AUTOMATIC CALL DISTRIBUTION

SOFTWARE SUBSYSTEM DESCRIPTION

2-WIRE NO. 1/1A ELECTRONIC SWITCHING SYSTEM

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1. GENERAL

INTRODUCTION

1.01 Automatic call distribution (ACD) systems are used to concentrate, queue, and uniformly distribute incoming calls to trained personnel called agents. The ACD system provides order-of-arrival service to incoming traffic, distributes the traffic equitably among the agents, maximizes attendant efficiency, and minimizes delays to the calling population.

1.02 When this section is reissued, the reason for reissue will be given in this paragraph.

1.03 Part 12 of this section provides a defined list of abbreviations and acronyms as used herein.

PURPOSE OF THE ACD SOFTWARE

1.04 The ACD software provides a centralized Stored Program Control System (SPCS) which controls the flow of traffic to the agent, by queuing and evenly distributing the incoming traffic.

SCOPE OF SECTION

1.05 This section provides an introduction to the ACD software operating in a No. 1/1A Electronic Switching System (ESS). Information unique to specific system applications (No. 1 or No. 1A) is so noted.

1.06 This section is based on the 1E7 (No. 1 ESS) and 1AE7 (No. 1A ESS) versions of the generic program. However, most of the ACD features were introduced in the CTX-8 (No. 1 ESS) and 1AE4 (No. 1A ESS) versions of the generic program.

2. ACD FUNCTIONAL DESCRIPTION

GENERAL

2.01 The ACD system is provided to optimize the call handling performance of the business customer with a large volume of incoming calls. It provides the capability to efficiently route incoming calls to a customer agent (at one or more locations) through functional groups (FGs) utilizing multiline hunting and interflow and intraflow queuing, if necessary, to minimum call delays. At the same time, it furnishes continuous traffic and performance data on visual and digital readouts and TTY printouts if desired. In automatic call distribution phase 1 (ACD1), the customer can control the composition of FGs, load compensating packages (LCPs), and reporting group packages (RGPs) by using the 90A CPS station. In ACD phase 2 (ACD2) the customer can control the composition of FGs and load compensating packages (LCPs) by using the video display and control station (VDCS). The VDCS may also be used to interrogate the ESS memory for the stored information concerning that ACD data accumulation group (DAG).

2.02 In the ACD offering, the agent lines function both as incoming ACD lines and extensions, thus providing a unified approach to ACD-ESS service. In phase 1 ACD-ESS service the No. 1 ESS is the combined ACD/centrex vehicle which provides access to customer leased communications facilities as well as to the DDD network. Figure 1 illustrates ACD-ESS service. The No. 1/1A ESS is the ACD vehicle which provides shared access to customer facilities as well as to the DDD network. With this arrangement, there is no need for multiple trunk groups or transfer trunks and, if local or INWATS trunks are provided, they are provided via a simulated facilities group instead of physical facilities.

2.03 The equipment associated with the ACD1 system located on the customer premises is listed below and illustrated in Fig. 2:

(a) 60A customer premises system (CPS) interface cabinet (J59205)

(b) Agent console (500A1) (maximum 72, including supervisors, per 60A)

(c) Supervisor console (500A1)

(d) Agent status console (103A1)

(e) Selector console (8A1)

(f) Call waiting indicator (BEEHIVE)

(g) 90A CPS (optional) (15 maximum per customer)

   (1) Inquiry and display station (102A1-B)

   (2) Printer

   (3) Controller (79A1)

(h) 90B CPS (optional)

   (1) Traffic display console (102B1-A)

   (2) Controller (79B1)

(i) Teletypewriter (optional) (3 channels maximum per central office).

2.04 The equipment associated with the ACD2 system located on the customer premises is listed below and illustrated in Fig. 3:

(a) 60B customer premises system (CPS) interface cabinet (J59207)

(b) Agent console (600-A) (maximum 50, including supervisors, per 60B)

(c) Supervisor console (600-A)

(d) Agent status console (106A1-A)

(e) Selector console (106A1-A)

(f) Call waiting indicator (BEEHIVE)

(g) Video display and control station (VDCS)

(h) Agent status and traffic station (ASTS)

(i) ACD-ESS Management Information System (AEMIS)

2.05 The ACD system utilizes the following features to perform its function:

(a) ACD uniform call distribution

(b) Functional groups

(c) Reporting groups (ACD1 only)

(d) Queuing (order-of-arrival and priority)

(e) Alternate server intraflow/interflow

(f) Alternate queuing intraflow (ACD1 only)

(g) Control of outgoing mode for 2-way trunks.

