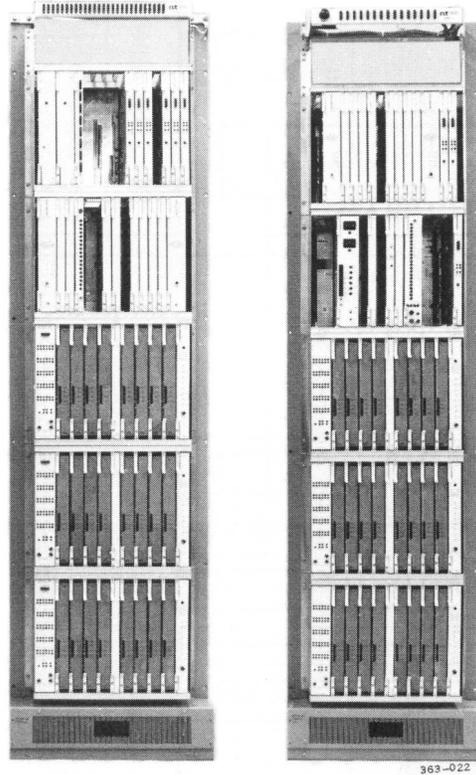


DMS-1* DIGITAL MULTIPLEX SYSTEMS

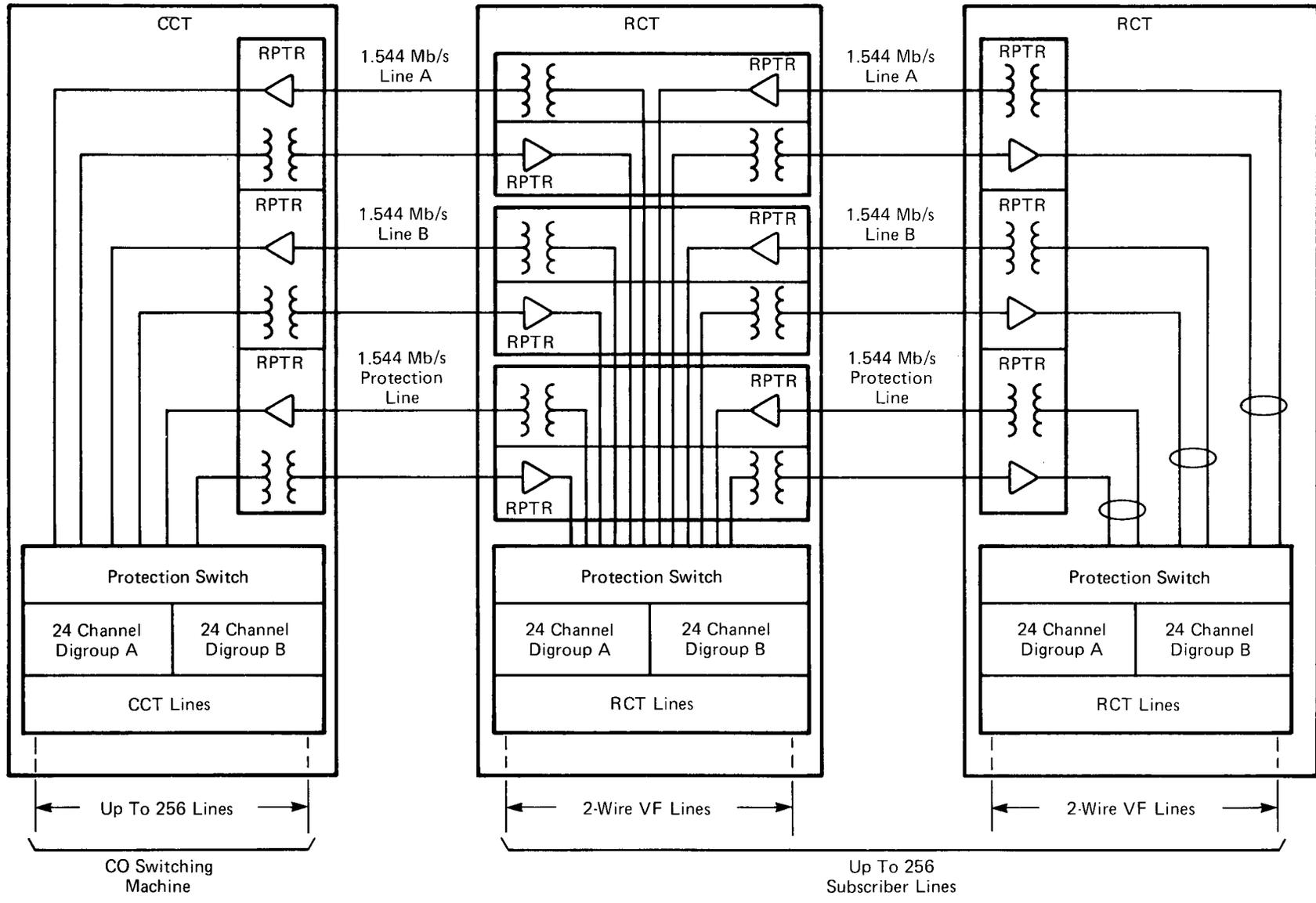
SYSTEM DESCRIPTION



CONTENTS	PAGE
1. GENERAL	4
2. SYSTEM DESCRIPTION	4
A. Basic Configuration	4
B. System Features	5
C. Signal Format	6
3. SYSTEM OPERATION	8
A. Operating Sequence	8
B. DS1 Line Protection Switching	12
C. Subscriber Line Test Extension	14
4. FUNCTIONAL DESCRIPTION	14
A. Control Concentrator Terminal	14
B. Remote Concentrator Terminal	16
C. DS1 Digital Line	18
5. REFERENCES	18
A. Northern Telecom Practices	18
B. Schematic Drawings	19

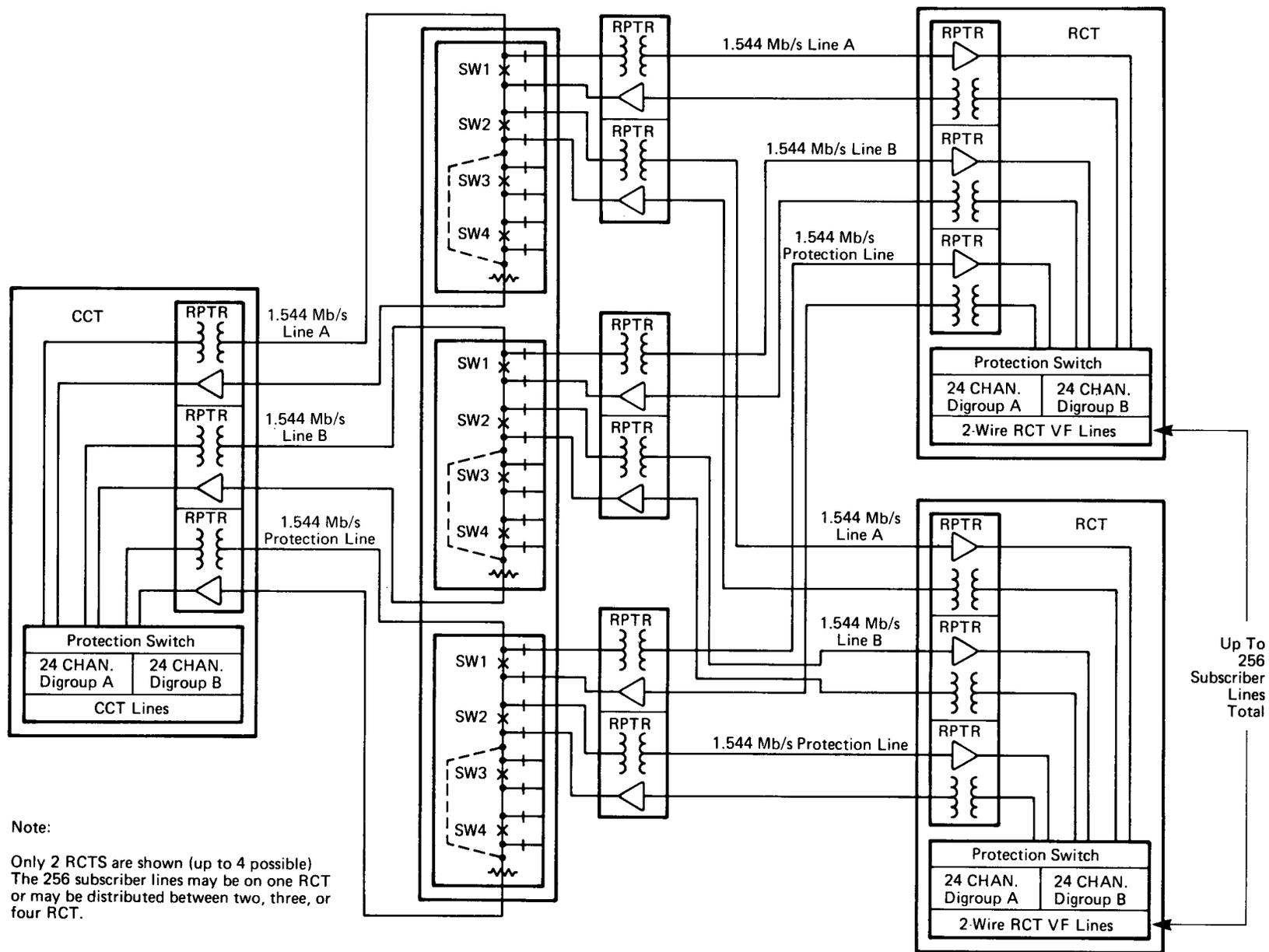
CONTENTS	PAGE
Figures	
1(a) DMS-1 System Block Diagram —Standard Configuration	2
1(b) DMS-1 System Block Diagram —Star Configuration	3
2. Control Concentrator Terminal	5
3. Remote Concentrator Terminal	5
4. DMS-1 Frame Format	7
5. B-Word Control Code Format	7
6. Operating Sequence	9
7. CCT Line Scan and Status Routine	10
8. Channel Assignment and Release Routine	11
9. DS1 Line Protection Switching	13
10. Subscriber Line Test Extension — Block Diagram	14
11. Control Concentrator Terminal Block Diagram	15
12. Remote Concentrator Terminal Block Diagram	17

