

**AVERAGE CHARACTERISTIC EVALUATION (ACE) METHOD**  
**BUSINESS SERVICES DESIGN ENGINEERING**  
**"DIMENSION®" 600/2000/CUSTOM PBX**

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GENERAL . . . . .	4	<b>1. GENERAL</b>	
ASSUMPTIONS AND LIMITATIONS . . . . .	4	1.01 The purpose of this section is to introduce the Average Characteristic Evaluation (ACE) method for sizing TOUCH-TONE dialing registers/ receivers, TOUCH-TONE dialing senders, and re- lease link trunks (RLTs) for the DIMENSION 600/ 2000/Custom PBX. The ACE method is basically a "shortcut" procedure for determining quantities of the components listed above. The ACE method is ac- ceptable for a <i>typical</i> installation displaying aver- age traffic characteristics. However, it should be used with caution as it is subject to limitations which will be discussed in the appropriate following subparts. The ACE methods discussed in this section are intended for initial jobs only where validated traffic data is not available. For the growth of exist- ing systems, traffic data on these components is available and should be trended and used for sizing additional equipment.	
4. RELEASE LINK TRUNKS (RLTs) . . . . .	5	1.02 Whenever this section is reissued, the rea- son(s) for reissue will be given in this para- graph.	
GENERAL . . . . .	5	1.03 The ACE method is not intended to be a com- plete replacement of the detailed business ser-	
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vices design engineering procedures discussed in Sections 554-111-6XX. However, in situations where the stated limitations and assumptions are satisfied, engineered quantities calculated using the ACE method will generally be consistent with quantities calculated using the detailed engineering procedures. Further, if the detailed engineering method(s) is chosen to engineer a given component, the ACE method will, in many cases, be a convenient means of verifying an engineered quantity.

**1.04** Throughout this section, references will be made to the companion-detailed engineering sections in order to enable the user to cross-check quantities determined through the ACE method which may be questionable due to expressed limitations or assumptions which are not satisfied.

**1.05** When new ACE techniques are available for other engineered components, they will be incorporated in a reissue of this section.

**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. "TOUCH-TONE" DIALING REGISTERS/RECEIVERS

### GENERAL

**2.01** This part describes the methodology for estimating TOUCH-TONE dialing registers/receivers. Presently, there are two methods used in determining TOUCH-TONE dialing registers/receivers: (1) a detailed manual method presented in Section 554-111-610 and (2) a mechanized method available as an output of Marketing, Engineering, and Business Services (MEBS) Magnitude Quote and Traffic Engineering Modules.

**2.02** The ACE method of determining TOUCH-TONE dialing registers/receivers uses charts specifically developed to be used for estimating TOUCH-TONE dialing registers/receivers of systems from 25 to 1000 lines. (See Figures 1 and 2.) The assumptions used in developing the charts, the limitations, and the use of the charts are discussed in the following paragraphs.

### ASSUMPTIONS AND LIMITATIONS

**2.03** The charts in Figures 1 and 2 have been developed based on typical customer configurations and traffic characteristics. Some deviations from assumptions in traffic characteristics can be tolerated. However, the user of the charts must ascertain that the PBX has *typical* characteristics. For example, a PBX would not be typical if it has 200 stations, 100 trunks, and 60 percent of the traffic is tandem. The high percentage of tandem traffic takes the PBX out of the typical category. In such a situation, engineering judgment in assessing the customer's traffic characteristics is essential.

**2.04** The chart in Fig. 1 is used for a PBX system without the Station Message Detail Recording (SMDR) feature, and the chart in Fig. 2 is used for a PBX system with the SMDR feature. Notice that more TOUCH-TONE dialing registers/receivers are required for systems with SMDR than systems without SMDR.

**2.05** In order to use the charts in Figures 1 and 2, the following "critical" assumptions *must* be present without any deviations:

- The serving central office (CO) must be equipped to receive TOUCH-TONE dialing signals.
- The serving CO must provide dial-pulse signaling to the PBX on direct inward dialing (DID) calls. Most COs provide dial-pulse signaling to the PBX; however, if the CO sends incoming (DID) digits via TOUCH-TONE dialing signals, ie, dual tone multifrequency (DTMF) signaling, additional registers will be needed.

**2.06** Other assumptions used in developing the charts are as follows:

- All stations at the DIMENSION PBX are TOUCH-TONE dialing stations.
- Trunk traffic is divided equally between incoming and outgoing (ie, 50 percent incoming and 50 percent outgoing traffic).
- End of dialing digit is not used.
- Advanced Private Line Termination (APLT) or Common Control Switching Arrangement (CCSA) trunks are not used.