2.06 Refer to Section 231-090-334 (ACD1) and Section 231-090-399 (ACD2) for a complete description of the operating hardware and system features.

3. ACD FEATURE PACKAGES

3.01 Table A provides a list of feature groups (including core) and their associated feature packages required to implement the ACD phase 1 feature in No. 1/1A ESS.

3.02 Table B provides a list of feature groups (including core) and their associated feature packages required to implement the ACD phase 2 feature in No. 1/1A ESS.

3.03 The feature packages involved in the ACD1 and ACD2 features are located among a large number of PIDENTs. The base generic for the ACD feature contains basic centrex feature packages plus feature packages that include queuing for trunks and lines (QTL).

4. ACD MULTILINE HUNT GROUP FEATURE

4.01 The ACD multiline hunt group (MLHG) equitably distributes an ACD customer's incoming traffic among agents. Figure 4 and 5 show the ACD feature flowchart for ACD1 and ACD2 respectively. It also provides the capability of controlling the distribution of traffic and adjusting the agent assignments according to traffic load. Assigned agents are arranged in FGs (2 through 31) based on the type of calls to be handled. The calls are routed to the FGs based on the listed directory number (LDN). Each assigned FG must be assigned a queue on which will hold incoming calls and connect them (in the same sequence as received) to agents as they become available. To accomplish this, a block of call store is designated as a mask block for each FG to overlay the MLHG activity block (the agent not assigned to the group is masked out with zeros).

4.02 ACD2 is an improved service over ACD1 as seen by comparing Fig. 4 and 5. The ACD2 of-fering has a night service feature which will either route an incoming call to a night directory number or place it on a queue if night service is not operating. ACD2 also has a delay announcement feature which will route an incoming call to give a delay announcement or the call path will continue and select the idle facility which will give the best grade of service. There are three types of facilities which may be employed:

(1) Agent in primary functional group

(2) Agent in alternate functional group

(3) Trunk in outgoing trunk group (interflow).

If the facility is a trunk, an outgoing facility will be seized; otherwise, the call path will proceed similar to an ACD1 incoming call.

4.03 The customer may have the ability to reassign individual agents or various predetermined groupings of agents by the use of the 90A CPS for ACD1 or by the use of VDCS for ACD2. The predetermined groupings are known as load compensating packages (LCPs) (Fig. 6) and there may be 1 through 8 LCPs in each data accumulation group (DAG). Within each LCP, each agent console must be assigned to one and only one FG.

4.04 The reporting group packages (RGPs) (Fig. 7) furnish performance data on the agent console for the ACD1 service. These packages have similar translations as LCPs but do not affect the MLHG configuration for call handling. Each agent may be assigned to a maximum of four reporting groups (RGs) or to none.

5. ACD QUEUING FEATURE

A. General

5.01 The queuing feature permits the incoming calls to an ACD customer to be placed on queue and connected in proper sequence to an agent (Fig. 8). If the ACD customer has more than one queue, alternate routing (within a central office [CO]) among the FGs may be accomplished by alternate server intraflow (ASI) for both ACD1 and ACD2 or alternate queuing intraflow (AQI) for ACD1 only. Interflow (between different COs) may be accomplished similarly (Fig. 9). It is possible to assign a priority status to specific LDNs which will permit these

TABLE A

**ACD PROGRAM STORE MEMORY
FOR FEATURE LOADED GENERIC PROGRAM IN NO. 1/1A ESS**

FEATURE GROUP		NO.	ACRONYM	FEATURE PACKAGE	NO. 1 PACKAGE WORDS	NO. 1 CODE WORDS	NO. 1A CODE WORDS
FIXED	Base Generic (Core)	3	CCAD*	Customer Changeable Speed Calling	960	894	1,222
		9	CTX*	Basic Centrex	10,368	10,261	14,233
		15	CXIX*	Centrex Tandem Tie Line	1,600	1,489	3,028
		16	HCTX*	Centrex 1B/2B Console	9,856	9,751	14,081
		35	SATT*	Centrex Satellite	896	793	1,103
		37	BQTL*	Basic QTL Queuing and Line Termination	2,688	2,572	3,795
		42	CQFX*	QTL Incoming FX Call Queuing	320	242	362
		44	QDAN*	ATL Delay Announcement	1,216	1,092	1,704
CONDITIONAL	ACD1	6	ACDT	Customer Data Collection	1,024	903	1,120
		4	ACD*	Automatic Call Distribution	2,432	2,118	3,008
		27	SIG*	TOUCH-TONE Key Signaling	320	226	327
		38	BAQI*	Basic AQI Intraflow for QTL	192	87	117
		39	BASI*	Basic ASI Intraflow for QTL	512	397	584
		40	BQNS*	Basic QTL Queuing Night Transfer	256	174	246
		41	BTRK*	Basic Intraflow QTL Trunk Termination Code	1,664	1,534	2,155
		43	GINF*	General Intraflow Logic for QTL	576	429	580
		45	QPRI*	Priority QTL Queuing	192	110	154
	IRES	19	IRES	Inquiry and Response System	4,480	4,381	5,929
	CTRF	12	CTRF	Customer Traffic Data	2,048	1,916	2,624
		24	OPSW	Outpulsing Switching Routines	192	118	139

Note 1: The arithmetic difference between package words and code words is patch space.

