

APPLICATION GUIDE FOR THE PREPARATION OF
DETAILED EQUIPMENT REQUIREMENTS FOR
DIRECT DISTANCE DIALING EQUIPMENT

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1. GENERAL

1.1 Purpose

1.11 This section provides REA borrowers, consulting engineers, suppliers and other interested parties with technical information for use in the design and construction of REA borrowers' telephone systems. It covers, in particular, the preparation of Part III, REA Form 538c, REA Specification for Direct Distance Dialing. Refer to paragraph 1.4 of REA Form 538a to determine the field of use of this specification.

1.12 The General Specification, REA Form 538a, establishes minimum performance requirements and capabilities for direct distance dialing (DDD) equipment to be supplied for use in the telephone systems of REA borrowers. However, the many variables involved make it impractical to devise a single overall specification for DDD equipment which will insure the provision of adequate and appropriate facilities to fit every situation. Accordingly, Part III, "Detailed Equipment Requirements," REA Form 538c, was prepared to permit the particular arrangements and requirements for individual offices to be specified to prospective suppliers of the equipment. The "Detailed Requirements" are based upon the premise that DDD equipment

is in compliance with the General Specification. Therefore, prior to preparation of the "Detailed Requirements," the General Specification should be consulted.

1.13 Most of the items covered by REA Form 538c are those that have purposely been left flexible in the General Specification in order to meet the requirements of individual situations. In some instances it may become necessary to deviate from the basic requirements established in the General Specification. Such deviations should be shown in Part III and, if acceptable to REA, may supersede the requirements established in Part I, General Specification.

1.14 In preparing a specification for DDD equipment, it will be helpful for the engineer to review the following sections of the REA Telephone Engineering and Construction Manual even though most of them do not relate directly to direct distance dialing:

- REA TE&CM 157 - "Customer Toll Dialing"
- REA TE&CM 205 - "Preparation of an Area Coverage Design"
- REA TE&CM 325 - "Application Guide for the Preparation of Detailed Step-by-Step Dial Central Office Equipment Requirements"
- REA TE&CM 326 - "Application Guide for the Preparation of Part III - Specification - Detailed Toll Office Equipment Requirements"
- REA TE&CM 328 - "Application Guide for the Preparation of Detailed Equipment Requirements for Automatic Number Identification Equipment"
- REA TE&CM 335 - "Application Guide for the Preparation of Detailed Common Control Central Office Equipment Requirements"
- REA TE&CM 500 - "Telephone Traffic"
- REA TE&CM 511 - "Telephone Traffic - Dial Equipment for Toll Centers"

1.15 The Area Coverage Design (ACD) (or Supplemental Loan Proposal (SLP), see REA Bulletin 320-14) for the project should be studied carefully and used as a reference. However, because of the possibility that some of the information therein may require updating to include recent changes, current information should be used in preparing Part III. If this information differs from that in the ACD or Supplemental Loan Proposal, it should be submitted to REA with the plans and specifications for approval.

1.16 The engineer should be familiar with the latest issue of the American Telephone and Telegraph Company's "Notes on Distance Dialing" (the "Blue Book").

1.17 The DDD equipment and associated interoffice trunk groups are to be engineered on the same five-year period that is customary for local dial and for toll offices. A 25-year estimate is desirable as a guide in layout of the floor plan and planning growth capacities.

1.18 Throughout this Guide, wherever reference is made to the "Owner," the words "or its engineer" should be considered to be implied.

1.19 Wherever paragraph numbers are shown in parentheses in the following text, these numbers refer to the paragraphs in Part III of the DDD specification, REA Form 538c.

1.2 Reasons for Reissue

1.21 This Application Guide is reissued for the following reasons:

1.211 To update the subject matter to conform with the new issue of REA Form 538.

1.212 To recognize the situation where DDD equipment for installation in a new common control central office will be specified in REA Form 538c, rather than in Parts III and IV of REA Form 524, "General Specification for Common Control Central Office Switching Equipment."

1.3 Explanation of Parts III and IV

1.31 The internal organization of DDD switching systems may vary widely among different types of systems. It would be difficult, if not impossible, for the borrower or its engineer to determine the proper quantities of various types of switching network and common control equipment (including electronic equipment in some cases) to meet a specific situation for all of the systems offered by the various suppliers.

1.32 To care for the situation outlined in paragraph 1.31 above, two sections are included as Parts III and IV of the "REA Specification for Equipment for Direct Distance Dialing." Part III includes all of the information available to the borrower and its engineer in regard to the traffic and equipment requirements for a specific DDD switching system. Part IV provides space for the supplier to complete the information which only he can provide in regard to switching network and control equipment quantities.

1.33 The borrower or its engineer should complete Part III and submit a copy of this, together with a blank copy of Part IV, to each supplier whom he wishes to bid on the project.

1.34 Each supplier submitting a bid is expected to fill out and return Part IV with its bid.

1.35 When a final decision is made as to which type of equipment is to be ordered, both Parts III and IV will become integral parts of the contract.

1.4 Engineering Considerations

1.41 In addition to the information from the ACD or Supplemental Loan Proposal, discussed in paragraph 1.15 above, it will usually be necessary to make a special study of DDD traffic volume and trunk requirements in order to obtain the information necessary to complete Part III, REA Form 538c. REA TE&CM 157, "Customer Toll Dialing," describes the procedure for making such a study. Where a computer is required, it will be necessary to make a point-to-point study to determine the offices called most frequently.

1.42 As outlined in paragraph 1.4 of Part I, REA Form 538a, this specification covers only the equipment required for DDD switching and call recording. Any ANI equipment required for local dial offices is covered by REA Form 537.

