
Meridian 1

Centralized Attendant Service

Description and engineering

Document Number: 553-2681-100

Document Release: Standard 5.00

Date: August 1996

© 1979, 1996

All rights reserved

Printed in the United States of America

Information is subject to change without notice. Northern Telecom reserves the right to make changes in design or components as progress in engineering and manufacturing may warrant. This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC rules, and the radio interference regulations of Industry Canada. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

SL-1 and Meridian 1 are trademarks of Northern Telecom.

Revision history

August 1996

Standard, Release 5.00. Reissued for X11 Release 22.0x.

December 1994

Standard, Release 4.00. Reissued to include editorial changes and indexing. Due to the extent of the changes, revision bars are not used.

December 1992

Standard, Release 3.00. This document is reissued to include technical content updates. Revision bars are omitted.

December 1991

Standard, Release 2.00. This document is reissued to include technical content updates. Due to the extent of changes, revision bars are omitted.

December 1990

Standard, Release 1.00. Reissued for compliance with Northern Telecom standard 164.0.

Contents

Feature description	1
Feature packaging	3
Feature interactions	3
Call Waiting Indication	7
Camp-On	7
Conference	8
Coordinated Dialing Plan	8
Departmental Directory Number	8
Dial “0” calls	8
Directory Number Expansion	8
Flexible Attendant Directory Number	9
Listed Directory Number calls	9
Message Registration	10
Night Service	10
Property Management System	11
Recorded Overflow Announcement	11
Remote Peripheral Equipment	11
Room Status	11
Silent Hold	11
Station Category Indication	12
Timed Reminder Recall	12
Transfer to Attendant	14
Trunk Group Busy Indication	14
Equipment specification and operation	15
Tone and Digit Switch cards	15

Release Link Trunk	16
QPC250 Release Link Trunk specifications	17
Operation at the Remote site	17
Operation at the Main site	19
Installation and connections	22
Engineering information	25
Memory and real-time requirements	25
Traffic measurements	25
Trunks (TFC002)	25
Queue (TFC003)	26
Console (TFC004)	27
Calculating the number of RLT circuits	28
Calculating the number of CAS attendants	30
Implementation and operation	47
Feature implementation	47
CAS Main	47
CAS Remote	50
Operation	53
Main operation	53
Remote operation	53
Testing	54

List of figures

Figure 1		
Typical CAS configuration	2	
Figure 2		
QPC250 RLT cross-connections to QPC70 CO trunk	23	
Figure 3		
TFC003 measurements at a Remote site when a call waits for an RLT to become idle	27	

List of tables

Table 1	
Meridian 1 precise tones with CAS	15
Table 2	
Meridian 1 tone interruptions with CAS	16
Table 3	
Release Link Trunk requirements	
Average speed of answer ≤ 2.00 seconds; average RLT delay ≤ 2.00 seconds	31
Table 4	
Release Link Trunk requirements	
Average speed of answer ≤ 2.00 seconds; average RLT delay ≤ 4.00 seconds	32
Table 5	
Release Link Trunk requirements	
Average speed of answer ≤ 2.00 seconds; average RLT delay ≤ 6.00 seconds	32
Table 6	
Release Link Trunk requirements	
Average speed of answer ≤ 4.00 seconds; average RLT delay ≤ 2.00 seconds	33
Table 7	
Release Link Trunk requirements	
Average speed of answer ≤ 4.00 seconds; average RLT delay ≤ 4.00 seconds	33

Table 8	
Release Link Trunk requirements	
Average speed of answer ≤ 4.00 seconds; average RLT delay ≤ 6.00 seconds	34
Table 9	
Release Link Trunk requirements	
Average speed of answer ≤ 5.00 seconds; average RLT delay ≤ 2.00 seconds	34
Table 10	
Release Link Trunk requirements	
Average speed of answer ≤ 5.00 seconds; average RLT delay ≤ 4.00 seconds	35
Table 11	
Release Link Trunk requirements	
Average speed of answer ≤ 5.00 seconds; average RLT delay ≤ 6.00 seconds	35
Table 12	
Release Link Trunk requirements	
Average speed of answer ≤ 6.00 seconds; average RLT delay ≤ 2.00 seconds	36
Table 13	
Release Link Trunk requirements	
Average speed of answer ≤ 6.00 seconds; average RLT delay ≤ 4.00 seconds	36
Table 14	
Release Link Trunk requirements	
Average speed of answer ≤ 6.00 seconds; average RLT delay ≤ 6.00 seconds	37
Table 15	
Release Link Trunk requirements	
Average speed of answer ≤ 8.00 seconds; average RLT delay ≤ 2.00 seconds	37
Table 16	
Release Link Trunk requirements	
Average speed of answer ≤ 8.00 seconds; average RLT delay ≤ 4.00 seconds	38

Table 17	
Release Link Trunk requirements	
Average speed of answer ≤ 8.00 seconds; average RLT delay ≤ 6.00 seconds	38
Table 18	
Release Link Trunk requirements	
Average speed of answer ≤ 10.00 seconds; average RLT delay ≤ 2.00 seconds	39
Table 19	
Release Link Trunk requirements	
Average speed of answer ≤ 10.00 seconds; average RLT delay ≤ 4.00 seconds	39
Table 20	
Release Link Trunk requirements	
Average speed of answer ≤ 10.00 seconds; average RLT delay ≤ 6.00 seconds	40
Table 21	
CAS attendant requirements	
Average speed of answer ≤ 2.00 seconds	41
Table 22	
CAS attendant requirements	
Average speed of answer ≤ 4.00 seconds	42
Table 23	
CAS attendant requirements	
Average speed of answer ≤ 5.00 seconds	43
Table 24	
CAS attendant requirements	
Average speed of answer ≤ 6.00 seconds	44
Table 25	
CAS attendant requirements	
Average speed of answer ≤ 8.00 seconds	45
Table 26	
CAS attendant requirements	
Average speed of answer ≤ 10.00 seconds	46

Feature description

The Centralized Attendant Service (CAS) feature allows customers with multiple locations to centralize their attendant services at a single location. A typical CAS configuration consists of one or more Remote locations, each served by its own switch and attendants, and a Main site location, where the CAS attendants are located (see [Figure 1](#)). Each Remote location has access to the Main CAS attendant through Release Link Trunks (RLT), which can be either analog or digital. In addition, the Remote locations are interconnected by TIE trunks.

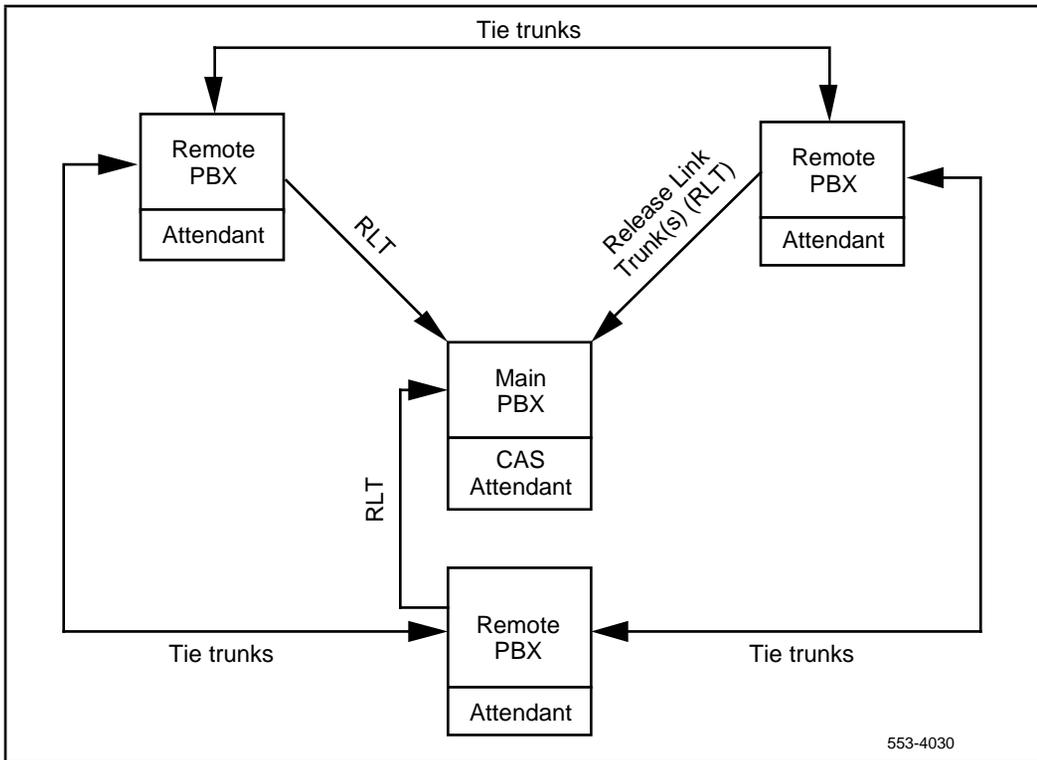
The types of calls that require attendant assistance and can be handled by a CAS attendant are as follows:

- Listed Directory Number (LDN) calls
- Dial “0” calls (“0” is optional if the Flexible Attendant Directory Number is used)
- Recalls, intercepts, or transfers to attendant
- Operator-assisted calls for restricted telephones, giving access to wide-area transmission service (WATS), Foreign Exchange (FX), and Central Office (CO) trunks

When any of the preceding calls are placed, an idle Release Link Trunk (RLT) at the Remote site is seized and the calls are presented to the CAS attendant. If an idle RLT is not available, the calls are queued until one becomes available. The CAS attendant can extend the call to a local or Remote telephone.

When a call is released by the attendant, the RLT is released. Information tones sent from the Remote site allow the CAS attendant to identify the type of incoming call and to confirm features, such as Camp-On, during call processing.

Figure 1
Typical CAS configuration



The system can serve as either a Main or a Remote site. Operation is compatible with *AT&T Technical Advisory Manual 10 (TA-10)*. CAS is therefore compatible with any system that meets the specifications in that document.

The attendant at the Remote location is automatically assigned a separate CAS key/lamp pair above the fifth loop key to control the CAS feature. Additionally, a signal remote key is automatically assigned above the fifth loop key on the consoles at the CAS Main location. On the M1250 and M2250 consoles, the C/H key acts as the CAS key. If an Attendant Console is not required at the Main location, up to ten multi-line telephones can be equipped with a CAS key to control CAS operation.

Feature packaging

The following packages are required for Centralized Attendant Service:

- Centralized Attendant Service Main (CASM) is package 26 and
- Centralized Attendant Service Remote (CASR) is package 27.