* DMS-1 is a trademark of Northern Telecom Limited



Note: Only 2 RCTs are shown (up to 4 possible). The 256 subscriber lines may be on one RCT, or may be distributed between up to four RCT.

Fig. 1(a) – DMS-1 System Block Diagram – Standard Configuration



Note:

Only 2 RCTs are shown (up to 4 possible)
 The 256 subscriber lines may be on one RCT
 or may be distributed between two, three, or
 four RCT.

Fig. 1(b) – DMS-1 System Block Diagram – Star Configuration

1. GENERAL

Scope

1.01 This section describes the DMS-1 Digital Multiplex System. Detailed descriptions of the major components of the DMS-1 are contained in the following Sections.

363-2011-101 Control Concentrator Terminal Description

363-2011-102 Remote Concentrator Terminal Description

363-2011-103 Order-Wire and Fault-Locate Shelf Description

363-2011-104 J7209C Power Bay Description.

1.02 *Reason for Reissue.* To add new and revised information. Because this is a general revision the changes are not marked.

Purpose

1.03 The DMS-1 provides telephone service for up to 256 subscriber lines. It acts both as a remote switch to concentrate up to 256 subscriber lines on 48 digital transmission channels, and as a digital transmission system to connect the subscriber lines to a central office.

Application

1.04 The primary applications of the DMS-1 are:

(a) to provide telephone service to groups of subscribers such as those in:

- a group of apartment houses
- a mobile-home park
- a farming community
- an isolated resort area.

(b) to replace small Community Dial Offices (CDO),

(c) to defer cable replacement.

Compatibility

1.05 The DMS-1 is compatible with most local switching centers without modifications or sleeve lead extensions on the switching machines.

2. SYSTEM DESCRIPTION

A. Basic Configuration (Fig. 1[a] and 1[b])

2.01 *System Components.* The DMS-1 system consists of:

- a Control Concentrator Terminal (CCT) located at the switching center
- one to four Remote Concentrator Terminals (RCT) located near a group of subscribers
- up to three (two working and one protection) DS1 digital transmission lines which interconnect the CCT and the RCT, and have order-wire and fault-locating facilities.

2.02 *System Operation.* The system operates in a closed-loop arrangement. A Pulse Code Modulated (PCM) bit stream originates in the CCT, passes through each RCT, and returns to the CCT.

Control Concentrator Terminal (Fig. 2)

2.03 The CCT scans the subscriber lines from the switching machine. When ringing or coin control signals on a line are first detected, the next available digital channel is assigned to the ringing line. The supervisory information and voice frequency signals on the line are then encoded into PCM format, and multiplexed into the assigned channel time slot, along with the signals from other working lines in their similarly assigned time slots, on the DS1 line to the RCT. The encoded and multiplexed signals include control bits which control the operation of the system.

Remote Concentrator Terminal (Fig. 3)

2.04 In each RCT the voice signals, supervisory information, and control signals transmitted from the CCT and assigned to that RCT are extracted. The voice signals and supervisory information are decoded, demultiplexed, and connected to the individual subscriber lines. The control signals are also decoded and used as follows:

- (a) to initiate the required tests and maintenance procedures,
- (b) to sequentially scan the on-hook/off-hook condition of each subscriber line.

7 ft. Bay Configuration	
Initial Bay	Extension Bay
Fuse Panel	
OW & Fault LOC	
Common 1	Line Shelf 3
Common 2	Line Shelf 4
Line Shelf 0	Line Shelf 5
Line Shelf 1	Line Shelf 6
Line Shelf 2	Line Shelf 7

Note:

Extension bay can be either on the right side or left side of the initial bay.

Fig. 2 — Control Concentrator Terminal

7 ft. Bay Configuration	
Initial Bay	Extension Bay
Fuse Panel	
OW & Fault LOC	
Power	Line Shelf 3
RCT Common	Line Shelf 4
Line Shelf 0	Line Shelf 5
Line Shelf 1	Line Shelf 6
Line Shelf 2	Line Shelf 7

Note:

Extension bay can be either on the right side or left side of the initial bay.

Fig. 3 — Remote Concentrator Terminal

2.05 Return voice signals, and supervisory information (dial pulses, coin condition) from the subscriber lines connected to the RCT, along with control signals originated by the RCT, (line scan, alarm, and maintenance indications) are multiplexed, encoded, and returned to the bit stream in the same time slots from which information has previously been removed. The DS1 signal is then returned to the CCT where it is decoded and demultiplexed. Return voice signals and supervisory information (dial pulses) are sent on the subscriber lines to the switching machine. At the same time, control signals from the RCT are checked for errors and analyzed for data. New service requests (off-hook conditions on lines previously on-hook) are assigned to available digital channels, while alarm and maintenance indications are displayed on the front panels.

B. System Features

2.06 *Main Features* of the DMS-1 are as follows:

- subscriber services for:
 - (a) single-party bridged ringing,
 - (b) 2-party divided ringing,
 - (c) 2-party divided ringing with Automatic Number Identification (ANI),
 - (d) multiparty divided, coded ringing;
 - (e) coin telephone (prepay, semipostpay, and postpay; loop or ground start),
 - (f) frequency-selective ringing,
 - (g) dial pulse and DIGITONE*,
 - (h) superimposed ringing.
- traffic monitoring capability;
- local link connection to provide 24 additional channels for calls within the same RCT (24 channels maximum in one DMS-1 system with one to four RCT);
- system alarms for monitoring the condition of the CCT, RCT, and digital lines;
- protection switching to a spare digital line on one-for-one or one-for-two basis on a single DMS-1 system; or on a one-for-n basis for two or more colocated systems;

* DIGITONE is a trademark of Northern Telecom Limited

- RCT bypass to maintain service to other RCT by bypassing the failed RCT (in both standard and star configured systems); and bypassing of the DS1 line of a failed arm to maintain service on other arms in star configured systems;
- digital line loopback to restore service to the RCT closer to the CCT when both digital lines fail (distributed systems only);
- reassignment of lines from a failed digroup to unassigned channels on a working digroup (dual digroup system only);
- dedicated channels and priority assignment capabilities;
- system fault location:
 - (a) *Automatically*: by periodic interrogation and display of alarms;
 - (b) *Manually*: at the CCT or RCT, by remote control of vf loopback at the subscriber pair interface.
- subscriber line testing, with a numeric read-out of loop parameters;
- subscriber line test extension, providing a metallic bypass of the DMS-1 system for normal testing methods on subscriber loops from a centralized test center;
- accommodation of DS1 line termination equipment with order-wire and fault-location access;
- RCT powering from central office battery, if available, or from an optional rectifier and backup battery supply;
- packaging for 256 lines on two 7-foot, 9-foot, or 11.5-foot bays;
- RCT cabinet with 128-line capacity.