1.43 In some instances an Owner with several tributaries (class 5 offices) may wish to use DDD switching and call recording equipment at a central location which will serve as a tandem office for extending toll calls to a class 4 (or higher) office, either in the Owner's or a connecting company's area. In this case, the tandem office should be considered as a class 4 office as far as transmission requirements are concerned. This means that all toll circuits between the tandem office and the next higher office should operate at VNL. Circuits between the tandem office and the tributary office should operate at 3db loss. (See REA TE&CM 415.) The tandem office, even though it may be located with a small local dial or CDO office, must have all the impedance compensators, switching pads, proper ratio repeating coils, buildout networks and other transmission apparatus required for a class 4 office.

1.44 It is expected that, in general, all subscribers in an Owner's operating area will have access to the nationwide toll dialing network. The information shown in Part III should reflect any limitation in the scope of DDD at a particular office.

1.45 The various types of equipment which may be specified for a DDD office are listed in paragraph 1.5 of Part I, REA Form 538a.

2. BASIC INFORMATION (PARAGRAPH 2)

2.1 Date of Issue of REA Specifications Relating to Associated Equipment (Paragraph 2.1)

2.11 (Paragraph 2.11) If DDD equipment is being added to an existing direct acting local dial office, or is being installed concurrently with a new direct acting local dial office, the date of issue of the REA Form 558 used for the local dial office installation should be entered in this paragraph.

2.12 (Paragraph 2.12) If DDD equipment is being added to an existing common control central office or is being installed concurrently with a new common control local dial office, the date of issue of the REA Form 524 used for the local dial office installation should be entered in this paragraph.

2.13 (Paragraph 2.13) If DDD equipment is being installed concurrently with ANI equipment in connecting tributaries and/or a local dial office in the same building, the date of issue of the REA Form 537 to be used for the ANI equipment installations should be entered in this paragraph.

2.14 (Paragraph 2.14) If DDD equipment is being installed at a location where manual toll positions are already installed, or are to be installed concurrently, the date of issue of the REA Form 542 used for the manual toll position modification should be entered in this paragraph.

2.2 Type of Office Covered by this Specification (Paragraph 2.2)

2.21 (Paragraphs 2.21, 2.22, 2.23, 2.24, and 2.25) The proper blank should be checked to indicate the type of office covered by this specification.

2.3 Type of Service to be Provided (Paragraph 2.3)

2.31 (Paragraph 2.31) If the DDD equipment is to be arranged to handle Station-to-Station Sent Paid (SSSP) calls on a CAMA basis, this paragraph should be checked.

2.311 (Paragraph 2.311) When ANI equipment is not provided, it will be necessary to use operator number identification (ONI), and this paragraph should be checked.

2.312 (Paragraph 2.312) Where ANI equipment is available or is being provided, this paragraph should be checked.

2.32 (Paragraph 2.32) If the DDD equipment is to be arranged to handle Person-to-Person, Collect and Special (PPCS) service on a CAMA basis, this paragraph should be checked.

2.321 (Paragraph 2.321) This paragraph should be checked when SSSP calls are not to be handled by the DDD equipment being ordered in this specification.

2.33 (Paragraph 2.33) If all of the connecting tributaries are arranged for LAMA, there will be no need for call recording equipment for the tribs at the DDD center. This paragraph should be checked if this condition exists.

3. TRUNK CIRCUIT REQUIREMENTS (PARAGRAPH 3)

3.1 General (Paragraphs 3.1 and 3.2)

3.11 The introduction of DDD service, either as an addition to an existing switching center or in a new switching center, offers an opportunity to review the grade of service provided for toll calls. In the past, because of the relatively higher expense of transmission facilities, it has been the practice to provide toll trunks on a greater probability of loss than is used for engineering local service trunks. Recently, however, with increased emphasis on the quality of toll service, and the availability of less expensive transmission facilities, REA recommends that trunks for handling DDD service should be engineered on a P=.01 basis for direct acting offices and a B.005 basis for common control offices. Any deviation from this practice should be explained by the Owner in a note in paragraph 13, Part III.

3.12 For new switching centers, much of the information necessary to complete the trunking requirements may be obtained from a completely and properly executed REA Form 810, "Central Office Equipment Engineering Information." However, in most cases where DDD equipment is being provided it will be found that the existing trunk circuits, if any, will not be adequate from an operating feature standpoint, and existing or previously engineered transmission facility quantities may have to be changed because of the considerations set forth in paragraph 3.11 above, and in the following paragraphs. Accordingly, the actual number of trunks to be provided should be determined as outlined in paragraphs 3.13 to 3.15, below.

3.13 The Owner should list in line 6 of the Trunking Information Table (paragraph 3.3) the Busy Hour CCS Capacity for each trunk group. This information, which should be obtained from current traffic studies if possible, should be used to determine the number of trunks required for each group, using a full access P=.01 trunk

table for direct acting offices and a full access B.005 table for common control offices. When trunk quantities are specified by a connecting company, and traffic information is not available for confirming the adequacy of the trunk quantities for providing a grade of service equal to P=.01 or B.005, the quantities specified by the connecting company should nevertheless be entered in paragraph 3.3. However, the CCS which such groups will handle should be determined by reference to the P=.01 or B.005 trunk table, and entered in paragraph 3.3 for these particular trunk groups. A note should be added to paragraph 13 indicating that the CCS entered for such groups are not based on actual traffic measurements, but have been determined from the P=.01 or B.005 trunk table on the basis of the trunk quantities specified by the connecting company. Unless otherwise specified, the incoming and outgoing traffic on two-way trunk groups will be assumed to be equal.

3.14 As discussed in paragraph 6.13 of Part I, there may be cases where the recording equipment will involve additional trunk holding time over and above the CCS entered in paragraph 3.3 by the Owner. In this case, it should be the responsibility of the Bidder to discuss this with the Owner prior to making a bid. The agreed upon trunk quantities should be listed by the Bidder in paragraph 2.1 of Part IV, together with an explanation of why and how much the trunk quantities differ from what would be required by the Owner in Part III.

