

**PROCESSOR COMMUNITY ENGINEERING
BUSINESS SERVICES DESIGN ENGINEERING
"DIMENSION®" 600/2000/CUSTOM PBX**

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NOTICE

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1. GENERAL

1.01 This section details those design engineering considerations which affect the configuration of the common control cabinet of the DIMENSION 600 (formerly the DIMENSION 400E) PBX, the DIMENSION 2000 PBX, and the DIMENSION Custom PBX. These considerations, which comprise Processor Community Engineering, are processor occupancy evaluation, memory sizing, data channel interface quantities, directory block sizing, and dial code match table sizing. Detailed in this section are processor occupancy evaluation procedures which are critical to the design engineering of the DIMENSION PBX System. Worksheets for the evaluation of the processor, with instructions for each method that can be used, are included in this section. The different memory configurations available and the memory parameters for each configuration are detailed in this section. Worksheet instructions for memory size determination, data channel quantities, directory block sizing, and dial code match table sizing are also provided.

1.02 The reasons for reissuing this section are listed below. Revision arrows are used to emphasize significant changes.

- Provides revised DIMENSION 600 PBX System parameters (Table A) and includes Fea-

ture Package (FP) 11 system parameters in the table.

- Provides revised DIMENSION 2000/Custom PBX system parameters (Table B).
- Provides revised ECTS terminating factors (Table D) based on feature packages and memory configurations.
- Provides revised Worksheet 7.1—Memory Configuration.
- Provides DESIGN EXAMPLE (Part 6).

1.03 This section pertains to FP7, FP8, FP9, FP11, and FP12. Design engineering requirements for all feature packages of the DIMENSION 100/400 PBX are contained in a single document, Section 554-101-006.

1.04 This section is one of a series of Business Services Design Engineering documents recommended for use during the design process of a DIMENSION 600/2000/Custom PBX. It is recommended, however, that Section 554-111-605 of this series be read first and the Basic Traffic Data (Worksheet 1.1) be completed before attempting to complete this section or any subsequent sections addressing other traffic-engineered components of the DIMENSION 600/2000/Custom PBX.

1.05 Section 554-111-650 contains reproducible copies of the worksheets found in this section as well as other worksheets required to design-engineer a DIMENSION 600/2000/Custom PBX. The worksheets in Section 554-111-650 will be the most current available since that section will be reissued first when any changes involving the worksheets are made.

1.06 References in this section to methods, planning, data requirements, service levels, and equipment quantities are based on American Telephone and Telegraph Company recommendations.

1.07 Recommendations for changes to this section should be submitted on Form E-3973 as specified in Section 000-010-015, How To Comment on Bell System Practices.

2. COMMON CONTROL CABINET

PHYSICAL DESCRIPTION

A. General

2.01 Since Processor Community Engineering relates mainly to the components of the common control cabinet, a brief discussion of this cabinet and its contents is given below.

2.02 The common control cabinet houses the central processor, main memory, input/output (I/O) data channels, network channels, space for one basic or cost-reduced control carrier, and up to two growth control carriers, in addition to the alarm panel, minirecorder, and power supplies. The configuration of this cabinet is based on information derived from the completion of the worksheets in this section.

B. Basic Control Carrier

2.03 The basic control carrier contains the processor, main memory, memory control, data channels, and various other interface circuits. It has 16 slots for 8K (LC28) or 16K (LC128) main memory circuit packs and 9 slots available for LC34B dual speed data channels. The basic control carrier is rated as Additions and Maintenance (A&M) only.

C. Growth Control Carrier

2.04 If the DIMENSION PBX requires more memory slots, data channels, or network channels than are available in the basic control carrier, either one or two growth control carriers may be installed. Each carrier provides 28 additional data channels (LC34B) and 64 network channels in addition to 16 slots for main memory. The growth control carrier is rated A&M only.

D. Cost-Reduced Control Carrier

2.05 The cost-reduced control carrier is designed to utilize the 64K memory board (LC346) and the quad I/O board (LC366). It is used in all new DIMENSION 600 and 2000/Custom PBX systems.

2.06 The cost-reduced control carrier has eight slots assigned for the 64K board which will provide 512K words of memory. Two additional slots have been provided in the carrier for future capacity; however, no usage is planned for these two additional slots at this time.

2.07 The quad I/O circuit board (LC366) doubles the I/O capacity from that currently provided by the LC34B. Each LC366 has four low-speed data channels per board instead of the two channels per board on the LC34B. The same quantity of slots and the identical slot numbers are retained in this carrier design to minimize the changes in administration software.

2.08 The number of high-speed data channels (LC130 and LC131) has been increased in the cost-reduced control carrier. Three LC130 and five LC131 boards are provided in this carrier so that a maximum of 15 modules of five cabinets each can be provided without requiring the growth carrier in the DIMENSION 2000/Custom PBX. Since the DIMENSION 600 PBX is limited to one module, only one LC130 and one LC131 are required.

2.09 The expanded capacities of the memory circuit pack in this carrier will eliminate the need for a growth control carrier in the DIMENSION PBX systems.

E. Supplemental I/O Carrier

2.10 If more data channels are required than can be provided with the cost-reduced control carrier, the supplemental I/O carrier may be used. There are seven slots available for the LC366 circuit pack. A maximum of 28 low-speed data channels may be configured with the supplemental I/O carrier.

F. Duplicated Common Control

2.11 The DIMENSION 2000/Custom PBX may be configured with single or duplicated common control. Two controllers can be used, an off-line standby controller and an active on-line controller. The DIMENSION 600 PBX cannot have duplicated common control.

2.12 A detailed description of the common control cabinet is located in Section 554-105-100 for the DIMENSION 600 PBX and Section 554-111-100 for the DIMENSION 2000/Custom PBX.

3. PROCESSOR OCCUPANCY

GENERAL

3.01 Engineering the overall traffic capacity of an FP7, FP8, FP9, FP11, and FP12 DIMENSION

600 PBX or DIMENSION 2000/Custom PBX is based on analysis of three items: (1) hardware requirements, (2) network load (CCS), and (3) processor occupancy evaluation. *Although the hardware and software capacities vary with memory size, the processor is subject to the same limitations regardless of memory configuration or feature package selected.*

3.02 Maximum capacities available with various memory configurations may be mutually exclusive. A requirement for the maximum lines, for example, may preclude the use of other maximums due to hardware, network, or processor limitations. Tables A and B provide maximums of hardware and software available in the memory configurations for the DIMENSION 600 PBX and the DIMENSION 2000/Custom PBX, respectively. These maximums reflect theoretical quantities, and evaluation of the proposed switch is required prior to quoting the use of any maximum.

3.03 Analysis has been made of in-service DIMENSION PBX FP7, FP8, and FP12 systems with memory configurations B, C, and D, and indications are that hardware and software capacities are usually exhausted prior to exceeding the processor capacity. Memory configurations B, C, and D with these feature packages are therefore more subject to hardware and software limitations than to processor limitations.

3.04 The FP7, FP8, and FP12 switches with memory configurations E and F are primarily call volume sensitive. The large quantities of hardware and software available with these configurations allow the generation of call volumes in excess of the actual processor capacity. Memory configurations E and F with these feature packages are therefore more subject to processor limitations than to hardware and software limitations.

3.05 Feature Package 9 and Feature Package 11 require special consideration. Because of the occupancy requirements of noncall-related features in FP9 and FP11 (Long Distance Billing, Energy Control, Journal Printers, Message Registers for Long Distance Billing, etc), total processor occupancy may be greater than anticipated from initial review of call quantities.

3.06 Processor occupancy, as an engineering step, must always be evaluated from cutover

through the end of the proposed engineering period. Although the initial period occupancy may be adequate, the processor capacity must be adequate for growth expected during the life of the contract.

3.07 The impact on occupancy by the future activation of certain features (Electronic Custom Telephone Service [ECTS], Energy Control, Uniform Call Distribution [UCD], Force Administration Data System [FADS], etc) available in a feature package must be recognized. A particular system, not utilizing these features, may be viable through the end of the engineering period. The future activation of an available feature, however, may result in the capacity of the processor being exceeded. In these situations, the limited ability to activate certain features available in the feature package must be identified and documented. Both the sales group and customer should be aware of this limitation on feature activation.

3.08 The DIMENSION 600 PBX and the DIMENSION 2000/Custom PBX processor handle all stimuli presented to the system. Stimuli refer to activities which require processor time. These activities may be call-related (ie, requests for dial tone) as well as noncall-related (ie, energy control).

3.09 Processor occupancy consists of two basic elements:

- (1) **Static Occupancy:** Largely dependent on the quantities of hardware and software items to be scanned, as well as features activated in the system
- (2) **Dynamic Occupancy:** Dependent on the number of calls presented to the system and the features utilized in these calls. Processor occupancy, as an engineering step, must always be evaluated from cutover through the end of the proposed engineering period.

STATIC OCCUPANCY

A. General

3.10 Static (or no-load) occupancy is the amount of processor time during which the processor is scanning hardware and software records for a possible change in state. Static occupancy consists of two distinct components: (1) the configuration component and (2) the feature component.

3.11 The sum of the static-configuration component and the static-feature component is the total static occupancy requirement. Total static occupancy is the occupancy always required by the system regardless of the presence of calls in the system.

3.12 Systems with large memory configurations (E and F) which provide large hardware and software capacities, as well as FP11, have a high static occupancy requirement. As this static occupancy requirement increases, the amount of processor time remaining for actual stimuli processing (dynamic occupancy) decreases, thus reducing the actual busy-hour call capacity of larger systems.

B. Configuration Component

3.13 The static-configuration component represents the occupancy required by the base feature package and quantities of line carriers, trunk carriers, attendant consoles, trunk records, and originating register records provided. The quantity of these items affects the amount of processor time consumed in this no-load task.

C. Feature Component

3.14 The static-feature component represents the occupancy required by the activation of certain features available in the feature package and hardware to support these features. The activation of features such as ECTS, Centralized Attendant Service (CAS), FADS, Energy Control, and Long Distance Billing requires various amounts of processor time in the analysis of the static-feature component.

DYNAMIC OCCUPANCY

A. General

3.15 Dynamic occupancy is the amount of processor time consumed in actually processing stimuli presented to the system. Dynamic occupancy consists of two components: (1) dynamic—call processing component and (2) dynamic—feature component.

3.16 Total dynamic occupancy is the sum of the dynamic—call processing component and the dynamic—feature component. Actual busy-hour call capacity is dependent on the amount of processor time available for call processing and the quantity of call stimuli (call processing and feature utilization) presented to the system.

B. Call Processing Component

3.17 The dynamic—call processing component represents the occupancy required to process the call stimuli presented to the system. The amount of occupancy required for processing a call is dependent on the complexity of the call.

C. Feature Component

3.18 The dynamic-feature component represents the additional processor time required for processing call stimuli due to features utilized by the calls. These features include Automatic Route Selection/Automatic Alternate Routing (ARS/AAR), Station Message Detail Recording (SMDR), Deluxe Queuing and Outgoing Trunk Queuing, ECTS, Long Distance Billing, and Journal Printer CCS.

TOTAL PROCESSOR OCCUPANCY LIMIT

3.19 Total processor occupancy is the sum of the static (size and feature activation dependent) and dynamic (call type and feature utilization dependent) occupancy as determined from the processor evaluation.

3.20 The estimated total busy-hour occupancy (static and dynamic) at the end of the engineering period must not exceed 75 percent. Although the system will continue to process calls when occupancy is above 75 percent, noticeable service deterioration may occur as the processor becomes excessively burdened. Switchhook flashes of a short duration may be missed more frequently; ECTS button depressions may be missed; noticeable dial-tone delays may occur, and maintenance and audit routines may be deferred. Assumption of the 75 percent engineering guideline allows actual peaks greater than 75 percent, while reducing the possibility of service deterioration.

3.21 An understanding of the average processor occupancy limit of 75 percent is necessary in the evaluation of a system. Processor occupancy evaluations in a presale environment may assume that the expected busy-hour call volume is uniformly spread across the hour. Actual call arrival, however, may be peaked with resultant intervals of peaked processor occupancy. Studies of in-service systems, for example, indicate that a system expected to operate at 75 percent occupancy may, in fact, operate at an average of 75 percent. The 75 percent average,

however, may consist of intervals of 80 through 85 percent and intervals of 60 through 65 percent.

3.22 Other activities requiring processor time (which influences processor occupancy) include the use of the Remote Maintenance Administration and Traffic System (RMATS), Customer Administration Center System (CACCS), and the Customer Administration Panel (CAP). Processor occupancy is increased by 2 to 3 percent while the PBX is being accessed by RMATS, CACCS, or CAP for administration activities (line, trunk, class-of-service changes, etc.). Polling of traffic data via RMATS or CACCS adds 6 percent to the processor occupancy for the duration of the poll. Use of Procedure 581 (Network Test) adds up to 15 percent to the occupancy during the test.

3.23 Although these activities may not significantly increase the hourly occupancy figures, the requirement for processor time while the activity is being conducted must be recognized. Administrators and customers should be aware of the impact of these activities on processor occupancy and the potential effect on service.

3.24 If a peaked occupancy interval is combined with maintenance, administrative, traffic study, or demand activities, service deterioration may be noticed on systems operating at high-occupancy levels. If high-occupancy levels exist, these other activities should be deferred to periods with lower call volumes and occupancy levels.

METHODS OF PROCESSOR OCCUPANCY EVALUATION (POE)

A. General

3.25 Evaluation of processor occupancy requires calculation of the static and dynamic occupancy and consideration of the activities to be performed during the PBX busy hour. Three methods (Method I, II, and III) for determining the expected busy-hour processor occupancy will be discussed in the following paragraphs. Each of the three methods detailed requires various assumptions and types of call data; therefore, they provide varying degrees of confidence in the results obtained.

3.26 Calculation of static occupancy is the same for all three methods, with the possible exception of the occupancy required for trunk records. Method I

assumes 1000 trunk records. For Method II and Method III analysis, the appropriate number of trunk records must be calculated.

B. Method I

3.27 Method I calculation of dynamic occupancy applies a fixed call rate per feature package to a total completed call quantity. Factors are then added if ECTS or various FP8, FP9, FP11, or FP12 features are active.

3.28 Method I equates to the POE calculated in the Marketing, Engineering, and Business Service (MEBS) "Quick Quote" Module, and is provided to the design engineer only if "Quick Quote" is not available. Method I is not intended to confirm the viability of or to reject a proposed vehicle. Method I is useful when obtaining an initial, broad gauge, rough estimate during the early design phase of a switch. It is useful in identifying potential high occupancy installations which are better analyzed using the more detailed approach found in Methods II or III. Methods II and III provide a more detailed analysis of processor occupancy.

3.29 Specific instructions for computation of dynamic occupancy by Method I are provided later in this section.

C. Method II

3.30 Method II calculation of dynamic occupancy applies an occupancy rate to the number of completed busy-hour calls. Selection of the occupancy rate is based on call mix (in-out-intercom), features to be utilized, and selection of the corresponding "model" in the Feature Model Matrix table (Table C). Additional factors related to calls terminating to ECTS, to ringing of Electronic Custom Telephone (ECT) sets, and to FP9 and FP11 features are added as appropriate.

3.31 Method II is provided for use by the design engineer when a quick and accurate analysis of POE is needed. It is used when a more detailed analysis by Method III is impractical at the time.

3.32 Specific instructions for computation of dynamic occupancy by Method II are provided later in this section.

D. Method III

3.33 If a model in the Feature Model Matrix table (Table C) does not match the proposed system,

analysis must be done by Method III. Method III provides calculation of dynamic occupancy from analysis of specific call types. Use of Method III requires confidence in the call data being applied to the various call types.

3.34 Assuming that the applied data are accurate, results from Method III should prove to be the most accurate of the three methods; that is, ± 5 percent of the actual occupancy.

3.35 Specific instructions for computation of dynamic occupancy by Method III are provided later in this section.

ELECTRONIC CUSTOM TELEPHONE SERVICE CONSIDERATIONS

3.36 The utilization of the ECTS has a considerable effect on the occupancy of a system. The initial provision or possible future addition of ECTS must be identified in the evaluation of processor occupancy through the engineering period. Various components of processor occupancy are increased either by a fixed percent or a variable percent to reflect the occupancy requirements of ECTS. These effects are specified below:

(a) **Static-Feature Component.** This component is increased by a factor of 0.2 percent to 3.7 percent based on the feature package/memory configuration being evaluated. This reflects the scanning of all ECTS controllers in the memory configuration, regardless of the number actually activated.

(b) **Dynamic—Call Processing Component.** This component is increased by approximately 0.7 percent per 1000 calls that terminate to ECTS to reflect additional processor time required for terminating calls involving ECTS. In theory, all calls involving ECTS (originating from and terminating to ECTS) are subject to the additional 0.7 percent per 1000 calls occupancy requirement. To simplify the evaluation process, however, only the calls terminating to ECTS are evaluated at the additional 0.7 percent rate. The same quantity of calls terminating to ECTS is evaluated for occupancy requirement related to ringing an ECT set.

(c) **Dynamic—Feature Component.** This component is increased by a factor of 0.08 percent to 12.39 percent based on the memory configura-

tion being evaluated and the number of calls terminating to ECTS per hour. This reflects the processor time required to simultaneously ring a given number of ECT sets. The ECT sets include multibutton electronic telephone (MET) sets and straight line (SL) sets.

3.37 The simultaneous ringing of ECT sets has a large effect on the dynamic-feature component. Two assumptions may be made to determine the number of calls that terminate at ECT sets: (1) Assume that the percentage of ECT sets to total sets corresponds to the percent of terminating calls to ECTS. For example, if a system has 2000 intercom and 3000 incoming calls (5000 total) and 25 percent ECTS, then 25 percent of 5000 calls (or 1250 calls) would terminate to ECTS. (2) Because of available data, an assumption other than (1) above may be made. For example, assume that the 25 percent ECT sets in (1) above are in the Service Department. Because of knowledge of the company operation, analysis may indicate that 50 percent (or 2500) of the calls are expected to terminate to the Service Department. In this case, application of the 2500 calls to Table D would provide a more accurate occupancy evaluation.

