STATION MESSAGE DETAIL RECORDING SYSTEM DESCRIPTION "DIMENSION*" PBX

CONTENTS

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†Registered trademark of Sykes Datatronics, Inc.

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1. GENERAL

1.01 This section describes the Station Message Detail Recording (SMDR) feature as provided in the following Feature Packages (FP):

- FP15—DIMENSION 100 PBX
- FP4, FP10, and FP15—DIMENSION 400 PBX

- FP7, FP8, FP11, and FP12—DIMENSION 600 PBX (formerly 400E)

- FP7, FP8, FP11, and FP12—DIMENSION 2000 and Custom PBX.

1.02 This section is reissued to provide:

- Coverage for Federal Communications Commission (FCC) Part 15 requirements

- Revised coverage for COMM-STOR II/SMDR unit

- To revise call record elements

- Current system information.

Revision arrows have been used to emphasize the more significant changes.

1.03 ***Warning: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.***

1.04 Two versions of the SMDR are available as follows:

(1) The ***direct output*** version can be provided in a small stand-alone cabinet (Fig. 1).

(2) The ***9-track magnetic tape*** version is always provided in a separate cabinet (Fig. 2).

1.05 The SMDR provides a record of the PBX station (or attendant) identity, completion time, call duration, dialed number, and the trunk group used for outgoing and/or incoming calls. A station dialed account code number of up to 15 digits may be recorded in addition to the calling station number. A record of trunk calls is made and can be used to compute costs, allocate charges, analyze calling patterns, and effect implementation of controls and/or restrictions. The SMDR is not a billing record since the call duration is measured from about 10 seconds after the establishment of the connection in the customer system to the time when the station goes on hook. Hence busy signal, don't answer, and wrong number calls may be recorded. Feature Packages 8, 11, and 12 provide for recording the facilities restriction level and time in queue. Feature Package 8 only provides for recording an authorization code, if dialed. The account code for FP4, 7, 8, 10, 11, 12, or 15, Preissue 1, is 5 digits (digits 1-5). Feature Package 15, Issue 1, provides an additional 10 digits (digits 6-15) for a maximum of 15 digits (digits 1-15) recorded.

Fig. 1—SMDR Direct Output and Typical Printer

1.06 The SMDR feature can provide detailed call information on all outgoing calls including Tie Trunks, Central Office (CO), Foreign Exchange (FX), Common Control Switching Arrangement (CCSA), Advanced Private Line Termination (APLT), Remote Access, and Wide Area Telecommunications Service (WATS) which are made from a DIMENSION PBX

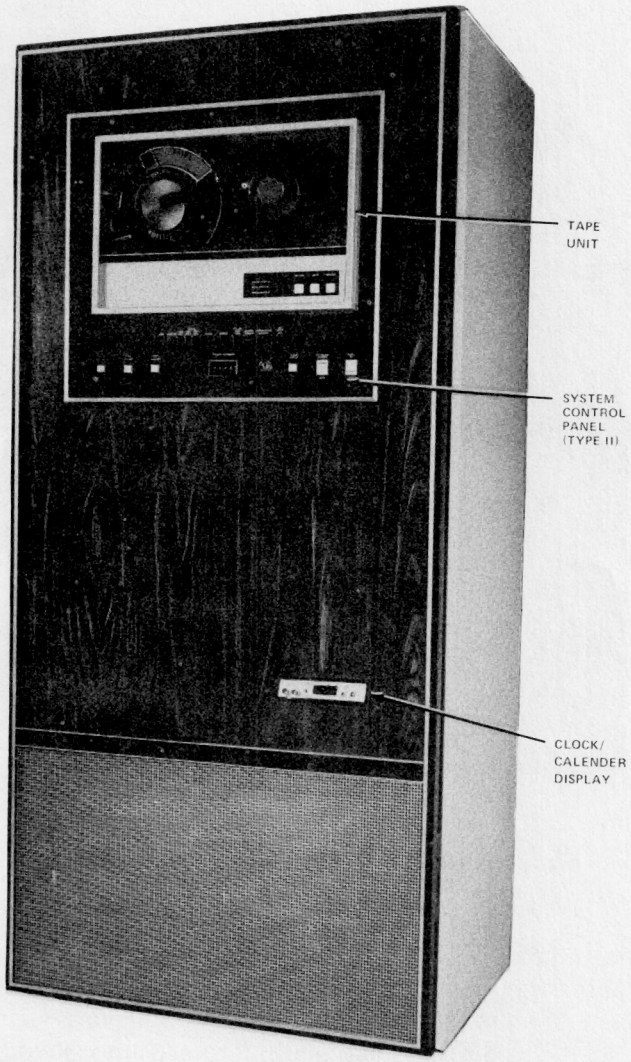

Fig. 2—SMDR 9-Track Cabinet

station or Attendant Console. Incoming Tie Trunks, Remote Access, CO, FX, CCSA, APLT, Direct Inward Dialing (DID), and WATS calls to stations may also be recorded by the SMDR.

DIMENSION PBX systems do not permit SMDR recording on Automatic Voice Network (AUTOVON) trunk circuits with precedence capabilities. However, SMDR recording can be provided on routine AUTOVON trunks.

1.07 The call information recorded by SMDR is listed as follows:

- Calling station number (or dial access code of incoming trunk group)
- Called number
- Condition code
- Time the call was completed
- Date (month and day) the call was made
- Dialed access code (trunk group access code if different from dialed access code)
- Dialed number
- Duration of the call
- Indication of attendant-handled calls
- Account number dialed, if any (see Note)
- Authorization code (FP8 only), if any
- Time in queue (FP8, 11, and 12)—(Off-hook is recorded in seconds—multiply display or printout value by 2. In FP8 only, ringback is recorded in minutes.)
- Facility restriction level (FP8, 11, and 12), if any
- Automatic Route Selection (ARS) pattern (FP8 only), if any.

Note: The SMDR feature in FP15 has been enhanced to increase the maximum number of account code digits from 5 to 15.

DIRECT OUTPUT VERSION APPLICATION

1.08 The direct output version provides Station Message Detail Recording using a printer, paper-tape punch, COMM-STOR II unit, or customer-provided terminal or storage device. The amount of output information from SMDR is proportional to customer traffic, number of stations within the PBX, and the number of trunks to be monitored.

Because of the voluminous amount of output information possible from the direct output version of SMDR, exercise care when selecting the type of terminal to be used.

"COMM-STOR" II APPLICATION

1.09 The COMM-STOR II unit, when used with SMDR, is a totally dedicated system, which interfaces with the DIMENSION PBX to record the call records generated by the PBX SMDR direct output system. In addition, the COMM-STOR II unit is capable of generating reports that summarize toll use and approximate toll charges by station or by department, and trunk usage data. These reports may be used by the customer in allocating costs and evaluating toll facilities. They also aid in identifying abuse to the customer's network.

1.10 The operator communicates with the COMM-STOR II unit via a terminal (43 teleprinter, DATASPEED* 40/2 terminal set, or equivalent). The system displays a message on the terminal, to which the operator responds. The operator may be instructed to perform a particular action or enter information in response to a question. Frequently, a list of operations appear from which the operator must choose one to perform. Through the interaction of terminal displays and operator responses, the operator can perform all of the necessary procedures.

1.11 Reports are displayed on a CRT and/or printed for hard-copy retention, depending on the option chosen by the customer.

9-TRACK MAGNETIC TAPE APPLICATION

1.12 For systems requiring capacity greater than the direct output for storing the recorded calling information, the 9-track magnetic tape version may be used. This version of SMDR provides a call storage medium (9-track magnetic tape) with a capacity of approximately 330,000 calls per tape. The tape may be changed as required, depending on customer requirements (traffic capacity or monitoring of calls). The 9-track system is equipped with a Kennedy 9217 (KS-22078, List 1) tape formatter used in conjunction with a Kennedy 9800 (KS-22077, List 1) tape transport to write data on a standard 9-track magnetic tape. When output information is required by the customer in the form of a hard copy for visual inspection, the 9-track magnetic tape must be processed (software decoded). The output from the magnetic tape may be grouped as required by the customer.

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1.13 There are two types of SMDR equipped with 9-track magnetic tape recorders:

(1) Type I (A&M)—the early version—is for use with DIMENSION PBX FP4, 7, 10, and 15.

(2) Type II—the later version—is for use with DIMENSION PBX FP4, 7, 8, 10, 11, 12, and 15.

1.14 The SMDR can be ordered via the PBX Mechanized Ordering Form (E-8124). Cabling, circuit packs, power equipment, printer, tape punch, and other necessary equipment are provided when ordered via this form.

1.15 The following is a checklist to be used for planning the installation of SMDR:

- Floor plan
- Floor loading
- Environmental requirements (temperature and humidity)
- Commercial power
- Interface with PBX
- Originating register requirements
- Cable distance from PBX to SMDR
- Cable distance from SMDR to printer or tape punch
- Maintenance spare equipment.

2. OPERATION

2.01 Information is transmitted from the PBX to the SMDR equipment via a fast-speed data channel on circuit pack LC34B, LC366, or LC171B. When the Remote Maintenance, Administration, and Traffic System (RMATS) is provided, LC171B is used and one data channel is dedicated to SMDR. The SMDR is connected to the data channel via a shielded

cable. Block diagrams of the direct output and 9-track magnetic tape systems are shown in Fig. 3 and 4, respectively. Data is transmitted from the PBX at a bit-rate of 833 kHz. Each transmission (word) consists of the 16 data bits plus one odd parity bit. Twelve words are required with FP4, 7, 10, or 15 (Preissue 1), and 15 words are required with FP8, 11, 12, or 15 (Issue 1) to transmit information for each call to be recorded. As each bit is received, an echo of the received bit is transmitted to the PBX. The parity bit is inverted and sent back to the PBX.

2.02 The first four bits of each word (bits 15 through 12) contain an operation code; the last 12 bits (11 through 00) are arranged in 4-bit bytes and contain coded data (Fig. 5). The final bit received (17th transmitted) is the parity bit. Each call recorded requires 13 words when used with FP4, 7, 10, or 15 (Type I), and 16 words as shown in Fig. 6 and 7 when used with FP8, 11, 12, or 15 (Type II). The first word of each call entered into memory is the time data generated by the SMDR time clock. The word required to completely define a call will be referred to as a call record.

2.03 The attendant is able to activate or deactivate SMDR on each trunk group. With FP4 (Issue 2 or later), or FP10 (Issue 1 or later) and FP15, SMDR can also be activated or deactivated from the Maintenance and Administration Panel (MAAP). Two con-

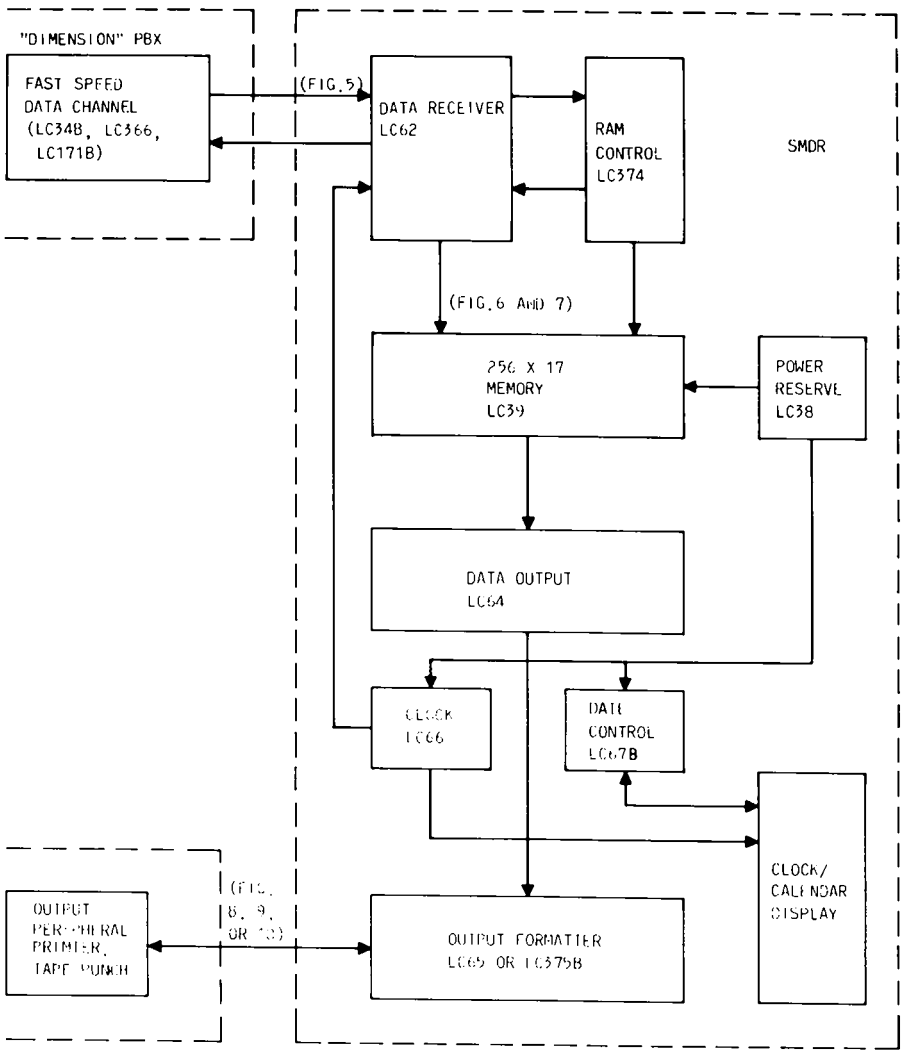


Fig. 3—Direct Output Version Block Diagram

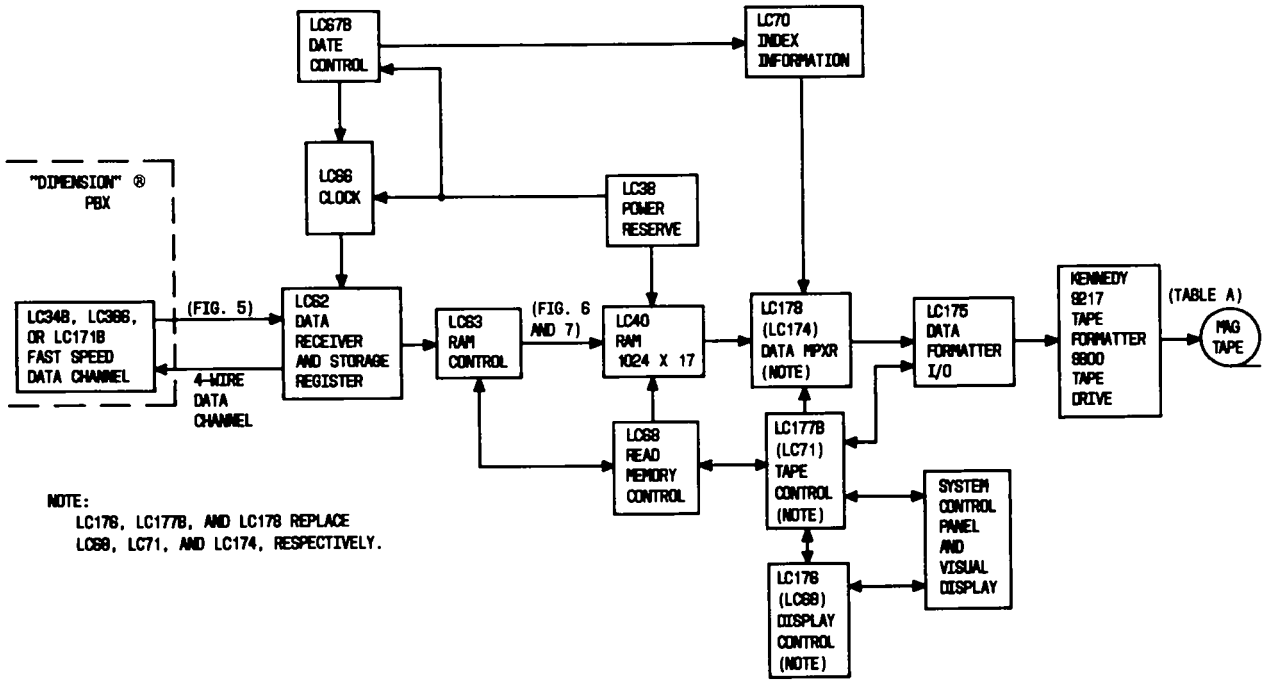


Fig. 4—9-Track Version Block Diagram

trol codes are associated with this feature: one to activate SMDR on specified trunk groups, and one to deactivate SMDR on specified trunk groups.

2.04 For direct output systems, a printout of the resulting trunk group status is provided 15 seconds after the attendant releases from the circuit. The printout contains a "B" for begin, "C" for cancel, and the trunk group numbers involved. For 9-track systems, the condition code stored is a "2" for begin and "3" for cancel.