Feature interactions

Access to special services

Special service circuits, such as WATS and FX trunks, can be either located and controlled at one location or distributed among various locations with each switch controlling access locally.

When special service circuits are located at the Main site, the CAS attendants have trunk-group busy indicators and control of trunk-group access. In this case, all Remote locations access the special-service circuits through TIE trunks. TIE Trunk Group Access Restrictions (TGAR) at the Main site can be arranged to provide dial access to the special services or to automatically route incoming calls to the CAS attendants to control access manually.

If the special-service circuits are situated at a Remote location, they can be dial-accessed and controlled through TGAR, or a unique access code can be assigned to access the local attendant and bypass selection of a release link trunk (RLT). The local-attendant directory number (DN) can also be used by those who desire attendant-controlled connections.

Alarm lamps

Centralized Attendant Service (CAS) attendants do not receive major or minor alarm indications for Remote locations. These alarms are provided at the local console at each Remote location.

Attendant End-to-End Signaling

Pressing the CAS key, while using Attendant End-to End-Signaling (AEES), may block the DTMF tones.

Attendant Overflow Position

CAS and Attendant Overflow Position (AOP) are incompatible with each other. If both are enabled, CAS takes precedence over AOP.

Automatic Identification of Outward Dialing

When Automatic Identification of Outward Dialing (AIOD) using the data-link method is used in conjunction with CAS, each location must be individually connected to its respective Central Office (CO) or toll center in order for telephone detail billing for all locations to be provided.

Where possible, the CDR option is recommended for passive cost control and cost allocation when arranged in a CAS network. This is practical only if the Main location and all Remote locations are Meridian 1 sites. An alternative is to provide toll restriction at all Remote locations and force all toll calls to be routed through CAS attendants for manual record keeping.

Automatic Number Identification

When Automatic Number Identification (ANI) using direct toll trunks to the Central Automatic Message Accounting (CAMA) center is used in conjunction with CAS, each location must be individually connected to its respective Central Office (CO) or toll center for telephone detail billing in order for all locations to be provided.

Where possible, the CDR option is recommended for passive cost control and cost allocation when arranged in a CAS network. This is practical only if the Main location and all Remote locations are Meridian 1 sites. An alternative is to provide toll restriction at all Remote locations and force all toll calls to be routed through CAS attendants for manual record keeping.

Background Terminal

CAS and Background Terminal (BGD) are incompatible. If both are enabled, CAS takes precedence over BGD.

Barge-In and Busy Verify

CAS attendants are able to “barge-in” on trunks located at the Main location and busy-verify telephones at the Main location, but are not able to perform these functions for Remote locations. The local console at each Remote location can barge-in or busy-verify its local trunks and telephones. Neither the CAS attendant nor the local attendant can barge-in on an idle or busy Release Link Trunk (RLT).

Basic or Network Alternate Route Selection

Where least-cost routing to all special services and toll routes is desired, the Basic or Network Alternate Route Selection (BARS/NARS) feature can be provided at the Main CAS location and accessed through TIE trunks from all Remote locations. This eliminates potential supervision problems with tandem TIE trunk connections that occur when BARS/NARS is provided separately at each location. The centralized BARS/NARS feature can be used only if all special-service outgoing toll calls are placed through the Main CAS location.

To ensure adequate Class of Service restrictions for controlling access to special services and toll routes, the following actions can be taken:

- Supply two separate TIE trunk routes from each Remote location to the Main location. One should be unrestricted or conditionally toll-denied, and the other toll-denied.
- Assign Trunk Group Access Restriction (TGAR) codes to control access from telephones at each Remote location to one or the other of these two trunks’ routes.

Busy Lamp Field Array

The busy-lamp field indicates the status of telephones for the Main location only.

Call Detail Recording

When a CAS network is equipped with Call Detail Recording (CDR), the following points should be noted:

- The CDR should be located at the Main site. This also applies to any special service trunks.

- Downstream processing of the CDR tapes must correlate tandem calls from a Remote site through the Main site by means of TIE trunks to special services. A record showing the facilities used or telephones involved in any tandem connection is given separately for each location. The CDR downstream processing must rebuild the tandem call based on the time correlation and trunk-route correlation. Every effort should be made to ensure time synchronization between the Main and Remote locations.
- Incoming calls completed by a CAS attendant show only the record for the completed connection to the destination, the same as if a local attendant had served the call.

Call Forward External Deny

A CAS local attendant is considered an internal directory number (DN) and is not excluded when Call Forward External Deny (CFXD) is activated on a telephone.

Call Park

Call Park is limited to the local switch and cannot be accessed from an RLT. An RLT cannot be parked at the Main location.

Call Party Name Display

The telephone number, or access code and Route Member number, of the originating telephone or trunk at the Remote location is not displayed to the CAS attendant answering the call. Instead, the access code and member number of the RLT, over which the call is presented, is indicated.

Calls to TIE trunks

The CAS attendant can connect an incoming CO call to a Directory Number (DN) at another site, or transfer calls to the connecting site. The operation is the same as that for completing a Listed Directory Number (LDN) or transfer call at the Main site, except that the attendant dials a trunk access code that corresponds to a TIE line, rather than a DN. When a second dial tone is sent from the Remote site, the attendant dials the DN.

This type of call is limited in the following ways:

- The Recall on No-Answer feature is inactive.
- The Camp-On feature is inactive.

- The Call Transfer feature operates according to the capabilities of the system on which the call transfer is being attempted.
- Disconnect supervision must either be provided by the incoming CO trunk or be repeated by the TIE trunk from the Remote site. If not, the Meridian 1 disallows these types of connections.

Call Waiting Indication

Calls waiting in queue for RLT at each Remote location are not included in the Call Waiting Indication given to the CAS attendants. Calls that have seized an RLT and are queued for service at the Main location are included in the Call Waiting Indication.

Camp-On

When the CAS attendant attempts to complete a call to a telephone that is busy, the call is automatically camped-on to the busy telephone, provided that a call is not already camped-on to that telephone. The Remote site transmits a camped-on confirmation tone (a 100-ms burst of 440-Hz tone) to the CAS attendant over the RLT and then connects to the calling party. If the calling party wants to wait, the CAS attendant releases and a disconnect signal is transmitted to the RLT, which releases. When the camped-on telephone goes on hook, the camped-on call is automatically presented.

If the called telephone does not answer within the specified time, the Remote site seizes an idle RLT and presents the calling party to the CAS attendant. When the CAS attendant answers, answer supervision is detected by the RLT, and the Remote site sends a 100-ms burst of 440-Hz tone to the CAS attendant so that the attendant can answer appropriately. The CAS attendant can then release from the calling party with the Release key, or from the called telephone, by operating the Release Destination key.

Direct inward dialing (DID) calls to a busy telephone can be routed to an RLT and can provide the attendant with the same tone as for a dial “0” call. This occurs only for telephones that have a Call Forward Busy Allowed (CFA) Class of Service and no other forwarding or hunting arrangements defined.

Conference

Attendant-controlled conference connections, involving telephones or trunks, require TIE trunk connections between the Main and Remote locations for each Remote party. RLTs cannot be conferenced. TIE trunk networks must be engineered with this fact considered.

Attendants must be trained to conference through TIE trunks, as well as to handle potential difficulties with transmission and supervision. Alternatively (and preferably), Remote locations can access the local console by dialing the local-attendant DN for attendant conference and other special services available at the Remote location.

Coordinated Dialing Plan

The Coordinated Dialing Plan (CDP) routes calls from the Remote to the Main, and from the Main to the Remote.

Departmental Directory Number

When CAS is active at the Remote Attendant Console, Departmental Listed Directory Number (DLDN) calls at that Remote site are handled at the CAS Main as if the DLDN feature were not active.

Dial “0” calls

When the Remote site translates a dial “0” request, the calling telephone or trunk is connected to an idle RLT and the call is presented to the CAS attendant. When the CAS attendant answers, the RLT detects answer supervision, transmits two 100-ms bursts of 440-Hz tone to the attendant, and connects the calling telephone or trunk to the CAS attendant. The call is then handled as a Listed Directory Number (LDN) call. See [“Flexible Attendant Directory Number”](#) below for Flexible Attendant DN information.

The CAS attendant is restricted in placing dial “0” calls on hold. If the Call Hold DN (CHDN) is dialed, the overflow tone is sent to the CAS attendant.

Directory Number Expansion

With DN Expansion, Attendant DNs and RLT access codes can be up to seven digits.

Flexible Attendant Directory Number

Each Remote location can be assigned two attendant DNs to provide access to the attendants. The Customer Data Block (LD15) allows the modification of these two DNs. The DN assigned must be a DN taken from the numbering plan and must not conflict with any other DN. The first is called the attendant DN (ATDN). Calls to this DN are presented over an RLT to the CAS attendant if the Remote location is in CAS service. If it is desired that “0” be the access code for the attendants, then “0” must be specified as the ATDN. If the Remote location is not in CAS service, the call is presented to the local attendant or to the night number.

The second DN is called the Local Attendant DN (LADN). Calls to this DN are presented to the local attendant or to the night number. A call dialed to the LADN is never terminated on an RLT.

These DNs cannot be made Do Not Disturb (DND) busy, and if they appear on a Lamp Field Array the associated LED is always dark.

Listed Directory Number calls

Calls to the Listed Directory Number (LDN) of the Main site are treated in the normal manner: an Incoming Call Indication (ICI) is presented to the attendant, and normal call-handling procedures are used. If the Remote location is in the CAS deactivated mode, LDN calls to the Remote location are also handled in the normal manner by the attendant at the Remote location.

When the CAS feature is activated at the Remote location, LDN calls to that location are presented to the CAS attendant with an RLT X ICI indication, where X represents the RLT route location of the Remote site. If the CAS attendant console is equipped with a numeric display, the RLT access code and route member number are displayed.

When the CAS attendant selects the incoming call by operating the loop key or the ICI key, answer supervision is sent to the Remote site over the RLT. Two 100-ms bursts of 440 Hz are given, if defined in the Customer Data Block (LD15). The RLT X ICI indication identifies the call and prompts the appropriate verbal response.

After obtaining the desired party's number, the CAS attendant presses the signal Remote (SIG REM) key, which is assigned automatically and is located above the LPK 5 key. The Main site responds by sending a timed flash over the RLT to the Remote site. This signal prompts the Remote site to connect a register or Digitone receiver to the RLT. When an idle register or Digitone receiver has been applied to the RLT, a dial tone from a Tone and Digit Switch (TDS) at the Remote location is sent to the CAS attendant. The CAS attendant then keys in the destination DN on the dial pad. When outpulsing is completed, the CAS attendant hears a ring-back or a busy tone. At this time, the CAS attendant can disconnect from the RLT by operating the release (RLS) key.

