using Issue 4A of SO-2 and 3E3 generic, is provided to handle traffic and translation for lines, trunks, and service circuits for systems with less than 1500 terminals.

(j) The supplementary power frame provides space for two additional -48V 100-amp rectifiers and fuse panels.

2.03 Another aspect that permits growth to be accomplished without interruption of service is the method by which new equipment is defined in the translations. When a new module of equipment is incorporated into the system, diagnostic programs are run on the module (frame) to verify its operating condition. Once the new module is considered operational, main memory is updated via recent change messages entered at the TTY.

SYSTEM FEATURES

2.04 A list of the No. 3 ESS features, over a full range of line size, is provided in Tables A through E. Refer to Section 233-190-010 for more information on Feature Description.

TABLE A

NO. 3 ESS GENERAL FEATURES

TYPES OF LINES SERVED
Individual-Residence, Business, Manual, PBX, Coin 2-Party 4-Party 8-Party
TRUNK CAPABILITIES
Outgoing Local (Extended Area Service—EAS) Incoming Local (EAS) 2-Way Local (EAS) 2-Way Operator Office Outgoing Recording Completing Incoming Toll Switch Outgoing CAMA Incoming Toll Incoming From Local Test Desk Number 14 Outgoing Intercept Outgoing Verification Request Outgoing TSP and TSPS Outgoing to Repair Service Board Local Tandem

METHOD OF PROCEDURES

2.05 ♦The method of procedure (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 Western Electric Company (WE) representatives.♦

A. Associated References

2.06 The installer shall review and become familiar with Sections 10, 11, 12, 13, 14, and 20 of Safety and Service Handbook 0 prior to the start of a No. 3 ESS addition. This information is essential for both the preparation of the MOP with TELCO representatives and the prevention of any service interruptions during a No. 3 ESS addition.

B. Preparation of a MOP

2.07 A WE Installation Supervisor will confer with the TELCO representative and establish the detailed MOP for each operation involving live office equipment. Concurrence by the TELCO representative must be secured in writing. The following documents should be referenced as an aid in developing a method of procedure:

- (a) General Information and Installation Handbook 3, Section 9
- (b) 092 Specification
- (c) Local WE and TELCO MOP instruction.

2.08 The following are examples of items to be included in the MOP:

- (a) Equipment to be added
- (b) In-service equipment affected which may require special considerations depending on the work performed
- (c) Time of day or night during which the work will be performed
- (d) Period of time equipment can be taken out of service
- (e) Allocation of responsibilities
- (f) Installation and testing procedures

TABLE B4

NO. 3 ESS LINE FEATURES

LINE FEATURE	TYPE OF LINE					
	SINGLE PARTY				MULTIPARTY	
	RES BUS	MAN	PBX	COIN	2	4&8
Originating	X	X	X	X	X	X
Terminating	X	X	X	X	X	X
Flat Rate	X	X	X	—	X	X
Message Rate	X	—	X	—	X	—
Hotel—Motel (To TSP/TSPS)	X	—	X	—	—	—
Free Terminating	X	X	X	—	—	—
TOUCH-TONE®	X	—	X	X	X	X
Dial Pulse 10 PPS	X	—	X	X	X	X
Dial Pulse 20 PPS	X	—	X	X	X	—
ANI	X	—	X	X	X	—
ONI	X	—	X	—	X	X
Bill to Listed Number	—	—	X	—	—	—
QZ Billing	X	—	X	—	—	—
Remote Message Register	X	—	X	—	—	—
Software Message Register	X	—	X	—	—	—
Reverting Calls	—	—	—	—	X	X
Plug-Up List	X	X	X	X	X	X
Emergency Manual Line	X	X	X	—	—	—
Emergency Line (Fire, Police)	X	X	X	—	—	—
Denied-Originating	X	X	X	X	X	—
Denied-Terminating	X	X	X	X	X	X
Loop Start	X	X	X	X	X	X
Ground Start	X	—	X	X	—	—
Immediate Ring	X	X	X	X	X	X
Coin First	—	—	—	X	—	—
Dial-Tone-First	—	—	—	X	—	—
Retain Coin on 0 or X11	—	—	—	X	—	—
Return Coin on 0 or X11	—	—	—	X	—	—

