GENERAL GROWTH

DESCRIPTION

NO. 1 ELECTRONIC SWITCHING SYSTEM

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1. GENERAL

1.01 This section describes general information related to the overall growth process for additions of equipment frames to operational 2-wire or 4-wire No. 1 Electronic Switching System (ESS) offices. Office growth is necessary whenever a working office must add equipment or equipment frames to increase its call-handling capacity.

1.02 This section is reissued for the following reasons:

(a) To include Addendum, Issue 1

(b) To add 1E5 and 1E6 generic frames to Table C

(c) To delete Category V parameter change information

(d) To move abbreviations from Table C to Part 6.

(e) To make minor corrections as required.

Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 Reference should be made to Part 6 for abbreviations.

GLOSSARY

1.04 The following words and phrases and their definitions are used frequently in growth.

Address — An octal number that identifies a memory storage location.

Auxiliary Block — See unit type auxiliary block.

Auxiliary Test Programs — Refers to the concept of removing a special module of memory cards and temporarily replacing them with a module containing special purpose programs. Program store module 5 or its duplicate module 15 is the module used for this purpose.

B-Links — The interconnections between junctor switch frames or circuits and their associated trunk switch or line switch frames or circuits.

Basic Line Switch Frame — Bays 0 and 1 of a 4:1 ferreed line switch frame.

Bit (Binary Digit) — A binary unit of information.

Bus — A lead or group of leads providing time-shared communication paths over which information is transmitted from any one of several sources to any of several destinations.

Call Store Table — A call store table is a block of contiguous call store words, assigned a specific function or set of related functions, and allocated by COMPOOL or PDA. The Fixed Call Store Tables are generally allocated by COMPOOL while the Variable Call Store Tables are allocated by PDA.

Categories — A group or classification of recent change procedures. A category of procedures is performed at a specific time in the installation sequence.

CC Generic Program — This is a Generic Program for an office without a pair of Signal Processors.

Centralized Off-line Program Updating System (COPUS)—The method used by Western Electric (WE) to magnetize program store cards with new generic program data at a central location rather than on site. Refer to Off-line Program Updating System (OPUS).

COMPOOL — The COMPOOL (common pool) record is a collection (a computerized dictionary of the symbolic references associated with a Generic Program) of mnemonic address to octal address equivalencies.

Error — A malfunction, the symptoms of which ***cannot*** be reproduced under program control.

E-8056 — The E-8056 is the Telephone Company (TELCO) Equipment Questionnaire for No. 1 ESS, published by WE. When filled out for submission to WE, it is called the Equipment Order. This form is used for initial and growth jobs. With Mechanized Ordering, the Equipment Order, less special TELCO instructions, is generated as an off-line report from the Central Office Equipment Engineering System.

Fault — A malfunction, the symptoms of which can be reproduced under program control.

Feature Loading — Feature loading is a generic program loading technique first introduced in CTX-8, Issue 2, whereby the generic code which is not required in a particular office is not loaded into it. Under feature loading, the Generic Program is divided into feature packages, each of which are only loaded if required. Periodically, if required, these packages will be improved or modified, will be given a higher issue designation, and will be loaded, replacing the old issue, if the package is still required. One package, the "core" package, is always required in all offices, and is always updated and reissued whenever this updating is done.

Filled (or Unfilled) Switching Network — Refers to the condition of a network with respect to the number of trunk switch (TS) or line switch (LS) frames or circuits present and the number allowed by the given equipage and B-link pattern.

Final Parameters — A parameter module that defines the system configuration at the conclusion of the office addition. In some cases, a final parameter module is supplied for the office. In other cases, the transitional parameter module is modified during the addition sequence and becomes the final parameters.

GRC Forms — Growth recent change forms are used for the transmittal of information between TELCO and WE.

Head Table — A memory table which contains the starting addresses of subtranslators.

Hole — A hole is a block of continuous unused program store or call store words.

Home Line Switch Frame — A 2:1 ferreed line switch frame which contains a line scanner controller.

Initialize — To write into. A memory address or location is initialized by writing into it.

Instruction — A binary word which directs CC to perform a particular operation.

Supplementary Line Switch Frame — Bay 2 of 4:1 ferreed line switch frame.

Linking — A procedure in which the starting address (pointer) of a new memory block is written into a memory location to provide access to the information contained in the new memory block.

Location — Address of a memory storage word.

Mate Line Switch Frame — A 2:1 ferreed line switch frame which does not contain a line scanner controller but whose ferrods are wired to a 2:1 home line switch frame.

MOD 4 — This is the 04 Module of Program Store 0 (and its duplicate Module 14 of Program Store 1), where Parameter data is stored, sometimes called the "Parameter Mod."

MOD 5 — See auxiliary test programs.

Method of Procedure (MOP) — An outline describing a job to be done which involves ***live office equipment. A MOP is prepared by installation and TELCO personnel and signed by authorized TELCO and WE personnel.***

Network Concentration Ratio (Trunk to Junctor or Line to Junctor — The overall concen-

tration ratio of a network is the product of the concentration ratio in the TS or LS frames and the B-link wiring ratio.

Network Equipage — Refers to the number of junctor switch frames or circuits contained in a trunk link or line link network. One junctor switch frame gives one-quarter equipped, two give one-half equipped, or four give fully equipped.

Off-line Program Updating System (OPUS)— OPUS is an elaborate No. 1 ESS installation tool introduced in support of feature loading to permit on-site updating of parameter data and the office data. OPUS uses a PDP11 with tape drive and bus umbilical connection with a design intended to help eliminate service crises due to data disagreements between TELCO and WE. It can be used to introduce TELCO and WE instituted changes, and it replaces shop card writing and precutover card writing via the AMA tape drives. OPUS is driven by the WE region PDA tape, but it forms the final twister image as it does program packing and address resolution. OPUS has been largely superseded by the Centralized Off-line Program Updating System (COPUS). Refer to the glossary definition for COPUS.

Packing — Packing is the process of manipulating the positions of tables, where possible, so as to minimize the number of words lost to holes.

Parameter Information — Program store information consisting of numerical values and constants which define the office size, scanning rates, and related information.

Parameter Data Assembler (PDA) — The PDA is a regionalized WE program which compiles parameter data derived from WE and TELCO set cards. The PDA output is a twister tape or an appropriate image to drive card writing at a manufacturing location or the No. 1 ESS office site.

Point Issue —The point issue is a decimal point and numeric suffix appended to the issue to designate a set of patch updates released between issues. When the number of patches required for an issue becomes large, relative to installing a new office or new program, the outstanding changes are updated into the program and then identified as a point issue. For example, an office may have last updated their generic program with 1E(B4)4.1, but as a result of adding 100 changes, they may now be said to be at 1E(B4)4.2.

Remreed Line Link Network — Composed of line switch circuits, mounted two circuits per line switch frame, and line junctor switch circuits, mounted four circuits per line junctor switch frame.

Remreed Trunk Link Network — Composed of trunk switch circuits, mounted four circuits per trunk switch frame, and trunk junctor switch circuits, mounted four circuits per trunk junctor switch frame.

Restart — Changes to a generic program may result in an issue being changed via alpha characters [eg, 1E(B6)6B to 1E(B6)6C] or a generic may remain the same but a new issue incorporated [eg, 1E(B6)6 to 1E(B6)7]. Either case is defined as a restart.

Retrofit — A change to the generic base to provide options for new features [eg, 1E(B6)7 to 1E(B7)7].

Seize —To obtain. For example, if a new block of memory is needed, it is seized from the list of idle PS space.

Set Card — A data input containing a number that is used to define the office size or features. Each set card has a mnemonic designation or name. For example, the PSF set card contains the number of program store frames the office has.

Software — The information stored in the systems memory.

SP Generic Program — This is a Generic Program for an office equipped with a pair of Signal Processors (SP).

Subtranslator — A memory table which contains one primary translation word per index. Growth frequently involves moving or building new subtranslators.

Transitional Parameters — Parameters information which has been modified in some respects so that, during the growth addition and testing interval, call-processing programs will not use the new equipment.

Translation Information — Information contained in the call store or program store pertaining primarily to individual lines or trunks. It may be used, for instance, to convert a directory number into an equipment location, to derive the class of service, etc.

Translator — A group of tables connected in a hierarchical pattern which contains data pertinent to a specific type of translation.

Unit Type Auxiliary Block — A block of information containing equipment-related information. Unit type auxiliary blocks link to a unit type subtranslator.

Unit Type Translator — A unit type subtranslator and its associated auxiliary blocks.

Update — Changing translation or parameter information.

Word — A set of digits associated to express system information. (The term ***word*** may be prefixed by an adjective describing the nature of the characters, such as binary word).

Word Number — The length of some memory blocks (of variable length) is contained in the first word of the block. The bits specifying the length contain the ***word number.***

2. METHOD OF PROCEDURE (MOP)

2.01 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 TEL and WE representatives.

2.02 The preparation of the MOP is normally done jointly by WE and TELCO. The MOP may be a very formal document, or somewhat informal, depending on the magnitude of the job.

2.03 Methods of procedure are required whenever WE activity involves:

(a) Hardware changes (class A)

(b) Equipment additions

(c) Equipment modifications

(d) Equipment removal

(e) Program changes.

2.04 Installation events which warrant defining responsibilities are those dealing with:

(a) Equipment to be added

(b) Live 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.

2.05 The following list may be used as a guideline for what should be included in 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) Installation and test procedures

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

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

3. OFFICE GROWTH

3.01 Office growth is recommended to be made only in offices having a generic program that is rated standard (STD) or additions and maintenance (A&M). Offices having generic programs rated manufacture discontinued (MD) may require program store (PS) growth before updating to a standard generic program.

BASIC CONCEPTS

3.02 In the No. 1 ESS, frames can be added to a working system with relatively few wired connections. Parameters and translation changes in program store instead of wired logic modifications provide most of the information required by the No. 1 ESS as new frames are added.

3.03 When new equipment or equipment frames are added to an ESS office, they are added with minimum interruption in telephone service. The duplicate design of the No. 1 ESS permits numerous working configurations among the duplicated system units. After the new equipment is wired 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 parameter and translation updates that have not yet been made.

3.04 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 the removal (deload) of translation assignments.

MAJOR OBJECTIVES

3.05 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 schedules and utilization of the work force.