If all RLTs from a Remote location are in use, LDN calls are queued and routed to an RLT when one becomes idle.

Message Registration

CAS and Message Registration (MR) are incompatible with each other. If both are enabled, CAS takes precedence over MR.

Night Service

Night Service at the Main CAS attendant location is applicable to calls at the Main location and to calls routed over the RLT from Remote locations.

Calls from Remote locations over an RLT can be transferred by the night-answer location at the Main site back to the Remote location over a TIE trunk; however, the RLT is held for the duration of the call.

Night Service is activated separately by each Remote location at its local console or telephone. This is usually prearranged for a given time of day, or it is in response to a call from the Main CAS attendant, and it is done before the Main CAS attendant activates Night Service. If the CAS attendant activates Night Service before the Remote locations do, then all calls routed to the RLT by the Remote site are directed to the night location at the Main site.

The three types of Night Service offered on Meridian 1—flexible, night-answer telephone, or Trunk Answer From Any Station (TAFAS)—can be assigned independent of any CAS arrangements. CAS service and Night Service are independent, and when both features are activated, CAS takes precedence.

When Night Service is activated at a Remote site, any calls in the RLT queue are automatically rerouted to the assigned night-answer location or TAFAS, as applicable. Calls in progress on the RLT are completed by the CAS attendants.

Property Management System

CAS and Property Management System (PMS) are incompatible with each other. If both are enabled, CAS takes precedence over PMS.

Recorded Overflow Announcement

The Recorded Overflow Announcement feature cannot be associated with the RLT x (x = key number) ICI key on the CAS Main Attendant Console.

Remote Peripheral Equipment

For CAS operation, each Remote Peripheral Equipment (RPE) location in a CAS network is considered to be part of the site to which it is connected. This means that the Remote end of the RPE connection shares the same numbering plan as the local end of the connection and that the Remote end is identified to the CAS attendant as part of the local site.

Room Status

CAS and Room Status (RMS) are incompatible with each other. If both are enabled, CAS takes precedence over RMS.

Silent Hold

The attendant may wish to hold incoming calls at the Remote site when unable to camp them onto a busy telephone. To accomplish this, the Silent Hold feature is provided. When the attendant activates Silent Hold, the CO trunk is placed in the hold state at the Remote site, and the RLT is released. After the timed reminder has timed out, the RLT is resealed and the CO trunk is reconnected to the CAS attendant.

When the attendant decides to place the call on hold, the attendant presses the signal Remote (SIG REM) key to send a flash to the RLT. The attendant receives a dial tone from the Remote site and dials the DN assigned for the Silent Hold code. The hold code is outputted to the Remote site and is translated, and the CO trunk is placed on hold. The Remote site then sends a hold confirmation tone (four to six 50-ms bursts of 440-Hz tone) to the attendant, who then releases the RLT by operating the release (RLS) key. The Remote site recognizes the disconnect signal and releases the RLT.

A recall occurs after the recall timer has elapsed. An idle RLT is seized, and the held call is presented to the CAS attendant. When the attendant answers, the Remote site receives answer supervision, transmits an information tone (four to six 50-ms bursts of 440-Hz tone) to the attendant, and removes the hold condition from the CO trunk. The attendant can then complete the call.

The CAS attendant can also hold the RLT at the console by operating the HOLD key. This differs from Silent Hold in that the CO trunk is held at the Main site (over the RLT) rather than at the Remote end.

Station Category Indication

When CAS is active, calls from a Remote telephone to the Attendant DN (ATDN) appear on the Remote Incoming Call Indication (ICI) key lamp at the CAS Main regardless of Station Category Indication (SCI).

Timed Reminder Recall

If the Remote site is programmed to recall the attendant on “no answer” calls, then after the prescribed timeout (during which the telephone has not answered or the CO trunk has not disconnected), an idle RLT is seized and the call is presented to the CAS attendant. This time, a different attendant may answer the call; however, an RLT X ICI indication is still received.

When the CAS attendant answers the call, the Remote site detects answer supervision over the RLT, sends a ring-back tone for 2 seconds to the attendant, and then connects the call. The ICI and the ring-back tone prompt the attendant to answer in the appropriate manner. During the answer, the CAS attendant and the calling party talk over the ring-back of the called telephone. The attendant can press the release destination (RLS DEST) key to stop the ring-back.

If the calling party wishes to continue waiting, the CAS attendant at the Main location releases. Disconnect is detected at the Remote site, and the RLT connection is removed. Further timed recalls cause the preceding process to be repeated until either the called telephone answers or the calling party disconnects.

When the Remote location is arranged for direct inward dialing (DID) and the called telephone is arranged to forward calls to the attendant on no answer, the call is treated as in the first two examples given in this section.

Transfer to Attendant

The CAS attendant can be recalled by a telephone in order to transfer a trunk to another telephone. The call is presented to the CAS attendant in the same manner as a dial "0" call. The CAS attendant transfers the call by operating the release destination (RLS DEST) key and then following the procedure for an LDN call. The RLS DEST key sends a timed flash over the RLT, which drops the initial telephone. This procedure applies to all calls intercepted by the CAS attendant.

The CAS attendant can be recalled by flashing the switch hook on a 500 or 2500 telephone and dialing "0," or by operating an Attendant Recall key.

Trunk Group Busy Indication

The Trunk Group Busy Indication is a local application and does not reflect trunk activity at any other CAS location (Main or Remote).

Equipment specification and operation

Tone and Digit Switch cards

A Remote site that is arranged for the CAS feature requires the QPC251 Tone and Digit Switch (TDS) card, the QPC609 TDS card, or the NT8D17 conference/TDS card. At the Remote site, all TDS cards must be the same type; they cannot be mixed. The TDS cards can be mixed at the Main CAS location.

Table 1
Meridian 1 precise tones with CAS

Tone	Frequency (Hz)	Level (dB)
Dial tone	350 + 440	16*
Busy tone, overflow tone	480 + 620	23*
Audible ring-back	440 + 480	18*
Miscellaneous tone	440	16
*Per tone combined is 3 dB higher.		

Table 2
Meridian 1 tone interruptions with CAS

Tone	Cadence
Listed Directory Number	100 ms of 480 Hz 100 ms of 440 Hz 100 ms of 480 Hz
Camp-on Dial "0" recall	100 ms on/off 100 ms on/100 ms off 100 ms on
No-answer recall	300 ms on/off
Busy	0.5 s on/0.5 s off
Overflow	0.25 s on/0.25 s off
Hold confirmation, recall	0.05 s on/0.05 s off
Standard ringing	2 s on/4 s off

The maximum delay on an application of any of the CAS tones, subsequent to detecting answer supervision from the Main CAS location, is 150 ms. A break in the middle of a tone cycle is inhibited so that a complete tone is always heard by the CAS attendant.

Flexible Tones and Cadences (FTC) adds many options for tones. See *Flexible Tone and Digit Switch cards description* for complete information.

Release Link Trunk

Various trunk types can be used to interface a Remote site to the Main site when the CAS feature is required. One configuration of an RLT circuit is to have either a 2-wire (QPC71) or a 4-wire (QPC237) TIE trunk at both the Remote and Main locations, with a repeater facility between the two. Another configuration is to have an NT8D15 E&M trunk card at the local location and a QPC237 at the Remote location.

Alternatively, the Remote location can be equipped with a QPC250 RLT card to interface with a QPC70 CO trunk card, or QPC450 CO/FX/WATS trunk card. This application is limited to a maximum loop resistance of 1400 Ω.

An RLT circuit consists of a trunk circuit at a Remote private branch exchange (site) to be served by a CAS attendant and an interfacing trunk circuit at the Main site, where the CAS attendant is located. The type of circuit pack that can be used at either the Remote site or the Main site depends on the distance between the Remote site and the Main site.

QPC250 Release Link Trunk specifications

A QPC250 RLT card contains two identical trunk circuits and common circuitry mounted on a printed circuit board. The card can be inserted into any peripheral equipment (PE) shelf slot. Each circuit on a QPC250 RLT card at a Remote site interfaces with a CO trunk circuit at the Main site to allow access to the CAS attendant. Each circuit on the QPC250 RLT card has the following specifications:

Impedance	900 Ω
Loop limit	1400 Ω at nominal -48 V
Leakage resistance	30,000 Ω
Ring trip	During silent or ringing intervals
Ringing voltage	85-V rms, 20 Hz superimposed on -48 -V dc
Signaling	Ground start
Supervision	Normal battery conditions are applied (-48 V to ring, ground to tip) when the interfacing CO trunk circuit is to be seized
Power input from shelf	± 10 -V dc, ± 6 -V dc, -48 -V dc, 85-V rms, 20 Hz, superimposed on -48 -V dc
Effective loss	0.5 dB at 1020 Hz (pads in), -1.5 dB (pads out)
Insertion loss	1 dB
Answer supervision	Does not reverse battery when the terminating end answers
Disconnect supervision	Does not momentarily open-circuit the tip and ring leads on disconnect

Operation at the Remote site

Idle state

The RLT at the Remote site is connected to a CO trunk circuit at the Main site by tip and ring leads. The RLT circuit provides open tip and ring leads during the idle state.

Outgoing seizure

Upon seizure of the RLT by the Remote site, the RLT provides ground on the tip lead and a battery on the ring lead, and it waits 256 ms.

If the DC resistance across the tip and ring leads is greater than 20-K Ω , the site provides steady ringing superimposed with -48-V battery through up to 220 Ω of resistance on the ring lead.

If the DC resistance across the tip and ring leads is less than 1300 Ω , then the CO trunk at the Main site has not released from a previous call, and the RLT is locked out until the Main site removes the loop. A trunk-error message (TRK 241) is printed and another RLT circuit is used.

The ringing supply at the Remote site should generate AC ringing voltage between 75- and 100-V rms at a frequency of 20 Hz (± 3 Hz).

Detecting answer supervision

The RLT detects a decrease in DC resistance across the tip and ring leads from at least 20-K Ω to 1300 Ω or less as an off hook signal from the Main site equipment. If the off hook signal persists for at least 256 ms, the signal is an answer supervision. The RLT trips ringing within 100 ms when it detects the answer signal. Ringing can be tripped during both the silent and ringing intervals.

Talking state

After answer and until disconnect, the RLT provides ground through a maximum of 425 Ω of resistance on the tip lead and -48-V battery through up to 425 Ω of resistance on the ring lead.