3.15 If ANI equipment is being added in connecting tributary offices, the quantities of trunks from such offices to be provided in the DDD center should agree with the quantities specified in paragraph 6.2 of REA Form 537c, the ANI equipment specification.

3.2 Trunking Information Table (Paragraph 3.3)

3.201 Line 1: This block should show the geographical name of the distant office. Each column will be used for a separate trunk group even though each group goes to the same office.

3.202 Line 2: This block should indicate whether the trunk group is to be used for intertoll or tributary traffic.

3.2021 In the future, it is possible that EAS service may be provided on a "message rate" basis. In this case, the recording equipment in the CAMA center may be used to record some or all of the details of EAS calls handled either over separate groups of trunks for EAS service only, or combined groups handling both toll and EAS service. If such an arrangement is to be provided, the details should be described in paragraph 13 of Part III.

- 3.2022 In some cases, LAMA (Local Automatic Message Accounting) may be provided in an associated tributary office for providing "message rate" service, either for local calls or for EAS calls, or for both. In such cases, the details of SSSP toll calls originating in such tributaries may also be recorded by the LAMA equipment in which case no ANI equipment will be required. If PPCS service is to be provided, however, and the CAMA center is arranged to handle such service, it might be considered desirable to provide equipment at the LAMA tributary for outpulsing the calling number to the CAMA center, so that at least the PPCS service could be handled there. In this case, the recording of the SSSP calls could be done either at the LAMA tributary or the CAMA center, as desired by the company or companies involved. In any case, the details of the desired arrangement should be outlined in paragraph 13.
- 3.2023 If a tributary trunk group is to handle "0-" calls ("Special Service") either separately or in combination with other types of calls, the details of the desired arrangement should be outlined in paragraph 13.
- 3.203 Line 3: The quantity of trunks in each group, obtained as indicated in paragraph 3.1 above, should be shown.
- 3.204 Line 4: For common control offices only, show the percent of the original number of trunks which can be reasonably expected to be added to the group during the lifetime of the system. Without additional information the same percentage may be shown as is given for subscriber lines in the local office.
- 3.205 Line 5: For direct acting offices only, indicate the quantity of trunks to be wired.
- 3.206 Line 6: List the busy hour CCS data for each trunk group, obtained as described in paragraph 3.1 above.
- 3.207 Line 7: This line should show the direction of the trunks relative to the office being specified. In the case of high usage trunks and groups having one-way and two-way trunks combined, see REA TE&CM 335, paragraph 3.112, line 5-b,c, and d.
- 3.208 Line 8: For each trunk group an indication should be given to whether the connecting office is a dial tributary or a dial or manual toll office. The considerations outlined in paragraph 3.202, above, will apply here also, and any necessary additional information shall be provided in paragraph 13.

- 3.209 Line 9: For outgoing and two-way trunk groups, the number of digits required to be dialed for completing calls via each group should be specified. Toll groups will normally require an access digit plus seven or ten digits. In this case either "8" or "11" should be shown in this line. Trunks to desks, such as information, repair service, chief switchman, etc., will not usually require any digits.
- 3.210 Line 10: The number of digits to be outpulsed from the office covered in this specification to complete calls in the distant office is to be inserted in this line. This information will be used to determine the average holding times of the originating register-senders, where provided.
- 3.211 Line 11: For incoming and two-way trunk groups, show the number of digits received by this office. This information will be used to determine the average holding times of incoming registers, where provided.
- 3.212 Line 12: The type of signaling, such as E & M, loop dial, tone, etc., should be indicated in this line. Engineering considerations relating to the selection of a trunk signaling method, where there is a choice available, are outlined in paragraph 3.112, line 16, a - f, of REA TE&CM 335, "Application Guide for the Preparation of Detailed Common Control Central Office Equipment Requirements." Careful consideration should be given to the factors discussed in this paragraph.
- 3.213 Line 13: The mode by which the digital address information is sent should be shown in this line. Examples are 20 pulses per second, 10 pulses per second, multifrequency dialing, etc.
- 3.214 Line 14: Check if trunks are to be carrier derived. If the group is partially carrier derived, show the number of carrier derived trunks in the group.
- 3.215 Line 15: Check if trunks are to be on physical circuits. If the group is partially physical, show the number of physical trunks.
- 3.216 Line 16: Show the number of repeat coils for physical circuits only.
- 3.2161 Trunk circuits using DX, SX, CX, or E type signaling require the use of repeating coils.

3.2162 Repeating coils should not be specified for radio multiplex or carrier derived trunks, since the proper impedance match (and A and B leads) will be provided within the 4-wire terminating unit of the multiplex or carrier equipment.

3.2163 Where the repeating coils are not included as part of the trunk terminating equipment, or the trunk circuit itself, and are not to be furnished by a connecting company, the quantities of repeating coils to be provided by the Bidder should be specified in line 16.

3.217 Line 17: When E and M signaling is specified on physical trunks, "DX" shall be provided in preference to the CX or SX type except where required for compatibility with the connecting office. Accordingly, the CX and SX types of signaling are not listed under trunking requirements. If such circuits are required for compatibility, a check should be placed in line 18, "Other Type Signaling," and the type of circuit required shall be specified by a note in paragraph 13, Part III.

3.2171 For radio multiplex or carrier derived trunks employing E-M signaling including separate inband signaling units, no separate signaling units are required since the necessary signaling equipment is contained in the carrier or signal unit equipment itself. The same holds true where a "loop type" carrier trunk circuit is encountered.

3.218 Line 18: In the absence of DX signaling, the most preferable signaling on physical trunks is loop dial. If this type of signaling is to be specified, it should be done here.

3.219 Line 19: If the trunk group is coming from a distant office which has senders, the group should be assigned as delay dial. The purpose is to stop the distant sender until a local incoming register has been attached to the trunk. The incoming registers can be supplied at a lower grade of service under these conditions. If the distant office is direct driven step-by-step, the dialing cannot be delayed and registers must be provided in larger quantity.