3.06 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 intervals where simplex operation (no duplication) of equipment is required.

(c) Installation procedures are sequenced to allow growth frames to be integrated into the system in small steps that can be easily verified.

(d) Several safe stopping points are provided in the growth procedures to allow for unforeseen difficulties that may arise.

(e) The procedures are kept clear and simple.

(f) Computer-generated data, when available, is used.

JOB COORDINATION

3.07 A cooperative effort between the TELCO and WE is absolutely essential when adding equipment frames to an in-service ESS office.

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

SYSTEM EVALUATION

3.09 The following tests and diagnostic procedures must be made prior to and after office growth to ensure that the office is in excellent operating condition:

- Section 231-105-303, System Evaluation Tests (2-wire generics)
- Section 231-125-302, Master Control Center Diagnostic Procedures (2-wire generics)
- Section 231-405-303, System Evaluation Tests (4-wire generics)
- Section 231-425-302, Master Control Center Diagnostic Procedures (4-wire generics).

These tests consist of testing the emergency action portion of the MCC to ensure that the system can operate without trouble in all possible configurations of the central controls (CCs), call stores (CSs), and program stores (PSs). Also, the system tests verify that power can be removed and restored to either one of a pair of duplicate buses or equipment units without equipment troubles or adverse system action. An optional test is to execute a manual phase of reinitialization to make sure this function is operational.

RESTRICTIONS

3.10 Restrictions which must be considered in any office growth are imposed by dc power re-

TABLE A

GENERAL DIVISION OF RESPONSIBILITY BETWEEN TELEPHONE COMPANY AND WESTERN ELECTRIC COMPANY ON NO. 1 ESS ADDITIONS

<table>
<tr><th rowspan="2">OPERATION</th><th colspan="3">RESPONSIBILITY</th></tr>
<tr><th>WESTERN ELECTRIC COMPANY REGION ENGINEERING</th><th>WESTERN ELECTRIC COMPANY INSTALLATION</th><th>TELEPHONE COMPANY</th></tr>
<tr><td>Project Development</td><td>Sequence Equipment Installation</td><td colspan="2">Joint Preparation of Method of Procedure</td></tr>
<tr><td>System Evaluation Tests</td><td></td><td>Check Output Messages from System Evaluation Testing</td><td>Perform System Evaluation Testing</td></tr>
<tr><td rowspan="2">Growth Recent Change Forms</td><td rowspan="2">Assignment Data</td><td>Coordinate Growth Recent Change Activity</td><td>Input Messages for Translation and Parameter Updates</td></tr>
<tr><td colspan="2">Joint Interpretation of Output Messages</td></tr>
<tr><td>Testing Added Frames</td><td></td><td>Performed Prescribed Tests on Added Frames and Monitor System Reaction</td><td>Operate Central Office</td></tr>
</table>

quirements, frame interdependencies (point assignments), frame line-up pattern, special wire length limitations, and other similar items. The dc power requirement is met by simply ensuring that the existing power distributing (PD) frames have the necessary excess power capability for the new equipment being added. If this power is not available, one or more pairs of PD frames must be added first.

3.11 The restrictions imposed by frame interdependencies can cause more of a problem. For example, suppose the addition includes a CS frame and a master scanner (MS) frame. Normally, the CS is added first. However, for this example, suppose that the CS cannot be added first because all of the required MS points are not available (nine points required: two supervisory and seven directed) and the MS cannot be added first because of insufficient CS space. (A CS table is required to keep a record of the busy-idle status of each MS point.) The recommended solution to such a problem is to unassign enough MS points to permit the CS to be added. This solution is not always possible because the addition could have included five CSs instead of one CS. In this case, a single CS would have to be added first, the MS added next, and finally the other CSs added. The disadvantage of this solution is that two transitional parameter modules would be required which adds to the complexity of the job. In summary, each job is different and each job is unique; thus, the problems associated with each job must be solved individually.

3.12 The frame line-up pattern is sometimes restricted by wire length limitations. For example, bus leads from a CC to a PS or a CS cannot exceed 125 feet, and bus leads to peripheral units cannot exceed 450 feet. Another restriction is that a mate universal trunk frame must be physically adjacent to the corresponding home frame. For example, if a home universal trunk frame is being added without a mate frame, care must be used not to mount the home frame at the end of an aisle where it would be impossible to add the mate frame in a subsequent office addition.

DOCUMENTAION

3.13 Documentation covering growth consists primarily of Bell System Practices and Growth Recent Change (GRC) forms. Most documentation is primarily intended to cover a single type of frame or piece of equipment. Consequently, if several types of frames are being added, it is necessary to use the documentation together. The PDA listing is another doc-

ument which is used for reference during office growth.

A. Bell System Practices (BSPs)

3.14 A Bell System Practice (BSP) is written to cover the translation and parameter recent change (RC) procedures as well as diagnostic configuration procedures for each frame. Each BSP 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 integrated (included) into the system in small steps

(c) To use relatively short procedures

(d) To verify each procedure

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

3.15 The BSPs in the 231-119 and 231-419 division layers give detailed procedures that are required to add specific equipment frames to an operational office. The 231-419 layer BSPs are for use in 4-wire offices. BSPs in the 231-119-320 and up, or in 231-050 through 231-055 layers TOP practices for specific features, are for use in 2-wire offices. Each BSP gives the complete procedure to provide office personnel with a general view of the entire process for the frame involved. The procedures performed by office personnel are covered in detail.

B. Growth Recent Change Forms

3.16 GRC forms (PA591099) are used for the transmittal of information between the WE regional engineer and TELCO. The assignment of central pulse distributor (CPD) points, MS points, and signal distributor (SD) points for growth frames is made by the WECo regional engineer. Up to three types of GRC forms (xxxx.1, xxxx.2, and xxxx.3) are provided for each type of frame. GRC forms are numbered as follows:

GRC xxxx.y

xxxx = Basic GRC number of the frame being added

y = 1, 2, or 3 as explained below.

GRC xxxx.1 Form

3.17 This form contains the RC messages needed to determine if sufficient head table and/or subtranslator capacity exists for the frame type specified by xxxx. This form also contains the RC messages necessary to seize and reserve only blocks of memory that the addition requires. Not all frame additions require the use of this form (Table B or C). If the growth consists of more than one frame type, regardless of the quantity of frames of the same type, then one copy of this form is required for each frame type (if the frame type requires use of this form). For example, if three types of frames are being added that require the use of this form, then three point-one forms are required. The necessary point-one forms should be ordered by TELCO as early as practical to determine if there is a memory capacity problem. Point-one forms are filled out by TELCO personnel and then used, if required, to prepare point-two and point-three forms.

3.18 If the GRC point-one form(s) indicates that a memory capacity problem exists, this indicates that a head table, subtranslator, or both, are not large enough to contain the necessary information to define the new frame(s). In this case, a larger head table or subtranslator must be built. These procedures are covered in Section 231-119-320 (2-wire generics) or 231-012-301 (4-wire generics).

GRC xxxx.2 Form

3.19 This form contains the RC messages necessary to update translations. Not all frame additions require the use of this form (Table B or C). If the addition involves frames or units that use this form, then one copy of this form is required for each frame or unit being added. For example, if two CS frames are being added, two copies of GRC xxxx.2 form are required. Point-two forms are furnished by the WE regional engineer. The form consists of RC messages filled out in part by the WE regional engineer. The remaining parts of the form are filled out by TELCO personnel as the RC messages are entered on the maintenance teletypewriter in the office. (The information for many RC messages is derived from the system response to previous messages.)

GRC xxxx.3 Form

3.20 This form contains the RC messages necessary to update parameters. Not all frame ad-

TABLE B

TYPES OF GROWTH AND ASSOCIATED DOCUMENTATION (4-WIRE GENERICS)

EQUIPMENT OR FRAME TYPE	GRC NUMBER	GRC FORMS USED			BSP SECTION
		XXXX.1	XXXX.2	XXXX.3	
Universal Trunk	0180	X	X	X	231-419-302
Miscellaneous Trunk Frame with Teletypewriter (List 1 and 2)	0900	X	X		231-419-305
Miscellaneous Trunk Frame with Teletypewriter (List 1 and 3)	0220		X		231-419-305
Miscellaneous Trunk Frame with Data Link Circuit	0280		X		

ditions require the use of this form (Table B or C). If the addition involves frames or units that use this form, then one copy of this form is required for each frame or unit being added. For example, if two CS frames are being added, two copies of GRC xxxx.3 form are required. The point-three forms are also furnished by the WE regional engineer. They are filled out in the same manner as the point-two forms.

3.21 Point-two and point-three forms divide RC procedures into categories which are performed at specific time intervals during the installation process. These categories are defined in paragraphs 4.03 and 4.04.

C. Parameter Data Assembler (PDA) Listing

3.22 The PDA listing is a computer-generated document which gives the input and output of the PDA program. This program generates the parameter data which is used by the ESS generic program. The listing is always required during office growth to obtain set card values and PS addresses.

3.23 The PDA also lists RC-CHPSWD messages (4-wire generics) or RC:PSWD messages (2-wire generics) necessary to produce a final parameter module from the transitional parameter module. These messages assume that all frames of a given type are added simultaneously, which is not always the case. However, it is suggested that these messages be used for error checking.

CENTRAL CONTROL TO SIGNAL PROCESSOR CONVERSION

3.24 CC to SP conversion involves the addition of an SP community to an in-service, nonsignal processor 2-wire office.

3.25 If the CC office contains a 4:1 ferreed LS frame without a supplementary bay, the supplementary bay must be added and made operational in the CC generic program environment before SP conversion procedures are started. This restriction is imposed because the SP centrex programs are not compatible with only a basic 4:1 ferreed LS frame. The procedures for adding a supplementary bay to a basic-only ferreed LS frame are given in Section 231-119-323.

3.26 System evaluation procedures (Section 231-105-303) and MCC diagnostic procedures (Section 231-125-302) should be run before conversion to the SP generic program. The operating system hardware, both processor and peripheral, must be kept in a trouble-free state prior to and during the CC to SP conversion.

3.27 Only Category II update of parameters and translations is required when performing CC to SP conversion. Detailed procedures for CC to SP conversion are given in Section 231-119-330.