C. Signal Format

Framing Codes

2.07 The vf, supervision, and control information between the CCT and the RCT is transmitted by the digital bit stream at the rate of 1.544 Mb/s. The different types of information contained in this bit stream must be routed to the proper circuit paths. To achieve this, the bits are arranged in frame and master frame patterns as shown in Fig. 4.

2.08 Each frame contains 193 bits, including the frame bit. Each of the 24 digital channels in a frame is represented by 8 consecutive speech bits in the frame, except in every sixth frame. In every sixth frame the least significant bit in every 8-bit word is replaced by either a signaling bit or a control bit.

2.09 Framing synchronization is achieved by sending the frame bits in a set pattern which is repeated in every 12-frame master frame. The pattern is such that the receiving circuits can:

- (a) recognize the start of every 193-bit frame;
- (b) recognize every sixth frame in which signaling and control information is transmitted;
- (c) distinguish the odd-numbered sixth frames carrying signaling information from the even-numbered sixth frames carrying control information.

2.10 The out-of-frame detector counts up one count for every framing-bit error detected, and down one count for every 3 successive correct framing bits detected. The counter capacity is 12 bits. When the counter accumulates a count of 12 errors, an out-of-frame condition is indicated and automatic resynchronization is attempted. This is done by a search, 8 bits at a time through the frames, for the correct pattern of framing bits. After frame resynchronization has been achieved, detection of one framing-bit error before three correct bits are detected initiates another attempt to resynchronize. If correct framing has not been achieved within 100 ms, an alarm is generated.

2.11 Supervisory information, such as on-hook/off-hook, ringing, and dial pulsing, is transmitted by replacing the least significant bits in the channel words with supervisory information bits during every odd-numbered sixth frame. These are referred to as the 24 'A' bits. In the even-numbered sixth frames, the least significant bits for the 24 channels are replaced by control bits which form a 24-bit word; these are referred to as 'B' bits.

Control Codes

2.12 The CCT and the RCT exchange information through the B-bit words transmitted in every even-numbered sixth frame. The 24-bit B-word is divided into three 8-bit bytes (Fig. 5). The operation code byte (byte 1) is used to instruct the RCT on the type of operation to be performed (read, reset, write) and the type of memory or register to be accessed.

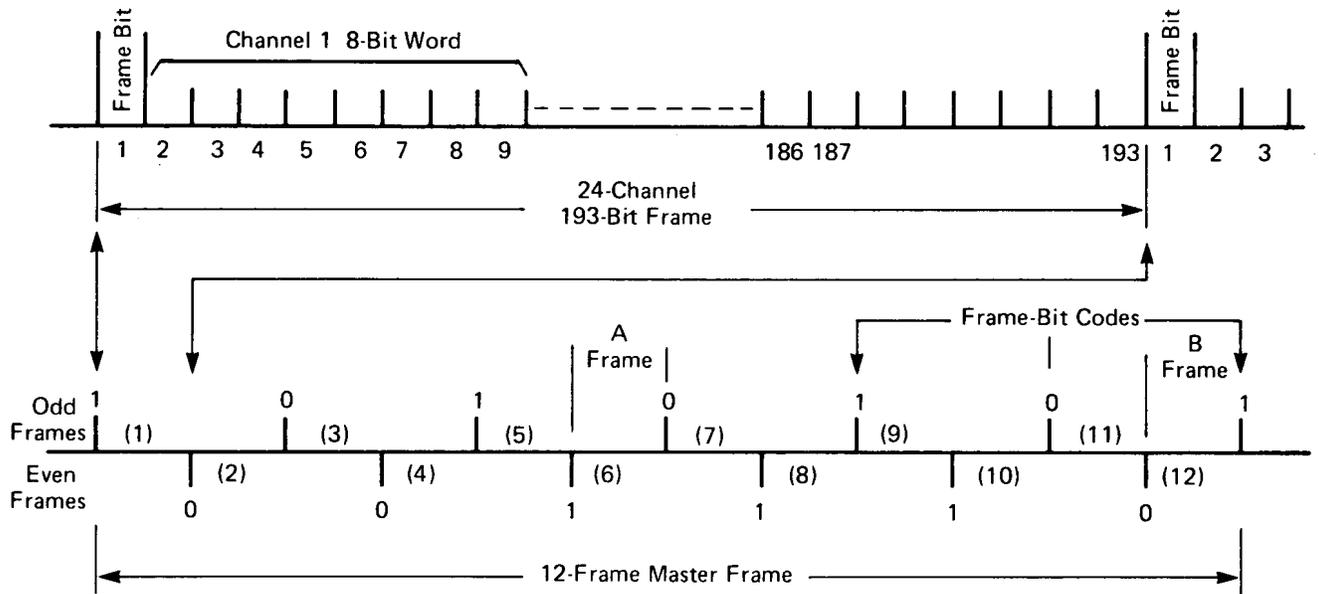


Fig. 4 – DMS-1 Frame Format

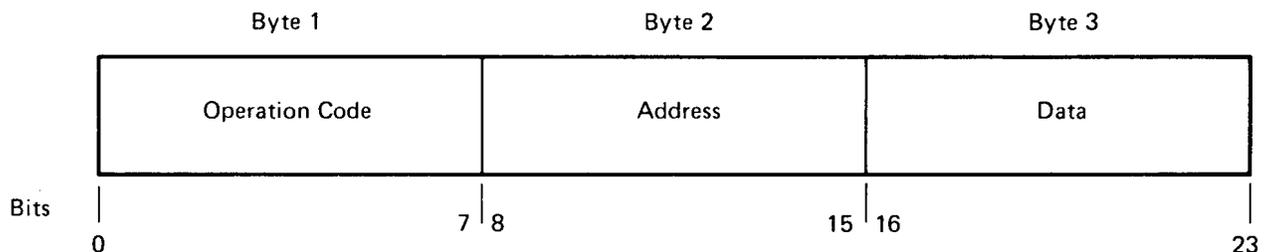


Fig. 5 – B-Word Control Code Format

2.13 Five types of scan operations are used in the DMS-1 system.

- (a) **Line Scan.** A routine operation which interrogates the status of the 256 lines for on-hook/off-hook and ringing conditions.
- (b) **Identification Scan.** Interrogates the type of line circuit pack at each location on the line shelves (CCT only).
- (c) **Alarm Scan.** Interrogates the alarm registers in the CCT and RCT for alarm states.

(d) **Maintenance Scan.** Interrogates the status of maintenance controls; e.g., test, protection switch.

(e) **Audit.** Checks the operation of the supervisory circuits in all line circuit packs.

2.14 The address byte (byte 2) contains the address code or location of the circuit pack and channel to which the information bits contained in byte 3 are to be directed.

2.15 The data byte (byte 3), during scan and read operations, returns the 8 bits of data from the addressed RCT memories or registers and, during a write operation, transmits the channel number or control bits to the RCT.

3. SYSTEM OPERATION

A. Operating Sequence (Fig. 6)

3.01 Since there are 256 subscriber lines sharing 48 channels, and since each subscriber line has equal priority (except when the priority-dedicated option is installed) and full access to any one of the 48 channels, the system must operate in a logical sequence to:

- (a) monitor and assign available channels to the subscriber lines upon receipt of service requests,
- (b) release the channels once the calls have been completed,
- (c) control alarm and test functions.

3.02 These functions are carried out in a routine sequence of operations by the CCT system controller which keeps the CCT informed of the RCT status. The sequence of the functions performed are as follows.

- (1) line scan and status routine,
- (2) channel assignment and release routine,
- (3) local link assignment and channel release,
- (4) memory audit and line identification,
- (5) alarm scan,
- (6) maintenance routine.

3.03 *Line Scan and Status Routine (Fig. 7).* The line scan and status routine monitors the on-hook/off-hook state on each of the subscriber lines connected to the RCT; and the ringing status of the lines between the CCT and the switching equipment.

3.04 *Channel Assignment and Release Routine (Fig. 8).* The channel assignment and release routine in the DMS-1:

- assigns available channels to the line upon receipt of service requests,
- releases the channel when the subscriber goes on-hook.

3.05 *Local Link Assignment and Channel Release.* The local link assignment and channel release routine in the DMS-1:

- assigns a local-link channel between two subscribers if the call originates from and terminates at subscribers connected to the same RCT, but excluding calls originated from a coin line;
- releases the channel between the RCT and the CCT once the local-link assignment is made;
- maintains an off-hook condition at the CCT so that calls from outside the DMS-1 system receive a busy tone.

