SWITCHING SYSTEMS MANAGEMENT

NO. 4A AND 4M SWITCHING SYSTEMS

ASSIGNMENT PRACTICES

ELECTRONIC TRANSLATOR SYSTEM AND PERIPHERAL BUS COMPUTER

1. GENERAL

1.01 The network administrator is responsible for the preparation, assembly and maintenance of basic office records required for programming the electronic translator system (ETS) and the peripheral bus computer (PBC). Programming is accomplished by the formatted entry of office data ascending to instructions contained in Translation Guide TF 4A/ETS issued by the Western Electric Company.

1.02 This section is being reissued to contain only the administrative considerations required in completion of form codes associated with programming of the 4A/ETS and the 4A/ETS/PBC. The network administrator is referred to the Translation Guide for detailed form code instructions.

2. TERMINOLOGY

A. Stored Program Control

2.01 The ETS consists of a stored program control (SPC) type machine equipped with the necessary interface circuits and components to store, read and translate the necessary data to activate the electromechanical components of a 4A System. Fig. 1 shows a block diagram of a 4A with ETS.

B. Store Frames

2.02 Store frames are the actual memory storage areas of the SPC. The amount of memory space depends on the number of store frame pairs the office has equipped. All memory is duplicated to provide service protection in the event of trouble.

2.03 The store frames contain two basic types of memory, protected and unprotected. The protected memory contains systems programs and semipermanent data that are safeguarded against accidental destruction. The unprotected memory is that area containing temporary data that is constantly being altered during call processing.

C. Generic Program

2.04 This program is designed and compiled by the Bell Laboratories. It informs the SPC of call processing procedures and the various maintenance and diagnostic routines to be performed on the ETS.

2.05 The generic program frequently undergoes changes, some minor, some major. It is important that the network administrator understand the call processing program and how the generic program will treat all conditions. WECo will issue program documents with each new issue of the generic program. It is important that the network administrator study these documents to understand what functions have been incorporated in the new generic.

D. Data Tables

2.06 The data tables are compiled from all of the information submitted by the network administrator, routing supervisor and the Western Electric Engineer on ETS Form Codes. The tables describe the incoming trunks and their associated trunk classes, incoming senders, outgoing trunks and classes, office routing patterns and the required digit translation.

2.07 It is necessary for the network administrator to have a working knowledge of most of the tables and their interrelationships.

E. Compiler Program

2.08 The compiler program, designed by the WECo is the processing checking, validating and packing of the data tables into the available memory space. The network administrator should receive at least one copy of the compiler program (compiler data listing) output when the ETS translation job is completed. This allws the verification of input data.

F. Decompile

2.09 Decompile is a WECo program to identify existing machine data from the various data tables. Present memory is "dumped" onto magnetic tape and then printed out for verification by the machine administrator. This step is necessary before a recompile can be performed on a given office.

G. Recompile

2.10 Recompile is a process where future needs as well as immediate requirements can be implemented on existing ET machines. New tables can be built in memory for later activation, and existing data will be "repacked" for more efficient use and logical growth patterns.

2.11 Translation Guide TF 4A/ETS, Division 4, 5, and 6, contain additional information on the generic programs, data tables compiler program and on decompile/recompile.

H. Peripheral Bus Computer

2.12 The PBC is a minicomputer manufactured by Digital Equipment Corporation (DEC). It acts as a peripheral processor of the ETS, and will collect all peg count and traffic usage data. It will do reorder analysis, and provide the network administrator and the network manager with data, in time frames required to properly administer their respective areas of responsibility.

The PBC complex consists of four cabinets, three provided by DEC which contain the processor and memory and an interface cabinet furnished by the Western Electric Co.

The PBC is required for ETS generic Issue 9 and subsequent programs.

3. PRELIMINARY STEPS

3.01 Translation Guide TF 4A/ETS can be ordered from:

> Western Electric Co., Inc.
> Reproduction Organization
> Dept. 4236-2
> Building 23-6
> Hawthorne Station
> Chicago, Illinois 60623

3.02 The ordering information is:

> New-Standing Order (qty) Document TG 4A ETS Translation Guide #4A ETS — Complete (include binders and complete set of index tabs for each document and all subsequent issues.)