◆TABLE B (Contd)◆

NO. 3 ESS LINE FEATURES

LINE FEATURE	TYPE OF LINE					
	SINGLE PARTY				MULTIPARTY	
	RES BUS	MAN	PBX	COIN	2	4&8
Local Overtime	—	—	—	X	—	—
Multiline Hunt	X	—	X	—	—	—
Series Completion	X	—	—	—	—	—
No Hunt	X	—	X	—	—	—
Make Busy	X	—	X	—	—	—
Dynamic Service Protection	X	X	X	X	X	X
Group Alerting	X	—	—	—	—	—
Call Waiting	X	—	—	—	—	—
Speed Calling	X	—	X	—	—	—
Threeway Calling	X	—	X	—	—	—
Call Forwarding	X	—	X	—	—	—
Toll Diversion	—	—	X	—	—	—
Toll Restriction	X	—	X	X	—	—
Line Lockout	X	X	X	X	X	X
Call Tracing	X	X	X	X	X	—
Nonsynchronized Audible	X	X	X	X	X	X

BUS—Business
 COIN—Coin Station
 MAN—Manual
 PBX—Private Branch Exchange
 RES—Residential

- (g) Translation update procedures
 (h) Integration or operational test procedures.

personnel is essential to prevent any interruption in service during a No. 3 ESS addition.

C. Implementation of MOP

2.09 The WE installer, the WE Region, and the TELCO plant craft person shall not deviate from the signed MOP unless it is amended and signed. Cooperation between WE and TELCO

3. DIVISION OF RESPONSIBILITIES

3.01 The division of responsibilities relating to an ESS office is as follows:

- Ordering

TABLE C

NO. 3 ESS TRUNK FEATURES

TRUNK FEATURES	LOCAL			OPERATOR		OGT CAMA OR TSP/TSPS	TOLL ICT	LOCAL TEST DESK #14 & #16 ICT
	OGT	ICT	2-WAY	REC COMP	TOLL SWITCH			
E&M Lead	X	X	X	X	X	X	X	—
Reverse Battery	X	X	—	X	X	X	—	X
Immediate Start	X	X	X	—	—	—	—	—
Wink Start	X	X	X	—	X	X	X	X
Delay Dial	—	—	—	—	—	—	X	—
Stop—Go	X	—	X	—	—	—	—	—
Dial Pulsing	X	X	X	—	—	—	X	X
Multifrequency Pulsing	X	X	X	—	X	X	X	—
Inband Coin & Rering	—	—	—	X	X	X	—	—
Class of Service Tone	—	—	—	X	—	—	—	—
Automatic Ring	—	—	—	—	X	—	—	—
No Test Access	—	—	—	—	X	—	—	X
Local Tandem	X	X	X	—	—	—	—	—

OGT—Outgoing Trunk

ICT—Incoming Trunk

REC COMP—Recording Completing

- Preparation of Translation Input Forms
- Job Coordination
- System Evaluation Tests
- Installation.♦

A. Ordering

3.02 The TELCO is directly responsible for ordering necessary equipment and submitting appropriate order forms to WE for processing.

B. ♦Preparation of Translation Input Forms♦

3.03 The TELCO is responsible for providing translation data for the added frames. This data should be made available on the appropriate ESS forms.

C. Job Coordination

3.04 A cooperative effort between the TELCO and WE is absolutely essential when adding equipment or frames to an in-service ESS office. Installation, wiring, and testing new frames are performed by WE personnel. Main memory changes in translation data are normally prepared and inserted into the memory by TELCO personnel. When all wiring and verification procedures are completed, translation changes are made so that diagnostic programs can test the new frames. Initially, the added circuits will not be available to call processing. These circuits will be made available when they pass all installation and diagnostic tests. Some circuits can be tested before translation changes are made and then made "active" after the changes are made.

3.05 During the planning stage of each office addition, WE installation personnel and

TABLE D

NO. 3 ESS ROUTING FEATURES

ROUTING FEATURES	
Access Codes	0+, 1+, 01+, 011+
Service Codes	X11, 11X
Information Codes	114, 411, 1+411, 555 1212, 1+555 1212 NPA+555 1212, 1+NPA+555 1212
	0, 0+, 1+, To TSP/TSPS
	01+, 011+, To TSPS (IDDD)
	1-, 3-, 7-, 10-Digit Dialing (Exclusive of Access Codes)
	Dialing Plan—NXX-NXX-XXXX (N=2 Thru 9, X=0 Thru 9)
	Up Thru Two Alternate Routes
	Shared Office Code Via 1000s Digit Translation
	Up Thru Three Foreign Area Translators (Optional)
	Extended Area Service (EAS)
	Emergency Service Bureau 911

TELCO personnel prepare a MOP which specifies the sequence of all activities to be performed. Table F shows the general areas of responsibility for WE engineering, WE installation, and the TELCO during an office addition.