3.06 *Line Identification Scan.* At the end of each complete line-scan cycle, the CCT scans eight CCT line circuits to update the memories that record the type of service provided (single-party, multiparty, coin telephone, etc.). This information is required for the CCT to carry out the specialized functions associated with coin telephones, ANI tests, priority and dedicated line units, and other special features.

3.07 *Alarm Scan.* The steps carried out by the system for the alarm scan are similar to those for the line scan, except that the contents of the RCT and CCT alarm registers are inserted into the 8-bit data bytes of the B-word rather than the line on-hook/off-hook or ringing states.

3.08 Alarm conditions are stored in the CCT control memory and checked for conditions requiring a maintenance operation. The alarms are also transferred to the alarm circuit pack for display and operation of the office alarms.

3.09 *Maintenance Routine.* After the alarm scan has been completed, the CCT scans the status of local manual controls (e.g., test, protection switch). If one of the controls has been operated, the command is transferred to the RCT through a write B-word to operate a remote control, and is checked through a read B-word. If a reply is required from RCT (e.g., subscriber line test results), the associated register is addressed and scanned. If the test access coin-collect detector has been activated, the applicable relays are operated at the CCT, and relay operation commands are sent to the RCT.

3.10 *Memory Audit.* The channel idle/busy memories are scanned one memory position at a time. The RCT, CCT, and system controller memories are compared. Discrepancies cause the memories to be erased and rewritten.