3.03 Before attempting to fill out the forms provided with the Translation Guide it is important to verify that the network administrator has the latest issue. Forms and/or instructions are frequently updated. When new pages are issued, old pages should be discarded to avoid possible conflicts with the compiler program.

3.04 Division 10 of the Translation Guide contains copies of all forms, printed on heavier stock. These should be used for local printing of each form, as required.

4. PREPARING FORM CODES

A. General

4.01 The input to the electronic translator system — office data compiler system (ETC — ODCS) is provided by IBM cards, punched from information specified in the E-8075 forms prepared by the Telephone Company. *The data required in the questionnaire must be exact and any variations from the standard format or instructions may cause compiler system delays.*

4.02 The network administrator is responsible for the completion of many of the form codes associated with the initial job. These are listed in the following paragraphs and summarized in Fig. 2. Instructions for completing the forms are contained in the Translation Guide. Most entries are determined by office layout, trunk group size, routing structure, etc. Some entries, however, require administrative decision. The following paragraphs briefly describe each form for which the network administrator is responsible. Only those entries requiring administrative decision are discussed in detail in this practice.

B. Form Codes 01A and 01B

4.03 The network administrator is responsible for form 01A (ETS) and 01B (ETS/PBC). These forms describe each *incoming* trunk group and its associated members. It shows the equipment location by the sender link frame appearance of each member. Each form can accommodate up to 40 trunks in a particular trunk group.

4.04 Traffic Separation (ITSP) is used to specify one of four classes for Division of Revenue. Each office has to define what each class will

represent. **This information is also of value to the network manager and the layout of classes should be done with the network manager. However, assignments must be made to meet the requirements for Division of Revenue.**

4.05 Screening class (SCL) is used to allow access to different outgoing trunk groups for the same dialed digits. The network administrator can use screening to restrict unauthorized traffic from a given route. Screening should be done in consultation with the routing supervisor. An example of the use of screening is shown in Division 3 of the Translation Guide.

> *Caution: Screening should not be used indiscriminately as it does require 16 words of memory for each screening table. The network design engineer should be advised of office screening requirements so that sufficient store frames (memory space) will be provided.*

C. Form Codes 02 Series

4.06 The 02 forms are the responsibility of the routing supervisor. Instructions for completing these forms are contained in the Translation Guide.

4.07 *No attempt should be made to alter, modify or manufacture routing information without the consent of the routing supervisor.*

D. Form Code 03 Series

4.08 The 03 series of forms is also the responsibility of the Routing Supervisor. These forms cover the routing of Inward WATS calls. The machine administrator should be familiar with the handling of Inward WATS traffic and its unique method of translation. Detailed information is available in the Translation Guide.

E. Form Codes 04A and 04B

4.09 The network administrator is responsible for form 04A (ETS) and 04B (ETS/PBC). These forms describe outgoing trunk groups and the outgoing portion of 2-way trunk groups. The network administrator should consider future growth when completing these forms. Preplanning should include both trunk groups that are expected to

exceed their normal configuration and known new groups, expected in the future.

4.10 When more than one group of trunks are provided to an office and they are designed to handle different types of traffic, it may be desirable to arbitrarily assign them different trunk group names for ease in data collection and validation. If part of a trunk group is scannable and part non-scannable they *must* be given different group names or suffixes.

4.11 Trunk Group Peg Count and Overflow Registers are assigned on form 04A (ETS). There are 1000 register assignments possible, from 000 to 999. The network administrator can assign these registers in various patterns, to obtain the most usable configuration of printout data. Possible arrangements could be by network regions, by subtending network, by ownership, by alternate route patterns, etc. It is advisable to keep the number assigned to a minimum. The longer the list of registers the more time is required to print out data.

F. Form Code 05

4.12 Form 05 is completed by both the routing supervisor and the network administrator. This form describes the routing patterns or treatments associated with each trunk group. A detailed explanation of this form is contained in Division 3 of the TG 4A/ETS.