4. GROWTH MEMORY CHANGES

4.01 Memory changes refer to the software changes in PS memory which define the new

TABLE C

TYPES OF GROWTH AND ASSOCIATED DOCUMENTATION (CTX-6 AND LATER 2-WIRE GENERICS)

EQUIPMENT OR FRAME TYPE	GRC NUMBER	GRC FORMS USED			BSP SECTION
		XXXX.1	XXXX.2	XXXX.3	
Program Store	0105	X	X	X	231-119-343
8K CC Call Store	0115	X	X	X	231-119-342
32K CC Call Store	0117	X	X	X	231-119-347
Signal Processor Conversion with 8K Call Store	0275		X	X	231-119-330
Signal Processor Conversion with 32K Call Store	0276		X	X	231-119-330
Master Scanner (MS, MSCMT, or MSHMT)	0135	X	X	X	231-119-341
Central Pulse Distributor	0125	X	X	X	231-119-344
Miscellaneous Trunk	0225	X	X	X	231-119-345
Recorded Announcement	0305	X	X	X	231-119-346
Common System Recorded Announcement Frame	0306		X		231-119-346
Control and Distribution Frame	0307		X		231-119-346
Signal Processor Call Store (8K)	0116	X	X	X	231-119-342
Ringing and Tone	0315		X		
Power Distributing	0215	X	X	X	231-119-346
Centrex Data Link Frame and Unit 0 (Centrex Console)	0265	X	X	X	231-119-329
Centrex Data Link Units 1 thru 7 (Centrex Console)	0266		X	X	231-119-329
Centrex Data Link Frame and Unit 0 (Centrex Non-Console)	0267	X	X	X	231-119-329
Centrex Data Link Units 1 Thru 7 (Centrex Non-Console)	0268		X	X	231-119-329
Miscellaneous Power	0235		X		231-119-346
Miscellaneous	0235		X		231-119-346
Universal Trunk (UT, MUT, or HUT)	0185	X	X	X	231-119-322

TABLE C (Contd)

TYPES OF GROWTH AND ASSOCIATED DOCUMENTATION
(CTX-6 AND LATER 2-WIRE GENERICS)

EQUIPMENT OR FRAME TYPE	GRC NUMBER	GRC FORMS USED			BSP SECTION
		XXXX.1	XXXX.2	XXXX.3	
Line Switch (Ferreed or Remreed)	0145	X	X	X	231-119-321 231-119-323
Line Junctor Switch (Ferreed or Remreed)	0155	X	X		231-119-321 231-119-323
Junctor	0195	X	X	X	231-119-325
Trunk Switch (Ferreed or Remreed)	0165	X	X	X	231-119-324
Trunk Junctor Switch (Ferreed or Remreed)	0175	X	X		231-119-324
Miscellaneous Trunk Signal Distributor (MTFSD, CMT SD or HMTSD)	0205	X	X		231-119-345
Supplementary Trunk Test Panel	0245	X	X		231-119-328
Auxiliary Test Frame	0335		X		231-119-328
Manual Trunk Test Position	0246	X	X		231-119-351
Auxiliary Manual Test Frame	0247		X		231-119-351
Miscellaneous Trunk Frame with Step-By-Step Trunks	0225		X		231-119-331
Miscellaneous Trunk Frame with TTY (TR) (Lists 1 and 2)	0905		X		231-119-326
Miscellaneous Trunk Frame with Data Link Circuit	0285		X		
Miscellaneous Trunk Frame with AIOD and First ANI Connecting Unit	0295	X	X		231-119-332
AIOD ANI Connecting Units	0296		X		231-119-332
Remote Office Test Line (ROTL) Frame	0325		X		231-055-008
Attendant Interface Frame	345		X		231-119-335
Dynamic Overload Control Receiver Circuit with Receiver Loop 0	355		X		231-055-004

TABLE C (Contd)

TYPES OF GROWTH AND ASSOCIATED DOCUMENTATION
(CTX-6 AND LATER 2-WIRE GENERICS)

EQUIPMENT OR FRAME TYPE	GRC NUMBER	GRC FORMS USED			BSP SECTION
		XXXX.1	XXXX.2	XXXX.3	
Dynamic Overload Control Receiver Loops (excluding Loop 0)	356		X		231-055-004
Dynamic Overload Control Transmitter Frame	365		X		231-055-004
Processor Interface Frame	0375	X	X	X	
Peripheral Unit Controller/Data Link	0390	X	X	X	231-050-027
Peripheral Unit Controller/ Digital Carrier Trunk	0391	X	X	X	231-050-015
CCIS Data Terminal Frame	0385	X	X	X	231-050-020
CCIS Data Terminals	0386	X	X	X	231-050-020
Loop Range Extension Frame	7005	X	X		231-051-004

frames or equipment. These changes are divided into translation changes and parameter changes. Translation changes are performed first and are sometimes completed before parameter changes are started for a given frame or piece of equipment. Memory changes are made by TELCO personnel at times agreed to jointly with WE installation personnel.

CATEGORY DEFINITIONS

4.02 Both translation changes and parameter changes are divided into categories of updates. The category definitions for line link network (LLN) and trunk link network (TLN) additions are somewhat different from the definitions for the other additions.

A. Non-network

4.03 The additions for all frames, except LLN and TLN additions, are divided into three categories of updates. These categories are defined as follows:

- ***Category I:*** Changes made at any time before the system testing interval. These changes can be made before frames are ordered, during the interval that the frames are erected, or before transitional PDA.

Catetory I translations consist of building new subtranslators which link through a head table back to the master head table and of building new unit type auxiliary blocks which link through a subtranslator back to the unit type head table. Usually no parameter changes can be made before the system testing interval.

- ***Category II:*** Changes made just prior to diagnostic testing. At this time some growth programs have been installed and run, and the communications bus and private signal leads have been connected and verified. Category II changes are made to define growth units for access by diagnostic programs while denying access by all other programs. Typical Category II translation changes are updating the MS to unit type number translator and updating the CPD number to unit type number translator.

- ***Category III:*** Changes made to complete growth bring new frames or equipment units into service and make the new equipment units available to the call-processing program. Typical Category III translation changes consist of assigning MS points, and typical Category III parameter changes consist of updating the necessary parameter tables to put the new frames or equipment into service. For example, if a frame with a scanner is being added, a table is updated to turn on scanning.

B. Network (LLN and TLN)

4.04 The additions for LLN and TLN frames are divided into five categories of updates. These categories are defined as follows:

- ***Category I:*** Changes made at any time before the system testing interval. These changes can be made before frames are ordered or during the interval that the frames are erected. Category I translations consist of building new subtranslators which link through a head table back to the master head table and of building new unit type auxiliary blocks which link through a subtranslator back to the unit type head table. Usually no parameter changes can be made before the system testing interval.

- ***Category II:*** Changes made to permit network testing. Typical Category II translation changes are updating the MS to unit type number translator and updating the CPD number to unit type number translator. Typical Category II parameter changes consist of updating the equipage bits.

- ***Category III:*** Changes made upon completion of the network testing to permit system diagnostic testing. Typical Category III translation changes consist of removing the sign bit from auxiliary block pointers. ***There is no Category III update of parameters for LLN additions.***

- ***Category IV:*** Changes made to completely define the added equipment and make the new equipment available to the call-processing program. Typical Category IV translation changes for LLN additions consist of assigning scan point SC00 to unit type number translator. ***There is no Category IV update of translations for TLN additions.*** Typical Category IV parameter changes for LLN additions consist of updating parameter tables to permit scanning in the new line switch frames. ***There is no Category IV update of parameters for TLN additions.***

TRANSLATION CHANGES

4.05 Most translation changes are usually Category I changes. The translation procedures in paragraphs 4.07 through 4.13 ***may*** be required when a specific frame is added.

4.06 The following steps should be performed to obtain a correct list of RC messages required to update translations.

(1) Use the associated BSP to form a detailed list of RC messages. Include the addresses and translation data in the list.

(2) Compare this list with the RC messages on GRC xxxx.1 and xxxx.2 forms. Any differences between the two should be reconciled. Report errors found in any BSP by using the procedure given in Section 000-010-015. Report any errors in the GRC forms to the WE regional engineer.

A. Category I

4.07 In Category I translations, two types of translators may need updating.

(a) ***Master Head Table Translators:*** The updating procedure consists of building new subtranslators which are accessed by translation programs through the master head table. The link from the master head table to the subtranslator involves a head table. A translator of this type is shown in Fig. 1.

(b) ***Unit Type Translators:*** The updating procedure consists of building new unit type auxiliary blocks which are accessed by translation programs through the unit type head table. The link from the unit type head table to the auxiliary block involves a unit type subtranslator. A unit type translator is shown in Fig. 2.

4.08 Typical translators which begin with an entry in the master head table are the directory number (DN), line equipment number (LEN), and master scanner number (MSN) translators. The addition of some types of frames does not involve updating a translator of this type (for example, PS frames). A translator of this type is updated as follows:

(1) Obtain the length of the head table. The octal length is stored in the master head table length table.