Flash signal

The CAS attendant at the Main site controls the RLT by the console signal Remote (SIG REM) key or the release destination (RLS DEST) key. The operation of this key sends a timed flash signal to the RLT. The CAS attendant is required to control the RLT functions by flashing to request a Digitone receiver for the calling party and cancellation of a prior attendant request (Release Destination).

The RLT recognizes an increase in the DC resistance across the tip and ring leads from 1300 Ω or less to 20-K Ω or more as an on hook signal. The on hook signal should be timed for 200 ms to 1.0 second. If the conductor loop resistance changes back to low resistance (off hook) in this interval, the RLT interprets that as a flash signal from the CAS attendant.

When the RLT has been seized for an incoming CO call, a dial “0” call, an intercept call, or a hold recall after the CAS attendant has talked to the calling party, the detection of the first flash signal prompts the connection of a Digitone receiver to the RLT and splits the calling party away from the RLT.

A dial tone is sent to the CAS attendant when the Digitone receiver is available to receive address signals. The dial tone is removed within 50 ms of the start of dialing the first address character. If the RLT detects a subsequent flash signal while connected to a receiver—that is, an attendant flash to clear the receiver—it disconnects the receiver and returns to its initial state (connection with the calling party).

When the receiver has translated the dialed address characters, different confirmation tones are sent to the CAS attendant, depending on the status of the called telephone.

Disconnect

The RLT recognizes and times an increase in the DC resistance across the tip and ring leads from 1300 Ω or less to 20-K ohms or more as an on hook from the CAS attendant. If the on hook lasts longer than the flash timer, the RLT interprets the change as a disconnect.

After interpreting disconnect from the attendant, the RLT opens the tip and ring leads to the interfacing CO trunk at the Main site, sending a disconnect signal to the Main site. To prevent the RLT from being seized from a new call before the CO trunk at the Main site has released, the RLT provides a busy guard timer.

Operation at the Main site

Idle state

There is a resistance greater than 20-K ohms across the tip and ring leads at the CO trunk interface during the idle state.

Incoming seizure

The CO trunk at the Main site detects seizure by an RLT at a Remote site when the RLT simultaneously provides

- a ground through 1.2-K Ω of resistance or less on the tip lead
- ringing with superimposed -48 -V battery on the ring lead through a resistance of 1.2-K Ω or less

The maximum delay of ringing must be less than 5 seconds after ground and battery detection, and the ringing must last more than 640 ms. If any one of the preceding conditions is not satisfied, the call is not presented to the CAS attendant.

Disconnect before the attendant answers

Before the attendant answers the call, tone ringing should be 2 seconds on and 4 seconds off. If there is no ringing for longer than a programmable timer, the call is withdrawn from presentation to the attendant.

The CAS attendant answers

When the CAS attendant answers, a resistance of 800 Ω or less is applied across the tip and ring conductors at the CO trunk. A two-way transmission path between the RLT and the CAS attendant is established within 160 ms to avoid clipping initial speech. The circuit maintains the low resistance across the tip and ring leads until the RLT is flashed or disconnected by the attendant.

Flash signal

When the CAS attendant presses the Signal Remote (SIG REM) key on the console, a timed flash (on hook) signal is sent to the Remote site. The flash signal changes the resistance across the tip and ring leads from low (off hook) to high (on hook) resistance for a timed interval. The flash signal should be 600 ms (± 200 ms), with the preferred signal being 512 ms.

After the CAS attendant has pressed the SIG REM key, a Digitone receiver at the Remote end is connected to the RLT, and a dial tone is sent to the attendant as confirmation that an idle receiver has been connected. Digits dialed after receiving the dial tone are outpulsed as soon as an outpulser is available.

When the CAS attendant wants to release from a prior request—for example, a call extended to a busy telephone—the Release Destination (RLS DEST) key on the console is pressed. The operation of this key sends a timed flash to the Remote site and connects the attendant to the original calling party.

Disconnect

The CO trunk at the Main site interprets the removal of ground from the tip lead and the removal of the -48 -V battery from the ring lead that persists for more than 1 second as a disconnect signal from the RLT. After interpreting a disconnect from the Remote site, the CO trunk disconnects from the CAS attendant and removes the loop across the tip and ring leads, which acts as a disconnect supervision.

When the CAS attendant disconnects, the resistance of $800\ \Omega$ or less applied to the tip and ring leads at the CO trunk changes to $20\text{-K}\ \Omega$ or more, which is an on hook signal to the RLT at the Remote site.

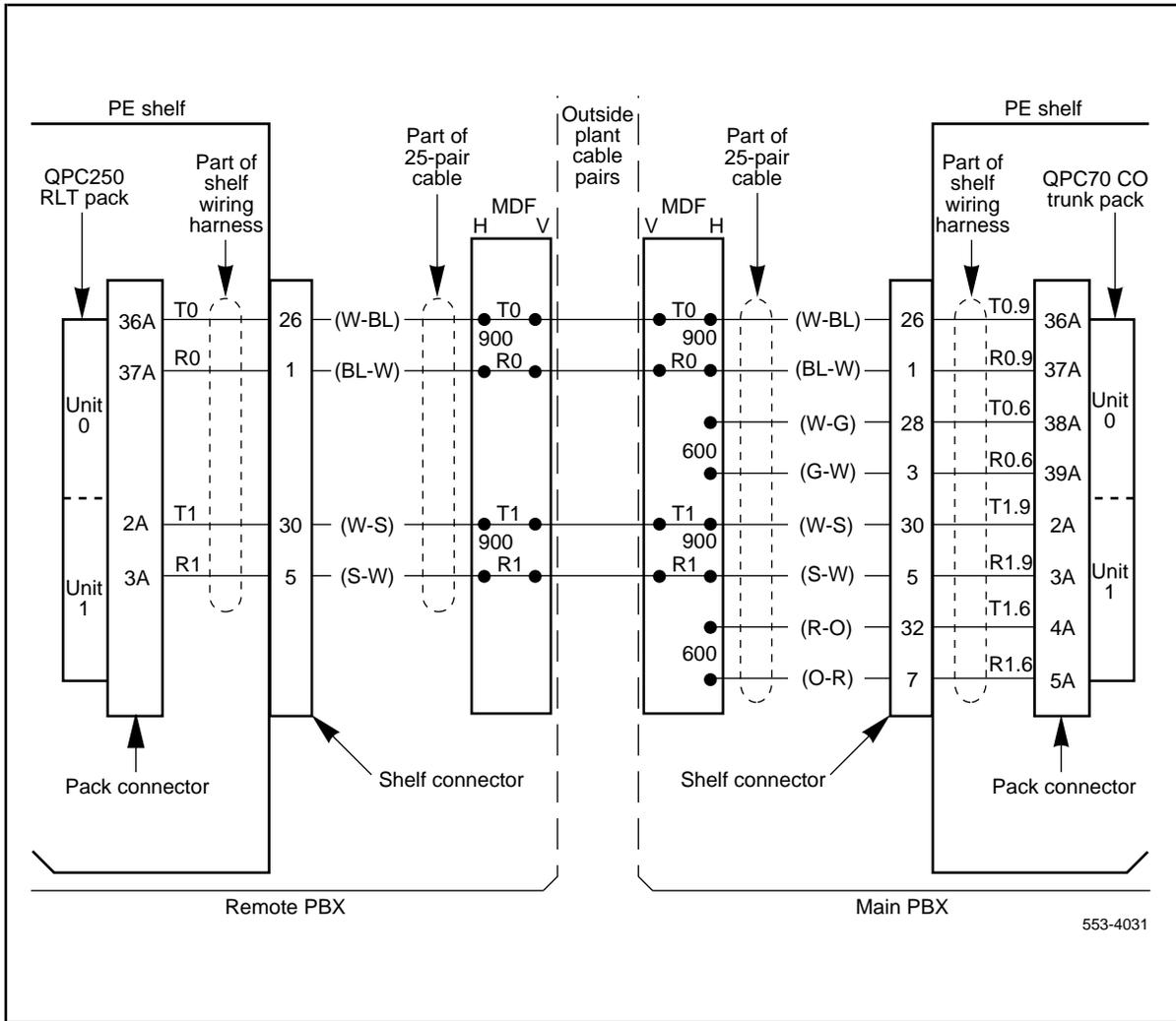
Installation and connections

The QPC250 RLT circuit pack can be inserted into any trunk-pack position on a peripheral equipment (PE) shelf. The circuit-pack handling precautions must be observed when installing trunk packs in PE shelves. Installation procedures for trunk-circuit packs are provided in *Meridian 1 system installation procedures*.

When telephone lines connected to the trunk circuit are exposed to foreign voltages by direct contact or induction—for example, by power-line crosses or by lightning—protection devices must be installed at the customer's premises. These devices must be capable of providing a path to ground from the tip and ring leads for foreign voltages that exceed a 600-V peak.

Typical cross-connections between a QPC250 RLT trunk at a Remote site and a QPC70 CO trunk at the Main site are shown in [Figure 2](#).

Figure 2
QPC250 RLT cross-connections to QPC70 CO trunk



Engineering information

Memory and real-time requirements

The impact of the CAS feature on the memory and real-time requirements of a particular system can be calculated by using *Meridian 1 capacity engineering*.

Traffic measurements

Traffic measurements are provided separately for each location. To coordinate the accumulation of traffic data on a network basis, the system clocks and traffic schedules for each location should be set and maintained in reasonable synchronization. See *Traffic measurement formats and output* for details concerning traffic-schedule outputs.

Trunks (TFC002)

At each Remote location, Release Link Trunks (RLTs) are considered an outgoing trunk route. Outgoing usage and peg counts are accumulated for traffic schedule TFC002. All other fields in this traffic schedule are zeroed.

At the Main location, RLTs are considered an incoming trunk route for each Remote location. Usage, peg counts, failure to match, and all-trunks-busy measurements are recorded for each RLT route in traffic schedule TFC002.

Queue (TFC003)

If the CAS feature is not active, queue measurements are recorded at the Main and Remote locations in the normal manner. When the CAS feature is active, calls that originate at the Remote site and are handled over an RLT by the CAS attendant at the Main location are measured and recorded in TFC003 at the Remote site. For these measurements, the Remote site interprets the RLT as a local attendant. Calls dialed *specifically* to the local attendant at the Remote site are also reflected in TFC003 when the CAS feature is active. TFC003 measurements are recorded in the normal manner at the Main site.

For measurements at the Remote site when CAS is active, TFC003 definitions should be interpreted as follows. (See also [Figure 3](#).)

Average attendant response

This is the average time between a call being presented to an attendant console and the CAS attendant answering it.

Average time in queue

This is the time that calls spend in the attendant queue averaged over all calls that are placed into that queue.