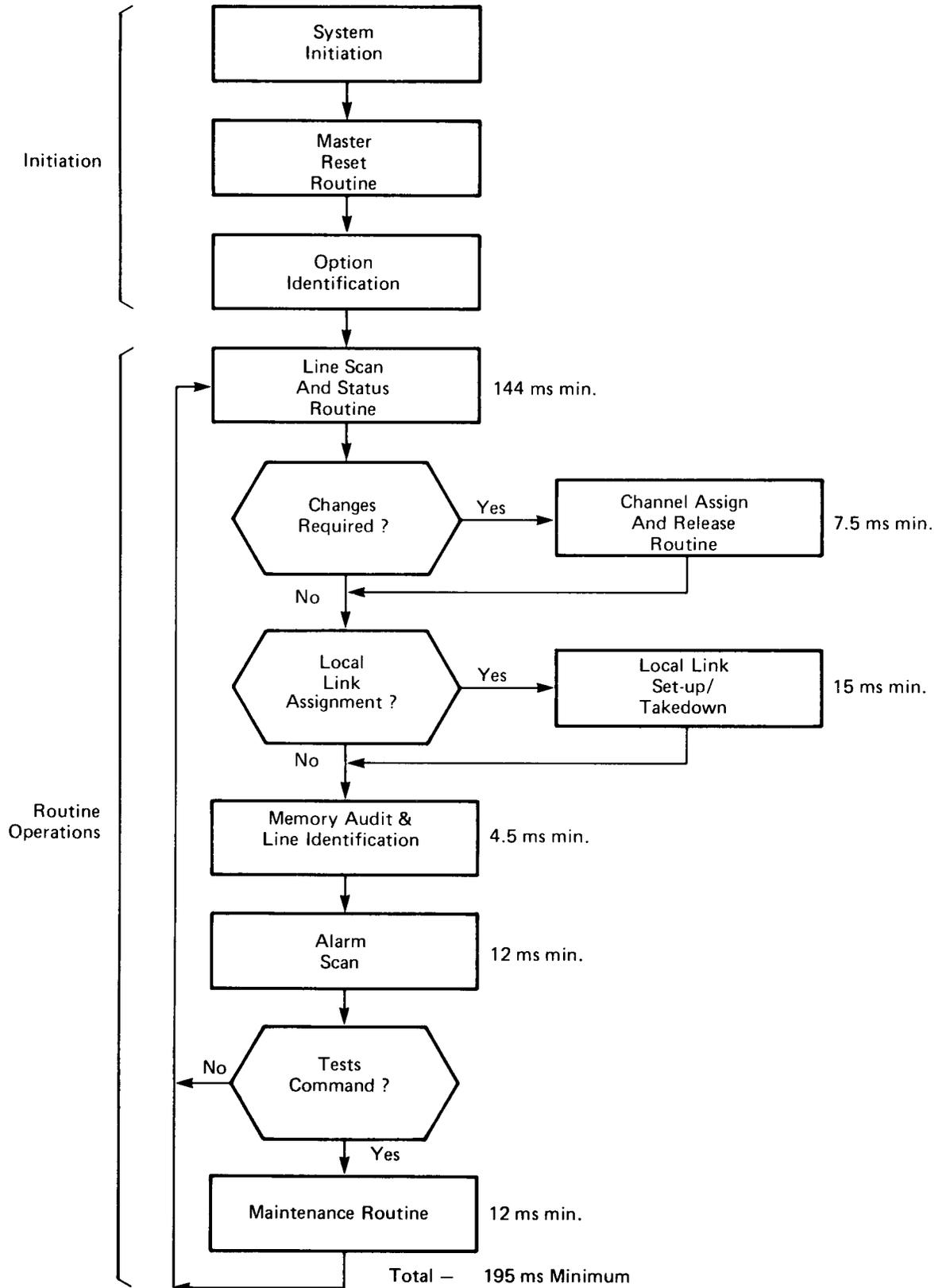


Fig. 6 — Operating Sequence

SECTION 363-2011-100

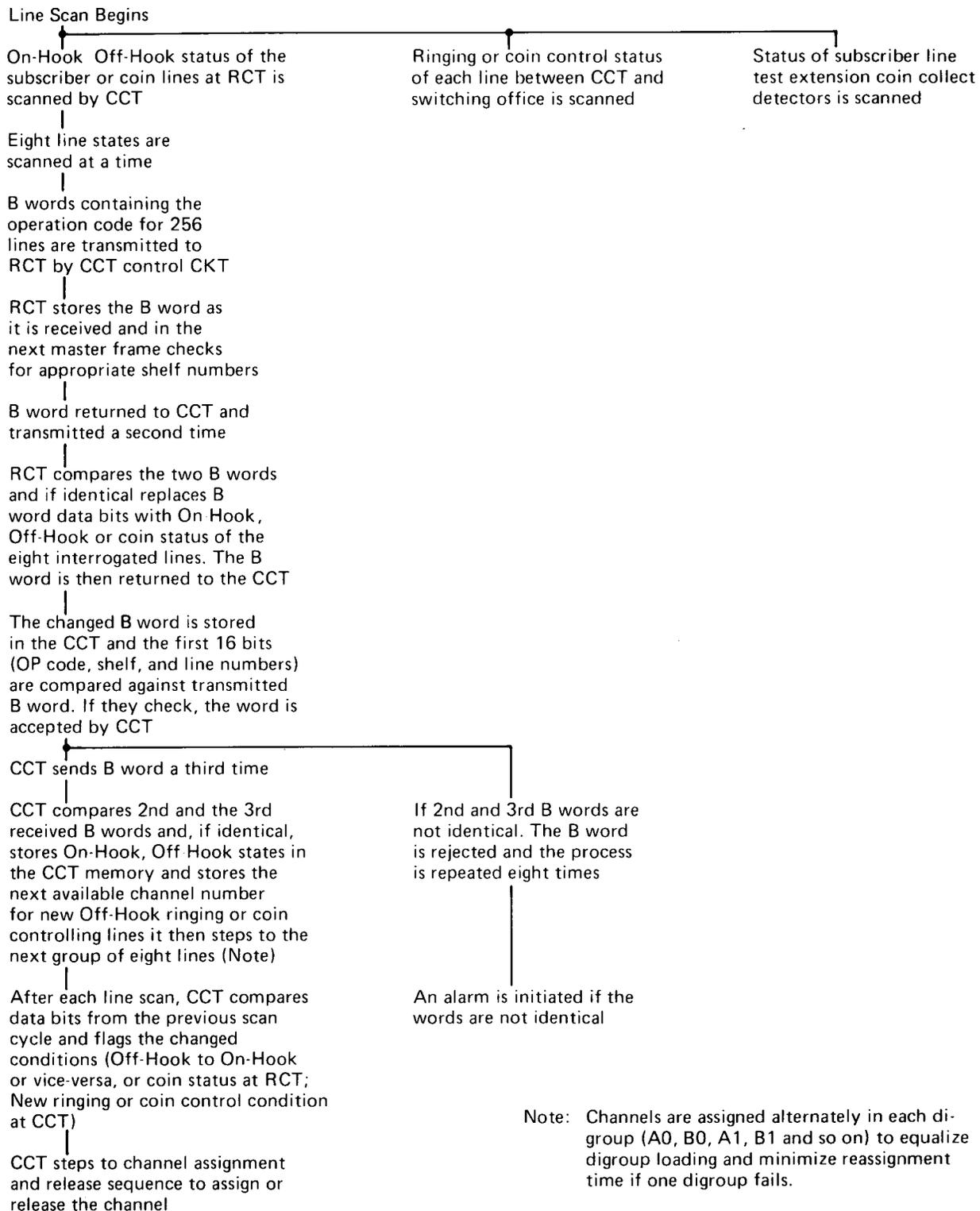


Fig. 7 — CCT Line Scan and Status Routine

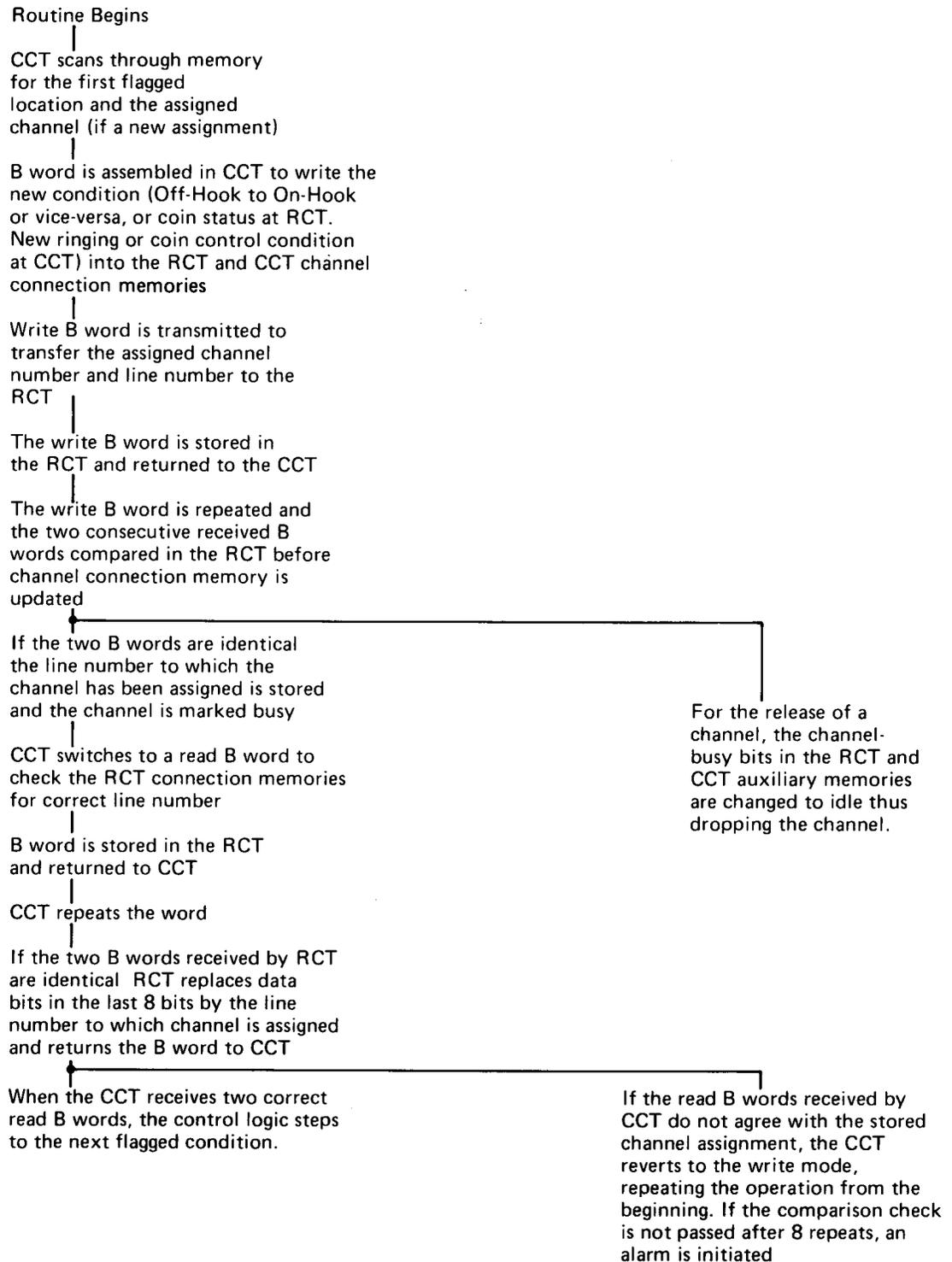


Fig. 8 – Channel Assignment and Release Routine

3.11 *Channel Reassignment.* In the event of a failure on a DS1 line or in the hardware of one digroup, and traffic on the digroup cannot be restored on the protection channel or on standby circuit packs, calls on the failed digroup are transferred to the other digroup up to the full 24-channel capacity of the second digroup. Calls in progress that cannot be transferred are disconnected; e.g., when all channels of the second digroup are filled with calls.

B. DS1 Line Protection Switching (Fig. 9)

3.12 The CCT and the RCT in the DMS-1 system are interconnected by one or two working and one (optional) protection DS1 digital lines. The line protection switching is carried out automatically on a one-for-one or two-for-two basis.

Single System Protection (one-for-one or one-for-two)

3.13 In normal operation (Fig. 9), the protection line is bridged onto line A on the CCT protection switching circuit pack, passes through each of the RCT in succession, and terminates at the CCT.

3.14 The status of the two working lines and the protection line is continuously monitored by the detector circuits in the terminal repeaters. In the event of a fault or high bipolar violation rate, the detector identifies the fault and sends a request for transfer to the protection switching logic in the RCT. If the protection line is functioning correctly and if there are no high-priority conditions (e.g., protection line occupied by the other DS1 line), the transfer of service to the protection line is made on both the receive and transmit sides by the protection switching circuit pack at the RCT. The transmit signal is stopped for 80 ms to signal the RCT switch to the next terminal.

3.15 This procedure is repeated at all RCT between the failure and the loopback at the RCT farthest away from the CCT.

3.16 At the switching center the failed condition on the working span line is detected by the CCT protection switching logic. The logic operates the CCT transmit and receive switches and informs the system controller of the failure.

3.17 The break in the transmit signal generated in the CCT initiates the same procedures at all RCT between the CCT and the failure point. The traffic from the failed lines is thus carried on the

protection line between the CCT and the RCT and is connected to the digroup associated with the failed span line at the RCT and CCT. The failed working line bypasses all RCT and is looped at the farthest RCT for fault locating.

3.18 When the failed working line has been repaired, the detector output indicates a good signal for 10 seconds, the system automatically restores traffic to the working line on command from the system controller.