Note 2: Each feature package contains two words of overhead that define the package name and size.

* Feature packages are shared between two or more feature groups.

calls to be entered in front of routine calls on the queue. An abandoned call check is performed on FX and centrex tie trunks to prevent a vacant trunk from being connected to an attendant. Night calls are directed to night directory numbers (DNs) controlled from the supervisor console.

B. Alternate Routing

Alternate Server Intraflow/Interflow (ASI)

5.02 When the initial queue is in a poor service state and an alternate queue has an agent available, ASI will provide the ability to route an incoming call for one queue to an agent in another queue (Fig. 8, 10, and 11). The alternate server pool has a maximum of 32 (0 through 31) queues but only 31 will be available to assist an overload queue.

Alternate Queuing Intraflow (AQI)

5.03 Alternate queuing intraflow (AQI), which is an ACD1 offering only, will provide the ability to route an incoming call from one queue to a different queue when the initial queue is in an overload or poor service state and an alternate queue has an

TABLE B

**ACD2 PROGRAM STORE MEMORY FOR
FEATURE LOADED GENERIC PROGRAM NO. 1/1A ESS**

			FEATURE PACKAGE		NO. 1		NO. 1A
	GROUP FEATURE	NO.	ACRONYM		PACKAGE WORDS	CODE WORDS	CODE WORDS
FIXED	Base Generic (9SB4) (Core)	3	CCAD*	Customer Changeable Speed Calling	960	894	1,222
		9	CTX*	Basic Centrex	10,368	10,261	14,233
		15	CX1X*	Centrex Tandem Tie Line	1,600	1,489	2,028
		16	HCTX*	Centrex 1B/2B Console	9,856	9,751	14,081
		35	SATT*	Centrex Satellite	896	793	1,103
		37	BQTL*	Basic QTL Queuing and Line Termination	2,688	2,572	3,795
		42	CQFX*	QTL Incoming FX Call Queuing	320	242	362
		44	QDAN*	QTL Delay Announcement	1,216	1,092	1,704
CONDITIONAL	ACD2	4	ACD*	Automatic Call Distribution	2,432	2,118	3,008
		27	SIG*	TOUCH-TONE Key Signaling	320	226	327
		39	BASI*	Basic ASI Intra/Interflow for QTL Customers	512	397	584
		40	BQNS*	Basic QTL Queuing Night Transfer Service	256	174	246
		41	BTRK*	Basic Intraflow QTL Trunk Termination Code	1,664	1,534	2,155
		43	GINF*	General Intra/Interflow Logic for QTL Customers	576	429	580
		45	QPRI*	Priority QTL Queuing	192	110	154
		48	DDDT*	Direct Distance Dialing Terminations	256	139	203
		49	MIS1	Management Information System	2,368	2,266	2,833
		50	ACD2	Automatic Call Distribution Phase 2	3,584	3,410	4,263
	DLIO	54	DLIO	Data Link Input/Output	6,784	5,542	8,953
	DLSO	95	DLSO	Data Link Sequencing	1,728	1,584	1,980
	IRES	19	IRES	Inquiry and Response System	4,480	4,381	5,929
	CRAF	53	CRAF	Common Systems Recorded Announcement Frame	3,392	3,205	4,059
	RCXI	86	RCXI*	Recent Change Digit Interpreter	320	201	252

Note 1: In 1AE4, code words are the same as package words; feature packages share a common patch space.

Note 2: The code words shown for feature package 48 and 50 are approximations and may be subject to change.

* Feature packages are shared between two or more feature groups.

agent available (Fig. 8 and 12). In the alternate queuing sequence (AQS), there is a maximum of four alternate queues which may be provided to assist an overload queue.

C. Priority Calling

5.04 The call processing for a priority call is illustrated in Fig. 13. Priority calling offers the ability to assign priority status to specific calls made to or within a centrex multiline hunt group (MLHG) for queuing purposes. There are two methods of establishing priority status:

(1) An LDN for an MLHG may be designated as a priority line for queuing.

(2) A member of a centrex complex (master centrex group) may be designated as a priority line for queuing.