Average speed of answer

This is the time that a call waits for its request to terminate at an attendant recognized by the system and before it is answered.

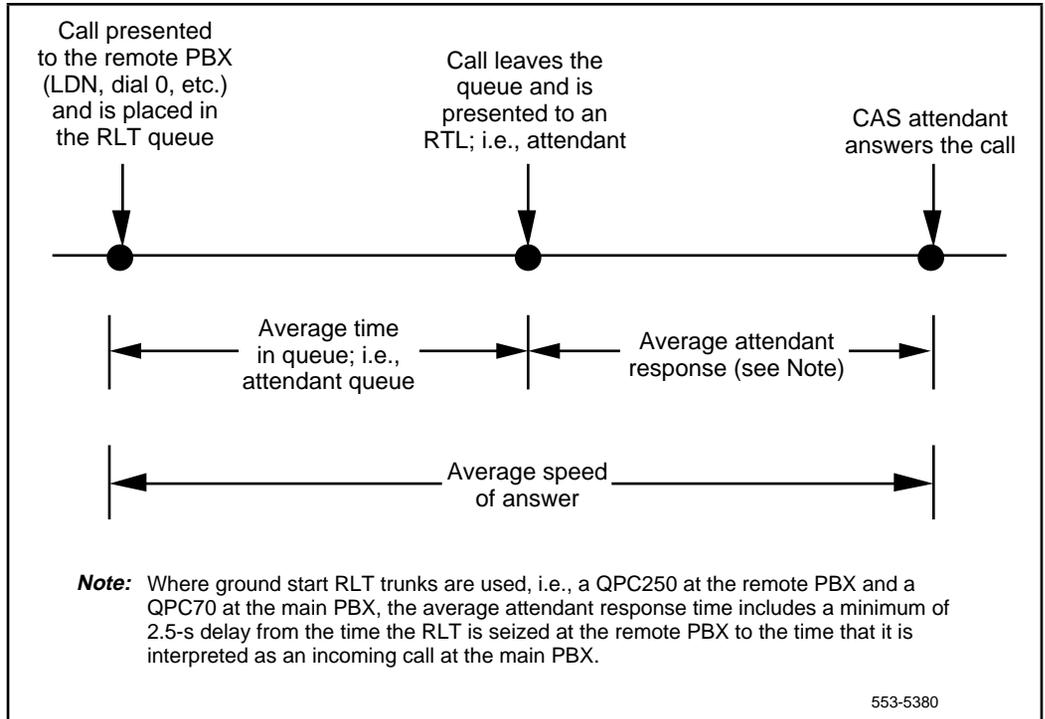
Peg count of calls delayed

This count is incremented whenever a call is removed from the attendant.

Peg count of abandoned calls

This count is incremented whenever a call abandons before being answered by the CAS attendant.

Figure 3
TFC003 measurements at a Remote site when a call waits for an RLT to become idle



Console (TFC004)

When the CAS feature is not active, the local attendant at the Remote site handles all calls that require attendant services. These calls are measured and recorded in TFC004 at the Remote site. When the CAS feature is active, TFC004 measurements reflect only calls dialed specifically to the local attendant. All other calls requiring attendant assistance are directed to the CAS attendant at the Main location.

At the Main site, TFC004 measurements are recorded in the normal manner. When the CAS feature is active, calls originating from the Remote site are treated as incoming trunk calls at the Main site.

Calculating the number of RLT circuits

To calculate the number of RLT circuits required between a particular Remote site and the Main site, the following grades of service must be specified. [Tables 3](#) through [20](#) calculate the RLT requirements.

Average speed of answer

This is the average time in seconds that a call from the Remote site, which requires an attendant, waits at the *Main* site for an attendant to answer.

Average RLT delay

This is the average time in seconds that a call from the Remote site, which requires an attendant, waits at the *Remote* site for an RLT to become idle under average busy season busy hour (ABSBH) traffic.

Note 1: Where ground-start signaling is used for RLT circuits (for example, with a QPC250 RLT trunk card at the Remote site and a QPC70 CO trunk card at the Main site), *add* a minimum of 2.5 seconds to the average RLT delay. There is a minimum average delay of 2.5 seconds from the time that the RLT is seized at the Remote site until the time that it is interpreted as an incoming call at the Main site.

Note 2: The RLT 20 percent overload delay is fixed at 10.0 seconds and is reflected in the values shown in [Tables 3](#) through [20](#).

The calculation of the number of RLT circuits required between a Remote site and the Main site requires the following information:

- The number of calls per hour in the Remote site that require an attendant.
- The attendant work time (AWT). This is the average time in seconds taken by an attendant at the Main site to service a call.

The engineering procedure is as follows:

- 1 Calculate the attendant traffic (T_a) generated at the Remote site by using this formula: $T_a = \tau \times \text{AWT}/100 \text{ CCS}$.

τ = the number of calls per hour in the Remote site that require an attendant

AWT = attendant work time

- 2 Select the appropriate table (Tables 3 through 20) according to the specified grade of service.
- 3 Select the appropriate column in the table according to the attendant work time.
- 4 Select from the chosen column a number (T) that is greater than or equal to the value T_a that was determined in step 1.

Example:

Average speed of answer	= 2 s grade of service
Average RLT delay	= 2 s
Attendant work time (AWT)	= 20 s
Attendant calls/hours in the Remote site (\hat{E})	= 500

Then

$$T_a = 500 \times 20/100 \text{ CCS}$$

$$T_a = 100 \text{ CCS}$$

Table 3 is chosen because it meets the given grade-of-service values. From this table, in the AWT 16–20 column, the value T of 120 CCS is selected ($T \text{ CCS} \geq T_a \text{ CCS}$). For the value $T = 120 \text{ CCS}$, the table shows that six RLT circuits are required for this particular application.

Calculating the number of CAS attendants

To calculate the number of attendants required at the Main site that are serving multiple Remote sites, the Average Speed of Answer grade of service must be specified. This delay constitutes the average time in seconds that a call coming from either a Remote site or the Main site, and requiring an attendant, waits at the site for an attendant to answer. **Tables 21** through **26** calculate the CAS attendant requirements.

Furthermore, the following information is required:

- The attendant traffic (T_a) generated at the Main site
- The attendant traffic (T_a) generated at each Remote site

The engineering procedure is as follows:

- 1 Calculate the attendant traffic (T_a) generated at the Remote site by using this formula: $T_a = \tau \times \text{AWT}/100 \text{ CCS}$

τ = the number of calls per hour in a Remote site or the Main site that require an attendant.

AWT = the attendant work time. This is the average time in seconds taken by an attendant at the Main site to service a call.

- 2 Calculate the total attendant traffic (T_t) by adding the attendant traffic (T_a) from each Remote site to the attendant traffic (T_a) at the Main site.
- 3 Select the appropriate table (**Tables 21** through **26**).
- 4 Select the appropriate column in the table according to the attendant work time (AWT).
- 5 The number of attendants required corresponds to a value $T \text{ CCS}$ in the column chosen, where $T \text{ CCS} \geq T_t \text{ CCS}$.

Note: The values shown in **Tables 21** through **26** reflect a 5 percent attendant overload delay (10.0 seconds) and a 92 percent attendant occupancy.

Example:

- Average speed of answer = 2 s grade of service
- Attendant work time (AWT) = 20 s
- Attendant traffic (Ta) at Main site = 170 CCS
- Attendant traffic (Ta) at Remote site #1 = 100 CCS
- Attendant traffic (Ta) at Remote site #2 = 120 CCS

Then

$$T_t = 170 + 100 + 120 \text{ CCS}$$

$$T_t = 390 \text{ CCS}$$

Table 21 is chosen because it meets the given grade-of-service value. From the table, in the AWT 16–20 column, the value T of 395 CCS is selected ($T \text{ CCS} \geq T_t \text{ CCS}$). For the value $T = 395 \text{ CCS}$, the table shows that 14 attendants are required at the Main site to handle this particular application.

Table 3
Release Link Trunk requirements
Average speed of answer ≤ 2.00 seconds; average RLT delay ≤ 2.00 seconds

RLT circuits needed	Attendant work time (AWT) in seconds											
	1–5	6–10	11–15	16–20	21–25	26–30	31–35	36–40	41–45	46–50	51–55	56–60
	Attendant traffic (Ta) in CCS											
1	5	4	3	2	2	1	1	1	1	1	1	1
2	24	22	20	18	17	16	15	14	13	13	12	12
3	45	45	43	41	39	37	36	34	33	32	31	31
4	68	70	68	66	63	61	60	58	56	55	54	53
5	92	96	95	92	90	87	85	83	82	80	79	77
6	116	123	122	120	117	115	112	110	108	107	105	104
7	138	150	150	148	145	143	140	138	138	134	132	131
8	159	178	179	177	174	171	169	167	164	162	160	158

Table 4
Release Link Trunk requirements
Average speed of answer ≤ 2.00 seconds; average RLT delay ≤ 4.00 seconds

RLT circuits needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	9	7	6	5	4	3	3	2	2	2	2	2
2	31	29	27	25	23	22	21	20	19	18	17	17
3	53	55	53	51	49	47	45	43	42	41	40	39
4	74	81	81	78	76	74	72	70	68	67	65	64
5	95	105	106	105	104	102	100	98	96	94	92	91
6	117	130	132	131	130	128	126	125	123	121	120	118
7	138	154	158	158	156	155	153	151	149	148	146	145
8	159	179	183	184	183	182	180	178	176	174	173	171

Table 5
Release Link Trunk requirements
Average speed of answer ≤ 2.00 seconds; average RLT delay ≤ 6.00 seconds

RLT circuits needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	11	9	8	7	6	5	4	4	3	3	3	3
2	32	33	32	30	28	26	25	24	23	22	21	20
3	53	57	56	54	53	51	49	48	47	45	44	43
4	74	81	81	80	78	76	74	73	71	70	69	67
5	95	105	106	105	104	102	100	98	97	95	94	93
6	117	130	132	131	130	128	126	125	123	121	120	118
7	138	154	158	158	156	155	153	151	149	148	146	145
8	159	179	183	184	183	182	180	178	176	174	173	171

Table 6
Release Link Trunk requirements
Average speed of answer ≤ 4.00 seconds; average RLT delay ≤ 2.00 seconds

RLT circuits needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	3	3	2	2	2	1	1	1	1	1	1	1
2	17	18	17	16	15	14	14	13	13	12	12	11
3	33	37	37	36	35	34	33	32	31	31	30	29
4	50	58	59	59	58	57	56	55	54	53	52	51
5	68	80	83	83	82	81	80	79	78	77	75	74
6	86	102	107	108	108	107	105	104	103	102	101	100
7	105	125	132	134	134	133	132	131	131	129	127	126
8	122	149	157	160	160	160	159	158	156	155	154	153