3.3 Interoffice Trunking Diagram (Paragraph 3.4)

3.31 As stated in paragraph 3.4 of Form 538, Part III, an inter-office trunking diagram should be attached to each Part III submitted for bids. If translation is required, as will usually be the case, a translator function chart should also be provided showing the translation necessary for each connection shown on the trunking diagram. A typical chart is shown in paragraph 3.421 of Form 538.

3.32 Useful examples of interoffice trunking diagrams and a translator function chart are shown in REA TE&CM 335, "Application Guide for the Preparation of Detailed Common Control Central Office Equipment Requirements." This information is provided in association with paragraph 1.67 of TE&CM 335, which also provides a discussion of the factors involved in preparing such information.

4. SWITCHING NETWORK REQUIREMENTS (PARAGRAPH 4)

4.1 Traffic Data (Paragraph 4.1)

4.11 As discussed in paragraph 1.511 of Part I of REA Form 538, some kind of switching network will be required for extending connections to and from the intertoll trunk facilities used for DDD service. Where the DDD equipment is being added to existing local central office equipment, the switching facilities may consist either of an additional set of switches for the DDD traffic, or an enlargement of the existing network to provide additional incoming and outgoing trunk terminals. For cases where the DDD equipment is being provided concurrently with new local central office equipment, consideration should be given to the overall switching network arrangement so that it may be designed by the Bidder to provide the desired functions in the most economical and efficient manner. In any case, it is essential that all of the information regarding the traffic to be served by the switching network be entered in the appropriate blanks of paragraph 4.1, Part III, so that the Bidder may design a network to provide the grade of service specified in paragraph 3.024 of Part I of Form 538. The busy hour CCS to be served by the network (exclusive of additional network holding time generated by the recording and control equipment) should be obtained from current traffic studies wherever possible. Otherwise, the CCS data should be developed in consultation with the REA Area Office.

4.111 (Paragraph 4.11) If the switching network is to be arranged to handle DDD traffic originating from local subscribers, the originating CCS contributed by such subscribers should be entered in paragraph 4.11.

4.112 (Paragraph 4.12) If the switching network is to be arranged to handle DDD traffic originating from tributaries, the originating CCS contributed by these trunks should be entered in paragraph 4.12.

4.113 (Paragraph 4.13) If the switching network is to be arranged to handle terminating DDD traffic to local subscribers, the terminating CCS contributed by such calls should be entered in paragraph 4.13.

4.114 (Paragraph 4.14) If the switching network is to be arranged to handle DDD traffic terminating to tributaries, the terminating CCS contributed by these trunks should be entered in paragraph 4.14.

4.115 (Paragraph 4.15) Any DDD traffic not included in the above categories should be entered in paragraph 4.15.

4.116 (Paragraph 4.16) Any metered EAS traffic handled by the DDD switching network should be entered in paragraph 4.16.

4.117 (Paragraph 4.17) The busy hour CCS listed in paragraphs 4.11 through 4.16 should be totaled and entered in paragraph 4.17. This figure represents the total traffic to be handled by the switching network except as discussed in paragraph 4.118, below.

4.118 (Paragraph 4.18) Any additional holding time for the network which may be introduced by the recording and control equipment required for the office should be determined by the Bidder and added by him to the CCS entered in paragraph 4.17, above. This new figure should be taken into consideration by the Bidder in the design of the switching network to meet the required service objective of $P=.01$ for direct acting offices and $B.005$ for common control offices.

4.2 Trunk Appearances (Paragraph 4.2) and Switch Frames and Circuits by Quantities and Types (Paragraph 4.3)

4.21 These paragraphs in the specification are self-explanatory.

4.3 Network Switching Diagram (Paragraph 4.4)

4.31 (Paragraph 4.41) The network switching diagram supplied by the Bidder is to be used primarily for specifying the interconnection of switches and switching frames and for an understanding of the routing of calls through the switching equipment. Since the numbering plan arrangement will be indicated on the interoffice trunking diagram, as discussed in paragraph 3.3, above, there will be no need to repeat this information in the network switching diagram. Instead, the network switching diagram will show quantities of switches and switch frames, specify the interconnections between them, and indicate the assignment of trunk circuits to switch terminals.

5. REGISTER, SENDER AND CONTROL EQUIPMENT (PARAGRAPH 5)

5.1 General

5.11 The information provided by the borrower in paragraph 5 will be used by each Bidder to determine the types and quantities of registers, senders and control equipment required to provide the grade of service specified in paragraph 3.02⁴, Part I, of REA Form 538, when used in conjunction with the switching network.

5.2 Traffic Data (Paragraph 5.1)

5.21 General

5.211 The traffic data normally used for engineering direct acting central offices has been expressed only in terms of 100 second calls per busy hour (CCS/BH). For determining quantities of registers and senders, and the associated control equipment, it is necessary to have information as to the actual number of calls made (or usages) during the busy hour. If the average call holding time is known, per type of call, the number of busy hour calls can be calculated by dividing the CCS figures times 100 by the call holding time. Even if data is available in the Area Coverage Design as to the total number of originating and terminating busy hour calls by type, such data is likely to be obsolete. It is highly desirable that current data be obtained from actual traffic measurements. If such measurements cannot be made, an attempt should be made to obtain data from similar exchange areas in the vicinity. If this cannot be done, figures should be obtained from the REA Area Office covering the calls/BH to be specified for each type of connection. The current issue of REA Form 524, "General Specification for Common Control Central Office Equipment," contains typical call holding times which may be used in lieu of other information. It should be emphasized that some of the newer services, such as Data Service, may have extremely short holding times, so that for the same CCS the calls/BH for a trunk group may be much higher than for regular telephone service.

5.212 If any EAS calls are to be handled for call recording purposes by the registers, senders and control equipment being ordered in this specification, a note should be provided in paragraph 13 covering all pertinent traffic data and translator requirements for such service.