2.05 The SMDR is designed to operate in two modes:

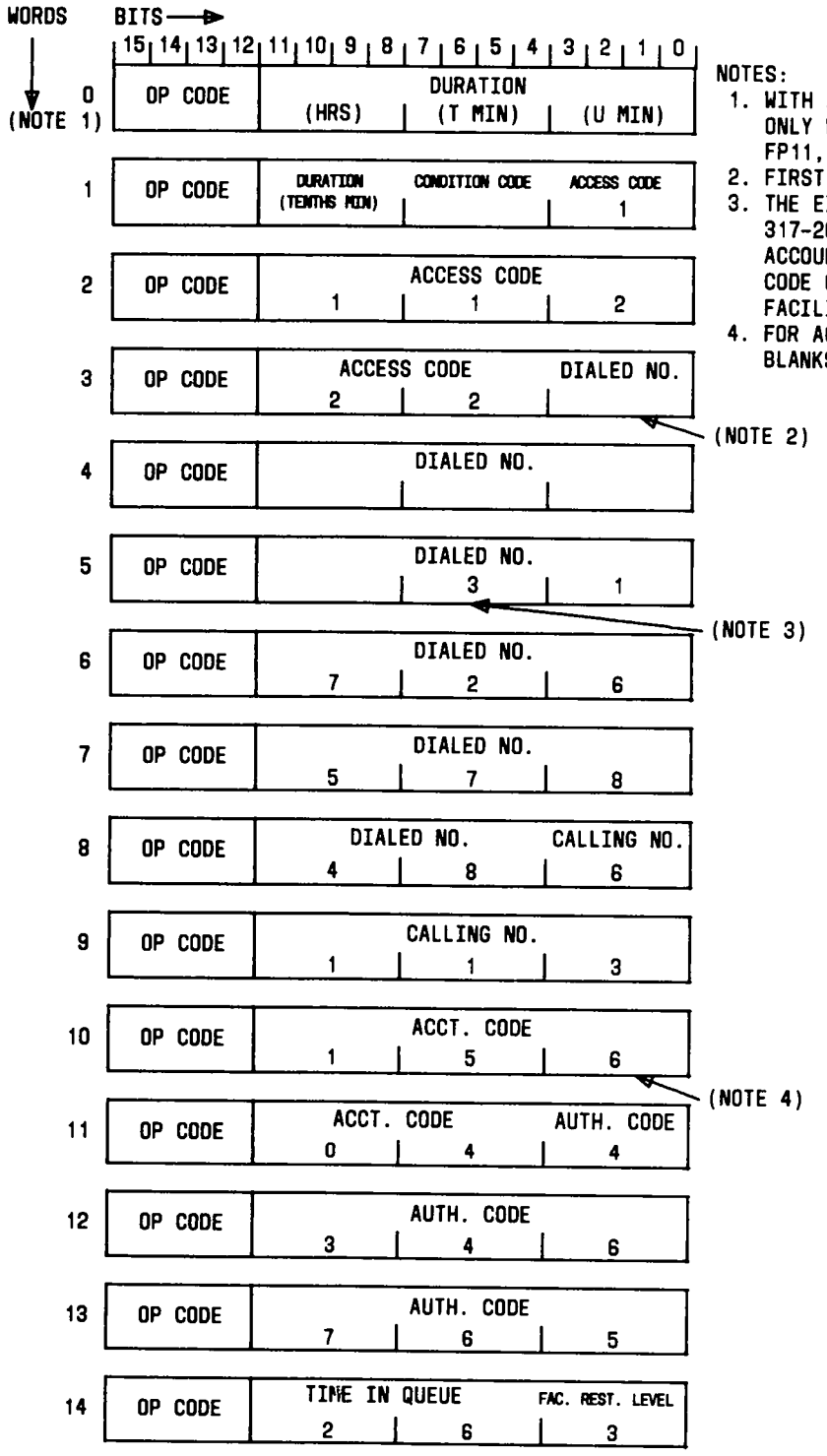
(1) Recording ***without*** account number—all calling procedures are normal, and printout does not reflect an account number.

(2) Recording ***with*** account number—the user dials an SMDR feature access code, the account number, the trunk access code, and then the desired number.

2.06 The SMDR provides detailed recording on all outgoing calls including CO, FX, WATS, and Tie Trunks made from a station or incoming tie trunks. The 800 Service (Inward Wide Area Telecommunications Service) and Remote Access calls are also recorded. When the attendant "assists" or completes any outgoing calls, a condition code "A" is recorded for direct output systems. For 9-track systems, a condition code "1" is recorded in a call record. Station numbers are also recorded, but in case of an incoming tie trunk to an outgoing trunk, the field normally used for the 4-digit station number contains the access code or attendant identification code.

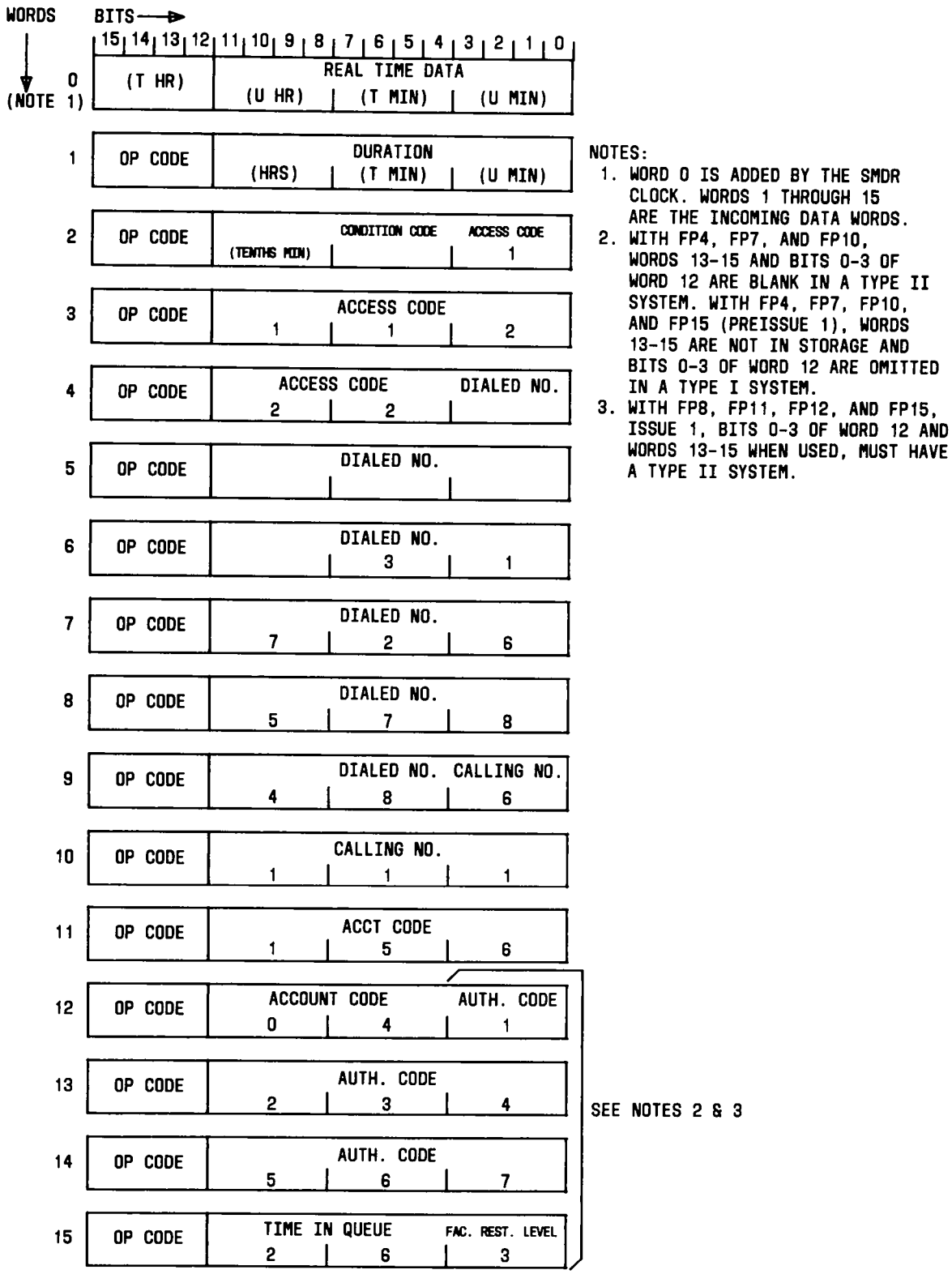
DIRECT OUTPUT SMDR OPERATION

2.07 The direct output SMDR receives a call record and records the information on the output device on a "first-in, first-out" basis. The incoming message recording cycle has priority over the output cycle. The call record is passed to the output device when no incoming calls are being recorded. The message is stored in a random access memory (RAM) prior to printout. The capacity of the memory allows 16 call records to be stored. If 16 records are stored in memory, an incoming call creates an overload and the system is forced into the output cycle. When overload occurs, a partial line is printed on the output device and some information is lost.



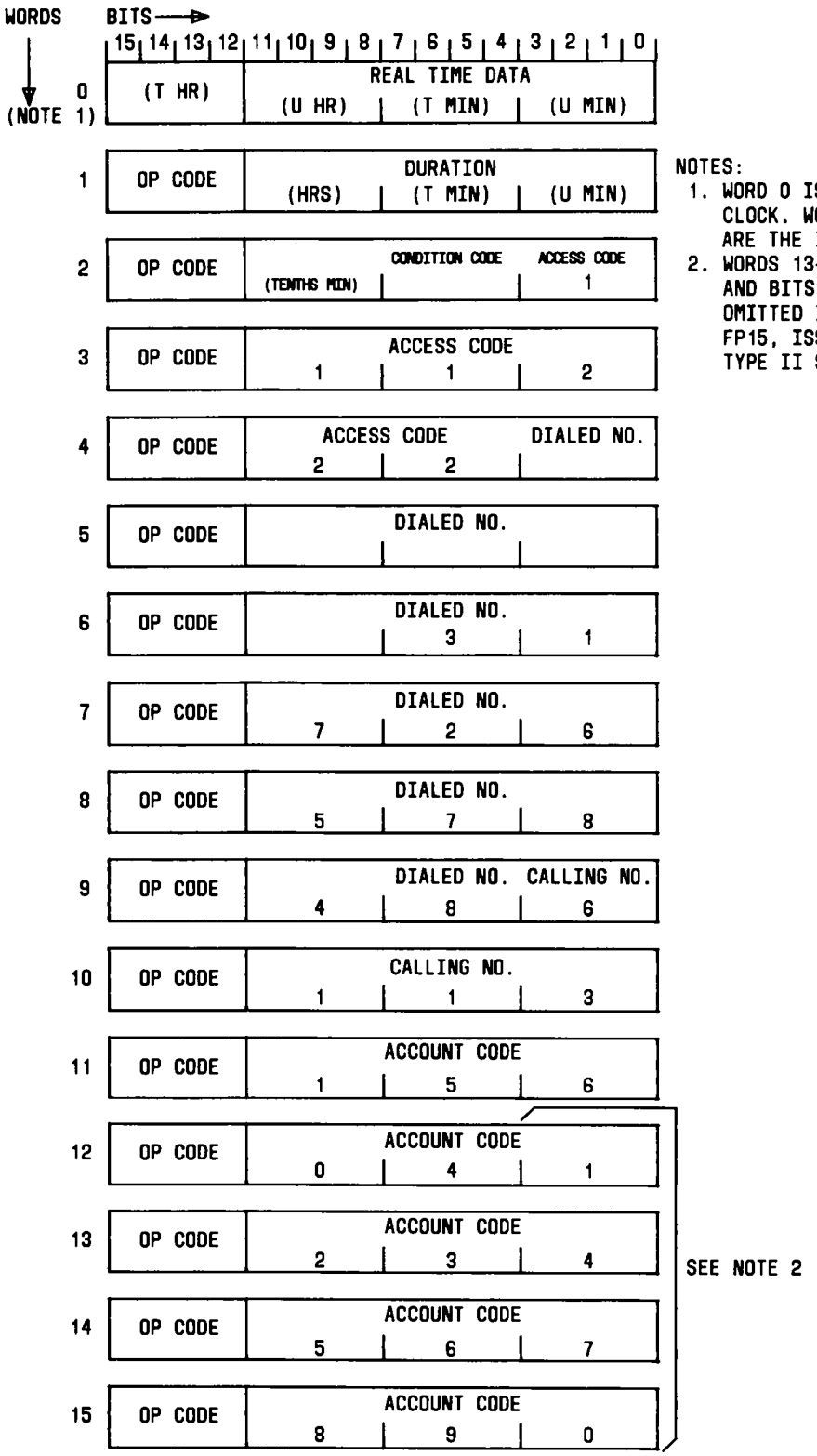
NOTES:
1. WITH FP4, FP7, FP10, AND FP15 (TYPE I), ONLY WORDS 0-11 ARE TRANSMITTED. WITH FP8, FP11, AND FP12, WORDS 0-14 ARE TRANSMITTED.
2. FIRST FIVE DIGITS USED FOR DISTANT DIALING.
3. THE EXAMPLE SHOWN GIVES A DIALED NUMBER OF 317-265-7848, A CALLING NUMBER OF 6113, AN ACCOUNT CODE OF 15604, AN AUTHORIZATION CODE OF 4346765, A TIME IN QUEUE OF 26, AND A FACILITY RESTRICTION LEVEL OF 3.
4. FOR ACCOUNT CODE LESS THAN FIVE DIGITS, BLANKS WILL BE PRINTED.

Fig. 5 — Data Message From PBX



NOTES:
1. WORD 0 IS ADDED BY THE SMDR CLOCK. WORDS 1 THROUGH 15 ARE THE INCOMING DATA WORDS.
2. WITH FP4, FP7, AND FP10, WORDS 13-15 AND BITS 0-3 OF WORD 12 ARE BLANK IN A TYPE II SYSTEM. WITH FP4, FP7, FP10, AND FP15 (PREISSUE 1), WORDS 13-15 ARE NOT IN STORAGE AND BITS 0-3 OF WORD 12 ARE OMITTED IN A TYPE I SYSTEM.
3. WITH FP8, FP11, FP12, AND FP15, ISSUE 1, BITS 0-3 OF WORD 12 AND WORDS 13-15 WHEN USED, MUST HAVE A TYPE II SYSTEM.

Fig. 6—Data Message Entered Into SMDR Memory



NOTES:
1. WORD 0 IS ADDED BY THE SMDR CLOCK. WORDS 1 THROUGH 15 ARE THE INCOMING DATA WORDS.
2. WORDS 13-15 ARE NOT IN STORAGE, AND BITS 0-3 OF WORD 12 ARE OMITTED IN A TYPE I SYSTEM. FP15, ISSUE 1, REQUIRES A TYPE II SYSTEM.

Fig. 7—Data Message Entered Into SMDR Memory for FP15 (Issue 1)

2.08 The LC374 circuit pack controls the output baud rate of data from the SMDR memory to the terminal device. Table A provides the circuit pack switch settings for the various baud rates. When the terminal device is a TELETYPE* model 4310AA teleprinter or a FACIT† model 4070 paper-tape punch, set the switches for a baud rate of 300.

TABLE A

LC374 BAUD RATE SWITCH SETTINGS

BAUD RATE	OPERATE SWITCHES
300	1, 4, 7
600	2, 4, 7
1200	3, 4, 7
2400	3, 5, 7
4800	3, 5, 6

9-TRACK SMDR OPERATION

2.09 The 9-track magnetic tape SMDR uses the same receiving circuitry as the direct output version and provides greater record storage capacity. The memory for the 9-track magnetic tape system is separated into two blocks, and each block has the capacity to store 31 call records. The data is received and stored in memory until 31 call records have been received. After the first block is filled, the second block is used to store incoming messages while the records in the first block are passed to the output device (9-track tape formatter).

2.10 With a Type I version SMDR, if the magnetic tape is not replaced before the tape reaches the end-of-tape mark, no end-of-file mark is written; instead, the tape is automatically rewound to load point and any additional call data will be written over the previously recorded data.

2.11 With a Type II version SMDR, when the tape reaches the end-of-tape mark, a contact closure is provided for use in activating an external alarm. (An external alarm is not part of the system and, if desired, must be provided locally.) The tape will not rewind, but continues to store data past the end-of-tape mark for approximately 1,100 additional call records. If the tape is not replaced or rewound, any additional call records will be lost.

2.12 When the power is restored after a power failure, the tape will move forward to create a gap of 51 mm (2 inches) to 152 mm (6 inches) beyond the point on the tape when the power failure occurred. This is to insure that the data already recorded on the tape will not be lost. The utility system used for off-line processing should be capable of reading past the gap on the tape, where additional data is recorded. It should be noted that this gap on the tape may contain old data, no data, or possibly an end-of-file from a previous use of the tape. The circuitry which generates the index number of the data block is likely to assume an out-of-sequence logical state. However, consecutive numbering of data blocks from this point forward would occur in the normal manner. The SMDR system is equipped with battery reserve power to prevent loss of call data in the memory and also to maintain power for the real-time/date clock during a power failure. However, the date recorded on the tape after power is restored is likely to be out of sequence without an LC76B circuit pack. With an LC67B circuit pack, the date store register will be updated with the correct date after midnight, or it can be operated manually by operating the PRINT DATE button any time after power is restored.