3.38 ♦Table D provides the ECTS terminating factors for each memory configuration of FP7, FP8, FP11, and FP12.♦

3.39 Table D reflects the occupancy required to simultaneously ring a given number of ECT sets. The following assumptions and summations have been made in the Table D derivation. One (1) hour provides 3600 seconds and, if an average ringing interval is 15 seconds, then 240 ringing intervals would be available (3600/15). If 960 calls terminate to ECTS per hour and the arrival of calls is equally spread across the hour, then four ECT sets would always be in a ringing state (960/240). The occupancy factors are related to the number of simultaneous ringing ECT sets but, for ease of look up, are presented in Table D as a factor based on the number of calls per hour terminating to ECTS.

3.40 ♦The ECTS terminating factors are feature package and memory configuration dependent. For example, at a terminating rate of 1000 calls to ECTS per hour, memory D of FP8/FP12 would have an occupancy requirement of 1.11 percent; memory F of FP8/FP12, 1.48 percent; memory D of FP11, 1.10 percent.♦

FEATURE PACKAGE 9 CONSIDERATIONS

3.41 Analysis of FP9 processor occupancy requires identification of a busy hour and an assumption that noncall-related activities (Long Distance Billing and Journal Printers) will be either active, inactive, or partially active during the busy hour. Computation of static occupancy requires identification of those FP9 features to be active. Computation of dynamic occupancy requires determination of those FP9 activities occurring during the busy hour.

3.42 Feature Package 9 provides several features that require processor time and are conducted at the demand of the customer (Cathode Ray Tube [CRT] activity). The affect of these activities must also be recognized in the final evaluation of processor occupancy.

3.43 Methods I and II assume a fixed rate of 10 percent for the FP9 dynamic feature component. The 10 percent is an estimate and subject to refinement at a later date. Method III requires analysis of Long Distance Billing information received from the Traffic Service Position System (TSPS) and the total Journal Printer CCS for the busy hour.

3.44 Long Distance Billing information received from TSPS requires 11 percent occupancy per 1000 calls. If information is received for 250 calls, the percent occupancy is:

$$(250 \div 1000) \times 11.0 \text{ percent} = 2.75 \text{ percent.}$$

Note: If the Long Distance Billing busy hour occurred at an hour other than the PBX busy hour, the Long Distance Billing during the PBX busy hour should be analyzed.

3.45 The Journal Printer factor requires identification of printer CCS at the PBX busy hour. If, during the busy hour, four printers each operated for 30 total minutes (or 18 CCS), the percent occupancy is:

$$(4 \text{ printers}) \times (18 \text{ CCS}) \times (\text{factor of } 0.17) = 12.24 \text{ percent occupancy.}$$

3.46 Overhead required to scan message registers for local call billing is a significant static occupancy factor to be considered.

3.47 Hotel/motel activities, which require large amounts of dynamic occupancy, may be inac-

tive or only partially active during the busy hour. Use of journal printers, for example, may be heavy outside the busy hour (ie, late at night for wake-up audits, etc). The design engineer should be aware of these considerations and make an attempt to estimate those hotel/motel activities that will be conducted during the PBX busy hour. On systems nearing the 75 percent limit, deferrable hotel/motel functions should be scheduled at times other than the busy hour.

FEATURE PACKAGE 11 CONSIDERATIONS

3.48 Real-time factors evaluated in laboratory simulation indicate that the value for line carriers, trunk carriers, trunk records, and originating register records in FP11 are similar to the values for other DIMENSION 2000/Custom PBX feature packages.

3.49 However, the basic overhead of FP11 is higher (16.9 percent) because of the larger number of tasks performed in FP11. In addition, the occupancy/attendant factor on the Static Occupancy—Summary Worksheet is really twice that of all the other feature packages. The exact reason for this is not known; however, it seems that the Emergency Access to Attendant feature may be a contributor.

3.50 Overhead required to scan message registers for local billing is a significant static occupancy factor to be considered.

3.51 The UCD FADS requires 2.20 percent plus 0.539 percent per terminal. When UCD FADS is not activated and there are no terminals assigned, the 2.20 percent disappears.

3.52 A new FP11 feature is data entry via the Property Management System (PMS). With PMS active, there is a 5 percent increase in static occupancy. The dynamic overhead for this feature is made up of two components: (1) standard call processing overhead per 1000 data entry calls and (2) digit collection and transmission over PMS for data digits, which is in addition to the standard call setup overhead.

3.53 For call processing, the first component, the overhead for an intercom call, should be used. The second component, digit collection and transmission over PMS, requires 0.7 percent per 1000 data digits per hour.

3.54 For example, if 500 data entry calls were estimated for 1 hour and average digits dialed per

call were 12, the overhead due to PMS would be as follows:

$$(1.83 \times 500/1000) + (0.7 \times 12 \times 500/1000) = 5.12 \text{ percent}$$

Note: If this component computes to a percent occupancy greater than 24 percent, there could be a service degradation due to data-speed limitations even if the overall percent occupancy falls within acceptable limits.

PROCESSOR OCCUPANCY EVALUATION PROCEDURES

3.55 This part describes the steps to be used to determine processor occupancy for the DIMENSION 2000/Custom PBX using Worksheet 6, Processor Occupancy Evaluation (Fig. 1). A design example with a completed Worksheet 6 is discussed in Part 6 of this section. The present limit for processor occupancy is 75 percent based on Average Busy-Season Busy-Hour (ABSBH) engineering as discussed in Section 788-100-106.

A. Static Occupancy (Worksheet 6.1)

3.56 The Static Occupancy (Worksheet 6.1) consists of the Static Occupancy — Summary (Worksheet 6.1.1) and the Static Occupancy — Feature Additions (Worksheet 6.1.2).

Static Occupancy-Summary (Worksheet 6.1.1)

3.57 The steps shown below should be used in filling out Worksheet 6.1.1:

(1) **Basic Occupancy:** Enter the appropriate occupancy factor in column D for the feature package being evaluated.

(2) **Line Carriers:** Enter the quantity of required line carriers in column B; multiply column B by the factor in column C, and enter the result in column D (includes line carriers and line group control carriers).

(3) **Trunk Carriers:** Enter the quantity of required trunk carriers in column B; multiply column B by the factor in column C, and enter the result in column D (includes trunk, tie trunk, module control, and trunk port carriers. It does not include link carriers).

(4) **Attendant Consoles:** Enter the quantity of attendant consoles (does not include FP9 and

FP11 *station* console terminals) in column B; multiply column B by the factor in column C, and enter the result in column D.

(5) **Trunk Records:** Enter the quantity of trunk records in column B; multiply column B by the factor in column C, and enter the result in column D.

(a) Trunk records include the engineered quantities of assignable trunk records (sum of physical trunks, intercom records, and queuing records), dial pulse and TOUCH-TONE® dialing originating register (OR) records, and Automatic Number Identification (ANI) queuing records (6, even if ANI is inactive).

(b) Also included are the maximum attendant consoles in the memory configuration and feature package combination multiplied by 7 (one trunk record per each of the six switched loops per console and one attendant OR per console is required) and the maximum attendant conferences in the memory configuration and feature package combination (one trunk record for each OR associated with each attendant conference circuit). Table E provides the trunk record requirement per memory configuration/FP for *maximum* attendants (includes switched loops and ORs) plus *maximum* attendant conference circuits combined. For example, memory F, FP7, has a maximum of 25 attendants and 13 attendant conference circuits. Trunk record requirements are therefore 188 ($7 \times 25 + 13$).

(c) If the exact number of trunk records is not known, an assumption of 1000 records may be used.

(6) **Originating Register:** Enter the quantity of originating registers in column B; multiply by the factor in column C, and enter the result in column D. The ORs include the engineered quantities of TOUCH-TONE dialing and dial pulse ORs, the *maximum* number of attendant ORs, and the *maximum* attendant conferences in the memory configuration/feature package combination. These maximums are independent of the actual number of attendant consoles or attendant conferences provided. Table F defines the required maxi-

imum number of attendant plus conference circuit ORs combined per memory configuration/FP. For example, a memory F, FP8, has a maximum of 40 attendant and 13 conference circuits. The OR requirements are therefore 53 ($40 + 13$).

(7) **Message Registers:** Enter the quantity of message registers (if used) in column B; multiply by factor in column C, and enter the result in column D.

(8) **Power Meters:** Enter the quantity of power meters (if used) in column B; multiply by factor in column C, and enter the result in column D.

(9) **Static Occupancy — Feature Additions:** After completing Worksheet 6.1.2, enter the result in column D, line 9, of this worksheet.

(10) **Static Occupancy:** Enter the sum of lines 1 through 9, column D, in column D on line 10. This represents the static occupancy and is for use in calculating total processor occupancy by all three methods.

Static Occupancy — Feature Additions (Worksheet 6.1.2)

3.58 The activation of certain features of a feature package generates an occupancy requirement that is noncall-related. Completion of this worksheet requires a yes/no analysis of the features listed. Use the following steps to complete this worksheet:

(1) If the feature is to be activated, the appropriate occupancy figure is entered in column D. If a feature is not used, enter a zero.

Line 1: **ECTS:** If ECTS is activated, the appropriate factor from column C, based on memory configuration, is entered in column D.

Line 2: **CAS FADS:** If CAS FADS is activated, the appropriate factor from column C is entered in column D.

Line 3: **UCD FADS:** If UCD FADS is activated, a basic factor plus a factor multiplied by the number of UCD FADS terminals is entered in column D.

Lines 4-8: If the feature in column A is activated, the appropriate fac-

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tor from column C is entered in column D. ♦For Distributed Communications Service (DCS) planning purposes, presently an occupancy factor of 5 percent is used. This occupancy factor is an estimate, and will be revised when empirical data is gathered from working systems.♦

(2) Total the entries of lines 1 through 8, column D. This total represents the static occupancy—feature additions component.

B. Dynamic Occupancy (Worksheets 6.2, 6.3, and 6.4)

3.59 The Dynamic Occupancy (Worksheets 6.2, 6.3, and 6.4) includes one worksheet each for Methods I and II and three worksheets for Method III, respectively.

Method I — Dynamic Occupancy (Worksheet 6.2)

3.60 The steps shown below should be used in filling out Worksheet 6.2, Method I — Dynamic Occupancy.

(1) **Completed Busy-Hour Calls:** Enter the quantity of **completed** busy-hour calls in column B; multiply column B by the appropriate feature package rate in column C, and enter the result divided by 1000 in column D.

The quantity of completed calls does not include false starts, partial dials, or feature activations (call pickup, trunk queuing, etc.). A tandem (trunk-to-trunk) call is counted as one call.

(2) **ECTS Factor:** Based on the number of ECT sets, an occupancy requirement (assuming two terminating calls per set per hour) is entered in column D. The ECTS factor chart at the bottom of the worksheet is provided as part of Worksheet 6.2.

(3) **FP9/FP11 Feature Addition:** Enter 10 percent in column D for FP9 systems. Enter 15 percent for FP11 systems. This is for noncall-related occupancy requirements (Long Distance Billing and Journal Printers).

(4) **Total Dynamic Occupancy:** The total of lines 1 through 3 is entered on line 4, column

D. This total represents the expected dynamic occupancy.

(5) **Total Static Occupancy:** The total from Worksheet 6.1.1 is entered on line 5, column D.

(6) **Total Occupancy:** The sum of lines 4 and 5 is entered in column D. This total occupancy figure does not take into account the use of RMATS, CACS, CAP, or maintenance procedures.

Method II — Dynamic Occupancy (Worksheet 6.3)

3.61 Steps used to complete Worksheet 6.3, Method II — Dynamic Occupancy—are shown below:

(1) **Completed Busy-Hour Calls:** Enter the quantity of **completed** busy-hour calls in column B. The quantity of completed calls does not include false starts, partial dials, or feature activations (call pickup, automatic callback, etc.). Tandem (trunk-to-trunk) calls are counted as one call. Enter in column C the occupancy factor selected from the Feature Model Matrix table (Table C). Selection of an occupancy factor requires identification of a call mix (in-out-intercom) and expected feature utilization (SMDR, ARS, etc.).

(a) For example, given the following call mix and feature combination information:

- 1/3, 1/3, 1/3 Call mix with Main/Satellite, SMDR, ARS/AAR, and Queuing (Matrix A, B, and C)
- 12,000 Completed calls per hour
- 20 Percent false starts/partial dials
- SMDR and AAR/ARS on all outgoing calls
- Queuing on 10 percent of the outgoing calls
- 30 Percent of the incoming calls goes to the satellite
- 30 Percent of the intercom calls goes to the satellite,

it can be determined that the feature combination "ABC" is used in conjunction with a 1/3, 1/3, 1/3 call mix to produce a FEATURE MODEL MATRIX factor of 3.14.

(b) For FP9 evaluation, column A of Table C should be used. If a feature model does not correspond to the proposed system, Method III must be used. Multiply column B by column C, and enter the result divided by 1000 in column D. Using the above example, this result would be 37.68 percent occupancy. In other words,

$$\frac{12,000 \times 3.14}{1,000} = 37.68\% \text{ Occupancy.}$$

(2) **Number of Calls Terminating to ECTS:**

Enter the number of calls that terminate to ECTS in column B, and multiply by the rate in column C. Enter the result divided by 1000 in column D. Unless more specific data is available, the terminating calls to ECTS may be assumed to be proportional to the number of ECTS sets in the system (ie, if ECTS represents 20 percent of the sets in the system, then 20 percent of the incoming plus intercom calls may be assumed to terminate to ECTS).

(3) **ECTS Factor:** Using the number of calls terminating to ECTS, find the ringing factor based on memory configuration of FP selected. This factor is located on Table D, ECTS Terminating Factors. Enter this factor in column D.

(4) **FP9/FP11 Feature Addition:** Enter 10 percent in column D for FP9 systems for noncall-related occupancy requirements. For FP11, enter 15 percent.

(5) **Total Dynamic Occupancy:** The total of lines 1 through 4 is entered on line 5, column D.

(6) **Total Static Occupancy:** The total from Worksheet 6.1.1 is entered on line 6, column D.

(7) **Total Occupancy:** The sum of lines 5 and 6 is entered in column D. This total occupancy figure does not take into account the use of RMATS, CACS, CAP, or maintenance procedures.

(Worksheet 6.4.1), a Call Processing Component (Worksheet 6.4.2), and a Feature Additions (Worksheet 6.4.3).

Method III — Summary (Worksheet 6.4.1)

3.63 Entries from the Static Occupancy — Summary (Worksheet 6.1.1), the Dynamic Occupancy—Call Processing Component (Worksheet 6.4.2), and the Dynamic Occupancy—Feature Additions (Worksheet 6.4.3) are written onto Worksheet 6.4.1. The worksheet provides a summation of Method III calculation of the Dynamic — Call Processing Component and Dynamic — Feature Component Occupancy. Line 5 of this worksheet represents the total occupancy of the system. This total occupancy figure does not take into account the use of RMATS, CACS, CAP, or maintenance procedures.

Method III — Call Processing Component (Worksheet 6.4.2)

3.64 The Call Processing Component (Worksheet 6.4.2) requires identification of specific call types, the quantity of each type of call, and application of the appropriate occupancy rate per call type.

3.65 Specific call types do not include the additional occupancy requirements from the use of ARS/AAR/SMDR/Queuing. Adjustments for these features are computed on Worksheet 6.4.3, Method III — Dynamic Occupancy — Feature Additions. For example, outgoing calls routed by ARS and not routed by ARS would be counted together in the outgoing category (line 5). Those calls routed by ARS, however, would also be evaluated on Worksheet 6.4.3 for the additional occupancy required for ARS routing.

3.66 Specific call types provide factors for calls that terminate to ECTS and non-ECTS. The estimation of calls terminating to ECTS may be based on the representative mix of ECTS in the system. For example, if ECTS (SLS + MET sets) represents 30 percent of the stations, 30 percent of the intercom traffic may terminate to ECTS. Other assumptions may also be made if additional information is available.

3.67 Use of Worksheet 6.4.2 requires identification of specific call types. They are as follows:

- (a) Intercom

Method III — Dynamic Occupancy (Worksheet 6.4)

3.62 The Dynamic Occupancy (Worksheet 6.4) for Method III includes a Summary

- (b) Incoming
- (c) Outgoing (includes trunk-to-trunk)
- (d) Attendant-related
- (e) Main/Satellite - at main
- (f) Main/Satellite - at satellite
- (g) CAS - at main
- (h) CAS - at branch
- (i) UCD/DDC
- (j) Data entry via PMS.

A specific call is analyzed in only one category. A DID call to the satellite via the main, for example, would be analyzed in the Main/Satellite category only, not in the incoming or outgoing categories.

3.68 The following steps are used to complete the Call Processing Component (Worksheet 6.4.2):

- (1) The quantity of each type of call in column A is entered in column B. Column B is multiplied by the factor in column C, and the result divided by 1000 is entered in column D.

Lines 1-2: Station-to-station within the PBX. The ECTS factor applies to calls terminating to ECTS.

Lines 3-4: Incoming calls that terminate directly to a station without attendant intervention (direct inward dialing [DID], incoming tie to station, network in-dialed calls, etc.). Note that incoming calls from a satellite station to a main station are in the Main/Satellite category, not in this category.

Line 5: Direct outward dialing (DOD) calls from stations within the PBX. If routed by AAR/ARS, additional occupancy requirements are added on Worksheet 6.4.3. Calls to a satellite station are properly analyzed in the Main/Satellite category.