(2) Compare the actual length of the table to the required length. The required length depends on the number of frames being added. If the table length is insufficient to contain the necessary

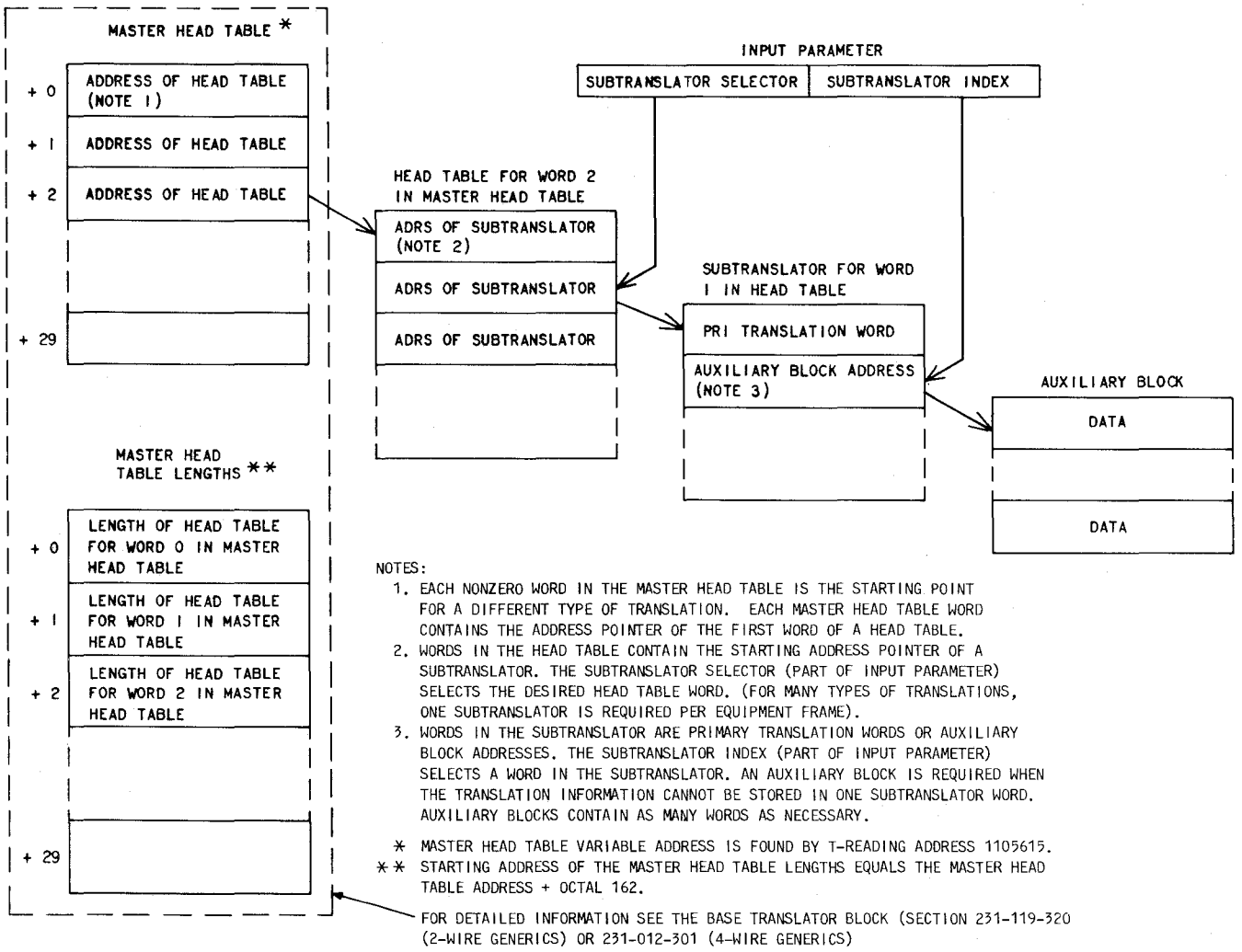


Fig. 1—Basic Layout of a Master Head Table Translator

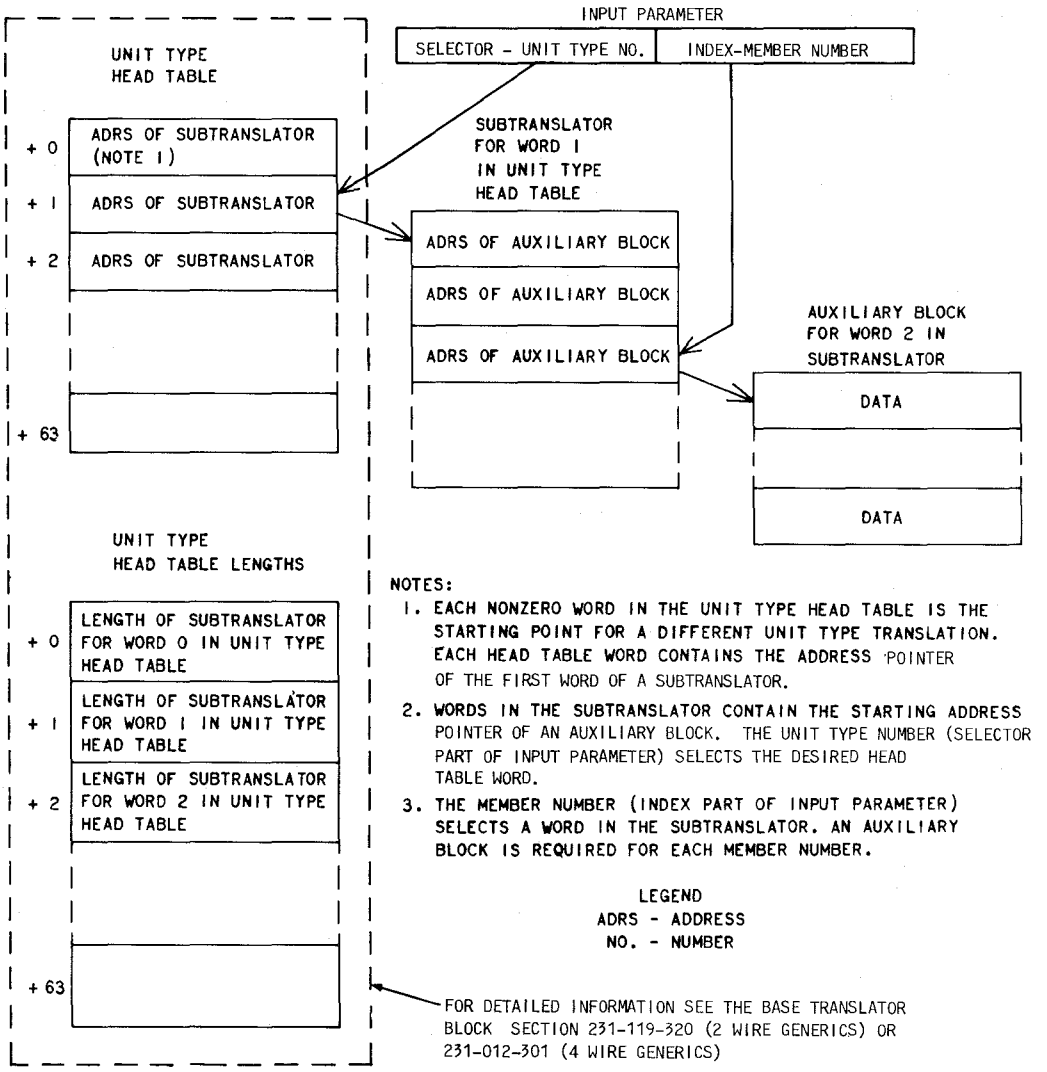


Fig. 2—Basic Layout of a Unit Type Translator

growth information, a larger head table must be built. These procedures are given in Section 231-119-320 (2-wire generics) or Section 231-012-301 (4-wire generics).

(3) If the head table length is sufficient or after it is moved, the necessary subtranslators are built. The number of subtranslators required and the length of each subtranslator depend on the frame being added. Subtranslators are built with unassigned primary translation words.

(4) The new subtranslator(s) is linked to the head table. At this point the head table has an unused word for each new subtranslator. These unused words are initialized to the starting address of the new subtranslator(s). The existence of the unused word(s) is guaranteed by (1) and (2).

4.09 Most equipment frames in an ESS office have a unit type number. When any of these frames are added, the associated unit type translator must be updated. A unit type translator is updated as follows:

(1) Obtain the length of the unit type subtranslator. The octal length is stored in the unit type subtranslator length table.

(2) Compare the actual length of the subtranslator to the required length. The required length depends on the number of frames being added. If the table length is insufficient to contain the necessary growth information, a larger subtranslator must be built. These procedures are given in Section 231-119-320 (2-wire generics) or Section 231-012-301 (4-wire generics).

(3) If the subtranslator length is sufficient or after it is moved, the necessary auxiliary blocks are built. The number of auxiliary blocks required and the length of each auxiliary block depend on the frame being added. Auxiliary blocks are built with final translation data.

(4) The new auxiliary block(s) is linked to the subtranslator. At this point the subtranslator has an unused word for each new auxiliary block. These word(s) are initialized to the starting address of the new auxiliary block(s). Bit 22 in the subtranslator word is set which inhibits call processing and diagnostic programs from using the translation data. The existence of the unused word(s) is guaranteed by (1) and (2).

4.10 The updating procedure for both types of translators is the same; the only difference is the names of the memory blocks involved.

B. Category II

4.11 These changes consist of entering RC messages to activate the MS points and CPD points used to scan or control unit type (frame) equipment. These changes are called

(a) updating MSN to unit type number translator

(b) updating CPD number to unit type number translator.

4.12 In offices other than those adding centrex data links, bit 22 in the unit type subtranslator words is set, which points to the new auxiliary block for most frames. Bit 22 in the auxiliary block pointer(s) is set in Category I update of translations when the new auxiliary blocks are built. Bit 22 of the auxiliary block pointers is removed (zeroed) in Category II update of translations for most additions except LLN and TLN frames. When the growth involves LLN or TLN frames, bit 22 of the auxiliary block pointers is removed (zeroed) in Category III update of translations.

C. Category III

4.13 For some frames certain point assignments mentioned for Category II are made in Category III; that is, part of the assignments are made in Category II and the rest of the assignments in Category III. In many cases there are no Category III translation changes.

D. Category IV

4.14 These changes are required for LLN growth only. These changes consist of assigning scan point SC00 to unit type number translator.

TRANSITIONAL PARAMETER MODULE

4.15 Depending on the type of equipment being added, one or more sets of transitional parameter modules may be required. Some office additions do not require a transitional parameter module. A transitional parameter module (furnished by WE) defines growth units during the interval that growth frames are tested and gradually introduced into the system. This parameter module differs from the final parameter module only in the sense that selected words and constants contain numerical values that do not reflect the existence of growth frames to call-processing programs. In this way, access to growth frames by growth and diagnostic programs is allowed while access by call-processing programs is denied. This approach is used to reduce the number of parameter changes which must be made on the job during the interval of office growth.

4.16 The data for a transitional parameter module is prepared by taking the information for a final parameter module and backing off selected numerical values. After the transitional module is installed, changes are made in the parameter data at certain intervals as the installation progresses. With each change or transition, the parameter data approaches more closely the final data to be contained in the parameter module. The final parameter module is by definition that data contained in the module after the last transition has been made, and all growth frames are fully operational. It is imperative that the final data be correct. If invalid parameter data is entered into the system, serious problems may result, including the complete loss of call-processing programs. The updates of the transitional parameter module are segmented into categories which are performed at specific time intervals.

