LINE AND NUMBER ADMINISTRATION
NETWORK ADMINISTRATION CONSIDERATIONS
10A REMOTE SWITCHING SYSTEM

CONTENTS PAGE

1. GENERAL

1.01 This section provides the network administrator with considerations to be applied for line and number administration in a 10A Remote Switching System (RSS). This section covers those items that relate to the RSS. Assignment considerations for the host office are covered in other sections.

1.02 This section is being reissued to include information and recommendations governing the deployment of multiple units at a single wire center. Revision arrows are used to denote the more significant changes.

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

1.04 References in this section to methods, planning, data requirements, and equipment quantities are based on American Telephone and Telegraph (AT&T) Company recommendations.

1.05 Recommendations for changes, additions, and/or deletions to this section should be forwarded as specified in Section 000-010-015.

2. RSS LINE ASSIGNMENT CONSIDERATIONS

A. General

2.01 The network administrator must provide requirements for determining the quantity of lines and numbers needed to properly administer an office. The network administrator should be an active member of the team that determines the amount of equipment required for an office. These determinations should be predicated on empirical data compiled through regularly-scheduled studies. An accurate office profile is essential to decision making. The areas to be documented are as follows:

(a) Quantity of directory numbers (DNs) in software to meet number-aging requirements

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(b) Office growth (lines and numbers)

(c) Available line equipment required for proper class-of-service distribution and load balance techniques

(d) Lines and numbers required to maintain advance assignment lists

(e) Quantity of equipment withheld from general assignment, dedicated to special administrative needs

(f) ◆Sufficient line equipment and junctor capacity available at the host to handle additional traffic caused by multiple RSSs.◆

B. Physical Description

2.02 The basic hardware item of an RSS is the equipment frame. The frame is 7-foot by 3-foot 3-inches with an 18-inch deep base. A single 3-foot 3-inch (7-foot high) frame (home) provides capacity for up to 1024 lines and 120 T1 channels. A second 3-foot 3-inch (7-foot high) frame (mate) can provide up to an additional 1024 lines and 120 T1 channels. Certain processor, test, and control functions are not duplicated in the mate frame. Otherwise, the basic units are identical in the two frames. Figure 1 illustrates a fully-equipped home frame (1024 lines and 120 channels).

2.03 There are several line interface (LI) units (Fig. 2) within an RSS frame. There are two types of circuit packs within an LI unit. Descriptions of these packs are as follows:

(a) The ***LI*** circuit pack is the interface between the electronic switching network in the RSS and the customer line. It isolates and protects the low-level switching network from the outside plant. The circuits on this pack perform the functions of supervision (on-hook/off-hook ***and*** dial pulse detection), battery feed to the subscriber, and first-stage switching for low-level audio connections and the time-shared metallic network for high-level signaling such as ringing and coin collection signals.

(b) The ***universal service circuit (USC)*** generates all high-level signals for the RSS. It gains access to the customer line through a metallic relay network located physically on the LI circuit packs and on the USC pack. This metallic network is time-shared to minimize the number of relays and service circuits. The signals which share this metallic network can be classified by their duration:

(1) ***Very short (300 milliseconds)*** signals are power cross, party, or coin presence test.

(2) ***Short (2 seconds)*** signals are ringing, coin collection, automatic line insulation test (ALIT), or electronic loop segregation.

(3) ***Continuous*** signals are line testing from local test desk.

2.04 The USC pack generates the very short signals mentioned in paragraph 2.03, as well as the ringing and coin collection signals. The USC pack does ***not*** itself generate the ALIT, electronic loop segregation, or local test desk signals. However, the relays on a USC pack are involved in setting up these signals on the metallic bus.

2.05 An RSS remote equipment number (REN) is similar to a No. 1 Electronic Switching System (ESS) line equipment number (LEN). Formats for each are:

No. 1 ESS (LEN)	RSS (REN)
XX-XXX-XXX	XXX-X-XXXX

A typical REN layout is shown in Table A. Table B provides a listing of the maximum line equipment configurations allowable for an RSS.