▶COMM-STOR II OPERATION

2.13 The COMM-STOR II/SMDR unit (Fig. 8) is available in Model 8220A (dual drive). This unit can interface with the direct output version of the SMDR option offered with the DIMENSION PBX system. The unit records call information and generates report summaries by date and time of call, duration, dialed number, calling station, account code, department, dial-access code, and cost. These reports may be printed on a hard-copy terminal.

2.14 The operator communicates with the COMM-STOR II/SMDR unit via a terminal by responding to questions or making selections from a menu of activities.

2.15 The COMM-STOR II/SMDR unit consists of a microprocessor-based controller, a firmware-based operating system, random access memory (RAM), and two flexible diskette drives. Standard density recording is implemented on soft-sectored

*Registered trademark of Teletype Corp.
†Registered trademark of Facit Inc.

diskettes. Further information on the COMM-STOR II unit may be obtained in Section 578-400-102 (Description and Operation) or Section 578-400-202 (Installation).

OUTPUT DATA

2.16 A printer output sample showing data recorded for various call-types illustrates the type of information recorded with the direct output SMDR (Fig. 9, 10, and 11).

2.17 Data recorded on the 9-track tape must be processed and formatted on off-line facilities. A typical hexadecimal dump of call data recorded on the Type I 9-track magnetic tape is shown in Fig. 12 and on the Type II 9-track magnetic tape is shown in Fig. 13, 14, and 15. The elements of a call record are described in Table B, and the call record condition codes are explained in Table C.

2.18 The customer may arrange for grouping the output data as required, ie, grouped per call-type, specific dates, or account codes. Refer to Table D for hexadecimal-to-decimal-to-binary conversions.

3. PHYSICAL DESCRIPTION

3.01 The SMDR carrier shown in Fig. 16 contains a 207B power supply and circuit packs. The circuit packs furnished vary, depending upon which version (direct output or 9-track magnetic tape) of SMDR is provided.

3.02 Table E provides the equipment codes for SMDR equipment. All necessary equipment for a complete installation will be provided when the system is ordered via the Mechanized Ordering Form E-8124.

3.03 The front door panel of the cabinet is removable, and can be locked in place using a 216B tool to prevent unauthorized access to the system. Colored inserts can be ordered to slide into the front panel. (See Table F.) The side panels are provided in a neutral color only.

3.04 The SMDR cabinets are shipped from the factory fully assembled and tested. The crated cabinet will fit through a standard door 2134 mm (7 feet) by 914 mm (3 feet) when mounted on a 178-mm (7-inch) dolly.

3.05 Sample tapes for the 9-track magnetic tape [J59209TB, List 1 (MD), List 3, and List 4] and punched paper tape (J59209TB, List 2) can be ordered from Western Electric Company. These tapes may be used to verify that the off-line data processing is being performed correctly.

DIRECT OUTPUT VERSION

3.06 The direct output SMDR can be provided in a small stand-alone cabinet (Fig. 1) that houses the SMDR carrier and clock/calendar display. The cabinet measures 610 mm (24 inches) deep, 800 mm (31-1/2 inches) wide, and 762 mm (30 inches) high, and must be located in the same building within 61m (200 feet) of the PBX control carrier.

Caution: The top of the small stand-alone cabinet may collapse if subjected to forces greater than 45 kilograms (100 pounds).

3.07 The following is a list of typical terminal equipment used with the direct output SMDR:

- TELETYPE Model 4310 AAC teleprinter or equivalent compatible with the Electronic Industries Association (EIA) standard RS-232C

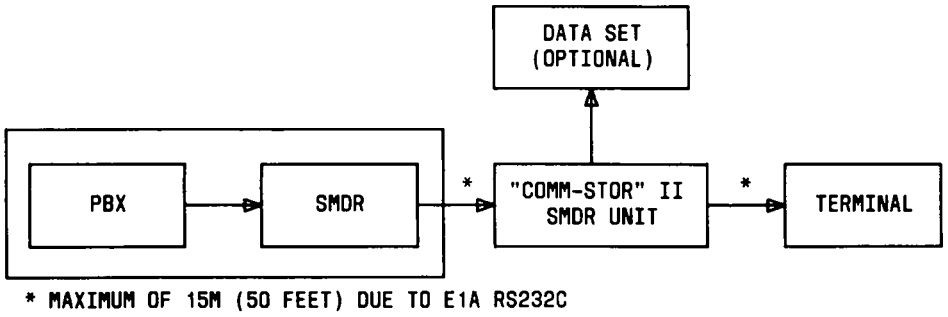
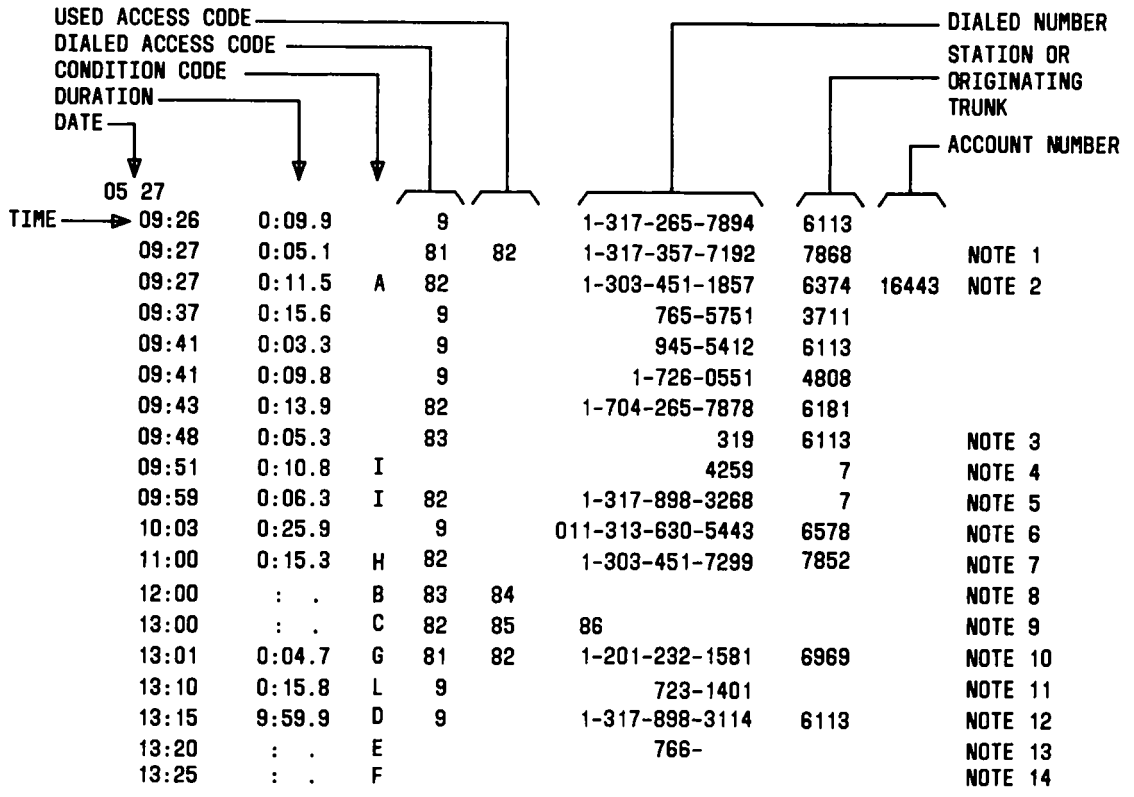


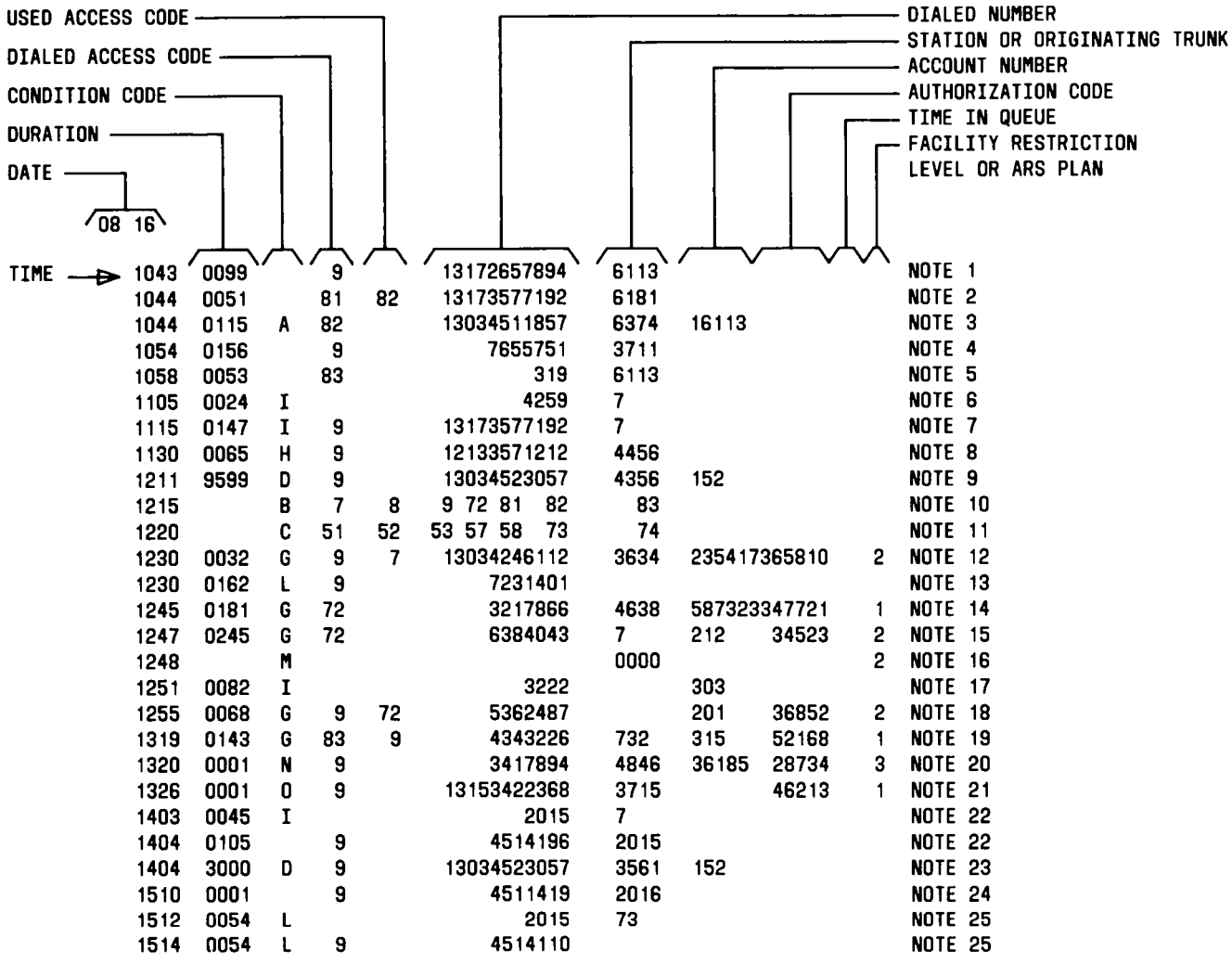
Fig. 8—Block Diagram of SMDR With COMM-STOR II/SMDR Unit



NOTES:

1. DIALED NUMBER 81 ROUTE ADVANCED TO 82.
2. OUTGOING CALL PLACED BY THE ATTENDANT.
3. OUTGOING TIE TRUNK CALL REQUIRING 3 DIGIT DIALING OF STATIONS AT DISTANT END.
4. INCOMING CALL COMPLETED TO STATION INDICATED BY LETTER DESIGNATION I.
5. INCOMING CALL COMPLETED TO OUTGOING TRUNK AS INDICATED BY THE LETTER DESIGNATION I AND ACCESS CODE.
6. OUTGOING CALL INTERNATIONAL DISTANCE DIALED TO TOKYO, JAPAN.
7. OUTGOING TRUNK QUEUED CALL AS INDICATED BY THE LETTER DESIGNATION H.
8. LETTER DESIGNATION B INDICATES TO BEGIN RECORDING ON TRUNK ACCESS CODES 83 AND 84.
9. LETTER DESIGNATION C INDICATES TO CANCEL RECORDING ON TRUNK ACCESS CODES 82, 85, AND 86.
10. LETTER DESIGNATION G INDICATES THAT AUTOMATIC ROUTE SELECTION WAS USED.
11. LETTER DESIGNATION L INDICATES A 6-WAY CONFERENCE CALL.
12. LETTER DESIGNATION D INDICATES DURATION OF CALL HAS EXCEEDED 10 HOURS.
13. LETTER DESIGNATION E INDICATES A SOFTWARE ERROR HAS BEEN ENCOUNTERED.
14. LETTER DESIGNATION F INDICATES A LONG INITIALIZATION HAS TAKEN PLACE, USUALLY DUE TO A POWER FAILURE.

Fig. 9—Printer Output Sample for FP4, FP7, FP10, or FP15 (Preissue 1)



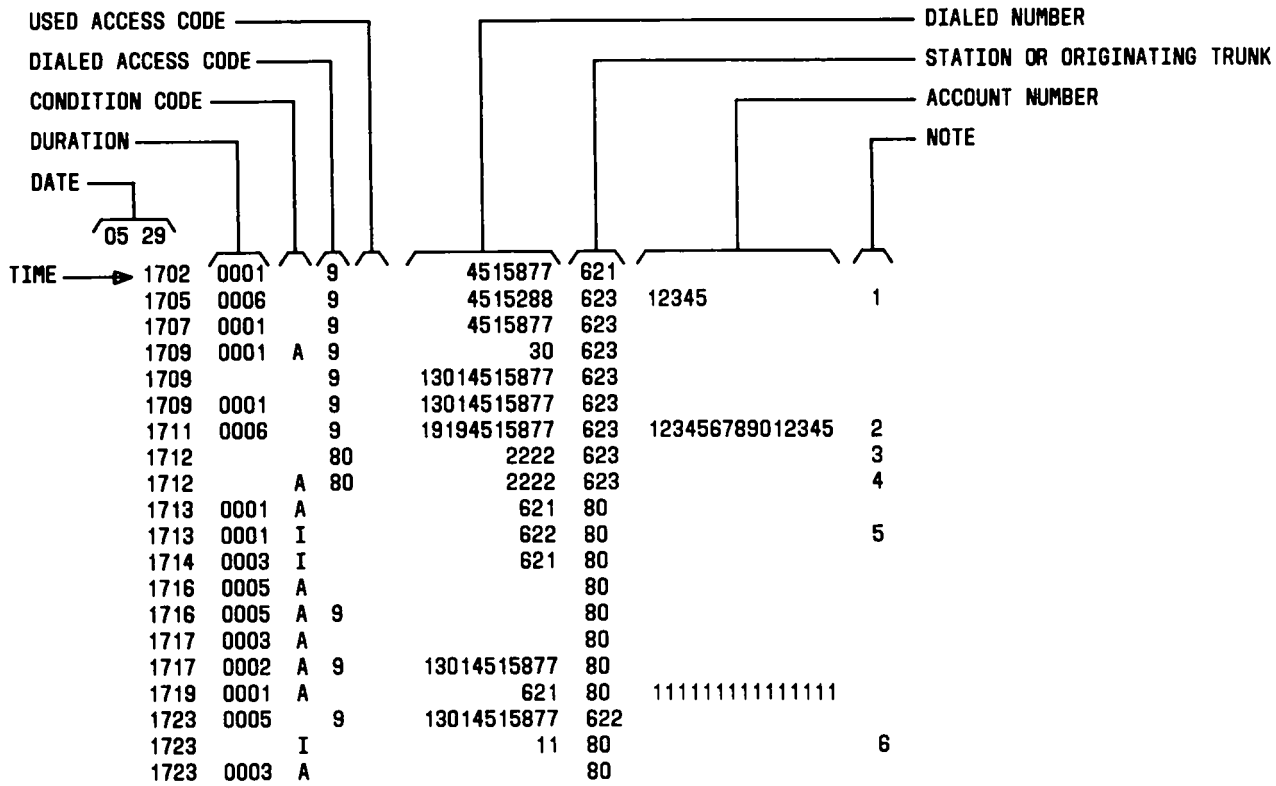
TIME											
1043	0099		9		13172657894	6113				NOTE 1
1044	0051		81	82	13173577192	6181				NOTE 2
1044	0115	A	82		13034511857	6374	16113			NOTE 3
1054	0156		9		7655751	3711				NOTE 4
1058	0053		83		319	6113				NOTE 5
1105	0024	I			4259	7				NOTE 6
1115	0147	I	9		13173577192	7				NOTE 7
1130	0065	H	9		12133571212	4456				NOTE 8
1211	9599	D	9		13034523057	4356	152			NOTE 9
1215		B	7	8	9 72 81 82	83				NOTE 10
1220		C	51	52	53 57 58 73	74				NOTE 11
1230	0032	G	9	7	13034246112	3634	235417365810		2	NOTE 12
1230	0162	L	9		7231401					NOTE 13
1245	0181	G	72		3217866	4638	587323347721		1	NOTE 14
1247	0245	G	72		6384043	7	212	34523	2	NOTE 15
1248		M				0000			2	NOTE 16
1251	0082	I			3222		303			NOTE 17
1255	0068	G	9	72	5362487		201	36852	2	NOTE 18
1319	0143	G	83	9	4343226	732	315	52168	1	NOTE 19
1320	0001	N	9		3417894	4846	36185	28734	3	NOTE 20
1326	0001	O	9		13153422368	3715		46213	1	NOTE 21
1403	0045	I			2015	7				NOTE 22
1404	0105		9		4514196	2015				NOTE 22
1404	3000	D	9		13034523057	3561	152			NOTE 23
1510	0001		9		4511419	2016				NOTE 24
1512	0054	L			2015	73				NOTE 25
1514	0054	L	9		4514110					NOTE 25