Table 7
Release Link Trunk requirements
Average speed of answer ≤ 4.00 seconds; average RLT delay ≤ 4.00 seconds

RLT circuits needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	6	5	4	4	3	3	3	2	2	2	2	1
2	22	24	23	22	21	20	19	18	18	17	16	16
3	39	45	46	45	44	43	42	41	40	39	38	37
4	56	68	70	70	69	68	67	66	65	63	62	61
5	72	88	94	95	95	95	94	92	91	90	89	87
6	89	109	116	119	120	119	119	118	117	116	115	114
7	105	130	139	143	144	144	144	143	142	141	140	139
8	122	151	162	167	169	170	169	169	168	167	166	165

Table 8
Release Link Trunk requirements
Average speed of answer ≤ 4.00 seconds; average RLT delay ≤ 6.00 seconds

RLT circuits needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	7	7	6	5	5	4	4	3	3	3	3	2
2	22	24	27	27	26	25	24	23	22	21	21	19
3	40	47	49	49	48	47	46	45	44	43	42	42
4	56	68	71	72	71	71	70	69	68	67	66	65
5	72	88	94	95	95	95	94	93	92	91	90	89
6	89	109	116	119	120	119	119	118	117	116	115	114
7	105	130	139	143	144	144	144	143	142	141	140	139
8	122	151	162	167	169	170	169	169	168	167	166	165

Table 9
Release Link Trunk requirements
Average speed of answer ≤ 5.00 seconds; average RLT delay ≤ 2.00 seconds

RLT circuits needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	2	2	2	2	1	1	1	1	1	1	1	0
2	14	16	16	15	14	14	13	13	12	12	11	11
3	28	34	35	34	34	33	32	31	31	30	29	29
4	44	53	55	56	55	55	54	53	52	51	51	50
5	60	73	78	79	79	78	77	77	76	75	74	73
6	76	94	101	103	103	103	102	101	101	100	99	98
7	93	116	124	127	128	128	128	127	126	125	124	123
8	109	137	148	152	154	154	154	154	153	152	151	150

Table 10
Release Link Trunk requirements
Average speed of answer ≤ 5.00 seconds; average RLT delay ≤ 4.00 seconds

RLT circuits needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	5	5	4	3	3	3	2	2	2	2	2	1
2	19	22	22	21	20	19	18	18	17	17	16	16
3	35	41	43	43	42	41	40	40	39	38	37	36
4	50	62	66	67	66	66	65	64	63	62	61	60
5	64	82	88	91	92	91	91	90	89	88	87	86
6	79	101	110	113	115	116	115	115	114	114	113	112
7	94	121	131	136	139	140	140	140	139	138	138	137
8	109	140	153	160	163	164	165	165	164	164	163	162

Table 11
Release Link Trunk requirements
Average speed of answer ≤ 5.00 seconds; average RLT delay ≤ 6.00 seconds

RLT circuits needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	6	6	6	5	4	4	4	3	3	3	2	2
2	21	25	25	25	24	23	22	21	21	20	19	19
3	35	43	46	46	46	45	45	44	43	42	41	41
4	50	62	67	68	69	68	68	67	66	65	64	64
5	64	82	88	91	92	92	91	91	90	89	88	87
6	79	101	110	113	115	116	115	115	114	114	113	112
7	94	121	131	136	139	140	140	140	139	138	138	137
8	109	140	153	160	163	164	165	165	164	164	163	162

Table 12
Release Link Trunk requirements
Average speed of answer ≤ 6.00 seconds; average RLT delay ≤ 2.00 seconds

RLT circuits needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	2	2	2	1	1	1	1	1	1	1	1	0
2	12	14	15	14	14	13	13	12	12	11	11	11
3	25	31	32	33	32	32	31	30	30	29	29	28
4	39	49	52	53	53	53	52	52	51	50	49	49
5	53	68	73	75	76	76	75	75	74	73	72	72
6	68	87	95	98	99	99	99	99	98	97	97	96
7	83	107	117	121	123	124	124	124	123	123	122	121
8	98	128	140	145	148	149	150	150	149	149	148	147

Table 13
Release Link Trunk requirements
Average speed of answer ≤ 6.00 seconds; average RLT delay ≤ 4.00 seconds

RLT circuits needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	4	4	4	3	3	2	2	2	2	2	1	1
2	16	20	20	20	19	18	18	17	17	16	16	15
3	31	38	40	41	40	40	39	38	38	37	36	36
4	44	58	62	64	64	63	63	62	61	61	60	59
5	58	76	83	87	88	88	88	87	87	86	85	84
6	71	94	104	108	111	112	112	112	112	111	111	110
7	85	112	124	130	134	135	136	136	136	136	135	134
8	98	131	145	153	157	159	160	160	160	160	160	159

Table 14
Release Link Trunk requirements
Average speed of answer ≤ 6.00 seconds; average RLT delay ≤ 6.00 seconds

RLT circuits needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	5	6	5	5	4	4	3	3	3	3	2	2
2	18	23	24	23	23	22	21	21	20	19	19	18
3	31	40	43	44	44	44	43	43	42	41	41	40
4	44	58	63	65	66	66	66	65	64	64	63	62
5	58	76	83	87	88	89	89	88	88	87	86	86
6	71	94	104	108	111	112	112	112	112	111	111	110
7	85	112	124	130	134	135	136	136	136	136	135	134
8	98	131	145	153	157	159	160	160	160	160	160	159

Table 15
Release Link Trunk requirements
Average speed of answer ≤ 8.00 seconds; average RLT delay ≤ 2.00 seconds

RLT circuits needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	1	1	1	1	1	1	1	1	1	1	0	0
2	10	12	13	13	13	12	12	11	11	11	11	10
3	20	26	29	29	30	29	29	29	28	28	27	27
4	32	42	46	48	49	49	49	49	48	48	47	47
5	43	59	65	69	70	71	71	71	70	70	70	69
6	56	76	85	90	92	93	94	94	94	93	93	93
7	68	93	105	111	115	116	117	118	118	118	117	117
8	81	111	126	133	138	140	142	142	143	143	143	142

Table 16
Release Link Trunk requirements
Average speed of answer ≤ 8.00 seconds; average RLT delay ≤ 4.00 seconds

RLT circuits needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	3	3	3	3	2	2	2	2	2	2	1	1
2	13	17	18	18	17	17	17	16	16	15	15	14
3	25	33	36	37	37	37	37	36	36	35	35	34
4	37	50	55	58	59	59	59	59	58	58	57	57
5	48	66	75	79	82	83	83	83	83	82	82	81
6	59	82	94	100	103	105	106	107	107	107	106	106
7	70	98	112	120	124	127	129	130	130	130	130	130
8	82	115	131	140	146	149	152	153	154	154	154	154

Table 17
Release Link Trunk requirements
Average speed of answer ≤ 8.00 seconds; average RLT delay ≤ 6.00 seconds

RLT circuits needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	4	4	4	4	4	3	3	3	3	2	2	2
2	15	19	21	21	21	20	20	19	19	19	18	18
3	26	35	38	40	41	41	41	40	40	39	39	38
4	37	50	56	59	61	62	62	62	61	61	61	60
5	48	66	75	79	82	83	84	84	84	84	83	83
6	59	82	94	100	103	105	106	107	107	107	106	106
7	70	98	112	120	124	127	129	130	130	130	130	130
8	82	115	131	140	146	149	152	153	154	154	154	154

Table 18
Release Link Trunk requirements
Average speed of answer ≤ 10.00 seconds; average RLT delay ≤ 2.00 seconds

RLT circuits needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	1	1	1	1	1	1	1	1	1	0	0	0
2	8	10	11	11	11	11	11	11	11	10	10	10
3	17	23	26	27	27	27	27	27	27	26	26	26
4	26	37	42	44	46	46	46	46	46	46	46	45
5	36	52	59	63	65	66	67	67	67	67	67	67
6	47	67	77	82	86	88	89	89	90	90	90	89
7	58	83	95	103	107	110	111	112	113	113	113	113
8	68	98	114	123	129	132	134	136	137	137	137	137

Table 19
Release Link Trunk requirements
Average speed of answer ≤ 10.00 seconds; average RLT delay ≤ 4.00 seconds

RLT circuits needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	2	2	2	2	2	2	2	2	1	1	1	1
2	11	14	16	16	16	16	15	15	15	14	14	14
3	20	28	32	34	34	35	35	34	34	34	33	33
4	31	44	50	53	55	55	56	56	56	55	55	55
5	41	59	68	73	76	78	78	79	79	79	79	78
6	50	73	85	92	96	99	101	102	102	102	102	102
7	60	87	102	111	116	120	122	124	125	125	125	125
8	70	102	120	130	137	141	144	146	147	148	149	149

Table 20
Release Link Trunk requirements
Average speed of answer ≤ 10.00 seconds; average RLT delay ≤ 6.00 seconds

RLT circuits needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	3	4	4	3	3	3	3	3	2	2	2	2
2	12	17	19	19	19	19	19	18	18	18	17	17
3	21	30	35	37	38	38	38	38	38	38	37	37
4	31	44	51	55	57	58	58	59	59	58	58	58
5	41	59	68	73	76	78	79	80	80	80	80	80
6	50	73	85	92	96	99	101	102	102	102	102	102
7	60	87	102	111	116	120	122	124	125	125	125	125
8	70	102	120	130	137	141	144	146	147	148	149	149

Table 21
CAS attendant requirements
Average speed of answer ≤ 2.00 seconds

CAS attendants needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	10	5	4	3	2	2	1	1	1	1	1	1
2	38	29	24	21	19	17	16	15	14	14	13	12
3	70	57	51	46	43	40	38	37	35	34	33	32
4	103	88	80	74	70	67	64	62	60	58	56	55
5	136	120	110	104	99	95	91	89	86	84	82	81
6	170	153	142	134	129	124	120	117	114	112	110	108
7	205	186	174	166	159	154	150	146	143	140	138	136
8	240	219	206	197	190	185	180	176	173	170	167	165
9	274	253	239	230	222	216	211	207	203	200	197	194
10	309	287	272	262	254	248	243	238	234	230	227	224
11	344	321	306	295	287	280	274	269	265	261	258	255
12	380	355	340	328	319	312	306	301	297	293	289	286
13	415	390	373	362	352	345	339	333	328	324	320	317
14	450	424	407	395	385	378	371	365	360	356	352	348
15	485	459	441	429	419	411	404	398	393	388	384	380