- All tie lines are translated as TOUCH-TONE dialing.
- The average CCS/trunk is 20 CCS.
- The intercom CCS/station is 1.0 CCS.
- The average holding time per outgoing call is 150 seconds.
- The average holding time per intercom call is 100 seconds.
- Incoming tie-line traffic is considered intercom.
- The average register holding time for intercom is 6 seconds.
- The average register holding time for outgoing is 10 seconds.
- Less than 15 percent of total trunk traffic is tandem traffic.

**2.07** Substantial deviations from the assumptions can be present in a given system. Table A shows assumptions that can have possible deviations if no extremes are present and not too many deviations are biased in the same direction. Table A is divided into three columns as follows:

- (1) **ASSUMPTION:** This column shows the assumptions used in developing the charts and considered the "typical PBX" category.
- (2) **POSSIBLE DEVIATION:** This column indicates possible deviations from the assumptions made for a typical PBX.
- (3) **PROVISION RESULT:** This column shows the result when a possible deviation exists from an assumption and therefore would require the user of the chart to use engineering judgment. Where "under" is indicated, it means the deviation specified will increase receiver requirements, and the charts would tend to underprovide receivers.

**2.08** For example, if the average holding time per intercom call is 80 seconds (which is less than the 100-second assumption) and no other deviations exist, the number of TOUCH-TONE dialing regis-

ters/receivers obtained from the chart would be "underprovided". Although not specifically shown, if the average holding time per intercom call is 140 seconds, which is greater than the 100-second assumption, the TOUCH-TONE dialing registers/receivers obtained from the chart would be overprovided. Similarly, the charts would "overprovide" TOUCH-TONE dialing registers/receivers if the average CCS/trunk is 15 CCS and no other deviations were present from the assumptions.

#### REGISTER/RECEIVER CHARTS

**2.09** The following steps show procedures for using the TOUCH-TONE dialing register/receiver charts shown in Figures 1 and 2.

- (1) Determine that the serving CO is equipped to receive TOUCH-TONE dialing signals and that the CO sends dial-pulse signaling on DID calls. **IF THIS IS NOT TRUE, DO NOT USE THE CHARTS.** Instead, use the detailed method presented in Section 554-111-610.
- (2) Using Table A, examine assumptions that can have deviations, and decide whether there is too much over- or underbias. As a guide, consider an assumption within bounds if it is  $\pm 20$  percent.
- (3) Determine the total trunks to be provided by adding all incoming, outgoing, 2-way, foreign exchange (FX), wide area telecommunications service (WATS), DID, and tie trunks for the system being designed. It must be emphasized that all trunks must be included even if the trunk(s) does not use a TOUCH-TONE dialing register/receiver.
- (4) Determine the total number of TOUCH-TONE calling lines in the system; include in the total one line for each dial-pulse station that has a TOUCH-TONE dialing class-of-service.
- (5) Determine if SMDR is provided for the system and select the appropriate chart. For systems without SMDR, use the chart in Fig. 1; otherwise use the chart in Fig. 2.
- (6) Using total trunks obtained in Step 3 and the total lines in Step 4, find the intersection of lines and trunks on the chart and record the number of registers/receivers. For example, a system not equipped with SMDR, with 300 TOUCH-TONE calling lines and 60 trunks would need seven registers/receivers.

**2.10** A decision is often required when the charts are used. Consider a system without SMDR equipped with 200 TOUCH-TONE calling lines and 60 trunks. This is a borderline situation between six or seven registers/receivers. In such a case, the following items should be considered in making this decision.

- (a) Do the deviations from the assumptions (Table A) tend to under- or overprovide.
- (b) Is the customer expected to grow in either lines, trunks, or both in a reasonable period of time.
- (c) Are the customer's traffic characteristics expected to increase or decrease.

**3. "TOUCH-TONE" DIALING SENDERS**

**GENERAL**

**3.01** This part describes the ACE method for estimating TOUCH-TONE dialing senders. Presently, there are two methods used in determining TOUCH-TONE dialing senders: (1) a detailed manual method presented in Section 554-111-610 and (2) a mechanized method available as an output of MEBS Magnitude Quote and Traffic Engineering Modules.