Line 6: Incoming trunk that terminates to an outgoing trunk. If routed by AAR/ARS, additional occupancy requirements are added on Worksheet 6.4.3.

Lines 7-15: Incoming, outgoing, and intercom calls that require attendant involvement.

Line 7: Station calls to the attendant.

Lines 8-9: Station-to-station calls, terminating to non-ECTS or ECTS, that are completed by the attendant.

Lines 10-11: Calls originated by the attendant that terminate to non-ECTS or ECTS.

Line 12: Incoming CO, DID, tie, and network calls that terminate to the attendant. These are listed directory number (LDN) type calls that are not subsequently extended to a station.

Lines 13-14: Incoming CO, DID, tie, and network calls that are directed to the attendant and subsequently dialed (or direct station selection [DSS]) to a station. The CAS calls are analyzed in the CAS categories, not in this category.

Line 15: Outgoing calls from stations that are completed by the attendant. For example, a station dials "0" to request a wide area telecommunications service (WATS) trunk and the attendant connects the station to the requested trunk.

Lines 16-20: Analysis of Main/Satellite calls for a system operating as a **main**.

Line 16: A DID or network call is directed to the main, and the main routes the call to a satellite.

- Line 17:** A call originated from a main station is directed to a satellite station.
- Lines 18-19:** Incoming calls from a satellite station are terminated to non-ECTS or ECTS.
- Line 20:** An outdialed call from a satellite is routed through the main to a trunk at the main. Additional occupancy is required if this call is routed by AAR/ARS at the main and is computed on Worksheet 6.4.3.
- Lines 21-26:** Analysis of main/satellite calls for a system operating as a **satellite**.
- Lines 21-22:** An incoming call to non-ECTS or ECTS is received from the main.
- Line 23:** A call to a station at the main is originated by a station at the satellite.
- Lines 24-25:** A call to non-ECTS or ECTS is received by a satellite station from a station at the main.
- Line 26:** An outgoing call made by a station at the satellite is forwarded to main for routing.
- Lines 27-29:** Analysis of CAS-type calls for a system operating as a **main**.
- Line 27:** Incoming CO calls to a branch trunk are received by the CAS attendant at the main via a release link trunk (RLT) and subsequently terminated to a branch station.
- Line 28:** Incoming CO calls to a branch trunk are received by the CAS attendant at the main via an RLT. These calls are not subsequently extended to a branch station (questions such as "How late are you open?").
- Line 29:** A station at the branch dials "0" and is received by the CAS attendant at the main over an RLT.
- Lines 30-33:** Analysis of CAS-type calls for a system operating as a **branch**.
- Lines 30-31:** Incoming CO calls to a branch trunk are forwarded to a CAS attendant at the main via an RLT and subsequently terminated to ECTS or non-ECTS at the branch.
- Line 32:** Incoming CO calls to a branch trunk are forwarded to a CAS attendant at the main via an RLT. These calls are not subsequently extended to a branch station.
- Line 33:** A station at the branch dials "0" and is forwarded to a CAS attendant at the main via an RLT.
- Lines 34-37:** Analysis of calls that terminate to UCD/direct department calling (DDC) groups.
- Line 38:** Data entry calls via PMS, Dynamic overhead consists of two components: standard call processing overhead per 1000 data entry calls and an additional factor for digit collection and transmission. For call processing, the standard non-ECTS intercom call factor should be used. The second component requires 0.7 percent/1000 data digits per hour but can never be greater than 24 percent because of data speed limitations. For example, if 500 data entry calls were estimated in 1 hour and the average number of digits dialed per call were 12, then the overhead would be $(1.83 \times 500/1000) + (0.7 \times 12 \times 500/1000) = 5.12$ percent.
- Lines 39-41:** For specific calls not detailed in lines 1 through 37, estimate the

appropriate factor by analyzing and combining other call types, and enter on these lines.

Line 42: The sum of lines 1 through 41, column B, will be the total completed calls.

Line 43: The quantity of completed calls from line 42, column B, is entered on this line in column B; column B is multiplied by $(N-1/N) \times 0.15$, where N is the number of modules. The result divided by 1000 is entered in column D. For example, 10,000 completed calls, 10 modules would be $[10,000 \times (10-1/10) \times 0.15] \div 1000 =$ percent.

Line 44: The assumed quantity of false starts/partial dials (15 percent to 20 percent) is entered in column B; column B is multiplied by the factor in column C. The result divided by 1000 is entered in column D.

Line 45: The assumed quantity of busy/don't answer (BY/DA) calls (5 percent to 10 percent) is entered in column B; column B is multiplied by the factor in column C. The result divided by 1000 is entered in column D.

Line 46: The total of lines 1 through 45, column D, is entered in column D of this line. This sum is also entered on the Method III — Dynamic Occupancy — Summary (Worksheet 6.4.1), line 1, column B.

Method III — Dynamic Feature Additions
(Worksheet 6.4.3)

3.69 The steps shown below should be used in filling out the Dynamic Occupancy — Feature

Additions (Worksheet 6.4.3):

Lines 1-5: Enter the quantities of calls using the feature in column B. Multiply column B by the factor in column C. Enter the result divided by 1000 in column D. The count of basic calls (in-out-intercom) computed on Worksheet 6.4.2 along with the feature usage percentage is used to determine quantity of calls. For example, if all outgoing calls are recorded by SMDR and 10 percent of the calls are queued, appropriate call quantities would be entered in column B.

Line 6: Enter the number of long distance billing messages to be received from TSPS during the hour analyzed on line 6, column B. Multiply column B by the factor in column C. Enter the result divided by 1000 in column D.

Line 7: Enter the total of anticipated printer CCS for the hour being analyzed on line 7, column B. Multiply the printer CCS (column B) by the factor in column C. This result is then entered in column D.

If, during the busy hour, four printers each operated for 30 total minutes (or 18 CCS), the printer CCS would be 4 times 18 or 72 CCS. This CCS would be multiplied by the 0.17 factor for an occupancy requirement of 12.24 percent. Note that the result of the multiplication is not divided by 1000. Printer CCS is an available traffic measurement item in FP9 and FP11.

Line 8: Enter the number of calls that terminate to ECTS in the blank on line 8, column A. Obtain the ringing factor, based on memory configuration, from the ECTS Terminating Factor table (Table D). Enter this factor in column D.

Unless more specific data is available, the terminating calls to ECTS may be assumed to be proportional to the number of ECTS in the system.

Line 9: Total the entries of lines 1 through 8, column D, and enter this total on line 9, column D. This total represents the dynamic feature additions components. This sum is also entered on line 2, column B, Worksheet 6.4.1.

3.70 The following example illustrates how each method can produce a similar result for dynamic occupancy calculation.

3.71 Given the same call data that were used in Method II of:

- 1/3, 1/3, 1/3 Call mix with Main/Satellite, SMDR, ARS/AAR, and Queuing
- 12,000 Completed calls per hour
- 20 Percent false starts/partial dials
- SMDR and AAR/ARS on all outgoing calls
- Queuing on 10 percent of the outgoing calls
- 30 Percent of the incoming calls goes to the satellite
- 30 Percent of the intercom calls goes to the satellite

and applying Method III factors, the following dynamic occupancy factors can be derived.

False Start/Partial Dials	$((20\% \times 12,000) \times 0.81)/1000$	= 1.94%
Intercom (Internal)	$((70\% \times 4,000) \times 1.83)/1000$	= 5.12%
Intercom (to Satellite)	$((30\% \times 4,000) \times 3.61)/1000$	= 4.33%
DID to Station	$((70\% \times 4,000) \times 1.66)/1000$	= 4.65%
DID to Satellite	$((30\% \times 4,000) \times 4.60)/1000$	= 5.52%
Direct Outward Dial	$(4,000 \times 2.94)/1000$	= 11.76%
SMDR - All Outgoing	$(4,000 \times 0.15)/1000$	= 0.60%
ARS/AAR - All Outgoing	$(4,000 \times 0.60)/1000$	= 2.40%
Queuing	$((10\% \times 4,000) \times 0.75)/1000$	= 0.30%
Intermodule Factor (Assume Eight Modules)	$(8,000 \times (7/8) \times 0.15)/1000$	= 1.05%
Total Occupancy		37.67%
Total Calls		12,000

$$\text{Basic Rate} = 37.67/12,000 \text{ Calls} = 3.14\% \text{ per 1000 Calls}$$

The 3.14 percent factor compares with the FEATURE MODEL MATRIX occupancy factor obtained in Method II.

POST CUTOVER OCCUPANCY EVALUATION

A. General

3.72 The processor occupancy of a system must be evaluated immediately after cutover to confirm the expected results of the presale, precutover engineering evaluation. The occupancy measured on the study should be ± 5 percent of the occupancy computed in the presale evaluation. The ± 5 percent accuracy window assumes that the call/feature data used in the presale evaluation was an accurate estimate of the actual system operation and call volume.

3.73 To adequately analyze the processor occupancy measurement on the post cutover study, the static component and dynamic component must each be derived from the study data although the processor occupancy traffic measurement item is the total occupancy (static + dynamic).

B. Static Occupancy Evaluation—Post Cutover

3.74 The measurement of total occupancy during late p.m. hours, early a.m. hours, or days/hours of low call volume should result in a total occupancy measurement that closely approximates the static component.

3.75 To confirm the expected low activity/call volume present in the system during these polls and the possible amount of dynamic occupancy represented in the measurement, Processor Pegs \times 100 measurement may be analyzed. Processor Pegs \times 100 measurement can be obtained from an RMATS Study Summary Report.

3.76 The processor pegs measurement, when multiplied by 100, represents the total processor pegs during the measured hour. An average call requires 8 to 12 pegs per call. Approximate calls in the system, therefore, may be estimated by multiplying the processor pegs by 100 and dividing by an average of 10 pegs per call. The call volume and dynamic occupancy represented in the low activity hour occupancy measurement may then be calculated.

3.77 For example, if the measurement of several low activity hours indicates that total occupancy was 29 percent and the *Processor Pegs* \times 100 was 10, the following computations would yield approximately 100 calls and an indication that the measured occupancy closely equated to the static occupancy of the system.

$$(1) (10 \text{ Processor Pegs} \times 100) \div 10 \text{ pegs/call} = 100 \text{ calls}$$

$$100 \text{ calls @ an assumed } 3.5\% \text{ per } 1000 \text{ rate} = (100/1000) \times 3.5\% = 0.35\%$$

(2) The total occupancy measured during the low activity hours approximates the static occupancy. Approximately 0.35 percent of the 29 percent is attributable to calls in the system; the remaining 28.65 percent is attributable to the static occupancy component. The assumption that the system static occupancy is 29 percent appears to be valid.

3.78 Because static occupancy is the occupancy required to scan hardware and software records and to support the activation of certain features, measured (derived) static occupancy should closely

approximate the computation of static occupancy on Worksheet 6.1.1.

3.79 Deviation from the static occupancy calculation on Worksheet 6.1.1 by +2 to 5 percent may indicate that the originating register quantities in the software tables are set to the maximum allowed in the FP/memory configuration.

3.80 The RMATS Traffic Summary Report, in trunk groups 16 and 17, indicates the quantities of dial pulse (DP) + TOUCH-TONE dialing ORs translated based on engineering requirements. Procedure 254 also provides the total DP ORs active and the maximum number allowed. The software tables, however, may be set to the maximum number of ORs and require additional occupancy for scanning.

3.81 For example, an F memory FP7 has a maximum of 178 DP + TOUCH-TONE dialing ORs. If the system has 15 TOUCH-TONE dialing ORs, then a maximum of 163 (178-15) DP ORs is active. If the engineering requirement for DP ORs is 20, Procedure 254 would indicate 20 DP ORs active and a maximum of 163 DP ORs allowed. An RMATS Traffic Summary Report would indicate 20 DP ORs and 15 TOUCH-TONE dialing ORs in trunk groups 16 and 17, respectively. If the software tables are set to the maximum number of ORs, an additional 4.3 percent occupancy would be indicated in the measured static occupancy (total engineered DP + TOUCH-TONE dialing ORs = 35; memory maximum = 178; $178 - 35 = 143$ additional ORs; 143×0.03 percent per OR = 4.3 percent additional static occupancy).

3.82 The reduction of the ORs in the software tables to the engineered and translated quantity may be accomplished as follows: Using Procedure 254, display the number of DP ORs active; increase the number of active ORs to the displayed maximum number allowed; and using Procedure 254 again, reduce the active ORs back to the original quantity active. This operation will adjust the software tables to match the active ORs translated. Refer to the Administration and Maintenance Manual for specific Procedure 254 task sequences.

C. Dynamic Occupancy Evaluation—Post Cutover

3.83 The dynamic occupancy may also be calculated from the total processor occupancy measurement, once the static component has been

derived. After determination of peak total occupancy, the static component may be subtracted, with the remaining occupancy being attributable to the dynamic component.

3.84 For example, a peak processor occupancy measurement of 70 percent may be indicated on an RMATS study. From a previously studied low call volume hour, the static occupancy was calculated at 29 percent. The difference of 41 percent (70 percent - 29 percent) is the dynamic occupancy.

3.85 An estimate of the number of calls presented to the system during the peak occupancy hour may be derived from the **Processor Pegs** \times 100 measurement, assuming that one call requires 8 to 12 processor operations.

3.86 Estimates of calls may also be made by summing the pegs on the various trunk groups. For this type of an estimate to be accurate, an hourly study should be taken to have time-consistent trunk group pegs. The summation of trunk group pegs on a daily study would overstate the total busy-hour calls due to the bouncing busy-hour trunk group data provided.

3.87 The sum of the incoming, outgoing, and intercom pegs from a time-consistent busy hour would include tandem calls. One tandem call would peg an incoming and an outgoing trunk. The quantity of tandem calls may be estimated from the **Tandem CCS** measurement. The tandem CCS measured is the sum of the incoming and outgoing trunk CCS and is effectively double the actual tandem CCS.

3.88 For example, one 30-minute (or 18 CCS) tandem call would be measured as 36 CCS on the Tandem CCS measurement (18 CCS on the incoming trunk + 18 CCS on the outgoing trunk).

3.89 To derive the approximate number of tandem calls, the measured tandem CCS is divided by 2 and an assumed holding time per call is applied. For example, from a tandem CCS measurement of 300 CCS and an assumed holding time of 150 seconds per call, 100 tandem calls may be approximated (300 CCS divided by 2, multiplied by 100 seconds, divided by 150 seconds per call = 100 calls). The number of incoming and outgoing calls would each be reduced by the number of tandem calls to avoid the double counting of these calls.

3.90 Another estimate of calls on systems with DID may be made from the peg count on the

ORs as measured on hourly studies of trunk groups 16 and 17. This approach assumes that all incoming, outgoing, intercom and tandem calls use the ORs. This peg count will also include false starts, BY/DA calls, queued calls, and may somewhat overstate call quantities.

4. MEMORY CONFIGURATION AND CONSIDERATIONS

GENERAL

4.01 The primary area for storage in the processor of the DIMENSION PBX is called the **main memory**. Main memory consists of dynamic random access memory (RAM) elements which require periodic refreshing to maintain stored data. The main memory stores the PBX generic program, system translation parameters, and call processing status information and is randomly addressable for read and write operations.

4.02 The main memory consists of 8K, 16K, or 64K word circuit packs which are located in the basic and growth control carrier(s), or in the case of the 64K, in the cost-reduced control carrier.

4.03 Memory size (number of memory boards) is determined by the type of circuit packs used (8K, 16K, or 64K), feature package, and memory configuration. The memory configuration is controlled by parameters needed to satisfy individual customer requirements for lines, trunks, and attendants. Maximum system parameters for each memory configuration of the DIMENSION 600 PBX and the DIMENSION 2000/Custom PBX are summarized in Tables A and B, respectively.

4.04 The software programs that are stored in main memory are in machine code (binary). The pattern of 0s and 1s represents program instructions and data that the processor uses to furnish call processing and features. The program consists of one or more memory words that the processor uses to implement high-level instructions.

MEMORY CONFIGURATION

4.05 Two memory configurations (B and C) are offered for the DIMENSION 600 PBX with 16K memory packs. ♦If 64K memory packs are used, C memory configuration is recommended for all feature packages except FP11, which only is available in D memory.♦ The C memory configuration only is

available for FP8 and FP12 of the DIMENSION 600 PBX.

4.06 Five memory configurations (B, C, D, E, and F) are offered for the DIMENSION 2000/Custom PBX equipped with FP7. (Issue 1.7 of FP7 will not offer memory size B or E.) The FP9 offers memory configurations B, C, D, and E. Three memory configurations (C, D, and F) are offered for FP8 and FP12. The same letter configurations (C, D, and F) have different limits for FP7 and FP9 than for FP8 and FP12. One memory size, D, is available for FP11.

4.07 The difference in memory sizes is the quantity of memory words required by each memory size. For example, one 8K memory circuit pack has 8192 memory words for storage. These packs, when combined, comprise different memory sizes.

4.08 Each control carrier, basic and growth(s), can physically support a maximum of 16 memory circuit packs (8K or 16K) plus the associated memory control interfaces, etc. The cost-reduced control carrier can support a maximum of eight 64K circuit packs with two remaining slots available for future growth.

4.09 A memory control interface is provided via LC135, LC136, and LC137 circuit packs for 8K high-speed memory. Each 128K block of memory requires a set of memory control boards (LC135, LC136, and LC137). If 16K memory is used, for each 256K block of memory, a set of LC135, LC136, and LC138 circuit packs is used. If 64K memory is used, a set of LC135C, LC136, and LC454 circuit packs is needed for the DIMENSION 600 PBX and the DIMENSION 2000/Custom PBX.