D. Abandoned Call Check

5.05 The abandoned call check is required only for trunks from electromechanical central offices which do not give an on-hook signal to the called line after answer. The abandoned call check prevents an open line from being connected to an agent which could cause confusion or an error in the trouble line report. Figure 14 contains the flow diagram for the abandoned call check feature.

E. Night Transfer Service

5.06 The night transfer service permits a queue to reroute its incoming calls to another customer location by the use of a night directory number. All calls to that FG will then be forwarded to (1) another FG, (2) another ACD, or (3) to a group of telephones as predesignated by the ACD customer. The Local Night key on the supervisory console controls this feature. Figure 15 shows the flow diagram for the night service feature.

6. ACD ZIP TONE AND ANNOUNCEMENT FEATURES

A. General

6.01 Zip tone (ZIP) and the city-of-origin announcement (COA) are features which aid the agent in servicing incoming calls. The delay announcement (DA) notifies the calling line of the circumstances of termination at that time.

B. Zip Tone Announcement

6.02 Zip tone is used to alert the agent that an incoming call is being terminated to that console. The zip tone consists of a 500 ± 100 millisecond burst of 480 Hz tone. The only difference between zip tone for ACD1 and zip tone for ACD2 is that in the ACD2 service if the customer has the zip tone feature and the incoming call was intraflowed or interflowed a stutter zip tone is applied to the agent line instead of the regular zip tone burst.

C. City-of-Origin Announcement

6.03 The city-of-origin (COA) announcement flowchart, which is illustrated in Fig. 16, provides a recorded identification of the incoming line being terminated to that console immediately following the zip tone, if provided. The agent may recall the COA during the call by depressing the console Call ID key.

D. Delay Announcement

6.04 The delay announcement (DA) feature provides recorded announcements (1 through 4) to an incoming call if the call is delayed in connecting to an agent. Figure 17 illustrates the flow diagram of the delay announcement feature. The content of the announcement is specified by the ACD customer. The customer can choose the interval between announcements (6 through 42 seconds), and the sequence of the announcements. Three additional features are also available with the delay announcement.

(a) Special tone feature provides either music or silence to the calling party after the first delay announcement rather than the normal audible ringing.

(b) Service after delay announcement (SADA) is a feature for the night service, which will give a complete announcement, even if the night number is idle. ACD2 differs in that if the trunk is a (SD-1A221) "Q" option trunk it will open the delay announcement cut-through and bypass the trunk for audible (Fig. 18).

(c) Flexible first delay announcement, available with ACD2 only, permits the use of either of two recorded first announcements depending on the projected delay in termination.

7. CUSTOMER TRAFFIC REPORT FEATURE (CTRF)

A. General

7.01 The selected traffic data to customer feature (CTRF), available only with ACD1, collects and reports traffic counts related to a customer's agents, trunk groups, simulated facilities groups, and other miscellaneous counts for the ACD data group (DAG). These counts are gathered at the ESS central office and are transmitted to the customer premises where they are printed out via a TTY or displayed.

7.02 As part of the CTRF feature, the nonusage trunk scan (NUTS) and the locked-up trunk scan (LUTS) service is provided to check the usage of certain trunks during a 2-hour time period.

7.03 The CTRF feature can be used with an ACD-ESS or centrex customers.

B. 90B-CPS Dynamic Traffic Display Console

7.04 The 90B-CPS dynamic traffic display console provides an ACD customer with the CTRF feature five preselected 3-digit traffic counts. Figure 19 illustrates the feature flow for the 90B-CPS dynamic traffic display when feature CTRF is loaded. This feature will update the traffic counts which are sent from the ESS to the customer premises every 100 seconds over a dedicated trunk.

C. Teletypewriters

7.05 Teletypewriters, located on customer premises, are connected over a dedicated path to TTY channels in the central office. These TTYs output both traffic count data and NUTS data. The feature flow diagram for the CTRF TTY feature and the NUTS/LUTS service is given in Fig. 20. The CTRF feature has three TTY channels reserved for the use of CTRF customers. One customer may have two blocks of counts which are to be printed at different rates. One channel may be for this purpose. For example, one report scheduled every half hour and another report every 8 hours may both be printed using the same TTY channel.

D. Nonusage Trunk Scan (NUTS) and Locked-Up Trunk Scan (LUTS) Service

7.06 In this service every 10 seconds a program is entered to scan each trunk to determine if it

is idle, busy, or on the high and wet (maintenance busy list). Once a previously idle trunk is found busy, it is no longer scanned until the next collection period. Every two hours, beginning at 12:15 a.m., this information is used to generate a list of trunks which were not used or were locked on the high and wet list for the entire 2-hour period. If the customer requests this information, it is formatted and sent to the customer's terminal. The list includes the trunk group number and member ID of the trunk on the list. LUTS entries are marked with an asterisk.