5.22 Incoming from Tributaries (Paragraph 5.11)

5.221 To complete the chart shown in paragraph 5.11 the CCS, pulsing mode and number of digits impulsed can be obtained from paragraph 3.3. If not known, the holding times for the various types of calls can be found in REA Form 524, paragraph 11.32. The number of busy hour calls can then be calculated as shown in paragraph 5.211. Seven- and 10-digit calls should be broken down in the ratio of two to one when other information is not available. The total BHC and CCS figures for each type of call should be separated for dial pulsing and MF pulsing and entered in the appropriate column.

5.23 Incoming from Local Subscribers (Paragraph 5.12)

5.231 The busy hour calls to the DDD network from local subscribers should be calculated by applying the appropriate holding times. These figures should be entered in the chart in paragraph 5.12.

5.24 Incoming from Toll Network (Paragraph 5.13)

5.241 The busy hour calls incoming from the toll network, if not available from current traffic studies, should be calculated by applying the appropriate holding times to the CCS data provided for the various trunk groups listed as incoming to this office in paragraph 3.3, Part III. The traffic information should be separated according to the pulsing mode as shown in the chart in paragraph 5.13. The type of impulsing which will be received from each trunk group will usually be determined by the nature of the connecting office. If a choice is available, consideration should be given to the use of MF pulsing, if it can be justified economically.

5.25 Outgoing to Tributaries (Paragraph 5.14)

5.251 The busy hour calls outgoing to tributaries, if not available from current traffic studies, should be calculated by applying the appropriate holding times to the CCS data provided for the various trunk groups listed as outgoing to tributaries in paragraph 3.3, Part III. Information as to the number of digits outpulsed is also obtainable from paragraph 3.3 and from the translation chart. The type of outpulsing required will usually be determined by the nature of the connecting tributary office. However, as mentioned previously, if a choice is available, MF outpulsing should be provided where economically feasible.

5.26 Outgoing to Toll Network (Paragraph 5.15)

5.261 The busy hour calls outgoing to the toll network should be calculated by applying the appropriate holding times to the CCS data provided for the various trunk groups listed as outgoing to the toll network in paragraph 3.3, Part III. This information should be shown in the appropriate pulsing category in paragraph 5.15 according to the number of digits outpulsed.

5.27 The data provided in paragraphs 5.11 to 5.15 will be used by the Bidder in determining the types and quantities of registers and senders, or register-senders, and the associated control equipment required for the DDD switching. Also, if recording equipment is required, the information in paragraph 5 will be used by the Bidder in conjunction with the information provided in paragraph 6, Part III, to determine the type and quantities of recording equipment to be provided. Using average overall pulsing times for each type of call, and the machine work times individual to his own system, the Bidder will derive overall holding time requirements. Applying these to the given busy hour calls he will be able to engineer and specify the proper equipment in adequate quantities. In no case should the Bidders be relied upon to engineer the registers, senders and control equipment (and the recording equipment when required) on the basis of obtaining calls/BH by applying their own estimates of holding time (HT/BHC) to the CCS shown in line 6 of paragraph 3.3, Part III. Should different HT/BHC figures be used by different Bidders, equipment quantities would differ and the bids would not be comparable.

5.3 Translator Requirements (Paragraph 5.2)

5.31 (Paragraph 5.21) If translation is not required, a check should be placed in this paragraph.

5.32 (Paragraph 5.22) If translation is required, a check should be placed in this paragraph.

5.33 (Paragraph 5.23) This paragraph is self-explanatory.

5.4 Quantities and Types of Registers, Senders and Control Equipment (Paragraph 5.3)

5.41 (Paragraph 5.31) This paragraph is self-explanatory.

6. RECORDING EQUIPMENT REQUIREMENTS (PARAGRAPH 6)

6.1 Traffic Data (Paragraph 6.1)

6.11 Number of Messages per Busy Hour (Paragraph 6.11)

6.111 (Paragraph 6.111) For calls from tributaries, the calls to be recorded per busy hour can be obtained from paragraph 5.11, Part III. The calls from local subscribers can be found in paragraph 5.12. Since the figures to be entered in paragraph 6.111 should include both the calls originated at tributaries and the DDD calls originated by local subscribers, the total figures to be used should be the sum of paragraphs 5.11 and 5.12, Part III. The breakdown of calls between SSSP and PPCS service can be obtained directly from the charts.

6.112 (Paragraph 6.112) Wherever available, the Owner should enter his 1-year forecast in this paragraph to enable the Bidder to make suitable provisions for growth.

6.12 (Paragraph 6.12) The machine attempts per call may be assumed to be 1.5 for SSSP calls and 2.0 for PPCS calls, unless other data is available.

6.13 (Paragraph 6.13) The paid conversation time per message should be obtained from current traffic studies where possible. Otherwise, the figures to be used in this paragraph should be determined by consultation with the REA Area Office.

6.14 (Paragraph 6.14) The remarks in paragraph 6.13, above, in regard to the method of obtaining the required information, will apply also for this paragraph.

6.2 Quantities and Types of Recording Equipment (Paragraph 6.2)

6.21 The detailed machine work times for the various types of call recording equipment and the holding times for various call recording components will be known to the Bidders, and should be used with the traffic data provided in paragraph 6.1 and the other traffic data in the specification in determining the quantities of call recording equipment which will be required. The Bidders will necessarily coordinate with the Owner in regard to the related DDD and identifying equipment in connecting offices.

6.3 Type of Billing Record Required (Paragraph 6.3)

6.31 The final output of the recording equipment will be magnetic tape. This type of output has many advantages such as size, convenience, capacity and reliability. In many cases it is required to function with available computer or billing center equipment. Arrangements must be made by the Owner for processing the information recorded on the tape. For small companies it is probably most feasible to have a commercial billing service perform the reading function. Large companies could rent or buy business machines which would perform this

function. Where there is an accounting center available with spare capacity in a connecting company, consideration should be given to arranging with that company to perform the readout and prepare the subscribers' bills. In this case, the Owner would have to specify recording tape companies with the available readout equipment.