4.10 There are three distinct types of memory circuit packs (LC28C, LC128, and LC346) which may be used in the PBX. All are high-speed memory circuit packs. There still exists an LC28B low-speed memory circuit pack which has been rated manufacturer discontinued (MD). It requires different memory control circuit packs and can still be found in DIMENSION 2000 PBXs (FP7) that have not been retrofitted.

4.11 The LC28C contains 8K words of memory; the LC128 contains 16K words of memory; and the LC346 contains 64K words of memory. Each circuit pack is the same physical size. The main impact of the 64K memory board is to reduce the amount of

carriers in almost all new DIMENSION 2000/Custom PBX systems. The need for a growth control carrier is eliminated. It makes possible the provision of duplicate common control within a single control cabinet for even the largest memory configuration. The DIMENSION 600 PBX using the 64K memory pack allows for greater FP9 applications by doubling the number of data channels available for connection to peripheral equipment.

MEMORY PROGRAM ORGANIZATION

4.12 Programs (a series of program instructions) which reside in main memory maintain the sequential flow of operation necessary for system control. All programs are placed into a hierarchy of order based on their relative importance.

4.13 There are two basic types of programs contained in the RAM system: a generic program and a translation program.

A. Generic Program

4.14 The generic program includes the processing and maintenance instructions for performing all DIMENSION PBX system functions. The generic program is what determines the feature package designation used in the system. The generic program is loaded at the factory and ordinarily will not be changed in the field.

B. Translation Program

4.15 The translation program provides translation data which includes class-of-service information, numbering plan, station hunting, trunk grouping, and all similar customer information. This program (for a new system) will be loaded at the factory from information generated from the DIMENSION PBX Ordering Form E-8124, which is an input for detailed customer requirements.

4.16 The translation program may be changed by manual entry through the Maintenance and Administration Panel (MAAP), CAP, or CACS.

MEMORY CONFIGURATION SIZING

A. Memory Configuration (Worksheet 7.1)

4.17 In order to determine the correct memory configuration required, Worksheet 7 is complet-

ed. Worksheet 7 is subdivided into the Memory Configuration Worksheet, the Directory Blocks Worksheet, and the Trunk/Feature Dial Access Code Match Table Worksheet. ♦A design example with a completed Worksheet 7 is discussed in Part 6.♦

4.18 ♦The following steps are used to complete Worksheet 7.1 (Fig. 2), Memory Configuration:

(1) For each item listed on Worksheet 7.1 in column A, except ECTS, enter the quantity required of that item in column C for the system being engineered. The quantity required for each item is obtained from the source indicated under Column B; ie, DIMENSION Service Request (DSR) Form or the completed DIMENSION 600/2000/Custom Design Engineering Worksheet indicated.

(2) Using Table A for the DIMENSION 600 PBX or Table B for the DIMENSION 2000/Custom PBX, enter the memory configuration required (B, C, D, E, or F) in column D for each quantity listed. For ECTS the memory configuration required is obtained after completing Worksheet 5, as discussed in Section 554-111-625. When selecting the appropriate memory size for each item listed, always choose one that is adequate to handle the quantity specified in column C. In other words, never choose a memory size that has a maximum capacity less than what is specified for each item in column C.

(3) Enter the largest memory configuration required by any one item at the bottom of Worksheet 7.1. This is the configuration that must be provided.♦

B. Directory Blocks (Worksheet 7.2)

4.19 Blocks of station lines are assigned in memory in increments of ten lines (10-word tables) and are referred to as directory blocks. As long as sufficient memory directory blocks are available, any number of consecutive extension dial codes can be assigned within a hundreds grouping.

4.20 Station number assignments can begin with any digit 1 through 9 and must be fixed to two, three, or four digits. Exceptions are FP9 and FP11 which offer mixed numbering of stations and single digit dialing where station numbering can vary in length from one to four digits within the same installation.

4.21 Based on the numbering plan chosen, the number of directory blocks required is calculated on Worksheet 7.2 and then entered on Worksheet 7.1.

4.22 The following steps are used to complete Worksheet 7.2 (Fig. 3):

- (1) List each thousands digit in the station numbering plan.
- (2) List each unique hundreds group.
- (3) List each unique tens group.

4.23 ♦For more than 100 directory blocks, duplicate Worksheet 7.2. However, only one FIRST-DIGIT TABLE is required. Therefore, enter appropriate digit table, in place of the FIRST-DIGIT TABLE, on succeeding sheets of Worksheet 7.2.♦

4.24 If mixed numbering/single digit dialing (FP9 and FP11) of stations is provided, the following rules for providing directory blocks apply in addition to the rules indicated above.

- (1) One directory block is used as an intercept table and is therefore unavailable for assignment.
- (2) If a single-digit station is translated as a station in the station series, no additional directory block is needed. For example, station series 100-129 is used; room service is "1" and is translated as station "115". The directory blocks would equal: (1) FIRST DIGIT TABLE, (2) Intercept, (3) 1XX, (4) 10X, (5) 11X, and (6) 12X. Six directory blocks are required, and 115 is unavailable for assignment.
- (3) The same reasoning applies to 2-digit stations translated as a station in a station series (ie, room service is "10"—translated as station 118). No additional directory block is needed.
- (4) However, when one or more single-digit stations do not have the same initial digit as the station series, one additional directory block is required, and this one directory block will be used for all single-digit stations. For example, the dialing plan provides for station series 100 through 129; room service is "2", bell captain is "3", bar is "4", and pool is "5". The directory block assign-

ments are as follows: (1) FIRST DIGIT TABLE, (2) Intercept, (3) 1XX, (4) 10X, (5) 11X, (6) 12X, and (7) Single Digit. Seven directory blocks are required.

C. Trunk/Feature Dial Access Code Match Table (Worksheet 7.3)

4.25 All trunk access codes, feature access codes, and route advance groups are assigned a location in memory. These quantities must be calculated to determine which memory configuration is required.

4.26 The following steps are used to complete Worksheet 7.3 (Fig. 4):

(1) List all trunk access codes. If a dial code is used for more than one trunk group, it must be listed once for each group.

(2) List all **multidigit** feature access codes. Note that in the numbering plan, "0" and "#" are listed as feature access codes. However, they are **not** multidigit; therefore, they are not entered on the worksheet.

(3) List each route advance group. If a trunk group appears in more than one route advance group, it must be entered again with each group.

4.27 ♦Figure 4 shows a completed Worksheet 7.3 for the numbering plan given in design example (Part 6). The total obtained is entered on Worksheet 7.1, and the appropriate memory size determined.♦

5. DATA CHANNEL REQUIREMENTS

GENERAL

5.01 Data are passed between the DIMENSION PBX and the various peripheral units via a data channel on the fast/slow speed data I/O circuit pack (LC34B) or the slow speed data I/O circuit pack (LC366) that is designed for use in the cost-reduced control carrier.

5.02 There are dedicated data channels for:

- SMDR
- MAAP/CAP
- RMATS/CACS

- Network Control Operations Support System (NCOSS)
- Centralized Station Message Detail Recording (CSMDR).

In addition, other features that require a data channel interface are:

- Calling Number Displays
- ECTS Controllers
- Attendant Console/Terminals
- Printers
- Property Management Interface
- Energy Control Interface
- FADS for CAS
- FADS for UCD
- ♦Management Information System♦.

5.03 When using 64K memory circuit packs, the data channels are located in the cost-reduced control carrier and, if needed, the supplemental I/O carrier. If 8K or 16K memory circuit packs are used, the data channels are located in the basic control carrier and each growth control carrier as required. The quantity of data channels is an engineered item which is dependent on the features selected that require I/O circuit packs. Worksheet 8 (Fig. 5) is used to determine the total data channel circuit packs required. Total LC366 data channel circuit packs are sized using Worksheet 8.1 and 8.2, while Worksheet 8.3 is used to size LC34B data channel circuit packs. ♦A design example with a completed Worksheet 8 is discussed in Part 6.♦

DATA CHANNEL SIZING

A. Cost-Reduced Control Carrier (Worksheet 8.1)

5.04 The concept of double numbering of physical slots for the LC366 circuit pack must be understood. The software has been designed for use with the LC34 software, meaning that it administers two channels per slot. This scheme has been followed to facilitate administration of the LC366 circuit packs

without introducing major software changes. Since the LC366 contains four channels, it is administered as two slots. Figure 6 is an example of how to administer the LC366.

5.05 To complete Worksheet 8.1, in column A, associate feature(s) requiring an LC366 circuit pack with a slot/circuit assignment. If a slot designation is assigned, place a checkmark (✓) in the square in column B associated with that slot designation.

5.06 Certain features such as MAAP/CAP, SMDR, CSMDR, and NCOSS are assigned to dedicated circuits. If the features are used, they must be assigned to these dedicated slot/circuit locations. The local storage unit (LSU) is used to interface the NCOSS and CSMDR features. Other features, such as ECTS controllers, calling number displays, attendant console/terminals may be assigned to any unused circuit. Where the word "Any" appears in column A, any feature that requires a data channel interface (in lieu of those specifically dedicated) can be associated with that slot/circuit location.

5.07 Column C lists features that use *special* circuit packs and have *dedicated* slot/circuit assignments. These packs are used in place of the LC366 circuit pack. They are the LC172 (MAAP/CAP, RMATS/CACS) located in slot 30, circuits 0 and 1; LC171 (SMDR, RMATS/CACS) located in slot 31, circuit 0 and 1, leaving slot 35, circuits 0 and 1, unavailable for assignment; and the LC144 (TIME OF DAY CLOCK) in slot 32, circuit 0, leaving circuit 1 and slot 36, circuits 0 and 1, unavailable. When RMATS or CACS is provided, both LC171 and LC172 circuit packs are required.

5.08 If any of these packs are used, place a checkmark (✓) in the appropriate square in column D.

5.09 Count the checkmarks in column B. This is the total number of LC366 circuit packs that are required. If any circuit packs are checked in column D, these are required in place of an LC366.

B. Supplemental I/O Carrier (Worksheet 8.2)

5.10 If more LC366 data channels are required than can be provided in the cost-reduced control carrier, Worksheet 8.2 for the supplemental I/O carrier (DIMENSION 2000/Custom only) can be completed in the same manner as for the Cost-

Reduced Control Carrier (Worksheet 8.1). The supplemental I/O carrier is available in "F" memory only.

C. LC34B Data Channel (Worksheet 8.3)

5.11 Fill out Worksheet 8.3 to determine the number of LC34B data channels required in the common control cabinets. Column A lists items that require an LC34B data channel. In column B, enter the quantity of each of these items required for the system being engineered. Quantities of data channels are determined by multiplying each quantity in column B by each number in column C. The sum is entered in column D, and shows the total number of data channels required. Two data channels require one LC34B circuit pack. Divide the total of column D by 2, and enter this quantity in column E. Slot 30 is reserved for Large Maintenance and Administration Panel (LMAAP) and uses an LC172-type circuit pack. Slot 31 is reserved for SMDR and RMATS and uses an LC171-type circuit pack.

◆6. DESIGN EXAMPLE◆

6.01 ◆The following paragraphs discuss a hypothetical design example with completed Worksheets 6, 7, and 8. The example in no way is intended to depict a typical DIMENSION PBX configuration and/or data which may be found in an actual working PBX. Rather, it is intended to highlight proper determination of memory configuration and processor occupancy by entering data in the appropriate worksheets. Many assumptions, such as the number of attendants, TOUCH-TONE dialing and dial pulse originating register records, etc, have been made in constructing the example. In an actual design engineering process, these data are obtained by completing appropriate design engineering worksheets found in Section 554-111-650 or from the DSR Form provided for a particular system.

6.02 The design example consists of DIMENSION 2000 PBX equipped with FP8 and operating as a main in a Main/Satellite arrangement. A total of 2000 stations (requiring 2000 line records) is provided with a mix of 800 ECTS sets and 1200 non-ECTS sets. The number of calls terminating to ECTS sets is assumed to be proportional to the number of ECTS sets in the system, ie, 40 percent ($800 \div 2000$) of incoming and intercom calls terminate to ECTS sets. The ECTS sets are driven by Electronic Telephone Controllers (ETCs) which are engineered using procedures◆

◆in Section 554-111-625. Eight ETCs and the "F" memory configuration of FP8 are assumed for this example to support ECTS. Additional data are assumed as follows:

2	Attendant Consoles
2	Attendant Conferences
2	Calling Number Displays
30	TOUCH-TONE Dialing Originating Register Records
20	Dial Pulse Originating Register Records
250	Intercom Records
600	Physical Trunks (Hardware)
250	Link Paths
310	SMDR Records
5	Modules
36	Line Carriers
22	Trunk Carriers
10	Link Carriers
14	Network Cabinets.

6.03 The processor occupancy for the main PBX (DIMENSION 2000 PBX) is evaluated by completing Worksheet 6 as shown in Fig. 1 and discussed in the following paragraph. Before processor occupancy can be evaluated, a memory configuration of the feature package must be determined by completing Worksheet 7.1 which is discussed later in this part. The following busy-hour call data are assumed:

INTERCOM	2000 Calls
INCOMING	2250 Calls
OUTGOING	4750 Calls (Includes 800 Tandem Calls)
Total	9000 Calls
FALSE START/ PARTIAL DIAL	700 Calls.

The AAR/ARS/Queuing features are not provided. The SMDR is enabled for incoming and outgoing calls which are further categorized by call types as follows:

INCOMING—2250 Calls

2000	DID Calls to Main PBX Stations
200	Calls From Satellite Stations to Main PBX Stations
30	Calls terminating to Attendant
20	Calls to Main PBX Station via Attendant.

OUTGOING—4750 Calls

3600	DOD Calls from Main PBX Stations
350	Calls from Main PBX Stations to Stations at Satellite
50	DOD Calls from Satellite via Main
750	DID Calls to Satellite via Main.

6.04 The total processor occupancy is obtained by evaluating static and dynamic occupancy. The static occupancy of 30.57 percent is obtained from Worksheet 6.1 (Fig. 1).

6.05 The dynamic occupancy can be evaluated by three methods (Methods I, II, and III) as discussed in Part 3. The dynamic occupancy for the design example is evaluated using all three methods to show the degree of accuracy attained. Worksheets 6.2, 6.3, and 6.4 used for each method, respectively, are completed as shown in Fig. 1. When compiling the total completed busy-hour calls for use with Method I, it is important to avoid double counting tandem calls. The 9000 calls entered on Worksheet 6.2 include 800 tandem calls which were counted once in the outgoing category (paragraph 6.03). For Method II, the intercom-in-out call mix of 1/4, 1/4, 1/2 respectively is used with "AC" feature combinations to determine occupancy factor from Table C. Note that Method III requires more detailed call data than Method I or II to evaluate processor occupancy. Note from the ◆

◆example shown in Fig. 1 (Worksheet 6.4), that the Main/Satellite calls are not included in any of the intercom, incoming, or outgoing categories on Worksheet 6.4.2. All Main/Satellite calls were accounted

for in items 16 through 20 of Worksheet 6.4.2. The total processor occupancy for the design example is summarized below:

OCCUPANCY	METHOD I	METHOD II	METHOD III
Static	30.57	30.57	30.57
Dynamic	<u>41.50</u>	<u>28.71</u>	<u>30.38</u>
Total	72.07	59.28	60.95

Note that the static occupancy is constant for any of the three methods selected. However, the dynamic occupancy varies depending on the accuracy of call data used, resulting in the increase or decrease in total processor occupancy.

6.06 The memory configuration of FP8 required is determined by completing Worksheet 7.1, Memory Configuration. The data for each applicable item on Worksheet 7.1 is obtained from either the DSR Form or completed worksheets indicated under "SOURCE", Column B, as discussed in Part 4. From the above assumed data and completed Worksheets 7.2, 7.3, and 8, which are discussed later in this part, Worksheet 7.1 is completed as shown in Fig. 2.

6.07 The memory configuration required for each applicable item on Worksheet 7.1 is obtained from Table B and entered in Column D of the worksheet. The largest memory configuration required for any applicable item is selected as the final memory configuration required. In this design example, "F" memory configuration is selected due to ECTS requirements.

6.08 The number of directory blocks required for the station numbering plan are determined by completing Worksheet 7.2 as discussed in Part 4. The station numbering plan used for the main PBX consists of four digit numbers assigned consecutively from 2000 to 3999. A total of 223 directory blocks is required as shown by a completed Worksheet 7.2 in Fig. 3.

6.09 The number of trunk/feature dial access codes required is determined by completing Work-

sheet 7.3 as discussed in Part 4. The numbering plan used for trunk access codes, feature access codes, and route advance is indicated below:

(a) Trunk Access Codes:

9 (1-way)	81
9 (2-way)	82
61	83
62	84
63	85

(b) Feature Access Codes:

0	70
71	*1
72	*2
73	*3
74	*4
75	*5
76	*6
77	*7
78	#
79	◆

◆ (c) Route Advance Groups:

81-82-83-84-85
82-83-84-85
83-84-85
84-85
61-62-63

A total of 44 trunk/feature access codes (including route advance) is required for the above plan as shown in Fig. 4.