C. Administrative Line Requirements

2.06 The provision of sufficient lines in an RSS is of vital importance. Shortages of line equipment make load and class-of-service balance procedures more difficult, necessitate more line equipment transfers, and require more frequent assignment lists. The location of the individual line packs within a given remote terminal is also very important. When an RSS is load- or ESS-limited, the line packs provided should be spread across all of the available line switch groups. The following paragraphs describe important items to be considered in determining line equipment requirements for an RSS. For more de-

tailed information on line equipment requirements, refer to Section 780-200-014. After cutover, the load on a remote terminal can be tracked by measuring the usage on the individual concentrators, ie, line switch groups (LSGs). Section 231-048-307 contains the necessary information, under the **RC:TRFLCU:** message, to measure the concentrators at the remote terminal.

2.07 There are limits to the intraframe and interframe junctor group capacities in the RSS. Further details of these limits are covered in the following paragraphs. It is of utmost importance that class-of-service balance procedures be followed as closely as possible.

2.08 When multiple RSS terminals are utilized to replace a single community dial office (CDO), the traffic patterns change. Some of the traffic that was intraoffice (IAO) will now become ***interoffice*** (ie, customer A is assigned to RSS No. 1 and calls customer B who is working in RSS No. 2). The latter type of traffic consumes additional network at the host and places additional usage on the channel circuit between the host and the remote units. A method of estimating the amount of this traffic is provided in the following paragraphs.

2.09 Only total IAO traffic measurements are available from the CDO. Therefore, assumptions must be made as to how the traffic will split in the new configuration. That is, what percentage of the IAO traffic will stay ***within*** each remote unit, and what percentage will be ***between*** the units.

2.10 It is recommended that the IAO traffic volume be treated as being proportional to the number of main stations (MS) assigned to each unit. The usage and call characteristics of the CDO are applied initially to each of the remote units. Each remote unit is assumed to have the same outgoing, incoming, originating, and terminating hundred calls seconds per main station (CCS/MS) as the CDO being replaced. Although intraunit and interunit traffic must be split, the two components when combined for a single remote unit will equal the IAO CCS/MS of the previous CDO.

2.11 For example, if 1500 MS were in Unit 1, and 500 MS in Unit 2, and the old IAO CCS/MS was 0.8, then the total intrawire center traffic volume is 2000 MS × 0.8 CCS/MS = 1600 CCS. In this remote configuration, 1500 MS × 0.8 CCS/MS = 1200 CCS originate from Unit 1, and 400 CCS originate from Unit 2. Of the 1200 CCS originating in Unit 1, 1200 CCS × .75 = 900 CCS remain in Unit 1, and 300 CCS go from Unit 1 to Unit 2. Likewise, 400 CCS × .25 = 100 CCS remain within Unit 2, and 300 CCS go from Unit 2 to Unit 1. Adding the contribution from both remote units gives 600 CCS additional traffic on the host network and on each of the two groups of voice channels, over and above the normal outgoing/incoming traffic to and from the wire center as a whole.

D. Restrictions

2.12 ***Sleeve-Lead Control:*** The RSS provides sleeve-lead functions through distributor points which are software controlled. The equipment providing these sleeve leads is mounted in the RSS frame and wired to the main frame where it may be cross-connected as necessary.

2.13 ***Essential Lines:*** The lines available for essential service in the RSS are the first eight lines (switch 0) in each concentrator. Levels 6 and 7 of this switch are available for ground-start service.