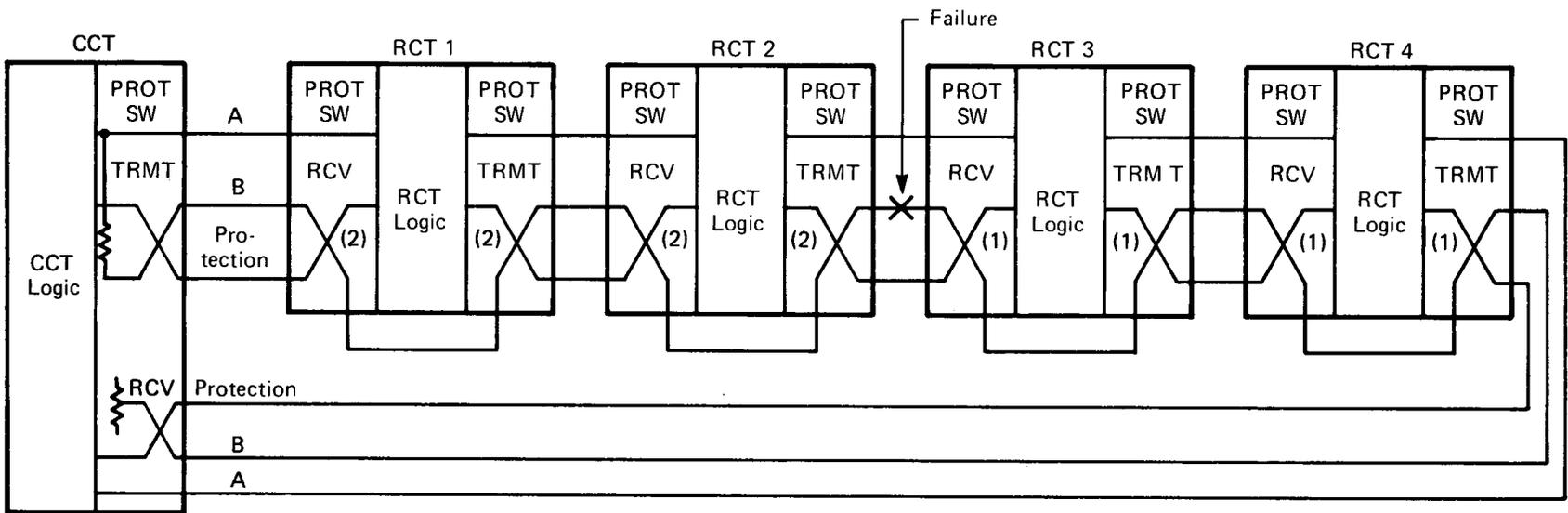
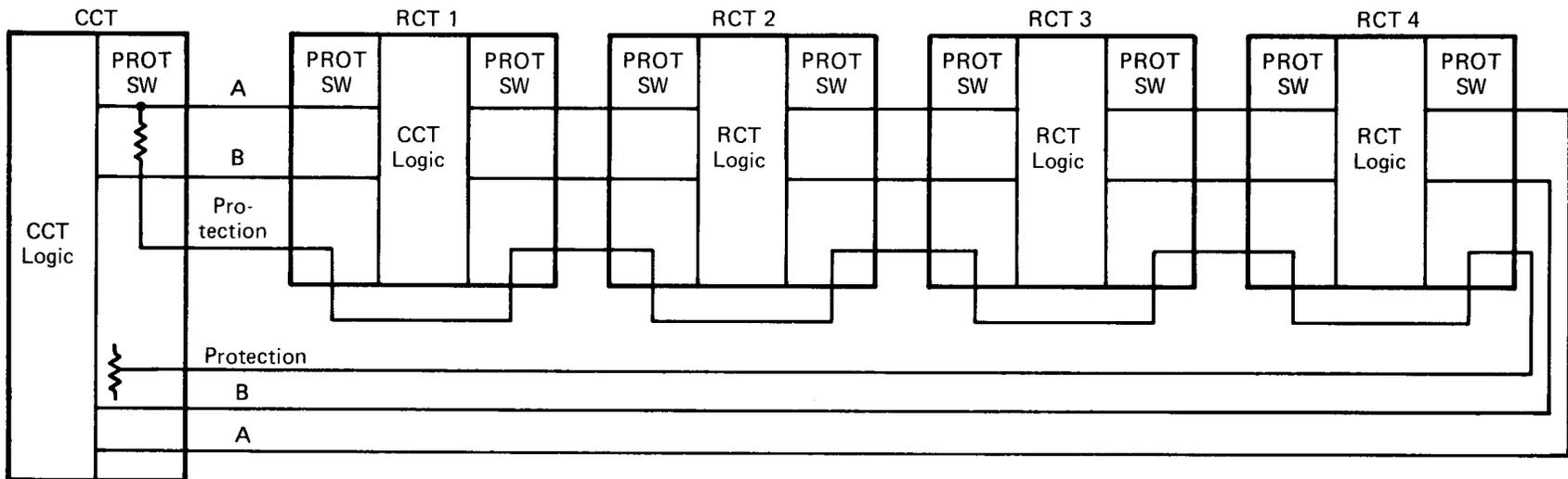
Multiple System Protection (one-for-n)

3.19 In the one-for-n protection switching system, the protection line is shared by two or more DMS-1 systems whose CCT and RCT are colocated. Operation of the system is the same as described in 3.12 through 3.18 with the following differences.

- (a) Interlocks are provided to prevent simultaneous seizure of the protection line by more than one system; the wiring option on the backplane determines the priority in which the protection span line is assigned to colocated systems.
- (b) The protection line signal for normal operation is obtained from a pattern generator on the protection switch circuit pack at the CCT, rather than by a bridge to working line A (see 3.13).
- (c) On the transmitted signal, the break period is extended to 320 ms from 80 ms (see 3.14).
- (d) The delay in switching back to the working line after removal of the failure condition can be set for either 10 or 80 seconds, rather than being fixed at 10 seconds (see 3.18).

Star Switch System

3.20 The star configuration is used to connect RCT which are disposed radially about a CCT, when no cabling exists from RCT to RCT. A cable-cut in one arm of such a network could cause total system failure. The star switch equipment automatically disconnects the failed arm, bypasses DS1 signals around the failed arm, and restores service on the other arms of the star. Up to three DS1 lines can be serviced; and any star configuration with up to four arms is allowed.



- Notes:
1. Switches operated by protection switching logic.
 2. Switches operated by CCT control code.

Fig. 9 – DS1 Line Protection Switching

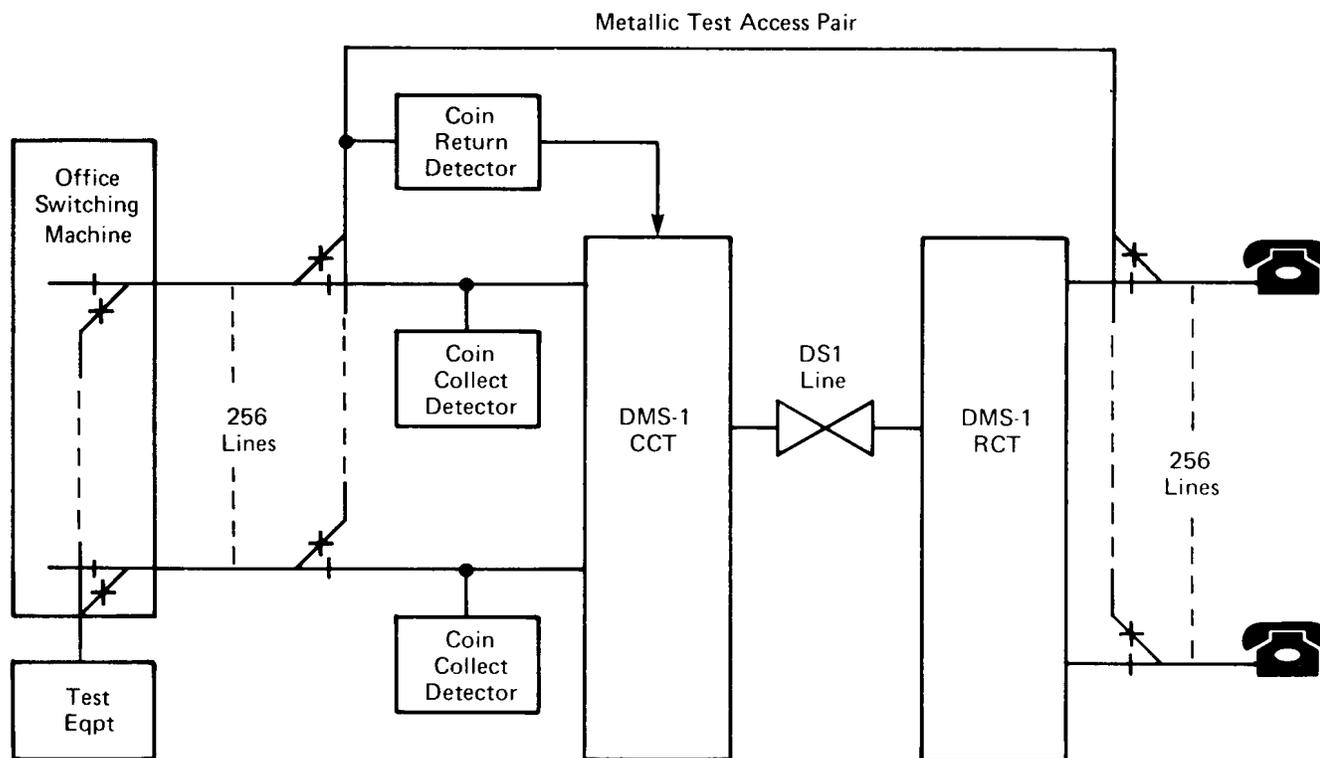


Fig. 10 — Subscriber Line Test Extension — Block Diagram

C. Subscriber Line Test Extension (Fig. 10)

3.21 The Metallic Test Access (MTA) equipment inserts transfer relays between the vf line outputs of the CCT and the office equipment, and between the subscriber loops and the RCT. Circuitry is provided for each vf line at the CCT to detect incoming coin collect signaling. In the idle state, the MTA relays are unpowered, and the vf line circuits are not affected. When a line is to be tested, a coin-collect signal (1 second for noncoin, or 5 seconds for coin lines) is applied to the line to obtain metallic test access. This signal is detected by one of the 256 coin-collect detectors, and causes the bypass relays on the line to be tested to operate at both the CCT and RCT. As a result, the external vf line connections at both the CCT and RCT are transferred from the DMS-1 equipment to the MTA pair between the RCT and the CCT, and thus a direct metallic connection from the test center to the subscriber loop is established.