6.10 The number of data channels required for ETC, attendant console, calling number display, etc., is obtained by completing Worksheet 8, as

discussed in Part 5. Using a cost-reduced control carrier, a total of 12 LC366 data channels (three circuit packs) is required as shown in Fig. 5. In addition, LC171 and LC172 circuit packs are required for MAAP, SMDR, and RMATS interface. If more data channels were required than could be accommodated by the cost-reduced control carrier, then Worksheet 8.2 would have been completed. Worksheet 8.3 would have been completed only if LC34B circuit packs were used.◆

"DIMENSION" 600/2000/CUSTOM PBX
DESIGN ENGINEERING WORKSHEET
WORKSHEET 6 - PROCESSOR OCCUPANCY EVALUATION

6.1 STATIC OCCUPANCY

6.1.1 SUMMARY

A	B	C	D
ITEM	QUANTITY	OCC FACTOR	OCC-BXC
CONFIGURATION COMPONENT			
1 BASIC	1	FP7 11.4 FP8 15.2 FP9 14.0 FP11 16.9 FP12 15.2	15.2
2 LINE CARRIERS (NOTE 1)	36	0.05	1.8
3 TRUNK CARRIERS (NOTE 2)	22	0.30	6.6
4 ATTENDANT CONSOLES (NOTE 3)	2	0.34 0.61	0.68
5 TRUNK RECORDS (NOTE 4)	1199*	0.001	1.2
6 ORIGINATING REGISTERS (NOTE 5)	103†	0.03	3.09
7 MESSAGE REGISTERS (NOTE 6)	—	0.26	—
8 POWER METERS (NOTE 6)	—	0.11	—
FEATURE COMPONENT			
9 FEATURE ADDITIONS (FROM WORKSHEET 6.1.2)			2.0
10 TOTAL STATIC OCCUPANCY (LINES 1+2+3+4+5+6+7+8+9)			30.57

NOTE 1: LINE CARRIERS + LINE GROUP CONTROL CARRIERS.

NOTE 2: TRUNK CARRIERS + TIE TRUNK CARRIERS + MODULE CONTROL AND TRUNK PORT CARRIERS.

NOTE 3: ATTENDANT CONSOLES + ATTENDANT CONSOLE/TERMINALS (DOES NOT INCLUDE STATION CONSOLE/TERMINALS - FP9 AND FP11). USE 0.61 FACTOR FOR FP11, USE 0.34 FACTOR FOR ALL OTHER FPs.

NOTE 4: IF EXACT QUANTITY IS UNKNOWN, USE 1000 TRUNK RECORD.

NOTE 5: ENGINEERED QUANTITY OF DIAL PULSE + "TOUCH-TONE" + MAXIMUM NUMBER OF ATTENDANT ORs IN THE FP/MEMORY CONFIGURATION + MAXIMUM NUMBER OF ATTENDANT CONFERENCE ORs IN THE FP/MEMORY CONFIGURATION.

NOTE 6: IF PROVIDED.

* 850 Assignable Records
50 TT/DP OR
6 ANI Records
293 ATNDT Switched loops,
OR and Conference (MAX)
1199 Total Trunk Records

† 50 TT/DP OR (MAX)
53 ATNDT OR and
Conference (MAX)
103 Originating Registers

Fig. 1—Completed Example of Worksheet 6 (Sheet 1 of 9)

**"DIMENSION" 600/2000/CUSTOM PBX
DESIGN ENGINEERING WORKSHEET
WORKSHEET 6 - PROCESSOR OCCUPANCY EVALUATION**

6.1 STATIC OCCUPANCY

6.1.2 FEATURE ADDITIONS

A		B	C					D	
FEATURE		FEATURE PACKAGE	OCCUPANCY FACTOR (IF FEATURE IS ACTIVE)					OCCUPANCY	
1	ECTS	7(8) 11, 12	FEATURE PACKAGE		MEMORY CONFIGURATION			2.0	
			B	C	D	E	F		
			7	0.2	0.3	0.5	1.7		3.7
			8/12	-	0.3	0.5	-		2.0
11	-	-	0.9	-	-				
2	CAS FADS	8, 11, 12	0.82					0	
3	UCD FADS	8, 11, 12	2.2 + [0.54 X (NO. OF UCD FADS TERMINALS)]					0	
4	ENERGY CONTROL	9, 11	8.8					0	
5	PROPERTY MANAGEMENT SYSTEM (CIPMS)	9, 11	5.0					0	
6	LOCAL CALL BILLING	9	1.5					0	
		11	0.5					0	
7	LONG DISTANCE BILLING	9, 11	1.3					0	
8	DISTRIBUTED COMMUNICATIONS SYSTEM	8	5.0					0	
9	TOTAL STATIC FEATURE ADDITIONS (LINES 1+2+3+4+5+6+7+8) (TO WORKSHEET 6.1.1, LINE 9)						2.0		

Fig. 1—Completed Example of Worksheet 6 (Sheet 2 of 9)

**"DIMENSION" 600/2000/CUSTOM PBX
DESIGN ENGINEERING WORKSHEET
WORKSHEET 6 - PROCESSOR OCCUPANCY EVALUATION**

6.2 METHOD I -- DYNAMIC OCCUPANCY - SPECIFIC OCCUPANCY FACTOR

A	B	C	D
ITEM	CALLS	OCC FACTOR	OCCUPANCY = $\frac{B \times C}{1000}$
1 NUMBER OF COMPLETED BUSY HOUR CALLS	9000	FP7 3.3 FP8 3.5 FP9 3.0 FP11 3.5 FP12 3.5	31.5

ITEM		OCC FACTOR	OCCUPANCY
2 ECTS FACTOR		(NOTE 1)	10.0
3 FP8-FP11 FEATURE ADDITION		(NOTE 2)	-
4 TOTAL DYNAMIC OCCUPANCY (LINE 1+2+3)			41.5
5 TOTAL STATIC OCCUPANCY (FROM WORKSHEET 8.1.1)			30.57
6 TOTAL OCCUPANCY (LINES 4+5)			72.07

NOTE 1: ECTS FACTOR

ECTS SETS	MEMORY					
	B	C	D	E	F	
1-100	1%	1%	2%	5%	5%	
101-300	2%	2%	3%	8%	8%	
301-800	3%	3%	5%	10%	10%	
801 +	4%	4%	6%	12%	12%	

**NOTE 2: FOR FP9 ENTER 10% IN COLUMN D.
FOR FP11 ENTER 15%.**

Fig. 1—Completed Example of Worksheet 6 (Sheet 3 of 9)

**"DIMENSION" 600/2000/CUSTOM PBX
DESIGN ENGINEERING WORKSHEET
WORKSHEET 6 - PROCESSOR OCCUPANCY EVALUATION**

8.3 METHOD II - DYNAMIC OCCUPANCY - MODEL MATRIX FACTOR

	A	B	C	D
	ITEM	CALLS	OCCUPANCY FACTOR	OCCUPANCY = $\frac{B \times C}{1000}$
1	NUMBER OF COMPLETED BUSY-HOUR CALLS	9000	(NOTE 1) 2.83*	25.47
2	NUMBER OF CALLS TERMINATING TO ECT SETS	1700 [†]	0.7	1.19

	ITEM		OCCUPANCY FACTOR	OCCUPANCY
3	ECTS FACTOR		(NOTE 2)	2.05
4	FP9-FP11 FEATURE ADDITION		(NOTE 3)	—
5	TOTAL DYNAMIC OCCUPANCY (LINE 1+2+3+4)			28.71
6	TOTAL STATIC OCCUPANCY (FROM WORKSHEET 6.1.1)			30.57
7	TOTAL OCCUPANCY (LINES 5+6)			59.28

NOTE 1: SELECT THE OCCUPANCY RATE FROM TABLE C, "FEATURE MODEL MATRIX", AND ENTER IN COLUMN C.

NOTE 2: USING THE QUANTITY OF CALLS TERMINATING TO ECTS FROM LINE 2, SELECT THE RATE, BASED ON MEMORY CONFIGURATION, FROM TABLE D, "ECTS TERMINATING FACTORS", AND ENTER IN COLUMN D.

NOTE 3: FOR FP9, ENTER 10% IN COLUMN D. FOR FP11, ENTER 15%.

* Model Matrix "AC"
 1/4 Incoming
 1/4 Intercom
 1/2 Outgoing

† 2250 Incoming
 2000 Intercom
 4250 Calls
 $\frac{4250 \times 800}{2000} = 1700$ Calls
 terminating to
 ECTS sets.

Fig. 1 — Completed Example of Worksheet 6 (Sheet 4 of 9)

**"DIMENSION" 600/2000/CUSTOM PBX
DESIGN ENGINEERING WORKSHEET
WORKSHEET 6 - PROCESSOR OCCUPANCY EVALUATION**

**6.4 METHOD III - DYNAMIC OCCUPANCY - SPECIFIC CALL
TYPE FACTOR**

6.4.1 SUMMARY

	A	B
	ITEM	OCCUPANCY
1	DYNAMIC CALL PROCESSING OCCUPANCY (FROM WORKSHEET 6.4.2, LINE 46)	25.87
2	DYNAMIC-FEATURE ADDITION OCCUPANCY (FROM WORKSHEET 6.4.3, LINE 9)	4.51
3	TOTAL DYNAMIC OCCUPANCY (LINES 1+2)	30.38
4	TOTAL STATIC OCCUPANCY (FROM WORKSHEET 6.1.1)	30.57
5	TOTAL OCCUPANCY (LINES 3+4)	60.95

Fig. 1—Completed Example of Worksheet 6 (Sheet 5 of 9)

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Reference - SECTION 554-111-630

**"DIMENSION" 600/2000/CUSTOM PBX
DESIGN ENGINEERING WORKSHEET
WORKSHEET 6 - PROCESSOR OCCUPANCY EVALUATION**

6.4 METHOD III - DYNAMIC OCCUPANCY - SPECIFIC CALL TYPE FACTOR

6.4.2 CALL PROCESSING COMPONENT

A	B	C	D
ITEM	CALLS	OCC FACTOR	OCC-BXC/1000
INTERCOM			
1 TO NON-ECTS STA	1200	1.83	2.2
2 TO ECTS STA	800	2.51	2.01
INCOMING			
3 DID TO NON-ECTS STA	1200	1.66	1.99
4 DID TO ECTS STA	800	2.36	1.89
OUTGOING			
5 DOD	3600	2.94	10.58
6 TRUNK TO TRUNK		3.02	
ATTENDANT RELATED			
7 STA TERMINATES TO ATNDT		1.25	
STA TO STA VIA ATNDT			
8 TO NON-ECTS STA		1.88	
9 TO ECTS STA		2.58	
ATNDT TO STA			
10 TO NON-ECTS STA		1.37	
11 TO ECTS STA		2.06	
12 INC CO TERMINATES TO ATNDT	30	2.00	0.06
INC CO TO STA VIA ATNDT			
13 TO NON-ECTS STA	12	3.08	0.04
14 TO ECTS STA	8	3.70	0.03
15 STA TO CO VIA ATNDT		3.50	

Fig. 1—Completed Example of Worksheet 6 (Sheet 6 of 9)

**"DIMENSION" 600/2000/CUSTOM PBX
DESIGN ENGINEERING WORKSHEET
WORKSHEET 6 - PROCESSOR OCCUPANCY EVALUATION**

6.4 METHOD III - DYNAMIC OCCUPANCY - SPECIFIC CALL TYPE FACTOR
6.4.2 CALL PROCESSING COMPONENT (CONTD)

A	B	C	D
ITEM	CALLS	OCC FACTOR	OCC-BXC/1000
MAIN/SAT - AT MAIN			
16 DID TO SAT VIA MAIN	750	4.60	3.45
17 STA (MAIN) TO STA (SAT)	350	4.00	1.4
STA (SAT) TO STA (MAIN)			
18 TO NON-ECTS STA	120	1.80	0.22
19 TO ECTS STA	80	2.50	0.2
20 DOD (SAT) VIA MAIN	50	3.00	0.15
MAIN/SAT - AT SATELLITE			
DID TO SAT VIA MAIN			
21 TO NON-ECTS STA		1.80	
22 TO ECTS STA		2.50	
23 STA (SAT) TO STA (MAIN)		4.00	
STA (MAIN) TO STA (SAT)			
24 TO NON-ECTS STA		1.80	
25 TO ECTS STA		2.50	
26 DOD (SAT) VIA MAIN		3.00	
CAS - AT MAIN - (BR-BRANCH)			
27 INC CO (BR) TO STA (BR) VIA CAS ATNDT		3.20	
28 INC CO (BR) TERMINATES TO CAS ATNDT		2.00	
29 STA (BR) TERMINATES TO CAS ATNDT		2.00	
CAS - AT BRANCH (BR-BRANCH)			
INC CO (BR) TO STA (BR) VIA CAS ATNDT			
30 TO NON-ECTS STA		4.33	
31 TO ECTS STA		5.03	
32 INC CO (BR) TERMINATES TO CAS ATNDT		2.31	
33 STA (BR) TERMINATES TO CAS ATNDT		2.23	

Fig. 1—Completed Example of Worksheet 6 (Sheet 7 of 9)

**"DIMENSION" 600/2000/CUSTOM PBX
DESIGN ENGINEERING WORKSHEET
WORKSHEET 6 - PROCESSOR OCCUPANCY EVALUATION**

6.4 METHOD III - DYNAMIC OCCUPANCY - SPECIFIC CALL TYPE FACTOR
6.4.2. CALL PROCESSING COMPONENT (CONTO)

A	B	C	D
ITEM	CALLS	OCC FACTOR	OCC=BXC/1000
UCD/DDC			
INC CO TO UCD/DDC STA			
34 TO NON-ECTS STA		2.25	
35 TO ECTS STA		2.95	
STA TO UCD/DDC STA			
36 TO NON-ECTS STA		2.21	
37 TO ECTS STA		2.91	
OTHER			
38 DATA ENTRY VIA PMS(NOTE 1)		1.83*0.7 X DIGITS PER CALL	
39			
40			
41			
42 TOTAL COMPLETED CALLS (SUM OF COLUMN B)	9000		
43 INTERMODULE FACTOR (NOTE 2)	9000	$\left[\frac{N-1}{N}\right] \times (0.15)$	1.08
44 FALSE START/PARTIAL DIAL	700	0.81	0.57
45 BUSY/DON'T ANSWER		1.60	
46 TOTAL DYNAMIC OCCUPANCY CALL PROCESSING COMPONENT (SUM OF LINES 1 TO 45) (TO WORKSHEET 6.4.1, LINE 1)			25.87

NOTE 1: THE ESTIMATED BUSY-HOUR DATA ENTRY CALLS AND THE AVERAGE NUMBER OF ESTIMATED DIALED DIGITS FOR SUCH CALLS ARE REQUIRED TO DETERMINE OCCUPANCY EFFECT OF SUCH CALLS. NUMBER OF CALLS IS ENTERED IN COLUMN B AND ESTIMATED NUMBER OF DIGITS IS MULTIPLIED BY 0.7 IN COLUMN C TO DETERMINE COMBINED OCCUPANCY FACTOR.

NOTE 2: THE CALL QUANTITY FROM LINE 42, COLUMN B IS ENTERED IN COLUMN B OF THIS LINE. IN THE EQUATION, N=THE NUMBER OF MODULES. RESULTS ENTERED IN COLUMN D SHOULD BE IN THE 0.5X TO 2X RANGE.

Fig. 1—Completed Example of Worksheet 6 (Sheet 8 of 9)

**"DIMENSION" 600/2000/CUSTOM PBX
DESIGN ENGINEERING WORKSHEET
WORKSHEET 6 - PROCESSOR OCCUPANCY EVALUATION**

6.4 METHOD III - DYNAMIC OCCUPANCY - SPECIFIC CALL TYPE FACTOR

6.4.3 FEATURE ADDITIONS

	A	B	C	D
	ITEM	CALLS	OCC FACTOR	OCC=BXC/1000
1	SMDR	7000	0.15	1.05
2	ARS		0.50	
3	AAR		0.70	
4	QUEUING - RINGBACK		1.00	
5	QUEUING - OFF-HOOK		0.50	
6	LONG DISTANCE BILLING		11.00	

	ITEM	CCS	OCC FACTOR	OCC=BXC
7	PRINTER - CCS		0.17	

	ITEM	CALLS	OCC FACTOR	OCCUPANCY
8	NUMBER OF CALLS TERMINATING TO ECTS	1688	2.05	3.46
9	TOTAL DYNAMIC OCCUPANCY FEATURE ADDITIONS (LINES 1+2+3+4+5+6+7+8) (TO WORKSHEET 6.4.1, LINE 2)			4.51

* USING THE QUANTITY OF CALLS TERMINATING TO ECTS ENTERED IN COLUMN B, SELECT THE OCCUPANCY RATE, BASED ON MEMORY CONFIGURATION, FROM TABLE D, "ECTS TERMINATING FACTORS," AND ENTER IN COLUMN D.