2.14 ***Ground-Start Lines:*** When the RSS interfaces with a coin line, a PBX line, or any ground-start line, a ground-start applique circuit must be used. Specifically, the coin line, PBX line, or ground-start line appearance at the distributing frame must first be connected to a ground-start applique. The output is then cross-connected again at the distributing frame to any line circuit on the RSS. Ground-start coin lines must be assigned to level 6 or 7 of a given switch (Fig. 3). The ground-start applique provides reversals necessary for coin-fraud prevention and for toll diversion. A total of 64 ground-start appliques (16 appliques/board, 4 boards/frame) can be provided per 1024 lines. This is an upper limit on the total number of coin lines and PBX trunks that can be served by a single RSS.

2.15 ***Coin Phone Interfaces:*** The RSS will provide standard prepaid coin service. Coin-first service, dial-tone-first service, rotary-dial service, and TOUCH-TONE® service are available. Local coin overtime (LCOT) without an operator, coin line activity monitor, and stuck coin identification are available. The RSS is compatible with automatic coin toll service (ACTS) and will be compatible with future coin features. However, in order to simplify the design of the RSS and minimize its cost, certain coin features are being eliminated.

2.16 The following features are affected:

(a) ***Double-Coil Coin Stations:*** The RSS is not designed to work with these sets. If any are in service today, they should be replaced with modern stations.

(b) ***Reverse-Polarity Coin Signals:*** Normally, a positive voltage (with respect to ground) is applied to collect coins, and a negative voltage is applied to return coins. In the past, some offices have used the reverse of these polarities. In most areas, this mode of operation is rapidly disappearing as central office (CO) replacements occur. This is a desirable trend. The RSS will only supply the standard (positive coin collect, negative coin return) signals.

(c) ***The LCOT:*** With the LCOT operation, customers must make additional five-cent deposits for overtime periods on local coin calls. Standard provisions for LCOT formerly required an operator. However, LCOT is now only provided without an operator. Therefore, the RSS only provides the "nonoperator" form of LCOT. Host ESS offices must use the standard Bell System nonoperator feature for all coin lines, both local and remote, if LCOT is provided on RSS lines.

2.17 ***Multiparty Service:*** Multiparty service requirements are as follows:

(a) ***Two-Party Lines:*** All eight lines on the LI circuit pack can be connected to conventional Plain Old Telephone Service (POTS) or ground-start lines. Only levels 6 and 7 can be used for 2-party lines because of the possible presence of ground from a 2-party phone. For 2-party reverting calls, no identifying digit is required and the calling party will be given its own ringing code instead of a special reverting-ringing code.

(b) ***Four- and Eight-Party Lines:*** Each RSS will have its own office-ringing option (either ac/dc or superimposed) independent of the host ESS ringing or any other RSS on that same host. For RSS-reverting calls, improvements in ac/dc multiparty are provided; 4-party semiselective ac/dc revertive ringing calls are handled analogously to 4-party, fully selective and 8-party, semiselective superimposed-revertive ringing calls. Specifically, the calling party (4- and 8-party lines only) dials a single identifying digit on reverting calls and is given its own ring code instead of a special reverting code (which is normally given on ac/dc reverting calls). The two exceptions to this are: (1) when both the calling and called parties are on the same side of the line (tip or ring), in the case of ac/dc ringing; and (2) when both have the same polarity of ringing (plus or minus) in addition to being on the same side of the line, in the case of superimposed ringing. In these cases, the calling party will hear the called party ring code while the called party is being rung. Eight-party ac/dc coded ringing will not be provided by the RSS. An office with this type of service must upgrade to 4-party service or convert to superimposed-ringing by the time of cutover. ***Customers with multiparty service must be informed of these changes before cutover.***

2.18 ***Loading Strategy:*** One of the key decisions that must be made when planning for a multiple remote unit arrangement is the way in which the customers currently served by the CDO will be assigned to one or the other of the remote units. Examples of such strategies are:

(a) Divide the lines equally between the two units, randomly assigned.

(b) Keep one unit at or near capacity, and take all net growth on the second unit.

(c) Divide the serving area geographically. There may be major subdivisions or villages which are distinct or customers could be separated by an outside plant feeder route.