6.311 (Paragraph 6.311) The DDD specification allows the conversation time to be recorded in terms of connect time and disconnect time, instead of in terms of the overall elapsed time. Business machines sufficiently complex to obtain conversation time by subtracting and recognizing time of day, etc., will usually be rather expensive. Therefore, if the provision of elapsed time output on the magnetic tape appears desirable to the Owner from an economic and feasibility standpoint, a check mark should be placed in paragraph 6.311. If computing equipment or a billing center is already available, the type of input required by such installations will determine the format of the output of the call recording equipment.

6.32 (Paragraph 6.32) If immediately available time and charge information is desired, a check mark should be placed in paragraph 6.32, Part III. As stated in paragraph 3.0630, Part I, details of the arrangement desired should be given in an information note in Part III (Paragraph 13). This service can only be given where an operator will be available to read the printer (or display), possibly to calculate the charge, and to notify the party who has requested time and charge information. This service may be quite useful where there is a large proportion of hotel or motel traffic, or where business concerns make a practice of requesting time and charges on toll calls. The service need not be confined to PPCS calls; all DDD traffic from predetermined lines can be specified to have time and charge service. The specification does not require that the charge be calculated and printed or displayed, because in most systems a rate computer, even if provided, will not be activated at this time. Where the charge is not printed or displayed, there will be the problem, which must be solved, of translating the called office code into a called place name so that the charge may be properly computed and transmitted to the requesting party by the operator monitoring this feature.

6.33 (Paragraph 6.33) Information Regarding Preparation of Subscriber Bills

6.331 (Paragraph 6.331) Information as to the location of the site at which the readout and printing equipment is installed should be included in this paragraph. If this

location is the same as that of the DDD equipment, it will be satisfactory to enter "Same" in this paragraph.

6.332 (Paragraph 6.332) If the output of the DDD recording equipment is entirely prepared at the DDD equipment location, it must be transported to the Billing Center physically, and a check mark should be placed in paragraph 6.3321. Also, if locally prepared intermediate tape records are to be transported physically to a readout and printing center to be fed into "Toll Ticketers" for production of a printed ticket, paragraph 6.3321 should be checked. If any of the call recording information is to be transmitted electrically to the readout and printing center (or Billing Center), paragraph 6.3322 should be checked, and details should be given in paragraph 6.33221. These details should include all the information listed in that paragraph, as well as any other pertinent information.

7. POSITION EQUIPMENT REQUIREMENTS (PARAGRAPH 7)

7.1 General

7.11 When a small amount of DDD switching equipment is being added to an existing toll center where manual toll positions are already installed, it may be desirable to have these positions modified to handle PPCS and/or ONI traffic. Most suppliers have circuits available which can be used for this purpose. Any positions so modified should be capable of handling ONI service, and also PPCS service, if the latter service is specified.

7.12 For larger installations in existing offices, or for cases where a completely new office is being installed, consideration should be given to the use of the newer type consoles arranged for "O-" (assistance), ONI and PPCS service. Even with such consoles being provided, it may be desirable, in cases where manual toll positions are retained to handle ringdown traffic, etc., or in cases where new cord type positions are provided for that service, to have arrangements provided for transferring from the consoles to modified cord type positions during periods of light load.

7.2 Traffic Data (Paragraph 7.1)

7.21 (Paragraph 7.11) Busy Hour Calls Handled by Operator

7.211 To enable the Bidder to calculate the number of positions required, the Owner should specify in paragraph 7.11 the number of SSSP (ONI), PPCS and Assistance ("O-") busy hour calls (BHC) which will be handled by operators. This information should be obtained from current traffic studies whenever possible.

Otherwise, these figures should be estimated by the Owner. The figures used should, of course, be consistent with the traffic data entered in paragraphs 5.1 and 6.1 of Part III.

7.3 Nature and Location of Operator Positions (Paragraph 7.2)

7.31 (Paragraph 7.21) If cord type positions are to be used, a check mark should be placed in paragraph 7.21. If new positions of this type are required, they should be ordered in REA Form 542c, "Specifications for Toll Office Equipment." The required modification of either new or existing positions should be ordered and provided under this specification (REA Form 538c).

7.32 (Paragraph 7.22) If console type positions are required, a check mark should be placed in paragraph 7.22. Positions of this type should be provided under this specification.

7.33 (Paragraph 7.23) The office in which the positions for handling PPCS and/or ONI service are to be located should be specified in paragraph 7.23.

7.34 (Paragraph 7.24) Nature of Existing Cord Type Positions

7.341 (Paragraphs 7.241 to 7.246) Different suppliers may have different techniques for modifying existing cord type positions for PPCS and/or ONI service. Sometimes face equipment is added, sometimes keyshelf equipment is added, and sometimes both are added. If positions are to be modified, the information requested in paragraphs 7.241 - 7.246 should be supplied. The wording of these information requests is sufficiently clear so that no elaboration is necessary in this Guide. It would be helpful, however, to attach a sketch of the layout of the shelf and face equipment.

8. COMPUTER REQUIREMENTS (PARAGRAPH 8)

8.1 (Paragraph 8.1) The Bidder should check the proper blanks in paragraph 8.1.

8.2 (Paragraph 8.2) When computing equipment is to be provided, complete information should be provided in paragraph 8.2 as to the offices (not necessarily the cities) to which the charges will be computed automatically. The arbitrary rate identification number for a call to each of these offices from the DDD center and from each tributary should be entered in the last column of paragraph 8.2. This number should be obtained as described below. It is suggested that a study be made of the toll messages for two or three typical months to determine the most frequently called offices. Enough data should be listed to

include about 95 to 98 percent of the total messages. For convenience, each different rate should be given an arbitrary rate designation number, e.g., "LLL101-124," for American Telephone and Telegraph Company's Long Line Schedule No. 1, the rate for distances from 101 to 124 miles. Similar identification numbers should be used for intrastate rates.