8. PROCON DATA BASE UPDATE (PRDU)

8.01 The PROCON was introduced as a customer premises (CU) agent console controller for No. 1/1A ESS ACD2 offering. The PROCON is a small general purpose programmable controller to provide the sequencing and control functions for various types of electronic and electromechanical equipment. The PROCON data base update defines the PROCON: (1) The type of electronic hardware connected to its interface ports, and (2) which interface ports are equipped. The data included in the PROCON data base update is:

(a) Special hardware ports

(b) Agent ports and type of agent console

(c) Fixed lamp agent status display ports

(d) Functional group/call type display index and display codes

(e) Supervisor call-waiting ports and type of supervisor console.

Each of the five previously listed categories is a software routine in the PROCON Data Base Update (PRDU) program. PRDU uses the 1-second entries provided by the block data link loading functions of the centrex data link to format and load data link orders. The PRDU program will not function unless the DLIO feature package is loaded, because it has the block data link loading capability. A feature flow diagram giving the functional operation of the PROCON data base is illustrated in Fig. 21.

9. ACD-ESS MANAGEMENT INFORMATION SYSTEM (AEMIS) DATA BASE (MSDU)

A. General

9.01 The ACD-ESS Management Information System (AEMIS) (available with ACD2 only) is a

minicomputer-controlled system designed to measure and analyze agent/traffic data and provide detailed agent/traffic information, performance calculations, summarize past history, and short-term forecasts to the ACD manager. To perform all of the AEMIS functions, a data base of the necessary data (describing the ACD) has to be established for the AEMIS by the No. 1/1A ESS. This is accomplished by the management information data base update program (MSDU) via a centrex data link (Fig. 22). MSDU uses the 1-second entries provided by the block data link loading function of the centrex data link (DLIO) feature (refer to Part 10 of this Section) to format and load the data link orders. System configuration and control requires the inquiry-response system (IRES) feature; therefore, the IRES feature must be loaded for the AEMIS feature. The necessary data for the AEMIS data base includes: (a) time of day; (b) the AEMIS trunk groups and associated TNNs; (c) the facilities; (d) the queue data; (e) the agent-to functional group assignments for each LCP and the active LCP; (f) the four 4-digit extension assigned to each agent terminal.

(1) **Time of Day:** The time-of-day function gives the AEMIS a snapshot of the ESS real-time clock. The time sent to the AEMIS is the year, month, date, hours, minutes, and seconds. The AEMIS resets the PDP*-11 clock to equal this time. See Fig. 23 for AEMIS data link message formats.

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(2) **Call Store Configuration:** The call store configuration function provides the AEMIS with a snapshot of the ACD changeable data, namely, the active LCP, the functional group (FG) patterns of the active LCP, and the queue data. The active LCP is the current invoked LCP. The FG patterns are the FG patterns of the active LCP plus any changes made by the ACD customer. The queue data is the interflow threshold, primary outflow threshold, and the secondary outflow threshold; if the night director number (DN) is call forwarded, the forwarded DN is also sent; if not forwarded, all zeros are sent.

(3) **Initialization or Program Store Refresh:** Both the initialization and the program store refresh functions send the same data to the AEMIS. The distinction is the rate at which the data link orders can be loaded into the data

link output buffer. For the initialization request, the maximum rate is 20 data link orders per 1-second entry; whereas the maximum rate for the program refresh is 10 data link orders per 1-second entry. The data that is sent to the AEMIS for either function is:

(a) All the trunk network numbers for each trunk group number associated with the AEMIS.

(b) All of the rows of data for each functional group for all of the LCPs in the data group associated with the ACD.

(c) The number of simulated facilities for each simulated facility group associated with the AEMIS.

(d) All of the agent terminals in the data group and their 4-digit extension number associated with the ACD.

(e) The inflow threshold, call waiting lamp threshold, primary outflow threshold A, primary threshold B, primary alternate server pool number, secondary alternate server pool number, queue size, number of queue registers, inflow queue indicator, functional group number associated with this queue, directory number of this queue, base night directory number of this queue, and the primary alternate server pool.

The AEMIS can also request a subset of the initialization or program store refresh data. That is, any of the individual blocks of initialization or program refresh data can be requested separately.

9.02 When interrogation requests are received by ESS, appropriate data is sent to the AEMIS to satisfy these requests. This data may include a copy of the current program store data and a call store configuration or some subset of this program store (Fig. 23).