4.13 This form also contains outgoing traffic separations classifications. The network manager may make use of the traffic separation data and should be consulted in the layout of the separation pattern. *However, the network administrator must recognize that the primary consideration in assignment must be to meet the Division of Revenue requirements.*

G. Form Codes 06 and 07

4.14 Forms 06 and 07 are the responsibility of the network administrator. Form 06 describes a route index with its multiple route pattern entries. It is normally used for announcement trunk groups and provides for spreading traffic equally over both trains. This will aid in minimizing congestion on one train. Form 07 is used to specify all of the announcement routes available in the

office. Instructions for completing these forms are in the TG 4A/ETS.

H. Form Code 08

4.15 This record will show the area code for each area of origin served by the office and where 10-digit intra-area dialing will be permitted. The local operating company determines whether 10-digit intra-area dialing is to be permitted. This form is the responsibility of the network administration.

I. Form Codes 09 and 10

4.16 These forms are used to identify test circuits, teletypewriters and data sets associated with the switching system. The forms are the responsibility of the network administrator. All required entry information is contained in the TG 4A/ETS.

J. Form Code 11

4.17 This form is the responsibility of the network administrator. It is used to describe the variable office parameters. The network administrator should give special attention to the four table lengths and spare words specified on this form. In all cases, unless memory space is limited, it is recommended that maximum length be specified for each table.

K. Form Codes 12 to 15

4.18 Forms 12 through 15 relate directly to network management functions and, therefore, the network manager will be the primary source for how these forms will be utilized. The forms are used to activate preplanned network controls within the switching system.

4.19 It is not necessary at time of cutover to request any or all functions of these form codes as they may be entered and activated by recent change procedure at any time. However, it is advisable to request at least one of each function covered by each form so that the network control console can be tested at the time of installation.

4.20 Forms 12, 13, 14, and 15 utilize 100 key positions to assign four types of network controls—

(a) Cancel traffic to or from a given point.

(b) Skip an in-chain route.

(c) Reroute traffic to an out-of-chain route.

(d) Code blocking on a 3- or 6-digit basis.

Since only 20 manual controls can be implemented at one time, judicious use of preplanned controls will increase overall control capability.

4.21 It is recommended that a master sheet be produced locally to list all 100 positions and their assigned functions to reduce double assignment errors. All controls requested on form codes 12, 13 and 15 can be implemented manually on a selected basis. Unless fixed cancels, skips, and/or code blocks are required on a recurring basis it may be desirable not to assign them to preprogram keys. Preprogrammed controls cannot be modified as quickly as manual inputs because they are entered in "protected memory" and can only be altered by a recent change message. For example, if a 100 percent Cancel, Skip or Code block were requested on forms 12, 13 or 15 respectively, and the control is activated, no variation could be made to this preprogrammed control in the percent, type of traffic affected or announcement route indicated without submitting a recent change message. However, manual changes from the network control console can be implemented immediately.

L. Form Code 16

4.22 This form is used to specify up to one hundred codes in a given domain (AC or NAC) that are classified as "hard to reach" during the implementation of network controls. This feature can be activated only by the higher ranking office only using remote entry positions 95 to 99 and they must be associated with a "cancel to" option as covered under form 12.

4.23 Although the network administrator is responsible for completing this form, the decision on what codes to classify "hard-to-reach" should be made jointly by the network managers of the local and higher ranking offices.

M. Form Code 17

4.24 This form is used for Traffic Overload Remote Control (TORC) in regional center offices. Regional offices have the ability to initiate reroutes of interregional traffic, making use of a

third, "via" regional office. Form 17 is used to specify the name and route index of the "From" trunk group. The "via" does not need identification on the form.

N. Form Code 18 (PBC Only)

4.25 This form generates the data tables used to score trunk block registers on calls routed to FRA or NCA. Completion of this form is a Network Administration responsibility.

O. Form Code 19 (PBC Only)

4.26 This form is used by the data compiler program to generate tables which will enable the PBC to identify by CLLI and number trunks causing stuck senders and sender retrials. The network administrator will complete this form using information obtained from the maintenance force's outgoing trunk identification circuit (OGTI) records.