Table 22
CAS attendant requirements
Average speed of answer ≤ 4.00 seconds

CAS attendants needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	15	10	7	5	4	4	3	3	2	2	2	2
2	47	38	33	29	26	24	23	21	20	19	18	17
3	81	70	62	57	54	51	48	46	45	43	42	40
4	116	103	94	88	84	80	77	74	72	70	68	67
5	151	136	127	120	115	110	107	104	101	99	97	95
6	186	170	160	153	147	142	138	134	131	129	126	124
7	221	205	194	186	179	174	169	166	162	159	156	154
8	257	240	228	219	212	206	202	197	194	190	188	185
9	292	274	262	253	245	239	234	230	226	222	219	216
10	328	309	296	287	279	272	267	262	258	254	251	248
11	362	344	331	321	313	306	300	295	291	287	283	280
12	396	380	366	355	347	340	334	328	324	319	316	312
13	430	415	401	390	381	373	367	362	357	352	348	345
14	463	450	435	424	415	407	401	395	390	385	381	378
15	496	485	470	459	449	441	435	429	423	419	415	411

Table 23
CAS attendant requirements
Average speed of answer ≤ 5.00 seconds

CAS attendants needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	17	11	8	7	5	5	4	3	3	3	2	2
2	50	41	35	32	29	27	25	23	22	21	20	19
3	85	74	66	61	57	54	52	50	48	46	45	44
4	120	107	99	93	88	84	81	79	76	74	72	71
5	155	141	132	125	120	116	112	109	106	104	102	100
6	190	176	166	158	153	148	144	140	137	134	132	130
7	225	211	200	192	186	180	176	172	169	166	163	160
8	259	246	234	226	219	213	209	204	201	197	194	192
9	294	281	269	260	253	247	242	237	233	230	226	224
10	328	316	304	294	287	280	275	270	266	262	259	256
11	362	351	339	329	321	314	308	304	299	295	292	288
12	396	385	373	363	355	348	342	337	332	328	324	321
13	430	419	409	398	390	382	376	371	366	362	358	354
14	463	453	443	433	424	417	410	405	400	395	391	387
15	496	487	477	468	459	451	444	439	433	429	424	421

Table 24
CAS attendant requirements
Average speed of answer ≤ 6.00 seconds

CAS attendants needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	19	13	10	8	6	5	5	4	4	3	3	3
2	53	44	38	34	31	29	27	26	24	23	22	21
3	87	77	70	65	61	57	55	53	51	49	48	46
4	123	111	103	97	92	88	85	82	80	78	76	74
5	157	145	136	130	124	120	116	113	110	108	106	104
6	191	180	170	163	157	153	148	145	142	139	136	134
7	225	215	205	197	191	186	181	177	174	171	168	166
8	259	249	240	231	225	219	214	210	206	203	200	197
9	294	283	274	266	259	253	248	243	239	236	233	230
10	328	317	308	300	293	287	281	277	272	269	265	262
11	362	351	342	334	327	321	315	310	306	302	298	295
12	396	385	376	368	361	355	349	344	340	335	332	328
13	430	419	410	402	395	389	384	378	373	369	365	362
14	463	453	443	435	429	423	417	412	407	403	399	395
15	496	487	477	469	462	456	451	446	441	437	433	429

Table 25
CAS attendant requirements
Average speed of answer ≤ 8.00 seconds

CAS attendants needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	22	15	12	10	8	7	6	5	5	4	4	4
2	55	47	42	38	35	33	31	29	27	26	25	24
3	89	81	75	70	66	62	60	57	55	54	52	51
4	123	114	107	102	98	94	91	88	86	84	82	80
5	157	148	140	135	130	126	122	119	117	114	112	110
6	191	181	174	167	162	158	154	151	148	145	143	141
7	225	215	207	201	195	190	186	183	180	177	174	172
8	259	249	241	234	228	223	219	215	212	209	206	203
9	294	283	274	267	261	256	252	248	244	241	238	235
10	328	317	308	301	295	289	284	280	276	273	270	267
11	362	351	342	334	328	322	317	313	309	306	302	299
12	396	385	376	368	361	356	351	346	342	338	335	332
13	430	419	410	402	395	389	384	379	375	371	367	364
14	463	453	443	435	429	423	417	412	408	404	400	397
15	496	487	477	469	462	456	451	446	441	437	433	430

Table 26
CAS attendant requirements
Average speed of answer ≤ 10.00 seconds

CAS attendants needed	Attendant work time (AWT) in seconds											
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
	Attendant traffic (Ta) in CCS											
1	22	17	13	11	9	8	7	6	6	5	5	4
2	55	48	43	39	36	34	32	30	29	27	26	25
3	89	81	75	70	66	63	61	58	56	55	53	52
4	123	114	107	102	98	94	91	88	86	84	82	80
5	157	148	140	135	130	126	122	119	117	114	112	110
6	191	181	174	167	162	158	154	151	148	145	143	141
7	225	215	207	201	195	190	186	183	180	177	174	172
8	259	249	241	234	228	223	219	215	212	209	206	203
9	294	283	274	267	261	256	252	248	244	241	238	235
10	328	317	308	301	295	289	284	280	276	273	270	267
11	362	351	342	334	328	322	317	313	309	306	302	299
12	396	385	376	368	361	356	351	346	342	338	335	332
13	430	419	410	402	395	389	384	379	375	371	367	364
14	463	453	443	435	429	423	417	412	408	404	400	397
15	496	487	477	469	462	456	451	446	441	437	433	430

Implementation and operation

Feature implementation

CAS Main

To configure CAS Main, respond to the prompts in the following overlays:

LD 15 – Change a CAS Main for a customer.

Prompt	Response	Description
REQ	CHG	Change the CAS Main.
TYPE	CDB ATT	Customer Data Block. Release 21 gate opener.
CUST	xx	Customer Number.
ATDN	nnnn	DN that must be dialed by local telephones to reach the CAS Main attendant (default is 0).
ICI	0-19 Rnnnn	Assign Release Link Main trunk routes to Incoming Call Indicators, as required.
CAS	YES	CAS is enabled for this customer. For Release 21 and later, CAS is the gate opener.
MAIN	YES	This is the CAS Main location.
ICI	0-19 Rnnnn	Assign Release Link Main trunk routes to Incoming Call Indicators, as required.

Note 1: When the CAS feature is defined, a signal Remote key is assigned automatically to the key above LPK5 on all CAS Main Attendant Consoles.

Note 2: For the M1250 and M2250 Attendant Consoles, the C/H key acts as the CAS key.

LD 16 – Add or change a trunk route at a CAS Main location.

Prompt	Response	Description
REQ	NEW, CHG	Add, or change the CAS Main.
TYPE	RDB	Route Data Block.
CUST	xx	Customer Number.
ROUT	0-511	Route Number.
TKTP	RLM	Release Link Main trunk type.
...		
ICOG	ICT	Incoming trunk route.
ACOD	nnnn	Trunk access DN. This DN and the Route Member Number display at the CAS Attendant Console. This DN cannot be dial-accessed.
...		
CNTL	(NO) YES	Changes to controls or timers.
- TIMR	FLH 0-(512)-32000	CAS flash timer in ms. Recommended setting is 768 ms or greater. The flash timer must be at least 256 ms shorter than the outgoing flash timer (OGF) at the Remote end.
	ICF 0-(512)-32640	Incoming flash timer.
	OGF 0-(512)-32640	Outgoing flash timer.
	ODT 256-(4096)-16128	Outgoing end-of-dialing timer for Digitone trunks.

NEDC	ORG ETH	Near-end disconnect control Originating (recommended) Either end
FEDC	ETH FEC JNT ORG	Far-end disconnect control Either end Far end Joint control Originating end (recommended)

LD 14 – Add or Change a Release Link Main trunk.

Prompt	Response	Description
REQ	NEW, CHG	Add, or change the CAS Main.
TYPE	RLM	Release Link Main trunk.
TN	l s c u c u	Terminal Number. For Option 11.
XTRK	XUT XEM EXUT	Extended Universal Trunk card. Extended E & M trunk card. Enhanced Extended Universal Trunk (Release 19 and later).
...		
CUST	xx	Customer Number.
...		
RTMB	rrr mmm	Route and member numbers (0-511 0-256).
...		
SIGL	GRD EM4	Ground-start signaling arrangement. Digital trunk.
...		
STRI	aaa	Start arrangement Incoming.
STRO	OWK	Outgoing wink start when SIGL = EM4.
...		
CLS	DTN	Digitone Class of Service.

CAS Remote

To configure CAS Remote, respond to the prompts in the following overlays:

LD 15 – Add or change a CAS Remote for a customer.

Prompt	Response	Description
REQ	NEW, CHG	Add, or change the CAS Main.
TYPE	CDB CAS	Customer Data Block. Release 21 gate opener.
CUST	xx	Customer Number.
ATDN	nnnn	DN that must be dialed by local telephones to reach the CAS Main attendant (default is 0).
CAS	(NO)YES	(Do not) change CAS options.
MAIN	NO	This is a CAS Remote location.
DFLT	(NO)YES	System to recover in the active mode after sysload.
LDNT	(NO)YES	Special tone to be given to the CAS Main attendant on presentation of LDN calls.
LADN	nnnn	Local attendant DN (must be different from the DN entered for ATDN.)
RLA	nnn	Route number for the Release Link Remote trunks.
CHDN	nnnn	DN to be dialed by the CAS attendant to place a call on silent hold.
HRCL	0-512	Time, in units of 2 seconds, that a call remains on silent hold before being recalled to the attendant

Note 1: When the CAS feature is defined, a signal Remote key is assigned automatically to the key above LPK5 on all CAS Main Attendant Consoles.

Note 2: For the M1250 and M2250 Attendant Consoles, the C/H key acts as the CAS key.

LD 11—Add or change a CAS key to multi-line telephones at CAS Remote (if required)

Prompt	Response	Description
REQ	NEW, CHG	Add, or change CAS key assignment.
TYPE	aaa	Telephone type.
TN	l s c u c u	Terminal Number. For Option 11.
KEY	nn CAS	Add a CAS key.

LD 16 – Add or change a Release Link Remote trunk route.

Prompt	Response	Description
REQ	NEW, CHG	Add, or change.
TYPE	RDB	Route Data Block.
CUST	xx	Customer Number.
ROUT	0-511	Route Number.
TKTP	RLR	Release Link Remote trunk type
ICOG	OGT	Outgoing trunk route.
...		
ACOD	xxxx	Access Code for the trunk route.
...		
CNTL	(NO)YES	Change timer controls.
TIMR	GRD 0-(512)-32640 GRD 0-(768)-32640 OGF (640)-32640	Guard timer for Analog trunks in ms. Guard timer for Digital trunks in ms Recommended setting is 768 ms or greater. Outgoing flash timer in ms. This timer must be at least 256 ms longer than the flash timer at the Main.