**3.02** TOUCH-TONE dialing senderized operation is used on Speed Calling, Automatic Route Selection (ARS), Automatic Route Selection—Deluxe (ARS—Deluxe), and Automatic Alternate Routing (AAR). The purpose of the sender is to regenerate TOUCH-TONE dialing signals. The reason is that the originally dialed signals have been converted to computer format and used to route the call. These signals must be regenerated for further processing at the distant end. TOUCH-TONE dialing signals are regenerated instead of dial pulse, because tones representing digits dialed can be transmitted much faster than a series of pulses. TOUCH-TONE dialing senders are also used for precision dial tone in networking configurations. For detailed TOUCH-TONE dialing senderized operation, refer to Section 554-191-241.

**3.03** The number of TOUCH-TONE dialing senders provided using the ACE method can be used in most cases. However, the user must consider unusual customer usage that might preclude the use of this method and require the detailed manual method as provided in Section 554-111-610.

**ASSUMPTIONS AND LIMITATIONS**

**3.04** The following assumptions are used in developing quantities of TOUCH-TONE dialing senders:

- Total trunks provided in the system carry 50 percent incoming and 50 percent outgoing traffic.
- The average CCS/trunk is 20 CCS.
- The average holding time per call on outgoing trunks is 150 seconds.
- The average TOUCH-TONE dialing sender holding time for speed calling is 3 seconds.
- The average TOUCH-TONE dialing sender holding time for ARS/AAR calls is 7 seconds.
- When Speed Calling is provided without ARS/AAR, 30 percent of outgoing calls will use speed calling.

**3.05** The flowchart in Fig. 3 shows the path for determining TOUCH-TONE dialing sender circuits required for the system. Three paths are shown as follows:

- (1) For systems with ARS and/or AAR, determine total trunk circuits by adding all CO, FX, WATS, tie lines, 1-way incoming, 1-way outgoing, and 2-way trunk circuits. Based on total trunk circuits obtained, provide TOUCH-TONE dialing sender circuits as follows:

Total Trunk Circuits	TOUCH-TONE Dialing Sender Circuits
10-50	4
51-110	6
111-190	8
191-280	10.

Notice that although only outgoing traffic uses TOUCH-TONE dialing senders, for the ACE method presented here, all trunks are totaled, and the assumption of 50 percent incoming and 50 percent out-

going algorithm is used. For a system with over 280 trunk circuits, a detailed method presented in Section 554-111-610 should be used. Each sender circuit pack (LC12) contains two sender circuits.

(2) For systems without AAR/ARS but with Speed Calling, provide four TOUCH-TONE dialing sender circuits (two LC12 circuit packs). If the assumptions presented above are used, four sender circuits would be adequate for systems with up to 1000 stations and 400 trunks.

(3) For a system without either AAR/ARS or Speed Calling, the TOUCH-TONE dialing sender circuits are not required.

**3.06** The capacity provided by the TOUCH-TONE dialing sender circuits obtained using the ACE method will be slightly more than actual usage when there are no deviations from the assumptions. However, when deviations do exist, the user must carefully consider the customer's traffic characteristics.

#### 4. RELEASE LINK TRUNKS (RLTs)

##### GENERAL

**4.01** This part describes the ACE method for estimating quantities of RLTs needed at each branch location when the Centralized Attendant Service (CAS) feature is activated. The Release Link Trunk Sizing Worksheet (Fig. 4) is a completed example used for the ACE method and discussed later in this part. A detailed manual method of sizing RLTs is presented in Section 554-111-635.

**4.02** The RLTs provide short holding time connections needed for CAS calls. The RLTs are used to connect calls from an unattended branch location to an attendant located at a single location called a **main**. After the call has been routed to the CAS attendant via an RLT, the attendant extends the call by signaling back over the same RLT to the unattended branch location and releases the RLT.

**4.03** The following paragraphs describe the assumptions used in developing the ACE method and the procedure for completing the Release Link Trunk Sizing Worksheet. A blank worksheet (Fig. 5) which can be duplicated is provided at the end of the section.

##### ASSUMPTIONS AND LIMITATIONS

**4.04** The ACE methodology presented has been developed based on typical customer traffic characteristics. Some deviations in traffic characteristics can be tolerated. However, the user of this method must ascertain that the proposed PBX does not have traffic characteristics that would take it out of the "typical PBX" category.

**4.05** The following fixed assumptions are present in all cases of RLT provisioning:

- The Erlang-C delay formula is applied for RLT sizing using an average busy-hour delay of 4 seconds for seizing an RLT at the branch.
- A minimum of two RLTs shall be provided, regardless of traffic, for backup in case of circuit failures.