Fig. 10—Printer Output Sample for FP8, FP11, or FP12 (Sheet 1 of 2)

NOTES:

1. OUTGOING CALL OVER LONG DISTANCE.
2. OUTGOING CALL WITH ROUTE ADVANCE OVER LONG DISTANCE (DIALED ACCESS CODE 81 ROUTE ADVANCED TO CODE 82).
3. OUTGOING CALL PLACED BY ATTENDANT AND CHARGED TO ACCOUNT CODE.
4. OUTGOING CALL TO LOCAL CENTRAL OFFICE.
5. OUTGOING TIE TRUNK CALL REQUIRING 3-DIGIT DIALING OF STATION AT DISTANT END.
6. INCOMING CALL FROM TRUNK ID 7 COMPLETED TO STATION 4259.
7. INCOMING CALL FROM TRUNK ID 7 COMPLETED TO OUTGOING TRUNK.
8. OUTGOING CALL SERVED BY OUTGOING TRUNK QUEUING FEATURE.
9. LONG DURATION OUTGOING CALL.
10. BEGIN AND CONTINUE MONITORING OF TRUNK IDs 7, 8, 9, 72, 81, 82, AND 83.
11. DISCONTINUE MONITORING OF TRUNK IDs 51, 52, 53, 57, 58, 73, AND 74.
12. OUTGOING TRUNK CALL WITH AUTOMATIC ROUTE SELECTION.
13. 6-WAY CONFERENCE CALL.
14. OUTGOING TRUNK CALL WITH AUTOMATIC ALTERNATE ROUTING.
15. INCOMING TRUNK CALL COMPLETED TO OUTGOING TRUNK WITH AUTOMATIC ALTERNATE ROUTING.
16. AUTOMATIC ROUTE SELECTION PATTERN CHANGE.
17. INCOMING REMOTE ACCESS CALL TO PBX STATION. STATION OR ORIGINATING TRUNK ID FIELD IS BLANK UNLESS DUMMY STATION LINE IS ASSIGNED.
18. INCOMING REMOTE ACCESS CALL COMPLETED TO OUTGOING TRUNK WITH AUTOMATIC ALTERNATE ROUTING. STATION OR ORIGINATING FIELD IS BLANK UNLESS DUMMY STATION LINE IS ASSIGNED.
19. INCOMING CALL FROM TRUNK ID 732 COMPLETED TO REMOTE PBX EXTENSION WITH AUTOMATIC ALTERNATE ROUTING.
20. INEFFECTIVE ATTEMPT OF OUTGOING CALL BECAUSE ALL TRUNKS ARE BUSY AND QUEUING IS NOT AVAILABLE.
21. INEFFECTIVE ATTEMPT OF OUTGOING CALL DUE TO INSUFFICIENT FACILITY RESTRICTION LEVEL.
22. INCOMING CALL FROM TRUNK ID 7 COMPLETED TO STATION 2015. STATION 2015 ADD CENTRAL OFFICE TRUNK CALL 451-4196 TO 3-WAY CONFERENCE.
23. CONTINUATION OF LONG DURATION CALL. (SEE NOTE 9.)
24. INCOMPLETED OUTGOING CALL.
25. INCOMING CALL FROM TRUNK ID 73 REQUESTING CONFERENCE. STATION 2015 AND CENTRAL OFFICE TRUNK 451-4110 ADDED TO CONFERENCE.

Fig. 10 — Printer Output Sample for FP8, FP11, or FP12 (Sheet 2 of 2)



TIME								
1702	0001		9	4515877	621		
1705	0006		9	4515288	623	12345	1
1707	0001		9	4515877	623		
1709	0001	A	9	30	623		
1709			9	13014515877	623		
1709	0001		9	13014515877	623		
1711	0006		9	19194515877	623	123456789012345	2
1712			80	2222	623		3
1712		A	80	2222	623		4
1713	0001	A		621	80		
1713	0001	I		622	80		5
1714	0003	I		621	80		
1716	0005	A			80		
1716	0005	A	9		80		
1717	0003	A			80		
1717	0002	A	9	13014515877	80		
1719	0001	A		621	80	111111111111111	
1723	0005		9	13014515877	622		
1723		I		11	80		6
1723	0003	A			80		

NOTES:
1. OUTGOING CALL PLACED BY STATION 623 AND CHARGED TO 5-DIGIT ACCOUNT.
2. OUTGOING CALL PLACED BY STATION 623 AND CHARGED TO 15-DIGIT ACCOUNT.
3. STATION 623 DIALED TIE TRUNK CODE 80, THE EXTENSION 2222.
4. STATION 623 DIALED ATTENDANT, THEN ATTENDANT CONNECTED STATION 623 TO TIE TRUNK 80, THEN STATION 623 DIALED EXTENSION 2222.
5. INCOMING TIE TRUNK IS 80.
6. INCOMING TIE TRUNK 80 CALL TO LOUDSPEAKER ZONE 1 ANSWER BACK CHANNEL 1, PRINTED WHEN ANSWER BACK IS NOT COMPLETED.

Fig. 11 — Printer Output Sample for FP15, Issue 1

- FACIT 4070 paper tape punch or equivalent compatible with the EIA standard RS-232C with even parity

- Customer-provided terminal equipment compatible with the EIA standard RS-232C.

3.08 Terminal equipment for direct output version, such as a printer, tape punch, or customer-provided peripheral equipment must be located in the same building within 30.5m (100 feet) of the SMDR.

9-TRACK MAGNETIC TAPE VERSION

3.09 The 9-track magnetic tape SMDR is mounted in a separate cabinet (Fig. 17) 610 mm (24 inches) deep, 800 mm (31-1/2 inches) wide, and 1765 mm (69-1/2 inches) high, which must be located in the same building within 61m (200 feet) of the PBX control carrier. This cabinet allows access to the magnetic tape, system control panel, and clock/calendar display without the front panel being opened.

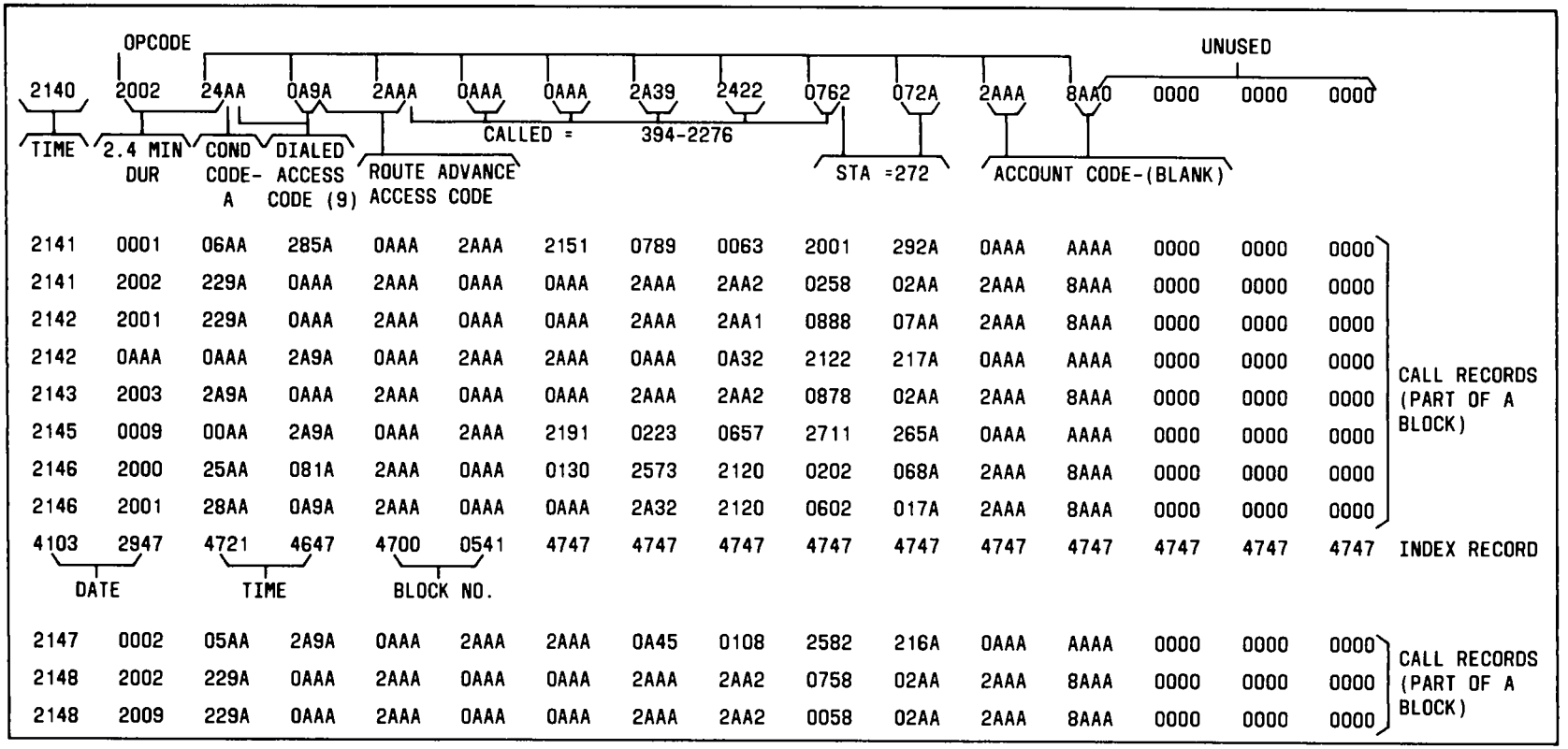
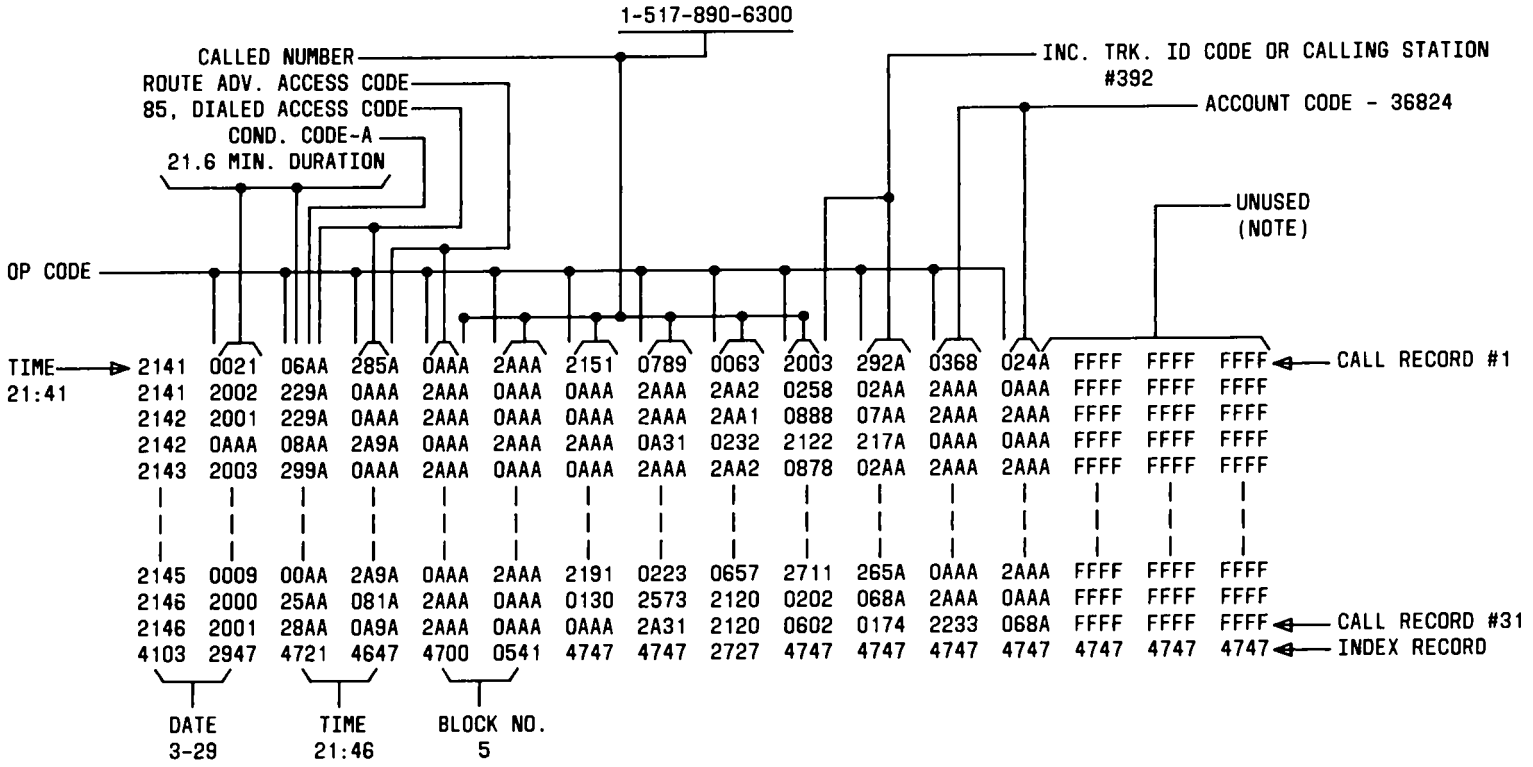


Fig. 12—Typical Hexadecimal Dump of Call Data (Type I—9-Track Version) for FP4, FP7, FP10, or FP15 (Preissue 1) (See Tables C and D)



NOTE:
A OR F = BLANK

Fig. 13—Typical Hexadecimal Dump of Call Data (Type II—9-Track Version) for FP4, FP7, or FP10 (See Tables C and D)