8.3 (Paragraphs 8.3 and 8.4) Copies of the Owner's rate tables, marked to show how far the computer should reach, and the arbitrary rate identification numbers, should be attached to show the composition of the rates listed in paragraph 8.2. These tables should list what modification of normal rates should be made for Sundays, Saturdays and holidays.

9. SPECIAL REQUIREMENTS (PARAGRAPH 9)

9.1 For DDD Systems Requiring a Direct Acting Switching Network (Paragraph 9.1)

9.11 (Paragraph 9.11) When access from the recording equipment is required to more than one toll trunk group, route selectors will be required. This will also include the possibility that route selectors may be required if the traffic originates in tributaries and terminates in the toll office. It is recommended that such selectors be provided as part of this specification, and if this is to be done, a check mark should be placed in paragraph 9.11. However, in some cases, special problems of compatibility may exist which would make it desirable that these selectors be purchased separately, from the manufacturer of the local dial equipment. If this situation exists, the Owner should provide an explanation in paragraph 13, Part III.

9.12 (Paragraph 9.12) If special service selectors are required as part of this specification, the location and quantities of such selectors should be entered by the Owner in paragraph 9.12. If there is already a shelf with special service selectors in the local office, it might be desirable to order the additional selectors, separately, from the manufacturer of the local dial office equipment. In this case, the Owner should provide a note of explanation in paragraph 13, Part III.

9.13 (Paragraph 9.13) This paragraph refers to the incoming selectors associated with trunks from tributary offices. These are usually ordered with the DDD equipment, and if this is the case, a check mark should be placed in paragraph 9.13.

9.14 (Paragraph 9.14) If it is necessary to provide for more than the 10 trunks which can be reached from one selector level, it may be desirable to consider the use of either level hunting selectors or rotary outgoing secondary preselectors.

Most manufacturers can provide this type of selectors, which will search over more than one group of 10 trunks in case the preceding trunks are all busy. The purpose of this arrangement is to increase the efficiency of large trunk groups over that obtainable with a graded multiple for 10 outlet switches. In this case, the CCS capacity of the trunk group should be calculated from the full access trunk table appropriate to the specified probability of loss ($P=.01$, unless otherwise specified). When level hunting selectors are to be provided, an explanation of the details should be given in paragraph 9.14.

9.2 Optional Features for PPCS Operation (Paragraph 9.2)

9.21 (Paragraph 9.21) If facilities for providing immediate printed information on time and charge calls are desired, the Owner should place a check mark in paragraph 9.21. Since this feature is primarily a function of the recording equipment, it is discussed in detail in paragraph 6.32, above. A detailed description of the arrangement desired will have already been placed in paragraph 13, as instructed in paragraph 6.32. However, for the sake of completeness, and since the feature requires the provision of some equipment associated with the position circuits, space is provided in paragraph 9.21 for specifying the feature insofar as it affects the equipment associated with the positions.

9.22 (Paragraph 9.22) Where billing tapes are sent to a connecting company to handle, it will usually be necessary to have the Home Numbering Plan Area (HNPA) code entered on the tape. If this is the case, a check mark should be placed in paragraph 9.22.

9.23 (Paragraph 9.23) Some subscribers may wish to be able to receive telephone calls without charge to the originating party. The assignment of an arbitrary terminating office name (or code), such as "Zenith" or "Enterprise", for the called subscriber's directory number, enables an operator, or the recording and billing equipment, to recognize that the charge for the call should be made to the called party. Details of the rate structure may vary in different areas. More recently, the use of inward WATS service has become popular for this purpose, with the assignment of the area code "800" being used to indicate that the call is to be charged to the called number. A description of the details used in providing this type of service is provided in the current issue of American Telephone and Telegraph Company's "Notes on Distance Dialing" (the "Blue Book"). If any of these services is desired, a check mark should be placed in paragraph 9.23, and a detailed explanation of the desired arrangement given in paragraph 13, Part III.

9.24 (Paragraph 9.24) When facilities for handling DDD calls from coin stations are required, a check should be placed in paragraph 9.24. The details should be discussed and agreed on by the Owner and the various Bidders. These details should be explained in paragraph 13, Part III.

9.25 (Paragraph 9.25) A description of the facilities required for "Notify" service is given in paragraph 3.0620, Part I of the specification. If the feature is required, a check should be placed in paragraph 9.25, and a description of the detailed requirements given in paragraph 13, Part III.

9.26 (Paragraph 9.26) If any key-selected trunks are required from PPCS positions to other points, as discussed in paragraph 3.0624, Part I of the specification, the locations to which such trunks are required should be listed in paragraph 9.26.

9.27 (Paragraph 9.27) When two-way trunks to a supervisor are required, as discussed in paragraph 3.0625, Part I of the specification, a check mark should be placed in paragraph 9.27.

9.28 (Paragraph 9.28) As stated in paragraph 3.0630, Part I of the specification, if the Owner desires to have facilities provided for establishing conference calls, he should discuss this feature with the prospective Bidders, place a check in paragraph 9.28, and explain the details of the arrangement agreed upon in paragraph 13, Part III.

9.29 (Paragraph 9.29) If a training console is required, the Owner should place a check in paragraph 9.29. If there is more than one DDD center in an Owner's area, it is probable that a training console will not be needed in more than one such center.

9.3 Other Miscellaneous Optional Features (Paragraph 9.3)

9.31 (Paragraph 9.31) In some unusual cases it may be desirable to provide facilities so that a CAMA or PPCS operator may handle special service calls initiated by subscribers who are required to dial three digits for various services, instead of or in addition to the "0" customarily dialed for assistance service. In this case, a check should be provided in paragraph 9.31 and the details of the situation and the desired arrangement should be described in paragraph 13, Part III.