3.06 The TELCO equipment engineering department and WE regional engineer are to make an analysis of the installation job for service-affecting hazards which shall be outlined and presented at the initial or supplemental MOP meeting. Also included shall be a list of WE work operations which are to be observed by the central office forces. Any acceptance test proposed must be agreed upon by all departments concerned. The MOP meeting must be held in advance of any work actually performed on an office that has been scheduled for growth.

3.07 The necessary supervision and adequate manpower to ensure the prevention of service interruptions and the completion of all acceptance tests will be furnished by the local TELCO supervisor.

3.08 The TELCO personnel will remove from service and restore to service all equipment

involved in the WE installation job as required by WE Installation Engineering Handbook 269.

3.09 When the need for office growth has been determined, a letter of intent stating the schedule of events should be received by each concerned local organization (office personnel, service orders, traffic, etc). All additions and revisions on input forms are forwarded to the Switch Control Center or Central Office by the line and traffic engineering organization. The supervision will schedule the time for any reallocation, installation of retrofit programs or cutover of additional office equipment.

Note: An Office Data Administration run is not required for office growth in No. 3 ESS.

D. System Evaluation Tests

3.10 A system evaluation should be performed prior to growth additions to determine if any marginal or hard-fault conditions exist. All faults should be corrected before starting the growth changes. All service orders, recent changes, and customer dialed-in changes should be saved. Results of this evaluation should be retained for comparison

TABLE E

NO. 3 ESS MISCELLANEOUS FEATURES

MISCELLANEOUS LINE FEATURES
Partial Dial Treatment Permanent Signal Treatment 8-Party Semiselective Ringing and 4-Party Full Selective 8-Party Divided Code Ringing and 4-Party Semiselective Ringing SLEEVE LEAD FUNCTION 64 Major Classes of Service 8 Incoming Office Codes 256 Possible Routes
MISCELLANEOUS TRUNK FEATURES
Delete Digits (Up Thru 7) Prefix Digits (Up Thru 3)
MISCELLANEOUS EQUIPMENT ARRANGEMENT FEATURES
7-Foot Frames—Single Sided Fire Detection Earthquake and Disaster Bracing (Optional) RF and External Power Protection (Optional) Unitized Frame Shipment Loose Frame Shipment (Optional)
MISCELLANEOUS HARDWARE FEATURES
Low Profile Combined Distributing Frame (30" Deep) Protector Units Reuse of Existing CDF Protector and MDF (Optional) Power Plant—Solid State 151A Type Ringing and Tone Supply Plant, 1/2 Amp

with a second evaluation performed after growth changes are implemented. ♦Any unexpected results concerning system operation and output messages must be investigated and corrected.♦

E. Installation

3.11 It is imperative that WE advise TELCO as per written agreement, before applying those procedures that are particularly hazardous to service or which involve temporarily placing certain units out of service or introducing recent change that activate new units.

3.12 A system diagnostic should be performed on the off-line control unit (CU) to ensure the system is in good working order.

3.13 Part of the maintenance center functions include capabilities which aid in installation of equipment through the use of TTY input messages. (Refer to Input Manual 3H300 for input messages to follow.) These functions provide the following:

- (a) Manual access to internal processor states, registers, and memory locations

TABLE F

DIVISION OF RESPONSIBILITY

OPERATION	RESPONSIBILITY		
	WE ENGINEERING	WE 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		Coordinate activity	Do message inputs
Insertion of New or Changed Office 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	

(b) Control capability over execution of program segments

(c) Emergency override procedures if necessary.

3.14 The TELCO personnel should participate in the scheduling and conducting of critical operations during the growth interval. In addition, all personnel should be completely familiar with backup procedures and emergency measures to restore the system to a safe point in the event of trouble. ♦Each TELCO office should have current back-up tapes available at all times during the growth process.♦

3.15 Frames and equipment are added to an ESS office in a predetermined sequence. The sequence for each office addition must be made by considering frame interdependencies as well as the hardware and software interrelationships.

3.16 The main store memory requirements are determined once the total translation word requirements are determined (see Table G).

3.17 A universal floor plan (Fig. 1) has been developed which grows naturally from the

smallest to the largest installation. The floor plan fits standard building bays of new buildings and can be readily adapted to existing buildings.

4. SOFTWARE CHANGES

4.01 Software changes may be required in a No. 3 ESS office when additions to the system are being made. When growth is required in an office, new frames must be added and software changes must be made.