NEDC	ICF 0-(512)-32640	Incoming flash timer.
	ODT 256-(4096)-16128	Outgoing end-of-dialing timer for Digitone trunks.
FEDC	ORG ETH	Near-end disconnect control. Originating (recommended). Either end.
	ETH FEC JNT ORG	Far-end disconnect control Either end. Far end. Joint control. Originating end (recommended).

LD 14 – Add or change a Release Link Remote trunk.

Prompt	Response	Description
REQ	NEW, CHG	Add, or change.
TYPE	RLR	Release Link Remote trunk type.
TN	l s c u c u	Terminal Number. For Option 11.
CUST	xx	Customer Number.
RTMB	rrr mmm	Route and member numbers (0-511 0-256).
RLDN	xxx...x	DN to be dialed to access the trunk directly.
SIGL	GRD EM4	Ground-start signaling arrangement. Digital trunk.
STRO	OWK	Outgoing wink start when SIGL = EM4.
CLS	DTN	Digitone Class of Service.

Operation

Main operation

To answer CAS calls, press the ICI or loop key.

To extend calls to a CAS Remote site, follow these steps:

- 1** Press the signal Remote key.
- 2** When you hear the special dial tone, dial the Remote DN.
- 3** Press the RLS key.

Remote operation

To activate CAS, press the CAS key. The CAS lamp lights steadily and remains lit as long as CAS is in use.

To deactivate CAS, press the CAS key again. The lamp goes off.

Testing

The tests in **Procedure 1**, which follows, are conducted when the CAS feature is installed at a Remote site that will be served by a CAS attendant. These procedures can also be used as a guide to locating a fault in the feature.

Procedures 2 through **7** describe tests that verify that the CAS attendant can receive and handle calls from any site arranged for the CAS feature.

Procedure 1 Testing the CAS feature at a Remote site

Procedure 2 Testing the CAS feature at the CAS Main attendant

Procedure 3 Answering an incoming call from a Remote site while at the CAS Main

Procedure 4 Extending a call to an idle telephone at a Remote site

Procedure 5 Extending a call to a busy telephone with Camp-On

Procedure 6 Placing a call on Silent Hold

Procedure 7 Transferring a call to a second Remote telephone

Procedure 1

Testing the CAS feature at a Remote site

- 1 Verify that all CAS data is correct. See feature implementation.
- 2 Verify that the Release Link Trunks (RLT) are installed and enabled.
- 3 Verify that the Tone and Digit Switches (TDS) are installed and enabled.
- 4 From any telephone, dial the DN of an RLT. If the RLT is busy, a busy tone is heard. If the RLT is idle, the following events occur:
 - A Ringback (RGB) tone is heard.
 - When the CAS attendant answers, the Ringback tone stops and a voice path is established.Verify that a two-way conversation can be carried out. Release the call.
- 5 Repeat step 4 for each RLT.
- 6 From any telephone, dial the DN for the local attendant. This call is presented to the local attendant as a normal dial "0" call.

- 7** From any telephone, dial the DN assigned for the CAS attendant. This call is presented to the local attendant as a normal dial "0" call. If this location is in Night Service, calls dialed to either the local attendant or the CAS attendant are presented to the night number or to Trunk Answer From Any Station (TAFAS) at this location, as applicable.
- 8** Verify that the CAS key (above the LPK 5 key) on the local attendant console is so designated. If a console is not equipped, this key can be assigned on as many as ten multi-line telephones.
- 9** Press the CAS key. The associated LED lights up to indicate that the CAS feature has been activated. All calls normally presented to the local attendant are now directed to the CAS attendant except as in step 10.
- 10** From any telephone, dial the DN assigned for the local attendant. This call is presented to the local attendant as a normal dial "0" call. See step 7.
- 11** From any telephone, dial the DN assigned for the CAS attendant. This call is presented to the CAS attendant, preceded by an identifying tone (two 100-ms bursts of 440-Hz tone).
- 12** From any telephone, dial the access code for an outside line. When the second dial tone is heard (although, depending on the TIE route, it may not be provided), dial the LDN for your location. This call is directed to the CAS attendant.
- 13** When the CAS attendant answers, request that your call be placed on Silent Hold. When the specified timeout period has elapsed, your call is directed back to the CAS attendant.
- 14** Ask the CAS attendant to extend your call to a busy telephone at your location.
 - If another call is not already camped-on to the busy telephone, your call is automatically camped-on. When the busy telephone becomes idle, your call is presented automatically to that telephone.
 - If the busy telephone does not become idle within the specified timeout period, your call is presented to the CAS attendant again.
- 15** If in step 14 your call was completed to a telephone that was busy, ask the telephone user to transfer your call to the attendant. This directs your call to the CAS attendant. Proceed to step 17.
- 16** If in step 14 the timeout period elapsed, and your call was directed back to the CAS attendant, proceed to step 17.

- 17 Release the call.
- 18 Momentarily press the RLS key on the local-attendant console (or multi-line). The associated LED goes out, and all calls requiring attendant assistance are presented to the local attendant.
- 19 Proceed to the CAS Main attendant location, and conduct the tests in Procedure 2.

Procedure 2

Testing the CAS feature at the CAS Main attendant

- 1 Verify that all CAS data is correct. See feature implementation.
- 2 Verify that the Release Link Trunks (RLT) are installed and enabled.
- 3 Verify that the TDS cards are installed and enabled.
- 4 Ensure that the CAS attendant console is equipped with the following:
 - an RLT X ICI key for each group of RLT from Remote locations, where X designates a particular Remote location
 - a Signal Remote (SIG REM) key (above the LPK 5 key) and a C/H key on the M1250 and M2250 consoles
 - a release destination (RLS DEST) key
- 5 From any telephone, dial the access code for a TIE trunk to a Remote location. When the second dial tone (optional, depending on the route) is heard, dial the DN for an RLT. This call is presented to the CAS attendant. Ensure that the call is presented on the correct ICI key and that the correct access code and route member number of the RLT are displayed. When the CAS attendant answers, two 100-ms bursts of 440-Hz tone are heard by the attendant (if defined in customer LD 15) before the voice path is established.

Calls that are active on a CAS attendant console and that are presented to a Remote telephone (by means of RLT) are considered as incoming external calls rather than as attendant calls for purposes of digit display. This is done for the following reasons:

- The identity of the CAS attendant cannot be determined from the Remote end.
 - The display of the RLT identification is sufficient to indicate that the call is connected to an attendant. The identification also enables the user to identify the specific RLT used, in case of a fault.
- 6 Repeat step 4 for each RLT at each Remote location.

- 7 Call the attendant at a Remote location by dialing the access code for an outside line, and then the LDN for the Remote location. Ask the attendant at the Remote location to activate the CAS feature by momentarily pressing the CAS key.
- 8 Occupy a CAS attendant position, and direct all CAS-related calls as described in Procedures 3 through 7.

Procedure 3**Answering an incoming call from a Remote site while at the CAS Main**

- 1 Initial condition: The console is idle.
- 2 Place a call to the console from a Remote site.
 - The ICI key is lit.
 - The SRC key flashes at 60 ipm.
 - A ringing tone is heard.
 - The digit display shows the access code and trunk member number of the RLT.
- 3 Press the LPK key.
 - The ICI, SRC, and LPK keys are steadily lit.
 - Two 100-ms bursts of 440-Hz tone are heard before the voice path is established.

Procedure 4**Extending a call to an idle telephone at a Remote site**

- 1 Initial condition: A two-way conversation between an attendant and the calling party.
 - The ICI, SRC, and LPK keys are steadily lit.
- 2 Press the SIG REMOTE key.
 - A dial tone is heard.
 - The calling party is excluded.
- 3 Dial the DN of a Remote telephone.
 - The DEST key flashes at 60 ipm (QCW 4).
 - A Ringback (RGB) tone is heard.
 - The called telephone answers.

- 4 Press the RLS key.

A two-way conversation is established between the calling and called parties.

Note: If the attendant releases before the telephone answers, the calling party hears a Ringback and is recalled to the attendant after 30 seconds (the slow-answer timer default).

Procedure 5

Extending a call to a busy telephone with Camp-On

- 1 Initial condition: A two-way conversation between an attendant and the calling party.
 - The ICI, SRC, and LPK keys are lit.
- 2 Press the SIG REMOTE key.
 - A dial tone is heard.
 - The calling party is excluded.
- 3 Dial the DN of a busy Remote telephone.
 - The DEST key flashes at 60 ipm (QCW4).
 - The Camp-On Tone is heard.
 - The dialed number is displayed.
 - The calling party is camped-on to the busy telephone.

Note: If the Remote telephone does not answer after 30 seconds, the call is recalled to the attendant (the slow-answer timer default).

Procedure 6

Placing a call on Silent Hold

- 1 Initial condition: A two-way conversation between the attendant and the calling party.
 - The ICI, SRC, and LPK keys are steadily lit.
- 2 Press the SIG REMOTE key.
 - The SIG REMOTE key is lit.
 - A dial tone is heard.
 - The calling party is excluded.

- 3 Dial Silent Hold DN.
 - The hold confirmation tone is heard.
- 4 Press the RLS key.

Note: The attendant is recalled when the hold timer expires.

Procedure 7**Transferring a call to a second Remote telephone**

- 1 Initial condition: A two-way conversation between the attendant and the calling party.
 - The ICI, SRC, and LPK keys are steadily lit.
- 2 Press the SIG REMOTE key.
 - A dial tone is heard.
 - The calling party is excluded.
- 3 Dial the DN of a Remote telephone.
 - A Ringback (RGB) tone is heard.
- 4 The called telephone answers.
- 5 Press the RLS DEST key.
 - The called party is disconnected.
- 6 Dial the DN of a second Remote telephone.
- 7 Press the SIG REMOTE key.
 - A dial tone is heard.
 - The calling party is excluded.
- 8 The called telephone answers.

Meridian 1

Centralized Attendant Service

Description and engineering

© 1979,1996 Northern Telecom

All rights reserved

Information is subject to change without notice.

Northern Telecom reserves the right to make changes in design or components as progress in engineering and manufacturing may warrant. This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC rules, and the radio interference regulations of Industry Canada. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

SL-1 and Meridian 1 are trademarks of Northern Telecom.

Publication number: 553-2681-100

Document release: Standard 5.00

Date: August 1996

Printed in the United States of America

NORTEL
NORTHERN TELECOM