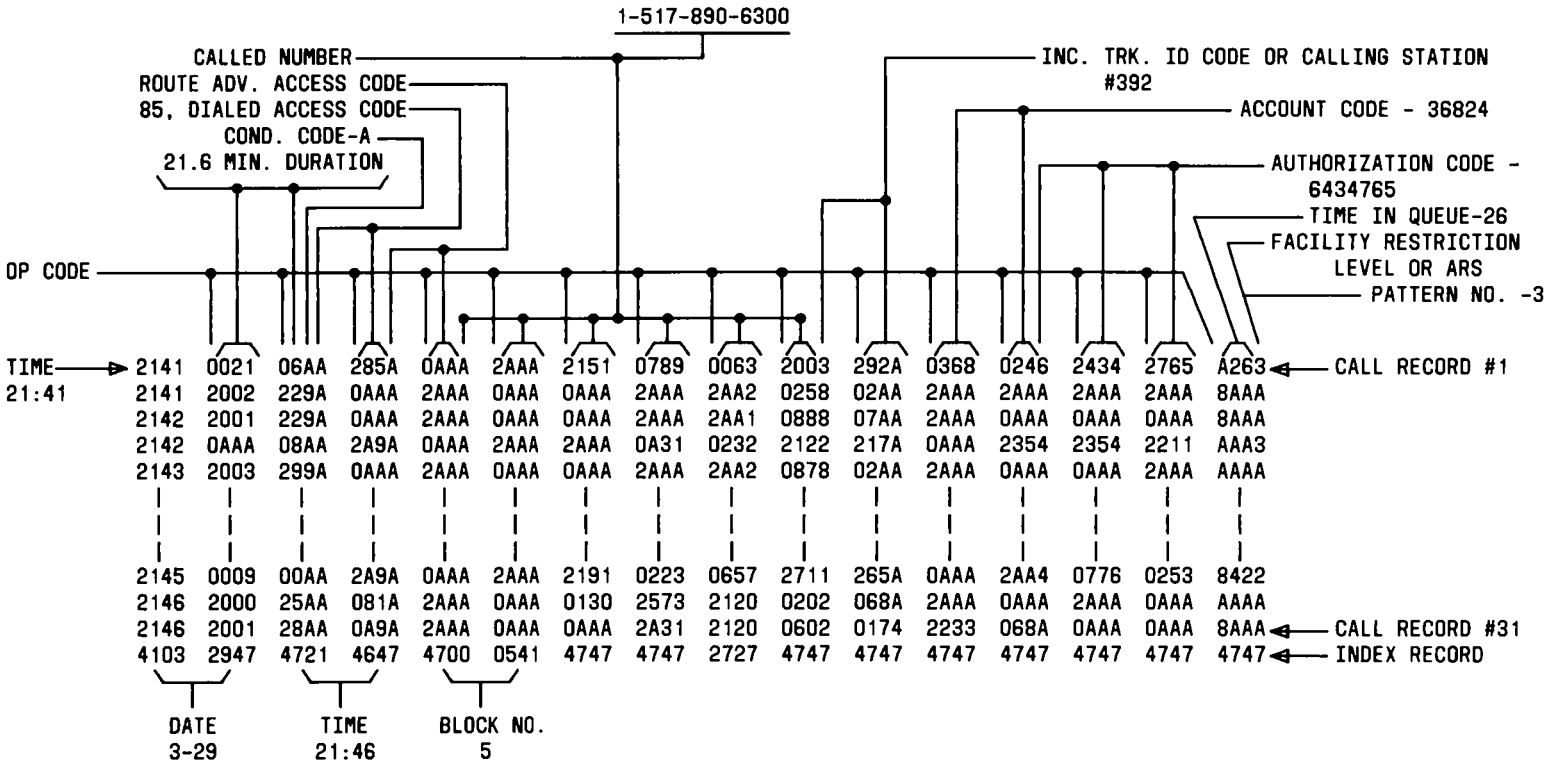
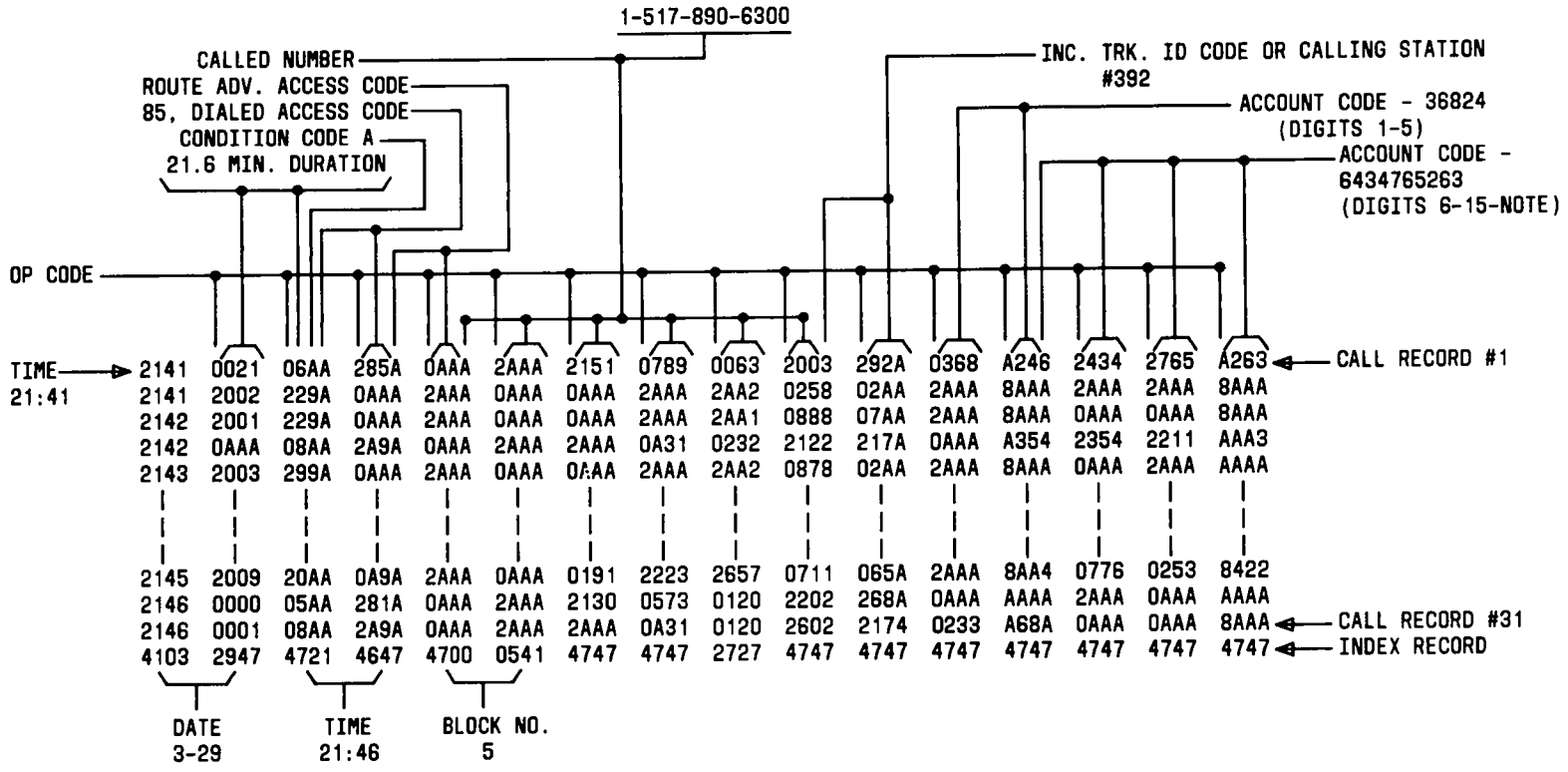


Fig. 14—Typical Hexadecimal Dump of Call Data (Type II—9-Track Version) for FP8, FP11, or FP12 (See Tables C and D)



NOTE:
ACCOUNT CODE DIGITS
6-15 ARE NEW WITH ISSUE 1.
THESES CHARACTERS ARE "F"
WITH PREISSUE 1 SOFTWARE.

F = A = BLANK

Fig. 15—Typical Hexadecimal Dump of Call Data (Type II—9-Track Version) for FP15
(See Tables C and D)

TABLE B

CALL RECORD ELEMENTS

ITEM	DESCRIPTION
ACCESS CODE	Two 3-digit access code entries are provided which are used only on outgoing or tandem calls. Therefore, access code entries for an incoming call contain blank characters, which are each represented by the character hexadecimal A. On an outgoing call, the first access code entry contains the access code number which the user dialed. The second access code entry contains the code of the trunk group actually used for the call if different from the user-dialed access code; else the entry contains blank characters. The second code, therefore, identifies if route advances has taken place on the call. Access code entries are right-justified: ie, hexadecimal A characters are inserted as needed.
AUTHORIZATION CODE (FP8 Only)	When required, the authorization code entry contains a user-dialed number, for identifying a specific call. The authorization code entry consists of 4 to 7 digits which are right-justified, with any blanks represented by the character hexadecimal A. An invalid authorization code (one that does not satisfy off-net calling) will result in an SMDR record of condition code "7".
ARS PLAN CHANGE (FP8 Only)	The ARS pattern entry will be recorded as a call record indicating the time that this ARS pattern has been changed. This record contains either 0000, 0001, or 0002 in place of the calling station number and a one-digit ARS pattern number in place of facility restriction level. A 0000 in the calling station number location indicates an ARS pattern under control of the PBX system clock, a 0001 indicates an ARS pattern under manual control, and a 0002 indicates an ARS pattern under clocked manual override.
CALLING NUMBER	The calling number entry contains the station number on outgoing calls, the attendant identification code on incoming calls that use 1-way incoming trunks, and the trunk access code on incoming calls that use 2-way trunks. On a remote access call, the calling number will be the attendant identification code. The calling number entry contains up to four digits, which are left-justified, with any blanks represented by a hexadecimal A character.
CONDITION CODE	The condition code entry is a single digit which categorizes the information represented in the call record. (See Table C.)

TABLE B (Contd)

CALL RECORD ELEMENTS

ITEM	DESCRIPTION
DIALED NUMBER*	The dialed number entry can contain up to 15 digits total. The dialed number is right-justified. A hexadecimal A is recorded for a blank character. If a * or # is used for dialing, eg, these characters will appear in the printout as hexadecimal C and E, respectively. If the # is used for the end of dialing signal, it should be ignored in data processing. Digits following a # may not be telephone number digits but could be account code digits for a data connection.
DURATION	The duration entry contains a total of four digits, representing hour (0-9), minutes (0-59), and tenths of minutes (0-9). The call duration is measured from about 10 seconds after the last digit is dialed to when the trunk is disconnected.
FACILITY RESTRICTION LEVEL (FP8, 11, AND 12 Only)	The facility restriction level (FRL) entry contains a 1-digit number to indicate the level of service that was utilized for the call.
OPERATION CODE	The operation code characters (part of bytes 02, 04, 06, 08, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, and 30) are four-bit characters used for hardware control and on-line error checking. These characters are not used in call data compilation.
SMDR ACCOUNT CODE NUMBER	The SMDR account code entry contains an optional, user-dialed number, which further identifies the specific call. The account code entry consists of from one to 15 digits (number of digits is fixed for a specific installation), which are left-justified, with any blanks represented by a hexadecimal A character. The account code may be inserted by a station on an outgoing call, by the attendant on an incoming or outgoing call, or by a calling station on an incoming tie trunk or remote access call. Only the FP15 account code number can contain the digits 6-15.
TIME	The time entry represents the time of day the call was completed, and comprises a total of four digits, two digits for the hour entry and two digits for the minute entry.
TIME IN QUEUE (FP8, 11, and 12 Only)	The time in queue (TQ) entry contains a 1- or 2-digit number to indicate the time that the call has spent in queue. The digits represent minutes for ringback queue, but must be multiplied by two to represent seconds for off-hook queue. When one ringback and one off-hook queue are provided on the same outgoing trunk, stations use the ringback queue and trunks use the off-hook queue. Time in is not part of the duration entry.

*In earlier systems, the dialed station number (not the terminating station) is recorded in the case of threeway transfer hunting, call transfer, and call pick-up.

TABLE C

CALL RECORD CONDITION CODES

CONDITION CODE		DESCRIPTION
DIRECT OUTPUT (ASCII)	9-TRACK (HEXADECIMAL)	
A	1	Attendant-handled call (except conference calls).
B	2	Following an attendant-initiated change of the list of trunk access codes or attendant identification codes for which call details are to be recorded, a call record with this condition code is produced. This call record lists the trunk access codes or attendant identification codes which are then being monitored. The list includes any newly initiated codes as well as all those previously active codes which have not been canceled.
C	3	Following an attendant-initiated change of the list of trunk access codes or attendant identification codes for which call details are not to be recorded, a call record with this condition code is produced. This call record lists the trunk access codes or attendant identification codes which are not being monitored. The list includes any newly canceled codes as well as all previously canceled codes which have not been reactivated.
D	4	A call record is produced for a call with a duration of 10 hours and continuing. On such an extremely long call, a standard call record, but with maximum duration entry and with this condition code, is produced after the first 10-hour period; a similar call record with this condition code is produced after each succeeding 10-hour period. When the call does terminate, a final call record is produced. The final call record condition code is not a "4", but the original condition code.
E	5	Identifies an SMDR maintenance test data record. This call record should be ignored in call data compilation.
F	6	This call record should be ignored in call data compilation. This condition code identifies a system reload and appears immediately following a system reload.
G	7	This condition code is used to identify calls served by the automatic route selection (ARS) feature or automatic alternate routing (AAR) feature. Overrides condition code A, I, or L (direct output) and 1, 9, or C (9-Track Tape).
H	8	This condition code is used to identify calls which have been served on a delayed basis via the outgoing trunk queuing feature.
I	9	Incoming or tandem call.
Blank	A	Outgoing call.

TABLE C (Contd)

CALL RECORD CONDITION CODES

CONDITION CODE		DESCRIPTION
DIRECT OUTPUT (ASCII)	9-TRACK (HEXADECIMAL)	
L	C	Six-way conference call. A separate call record with this condition code is produced for each outgoing call portion of a conference connection. PBX stations connected to the conference are not recorded.
M	D	This condition code is used to identify a call record with ARS pattern change data (FP 8).
N	E	Indicates an ineffective attempt of a call because of all trunks busy and no queuing exists or all queue slots are busy (FP 8, 11, and 12).
O	F	Indicates an ineffective attempt of a call due to insufficient facility restriction level (FP 8, 11, and 12).

3.10 The magnetic tape used is an industry-standard 1.7 mm (1/2 inch) wide, 9-track tape. The maximum reel size is 216 mm (8-1/2 inches) in diameter. The customer may either furnish the tapes or obtain them from the telephone company.

9-TRACK CONVERSION OF TYPE I TO TYPE II

3.11 To convert a type I version to a type II version, the following changes must be made:

(a) Replace the J59209AA-1 L-1 carrier with a J59209AA-2 L-10 carrier less 207B power supply. (Reuse existing power supply.)

(b) Replace the J59209AC-1 control panel with a J59209AC-1 L-3 control panel.

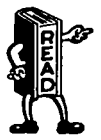
(c) Replace circuit packs LC69, LC71, and LC174 with circuit packs LC176, LC177B, and LC178.

(d) Make necessary wiring changes to agree with Issue 5B of SD-1E449-01. (See DCS-1E449-5.)

CIRCUIT PACKS

In order to prevent or reduce electrostatic noise in the system, the frame shall be well grounded as discussed in Part 6 (POWER AND GROUNDING). ◗Always attach an authorized wrist grounding strap before working on the system or handling circuit packs.◖

3.12 Circuit packs are 152 mm (6 inches) by 292 mm (11-1/2 inches). Each pack is equipped with an identification faceplate containing a color-coded label. The circuit packs have been separated according to function to simplify maintenance and repair. In addition, the circuit pack faceplates have test points to allow interrogation of internal circuit states for fault diagnosis.



A circuit pack is always replaced with a circuit pack having either the same or a subsequent suffix as printed on the carrier designation strip. That is, an LC67 cannot be used if the designation strip specifies LC67B. Only LC67B or later alpha-suffixed circuit packs are suitable replacements.

TABLE D

DECIMAL-HEXADECIMAL-BINARY AND ASCII CONVERSION

CHARACTER	ASC11
0	0110000
1	0110001
2	0110010
3	0110011
4	0110100
5	0110101
6	0110110
7	0110111
8	0111000
9	0111001
A	1000001
B	1000010
C	1000011
D	1000100
E	1000101
F	1000110
G	1000111
H	1001000
I	1001001
L	1001100
M	1001101
N	1001110
O	1001111
Blank	0001000
Space	0100000
—	0101101
.	0101110
:	0111010

HEXADECIMAL/BINARY		
DECIMAL	HEXADECIMAL	BINARY
0	0	0
1	1	1
2	2	10
3	3	11
4	4	100
5	5	101
6	6	110
7	7	111
8	8	1000
9	9	1001
10	A	1010
11	B	1011
12	C	1100
13	D	1101
14	E	1110
15	F	1111

3.13 Circuit packs contain the circuits for the system and plug into connectors on associated carriers. The following is a numerical listing and a brief description of the circuit packs used in the SMDR system.

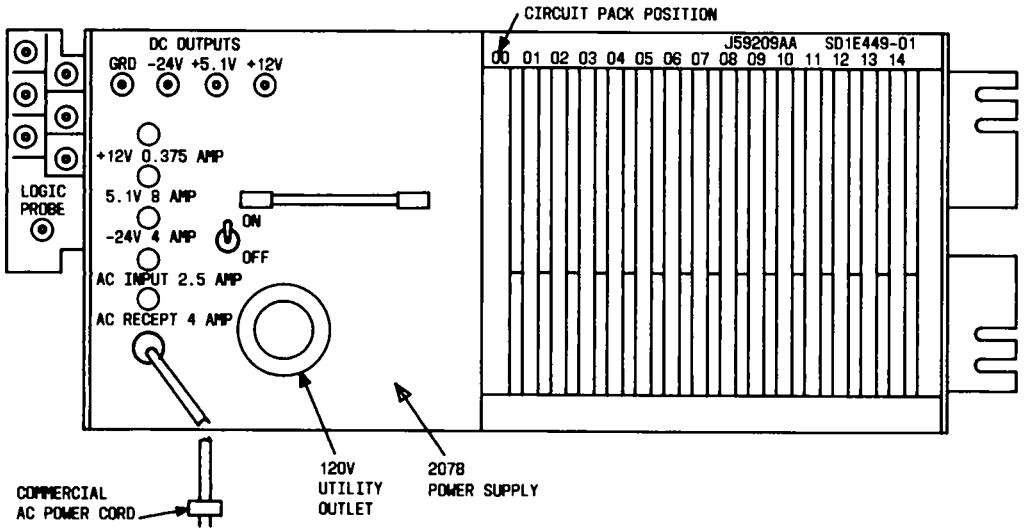
- ***LC38—Battery Reserve:*** The LC38 provides up to 6 hours of battery holdover power in case of power failure for memory holdover. One LC38 is required per system.