2.19 Each of these has advantages and disadvantages, and no one scheme is best for all applications. For example, strategy (a) may be easier to administer than strategy (b), but strategy (b) will result in less interunit calling than strategy (a). Strategy (c) may in some cases be better suited to the way emergency services are provided but in other cases may result in purely arbitrary boundaries. The advantages and disadvantages must be carefully weighed, in cooperation with engineering and administrative personnel. Some determination must be made early in the process, however, so that calculations important to the planning and engineering process can be made.

3. RSS NUMBER ASSIGNMENT CONSIDERATIONS

A. Administrative Requirements

3.01 One of the controlling factors in the determination of number requirements is the quantity of numbers needed to provide adequate intercept intervals. A sufficient quantity should be available to ensure good customer service.

3.02 The objective is to have enough numbers in an office to allow compliance with the Bell System recommendation for aging changed and disconnected numbers and to cover administrative unusables during periods of peak station movement. (See Sections 780-103-010 and 780-200-014.) Good customer service demands that a number be relatively free from incoming calls intended for the previous customer before being reassigned. The RSS can share the NXX (telephone exchange code) designation of the host ESS provided the two wire centers are within the same rate area.

3.03 An RSS and its host may be assigned to different numbering plan area (NPA) codes. The host can serve up to six different NPA codes. The initial offering of an RSS will require distinct NXX codes for an RSS and host ESS in different NPAs and for any two RSS units served by the same host and located in different NPAs. Until a significant need is established for a single host and associated RSS to serve offices with the same NXX in different NPAs, such capability will be deferred.

B. Restrictions

3.04 The only number assignment restrictions other than those stated in the preceding paragraph come into effect when the stand-alone option is provided. The stand-alone option provides intracalling within the RSS in the event of a data link failure between the RSS and the ESS host.

3.05 A DN table is established within the RSS when the stand-alone option is provided. This table will contain a maximum of 4000 DNs. The internal structure of the table consists of 40 blocks of 100 numbers each.

3.06 Individual numbers within the table are accessed in the following manner:

(a) The first five digits (NXX + thousands + hundreds) of the DN function as a pointer to the proper hundreds block of memory. There is a maximum of 40 unique combinations of these five digits that may be utilized. Therefore, in effect, a maximum of 40 unique NXX codes may be assigned to each RSS.

(b) The last two digits (tens and units) function as an index into the block of 100 to access the information stored for each DN.

3.07 The DNs provided in each block of 100 may be assigned to the RSS or the host ESS. However, once one number within a hundreds block is assigned in the RSS, the memory for that entire block of 100 DNs is allocated within the RSS. Therefore, to conserve memory space within an RSS, a basic assignment rule should be: ***Do not mix RSS and host ESS assignments within the same hundreds block when the host and RSS have the same NXX and the RSS has the stand-alone option.***

3.08 The quantity of multiline hunt (MLH) group lines is also restricted when the stand-alone option is provided. There will be a maximum of 100 hunting lines allowed in an RSS during stand-alone. The RSS MLH feature functions are as follows:

(a) The MLH information is loaded daily into remote terminal (RT) memory. The RT stores only the first 100 RENs (starting at lowest REN in office).

(b) When the recent change (RC) message adds the 101st line, a warning message is received.

(c) Within a MLH, RENs are searched in order from lowest REN to highest within total office 100.

(c) The 101st and higher RENs can originate calls but cannot receive calls.

3.09 These 100 lines can comprise a single MLH group or as many as 50 MLH groups of 2 lines each. It has been standard practice to provide series completion rather than the MLH function for small groups of lines in the ESS. ***Series completion will not function when an RSS is in a stand-alone mode.*** Therefore, groups should be screened carefully to retain MLH capabilities for those that need it (eg, local emergency agencies). This is especially important when an RSS includes the business portion of a community.