4.02 ♦Assignment information for the added equipment will be furnished to WE by TELCO to use in the development of a MOP (see Handbook 269, Sections 720, 730, and 740). Translation or office data may be inserted by WE installer when agreed to by TELCO or if information is required for testing purposes.♦

4.03 It will be necessary to have transmitted to regional engineering a copy of the translation requirements in advance of the additions. This copy will be used by the system equipment engineer to determine the availability of space in the translators memory area. Translation space can

TABLE G

MEMORY REQUIREMENTS (ISSUE 4A AND 3E3)

UNDUPLICATED TRANSLATION WORDS REQUIRED	32K MAIN STORE MODULES REQUIRED		128K MAIN STORE MODULES REQUIRED	
	ISSUE 4A	3E3	ISSUE 4A	3E3
0	3 (96K)	5 (160K)	1 (128K)	2 (256K)
0 thru 32K	4 (128K)	5 (160K)	1 (128K)	2 (256K)
32K thru 52K	5 (160K)	5 (160K)	2 (256K)	2 (256K)

be increased by using the nonresident "reallocation" programs.

5. INTEGRATION INTO SERVICE

5.01 The integration into service phase consists of installation of the new translation information that defines the equipment changes or additions that were made and of restoring the system to a normal operating condition. These procedures are covered in Section 233-154-130. This is the final phase of the growth procedure and should be scheduled in the early morning or as per agreement in the MOP.

5.02 As soon as possible after the growth addition is completed, appropriate tasks from Section 233-142-100 should be performed as a basis for acceptance and should be indicated as such in the MOP.

5.03 If no trouble is encountered at this time on the off-line CU, a system diagnostic should be run on the off-line CU to ensure the system is in good working order with the growth additions and is capable of maintaining call processing. The CU should be switched to on-line if the all tests pass response is received. Refer to Input Manual 3H300 for input message to switch CUs.

Note: The updated off-line CU should be switched on-line during the early morning hours or when traffic is at a minimum.

6. REFERENCES

6.01 The following Task Oriented Practices (TOP) are related to this section.

233-142-100—No. 3 ESS Office Equipment TOP Volume

233-143-100—No. 3 ESS Trouble Clearing TOP Volume

233-144-100—No. 3 ESS Power Equipment TOP Volume.

7. GLOSSARY

7.01 A glossary of terms is provided to aid in understanding definitive words used in this section.

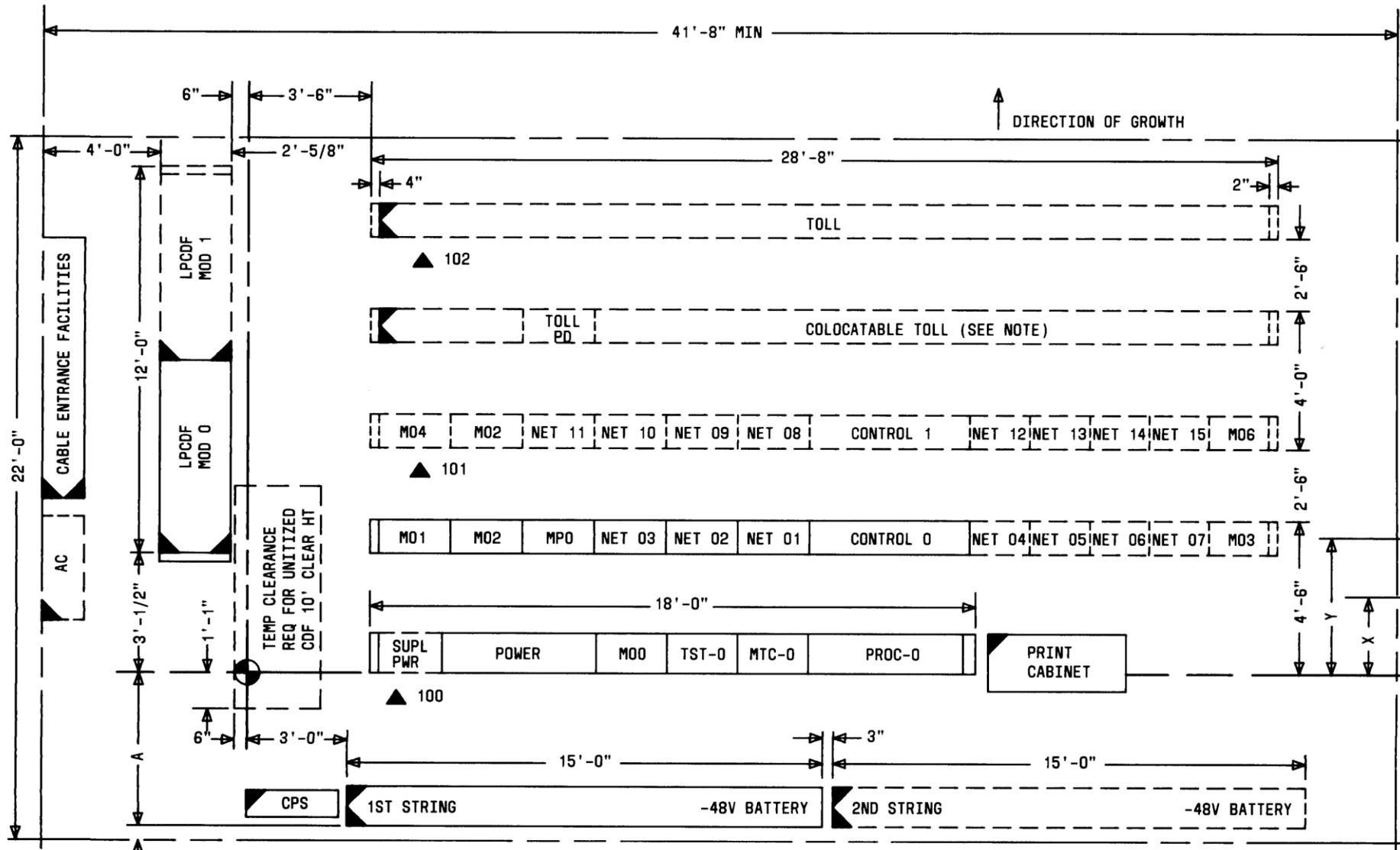
Control Unit (CU)—The combination of 3A CC, main store, power store buses, system status, and control panel.