4.17 Parameter cards used to update the transitional parameter module are normally written

at the office. The following procedure has the advantage that the parameter cards may be obtained well in advance before they are actually needed. The parameter cards are obtained in the following way:

(1) Addresses of words which must be changed are determined.

(2) A T-PATTERN message is used to print out the present parameter information (later used for verification).

(3) Addresses are verified via T-READ messages.

(4) The necessary RC messages are entered.

(5) New information is card written into a spare module by using the procedures in Section 231-104-301 or onto single cards by using the procedures in Section 231-104-302.

(6) One copy of the present module or card(s) is removed from the PS and is ***saved.*** The module or card(s) just written is inserted into the PS, but the PS is not returned to service.

(7) A PS-SWTCHIN message is used, and the T-PATTERN message given in (2) is repeated to obtain a new copy of parameter information.

Note: The PS-SWTCHIN and T-PATTERN messages permit reading information from an out-of-service PS.

(8) New parameter information is verified.

(9) The module or card(s) containing the new parameter information is removed from the card writer and the original module or card(s) which was removed in (6) is replaced. These steps yield one copy of new parameter information.

(10) Steps are repeated to obtain a duplicate copy of parameter information. ***Both copies of all parameter updates are obtained in the UPDATE mode of card writing.*** (When both copies are obtained in the UPDATE mode, each copy is obtained independently of the other. If these independently obtained copies agree, there is less probability of errors occurring.)

4.18 Category II parameter updates are introduced to the system in a diagnostic configuration procedure, and Categories III, IV, and V parameter updates are introduced during an integration procedure. These updates are introduced into the system by

(1) Forcing the system to run on a single copy of the old parameter information

(2) Loading the updated information into the out-of-service PS

(3) Configuring the system to run on the updated information (PS-CØNFIG message)

(4) Replacing the old information in the other PS, and finally

(5) Returning the system to normal duplicate running status.

PARAMETER CHANGES

4.19 Parameter information is used in No. 1 ESS offices to define to the system the quantity of each frame type contained in the office. The parameter information is located in the PS and changes only when additions are made to an office.

4.20 During growth, parameter information must be updated so that the system will be cognizant of the new frames. The TELCO orders parameter information on form E-8056 (2-wire) or E-8064 (4-wire). This is processed by the WE Regional Center and is combined with the office set card record to produce the final parameter data.

4.21 The following steps should be performed to obtain a correct list of RC messages required to update parameters.

(1) Use the associated BSP to form a detailed list of RC messages. Include the addresses and parameter data in the list.

(2) Compare this list with the RC messages on the GRC xxxx.3 form. Any differences between the two should be reconciled. Report errors found in any BSP by using the procedure in Section 000-010-015. Report any errors in the GRC forms to the WE regional engineer.

(3) Verify the corrected list by comparing it to the RC:PSWD messages (2-wire) or RC-CHPSWD

messages (4-wire) found in the PDA (paragraphs 3.22 and 3.23).

A. Category I

4.22 No parameter changes (updates to the transitional parameter module) are made in Category I.

B. Category II

4.23 Category II parameter changes are made to permit diagnostic testing on the growth frames.

4.24 In offices adding centrex data links, the highest member number table (mnemonic X2LMN) must be updated in Category II update of parameters. In other offices this update is not required.

4.25 Additional changes may be required in Category II. Any additional changes depend on the frame being added.

4.26 When several frames of the same type are added, they are added in parallel when possible in order to keep the installation interval as short as possible.

C. Category III

4.27 Category III parameter changes are made to complete the addition for all frames except LLN frames. The changes required depend on the frame being added; not all frames require Category III parameter changes.

D. Category IV

4.28 Category IV parameter changes are made to make the new LS frames or circuits available to the call-processing program. These changes consist of updating parameter tables to permit scanning in the new LS frames or circuits.

5. SEQUENCE OF ADDITIONS

5.01 Frames and equipment are added to an ESS office in a sequence engineered by WE. 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.

SEQUENCE OF FRAME ADDITIONS

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

- ***Group I***

  Power Distributing Frame

  Program Store Frame

  Central Pulse Distributor Frame

  Central Control Call Store Frame

  Signal Processor Call Store Frame

  Signal Processor

- ***Group II***

  Master Scanner (Master scanner frame, Master scanner combined miscellaneous frame, or Master scanner HILO miscellaneous frame)

  Miscellaneous Trunk Signal Distributor (Miscellaneous Trunk Frame Signal Distributor Frame, Combined Miscellaneous Trunk Frame Signal Distributor Frame, or HILO Miscellaneous Trunk Signal Distributor Frame)

- ***Group III***

  Ferreed or Remreed Line Link Network (Line Junctor Switch and Line Switch Frames or Circuits)

  Ferreed or Remreed Trunk Link Network (Trunk Junctor Switch and Trunk Switch Frames or Circuits)

  Universal Trunk (Universal Trunk Frame, Miniaturized Universal Trunk Frame, or HILO Universal Trunk Frame)

Supplementary Trunk Test Frame

Auxiliary Test Frame

Manual Trunk Test Frame

Auxiliary Manual Trunk Frame

Miscellaneous Trunk/TTY Frame

Miscellaneous Trunk/SXS Frame

Centrex Data Link Frame and Units (Centrex Consoles and/or Centrex Nonconsoles)

Miscellaneous Trunk Frame

Protector Frame

Recorded Announcement Frame

Common System Record Announcement and Control and Distribution Frames

Trunk Distributing Frame

Main Distributing Frame

Intermediate Distributing Frame

Miscellaneous Frame

Junctor Grouping Frame

Automatic Identified Outward Dialing

Remote Office Test Line Frame

Attendant Interface Frame

Dynamic Overload Control Receiver Circuit with Receiver Loop 0

Dynamic Overload Control Receiver Loops (excluding Loop 0)

Dynamic Overload Control Transmitter Frame

Processor Interface Frame

Peripheral Unit Controller/Data Link

Peripheral Unit Controller/Digital Carrier Trunk

CCIS Data Terminal Frame

CCIS Data Terminals

Loop Range Extension Frame

Trunk and Service Circuit Equipment.

5.03 A general list of specific activities to add frames is given in paragraph 5.04. The sequence in paragraph 5.04 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 WE regional engineer.

SEQUENCE OF ACTIVITIES IN A TYPICAL ADDITION

5.04 When office growth is made, the required activities are normally performed in the sequence listed below. Many steps are performed by WE installation, and these steps are listed only to give continuity to the overall process.

- ***Steps Performed for All Frames Being Added***

(1) Erection of frames.

(2) Ground tests.

(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) Category I update of translations (performed prior to or in parallel with the above steps).

- ***Steps Performed Only if Group I Frames Are Being Added***

(10) Verification of private signal leads.

(11) Connection and verification of communication bus.

Note: Steps (12) through (16) are performed for each individual Group I frame. Steps are repeated for additional frames. If the growth involves CC to SP conversion along with other Group I frames, Steps (12) through (16) for the SP community frames are performed after completion of (12) through (16) for the other Group I frames.

(12) Category II update of translations.

(13) Growth programs.

(14) Category II update of parameters.

(15) Diagnostics.

(16) Category III update of parameters.

- ***Steps Performed Only if Group II Frames Are Being Added***

Note: When several Group II frames of the same type are added, they are added in parallel up to Category II update of parameters. Beginning with Category II parameters, the frame additions are completed individually beginning with the lowest member number. Procedures are repeated for subsequent member numbers.

(17) Verification of private signal leads.

(18) Connection and verification of communication bus.

(19) Scanner wiring (mate scanners).

(20) Installation of transitional parameters.

(21) Configuration and restart.

(22) Category II update of translations.

(23) Category II update of parameters.

(24) Diagnostics.

(25) Growth programs.

(26) Category III update of translations.

(27) Category III update of parameters.

- ***Steps Performed Only if Group III Frames Are Being Added***

(28) Verification of private signal leads.

(29) Connection and verification of communication bus.

(30) Scanner wiring (mate scanners).

(31) Installation of transitional parameters.

(32) Configuration and restart.

(33) Category II update of translations.

Note: Steps (34) through (39) are performed in sequence individually for each Group III frame.

(34) Category II update of parameters.

(35) Diagnostics.

(36) Growth programs—Phase II.

(37) Category III update of translations.

(38) Category III update of parameters.

Note: Steps (39) through (43) are required only for LLN and TLN network additions. For all other Group III additions, proceed to Step (44).

(39) Category IV update of translations.

(40) Category IV update of parameters.

(41) Bring Category IV parameter updates into service.

(42) Category V update of parameters (4-wire generics).

(43) Reconfiguration procedures.

(44) Junctor redistribution.

Note: A junctor redistribution is required when junctor switch (JS) frames or circuits are added or when the junctor occupancy between networks is expected to change significantly as a result of growth. In some cases, more than one redistribution may be required.

- ***Steps Performed Only if Trunk and Service Circuit Equipment is Being Added***

(45) Update translations for any first-of-a-kind circuits being added (paragraph 5.07)

(46) Install parameter modules, if required, which include trunk and service circuits (paragraph 5.06)

(47) Separate the new circuits into the following classifications:

(a) Circuits to be assigned to existing networks

(b) Circuits to be assigned to new networks or frames

(c) Circuits to be assigned to service link network.

Note: Steps (48) through (51) are performed only when adding circuits to existing networks.

(48) Translations updated and trunks assigned to a special trunk group (trunk group 000 in 2-wire offices or an unassigned trunk group number in 4-wire offices).

(49) Circuits and translation information checked via system diagnostic programs or manual testing.

(50) Circuits taken out of special trunk group, assigned to their active trunk group, and operationally tested.

(51) PS memory cards updated.

Note: Steps (52) through (58) are to be performed only when adding circuits to a new network.

(52) Complete growth program tests on the associated new network(s).

(53) Translations updated and trunks assigned to a special trunk group (trunk group 000 in 2-wire offices or an unassigned trunk group number in 4-wire offices).

(54) Perform a junctor redistribution to permit testing the new circuits. The junctor redistribution can be complete or a partial junctor redistribution using borrowed subgroups.

Note: The partial junctor redistribution has the advantage over a complete junctor redistribution in that it permits testing of circuits in advance of the regular office redistribution.

(55) Circuits and translation information checked via system diagnostic programs or manual testing.