Fig. 1—Completed Example of Worksheet 6 (Sheet 9 of 9)

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Reference - SECTION 554-111-630

**"DIMENSION" 600/2000/CUSTOM PBX
DESIGN ENGINEERING WORKSHEET
WORKSHEET 7 - MEMORY REQUIREMENTS**

7.1 MEMORY CONFIGURATION

A	B	C	D
ITEM	SOURCE (NOTE 1)	QUANTITY REQUIRED	MEMORY CONFIGURATION REQUIRED
1. LINES (LINE RECORDS)	DSR	2000	D
2. ATTENDANT CONSOLES/TERMINALS	WS 10	2	C
3. ATTENDANT CONFERENCE	DSR	2	C
4. CUSTOM INTERCOM	DSR		
5. SPEED CALLING NUMBERS	DSR		
6. DIRECTORY BLOCKS	WS 7.2	223	D
7. ECTS (NOTE 2)	WS 5	2	F
8. LC34B/LC366 DATA CHANNELS	WS 8	12	C
9. FLEXIBLE NIGHT TRUNKS	DSR		
10. TRUNK/FEATURE DIAL ACCESS CODES	WS 7.3	44	C
11. CALLING NUMBER DISPLAYS	DSR	2	C
12. REMOTE ACCESS TRUNKS WITH VSG	WS 1		
13. MESSAGE REGISTER TRUNKS	DSR		
14. JOURNAL PRINTERS	DSR		
15. POWER METER INTERFACES	DSR		
16. PERIPHERAL INTERFACE CIRCUITS	DSR		
17. LONG DISTANCE BILLING NUMBERS	DSR		
18. SMOR RECORDS	WS 4	310	D
19. SMOR AAR/ARS QUEUING RECORDS	WS 4		
20. TOTAL LINK PATHS	WS 3	250	D
21. ASSIGNABLE TRUNK RECORDS	WS 1	850	D
22. "TOUCH-TONE" DIALING AND DIAL PULSE REGISTER RECORDS	WS 2	50	C
23. LINE CARRIERS (NOTES 3 AND 5)	WS 13	36	D
24. TRUNK CARRIERS (NOTES 4 AND 5)	WS 13	22	D
25. LINK CARRIERS (NOTE 5)	WS 13	10	D
26. CABINETS (NOTE 5)	WS 13	14	C
27. MODULES	WS 3	5	D
PROVIDE THE LARGEST MEMORY REQUIRED BY ANY ITEM ABOVE. MEMORY CONFIGURATION SELECTED (NOTE 6)			F

NOTES:

- "DSR" UNDER SOURCE COLUMN REFERS TO DATA OBTAINED FROM "DIMENSION" PBX SERVICE REQUEST FORM. WS __ REFERS TO WORKSHEET IN SECTION 554-111-650.
- MEMORY CONFIGURATION REQUIRED TO SUPPORT ECTS IS ENGINEERED IN SECTION 554-111-625; THE MEMORY SELECTED FROM WS 5 IS ENTERED IN COLUMN D.
- INCLUDES LINE GROUP CONTROL CARRIERS.
- INCLUDES MODULE CONTROL CARRIERS.
- ITEMS 23 THROUGH 26 ARE TO BE FILLED IN ONLY AFTER THE FINAL CONFIGURATION IS COMPLETED. THEY ARE PROVIDED ONLY FOR VERIFICATION PURPOSES.
- FOR FEATURE PACKAGE 11, ONLY MEMORY SIZE D IS AVAILABLE.

Fig. 2—Completed Example of Worksheet 7.1

**"DIMENSION" 600/2000/CUSTOM PBX
DESIGN ENGINEERING WORKSHEET
WORKSHEET 7 - MEMORY REQUIREMENTS**

7.2 DIRECTORY BLOCKS

FIRST DIGIT									
1. TABLE	2. 2XX	3. 3XX	4. 20XX	5. 21XX	6. 22XX	7. 23XX	8. 24XX	9. 25XX	
10. 26XX	11. 27XX	12. 28XX	13. 29XX	14. 30XX	15. 31XX	16. 32XX	17. 33XX	18. 34XX	
19. 35XX	20. 36XX	21. 37XX	22. 38XX	23. 39XX	24. 200X	25. 201X	26. 202X	27. 203X	
28. 204X	29. 205X	30. 206X	31. 207X	32. 208X	33. 209X	34. 210X	35. 211X	36. 212X	
37. 213X	38. 214X	39. 215X	40. 216X	41. 217X	42. 218X	43. 219X	44. 220X	45. 221X	
46. 222X	47. 223X	48. 224X	49. 225X	50. 226X	51. 227X	52. 228X	53. 229X	54. 230X	
55. 231X	56. 232X	57. 233X	58. 234X	59. 235X	60. 236X	61. 237X	62. 238X	63. 239X	
64. 240X	65. 241X	66. 242X	67. 243X	68. 244X	69. 245X	70. 246X	71. 247X	72. 248X	
73. 249X	74. 250X	75. 251X	76. 252X	77. 253X	78. 254X	79. 255X	80. 256X	81. 257X	
82. 258X	83. 259X	84. 260X	85. 261X	86. 262X	87. 263X	88. 264X	89. 265X	90. 266X	
91. 267X	92. 268X	93. 269X	94. 270X	95. 271X	96. 272X	97. 273X	98. 274X	99. 275X	
100. 276X									

PROCEDURE:

1. LIST EACH THOUSANDS DIGIT IN THE STATION NUMBER PLAN, IF ANY. EXAMPLE: 1XXX, 2XXX, 7XXX.
2. LIST EACH UNIQUE HUNDREDS GROUP. EXAMPLE: 11XX, 27XX, 74XX, OR 1XX, 4XX, 5XX.
3. LIST EACH UNIQUE TENS GROUP. EXAMPLE: 112X, 273X, 746X; 12X, 46X, 73X; OR 7X, 9X.

Fig. 3—Completed Example of Worksheet 7.2 (Sheet 1 of 3)

"DIMENSION" 600/2000/CUSTOM PBX
DESIGN ENGINEERING WORKSHEET
WORKSHEET 7 - MEMORY REQUIREMENTS

7.2 DIRECTORY BLOCKS

<u>1. 277X</u>	<u>2. 278X</u>	<u>3. 279X</u>	<u>4. 280X</u>	<u>5. 281X</u>	<u>6. 282X</u>	<u>7. 283X</u>	<u>8. 284X</u>	<u>9. 285X</u>
<u>10. 286X</u>	<u>11. 287X</u>	<u>12. 288X</u>	<u>13. 289X</u>	<u>14. 290X</u>	<u>15. 291X</u>	<u>16. 292X</u>	<u>17. 293X</u>	<u>18. 294X</u>
<u>19. 295X</u>	<u>20. 296X</u>	<u>21. 297X</u>	<u>22. 298X</u>	<u>23. 299X</u>	<u>24. 300X</u>	<u>25. 301X</u>	<u>26. 302X</u>	<u>27. 303X</u>
<u>28. 304X</u>	<u>29. 305X</u>	<u>30. 306X</u>	<u>31. 307X</u>	<u>32. 308X</u>	<u>33. 309X</u>	<u>34. 310X</u>	<u>35. 311X</u>	<u>36. 312X</u>
<u>37. 313X</u>	<u>38. 314X</u>	<u>39. 315X</u>	<u>40. 316X</u>	<u>41. 317X</u>	<u>42. 318X</u>	<u>43. 319X</u>	<u>44. 320X</u>	<u>45. 321X</u>
<u>46. 322X</u>	<u>47. 323X</u>	<u>48. 324X</u>	<u>49. 325X</u>	<u>50. 326X</u>	<u>51. 327X</u>	<u>52. 328X</u>	<u>53. 329X</u>	<u>54. 330X</u>
<u>55. 331X</u>	<u>56. 332X</u>	<u>57. 333X</u>	<u>58. 334X</u>	<u>59. 335X</u>	<u>60. 336X</u>	<u>61. 337X</u>	<u>62. 338X</u>	<u>63. 339X</u>
<u>64. 340X</u>	<u>65. 341X</u>	<u>66. 342X</u>	<u>67. 343X</u>	<u>68. 344X</u>	<u>69. 345X</u>	<u>70. 346X</u>	<u>71. 347X</u>	<u>72. 348X</u>
<u>73. 349X</u>	<u>74. 350X</u>	<u>75. 351X</u>	<u>76. 352X</u>	<u>77. 353X</u>	<u>78. 354X</u>	<u>79. 355X</u>	<u>80. 356X</u>	<u>81. 357X</u>
<u>82. 358X</u>	<u>83. 359X</u>	<u>84. 360X</u>	<u>85. 361X</u>	<u>86. 362X</u>	<u>87. 363X</u>	<u>88. 364X</u>	<u>89. 365X</u>	<u>90. 366X</u>
<u>91. 367X</u>	<u>92. 368X</u>	<u>93. 369X</u>	<u>94. 370X</u>	<u>95. 371X</u>	<u>96. 372X</u>	<u>97. 373X</u>	<u>98. 374X</u>	<u>99. 375X</u>
<u>100. 376X</u>								

- PROCEDURE:
1. LIST EACH THOUSANDS DIGIT IN THE STATION NUMBER PLAN, IF ANY. EXAMPLE: 1XXX, 2XXX, 7XXX.
 2. LIST EACH UNIQUE HUNDREDS GROUP. EXAMPLE: 11XX, 27XX, 74XX, OR 1XX, 4XX, 5XX.
 3. LIST EACH UNIQUE TENS GROUP. EXAMPLE: 112X, 273X, 746X; 12X, 46X, 73X; OR 7X, 9X.

Fig. 3—Completed Example of Worksheet 7.2 (Sheet 2 of 3)

**"DIMENSION" 600/2000/CUSTOM PBX
DESIGN ENGINEERING WORKSHEET
WORKSHEET 7 - MEMORY REQUIREMENTS**

7.2 DIRECTORY BLOCKS

<u>1. 377X</u>	<u>2. 378X</u>	<u>3. 379X</u>	<u>4. 380X</u>	<u>5. 381X</u>	<u>6. 382X</u>	<u>7. 383X</u>	<u>8. 384X</u>	<u>9. 385X</u>
<u>10. 386X</u>	<u>11. 387X</u>	<u>12. 388X</u>	<u>13. 389X</u>	<u>14. 390X</u>	<u>15. 391X</u>	<u>16. 392X</u>	<u>17. 393X</u>	<u>18. 394X</u>
<u>19. 395X</u>	<u>20. 396X</u>	<u>21. 397X</u>	<u>22. 398X</u>	<u>23. 399X</u>	<u>24. _____</u>	<u>25. _____</u>	<u>26. _____</u>	<u>27. _____</u>
<u>28. _____</u>	<u>29. _____</u>	<u>30. _____</u>	<u>31. _____</u>	<u>32. _____</u>	<u>33. _____</u>	<u>34. _____</u>	<u>35. _____</u>	<u>36. _____</u>
<u>37. _____</u>	<u>38. _____</u>	<u>39. _____</u>	<u>40. _____</u>	<u>41. _____</u>	<u>42. _____</u>	<u>43. _____</u>	<u>44. _____</u>	<u>45. _____</u>
<u>46. _____</u>	<u>47. _____</u>	<u>48. _____</u>	<u>49. _____</u>	<u>50. _____</u>	<u>51. _____</u>	<u>52. _____</u>	<u>53. _____</u>	<u>54. _____</u>
<u>55. _____</u>	<u>56. _____</u>	<u>57. _____</u>	<u>58. _____</u>	<u>59. _____</u>	<u>60. _____</u>	<u>61. _____</u>	<u>62. _____</u>	<u>63. _____</u>
<u>64. _____</u>	<u>65. _____</u>	<u>66. _____</u>	<u>67. _____</u>	<u>68. _____</u>	<u>69. _____</u>	<u>70. _____</u>	<u>71. _____</u>	<u>72. _____</u>
<u>73. _____</u>	<u>74. _____</u>	<u>75. _____</u>	<u>76. _____</u>	<u>77. _____</u>	<u>78. _____</u>	<u>79. _____</u>	<u>80. _____</u>	<u>81. _____</u>
<u>82. _____</u>	<u>83. _____</u>	<u>84. _____</u>	<u>85. _____</u>	<u>86. _____</u>	<u>87. _____</u>	<u>88. _____</u>	<u>89. _____</u>	<u>90. _____</u>
<u>91. _____</u>	<u>92. _____</u>	<u>93. _____</u>	<u>94. _____</u>	<u>95. _____</u>	<u>96. _____</u>	<u>97. _____</u>	<u>98. _____</u>	<u>99. _____</u>
<u>100. _____</u>								

PROCEDURE:

1. LIST EACH THOUSANDS DIGIT IN THE STATION NUMBER PLAN, IF ANY. EXAMPLE: 1XXX, 2XXX, 7XXX.
2. LIST EACH UNIQUE HUNDREDS GROUP. EXAMPLE: 11XX, 27XX, 74XX, OR 1XX, 4XX, 5XX.
3. LIST EACH UNIQUE TENS GROUP. EXAMPLE: 112X, 273X, 746X; 12X, 46X, 73X; OR 7X, 9X.

Fig. 3—Completed Example of Worksheet 7.2 (Sheet 3 of 3)

"DIMENSION" 600/2000/CUSTOM PBX
DESIGN ENGINEERING WORKSHEET
WORKSHEET 7 - MEMORY REQUIREMENTS

7.3 TRUNK/FEATURE DIAL ACCESS CODE MATCH TABLE

1. <u>9(1-w)</u>	2. <u>9(2-w)</u>	3. <u>61</u>	4. <u>62</u>	5. <u>63</u>	6. <u>81</u>	7. <u>82</u>	8. <u>83</u>	9. <u>84</u>
10. <u>85</u>	11. <u>71</u>	12. <u>72</u>	13. <u>73</u>	14. <u>74</u>	15. <u>75</u>	16. <u>76</u>	17. <u>77</u>	18. <u>78</u>
19. <u>79</u>	20. <u>70</u>	21. <u>*1</u>	22. <u>*2</u>	23. <u>*3</u>	24. <u>*4</u>	25. <u>*5</u>	26. <u>*6</u>	27. <u>*7</u>
28. <u>81</u>	29. <u>82</u>	30. <u>83</u>	31. <u>84</u>	32. <u>85</u>	33. <u>82</u>	34. <u>83</u>	35. <u>84</u>	36. <u>85</u>
37. <u>83</u>	38. <u>84</u>	39. <u>85</u>	40. <u>84</u>	41. <u>85</u>	42. <u>61</u>	43. <u>62</u>	44. <u>63</u>	45. _____
46. _____	47. _____	48. _____	49. _____	50. _____	51. _____	52. _____	53. _____	54. _____
55. _____	56. _____	57. _____	58. _____	59. _____	60. _____	61. _____	62. _____	63. _____
64. _____	65. _____	66. _____	67. _____	68. _____	69. _____	70. _____	71. _____	72. _____
73. _____	74. _____	75. _____	76. _____	77. _____	78. _____	79. _____	80. _____	81. _____
82. _____	83. _____	84. _____	85. _____	86. _____	87. _____	88. _____	89. _____	90. _____
91. _____	92. _____	93. _____	94. _____	95. _____	96. _____	97. _____	98. _____	99. _____
100. _____	101. _____	102. _____	103. _____	104. _____	105. _____	106. _____	107. _____	108. _____
109. _____	110. _____	111. _____	112. _____	113. _____	114. _____	115. _____	116. _____	117. _____
118. _____	119. _____	120. _____	121. _____	122. _____	123. _____	124. _____	125. _____	126. _____
127. _____	128. _____	129. _____	130. _____	131. _____	132. _____	133. _____	134. _____	135. _____
136. _____	137. _____	138. _____	139. _____	140. _____	141. _____	142. _____	143. _____	144. _____
145. _____	146. _____	147. _____	148. _____	149. _____	150. _____	151. _____	152. _____	153. _____
154. _____	155. _____	156. _____	157. _____	158. _____	159. _____	160. _____	161. _____	162. _____
163. _____	164. _____	165. _____	166. _____	167. _____	168. _____	169. _____	170. _____	171. _____
172. _____	173. _____	174. _____	175. _____					

NOTE: "DIMENSION" 600 PBX MAXIMUM QUANTITY OF TRUNK/FEATURE DIAL ACCESS CODES IS 150.

Fig. 4—Completed Example of Worksheet 7.3

"DIMENSION" 600/2000/CUSTOM PBX
DESIGN ENGINEERING WORKSHEET
WORKSHEET 8 - DATA CHANNEL REQUIREMENTS

8.1 COST-REDUCED CONTROL CARRIER

EQUIPMENT SLOT DESIGNATION	EQUIVALENT SOFTWARE DESIGNATION SLOT/CIRCUIT		LC366 USAGE		SPECIAL USAGE	
			A	B	C	D
			USE	CP	USE	CP
30	30	0	MAAP/CAP	366	MAAP/CAP	172
		1	NOT AVAILABLE		SMATS/CACS	✓
31/35	31	0	SMDR/ANY	366	SMDR	171
		1			SMATS/CACS	
		35	0			NOT AVAILABLE
32/36	32	0		366	TIME OF DAY CLOCK	144
		1			NOT AVAILABLE	
		36	0		NOT AVAILABLE	
33/37	33	0	NCOSS/CSMDR/ANY	366		
		1	ATND			
		37	CND*	✓		
34/38	34	0	ETC*	366		
		1	ETC	✓		
		38	0	ETC	✓	
20/24	20	0	ETC	366		
		1	ETC	✓		
		24	0	ETC	✓	
21/25	21	0		366		
		1				
		25	0			
22/26	22	0		366		
		1				
		26	0			
23/27	23	0		366		
		1				
		27	0			
		1				

* ATND - Attendant Console
 CND - Calling Number Display
 ETC - Electronic Telephone Controller

Fig. 5—Completed Example of Worksheet 8 (Sheet 1 of 3)

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Reference - SECTION 554-111-630

"DIMENSION" 600/2000/CUSTOM PBX
DESIGN ENGINEERING WORKSHEET
WORKSHEET 8 - DATA CHANNEL REQUIREMENTS

8.2 SUPPLEMENTAL I/O CARRIER

EQUIPMENT SLOT DESIGNATION	EQUIVALENT SOFTWARE DESIGNATION SLOT/CIRCUIT	LC366 USAGE	
		A USE	B CP
20/21	20 0		366
	1		
	21 0		
22/23	22 0		366
	1		
	23 0		
24/25	24 0		366
	1		
	25 0		
26/27	26 0		366
	1		
	27 0		
28/29	28 0		366
	1		
	29 0		
30/31	30 0		366
	1		
	31 0		
32/33	32 0		366
	1		
	33 0		

NOTE:
FOR USE WHEN LC366 CIRCUIT PACKS ARE REQUIRED IN
ADDITION TO THOSE PROVIDED IN THE COST-REDUCED
CONTROL CARRIER. THE SUPPLEMENTAL I/O CARRIER IS
AVAILABLE IN "F" MEMORY ONLY.