P. Form Codes 20, 21 and 26 to 29

4.27 The Western Electric Co. engineer is responsible for completing these forms. Information on forms 20, 21 and 26 (PBC only) relates to sender assignments. Forms 27, 28 and 29 are used only in PBC offices. Form 27 associates TDC terminals with PBC register numbers. Form 28 records common control usage assignments and Form 29 is used to indicate the trunk type, CAMA or non-CAMA, per each span of 48 TUI or STUI terminals.

Q. Form 22 (PBC Only)

4.28 This form is used only to show the common language location identification (CLLI) of the switching system. It is the responsibility of the Network Administration.

R. Form 23 (PBC Only)

4.29 This form must be completed for all 4A/ETS/PBC offices. It shows, by trunk type, the number of trunk relays installed and the number of working trunks. The "number working" in a new machine will initially be an estimated figure. This should be updated prior to cutover. These data will be used as part of the Machine Load and Service Summary (MLSS) information. The Network Administration is responsible for this form.

S. Form 24 (PBC Only)

4.30 This form is used to describe the quantities of common control equipment dedicated for traffic use and for maintenance. It is the responsibility of the network administrator to complete this form.

T. Form Code 25 (PBC Only)

4.31 This form lists sender information by type and controller group association. The order in which this information is entered will determine the order of the printout. The network administrator should complete this form, leaving lines blank between sender types where growth is anticipated

U. Form Codes 31 and 35

4.32 These forms are used by the network administrator to record supplementary growth data and are required for any type of recompile. Information required to complete these forms is obtained from tables WETRK1 and WETRK2.

V. Assembling Completed Forms

4.33 It is the responsibility of the network administrator to assemble the completed forms, along with those from the routing engineer and forward the complete package to the equipment engineer. The equipment engineer will then submit it to the Regional Western Electric Center for key punching.

5. RECOMPILING OFFICE DATA TABLES

5.01 The purpose of the recompile program is to:

- Add new data for present and future needs.

- "Repack" the new and existing data in memory with maximum safety and efficiency allowing for future growth with minimal recent change activity.

- Provide new compiler data listing and load map.

5.02 The recompiling process requires consideration and planning as to the types of recompile

to best meet an office's needs. Four types of recompile are available:

- Type "0" will provide a current view of the data table contents for verification by the network administrator. No recompilation of data takes place.

- Type "1" is a data recompile of present data with no additions or changes being introduced.

- Type "2" is a complete recompile where new and preplanned data are combined with existing data.

- Type "3" is a complete recompile where new and preplanned data are combined with existing data and provides for a Peripheral Bus Computer (PBC) retrofit.

5.03 Type "0" has two main applications—First, when an office wishes to validate its current data tables, but does not require the addition or expansion of tables. The returned documents will consist of:

(a) New data load map showing packing and addresses of all tables.

(b) A printout showing line-by-line the various entries, form code oriented.

5.04 The second application is similar to above, but is for offices considering a complete recompile and it is known or suspected that nonstandard entries exist in memory. All entries must be consistent with input procedures established by the Bell Laboratories before a recompile can be performed.

5.05 Type "1" should be requested when an office requires:

(a) Repacking of present data—no additions.

(b) New data compile printout.

(c) New load map.

(d) Qm—Questionnaire printout of present memory, form code oriented.

(e) New data tape.

5.06 Type "2" should be requested when a full data recompile is required. This will take all existing data tables, add new requirements and provide the following:

(a) Repacking of present data with new or added data.

(b) New data compile printout.

(c) New load map.

(d) Qm—Questionnaire printout of present memory, form code oriented.

(e) Qg—Questionnaire printout of growth items, form code oriented.

(f) Qc—Questionnaire printout of composite memory, (old plus new data) form code oriented.

(g) New data tape.

5.07 Type 3 should be requested when a full data recompile is required for an existing in-service ETS office retrofitting to PBC. This will take all existing data tables, add new requirements and permit the retrofitting to PBC.

5.08 The following will be provided:

(a) Repacking of present data with new added data.

(b) New data compile printout.

(c) New load map.