(56) PS memory cards updated.

(57) If a partial junctor redistribution using borrowed subgroups was performed, return the borrowed subgroups to their operational networks, then perform a complete junctor redistribution.

(58) Circuits taken out of special trunk group, assigned to their active trunk group, and operationally tested.

Note: Steps (59) through (65) are to be performed only when adding service link network circuits.

(59) Update translations for route indexes, trunk class code, and trunk group number.

(60) Test access connection and translations.

(61) Connect new service circuits using trunk group 0.

(62) Circuits and translation information checked via system diagnostic programs.

(63) Connect junctors and trunks.

(64) Activate service circuits.

(65) PS memory cards updated.

- ***Special Considerations if Trunk and Service Circuit Equipment Are Being Added***

5.05 Trunk and service circuits are normally added in parallel with Group III frames after all Group I and Group II frames have been added.

5.06 Not all trunks require changes in parameters. The following circuits require parameter changes before the trunks are operational:

- Receivers and transmitters
- Ringing circuits

- Coin circuits
- TOUCH-TONE® station ringer test circuits
- Conference circuits
- Attendant loop circuits.

5.07 If any of the following circuits are first-of-a-kind in an office, their associated translations must be inserted before the associated parameter modules are installed.

- Ring 1- and 2-party
- Customer dial pulse receiver*
- TOUCH-TONE call detector
- Trunk dial pulse receiver
- Revertive pulse receiver
- Revertive pulse transmitter
- Ring trunk
- TOUCH-TONE station test
- Incoming trunk step by step
- Multifrequency receiver.

*When changing route index 0077 to customer dial pulse receiver trunks only, location F4RILL bit 8 is set to 1 after translation changes are made.

OPERATING SYSTEM REQUIREMENTS AND PREREQUISITES

5.08 A summary of operating system requirements to add new frames is given in Table D.

5.09 Figure 3 shows in flowchart form the sequence of an office addition emphasizing prerequisites.

TYPICAL SEQUENCING EXAMPLE

5.10 Figure 4 shows a typical office addition. This example includes a pair of power distributing (PDs) frames, a PS, a CPD, two CSs, two MSs, one miscellaneous trunk supplementary signal distributor (MI/SSD), one LLN, one TLN, one universal trunk (UT) frame, five miscellaneous trunk (MTs) frames, and various trunk and service circuits. The following conditions exist:

(1) Power for Group I frames is from the existing office.

(2) Customer dial pulse receivers will be placed on the first two growth MTs and assigned to the growth TLN.

(3) Two junctor redistributions are scheduled; the first includes the TLN.

(4) Revertive pulse receivers and transmitters are being placed in the office for the first time.

(5) Office records indicate that PS space is available for the Group I frames only.

(6) MS points are available for the growth PDs, growth PS, growth CPD, growth CSs, and one growth MS.

(7) Private signal leads and CPD assignments for all growth peripheral units are assigned to growth CPDs and growth MSs.

(8) All growth peripheral units are on the same peripheral unit bus (PUB) as the first growth MS.

5.11 Figure 4 illustrates the sequencing of activities and also the activities which can be performed in parallel.

6. ABBREVIATIONS

6.01 The abbreviations are given as follows:

A&M—Addition and maintenance

AIOD—Automatic identified outward dialing

ANI—Automatic number identification

B—Base number

BSP—Bell System practice

CC—Central control

CCIS—Common channel interoffice signaling

CMT—Combined miscellaneous trunk

CS—Call store

CPD—Central pulse distributor

DN—Directory number

ESS—Electronic switching system

F/C—Frame (ferreed) or circuit (remreed)

GRC—Growth recent change

HMT—HILO 4-wire miscellaneous trunk

HUT—HILO 4-wire miniaturized universal trunk

JS—Junctor switch

LEN—Line equipment number

LJS—Line junctor switch

LLN—Line link network

LSF—Line switching frame

MCC—Master control center

MD—Manufacture discontinued

MOP—Method of procedure

MS—Master scanner

MT—Miscellaneous trunk

MTF—Miscellaneous trunk frame

MUT—Miniaturized universal trunk

PD—Power distributing

PDA—Parameter Data Assembler

PMT—Path memory for trunks

PS—Program store

PUB—Peripheral unit bus

RC—Recent change

SD—Signal distributor

SP—Signal processor

STD—Standard

TELCO—Telephone company

TJS—Trunk junctor switch

TLN—Trunk link network

TTY—Teletypewriter

UT—Universal trunk

WE—Western Electric.

TABLE D

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	SIGNAL DISTRIBUTOR POINTS
I	Program Store		X	X		X	†X
	Central Pulse Distributor		X			X	
	Call Store		X	X		X	†X
II	Master Scanner	X	X	X	X	X	
	Miscellaneous Trunk Signal Distributor	X		X		X	X
III	*Peripheral	X	X	X	X	X	X
IV	*Trunk and Service Circuit Equipment	X	X	X	X	X	X

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

† A program store or call store addition may require a monitor lockout circuit in which case a number of consecutive signal distributor points are needed. Of those required at least one of each type of monitor lockout circuit must have signal distributor points assigned in an operational frame.