Not Required

Fig. 5—Completed Example of Worksheet 8 (Sheet 2 of 3)

**"DIMENSION" 600/2000/CUSTOM PBX
DESIGN ENGINEERING WORKSHEET
WORKSHEET 8 - DATA CHANNEL REQUIREMENTS**

8.3 LC34B DATA CHANNELS

ITEMS REQUIRING LC34B DATA CHANNELS			NO. DATA CHANNELS	LC34B PACKS
TYPE	QUANTITY	DATA CHANNELS PER UNIT ITEM		
A	B	C	D = BXC	E = D÷2
ECTS CONTROLLERS		1		X
ATTENDANT CONSOLES/ TERMINALS		1		
CALLING NUMBER DISPLAYS TO STATION		1		
FADS DISPLAY TERMINALS*		1		
PERIPHERAL INTERFACE CIRCUITS†		1		
SMOR‡		§		
TOTAL	X	X		

* ONLY ONE FADS DISPLAY TERMINAL IS REQUIRED FOR CAS TRAFFIC STUDIES WHILE A MAXIMUM OF 12 TERMINALS MAY BE PROVIDED FOR UCD GROUP TRAFFIC STUDIES (ONE TERMINAL PER GROUP). EACH FADS DISPLAY TERMINAL REQUIRES ONE DATA CHANNEL INTERFACE.

† THE PERIPHERAL INTERFACE CIRCUIT (PIC) IS A GENERAL PURPOSE PROGRAMMABLE INTERFACE UNIT THAT CAN BE USED IN FP9 AND FP11 HOTEL/MOTEL OR HOSPITAL APPLICATIONS AS THE COMMUNICATIONS INTERFACE FOR PROPERTY MANAGEMENT SYSTEM (CIPMS), AS AN INTERFACE FOR PRINTERS, WITH ENERGY COMMUNICATIONS SERVICE, CRT, AND WITH TSPS DATA SETS.

‡ SMOR REQUIRES ONE LC34B WHEN RMATS IS NOT PROVIDED. IF RMATS IS PROVIDED, AN LC171 IS USED WITH RMATS OCCUPYING ONE HALF OF THE LC171 CIRCUIT PACK AND SMOR IS ASSIGNED TO THE OTHER HALF.

§ WHEN TIME OF DAY CLOCK IS USED, IT DISPLACES TWO DATA CHANNELS (ONE LC34B CIRCUIT PACK).

Not Required

Fig. 5—Completed Example of Worksheet 8 (Sheet 3 of 3)

EXAMPLE OF
ADMINISTRATION OF
QUAD I/O CIRCUIT PACK (LC366)

NEW HARDWARE ASSIGNMENT			ADMINISTERED IN PROC 253		
CARRIER	SLOT	LC366 CHANNEL	FIELD 2 (CARRIER)	FIELD 3 (SLOT)	FIELD 4 (CIRCUIT)
COST-REDUCED CONTROL	33/37	0	0	33	0
		1	0	33	1
		2	0	37	0
		3	0	37	1
COST-REDUCED CONTROL	20/24	0	1	20	0
		1	1	20	1
		2	1	24	0
		3	1	24	1
SUPPLEMENTAL I/O ("DIMENSION" 2000/CUSTOM PBX ONLY)	20/21	0	2	20	0
		1	2	20	1
		2	2	21	0
		3	2	21	1

Fig. 6—Example of Administration of Quad I/O Circuit Pack (LC366)

♦TABLE A♦

"DIMENSION" 600 PBX SYSTEM PARAMETERS

ITEM	NOTE	(400E) FP7		FP8		FP9		FP11	FP12	
	1	B	C	B	C	B	C	D	B	C
ARS - FREE NXX LIST		11	11		64			64		64
ARS NPA - NXX LIST		10	10		32			32		32
ARS PATTERNS		32	32		64			64		64
ARS ROUTES PER PATTERN		10	10		10			10		10
AAR PATTERNS					180					
AAR ROUTES PER PATTERN					4					
ALTERNATE FRLs					8					
AUTHORIZATION CODES					9000					
ATTENDANT CONSOLE/TERMINALS	2	6	8		14	9	14	14		14
ATTENDANT CONFERENCE		2	2		6	2	2	6		6
CAS BRANCH LOCATIONS					40			40		40
CABINETS	3	3	3		4	3	4	4		4
CALL PICKUP GROUPS		255	255		255	255	255	255		255
CALLING NUMBER DISPLAY	4	6	6		6	9	11	13		6
CLASS OF SERVICE		63	63		63	63	63	63		63
CODE RESTRICTION GROUP		5	5		5	5	5	5		5
CONTROLLED RESTRICTION GROUP		63	63		63	63	63	63		63
CONTACT INTERFACE (LC15)					35			34		35
CUSTOM INTERCOM		650	1000		1000			1280		1000
DSS GROUP SELECT KEYS		18	18		18	18	18	18		18
DATA CHANNELS (LC34B)	5	18	18		18	18	18			18
DATA CHANNELS (LC366)	5				34	34	34	34		34
DIRECTORY BLOCKS		110	145		145	110	145	270		145
ECS INDIVIDUAL LOAD						65	100	200		
ECTS CONTROLLERS		5	8		8			8		8
ECTS DIAL INTERCOM		32	50		50			100		50
ECTS STATION SETS		325	500		500			800		500
ECTS BUTTON ASSIGNMENTS		4128	6050		6050			11,600		6050
ECTS PERSONAL CO LINE		16	25		25			50		25
ECTS MANUAL AND AUTOMATIC INTERCOM GROUPS		32	50		50			100		50
FADS DATA CHANNEL					13			13		13
FRLs					8			8		8
FLEXIBLE NIGHT/TRUNK VERIFICATION TRUNKS		130	184		266	130	184	266		266
HOT LINE NUMBERS						30	30	30		
JOURNAL PRINTERS						9	15	15		
LINE CARRIERS	3	12	13		18	12	18	18		18

◆TABLE A (Contd)◆

"DIMENSION" 600 PBX SYSTEM PARAMETERS

ITEM	NOTE	(400E) FP7		FP8		FP9		FP11	FP12	
		B	C	B	C	B	C	D	B	C
LONG DISTANCE BILLING NUMBERS						1100	1600	4000		
MESSAGE REGISTER TRUNKS (LC16)	6					16	24	24		
MODULES		1	1		1	1	1	1		1
OGT QUEUE GROUPS		12	12		80			80		80
PERIPHERAL INTERFACE CIRCUIT						12	18	18		
RELEASE LINK TRUNKS OUTGOING - BRANCH					16			16		16
RELEASE LINK TRUNKS INCOMING - MAIN					110			110		110
REMOTE ACCESS TRUNKS		6	12		30			45		30
SMDR RECORDS		76	105		298			562		298
SMDR/ARS QUEUING RECORDS		84	87		246			382		246
SPEED CALLING NUMBERS		800	1000		1000			2000		1000
STATION LINE RECORDS	7	712	1072		1216	832	1216	2944		1216
TANDEM TIE RESTRICTION DAC		16	16		16	16	16	16		16
TRUNK-TO-TRUNK RESTRICTION DAC		16	16		16	16	16	16		16
TRUNK GROUPS	8	99	99		99	99	99	99		99
TRUNK/FEATURE DIAL ACCESS CODE		150	150		150	150	150	175		150
TRUNK CARRIERS		6	8		9	6	8	9		9
TRUNK RECORDS (TOTAL)	9	317	407		736	338	456	1231		736
• ANI QUEUE RECORDS	10	6	6		6	6	6	6		6
• ASSIGNABLE TRUNK RECORDS	11	242	311		563	242	311	993		563
• ATTENDANT CONF "OR" RECORDS	10	2	2		6	2	2	6		6
• ATTENDANT CONSOLE SWITCHED LOOPS	10	36	48		84	54	90	90		84
• ATTENDANT "OR" RECORDS	10	6	8		14	9	15	15		14
• DP/"TOUCH-TONE" DIALING "OR" RECORDS	10, 12	24	31		62	24	31	120		62
UCD AND DDC GROUP TOTALS					28			28		28
MEMORY REQUIRED	13	128K	144K		256K	176K	192K	512K		256K
• MEMORY PACKS 16K		8	9		16	11	12			16
• MEMORY PACKS 64K	3				4	3	3	8		4

◆TABLE A (Contd)◆

"DIMENSION" 600 PBX SYSTEM PARAMETERS

NOTES:

1. "DIMENSION" 600 PBX IS AVAILABLE WITH FP8 (MEMORY C), FP9 (MEMORY C), FP11 (MEMORY D), AND FP12 (MEMORY C). "DIMENSION" 400E PBX IS AVAILABLE WITH FP7 AND FP9 (MEMORY B AND MEMORY C). "DIMENSION" 400E PBX IS NO LONGER A STANDARD OFFERING; HOWEVER, PARAMETERS ARE SHOWN TO ACCOMMODATE EXISTING SYSTEMS. DIFFERENCES BETWEEN THE "DIMENSION" 400E AND 600 PBX PARAMETERS WILL BE SHOWN IN THE NOTES WHERE APPLICABLE.
2. DUE TO POWER LIMITATIONS, A SINGLE CABINET SYSTEM IS LIMITED TO TWO CONSOLES; A 2-CABINET SYSTEM IS LIMITED TO SIX CONSOLES MAXIMUM. THE MAXIMUM FOR 3- AND 4-CABINET SYSTEMS IS 10 AND 14 CONSOLES RESPECTIVELY.
3. MAXIMUM OF 3 CABINETS AND 12 LINE CARRIERS CAN BE PROVIDED WITH THE "DIMENSION" 400E PBX; 64K MEMORY PACKS ARE NOT AVAILABLE IN THE "DIMENSION" 400E PBX.
4. THE MAXIMUM NUMBER OF I/O CHANNELS (LC34/LC366 CIRCUITS) THAT CAN BE ASSIGNED TO THE CALLING NUMBER DISPLAY FEATURE IS CONTINGENT UPON ONE SMDR, ONE RMATS, ONE MAAP, AND THE NUMBER OF ATNDT CONSOLES AND ECTS CONTROLLERS.
5. THE I/O CHANNELS ARE REQUIRED FOR UCD, CAS, CALLING NUMBER DISPLAY UNITS, ATND CONSOLES, ECTS CONTROLLERS, PRINTERS, AND FOR INTERFACE TO NCOSS/CSMDR. THE NUMBER OF I/O CHANNELS AVAILABLE, THEREFORE, MAY LIMIT THE QUANTITY OF THE ABOVE ITEMS WHICH MAY BE PROVIDED. THE I/O CHANNELS SHOWN ARE MAXIMUM AVAILABLE WHEN THE SYSTEM IS NOT EQUIPPED WITH RMATS/CACS (LC171 AND LC172) AND TIME OF DAY (TOD) CLOCK (LC144). HOWEVER, WHEN RMATS/CACS AND/OR TOD CLOCK IS PROVIDED THE NUMBER OF I/O CHANNELS IS REDUCED FROM THE INDICATED MAXIMUM PER THE FOLLOWING:

<u>EQUIPPED WITH</u>	<u>LC366</u>	<u>LC34B</u>
RMATS/CACS AND TOD CLOCK	10	6
RMATS/CACS ONLY	6	4
TOD CLOCK ONLY	4	2

6. QUANTITY OF LC16 CIRCUIT PACKS (EIGHT CIRCUITS PER PACK).
7. MAXIMUM QUANTITIES SHOWN ARE SOFTWARE STATION LINE RECORDS AVAILABLE. THE NUMBER OF HARDWARE (LC02) IS LIMITED TO AVAILABLE NUMBER OF MAXIMUM LINE CARRIERS.
8. TRUNK GROUPS 1 THROUGH 17 ARE DEDICATED (SEE SECTION 554-111-101). TRUNK GROUPS 18 THROUGH 99 (82 TRUNK GROUPS) CAN BE ADMINISTERED AS REQUIRED.
9. SUM OF ANI QUEUING RECORDS, ASSIGNABLE TRUNK RECORDS (SEE NOTE 11), ATTENDANT CONFERENCE RECORDS, CONSOLE SWITCHED LOOP RECORDS, ATTENDANT "OR" RECORDS, DP/"TOUCH-TONE" DIALING "OR" RECORDS, AND ONE DUMMY HEAD ADDRESS RECORD.
10. THE MAXIMUM TRUNK RECORDS DEDICATED ONLY FOR THE ITEM INDICATED.
11. ASSIGNABLE TRUNK RECORDS INCLUDE PHYSICAL (HARDWARE) TRUNKS, INTERCOM RECORDS, AND OUTGOING TRUNK QUEUING RECORDS.
12. INCLUDES JOURNAL PRINTER RECORDS FOR FP9.
13. FEATURE PACKAGE 9 SUPPORTS MEMORY CONFIGURATIONS B AND C WHEN USING 16K MEMORY BOARDS. IF 64K MEMORY BOARDS ARE USED, THE SAME QUANTITY IS REQUIRED FOR B AND C MEMORY CONFIGURATIONS; THEREFORE, B MEMORY FOR FP9 IS NOT RECOMMENDED.

♦TABLE B (Contd)♦

"DIMENSION" 2000/CUSTOM PBX SYSTEM PARAMETERS

NOTES:

1. MAXIMUM QUANTITIES SHOWN DO NOT REFLECT REAL-TIME CONSIDERATIONS. TO PROVIDE THE MAXIMUMS IN A GIVEN MEMORY CONFIGURATION COULD CAUSE THE PROCESSOR TO EXCEED ALLOWABLE OCCUPANCY LIMITS (SEE WORKSHEET 6).
2. MEMORY CONFIGURATIONS B AND E WILL NOT BE AVAILABLE FOR FP7, ISSUE 1.7.
3. FOR FP7, THE MAXIMUM NUMBER OF I/O CHANNELS (LC34/LC366 CIRCUITS) THAT CAN BE ASSIGNED TO THE CALLING NUMBER DISPLAY FEATURE IS CONTINGENT UPON ONE SMDR, ONE RMATS, ONE MAAP, AND THE NUMBER OF ATNDT CONSOLES AND ECTS CONTROLLERS.
4. THE I/O CHANNELS ARE REQUIRED FOR UCD, CAS, CALLING NUMBER DISPLAY UNITS, ATNDT CONSOLES, ECTS CONTROLLERS, PRINTERS, AND FOR INTERFACE TO NCOSS/CSMDR. THE NUMBER OF I/O CHANNELS AVAILABLE, THEREFORE, MAY LIMIT THE QUANTITY OF THE ABOVE ITEMS WHICH MAY BE PROVIDED. THE I/O CHANNELS SHOWN ARE MAXIMUM AVAILABLE WHEN THE SYSTEM IS NOT EQUIPPED WITH RMATS/CACS (LC171 AND LC172) AND THE TIME OF DAY (TOD) CLOCK (LC144). HOWEVER, WHEN RMATS/CACS AND/OR TOD CLOCK IS PROVIDED, THE NUMBER OF I/O CHANNELS IS REDUCED FROM THE INDICATED MAXIMUM PER THE FOLLOWING:

<u>EQUIPPED WITH</u>	<u>LC366</u>	<u>LC34B</u>
RMATS/CACS AND TOD CLOCK	10	6
RMATS/CACS ONLY	6	4
TOD CLOCK ONLY	4	2

5. AUDIO LINK PATH MAXIMUMS SHOWN ARE BASED ON SOFTWARE LIMITS. HOWEVER, ACTUAL LINK PATHS AVAILABLE FOR SOME MEMORY CONFIGURATIONS ARE LIMITED BY THE MAXIMUM LINK CARRIERS AVAILABLE.
6. QUANTITY OF PHYSICAL LINK CARRIERS IS SHOWN. THERE ARE TWO ELECTRICAL LINK CARRIERS PER PHYSICAL LINK CARRIER.
7. QUANTITY OF LC16 CIRCUIT PACKS (EIGHT CIRCUITS PER PACK).
8. PICS (PERIPHERAL INTERFACE CIRCUITS) ARE USED WITH CIPMS (COMMUNICATION INTERFACE FOR PROPERTY MANAGEMENT SYSTEMS), JOURNAL PRINTERS, CRT DISPLAYS, AND WITH THE LONG DISTANCE BILLING TSPS AUTO-QUOTE SYSTEM INTERFACE ON "DIMENSION" PBX.
9. IN THE F CONFIGURATION, THE TOTAL OF SMDR RECORDS AND SMDR ARS/AAR QUEUING RECORDS CANNOT EXCEED 1024.
10. MAXIMUM QUANTITIES SHOWN ARE SOFTWARE STATION LINE RECORDS AVAILABLE. THE NUMBER OF HARDWARE (LC02) IS LIMITED TO AVAILABLE NUMBER OF LINE CARRIER MAXIMUMS AND MODULES.
11. TRUNK GROUPS 1 THROUGH 17 ARE DEDICATED (SEE SECTION 554-111-101). TRUNK GROUPS 18 THROUGH 99 (82 TRUNK GROUPS) CAN BE ADMINISTERED AS REQUIRED.
12. SUM OF ANI QUEUING RECORDS, ASSIGNABLE TRUNK RECORDS (SEE NOTE 14), ATTENDANT CONFERENCE RECORDS, CONSOLE SWITCHED LOOP RECORDS, ATTENDANT "OR" RECORDS, DP/"TOUCH-TONE" DIALING "OR" RECORDS, AND ONE DUMMY HEAD ADDRESS RECORD.
13. THE MAXIMUM TRUNK RECORDS DEDICATED FOR THE ITEM INDICATED.
14. ASSIGNABLE TRUNK RECORDS INCLUDE PHYSICAL (HARDWARE) TRUNKS, INTERCOM RECORDS, AND OUTGOING TRUNK QUEUING RECORDS.
15. INCLUDES JOURNAL PRINTER RECORDS FOR FP9.
16. THE 8K MEMORY CIRCUIT PACKS CANNOT BE USED WITH FP11.