- ***LC39—RAM (256):*** The LC39 provides 256 words of memory to store call records. One LC39 is required for a direct output version.

- ***LC40—RAM (1K):*** The LC40 provides 1024 words of memory to store call records. One LC40 is required for a 9-track magnetic tape version.

- ***LC62—Data Receiver:*** The LC62 transmits data to and receives data from the PBX. It converts the 17-bit serial data message to 17-bit parallel format. One LC62 is required per system.

- ***LC63—RAM Control:*** The LC63 controls the data input into the SMDR memory. It also generates clock signals which control the rate at which data is outputted from the memory. One LC63 is required with a 9-track magnetic tape version.



CIRCUIT PACK POSITION IN CARRIER	CIRCUIT PACK CODE		
	DIRECT OUTPUT	9-TRACK TAPE VERSION	
		TYPE I	TYPE II
00	LC62	LC62	LC62
01	LC39		
02	LC374	LC63	LC63
03	LC64		
04	LC65, LC375B*		
05	LC66	LC66	LC66
06	LC67, LC67B	LC67, LC67B	LC67, LC67B
07		LC40	LC40
08		LC68	LC68
09		LC69	LC176
10		LC70	LC70
11		LC71	LC177B
12		LC174	LC178
13		LC175	LC175
14	LC38	LC38	LC38

* LC375B USED FOR FP8, 11, OR 12.

Fig. 16—SMDR Carrier

- ***LC64—Data Output:*** The LC64 controls the data output from the SMDR memory. One LC64 is required with a direct output version.

- ***LC65—Output Formatter:*** The LC65 encodes the data into American Standard Code for Information Interchange (ASCII) format for the output device. One LC65 is required with a direct output version when used with other than FP8, 11, or 12.

- ***LC66—Real-Time Clock:*** The LC66 provides real-time data for the output device and the clock/calendar display. One LC66 is required per system.

TABLE E

EQUIPMENT LIST

EQUIPMENT CODE (Note)	LIST	DESCRIPTION
J59209A	1	Framework, assembly, wiring, and equipment for one direct output SMDR cabinet (including clock display) (MD)
	2	Apparatus and wiring always required in addition to List 1, 3 to provide AC EMI Filter
	3	Framework, assembly, wiring, and equipment required for one direct output SMDR cabinet (including clock display)
J59209B	1	Framework, assembly, wiring and equipment for one 9-track magnetic tape SMDR cabinet (MD)
	2	Required in addition to List 1 or 3 when this cabinet used in a DIMENSION 2000 PBX lineup (MD)
	3	Framework, assembly, wiring and equipment for one 9-track magnetic tape SMDR cabinet (MD)
	4	Framework, assembly, wiring, and equipment for one 9-track magnetic tape SMDR cabinet
	5	Required in addition to List 4 when this cabinet used in a DIMENSION 2000 PBX lineup or to provide an alternate method of providing earthquake bracing
J59209AA	1	Assembly, wiring, equipment, and power supply for one SMDR carrier (MD)
	2	Apparatus required in addition to List 10 for systems with printer output device (includes printer and paper) (MD)
	4	Apparatus required in addition to List 10 for systems with a paper tape punch output device (includes paper tape punch) (MD)
	5	Apparatus required in addition to List 10 for systems with printer and paper tape punch output devices (includes printer and paper tape punch) (MD)
	7	Apparatus required in addition to List 10 for systems with customer-provided peripheral equipment (MD)
	8	Apparatus required in addition to List 1 for systems equipped with a magnetic tape output device (MD)
	9	Apparatus required in addition to List 10 for systems equipped with a magnetic tape output device (CSS 201 only)
	10	Assembly, wiring, and equipment for one SMDR carrier (includes power supply)
	11	Apparatus required in addition to List 10 and 13, 14, or 15 to provide for direct output SMDR with FP8
	12	Apparatus required in addition to List 10 for systems equipped with a direct output device

See Note at end of table

▶TABLE E (Contd)◀

EQUIPMENT LIST

EQUIPMENT CODE (Note)	LIST	DESCRIPTION
J59209AA (contd)	13	Apparatus required in addition to List 10 and 12 for systems equipped with a paper tape punch output device (includes paper tape punch)
	14	Apparatus required in addition to List 10 and 12 for systems equipped with a printer output device (includes printer, paper, and cable)
	15	Apparatus required in addition to List 10 and 12 for systems with customer provided peripheral equipment
	16	Apparatus required in addition to List 10 for systems equipped with a magnetic tape output device
J59209AB	1	Assembly, wiring, and equipment for one clock display assembly, including cable (MD)
	2	Assembly, wiring, and equipment for one clock display assembly, including cable (Non-locking DISPLAY SWITCH)
	C	Required in addition to List 2 when unit is mounted inside the cabinet
J59209AC	1	Assembly, wiring, and equipment for one control panel including cable (MD)
	2	Assembly, wiring, and equipment for one expanded control panel (MD)
	3	Assembly, wiring, and equipment for one expanded control panel with key lock switch (MD)
	4	Assembly, wiring, and equipment for one expanded control panel with key lock switch
J59209JA	1	Assembly, wiring, and equipment for one AC power distribution unit for non-UPS
	3	Wiring and equipment in addition to List 1 to provide fans
J59209TB	1	Sample Tape (containing call information as generated by 9-track magnetic tape equipment) (MD)
	2	Sample Punched Paper Tape (contains call information as generated by SMDR equipment)
	3	Sample Tape (containing call information as generated by 9-track equipment using FP4, Iss 2.0, or FP10, Iss 1.0)
	4	Sample Tape (containing call information as generated by 9-track equipment using FP8 L3.4)

Note: Equipment ordered by means other than Mechanized Ordering Form E-8124 requires separate ordering for cables.

TABLE F

DECORATOR DOOR INSERTS (SEE NOTE)

COLOR	APPARATUS CODE	
	DIRECT OUTPUT	9-TRACK MAGNETIC TAPE
Avocado	840607006	842154171
Gold	840607006	842154189
Orange	840607022	842154197
Black	840607022	842154205
Red	840607030	842154213
Blue	840607030	842154221
Teak	842195232	842154239
Walnut	842195240	842154247

Note: Door insert is provided when ordered via the mechanized ordering Form E-8124.

- ***LC67—Data Control (MD):*** The LC67 provides month and day information for the output device and the clock/calendar display. One LC67 is required per system.
- ***LC67B—Data Control:*** The LC67B performs the same function as the 67, but with changes that cause the date register to be updated when power is restored after a power failure.
- ***LC68—Read Memory Controller:*** The LC68 controls the data output from the RAM for availability to the tape deck. One LC68 is required with a 9-track magnetic tape version.
- ***LC69—Display Control:*** The LC69 controls the call display circuitry of the Type I system control panel. One LC69 is required with a Type I 9-track magnetic tape version.
- ***LC70—Index Information:*** The LC70 collects date, time, and block number for each block of 31 calls written on the magnetic tape. One LC70 is required with a 9-track magnetic tape version.
- ***LC71—Tape Controller:*** The LC71 controls the functions of the tape deck. One LC71 is required with a Type I 9-track magnetic tape version.
- ***LC174—Data Multiplexer:*** The LC174 provides data bytes to the write heads of the tape deck. One LC174 is required with a Type I 9-track magnetic tape version.
- ***LC175—Formatter Input/Output:*** The LC175 provides buffering between SMDR circuitry and tape deck circuitry. One LC175 is required with a 9-track magnetic tape version.
- ***LC176—Display Control:*** The LC176 controls the call display circuitry of the Type II system control panel. One LC176 is required with a Type II 9-track magnetic tape version.
- ***LC177—Tape Control Circuit (MD):*** The LC177 controls the functions of the tape deck. One LC177 is required with a Type II 9-track magnetic tape version.
- ***LC177B—Tape Control Circuit:*** The LC177B performs the same function as the LC177 with changes so that a closure will occur across leads ALRM1 and ALRM2 when the transport is off-line as well as indicating an end-of-tape condition.
- ***LC178—Data Multiplexer:*** The LC178 provides data bytes to write heads of the tape deck. One LC178 is required with a Type II 9-track magnetic tape version.
- ***LC374—RAM Control:*** The LC374 controls the data input to the SMDR memory. It also generates clock signals which control the rate at which data is outputted from the memory to a terminal device. Baud rates of 300, 600, 1200, 2400, and 4800 can be selected. One LC374 is required for the direct output version.
- ***LC375—Output Formatter (MD):*** The LC375 is used for testing a 9-track tape version SMDR used with FP8, 11, or 12. The LC375 encodes the 15-word call data record from test 4 of Procedure PROC 523 into ASCII format for a test printer.
- ***LC375B—Output Formatter:*** The LC375B encodes the data into ASCII format for the output device. It is also used for installation testing of a 9-track tape version

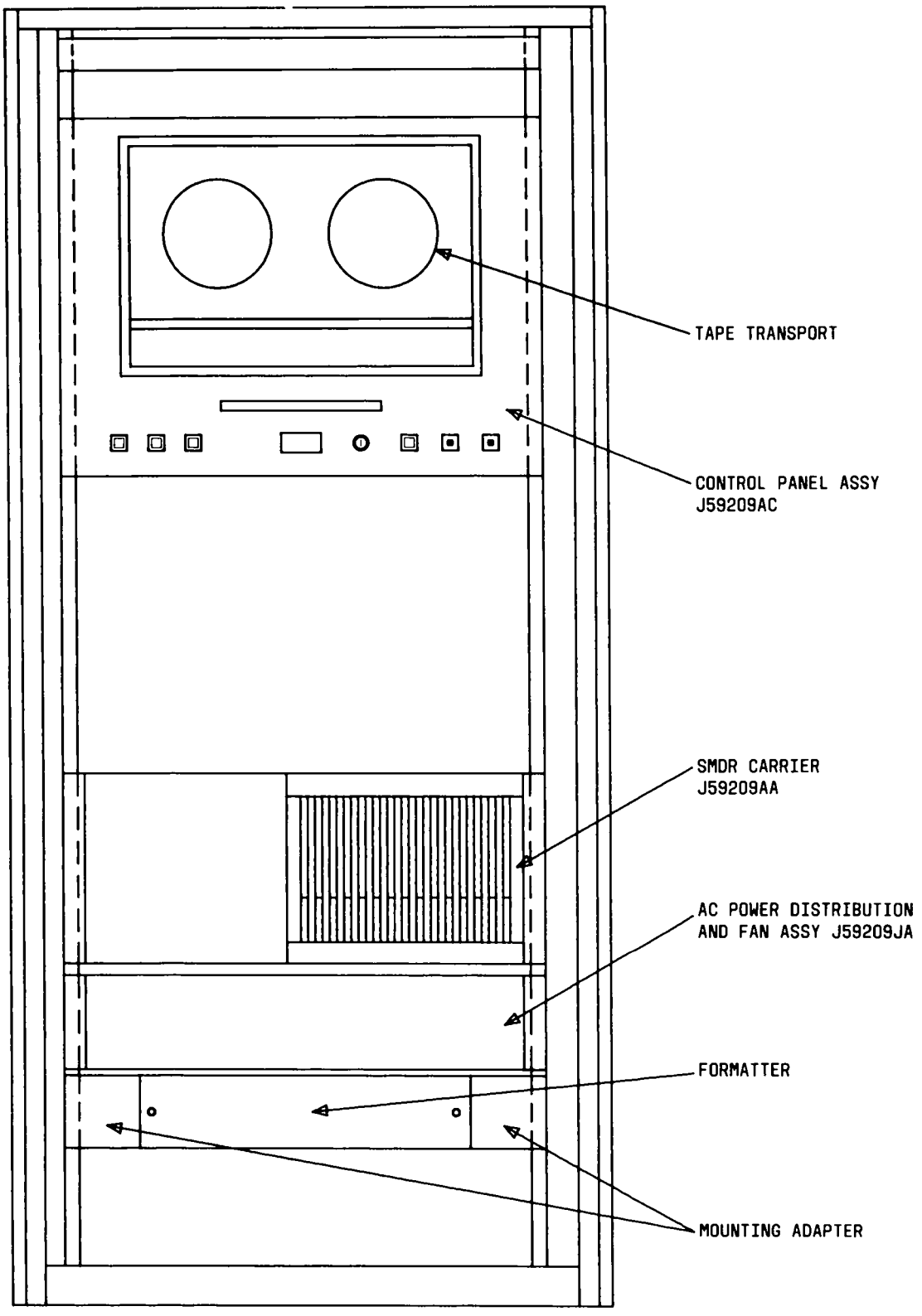


Fig. 17—9-Track SMDR Cabinet With Door Removed (J59209B)

SMDR used with FP8, 11, or 12. One LC375B is required for a direct output version SMDR when used with FP8, 11, 12, or 15.

9-TRACK SMDR CONTROL PANEL

3.14 There are several controls provided to allow the user both to initialize the system and to provide access to the tape. A visual display is also provided which can be used to show one call's worth of data sampled from the read-after-write heads of the tape deck. A diagram of the system control panel is shown in Figures 18 (Type I), 19 and 20 (Type II). The following is a description of the control panel buttons and switches.

- SYSTEM ON LINE—Pressing this button causes a command pulse to be sent to the formatter from the SMDR hardware ensuring that the system monitors the SMDR control leads.

- TAPE UNLOAD—Pressing this button causes the contents of the on-line memory, an end-of-file mark to be written on the tape, and rewinds the tape to the load point.

- DUMP MEMORY—Pressing this button causes the data contained in the on-line memory to be written on the tape.

After DUMP MEMORY button is pressed, the tape will move forward and stop. Wait 2 seconds after tape has stopped before pressing DUMP MEMORY button again or executing other commands.

- FILE SEARCH (Type I only)—This button has no functional use and should not be operated as it may cause the unit to go to a nonoperate state.

- CALLING EXTENSION—A thumbwheel switch with four numerical digits that can be set. An extension number from 0000 to 9999 can be selected as the calling extension when using the MODE EXTENSION NUMBER/AUTO switch.

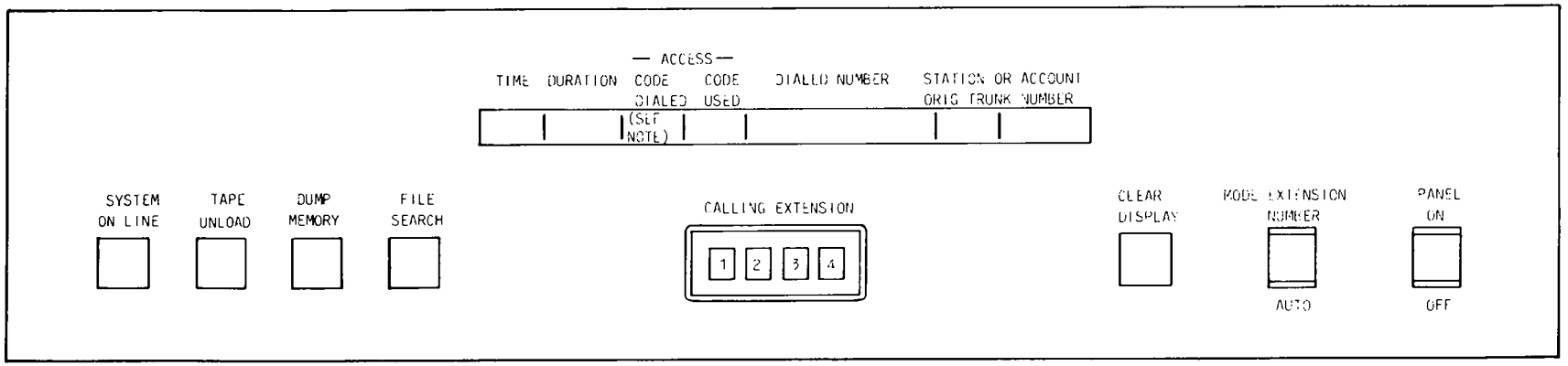
- CLEAR DISPLAY (Type I only)—Pressing this button resets the visual display after the panel ON/OFF button has been operated to the OFF then ON positions.

- CLEAR DISPLAY (Type II only)—Pressing this button clears and resets the visual display.

- KEY SWITCH (Type II only)—This switch is used to enable or disable the control panel and tape transport control buttons and switches.

- MODE EXTENSION NUMBER/AUTO—Normal operating position is in the AUTO mode. When a display of a specific extension is desired, place in EXTENSION NUMBER mode and select desired station using the CALLING EXTENSION thumbwheel switch. This button is labeled EXTENSION NUMBER/AUTO on the Type II SMDR.