(d) Qm—Questionnaire printout of present memory, form code oriented.

(e) Qs—Questionnaire printout of growth items, form code oriented.

(f) Qc—Questionnaire printout of composite memory, (old plus new data) form code oriented.

(g) New data tape

(h) PBC office data tapes for separate PBC memory system.

(i) PBC compiler printout—PBC office data tables

5.09 After determining the type of recompile required, the following steps must be taken:

(a) The operating company must make arrangements with the Western Electric Regional Center to perform a decompile and recompile. Time duration is negotiable. Decompile consist of identifying existing entries in all data tables and recompile is the assembling of this data and possibly new data into new data tables for call processing.

(b) The network administrator is required to submit supplemental forms 31, 35 and 36 to correctly identify present ETS trunk group identities in memory. In addition, for each type of recompile, pseudo form codes 001 - 008 are required.

(c) 4A maintenance forces will supply the Western Electric Regional Center with two copies of a current "data dump" on magnetic tape.

5.10 The Translation Guide contains flow charts showing processing steps and time intervals required for each type of recompile.

5.11 Once decompile and recompile are started, recent change activity should be held to a minimum as all changes will have to be re-inserted into memory after the new data tape is received.

> *Caution: When a recompile is performed, all present trunk identities in memory will probably be changed due to additions and deletions. This will have a marked effect on network controls and reroutes. Any unlinked data, dummy trunk groups etc, prior to recompile will be lost unless submitted on new form codes.*

6. ASSEMBLY OF COMPLETED FORMS

6.01 It is the responsibility of the network administrator to assemble the completed forms from both Routing and Network Administration and then forward the complete package to the equipment engineer. The equipment engineer will complete Form 2730, Telephone Equipment Order, and submit the entire package to the Regional Western Electric Center for Keypunching.

6.02 Several miscellaneous forms are to be filled out by the network administrator and submitted with the job. These forms are explained in TG 4A/ETS. Copies of the forms can be duplicated from Div. 10 of the TG.

7. VERIFICATION PROCESS

7.01 It is the responsibility of the network administrator to compare, validate, and update any necessary corrections shown in the compiler programs versus office records. The percentage of error should be very low but a 100 percent verification should be made.

7.02 The compiler printouts will be form code oriented so that a complete set of records may be verified at one time.

7.03 Additional information and data changes will require normal recent change procedures to bring the office data tables back to normal.

7.04 A set of compiler printouts relating to the routing supervisor's portion of the form codes should be forwarded so that they can be validated.

8. RECENT CHANGE REQUIREMENTS

8.01 A stored program control system permits translation changes to be made with reasonable ease. All information contained in the office data tables can be altered or modified by use of the recent change technique.

8.02 The network administrator should be familiar with the following documents and their use.

8.03 Input Message Manual IM-68000 (ETS) or IM-68500 (ETS/PBC) — Explains required recent change formats and the types of changes that can be offered.

8.04 Output Message Manual OM-68000 (ETS) or OM-68500 (ETS/PBC) — Explains system responses to input messages.

8.05 Office Variable Data Description — PD 68002 — Explains content and breakdown of data

by description of table and program plus "bit" content.

8.06 Data Compiler Printout — Shows all data tables as they are compiled in memory.

8.07 Data Load Map — Gives octal address in memory plus the length of each table in decimal and octal numbers.

8.08 A standard recent change form, (ETS 8075-T1) is utilized by both Network Administration and routing personnel for requesting changes or additions to ETS data tables. Supplies of these forms can be ordered from the Western Electric Supply House in packages of 25 each. Each form consists of 4 pages, three white and one pink, printed on NCR paper.

8.09 The numbering system to be used on recent change orders should be agreed to by the routing supervisor and the network administrator so that no conflict of numbering schemes will occur. All routing changes, additions and deletions will be originated by the routing supervisor; all others will be from the network administrator.

8.10 All recent change messages should contain at least 3 digits, ranging from 000 to 999. This is a requirement of the recent change program in ETS.

8.11 Numbers 000 to 499 will be reserved for the routing supervisor and 500 to 999 will be used by the network administrator.