Direct Distance Dialing (DDD)—Toll service which permits customers to dial their own long-distance call.

E&M Lead—Signaling circuit uses only one lead for each direction of transmission.

Input Manual (IM)—A listing of TTY input messages.

Line—Anything that connects to a network terminal which is not classified as a trunk or service circuit.



-  BENCH MARK
-  DENOTES MAINTENANCE AISLE
-  INDICATES EQUIPMENT WHOSE LOCATION CAN BE VARIED
-  INDICATES EQUIPMENT WHOSE LOCATION CAN BE VARIED WITH POTENTIAL COST PENALTIES

NOTE:
 COLOCATABLE TOLL EQUIPMENT IS THAT EQUIPMENT WHOSE RADIATION DOES NOT EXCEED 1 VOLT PER METER MEASURED AT A DISTANCE OF 1 FOOT FROM THE UNIT.

- A = 5'3" MIN FOR KS-20760 STAND;
5'9" MIN FOR ED-81014-31 STAND
- B = 3" FOR KS-20760 STAND; 1" FOR ED-81014-31 STAND
- X = 2'6" TO THE CENTERLINE OF THE 8'Wx10'H TEMPORARY OPENING FOR TWO LINEUPS OF UNITIZED EQUIPMENT
- Y = 4'0" TO THE CENTERLINE OF THE 11'Wx10'H TEMPORARY OPENING FOR THREE LINEUPS OF UNITIZED EQUIPMENT

Fig. 1—Floor Plan

Main Store—An addressable memory storage unit capable of storing increments of 128K or 256K words.

Terminals—A point at which information can enter or leave a communication network.

Trunk—A channel connecting switching centers or exchanges. An interface circuit for transmission purposes.

QZ Billing—Toll calls from lines having this feature are routed to a CAMA operator for identification.

8. ABBREVIATIONS

8.01 The following is a list of abbreviations used in this section.

ANI	Automatic Number Identification
CAMA	Centralized Automatic Message Accounting
CDF	Combined Distributing Frame
CU	Control Unit
DDD	Direct Distance Dialing
EAS	Extended Area Service

ESS	Electronic Switching System
IDDD	International Direct Distance Dialing
LDN	Listed Directory Number
MDF	Main Distributing Frame
MLHG	Multiline Hunt Group
MOP	Method of Procedure
NPA	Number Plan Area
ONI	Operator Number Identification
PBX	Private Branch Exchange
PPS	Pulse Per Second
TELCO	Telephone Company
TOP	Task Oriented Practices
TSP	Traffic Service Position
TSPS	Traffic Service Position System
WE	Western Electric Company

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