9.32 (Paragraph 9.32) When the feature of completing DDD calls from coin stations is not provided (see paragraph 9.24, above), and this function of blocking DDD service to coin stations is not provided in the associated tributaries and the local office in the same building, if any, it will be necessary to provide this

function in the DDD equipment. In this case, a check should be placed in paragraph 9.32, and an explanation of the desired arrangement given in paragraph 13, Part III.

9.33 (Paragraph 9.33) EAS calls should be blocked from the DDD switching equipment unless this equipment is to be arranged to handle EAS traffic on a message rate basis. (See paragraph 3.2021, above.) If EAS calls are to be blocked, and the feature is not provided in the associated tributaries and the local office in the same building, if any, it will be necessary to arrange the DDD equipment to perform this function, and a check should be placed in paragraph 9.33. The combinations of office codes which should be blocked should be listed in the translation chart or paragraph 13.

9.4 Maintenance Facilities (Paragraph 9.4)

9.41 (Paragraph 9.41) As specified in paragraph 3.032, Part I of the specification, any portable test sets usable only for a specific type of DDD equipment will be included by the Bidder in the basic bid unless the Owner indicates it does not require them. This will be the case if the Owner already has portable sets of the required type available in its area. In this case, the Owner should list in paragraph 9.41 the quantity and code numbers of the test sets which should be omitted from the base bid of specific Bidders.

9.42 (Paragraph 9.42) The Owner should list in paragraph 9.42 any other test equipment which it requires. This equipment should be bid as a separate alternate.

10. POWER REQUIREMENTS (PARAGRAPH 10)

10.1 General

10.11 As covered in paragraph 3.101, Part I of the specification, if the DDD equipment is to be provided concurrently with a new local dial office, the power equipment in the office should meet the requirements of REA Form 524. If the DDD equipment is being added to an existing office, it should be arranged to function with the existing power equipment, insofar as is feasible. In any case, the Bidder should ensure that adequate power facilities are included or arranged for in its bid.

10.2 (Paragraph 10.1) If a standby motor generator is provided in the DDD center, and it is arranged so that it can be connected to the DDD equipment without any loss of recorded information in case of commercial power failure, it will not be necessary to provide inverters for this purpose. In this case the Owner should not check paragraph 10.1.

10.3 (Paragraph 10.2) The dc voltage limits should be listed in paragraph 10.2 if an existing power distribution system is to be used for the DDD equipment. The voltage working limits can usually be obtained either from existing circuits or circuit descriptions, or from actual observation of the office voltmeter.

10.4 (Paragraph 10.3) If any additional power equipment will be required for the DDD equipment, or if new power facilities are being provided, the pertinent information should be given in paragraph 10.3 (see paragraph 10.1, above).

11. DISTRIBUTING FRAME REQUIREMENTS (PARAGRAPH 11)

11.1 (Paragraphs 11.1 and 11.2) Paragraph 4.01 of the specification requires that all cabling between the recording equipment and the rest of the office should be brought out to either an intermediate distributing frame (IDF) or a combined distributing frame (CDF). Accordingly, the Owner should indicate by a check mark in paragraph 11.1 which arrangement is required. As stated in paragraph 11.2, the Owner should provide information in paragraph 13, Part III, as to any additional distributing frame terminals which will be required, or any other special distributing frame requirements. If no information is provided in paragraph 13 in regard to distributing frames, it will be assumed that sufficient terminals are already available.

12. BUILDING AND FLOOR PLAN INFORMATION (PARAGRAPH 12)

12.1 (Paragraph 12.1) If the DDD equipment is to be installed in an existing building, paragraph 12.1 should be checked. A detailed plan of the existing building should be attached.

12.2 If a new building is planned, paragraph 12.2 should be checked, and a sketch of the tentative building plan attached. Dimensions need not be included, but all available detailed information should be given as to any size and/or shape restrictions which may apply due to lot size, lot location or any other reasons, and also as to any other restrictions, such as floor loading limitations, for instance.

12.3 Detailed Arrangements (Paragraph 12.3)

12.31 Partition (Paragraph 12.31)

12.311 Some operating companies provide partitions to isolate the switching equipment from the MDF, the power equipment and other equipment to which frequent access is required. (Of course, any operating positions required will always be in a separate room.) Partitions of this type keep much of the dust and dirt from the switching equipment and tend to reduce maintenance effort. If any partitions of this type are to be provided, the

Owner should place a check mark in paragraph 12.31 and describe the desired arrangement in the space provided.

12.32 Vestibule (Paragraph 12.32)

12.321 Some companies provide a vestibule to prevent dust and dirt from being blown or tracked into the equipment room. If a vestibule is to be provided, the Owner should place a check mark in paragraph 12.32.

12.33 Cable Entrance (Paragraph 12.33)

12.331 The appropriate blank should be checked in paragraph 12.33 to indicate whether the cable entrance is overhead or underground. This will assist the Bidder in arranging the floor plan.

12.34 Additional Space (Paragraph 12.34)

12.341 Any floor space which may be required for carrier, repeater, or any other equipment not furnished by the Bidder should be listed in paragraph 12.34. The connecting company requirements are readily available from a properly executed REA Form 810.

13. EXPLANATORY NOTES

13.1 Special arrangements of wiring or equipment not covered in Parts I or III of the specification, but desired in some special situations, should be specifically described under paragraph 13, Part III.

13.2 Any carrier equipment, voice frequency repeaters, standby power plants or other equipment not included by the Bidder in its basic bid should be purchased under a separate special equipment contract. This equipment should not be included in the "REA Specification for Equipment for Direct Distance Dialing."

13.3 Any of the preceding paragraphs of this Application Guide which require further explanation should be covered in paragraph 13.

13.4 A copy of Part IV, REA Form 538d, should be enclosed with each Part III sent to a manufacturer with a request for a bid. This Part IV should be filled in by each Bidder and returned with its bid.