TABLE C
FEATURE MODEL MATRIX (NOTES 1 AND 2)

MODEL SELECTION (NOTE 3)	FEATURE COMBINATIONS (NOTE 4)						
	A	AB	AC	AD	AE	ABC	ADE
INTERCOM 1/3 IN 1/3 OUT 1/3	2.39	2.67	2.86	2.49	2.85	3.14	2.94
INTERCOM 1/2 IN 1/4 OUT 1/4	2.33	2.53	2.82	2.40	2.67	3.02	2.91
INTERCOM 1/4 IN 1/2 OUT 1/4	2.28	2.49	2.86	2.43	2.95	3.06	3.10
INTERCOM 1/4 IN 1/4 OUT 1/2	2.57	2.98	2.83	2.64	2.90	3.24	2.98

NOTE 1: ECTS OCCUPANCY REQUIREMENTS ARE NOT INCLUDED IN THE MODEL FACTORS. THESE REQUIREMENTS ARE CALCULATED ON METHOD II-DYNAMIC OCCUPANCY (WORKSHEET 6.3), LINES 2 AND 3.

NOTE 2: FOR FP9, USE COLUMN A FEATURE COMBINATION FOR THE APPROPRIATE CALL MIX.

NOTE 3: SELECTION OF A MODEL FACTOR IS BASED ON IDENTIFICATION OF A CALL MIX (INTERCOM-IN-OUT) AND FEATURE COMBINATIONS TO BE UTILIZED IN THE PROPOSED SYSTEM. A MODEL FACTOR IS ENTERED ON WORKSHEET 6.3 FOR METHOD II ANALYSIS.

NOTE 4: FEATURE COMBINATIONS:

- A - INTERCOM, DID, DOD, 20 PERCENT FALSE START/PARTIAL DIAL
- B - SMOR AND AAR/ARS ON ALL OUTGOING CALLS AND QUEUING OF 10 PERCENT OF THE OUTGOING CALLS.
- C - THIRTY (30) PERCENT OF THE INTERCOM AND INCOMING CALLS GO TO A SATELLITE.
- D - FIFTY (50) PERCENT OF THE INCOMING CALLS GO TO UCD/DDC.
- E - FIFTY (50) PERCENT OF THE INCOMING CALLS GO TO CAS AND ARE ROUTED BACK TO A PBX STATION.

◆ TABLE D ◆

FACTS TERMINATING FACTORS

FP7 MEMORIES B AND C

BUSY-HOUR TERMINATING CALLS	PROCESSOR OCCUPANCY (PERCENT)	BUSY-HOUR TERMINATING CALLS	PROCESSOR OCCUPANCY (PERCENT)	BUSY-HOUR TERMINATING CALLS	PROCESSOR OCCUPANCY (PERCENT)
50	0.29	1700	3.25	3400	3.97
100	0.53	1750	3.29	3450	3.97
150	0.75	1800	3.34	3500	3.97
200	0.93	1850	3.38	3550	3.98
250	1.09	1900	3.43	3600	3.98
300	1.23	1950	3.47	3650	3.98
350	1.36	2000	3.50	3700	3.98
400	1.47	2050	3.54	3750	3.98
450	1.58	2100	3.57	3800	3.99
500	1.68	2150	3.61	3850	3.99
550	1.77	2200	3.64	3900	3.99
600	1.85	2250	3.66	3950	3.99
650	1.93	2300	3.69	4000	3.99
700	2.01	2350	3.72	4050	3.99
750	2.09	2400	3.74	4100	3.99
800	2.16	2450	3.76	4150	3.99
850	2.23	2500	3.78	4200	3.99
900	2.30	2550	3.80	4250	4.00
950	2.37	2600	3.82	4300	4.00
1000	2.43	2650	3.83	4350	4.00
1050	2.50	2700	3.85	4400	4.00
1100	2.56	2750	3.86	4450	4.00
1150	2.63	2800	3.88	4500	4.00
1200	2.69	2850	3.89	4550	4.00
1250	2.75	2900	3.90	4600	4.00
1300	2.81	2950	3.91	4650	4.00
1350	2.87	3000	3.92	4700	4.00
1400	2.93	3050	3.93	4750	4.00
1450	2.99	3100	3.93	4800	4.00
1500	3.04	3150	3.94	4850	4.00
1550	3.09	3200	3.95	4900	4.00
1600	3.15	3250	3.95	4950	4.00
1650	3.20	3300	3.96	4950	4.00
		3350	3.96	5000	4.00*

Use 4.00% for rates over 5000.

♦TABLE D (Contd)♦

ECTS TERMINATING FACTORS

FP7 MEMORY D

BUSY-HOUR TERMINATING CALLS	PROCESSOR OCCUPANCY (PERCENT)	BUSY-HOUR TERMINATING CALLS	PROCESSOR OCCUPANCY (PERCENT)	BUSY-HOUR TERMINATING CALLS	PROCESSOR OCCUPANCY (PERCENT)
50	0.57	1700	4.52	3400	5.87
100	1.04	1750	4.57	3450	5.89
150	1.43	1800	4.62	3500	5.91
200	1.76	1850	4.67	3550	5.93
250	2.04	1900	4.72	3600	5.95
300	2.27	1950	4.77	3650	5.97
350	2.47	2000	4.82	3700	5.98
400	2.65	2050	4.87	3750	6.00
450	2.80	2100	4.92	3800	6.01
500	2.93	2150	4.97	3850	6.03
550	3.04	2200	5.01	3900	6.04
600	3.15	2250	5.06	3950	6.05
650	3.24	2300	5.11	4000	6.06
700	3.33	2350	5.15	4050	6.07
750	3.41	2400	5.20	4100	6.08
800	3.49	2450	5.24	4150	6.09
850	3.56	2500	5.28	4200	6.10
900	3.62	2550	5.33	4250	6.11
950	3.69	2600	5.37	4300	6.12
1000	3.75	2650	5.41	4350	6.12
1050	3.81	2700	5.45	4400	6.13
1100	3.87	2750	5.48	4450	6.14
1150	3.93	2800	5.52	4500	6.14
1200	3.98	2850	5.56	4550	6.15
1250	4.04	2900	5.59	4600	6.15
1300	4.09	2950	5.62	4650	6.16
1350	4.15	3000	5.66	4700	6.16
1400	4.20	3050	5.69	4750	6.16
1450	4.25	3100	5.72	4800	6.17
1500	4.31	3150	5.75	4850	6.17
1550	4.36	3200	5.77	4900	6.17
1600	4.41	3250	5.80	4950	6.18
1650	4.46	3300	5.82	4950	6.18
		3350	5.82		6.18*

Use 6.18% for rates over 5000.

◆TABLE D (Contd)◆

ECTS TERMINATING FACTORS

FP7 MEMORIES E AND F

BUSY-HOUR TERMINATING CALLS	PROCESSOR OCCUPANCY (PERCENT)	BUSY-HOUR TERMINATING CALLS	PROCESSOR OCCUPANCY (PERCENT)	BUSY-HOUR TERMINATING CALLS	PROCESSOR OCCUPANCY (PERCENT)
50	1.51	1700	10.41	3400	12.15
100	2.76	1750	10.48	3450	12.17
150	3.78	1800	10.56	3500	12.19
200	4.63	1850	10.64	3550	12.21
250	5.33	1900	10.72	3600	12.22
300	5.92	1950	10.79	3650	12.24
350	6.42	2000	10.86	3700	12.25
400	6.83	2050	10.93	3750	12.27
450	7.18	2100	11.00	3800	12.28
500	7.49	2150	11.07	3850	12.29
550	7.75	2200	11.14	3900	12.30
600	7.98	2250	11.20	3950	12.31
650	8.18	2300	11.27	4000	12.32
700	8.36	2350	11.33	4050	12.32
750	8.52	2400	11.39	4100	12.33
800	8.66	2450	11.44	4150	12.34
850	8.80	2500	11.50	4200	12.34
900	8.92	2550	11.55	4250	12.35
950	9.04	2600	11.60	4300	12.35
1000	9.15	2650	11.65	4350	12.36
1050	9.25	2700	11.70	4400	12.36
1100	9.36	2750	11.74	4450	12.37
1150	9.45	2800	11.79	4500	12.37
1200	9.55	2850	11.83	4550	12.37
1250	9.64	2900	11.87	4600	12.38
1300	9.73	2950	11.90	4650	12.38
1350	9.82	3000	11.94	4700	12.38
1400	9.91	3050	11.97	4750	12.38
1450	9.99	3100	12.00	4800	12.38
1500	10.08	3150	12.03	4850	12.39
1550	10.16	3200	12.06	4900	12.39
1600	10.24	3250	12.08	4950	12.39
1650	10.32	3300	12.11	5000	12.39
		3350	12.13		12.39*

Use 12.39% for rates over 5000.

♦TABLE D (Contd)♦

FACTS TERMINATING FACTORS

FP8/FP12 MEMORY C

BUSY-HOUR TERMINATING CALLS	PROCESSOR OCCUPANCY (PERCENT)	BUSY-HOUR TERMINATING CALLS	PROCESSOR OCCUPANCY (PERCENT)	BUSY-HOUR TERMINATING CALLS	PROCESSOR OCCUPANCY (PERCENT)
50	0.08	1700	1.60	3400	3.01
100	0.14	1750	1.64	3450	3.05
150	0.21	1800	1.68	3500	3.10
200	0.27	1850	1.72	3550	3.14
250	0.32	1900	1.76	3600	3.18
300	0.38	1950	1.80	3650	3.22
350	0.43	2000	1.85	3700	3.26
400	0.48	2050	1.89	3750	3.31
450	0.53	2100	1.93	3800	3.35
500	0.57	2150	1.97	3850	3.39
550	0.62	2200	2.01	3900	3.43
600	0.67	2250	2.05	3950	3.47
650	0.71	2300	2.10	4000	3.51
700	0.75	2350	2.14	4050	3.56
750	0.80	2400	2.18	4100	3.60
800	0.84	2450	2.22	4150	3.64
850	0.88	2500	2.26	4200	3.68
900	0.93	2550	2.30	4250	3.72
950	0.97	2600	2.35	4300	3.76
1000	1.01	2650	2.39	4350	3.81
1050	1.05	2700	2.43	4400	3.85
1100	1.09	2750	2.47	4450	3.89
1150	1.14	2800	2.51	4500	3.93
1200	1.18	2850	2.55	4550	3.97
1250	1.22	2900	2.60	4600	4.01
1300	1.26	2950	2.64	4650	4.06
1350	1.30	3000	2.68	4700	4.10
1400	1.35	3050	2.72	4750	4.14
1450	1.39	3100	2.76	4800	4.18
1500	1.43	3150	2.80	4850	4.22
1550	1.47	3200	2.85	4900	4.26
1600	1.51	3250	2.89	4950	4.31
1650	1.55	3300	2.93	5000	4.35*
		3350	2.97		

* For rates over 5000, add 0.04% per 50 calls.

◆TABLE D (Contd)◆

ECTS TERMINATING FACTORS

FP8/FP12 MEMORY D

BUSY-HOUR TERMINATING CALLS	PROCESSOR OCCUPANCY (PERCENT)	BUSY-HOUR TERMINATING CALLS	PROCESSOR OCCUPANCY (PERCENT)	BUSY-HOUR TERMINATING CALLS	PROCESSOR OCCUPANCY (PERCENT)
50	0.11	1700	1.64	3400	2.92
100	0.20	1750	1.68	3450	2.96
150	0.28	1800	1.72	3500	2.99
200	0.36	1850	1.76	3550	3.03
250	0.43	1900	1.79	3600	3.07
300	0.49	1950	1.83	3650	3.11
350	0.55	2000	1.87	3700	3.15
400	0.60	2050	1.91	3750	3.18
450	0.65	2100	1.94	3800	3.22
500	0.70	2150	1.98	3850	3.26
550	0.75	2200	2.02	3900	3.30
600	0.79	2250	2.06	3950	3.33
650	0.83	2300	2.09	4000	3.37
700	0.87	2350	2.13	4050	3.41
750	0.92	2400	2.17	4100	3.45
800	0.96	2450	2.21	4150	3.48
850	1.00	2500	2.24	4200	3.52
900	1.04	2550	2.28	4250	3.56
950	1.08	2600	2.32	4300	3.60
1000	1.11	2650	2.36	4350	3.63
1050	1.15	2700	2.39	4400	3.67
1100	1.19	2750	2.43	4450	3.71
1150	1.23	2800	2.47	4500	3.75
1200	1.27	2850	2.51	4550	3.78
1250	1.31	2900	2.54	4600	3.82
1300	1.34	2950	2.58	4650	3.86
1350	1.38	3000	2.62	4700	3.90
1400	1.42	3050	2.66	4750	3.93
1450	1.46	3100	2.69	4800	3.97
1500	1.49	3150	2.73	4850	4.01
1550	1.53	3200	2.77	4900	4.05
1600	1.57	3250	2.81	4950	4.08
1650	1.61	3300	2.84	5000	4.12*
		3350	2.88		

* For rates over 5000, add 0.04% per 50 calls.

◆TABLE D (Contd)◆

ECTS TERMINATING FACTORS

FP11 MEMORY D

BUSY-HOUR TERMINATING CALLS	PROCESSOR OCCUPANCY (PERCENT)	BUSY-HOUR TERMINATING CALLS	PROCESSOR OCCUPANCY (PERCENT)	BUSY-HOUR TERMINATING CALLS	PROCESSOR OCCUPANCY (PERCENT)
50	0.10	1700	1.66	3400	3.00
100	0.18	1750	1.70	3450	3.04
150	0.26	1800	1.73	3500	3.08
200	0.33	1850	1.77	3550	3.12
250	0.40	1900	1.81	3600	3.16
300	0.46	1950	1.85	3650	3.20
350	0.51	2000	1.89	3700	3.24
400	0.57	2050	1.93	3750	3.28
450	0.62	2100	1.97	3800	3.32
500	0.67	2150	2.01	3850	3.36
550	0.71	2200	2.05	3900	3.40
600	0.76	2250	2.09	3950	3.44
650	0.80	2300	2.13	4000	3.48
700	0.85	2350	2.17	4050	3.52
750	0.89	2400	2.21	4100	3.56
800	0.93	2450	2.25	4150	3.60
850	0.97	2500	2.29	4200	3.63
900	1.02	2550	2.33	4250	3.67
950	1.06	2600	2.37	4300	3.71
1000	1.10	2650	2.41	4350	3.75
1050	1.14	2700	2.45	4400	3.79
1100	1.18	2750	2.49	4450	3.83
1150	1.22	2800	2.53	4500	3.87
1200	1.26	2850	2.57	4550	3.91
1250	1.30	2900	2.61	4600	3.95
1300	1.34	2950	2.65	4650	3.99
1350	1.38	3000	2.68	4700	4.03
1400	1.42	3050	2.72	4750	4.07
1450	1.46	3100	2.76	4800	4.11
1500	1.50	3150	2.80	4850	4.15
1550	1.54	3200	2.84	4900	4.19
1600	1.58	3250	2.88	4950	4.23
1650	1.62	3300	2.92	5000	4.27*
		3350	2.96		

* For rates over 5000, add 0.04% per 50 calls.

♦TABLE D (Contd)♦

ECTS TERMINATING FACTORS

FP8/FP12 MEMORY F

BUSY-HOUR TERMINATING CALLS	PROCESSOR OCCUPANCY (PERCENT)	BUSY-HOUR TERMINATING CALLS	PROCESSOR OCCUPANCY (PERCENT)	BUSY-HOUR TERMINATING CALLS	PROCESSOR OCCUPANCY (PERCENT)
50	0.17	1700	2.05	3400	3.39
100	0.32	1750	2.08	3450	3.43
150	0.44	1800	2.12	3500	3.47
200	0.55	1850	2.16	3550	3.51
250	0.65	1900	2.20	3600	3.55
300	0.74	1950	2.24	3650	3.59
350	0.81	2000	2.28	3700	3.63
400	0.88	2050	2.32	3750	3.67
450	0.95	2100	2.36	3800	3.71
500	1.01	2150	2.40	3850	3.75
550	1.06	2200	2.44	3900	3.79
600	1.12	2250	2.48	3950	3.83
650	1.17	2300	2.52	4000	3.87
700	1.22	2350	2.56	4050	3.91
750	1.26	2400	2.60	4100	3.95
800	1.31	2450	2.64	4150	3.99
850	1.35	2500	2.68	4200	4.02
900	1.40	2550	2.72	4250	4.06
950	1.44	2600	2.76	4300	4.10
1000	1.48	2650	2.80	4350	4.14
1050	1.52	2700	2.84	4400	4.18
1100	1.56	2750	2.88	4450	4.22
1150	1.60	2800	2.92	4500	4.26
1200	1.65	2850	2.96	4550	4.30
1250	1.69	2900	3.00	4600	4.34
1300	1.73	2950	3.04	4650	4.38
1350	1.77	3000	3.07	4700	4.42
1400	1.81	3050	3.11	4750	4.46
1450	1.85	3100	3.15	4800	4.50
1500	1.89	3150	3.19	4850	4.54
1550	1.93	3200	3.23	4900	4.58
1600	1.97	3250	3.27	4950	4.62
1650	2.01	3300	3.31	5000	4.66*
		3350	3.35		

* For rates over 5000, add 0.04% per 50 calls.

PACKAGE	B	C	D	E	F
7	44	58	104	127	188
8	—	104	132	—	293
9	65	107	153	225	—
11	—	—	111	—	—
12	—	104	132	—	293

TABLE F

MAXIMUM ATTENDANT "OR" AND
CONFERENCE RECORDS PER FEATURE
PACKAGE AND MEMORY CONFIGURATION

FEATURE PACKAGE	MEMORY CONFIGURATION				
	B	C	D	E	F
7	8	10	20	25	38
8	—	20	24	—	53
9	11	17	27	39	—
11	—	—	21	—	—
12	—	20	24	—	53