8.12 When a block of numbers is exhausted, reuse the same sequence but prefix a digit "1" to the 3 digit number, 1000 to 1499 and 1500 to 1999. Continue in an ascending manner. The maintenance forces will only use the last 3 digits.

8.13 The network administrator should maintain a log of all Recent Change orders showing:

(a) Order number

(b) Due date

(c) Date forwarded to maintenance forces

(d) Action requested

(e) Forms involved

(f) Date activated

(g) Date returned to routing supervisor (02, 03 & 05 only).

(h) Records updated

8.14 Two separate registers should be maintained because the Routing Changes will be separate from the Network Administration changes. All routing changes will be channeled through the network administrator for forwarding to the maintenance forces.

8.15 From an administration standpoint, it is advisable to keep an individual recent change orders as short and concise as possible. Many-paged orders can offer problems to the ETS personnel for input procedures to the program.

8.16 No recent change activity should be scheduled between midnight and 1 am Central Standard Time. During this period the ETS is performing a complete diagnostic program and data changes should be avoided during this time frame.

8.17 Forms attached to a recent change should show in detail what is to be performed. Old data and new data should be entered on appropriate form codes. Use of the "Update Code" on all ETS forms should have an entry of "A" for Add, "C" for Change, and "D" for Delete to further guide the maintenance force.

8.18 When submitting a recent change, the network administrator should forward two copies of the ETS 8075-T form and retain one copy for follow-up and control purposes. It is advisable to retain a copy of the duplicated form codes accompanying the recent change order so that local records may be updated when the order is activated by the maintenance force.

8.19 The same procedure should be followed on recent changes submitted by the routing supervisor. However, when routing and digit translation changes have been completed a copy of the recent change should be forwarded to the routing supervisor.

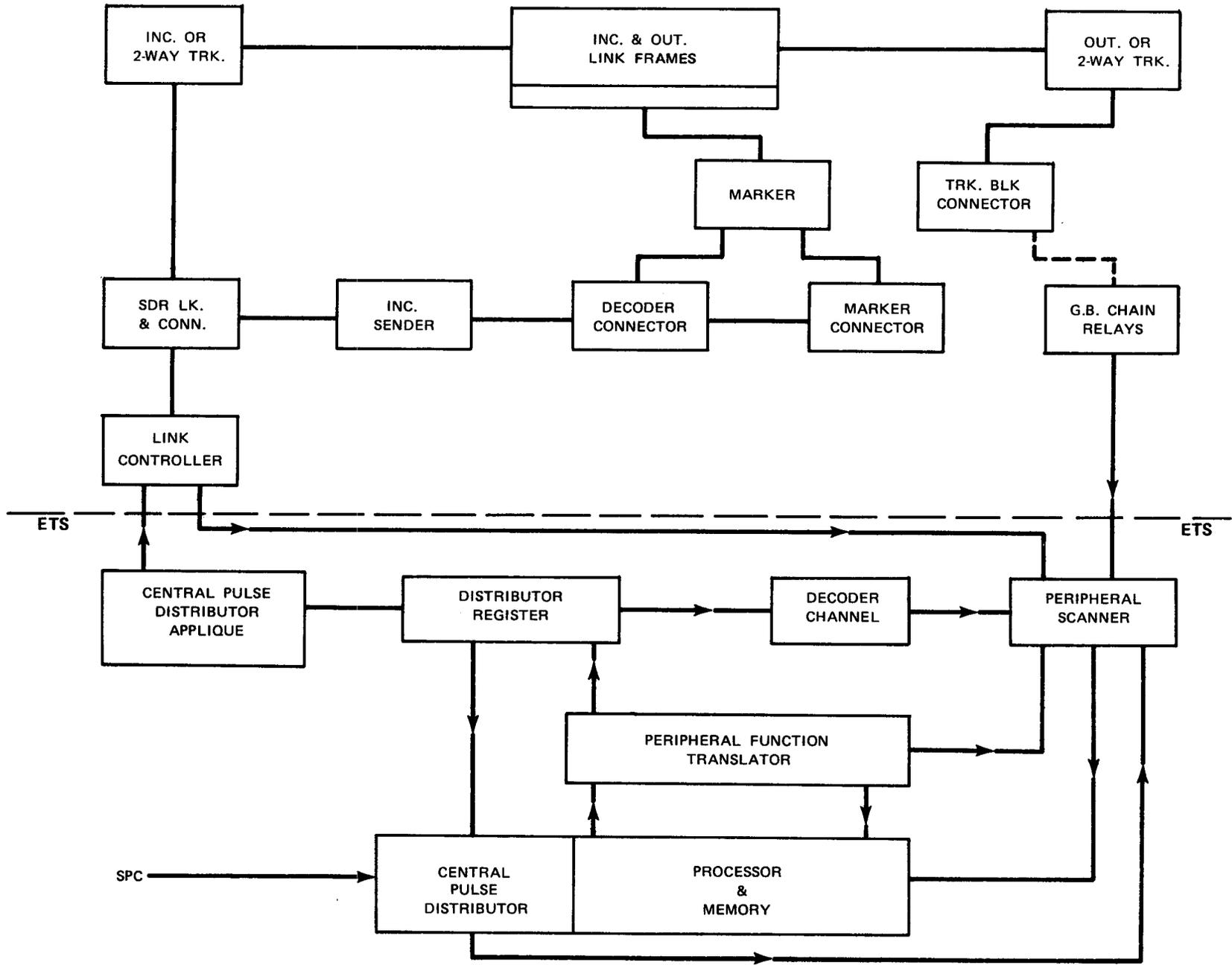**8.20** Completed orders should be filed numerically for future reference.