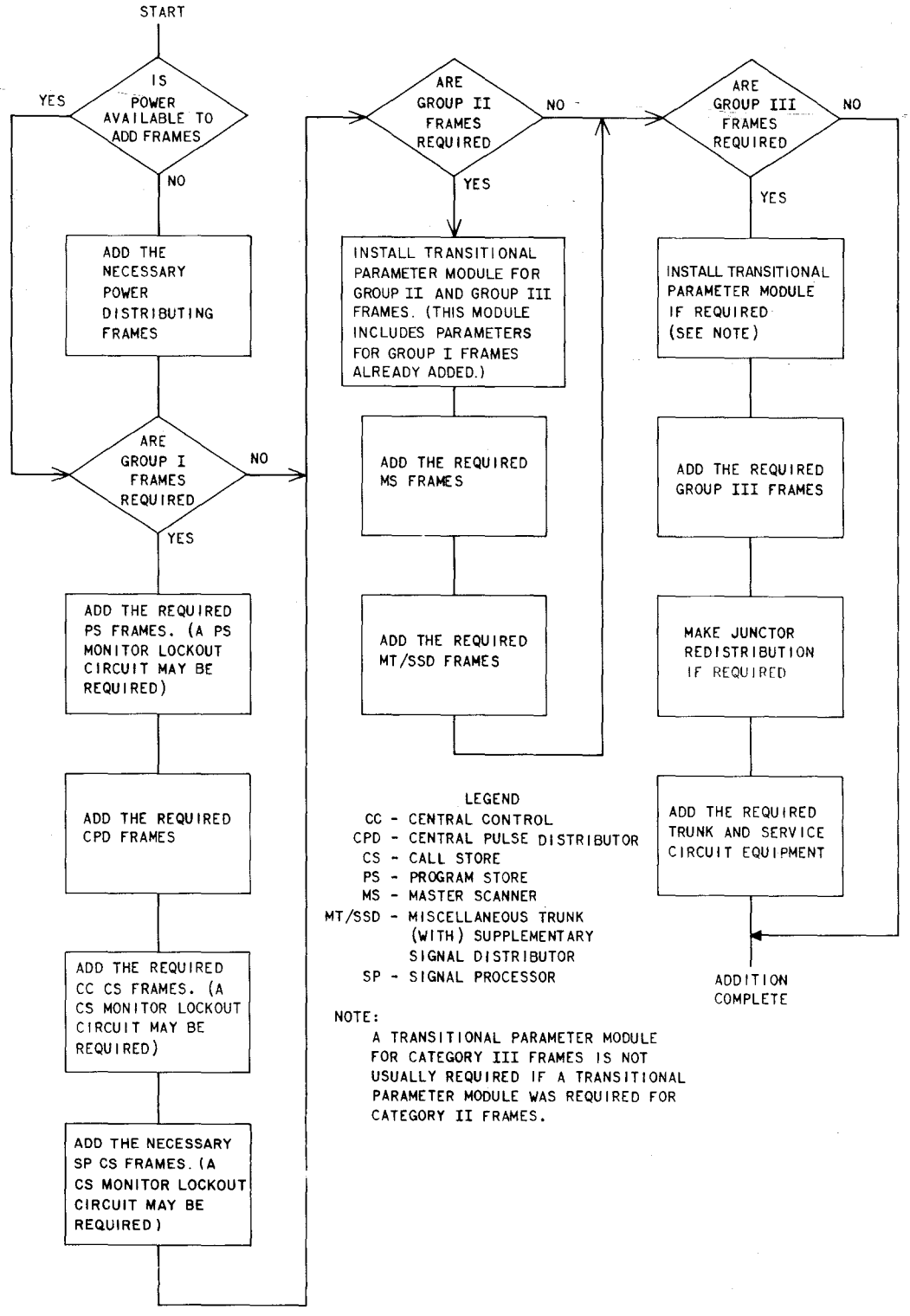
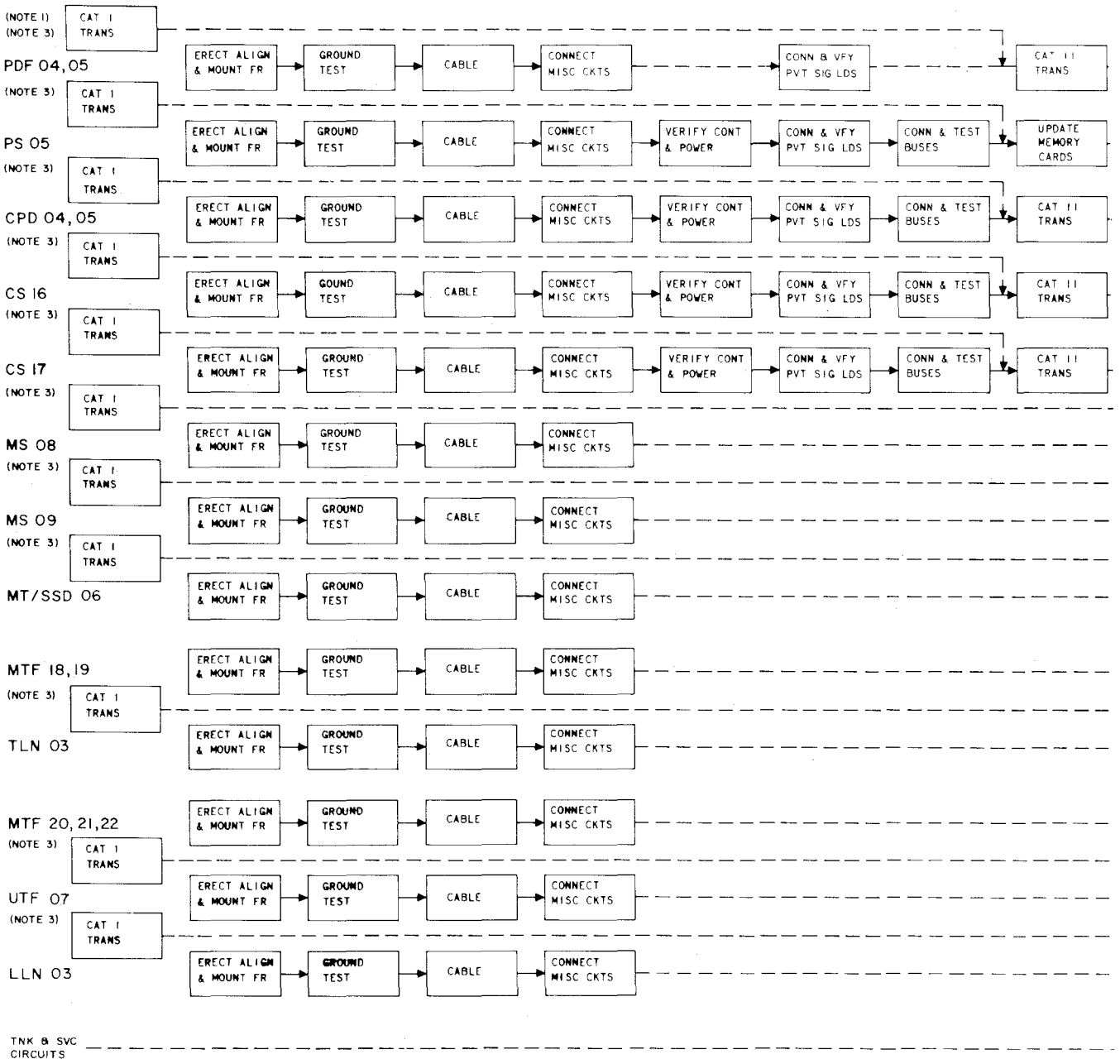
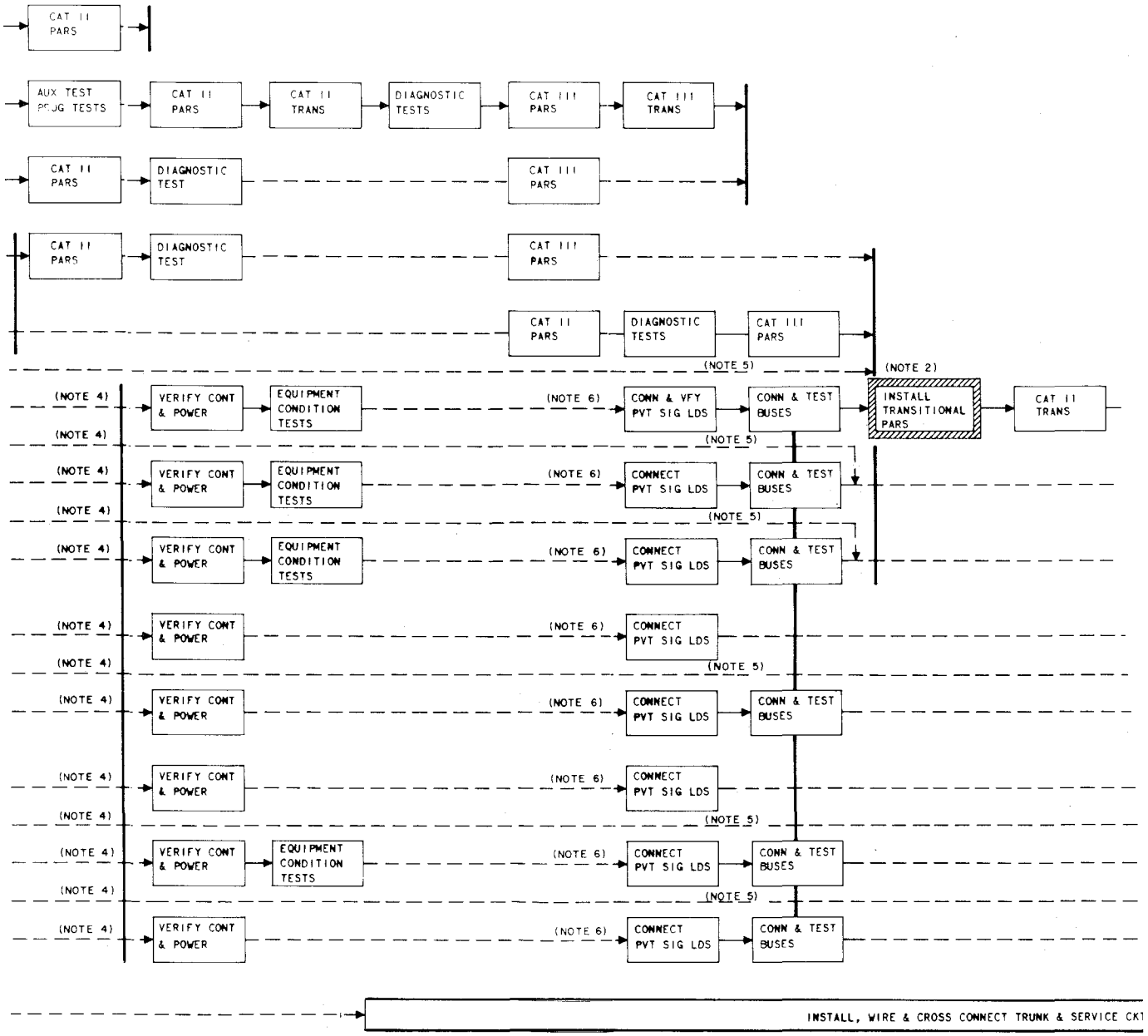


Fig. 3—Sequence of Additions


(NOTE 1)
(NOTE 3)
CAT I TRANS
PDF 04,05
(NOTE 3)
CAT I TRANS
PS 05
(NOTE 3)
CAT I TRANS
CPD 04,05
(NOTE 3)
CAT I TRANS
CS 16
(NOTE 3)
CAT I TRANS
CS 17
(NOTE 3)
CAT I TRANS
MS 08
(NOTE 3)
CAT I TRANS
MS 09
(NOTE 3)
CAT I TRANS
MT/SSD 06
MTF 18,19
(NOTE 3)
CAT I TRANS
TLN 03
MTF 20,21,22
(NOTE 3)
CAT I TRANS
UTF 07
(NOTE 3)
CAT I TRANS
LLN 03
TNK & SVC CIRCUITS
ERECT ALIGN & MOUNT FR
GROUND TEST
CABLE
CONNECT MISC CKTS
VERIFY CONT & POWER
CONN & VFY PVT SIG LDS
CONN & TEST BUSES
CAT II TRANS
UPDATE MEMORY CARDS


CAT II PARS
AUX TEST PROG TESTS
CAT II PARS
CAT II TRANS
DIAGNOSTIC TESTS
CAT III PARS
CAT III TRANS
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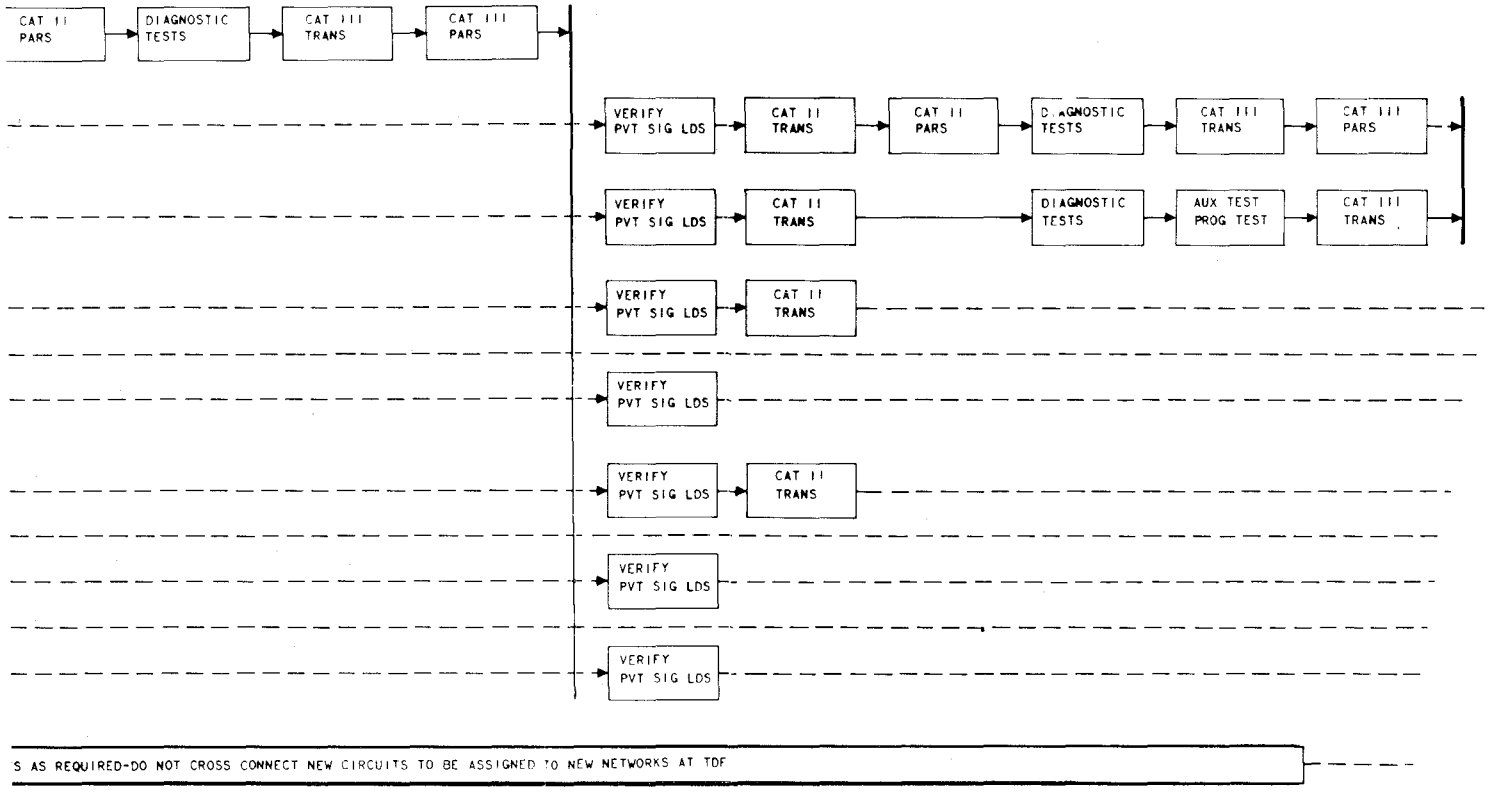
CAT II PARS
DIAGNOSTIC TESTS
CAT III PARS
(NOTE 5)
(NOTE 2)
(NOTE 4)
VERIFY CONT & POWER
EQUIPMENT CONDITION TESTS
(NOTE 6)
CONN & VFY PVT SIG LDS
CONN & TEST BUSES
INSTALL TRANSITIONAL PARS
CAT II TRANS
CONNECT PVT SIG LDS
INSTALL, WIRE & CROSS CONNECT TRUNK & SERVICE CKT