- PANEL ON/OFF—Switch that deactivates the display in the OFF position, or activates the display when in the ON position.



NOTE:
CONDITION CODE IS THE FIRST DIGIT OF THE ACCESS CODE DIALED FIELD.

Fig. 18—Type I 9-Track SMDR System Control Panel

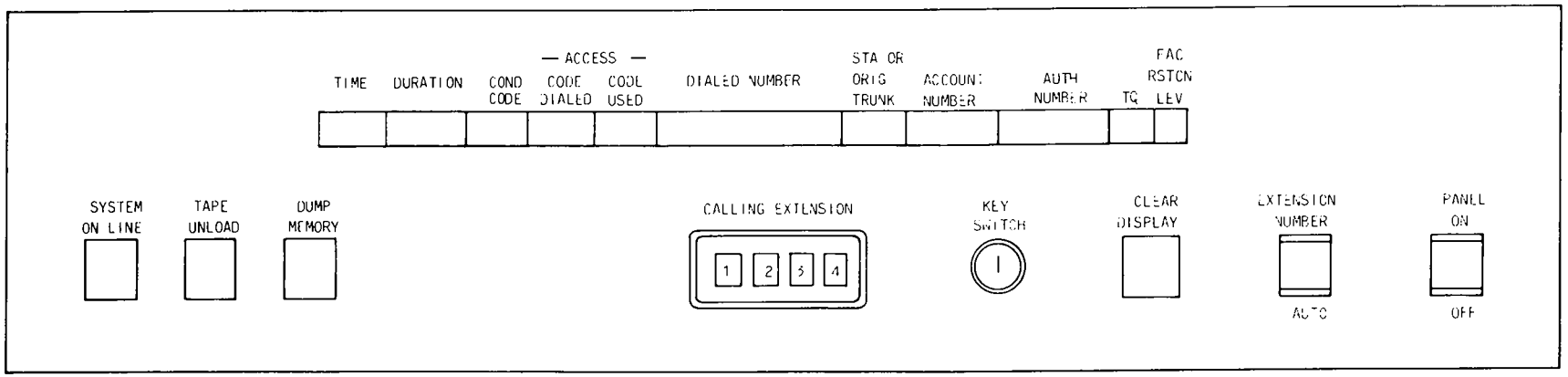


Fig. 19—Type II 9-Track SMDR System Control Panel for FP15

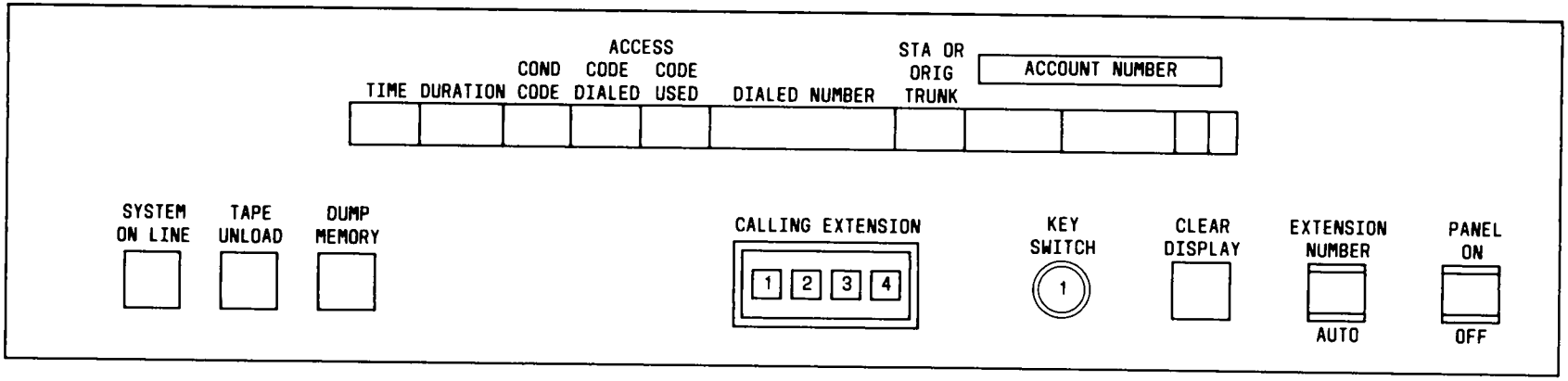


Fig. 20—Type II System Control Panel for FP15

▶FCC REGISTRATION REQUIREMENTS

3.15 The following paragraphs provide planning information concerning the implementation of the FCC registration program for the DIMENSION PBX SMDR.

3.16 The Commission has established a PBX register-only date and a PBX grandfather date. The PBX register-only date is the date by which all newly manufactured PBX systems being connected to the network must be registered. The PBX grandfather date is the date which establishes the systems that are excluded from the technical compliance regulations of the registration program. The grandfather provision of the registration program means that all PBXs that were legally connected to the network as of the grandfather date are grandfathered for life. These PBXs may remain connected; may be removed and reinstalled; and may be removed, repaired, refurbished, and reinstalled. Reinstallation of a removed PBX is not restricted to the same customer. The system may be reinstalled for any customer. Additions may be made to grandfathered systems using any equipment registered in configuration with the DIMENSION 400 PBX system. The grandfathered system does not become registered but the system does retain its grandfathered status. Specifically, this means that additions to grandfathered systems can only be made using units from Class C or Chief Engineers' stock. Grandfathered status is retained if units and/or cables used for repair and/or refurbishing are of a type that were connected to the network as of the grandfather date. Therefore, orders for new units from Western Electric for grandfathered systems must be restricted to maintenance, repair, or refurbishing.

A. FCC Part 15 Compliance

3.17 Although FCC Part 15 regulations apply to systems shipped on or after October 1, 1983, controlled introduction of compliant systems will be made in advance of this date. These complaint systems will have the following to make them more resistant to transmitting or receiving radio frequency interference (RFI):

- Shielded cabinets
- Cables having drain wire shields with spade lug connectors which attach to mating connector field on the back of the cabinets
- RFI gasket on mating surfaces of cabinet panels which can be removed
- Conductive paint on cabinet surfaces which permanently mate
- Quarter-turn fasteners which hold the doors in-place
- Triaxial 4 MHz cable between cabinets.

B. FCC Part 68 Compliance

3.18 Systems currently being shipped are in compliance with FCC Part 68 regulations. These regulations were developed to ensure the protection of the network from lightning surges and other induced voltages.◀

4. ENVIRONMENTAL REQUIREMENTS

ATMOSPHERIC AND TEMPERATURE

4.01 Extreme conditions of temperature and humidity may have damaging effects on system equipment. Exposure to extreme temperature and humidity may degrade telephone service, not only at the time of exposure but also when a normal environment is restored. Table G outlines the equipment room environmental requirements. The humidity design range chart (Fig. 21) is provided to indicate the safe ranges for the equipment. The use of the chart requires a hygrometer to measure wet and dry bulb temperatures and a psychrometric table to determine the relative humidity from the difference in the two measurements.

4.02 The requirements presented in Table G represent the extreme limits of the equipment operating ranges. These requirements should not be construed as being desirable working conditions for minimum maintenance. Installation in undesirable areas will cause degradation to the extent of reducing system life. Therefore, it is recommended that floor plans for customer equipment locations specify that the room ambient temperature be maintained in the range of 18°C (65°F) to 35°C (95°F) and relative humidity in the range of 20 to 60 percent.

4.03 For storage and transportation environments, the permissible extremes are 66°C (150°F) with 15 percent RH and −40°C (−40°F) humidity uncontrolled.

4.04 The following site selection guidelines should be followed.

TABLE G

ENVIRONMENTAL REQUIREMENTS

ROOM AMBIENT (DRY BULB) TEMPERATURE °C (°F) (See Note)		PERMISSIBLE RANGE HUMIDITY %		RECOMMENDED RANGES			
				TEMP °C (°F)		HUMIDITY %	
MAXIMUM	MINIMUM	MAXIMUM	MINIMUM	MIN	MAX	MIN	MAX
27 (80)		95	10				
29 (85)		95	8				
32 (90)		95	7				
35 (95)		80	6	18°	35°		
38 (100)	0 (32)	70	5	(65°)	(95°)	20%	60%
41 (105)		60	4				
43 (110)		55	4				
46 (115)		45	3				
49 (120)		40	3				

Note: Temperature is indicated by an ordinary thermometer measured at a location 381 mm (15 inches) in front of a cabinet and 762 mm (30 inches) above the floor for the direct output version, or 1524 mm (5 feet) above the floor for the 9-track version.

Due to the possibility of extensive lightning damage, the SMDR cabinet and peripheral equipment must be located in the same building as the PBX.

(a) The equipment should be installed in an air-conditioned space whenever possible.

(b) Environments which are not recommended for installation because of potential temperature problems include rooms in which a major heat source (ie, boiler room, furnace room, manufacturing areas using hot processes) can affect the room ambient temperature significantly. These areas could include:

(1) Nonventilated rooms with less than 4.6 square meters (50 square feet) of floor space

(2) Nonventilated rooms with two or more exterior walls that are frequently exposed to high ambient temperatures.

4.05 To aid in determining air-conditioning requirements when space is allocated, total power dissipation of each carrier is shown in Table H. The equipment engineer should analyze the room ventilation and/or air-conditioning to ensure that requirements for each installation are met.

4.06 Gold fingers and connector interfaces could chemically deteriorate through the corrosive effects of gases on particle surfaces. Environments containing high concentrations of corrosive gases such as sulfur or chlorine should not be used as installation sites.

4.07 The large cabinet that houses the 9-track magnetic tape SMDR is equipped with blower fans that operate continuously. The fans are required to guarantee proper operation of the tape transport unit. The filter assembly is always provided.

EARTHQUAKE BRACING

4.08 Earthquake zones for the continental United States are shown in Fig. 22. The zones are classified by susceptibility with 4 being the most susceptible.

4.09 Both the direct output and 9-track version can be bolted to the floor by using four insulating bolts (such as INSUL-BOLTS from Pylon Co., Inc.)

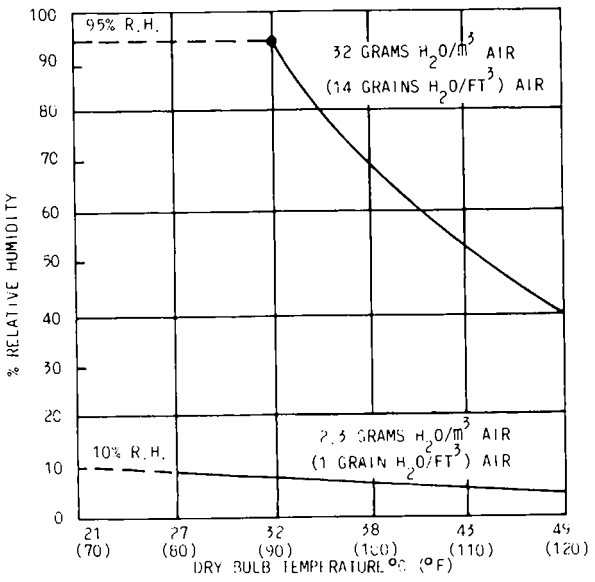


Fig. 21—Humidity Design Range

TABLE H

TOTAL POWER DISSIPATION

CABINET	MAXIMUM POWER DISSIPATION	
	BTU/HR	WATTS
Direct Output	587	172
9-Track	1799	527

and four insulating washers in holes provided in the baseplate of the cabinet for this purpose. When the cabinet is bolted to the floor, maintenance access space of 610 mm (24 inches) should be provided behind the cabinet.

4.10 The 9-track version can also be secured by the use of floor rails per ED-1E362-70, GR4 with J59209B, List 2, cabinet.

INSECTS AND RODENTS

4.11 The system cabinets are designed to retard insect and rodent entry to internal areas. For this reason, the front, back, and side panels should be used at all times, particularly when such pests are known to exist in a particular location.

TRANSPORTATION

A. In Transit

4.12 The system should always be shipped packaged in the Western Electric-provided crates.

4.13 The packing material used for shipping cabinets from Western Electric is adequate for upright or lay-down (on-side) shipment. If on-side shipment is used, installation personnel should carefully raise the cabinets to an upright position before unpacking.

4.14 The cabinet will be fully loaded ready for operation, with the exception of cabling, when shipped. This includes all maintenance books and manuals to be kept inside the door. This does not include the spacer assembly and floorplate which will be shipped in a separate crate.

4.15 The preferred modes of transportation are truck, rail, and air (in order of preference). Air transportation is known to subject equipment to severe handling shocks. Rail transportation is less severe, but railroad car coupling shocks can severely stress the system.

B. Handling on Site

4.16 It is preferable that, when possible, the system remain packaged in its crate until it is in the room in which it is to be located.

4.17 A forklift and dolly are acceptable for handling the crated system on customer premises. The pallet portion of the crate has been designed for these methods of handling.

4.18 Care should be taken to avoid dropping the system (either crated or uncrated) from any height. Under no circumstances should the system be allowed to drop from a height greater than 203 mm (8 inches) packaged or 25 mm (1 inch) unpackaged.

5. FLOOR PLAN

5.01 Figure 23 shows a floor plan layout of a typical SMDR installation. For general PBX space requirements (such as lighting, floor level requirements, or interdepartmental responsibilities), refer to Section 809-002-100.

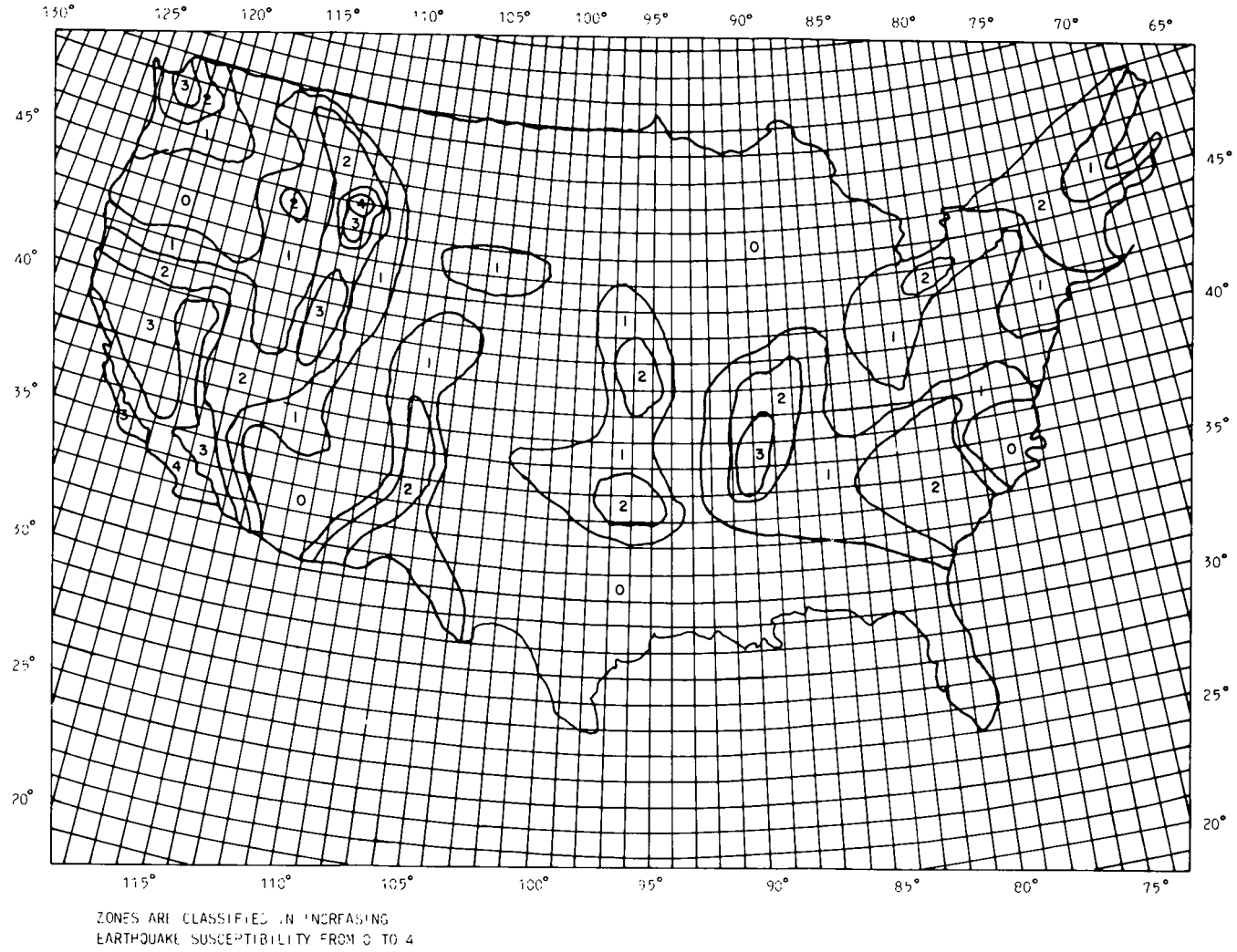


Fig. 22—Earthquake Zones (USA)

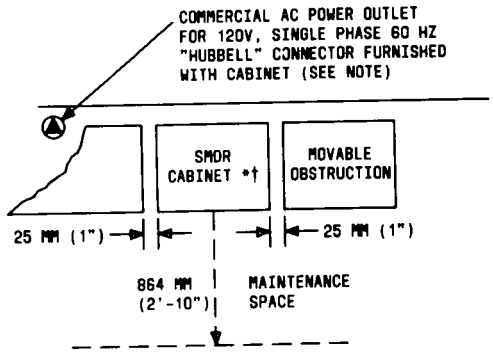
Due to the possibility of extensive lightning damage, the SMDR cabinet and peripheral equipment must be located in the same building as the PBX.