**4.06** Table B shows other assumptions used in developing the methodology that can have moderate deviations, if no extremes are present and not too many deviations are biased in the same direction. Table B is divided into three columns as follows:

- (1) **ASSUMPTION:** This column shows the assumptions used for the ACE method and considered as **typical** PBX traffic characteristics.
- (2) **POSSIBLE DEVIATION:** This column indicates possible deviations in traffic characteristics from the assumption that may exist.
- (3) **PROVISION RESULT:** This column shows the result when a possible deviation exists from the assumption and therefore would require the user of the method to consider the magnitude of the deviation. Where "under" is shown as a provision result, it means the deviation specified will increase RLT requirements and tend to underprovide RLTs.

**4.07** For example, if the average attendant holding time on each RLT call is 20 seconds, and no other deviations exist, the RLTs obtained from completing the RLT Sizing Worksheet would be underprovided. The number of additional RLTs needed, if any, would require the user to make a judgment based on considerations shown in Step 9 of the following paragraph.

**4.08** The following steps are used to complete the Release Link Trunk Sizing Worksheet (Fig. 5).

However, before using these steps, examine the assumptions that can have deviations (Table B) and decide whether there is too much over- or underbias. If it is determined that the customer deviates too much from the "typical", procedures covered in Section 554-111-635 should be used. The example of a completed Worksheet shown in Fig. 4 is discussed in the following paragraphs.

- (1) Enter branch location, name or number, for which RLTs are being determined.
- (2) In column A, list all trunk groups (eg, DID, FX, etc.) at the branch which carry calls that must be completed by an attendant.
- (3) In column B, enter the quantity of trunks for the trunk group listed in column A.
- (4) Enter estimated percentage of calls that are completed by an attendant on a trunk group listed in column A, and enter in column C. For example, if 20 percent of the calls on a trunk group are completed by an attendant, enter 20 in column C.
- (5) Using the number of trunks in the trunk group (column B) and percent (column C), determine busy-hour calls from Table C, and enter in column D.
- (6) Total the entries of column D, and enter the result on line 12 of column D.
- (7) Enter 10 percent of line 12 subtotal on line 13, column D.
- (8) Enter the sum of lines 12 and 13 on line 14, column D. This is the total busy-hour calls the RLTs should handle.
- (9) Using the total busy-hour calls on line 14, determine the number of RLTs required from

Table D, and enter on line 15 of column D. The busy-hour calls shown for each quantity of RLTs in Table D are the maximum calls that can be handled to keep within the design grade of service. When the number of busy-hour calls is close to a maximum, a decision must be made to determine the proper quantity of RLTs. For example, if the total of busy-hour calls is calculated to be 620 calls, decide whether five or six RLTs should be provided. In such situations, the following considerations will help in making this decision:

- (a) Do the customer deviations from the assumptions tend to over- or underprovide (Table B).
- (b) Do the estimates made in Step 4 tend to be high or low.
- (c) If six RLTs are provided when only five are needed, will the customer grow into a requirement for six RLTs in a reasonable time period.
- (d) If five RLTs are provided when six RLTs are really needed, will there be a serious impact on the customer's operation if there are delays in reaching the attendant.
- (e) Consider the additional hardware cost to the customer if RLTs are overprovided, ie, circuit packs, carrier mounting space, cabinet space, and cable facilities based on distance from the branch to main location.

**4.09** An example of a completed worksheet using the above procedure is shown in Fig. 4. In BRANCH LOCATION #1, there are six trunk groups which carry calls that must be completed by an attendant. Based on the trunk group size and the percent of calls on the trunk group that is completed by an attendant, the busy-hour calls are obtained from Table C. For the total busy-hour calls of 749 calls, six RLTs are required from Table D.