9.03 In addition to sending the AEMIS data to satisfy the interrogation requests, the ESS sends a continuous stream of messages describing the call processing activity of the ACD customer. In order to report events to the AEMIS minicomputer, the ESS keeps a record of each incoming or outgoing call over customer trunking facilities and simulated facilities

group. The ESS also keeps track of calls terminated to and originated from the agent consoles in order to maintain a record of the agent console state.

9.04 The AEMIS messages themselves may consist of one or two 24-bit words: 23 data bits, and one parity bit. The bits are numbered from right to left (0 through 23). Bit 23 is the parity bit. Bit 22 is a maintenance bit. When the maintenance bit is zero, this indicates an ESS maintenance request. When bit 22 is a one, the data link message contains AEMIS data.

9.05 Bits 21 through 17 in single word messages contain the operation code (SOP). Bits 21 through 17 in the first word of a double word message are always set to "11101." The operation code (DOP) is contained in bits 16 through 13. Bits 17 through 21 of the second word of a double word message are always set to "11111" as an indicator that this is the last word of a double word message. The individual SOP and DOP code messages are listed in Fig. 23.

B. Call Processing

9.06 A series of call processing AEMIS messages are generated whenever an ACD simulated facility or a dedicated ACD-ESS trunk becomes involved in a call (Fig. 23).

9.07 The sequence of facility messages that are sent to the AEMIS is essentially identical whether a simulated facility or a trunk is used. The messages sent to AEMIS are as follows:

(a) Facility seizure message (SOP2 for trunks, DOP1 for simulated facilities)

(b) Facility queued (DOP2)

(c) Facility dequeued (SOP3)

(d) Facility connected (DOP0)

(e) Facility idle (SOP4).

9.08 As indicated in (a) above, the facility seizure messages are unique for trunks and simulated facilities as shown below:

(a) Bit 16 of the SOP2 message is 0 for incoming trunks and 1 for outgoing trunks. When a trunk is seized and becomes traffic busy, the SOP2

message must be sent. The only exception to this is trunk seizures for a RADR test. No message is sent on a RADR seizure.

(b) Bit 16 of the second word of the DOP1 has the same function for simulated facilities.

9.09 In all facility messages a constant identifier, the facility number field (bits 14 through 0), is used throughout the call as a tag. When the facility is a trunk, the facility number field contains a TNN; bit 15 is 0 to indicate a trunk.

9.10 When a simulated facility is involved, the facility number field contains a simulated facility register address (bits 2 through 0 of the address is truncated in bits 14 through 0). Bit 15 is 1 to differentiate a simulated facility from a trunk. In addition, bit 14 of the facility number is always 1 to differentiate a simulated facility register from a queuing register (Fig. 23).

9.11 In addition to the call processing facility messages, AEMIS messages are sent for various trunk maintenance states. These states may be initiated either via the TTY, the trunk and line test panel, or as a result of a hardware failure during call processing. The AEMIS maintenance messages listed below are detailed in Fig. 23:

(a) Trunk disabled (SOP5)

(b) Trunk high and wet (SOP6)

(c) Trunk locked out (SOP11)

(d) Trunk active-in-service (SOP12)

(e) Trunk make busy (TMB) or carrier group alarm (CGA)-(SOP7).

10. DATA LINK INPUT/OUTPUT AND SEQUENCING FEATURES (DLIO/DLSQ)

INTRODUCTION

10.01 The data link input/output (DLIO) feature provides a software interface between the data link, call processing, and maintenance programs. The data link sequencing (DLSQ) feature maintains the integrity of the ACD2 AEMIS by ensuring that messages sent from the ESS to the AEMIS minicomputer over multiple data links arrive in the correct time sequence.

10.02 The DLIO feature performs data link loading procedures which allow the following functions:

(a) Multiple word data link orders

(b) Increased buffering and multiple data links to one destination

(c) Data link unloading procedure, which provide for multiple data link types

(d) An interface for providing CPS functions over a data link

(e) Maintenance diagnostic and audit changes to interface with new loading and unloading procedures

(f) Ability to load a large block of data link orders at a regulated rate.

10.03 In ACD2 the DLIO feature can accommodate the connection of more than one centrex data link between the AEMIS minicomputer and the CPS. Therefore, feature DLSQ will be loaded for sequencing in addition to the DLIO feature.

SOFTWARE COMPONENTS

10.04 The DLIO feature package software consists of the following components:

(a) Audits (PIDENTs SAIO, DLGC): These programs build the call store output buffers and related pointers, and periodically verify the integrity of the buffer structure.

(b) Buffer Loading Subroutines (PIDENT DLLD): This is a set of subroutines that will load one, two, or a multiple number of data link orders into an output buffer.