3.10 There are four "special numbers" available when the stand-alone option is provided.

These numbers will be used when the stand-alone option is invoked. The special numbers are translated to local 7-digit numbers from one of the following:

- A 1-digit number such as "0" operator
- A 3-digit number such as 911
- A 7-digit number other than the local NXX such as 555-1212.

3.11 For example, a subscriber in the RSS will dial 911 and, through the "special number" translations in the RT, will reach the correct destination. If it is desired, more than one of each of the numbers in paragraph 3.10 may be translated. Under no circumstance can the restriction of four different numbers be exceeded. However, each of the four numbers may point to a hunt group so that more than four lines are equipped. Further details and translation information is in the No. 1 ESS Translation Guide (TG-1A).

3.12 ***Emergency Services Access With Multiple RSSs:*** If there are customers served from both units who depend on a common local supplier of emergency services (ie, fire, police, ambulance), then the following steps should be taken to ensure that emergency service will always be accessible by telephone:

(1) The emergency service supplier should be assigned to one of the two remote units (Unit A) as its principal line appearance.

(2) A second line should be connected between the supplier and the other remote unit (Unit B). This line is assigned a nondirectory listed number for internal routing purposes.

(3) Translations in Unit B should be established to allow calls to the DN of the emergency service to be routed via the host to Unit A in normal operations and to the additional Unit B line appearance when Unit B is in the stand-alone mode.

(4) The two lines (one for Unit A and one on Unit B) should be treated as a ***MLH group*** by the host. This will ensure that calls originating in Unit B will be routed to the additional Unit B line appearance if either the Unit A line is busy or Unit A is in the stand-alone mode.

3.13 It may also be the case, especially where a geographically-based loading plan is used, that a given supplier of emergency services serve customers in only one RT. Lines to both terminals would not be required in this case. The only exception would be where; (a) customers in the other remote terminal obtain emergency services from the "host community" (or beyond), ***and*** (b) it is agreed that access to an emergency service located in the same serving area (even though that emergency service would not normally serve these customers) is preferable to no access at all in the event of a facility failure.

4. PAIR GAIN APPLICATIONS

4.01 An RSS can be used as a pair gain device in either a "normal" or "extended office" configuration. Both of these situations are covered in paragraphs 4.02 and 4.03.

4.02 When an RSS is used in a normal pair gain configuration, a distributing frame is not used at the remote location. The subscriber cable is hard wired to the backplane of the equipment at the RT. Balancing of network load is difficult in this situation; therefore, each RT frame is limited to 768 lines.

4.03 An RSS in an "extended office" configuration has a distributing frame. The subscriber cable and the RT equipment are both connected to the distributing frame. In this configuration, there may also be physical cable direct to the host from the remote frame. This arrangement is completely flexible for load balancing, and each RT frame is capable of handling the full 1024 lines.

4.04 The network administrator should keep manual line records in pair gain situations. The records must be kept to monitor and control the transfers and movement of lines between the host (via direct physical pairs) and the remote office equipment.

4.05 There are restrictions on DNs with the RSS stand-alone option. This option and its restrictions are discussed in detail in paragraphs 3.04 through 3.10 of this section. These restrictions are such that number changes for customers moving within a wire center could be necessary. Therefore, the stand-alone option is not recommended for a pair gain application of an RSS.

5. EXTENDED OFFICE CONSIDERATIONS

5.01 An extended office refers to an RSS that is used in a manner somewhat between a pair

gain system and a wire center. This type of office includes a distributing frame.

5.02 Traditionally distributing frame work in unattended offices is performed by installation craft personnel. For electronic switching, the AT&T recommendation is that only trained CO maintenance personnel be permitted access to equipment enclosures. To avoid the expense of frequent visits to a remote distributing frame by CO craft personnel, a policy based on dedicated inside plant is suggested. The following may be helpful in developing local procedures:

(a) Available cable pairs and equipment at the remote terminal should be apportioned dependent upon the anticipated single and multiparty service demands.