CAT II PARS
DIAGNOSTIC TESTS
CAT III TRANS
CAT III PARS
VERIFY PVT SIG LDS
CAT II TRANS
CAT II PARS
DIAGNOSTIC TESTS
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CAT III PARS
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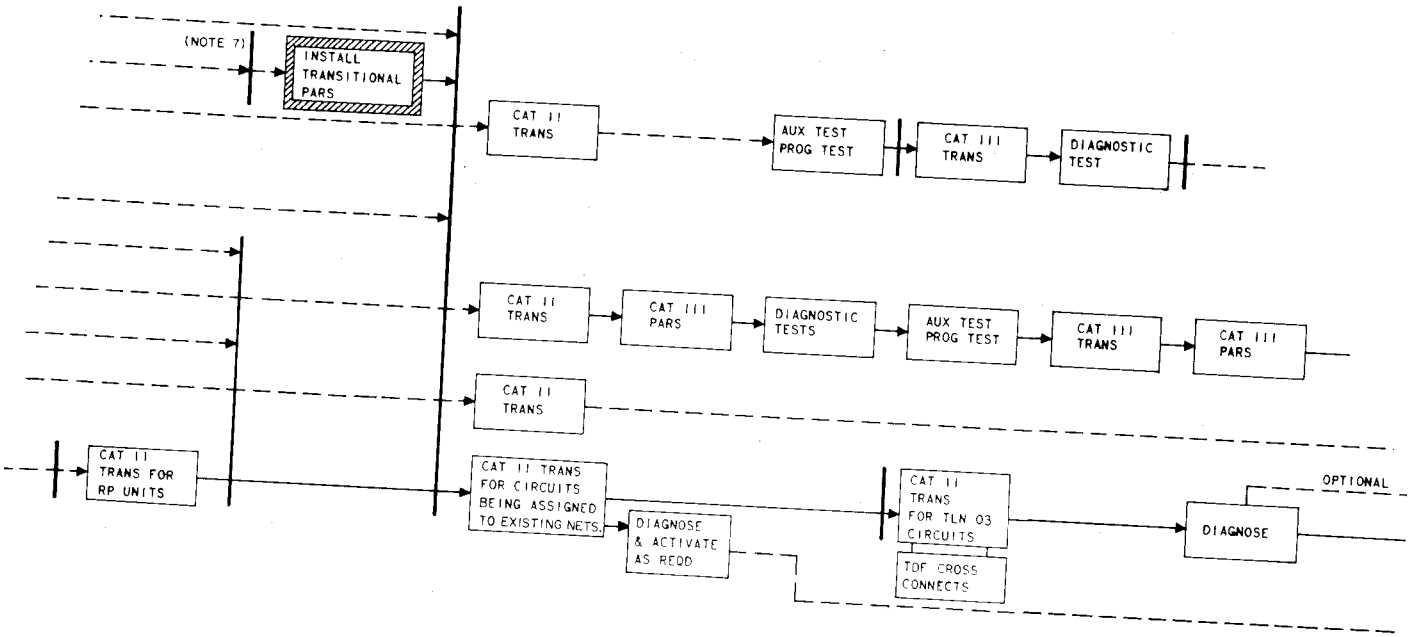
CAT II TRANS
VERIFY PVT SIG LDS
VERIFY PVT SIG LDS
S AS REQUIRED-DO NOT CROSS CONNECT NEW CIRCUITS TO BE ASSIGNED TO NEW NETWORKS AT TDF


(NOTE 7)
INSTALL TRANSITIONAL PARS
CAT II TRANS
AUX TEST PROG TEST
CAT III TRANS
DIAGNOSTIC TEST
CAT II TRANS
CAT III PARS
DIAGNOSTIC TESTS
AUX TEST PROG TEST
CAT III TRANS
CAT III PARS
CAT II TRANS
CAT II TRANS FOR RP UNITS
CAT II TRANS FOR CIRCUITS BEING ASSIGNED TO EXISTING NETS
DIAGNOSE & ACTIVATE AS REQD
CAT II TRANS FOR TLN 03 CIRCUITS
TDF CROSS CONNECTS
OPTIONAL
DIAGNOSE

NOTES:

1. POWER FOR ALL GROUP I FRAMES IS OBTAINED FROM EXISTING PD FRAMES, THEREFORE PD'S NEED ONLY TO BE AVAILABLE AS SHOWN.
2. PARAMETERS INCLUDE ALL GROUP I FRAMES AND TRANSITIONAL FOR GROUP II (MS'S & SSD). (IN THIS EXAMPLE, TWO SETS OF TRANSITIONAL PARAMETER MODULES ARE REQUIRED DUE TO MS POINT REQUIREMENT.)
3. ADD CAT I'S AS PERMITTED BY SYSTEM BEGINNING WITH PDF'S IN ORDER. IF PS LIMITATION IS REACHED, DELAY REMAINDER UNTIL NEW PS IS INTEGRATED INTO SERVICE.
4. POWER AVAILABLE FROM NEW PDF.
5. IN THIS EXAMPLE, PS SPACE IS NOW AVAILABLE FOR CAT I TRANSLATIONS.
6. BOTH CONNECTION & VERIFICATION ARE NORMALLY DONE TOGETHER, HOWEVER IN THIS EXAMPLE, VERIFICATION OF OTHER THAN MS08 IS DONE AFTER MS08 IS IN SERVICE.
7. PARAMETERS FULLY INCLUDE GROUPS I & II ALREADY ADDED - TRANSITIONAL FOR ALL GROUP III & GROUP IV EQUIPMENT.
8. THIS REDISTRIBUTION IS NOT NORMALLY REQUIRED.
9. THIS LAST PARAMETER UPDATE IS EQUIVALENT TO INSTALLING FINAL PARAMETERS. FINAL PARAMETER MODULES ARE NO LONGER REQUIRED.

LEGEND

AUX - AUXILIARY
CAT - CATEGORY
CKTS - CIRCUITS
CONN - CONNECT
CONT - CONTINUITY
CPD - CENTRAL PULSE DISTRIBUTOR
CS - CALL STORE
FR - FRAME
LDS - LEADS
LLN - LINE LINK NETWORK
MISC - MISCELLANEOUS
MS - MASTER SCANNER
MTF - MISCELLANEOUS TRUNK FRAME
MT/SSD - MISCELLANEOUS TRUNK SUPPLEMENTARY SIGNAL DISTRIBUTOR
NETS - NETWORKS
PARS - PARAMETERS
PDF - POWER DISTRIBUTING FRAME
PROG - PROGRAM
PS - PROGRAM STORE
PVT - PRIVATE
REDIST - REDISTRIBUTION
REQD - REQUIRED
RP - REVERTIVE PULSING
SIG - SIGNAL
SVC - SERVICE
TDF - TRUNK DISTRIBUTOR FRAME
TLN - TRUNK LINK NETWORK
TNK - TRUNK
TRANS - TRANSLATIONS
UTF - UNIVERSAL TRUNK FRAME
VFY - VERIFY

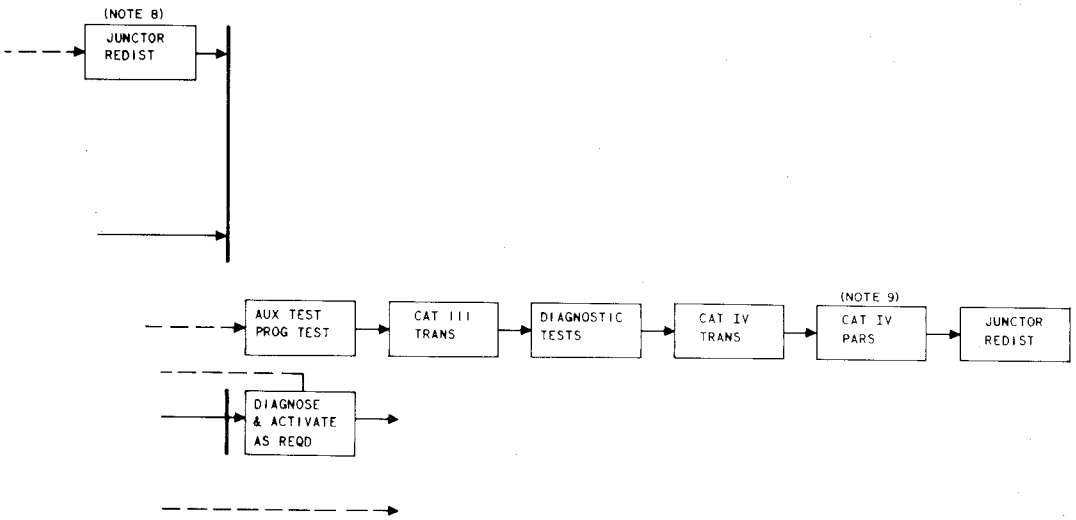


Fig. 4—Example of a Typical Office Addition