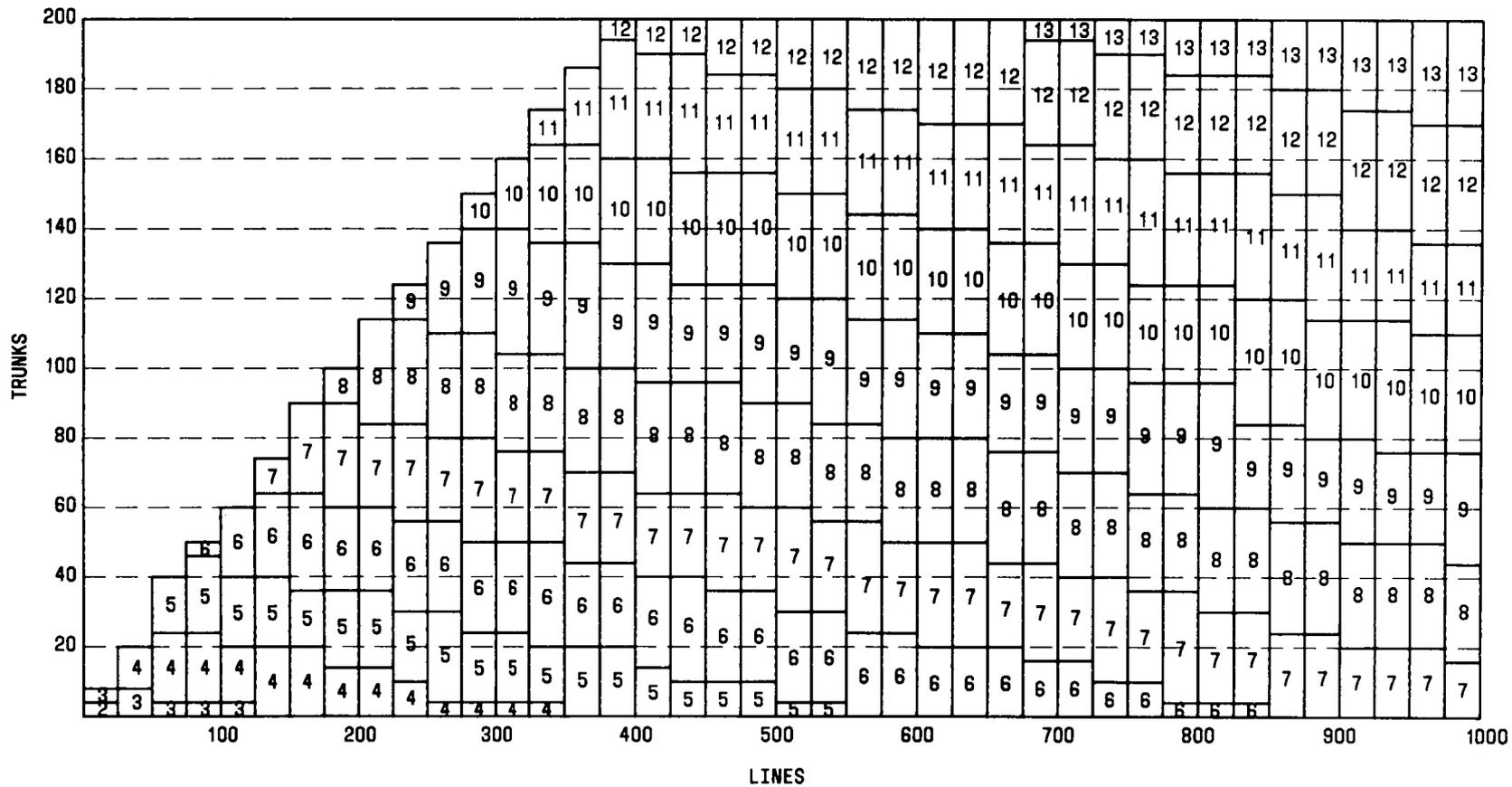


Fig. 1—Quantities of TOUCH-TONE Dialing Registers/Receivers Without SMDR

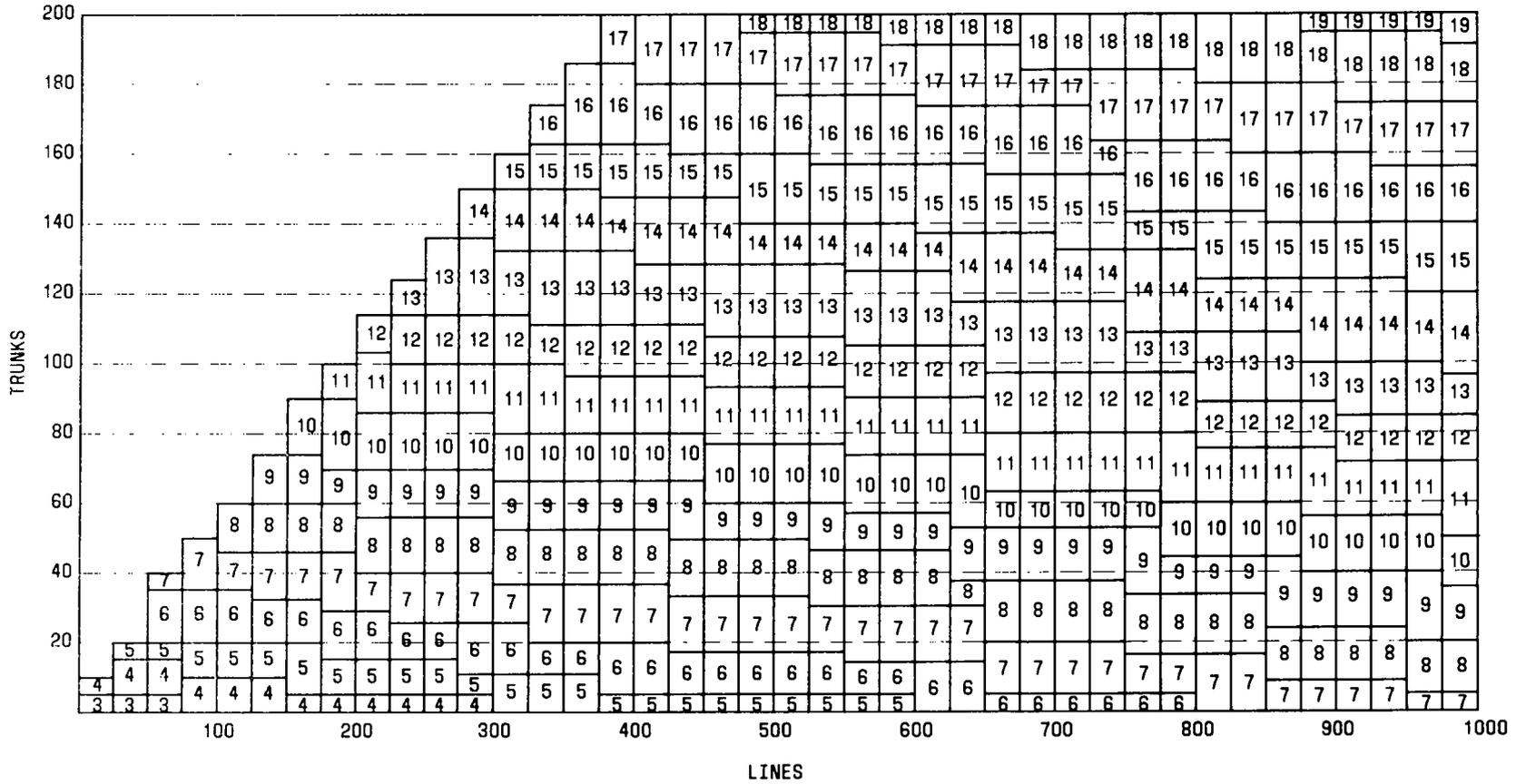
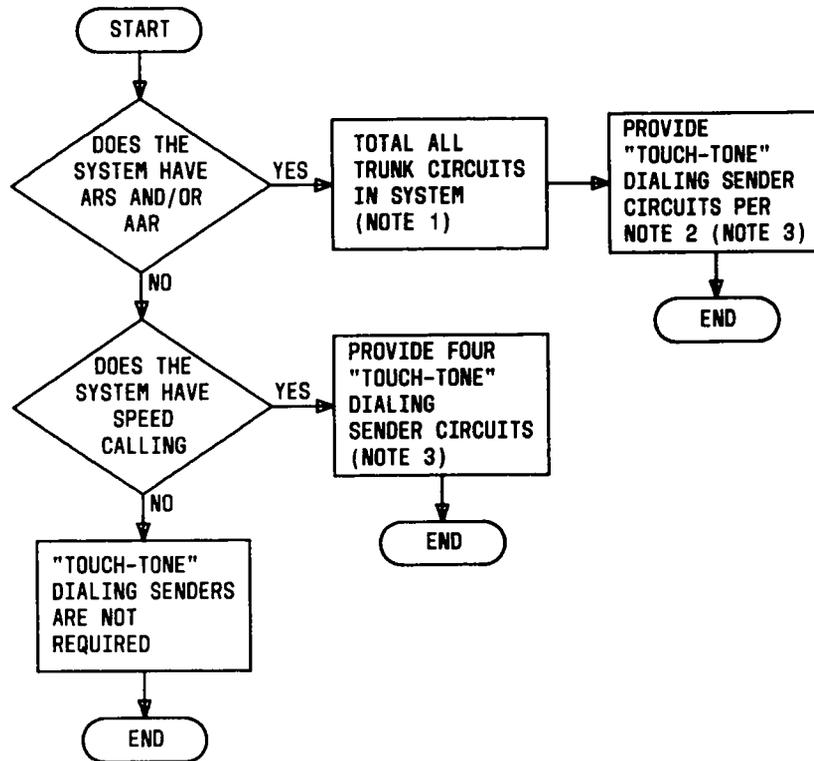


Fig. 2—Quantities of TOUCH-TONE Dialing Registers/Receivers With SMDR



NOTE 1: ADD ALL 1-WAY INCOMING, 1-WAY OUTGOING, 2-WAY, CO, FX, WATS, AND TIE TRUNKS.