(c) Block Loading Routines (PIDENT DLLD): This is a set of routines that are used when a client needs to transmit a very large block of data link orders. One-second main program entries will continue loading small groups of orders until the entire block has been outputted.

(d) Input Analysis (PIDENT CXKY): This routine routes input data link orders to the proper application processing routine. PIDENT CXKY

processes centrex console key signals, ISIG processes ACD console key signals, and CRTC processes CRT related messages.

(e) Input/Output (I/O) (PIDENTs SPCX, CXIO): These routines unload the output buffers and control the transmission of data link orders (DLOs) on the data link hardware. Also these routines monitor the data link circuit for arrival of input data link orders, and load the input DLOs into the centrex key hopper.

(f) Maintenance (PIDENTs CXMS, CXMA, CXDX): The new DLIO data structures and new customer premises hardware require changes to maintenance control for removing data links from service, and diagnosing the data links.

(g) CRT Control (PIDENT CRTC): The control of transmitting and receiving messages from the customer premises CRT used in ACD2 is included in the DLIO feature package. This PIDENT will be moved from feature package DLIO to feature package ACD2 for 1E6 (No. 1 ESS) and 1AE6 (No. 1A ESS) and later generic programs.

11. TRANSLATORS

11.01 Each particular feature in the ACD service has a different type of translation block. The flow diagram for building ACD1 and ACD2 translation blocks is illustrated in Fig. 24 and 25 respectively. For further details on a particular transition block, refer to Part 13 of this section for that particular Feature Document.

12. ABBREVIATIONS AND ACRONYMS

12.01 The following abbreviations and acronyms are used within this document.

ACD	Automatic Call Distribution
ACD1	Automatic Call Distribution Phase 1
ACD2	Automatic Call Distribution Phase 2
AEMIS	ACD-ESS Management Information System
AQI	Alternate Queuing Intraflow
AQS	Alternate Queuing Sequencing

ASI	Alternate Server Intraflow and Interflow
ASTS	Agent Status and Traffic Station
CGA	Carrier Group Alarm
CO	Central Office
COA	City-of-Origin Announcement
CPS	Customer Premises System
CTRF	Customer Traffic Report Feature
CTX	Centrex
DA	Delay Announcement
DAG	Data Accumulation Group
DDD	Direct Distance Dialing
DLIO	Data Link Input/Output
DLO	Data Link Orders
DLSQ	Data Link Sequencing
DN	Directory Number
DOP	Double Operation Code
ESS	Electronic Switching System
FG	Functional Group
INWATS	Inward Wide Area Telephone System
IRES	Inquiry-Response System
LCP	Load Compensating Package
LDN	Listed Directory Number
LUTS	Locked-Up Trunk Scan
MLHG	Multiline Hunt Group
MSDU	Management Information Data Base Update
NUTS	Nonusage Trunk Scan

PRDU	PROCON Data Base Update
QTL	Queuing for Trunks and Lines
RG	Reporting Group
RGP	Reporting Group Packages
SADA	Service After Delay Announcement
SOP	Single Operation Code
SPCS	Stored Program Controlled System
TMB	Trunk Make Busy
TNN	Trunk Network Number
VDCS	Video Display and Control Station

13. REFERENCES

13.01 The following documentation contains information pertaining to or affected by features in this document.

OFFICIAL DOCUMENTATION

A. Bell System Practices

(1) Section 231-061-050—Service Features, Network Design, No. 1 Electronic Switching System

(2) Section 231-061-450—Program Store, Network Design, No. 1 Electronic Switching System

(3) Section 231-061-510—Centrex, Network Design, No. 1 Electronic Switching System

(4) Section 231-062-050—Service Features, Network Design, No. 1A Electronic Switching System

(5) Section 231-062-460—Processor Community Engineering, Program Stores, No. 1A Electronic Switching System

(6) Section 231-062-510—Centrex, Network Design, No. 1A Electronic Switching System

(7) Section 231-090-082—Calls Waiting Lamps—2-Wire No. 1 and No. 1A Electronic Switching Systems (Changes planned)

(8) Section 231-090-123—Delay Announcement—2-Wire No. 1 and No. 1A Electronic Switching Systems

(9) Section 231-090-334—Automatic Call Distribution Feature Phase 1 Description—2-Wire No. 1 and No. 1A Electronic Switching Systems (When published)

(10) Section 231-090-336—ACD Multiline Group Hunt—2-Wire No. 1 and No. 1A Electronic Switching Systems

(11) Section 231-090-337—ACD Interface With 60A and 60B Customer Premises Systems—2-Wire No. 1 and No. 1A Electronic Switching Systems