Fig. 1—No. 4-Type Office Equipment with Electronic Translator System

FORM CODE NUMBER	DESCRIPTION	RESPONSIBILITY
01A & 01B	Incoming Trunk Assignment Record	Network Administrator
02A	Three Digit Code Grouping Record	Routing Engineer
02B	Three Digit Screening Code Group Record	Routing Engineer
02C	Six Digit Code Grouping Record	Routing Engineer
02D	Spare Screening Tables	Routing Engineer
03A	Inwats 3D Code Grouping Record	Routing Engineer
03B	Inwats Originating Band Record	Routing Engineer
03C	Inwats Orig. & Thru 6D Code Grouping	Routing Engineer
03D	Inwats Term. Screening & Code Grouping	Routing Engineer
04A & 04B	Outgoing Trunk Assignment Record	Network Administrator
05	Route Pattern Record	Routing Engineer & Network Administrator
06	Route Pattern Record — Route Multiple	Network Administrator
07	Announcement Route Record	Network Administrator
08	Area of Origin Record	Network Administrator
09	Outgoing Test Circuit Record	Network Administrator
10	Teletypewriter and Data Terminal Record	Network Administrator
11	Miscellaneous Other Parameters Record	Network Administrator
12	Network Control — Cancel	Network Administrator
13	Network Control — Skip	Network Administrator
14	Network Control — Reroute	Network Administrator
15	Network Control — Code Blocking	Network Administrator
16	Network Control — Hard-to-Reach	Network Administrator
17	Regional Center — Manual TORC	Network Administrator
18	FRA/NCA TBC Assignment	Network Administrator
19	Outgoing Trunk Identification	Network Administrator
20	Sender Link Frame Assignment	WECO Engineer
21	Incoming Sender Assignment	WECO Engineer
22	Own Office Information	Network Administrator
23	Trunks Equipped	Network Administrator
24 (A&B)	Common Control Equipped	Network Administrator
25	Sender Group Number/Name Assignment	Network Administrator
26	Sender Type/Frame — Span	WECO Engineer
27	Assignments for Traffic Data Converter	WECO Engineer
28	Common Control Usage Assignments	WECO Engineer
29	Incoming Trunk Usage Terminal Span/Type Assignment	WECO Engineer
31	Incoming Trunk Group Record (Supplementary Growth Data)	Network Administrator
35	Route Pattern Record (Supplementary Growth Data)	Network Administrator
001-008	Pseudo-Forms	Network Administrator

Fig. 2—Form Code Responsibility