3.21 When testing is completed, the tester applies a coin-return signal (1 second for noncoin, or 5 seconds for coin lines). This releases the bypass relays and returns the line under test to normal operation. If the coin-return signal is not applied, the line is restored to normal service at the end of a 10 minute time-out interval.

4. FUNCTIONAL DESCRIPTION

4.01 The DMS-1 has three major components:

- Control Concentrator Terminal
- Remote Concentrator Terminal
- DS1 Digital Line.

4.02 The CCT is described in detail in 363-2011-101; the RCT in 363-2011-102. Detailed descriptions of the DS1 digital line are found in the practices or other documentation pertaining to the particular line used.

A. Control Concentrator Terminal

4.03 One CCT for each DMS-1 system is located in the central office. Up to 256 subscriber lines can be connected between the office switching machine and the CCT. Each subscriber line has full access to any of the 48 channels on the DMS-1.

4.04 The CCT encodes the voice, supervisory, and control signals from the switching machine into the digital bit stream for transmission to the RCT. The returning bit stream from the RCT is decoded into the applicable subscriber lines to the office switching machine.

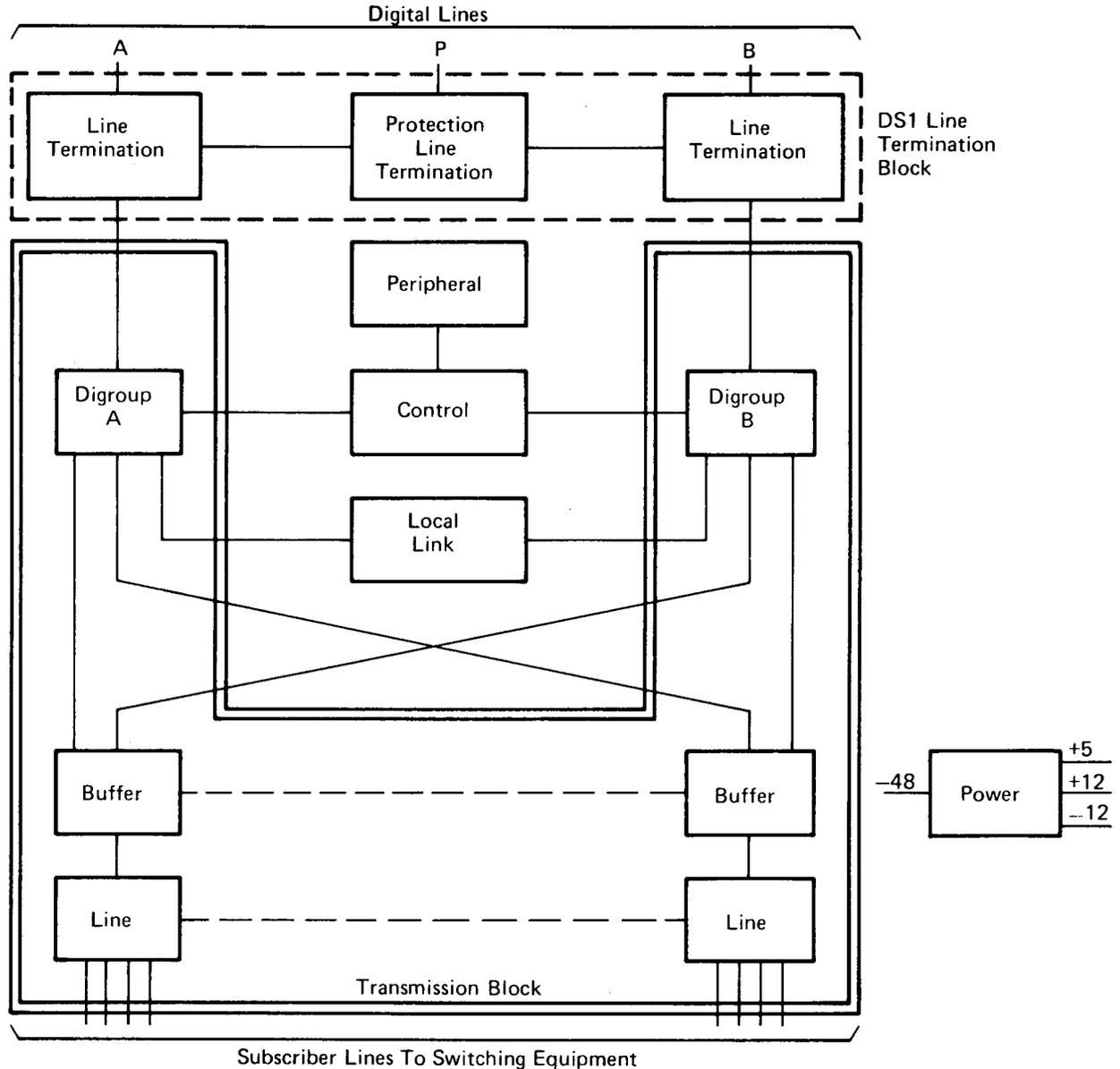


Fig. 11 – Control Concentrator Terminal Block Diagram

4.05 The CCT (Fig. 11) consists of six major functional blocks:

- (1) transmission block,
- (2) peripheral block,
- (3) control block,
- (4) local link block,
- (5) power block,
- (6) DS1 line terminating block.

Transmission Block

4.06 *Line Associated Circuit Packs.* The functions of the line-associated circuit packs are:

- conversion of the analog voice signals to digital format
- conversion of digital signals from the DS1 lines back into analog voice signals on the subscriber lines.

Cross-connections between the buffer and digroup-associated circuit packs provide full access for any subscriber line to any of the 48 channels on the DS1 lines.

4.07 Digroup Associated Circuit Packs. There is one set of digroup-associated circuit packs for each DS1 working line. The functions of these circuit packs are:

- conversion of the outgoing, unipolar, digital signal into bipolar form for the DS1 lines
- conversion of the incoming bipolar signals to unipolar form for processing in the CCT
- regeneration of clock and framing signals
- decoding, routing, and storage of the channel assignment data.

Peripheral Block

4.08 The peripheral block of circuit packs have the following functions.

- display system alarms,
- initiate office alarms,
- perform system tests and fault-locating procedures,
- display subscriber loop test results, or control subscriber line bypass for metallic test access,
- indicate system traffic load conditions,
- provide reorder tone.

Control Block

4.09 The control block consists of the system controller and B-word circuit packs. These circuit packs:

- generate and error check the control codes through which the CCT and RCT communicate
- organize and steer the control codes and information between the CCT and RCT peripheral blocks.

Local Link Block

4.10 The local link block:

- identifies lines which can be assigned to local links
- maintains the busy status at the CCT on lines which are assigned to local links at the RCT.

Power Block

4.11 The power block of circuit packs converts office battery supplies to the voltages required by the CCT circuit packs.

DS1 Line Terminating Block

4.12 The DS1 line terminating block of circuit packs provides digital-line repeaters, protection switching, and span line equipment (e.g., fault-locate circuits) for the DS1 line.

B. Remote Concentrator Terminal (Fig. 12)

4.13 A DMS-1 system can have up to four RCT. The number of RCT in each system depends on the locations of the subscribers to be served. A maximum of 256 subscriber lines are served by the DMS-1. All 256 subscribers can be served by one RCT (lumped mode), or be distributed through up to four RCT (distributed mode).

4.14 In each RCT the voice, supervisory, and control signals for that RCT are decoded. Voice and supervisory information are connected to the individual subscriber lines. The control signals are used to initiate line tests and system maintenance operations. Voice signals and supervisory information from the subscribers, along with alarm and maintenance data, are encoded back into the digital bit stream and returned to the CCT.