(b) Equipment for single-party service may be cross-connected to cable pairs. Additional equipment should be allocated for multiparty service but not cross-connected.

(c) Distributing frame jumpers for single-party service normally should not be removed on disconnect orders. When new service requests are received, every effort should be made to reuse left-in jumpers. To accomplish this effort, the network administration line assignment and the Loop Assignment Center (LAC) should both keep records of the left-in jumpers. Details should be worked out locally.

5.03 This basic approach should promote local balance across the concentrators (line switch groups) and allow balance of single and multiparty customers across the concentrators.

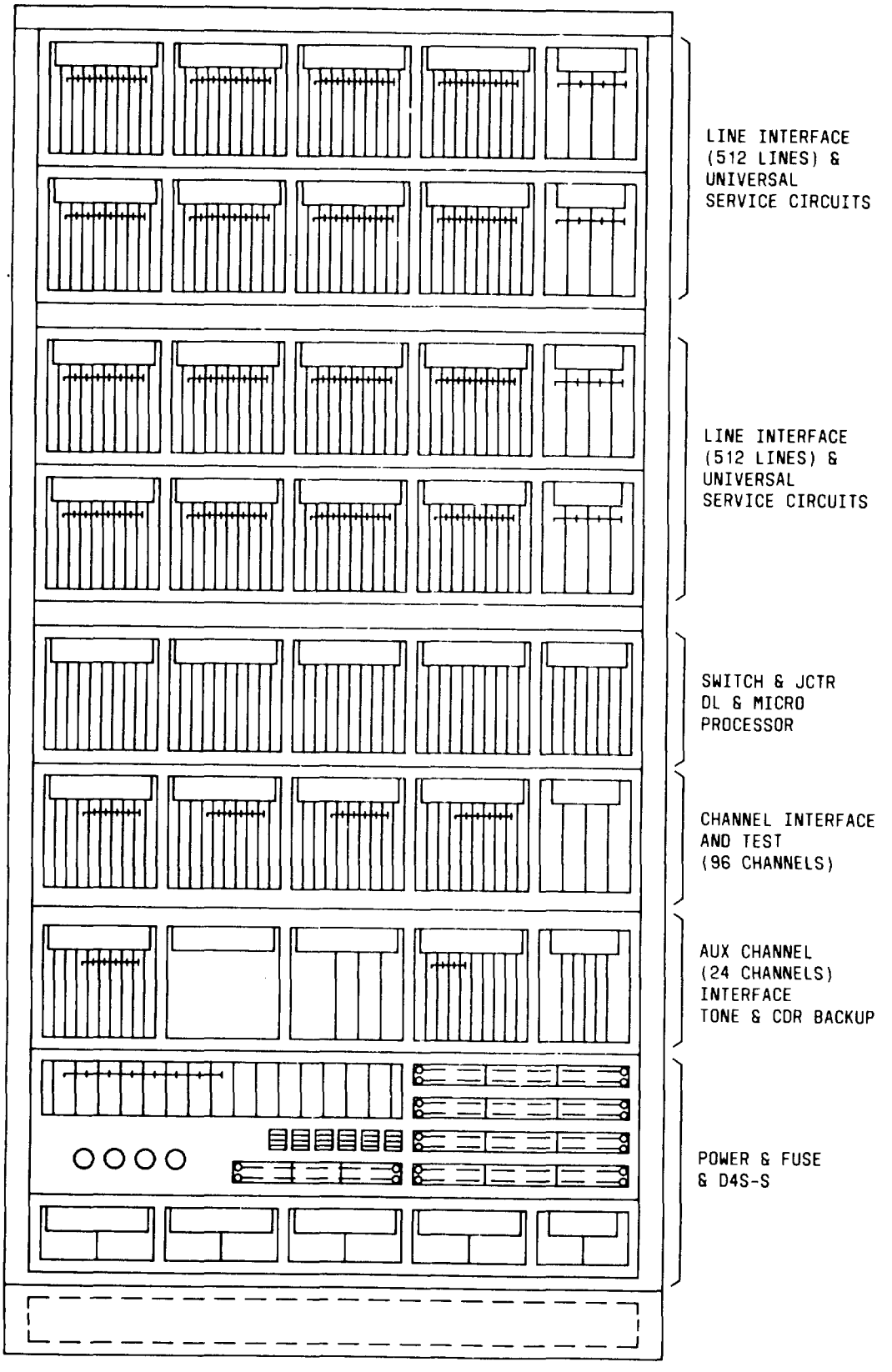


Fig. 1—RSS Home Frame (2.02)

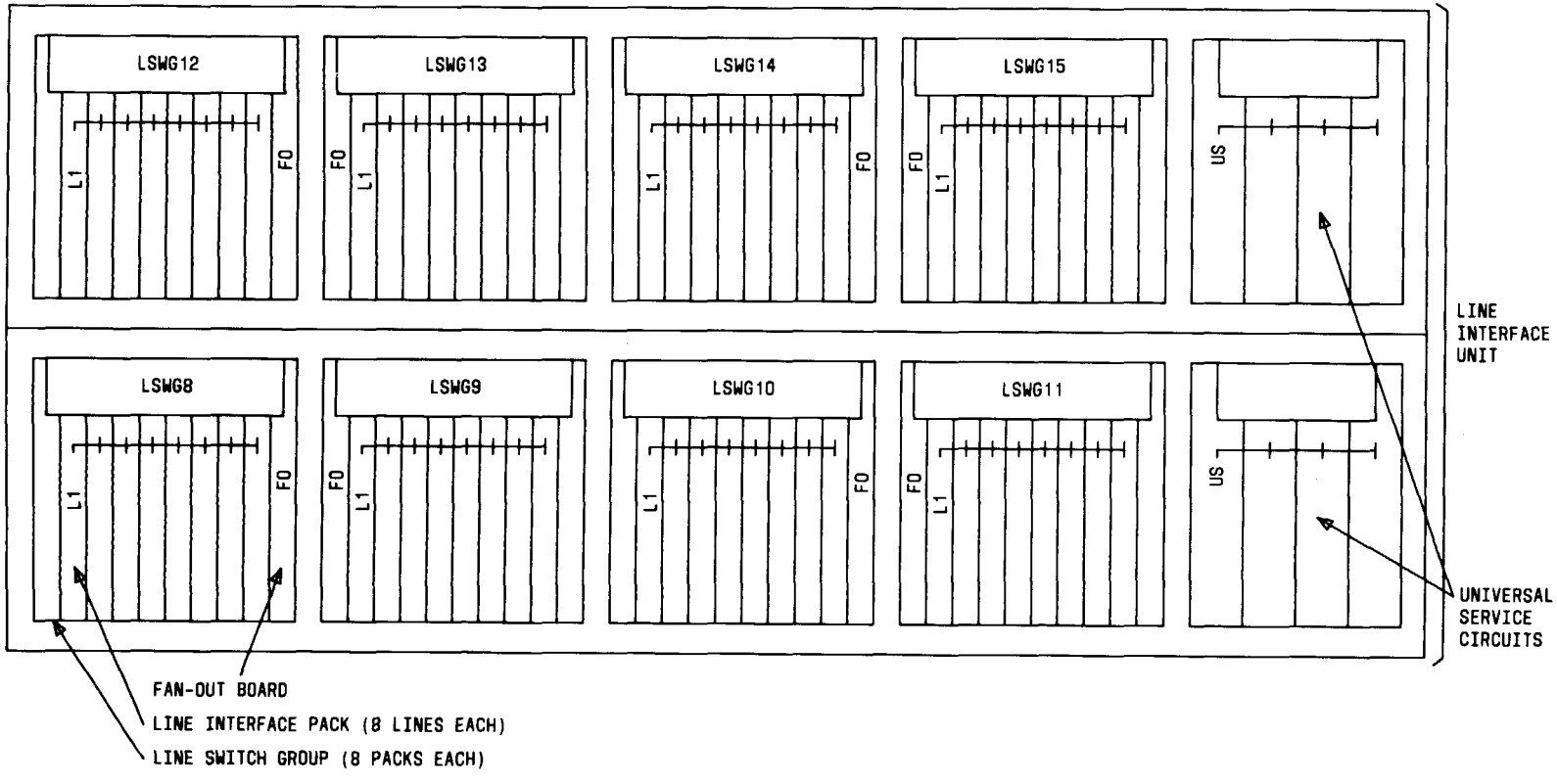
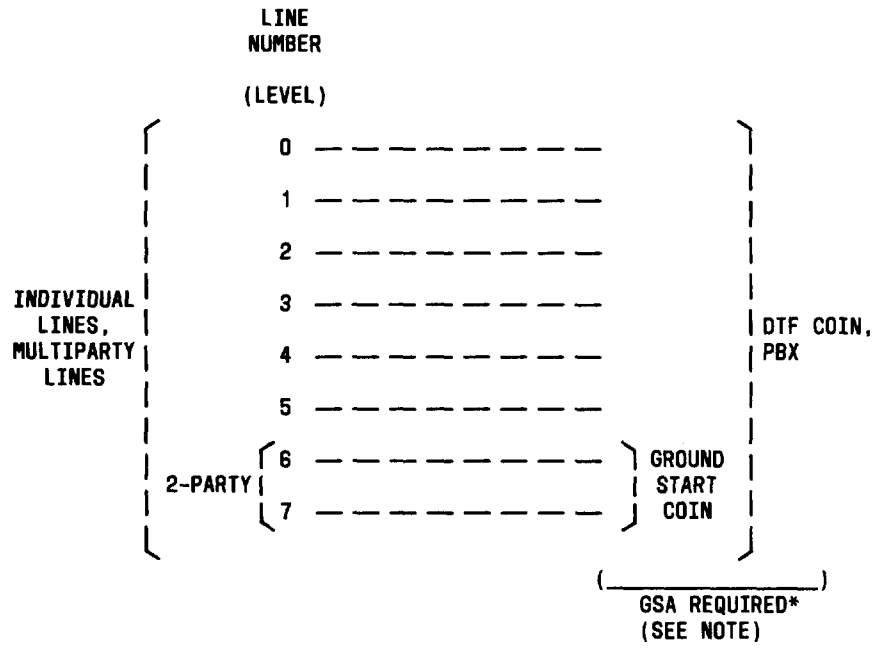


Fig. 2—Line Interface Unit Physical Design (2.03)



NOTE:
* A GROUND START APPLIQUE (GSA) IS REQUIRED EVEN THOUGH A DTF OR PBX LINE IS NOT GROUND-START.

Fig. 3—Assignment Restrictions (2.14)

TABLE A

REMOTE EQUIPMENT NUMBER (REN) CONFIGURATION

ALLOWABLE CHARACTERS					
UNIT	MODULE	TERMINAL TYPE	CONCENTRATOR NUMBER	SWITCH	LEVEL
00 - 31	0 or 1	0 or 1*	00 to 15	0 to 7	0 to 7

*Terminal Type 0 = Line Assignment;
1 = Channel Assignment

TABLE B

RSS FRAME CONFIGURATIONS

ITEM	ITEM CAPACITY	ITEM MAXIMUM PER FRAME	ITEM MAXIMUM PER RSS
Lines	—	1,024	2,048
Line Interface (LI) Pack	8 Lines	128	256
Line Switch Group (LSG)	8 LI packs (64 Lines)	16	32
Line Interface Unit (LIU)	8 LSGs (512 lines)	2	4
Module = Remote Terminal Frame			
Concentrator = LSG			
Switch = LI Pack			