NOTE 2: USE FOLLOWING CHART TO DETERMINE SENDER CIRCUITS BASED ON TOTAL TRUNK CIRCUITS:

TOTAL TRUNK CIRCUITS	"TOUCH-TONE" DIALING SENDER CIRCUITS
10-50	4
51-110	6
111-190	8
191-280	10

NOTE 3: EACH TOUCH-TONE DIALING SENDER CIRCUIT PACK (LC12) CONTAINS TWO SENDER CIRCUITS.

Fig. 3—Flowchart To Determine TOUCH-TONE Dialing Sender Circuits

"DIMENSION" 600/2000/CUSTOM PBX  
 DESIGN ENGINEERING WORKSHEET - ACE METHOD  
 RELEASE LINK TRUNK SIZING WORKSHEET

BRANCH LOCATION     # 1    

LINE	A TRUNK GROUP DESCRIPTION	B NUMBER OF TRUNKS IN GROUP	C PERCENT OF CALLS ON GROUP THAT ARE COMPLETED BY ATTENDANT	D BUSY- HOUR CALLS
1	DID	30	10	54
2	800 SERVICE BAND 2	10	100	130
3	800 SERVICE BAND 5	7	100	77
4	INTER-SWITCH TIE LINES	20	50	165
5	FX-SOMEWHERE	14	40	83
6	FX-NOWHERE	18	60	172
7				
8				
9				
10				
11				
12	SUBTOTAL			681
13	ADDITIVE FOR FALSE STARTS, RECALLS, ETC. (10% OF LINE 12)			68
14	TOTAL CALLS (LINE 12 + LINE 13)			749
15	RLTs REQUIRED FROM TABLE D			6

Fig. 4—Completed Example Release Link Trunk Sizing Worksheet

**"DIMENSION" 600/2000/CUSTOM PBX  
DESIGN ENGINEERING WORKSHEET – ACE METHOD  
RELEASE LINK TRUNK SIZING WORKSHEET**

BRANCH LOCATION \_\_\_\_\_

LINE	A	B	C	D
	TRUNK GROUP DESCRIPTION	NUMBER OF TRUNKS IN GROUP	PERCENT OF CALLS ON GROUP THAT ARE COMPLETED BY ATTENDANT	BUSY-HOUR CALLS
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12	<b>SUBTOTAL</b>			
13	<b>ADDITIVE FOR FALSE STARTS, RECALLS, ETC.</b>		(10% OF LINE 12)	
14	<b>TOTAL CALLS (LINE 12 + LINE 13)</b>			
15	<b>RLTs REQUIRED FROM TABLE D</b>			

Fig. 5—Release Link Trunk Sizing Worksheet

TABLE A

**ACE METHOD DEVIATIONS AND RESULTS —  
"TOUCH-TONE" DIALING REGISTERS/RECEIVERS**

ASSUMPTION	POSSIBLE DEVIATION	PROVISION RESULT (NOTE)
All stations are TOUCH-TONE dialing.	Some stations are rotary with TOUCH-TONE dialing class-of-service.	Under
Incoming trunk traffic and outgoing trunk traffic are equal.	Trunk traffic incoming is 70% and outgoing is 30%.	Over
End-of-digit dialing is not used.	End of digit dialing is used.	Over
APLT or CCSA trunks are not used.	APLT or CCSA trunks are provided.	Under
All tie lines are translated as TOUCH-TONE dialing.	Some tie lines are dial pulse.	Under
The average CCS/trunk is 20 CCS.	The average is 15 CCS/trunk.	Over
Intercom CCS/station is 1.0 CCS.	Intercom CCS/station is 0.6 CCS.	Over
The average holding time per outgoing call is 150 seconds.	The average holding time is 180 seconds.	Over
The average holding time per intercom call is 100 seconds.	The average holding time is 80 seconds.	Under
Less than 15% of trunk traffic is tandem.	The percent of tandem trunk traffic is 60%.	Over

**Note:** Provision result is based on possible deviation shown. There are many possible deviations, but only one for each assumption has been given as an example in this table. A change in possible deviation could change the provision result; ie, "over" could be "under" and "under" could be "over". For example, percent trunk traffic incoming and outgoing, as shown, results in "over" provision. However, if the possible deviation example were 40% incoming and 60% outgoing, the provision result would change to "under".