4.15 Each RCT consists of five major functional blocks:

- transmission block,
- peripheral block,
- local link block,
- power block,
- DS1 line terminating block.

Transmission Block

4.16 *Line Associated Circuit Packs.* The functions of the line-associated circuit packs are:

- conversion of analog voice signals from the subscriber lines into a digital bit stream for transmission to the CCT,
- conversion of digital signals from the CCT into analog voice signals on the individual subscriber lines.

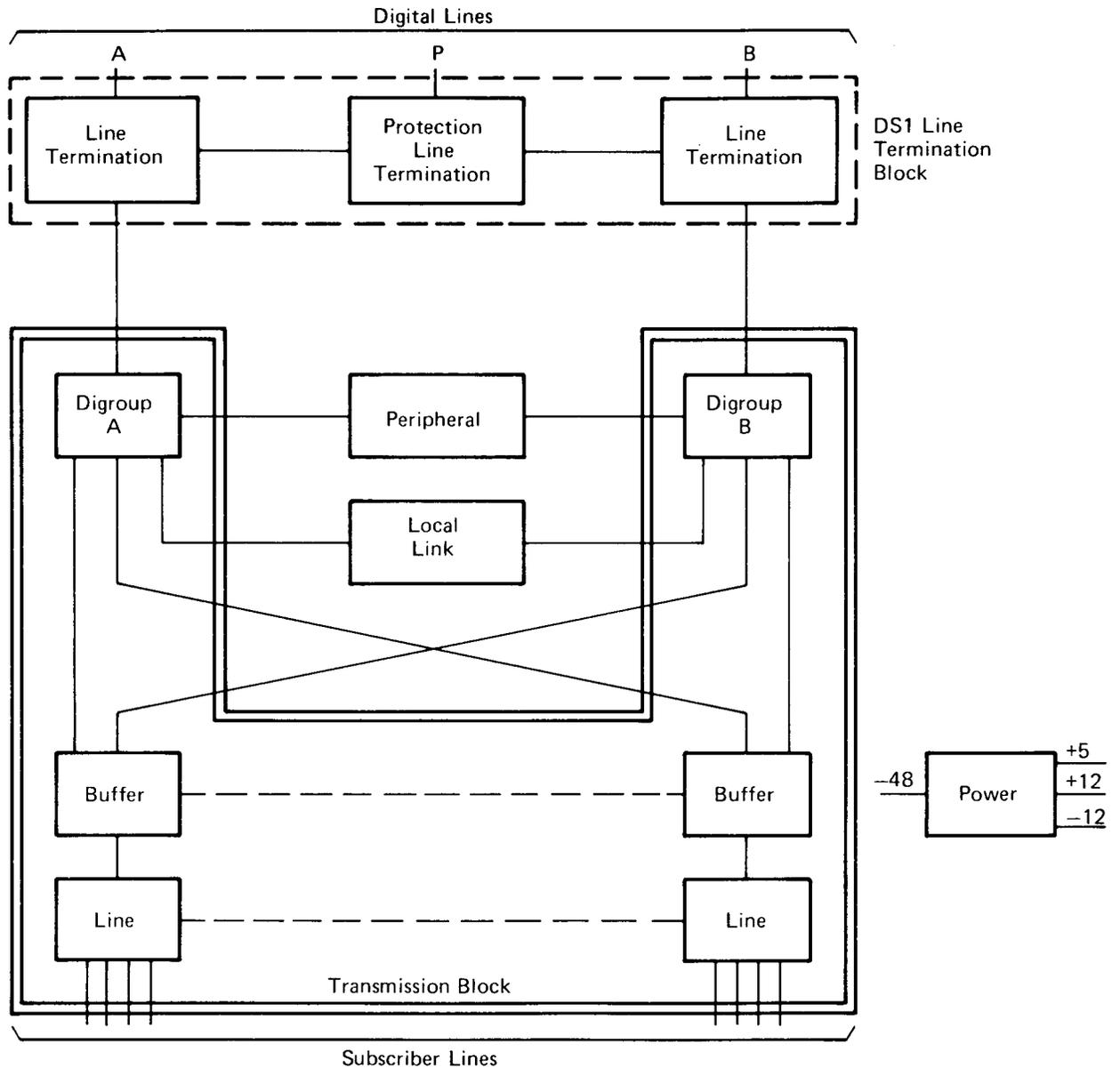


Fig. 12 – Remote Concentrator Terminal Block Diagram

4.17 Cross-connections between the buffer and digroup-associated circuit packs in the transmission block provide full access for any subscriber line to the 48 channels on the digital lines.

4.18 *Digroup Associated Circuit Packs.* There is one set of digroup-associated circuit packs for each working DS1 line. The functions of these circuit packs are.

- conversion of bipolar signals from the DS1 lines to unipolar form for processing in the RCT, and conversion back to bipolar form for transmission onward to other RCT or the CCT,
- regeneration of clock and framing signals,
- decoding, routing, and storage of channel assignment data.

SECTION 363-2011-100

Peripheral Block

4.19 The peripheral block of circuit packs have the following functions:

- monitor and transmit alarm data to the CCT,
- perform line tests and maintenance operations.

Local Link Block

4.20 The local link block:

- stores the assignments of subscriber lines to the local links,
- interconnects pairs of subscriber lines, which have been assigned to local links, on a local digital bus.

Power Block

4.21 The power block circuit packs provide the voltages needed for the RCT circuits. The RCT may be powered from an office 48-V battery supply, or from a 115-V 60-Hz supply through a rectifier and back-up battery circuit. Ring generators also provide 20-, 25- and 30-Hz, and frequency-selective ringing for the subscriber lines connected to the RCT.

DS1 Line Terminating Block

4.22 The DS1 line terminating block of circuit packs provides digital-line repeaters, protection switching, and span line equipment (e.g., fault-locate circuits) for the DS1 line.

C. DS1 Digital Line

4.23 The DMS-1 system can operate on any 1.544 Mb/s digital transmission system meeting DS1 signal requirements (see 363-2011-180). However, use of the Northern Telecom Limited LD-1 Digital Repeated Line is recommended for interconnecting the CCT and RCT. The system used LD-1 repeater circuits repackaged for mounting in the DMS-1 shelves (DS1 line terminating). LD-1 order-wire and fault-locate circuit packs can also be accommodated directly on the CCT and RCT bays, and in RCT cabinets.

5. REFERENCES

A. Northern Telecom Practices

Description

- 363-2011-100 System Description
- 363-2011-101 Control Concentrator Terminal, Description
- 363-2011-102 Remote Concentrator Terminal, Description
- 363-2011-103 Order-Wire and Fault-Locate Shelf, Description
- 363-2011-104 J7209C Power Bay, Description.

Engineering Information

- 363-2011-150 Control Concentrator Terminal J7208A, Remote Concentrator Terminal J7209A and J7209B, Power Bay J7209C, Equipment Application and Ordering Information
- 363-2011-151 DS1 Digital Line Engineering
- 363-2011-180 Performance Specifications.

Installation

- 363-2011-200 System Bay Installation, General
- 363-2011-201 J7208A Control Concentrator Terminal, J7209A Remote Concentrator Terminal, J7209C Power Bay, Bay Assembly Installation
- 363-2011-202 Installation Wiring
- 363-2011-205 Control Concentrator Terminal, Circuit Pack Installation
- 363-2011-206 Remote Concentrator Terminal, Circuit Pack Installation
- 363-2011-207 J7290C Power Bay, Battery Installation.

Lineup and Test

363-2011-210	Control Concentrator Terminal, Initial Operating Tests
363-2011-211	Remote Concentrator Terminal, Initial Operating Tests
363-2011-212	Digital Line, Order-Wire and Fault-Locate, Initial Operating Tests
363-2011-213	System Operation Tests
363-2011-214	J7209C Power Bay, Initial Adjustment.

Operation

363-2011-300	System Operation.
--------------	-------------------

Traffic

363-2011-450	Traffic Considerations.
--------------	-------------------------

Maintenance

363-2011-350	Routine Maintenance
363-2011-500	System Fault Location
363-2011-505	System Performance Tests.

Outside Carrier Apparatus

640-2131-200	J7209B RCT Cabinet, Description and Installation.
--------------	---

B. Schematic Drawings

SD7208-01	DMS-1 Control Concentrator Terminal Schematic
SD7209-01	DMS-1 Remote Concentrator Terminal Schematic
SD7284-01	DMS-1 Star Switch Shelf System Schematic.