(12) Section 231-090-338—Tones and Announcements to Agents—2-Wire No. 1 and No. 1A Electronic Switching Systems

(13) Section 231-090-339—ACD Queuing and Call Distribution to Agents—2-Wire No. 1 and No. 1A Electronic Switching Systems

(14) Section 231-090-411—Interface with Common Systems Recorded Announcement Frame—2-Wire No. 1 and No. 1A Electronic Switching Systems

(15) Section 231-090-412—Basic Data Link Input/Output Control—2-Wire No. 1 and No. 1A Electronic Switching Systems

(16) Section 231-090-413—Interface With ACD-ESS Management Information System (AEMIS)— 2-Wire No. 1 and No. 1A Electronic Switching Systems

(17) Section 231-090-414—ACD Interface With 90A CPS and Coordinator CRT Terminal—2-Wire No. 1 and No. 1A Electronic Switching Systems

(18) Section 231-118-331—Centrex CO RC Procedures for CTXCB, CTXDI, CTXEXR, CXDICH, DITABS, DLG, FLXDG, FLXRD, and FLXRS (CTX-6 Through 1E5 Generic Programs)

(19) Section 231-118-335—Line RC Procedures for LINE, TWOPTY, MPTY, SCLIST, MLHG, ACT, and CFV (CTX-7 Through 1E5 Generic Programs)

(20) Section 231-118-339—Overall Procedures for Implementing Automatic Call Distribution ACD Phase 2

(21) Section 533-205-000—60B-Customer Premises System Installation and Maintenance

(22) Section 533-205-100—Phase 2 ACD-ESS, 60B-Customer Premises System, Theory of Operation Descriptive Information

(23) Section 533-210-100—Phase 2 ACD-ESS, Management Information System, General Description

(24) Section 533-320-000—ACD-ESS Management Information System Installation and Maintenance

(25) Section 966-102-100—Centrex-CO Service General Description (Changes planned)

B. General Letters

(1) GL 74-11-227—ACD Service From No. 1 ESS Status Report

(2) GL 75-06-165—ACD-ESS Planning Information, Phase 2

(3) GL 77-01-004—Phase 2 ACD/ESS System Description

(4) GL 77-11-220—Type C (Phase 2) ACD-ESS Pricing and Traffic Guidelines
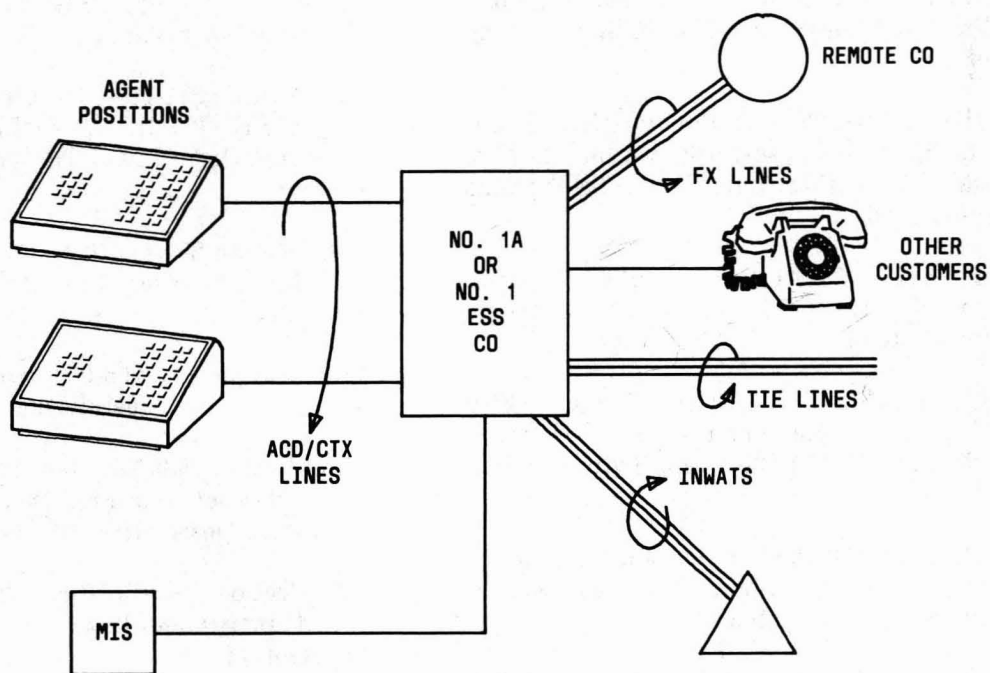
C. Other Documentation

(1) Translation Guide

Fig. 1—ACD ESS Service