TABLE B

## ACE METHOD DEVIATIONS AND RESULTS—RLTs

ASSUMPTION	POSSIBLE DEVIATION	PROVISION RESULT (NOTE)
Number of calls on trunk groups (non-RLT) are based on 150-second holding time.	The average holding time is 180 seconds.	Over
The trunk group is carrying a busy-hour CCS load that results in a P.04 grade of service.	The grade of service is P.02.	Over
The average attendant holding time on each RLT call is 15 seconds.	The average is 20 seconds.	Under
There is a 5-second average delay at the main for attendant queue.	The average delay at the main is 7 seconds.	Under
RLT calls for attendant recall for transfer to another station, automatic recalls, don't answer, call waiting, etc, amount to 10% of total calls.	These call types amount to 15% of total.	Under

**Note:** Provision result is based on possible deviation shown. There are many possible deviations, but only one for each assumption has been given as an example in this table. A change in possible deviation could change the provision result; ie, "over" could be "under" and "under" could be "over". For example, the grade of service for the trunk group, as shown, results in "over" provision. However, if the possible deviation example were P.10 grade of service, the provision result would change to "under".

TABLE C

## CALL VOLUME ESTIMATES (NOTE)

NUMBER OF TRUNKS IN GROUP	ATTENDANT-COMPLETED BUSY-HOUR CALLS ON TRUNK GROUP									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
1	1	1	1	1	1	1	1	1	1	1
2	2	3	5	6	8	10	11	13	14	16
3	2	5	7	10	12	15	17	20	22	24
4	3	6	10	13	16	19	22	26	29	32
5	4	9	13	18	22	26	31	35	40	44
6	6	12	18	24	30	36	42	48	54	60
7	8	15	23	31	39	46	54	62	69	77
8	9	19	28	38	47	56	65	75	85	94
9	11	22	34	45	56	67	78	90	101	112
10	13	26	39	52	65	78	91	104	117	130
11	15	30	45	60	75	90	105	120	134	149
12	17	34	50	67	84	101	118	134	151	168
13	19	37	56	75	93	112	131	150	168	187
14	21	41	62	83	104	124	145	166	186	207
15	23	45	68	91	113	136	159	182	204	227
16	25	49	74	99	124	148	173	198	222	247
17	27	53	80	107	134	160	187	214	240	267
18	29	57	86	115	144	172	201	230	258	287
19	31	62	92	123	154	185	216	246	277	308
20	33	66	99	132	165	197	230	263	296	329
21	35	70	105	140	175	210	245	280	315	349
22	37	74	111	148	185	222	259	296	333	370
23	39	78	117	156	196	235	274	313	352	391
24	41	82	124	165	206	247	288	330	371	412
25	43	87	130	173	217	260	303	346	390	433
26	46	91	137	182	228	273	318	364	410	455
27	48	95	143	190	238	286	333	381	428	476
28	50	99	149	199	249	298	348	398	447	497
29	52	104	156	208	260	311	363	415	467	519
30	54	108	162	216	270	324	378	432	486	540
31	56	112	169	225	281	337	393	450	506	562
32	58	117	175	233	292	350	408	466	525	583
33	61	121	182	242	303	363	424	484	545	605
34	63	125	188	251	314	376	439	502	564	627
35	65	130	195	260	325	389	454	519	584	649
36	67	134	201	268	336	403	470	537	604	671
37	69	139	208	277	347	416	485	554	624	693
38	72	143	215	286	358	429	501	572	644	715
39	74	147	221	295	369	442	516	590	663	737
40	76	152	228	304	380	455	531	607	683	759
Expansion Factor	2	5	7	9	11	13	15	17	20	22

**Note:** Calls are based on trunk groups having 150-second holding time and engineered at a P.04 grade of service. For trunk groups exceeding 40, multiply quantity over 40 by expansion factor, and add product to 40 trunk call volume in table.

TABLE D  
RLT CAPACITY CHART

REQUIRED QUANTITY OF RLTs	BUSY- HOUR CCS	BUSY- HOUR CALLS
2	29	145
3	58	290
4	89	445
5	120	600
6	153	765
7	186	930
8	220	1,100
9	253	1,265
10	287	1,435
11	321	1,605
12	356	1,780
13	390	1,950
14	425	2,125
15	459	2,295
16	494	2,470