5.02 Maintenance space is required above, in front of, and on one side of the cabinet to permit access to the interior components.

5.03 The direct output SMDR mounted in a small cabinet weighs approximately 91 kilograms (200 pounds). Concentrated floor loading under the cabinet casters is approximately 180 kilograms per square meter (37 pounds per square foot).

5.04 The large cabinet for the 9-track magnetic tape weighs approximately 204 kilograms (450 pounds), resulting in 415 kilograms per square meter (85 pounds per square foot) directly beneath the cabinet casters.

5.05 A floorplate and rollway assembly (ED-1E314-70, GR4) is available for use with the 9-track magnetic tape SMDR cabinet. This assembly can be used for redistributing the cabinet weight because of floor loading limitation, for prevention of indentation in floor surfaces, and for ease of movement on floor surfaces or coverings.



NOTE:
AC INPUT SHOULD BE PROTECTED BY 10 AMPERES.

* ALLOW 1.2M (4') OF DRAPE IN THE POWER AND DATA CABLING TO ALLOW THE CABINET TO BE PULLED AWAY FROM THE WALL FOR MAINTENANCE.

† THE CABINET DIMENSIONS FOR THE DIRECT OUTPUT VERSION ARE 610 MM (24") DEEP, 800 MM (31 1/2") WIDE, AND 762 MM (30") HIGH AND FOR THE 9-TRACK MAGNETIC TAPE VERSION ARE 610 MM (24") DEEP, 800 MM (31 1/2") WIDE, AND 1765 MM (69 1/2") HIGH.

Fig. 23—Typical Floor Plan

5.06 ***Prepare a sketch*** of the proposed installation similar to that of Fig. 23 to show the desired placement of the cabinet and location of the power outlets. The power outlet for the cabinet should be located within 1219 mm (4 feet) from a point where the power cord is fastened to the wall by a cable clamp.

LIGHTING

5.07 The light intensity level around the system cabinet should be sufficient to conform with the Occupational Safety and Health Act (OSHA) standards to provide a comfortable amount of light for maintenance personnel to do the repair tasks required. To obtain accurate footcandle measurement, measure level in center aisle, 5 feet above the floor, aiming meter upward. Light measurements can be made with a WESTON* Model 614 footcandle meter, or equivalent.

*Registered trademark of Weston Instruments, Inc.

Standard 48V lights used by some maintenance personnel for lighting are not to be powered from the 48V taps in the power supply or backplane.

SECURITY

5.08 The front doors of the system cabinets have locks that require a 216C tool to operate. This locking arrangement allows only authorized personnel access to the inside of the cabinet.

5.09 The rear panel is in effect locked when the back of the cabinet is against the wall since the wheel locks can only be released from inside the cabinet. Thus, the front panel must be opened to allow the cabinet to be moved away from the wall.

6. POWER AND GROUNDING

6.01 When the SMDR is installed ***inside*** the PBX equipment room, the following rules apply:

- The 9-track version SMDR must be powered from the same ac source as the PBX.
- If the SMDR cabinet and the peripheral device are powered from the same ac source as the PBX, they should not make contact with incidental grounds. No separation is required.
- If either the direct output version SMDR or the peripheral device (or both) are not powered from the same ac source as the PBX, a separation of 1829 mm (6 feet) is required.

6.02 When the SMDR is installed ***outside*** the PBX equipment room, the following rules apply:

- The PBX, SMDR, and peripheral device must be located in the same building.
- The SMDR cabinet must be located within 61m (200 feet) of the PBX control carrier.
- ▶The peripheral device must be located within 15m (50 feet) nominally of the SMDR cabinet.◀

- If the SMDR or peripheral device is powered from the same ac source (load center) as the PBX, they should not make contact with incidental grounds.

POWER

6.03 A 120-volt 60-Hz commercial power source is required for the SMDR cabinet. ⧫This commercial power source is provided either via a JA unit or, on or after October 1, 1983, via an EMI line filter to meet FCC Part 15 regulations.⧫ The following is a list of requirements for commercial power:

- 120-volt wide input frequency tolerance (±3 Hz) or wide input voltage level tolerance (−15 percent, +10 percent) as long as both conditions do not occur at the same time
- 10-ampere protection for ac input current
- 3-wire HUBBELL* receptacle 5279 provided with direct output version (provided in cabinet when ordered using Form E-8124)
- ⧫3-wire HUBBELL twist-lock receptacle IG-2310 provided with magnetic tape version (supplied with cabinet when ordered using Form E-8124).⧫

6.04 The SMDR uses a 207B power supply, which is mounted in the carrier as shown in Fig. 16, and furnishes the following voltages:

- −24 volts at 3 amperes (65 milliamperes required)
- +5.1 volts at 5 amperes (3.1 amperes for direct output, 5 amperes for the 9-track)
- +12 volts at 200 milliamperes (181 milliamperes required)
- 120-volt utility outlet (used for installation and maintenance).

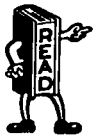
6.05 Power reserve for SMDR memory and the clock/calendar is provided by circuit pack LC38. The purpose of power reserve is to prevent the loss of call information stored in memory and to allow the time-keeping circuitry to remain functional during a commercial power failure. The LC38 circuit pack is capable of providing protection against memory loss for approximately 7 hours.

*Registered trademark of Harvey Hubbell, Inc.

GROUNDING

6.06 Proper grounding of the SMDR is particularly important to ensure personnel safety and to protect the equipment against lightning surges. Grounding within the SMDR cabinet is provided by a copper block (designated as ground block) which serves as the single connecting junction for the ac ground wire in the power cord (green wire), the circuit ground, and the frame ground.

6.07 Grounding for the cabinet is provided by a No. 6 AWG ground wire connected from one of the following approved ground sources to the SMDR single-point ground.



A separate ground wire (green) is required between the load center and each receptacle, although the wiring is run in conduit, armored cable, or raceway.

6.08 Since the equipment ground (equipment grounding conductor) for the wall-mounted ac receptacles is derived through the green wire conductor only, power receptacles which are designed to derive the protective ground from conduit, when mounted in a metallic junction box, shall not be used in the SMDR installation. The HUBBELL IG-2310 receptacle has its ground terminal insulated from its mounting hardware and has been specified for this purpose. A green wire conductor must be used from the load center to the grounding terminals of the receptacles, in order to provide the equipment grounding conductor required by the National Electrical Code.

7. CABLING

7.01 Shielded C2-type cables are used for SMDR installations. The C2A, and C2C are single-ended cables and used, as shown in Fig. 24, when cable termination is required. The C2D is a double-ended cable with male connectors on both ends and used for direct cabling. When the SMDR is ordered via Mechanized Ordering Form E-8124, the C2D cable is provided. For manual orders (material ordered by "J" or apparatus codes), the cables must be ordered separately. The PBX data link is equipped with a connector that mates with a SMS6P-1 Burndy type plug

furnished on a C2C or C2D cable. The other plug of a C2D cable and the plugs furnished on a C2A or C2B cable are P-306 CCT Cinch-Jones type plugs required by the SMDR carrier. Older PBX data links are equipped with a Cinch-Jones type connector. Substitute a C2B for a C2D cable on direct connect installation or a C2A for a C2C cable when cable termination is required.

The cable used for the data link between the PBX and the SMDR is a shielded-type cable. The shield of the cable is connected to the PBX frame ground. The SMDR end of the data link SHOULD NOT be connected to ground.

7.02 When the direct output terminal device is cabled via dedicated house cable, the data leads should be paired with ground leads to prevent degradation of the transmission (ie, one half of the cable pair is used for the signal and the other half is connected to ground).

7.03 Figure 24 is a block diagram of the typical cable connections for an SMDR installation. The fast-speed data link between the SMDR cabinet and the PBX makes use of six leads: two for transmit (IOXA and IOXB), two for receive (IORA and IORB), and two for ground leads. The cables to the output devices are separate connectors depending on the type of device used. Three interface connectors are provided on the SMDR carrier for interfacing the serial data channel to the terminal device (Fig. 25). If a telephone company printer is provided, it will be connected to SX01. If a telephone company paper-tape punch is provided, it will be connected to SX02. A customer-provided output terminal device can be connected to either SX01, SX02, or SX03. The customer shall select the connector option to be used, and the telephone company will provide the required cable. The ETALM connector is used with the Type II 9-track magnetic tape system and furnishes a dry contact closure for an end-of-tape and tape transport off-line indication. The rating of the contact closure is 10VA, 0.5 ampere maximum, or 50 volts dc maximum. The remaining connectors should be used as indicated in the list below:

- FORM 1 connects to Kennedy 9-track tape formatter
- FORM 4 connects to Kennedy 9-track tape formatter
- CD01 connects to clock/calendar display
- CD02 connects to system control panel
- CD03 connects to system control panel
- CD04 connects to system control panel
- SR01 connects to PBX
- ETALM connects to cross-connect field.

7.04 The connector designation at the DIMENSION 400 PBX cabinet for the fast-speed data channel is CX03, and the circuit pack location is slot 32, circuit 0.

7.05 The connector designation at the DIMENSION 600, 2000, and Custom PBX control cabinet for the fast-speed data channel is BX07, and the circuit pack location is slot 31, circuit 0.

7.06 Leads ALARM 1 and ALARM 2 in cable ETALM provide a dry contact closure. The contacts close to indicate an end-of-tape or tape drive off-line condition. The contacts are rated at 10VA, 0.5 amps maximum, or 50 volts dc maximum.

8. FORMATTER AND TAPE TRANSPORT

8.01 This part describes the Kennedy Company model 9217 formatter and model 9800 digital tape transport used with the 9-track version SMDR.

8.02 The formatter and tape transport are designed to respond to input signals and generate output signals having zero volt true logic. The circuitry is designed so that a disconnected lead results in a false signal. A true signal (low or logic 1) is less than or equal to +0.4 volts, and a false signal (high or logic 0) is greater than or equal to +2.5 volts.

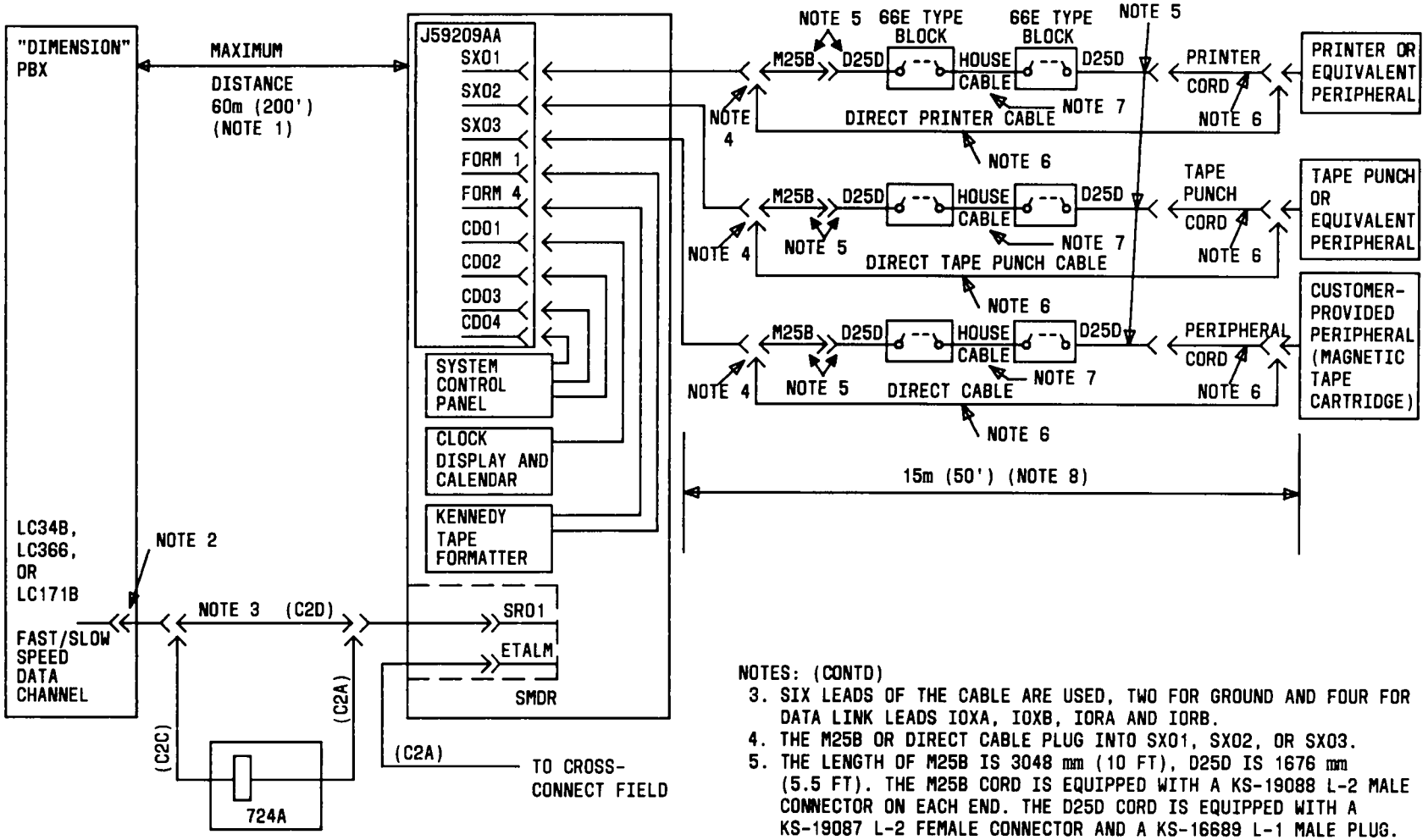
8.03 The formatter and tape transport provide phase encoded recording for SMDR.

FORMATTER

A. General

8.04 The Kennedy formatter is designed to format NRZ1 and phase encoded magnetic tapes, and contains all the circuitry required to read or write ASCII and IBM compatible formats.

8.05 The address and control logic circuits convert input commands into signals which initiate



NOTES:

1. THE DISTANCE BETWEEN THE PBX AND THE SMDR CABINET CANNOT EXCEED 60m (200 FT) BECAUSE OF THE FAST SPEED DATA CIRCUIT.
2. CONNECTOR DESIGNATION AT THE "DIMENSION" 400 PBX CABINET FOR THE FAST SPEED DATA CHANNEL IS CX03, AND THE CIRCUIT PACK LOCATION IS SLOT 32, CIRCUIT 0. CONNECTOR DESIGNATION AT THE "DIMENSION" 2000 OR "DIMENSION" CUSTOM PBX CONTROL CABINET FOR THE FAST SPEED DATA CHANNEL IS BX07, AND THE CIRCUIT PACK LOCATION IS SLOT 31, CIRCUIT 0.

NOTES: (CONTD)

3. SIX LEADS OF THE CABLE ARE USED, TWO FOR GROUND AND FOUR FOR DATA LINK LEADS IOXA, IOXB, IORA AND IORB.
4. THE M25B OR DIRECT CABLE PLUG INTO SX01, SX02, OR SX03.
5. THE LENGTH OF M25B IS 3048 mm (10 FT), D25D IS 1676 mm (5.5 FT). THE M25B CORD IS EQUIPPED WITH A KS-19088 L-2 MALE CONNECTOR ON EACH END. THE D25D CORD IS EQUIPPED WITH A KS-19087 L-2 FEMALE CONNECTOR AND A KS-16689 L-1 MALE PLUG.
6. FURNISH CABLES AS FOLLOWS:
   TP408065 - 213 cm (7 FT)
   TP408066 - 305 cm (10 FT)
   TP408067 - 762 cm (25 FT)
   TP408068 - 1524 cm (50 FT).
7. DEDICATED HOUSE CABLE.
8. CABLE LENGTH BETWEEN SMDR AND PERIPHERAL EQUIPMENT IS 15m (50 FT) NOMINALLY. ADDITIONAL CABLE LENGTHS SHOULD BE ENGINEERED LOCALLY USING THE RS232C SPECIFICATIONS.

Fig. 24—Typical Cabling

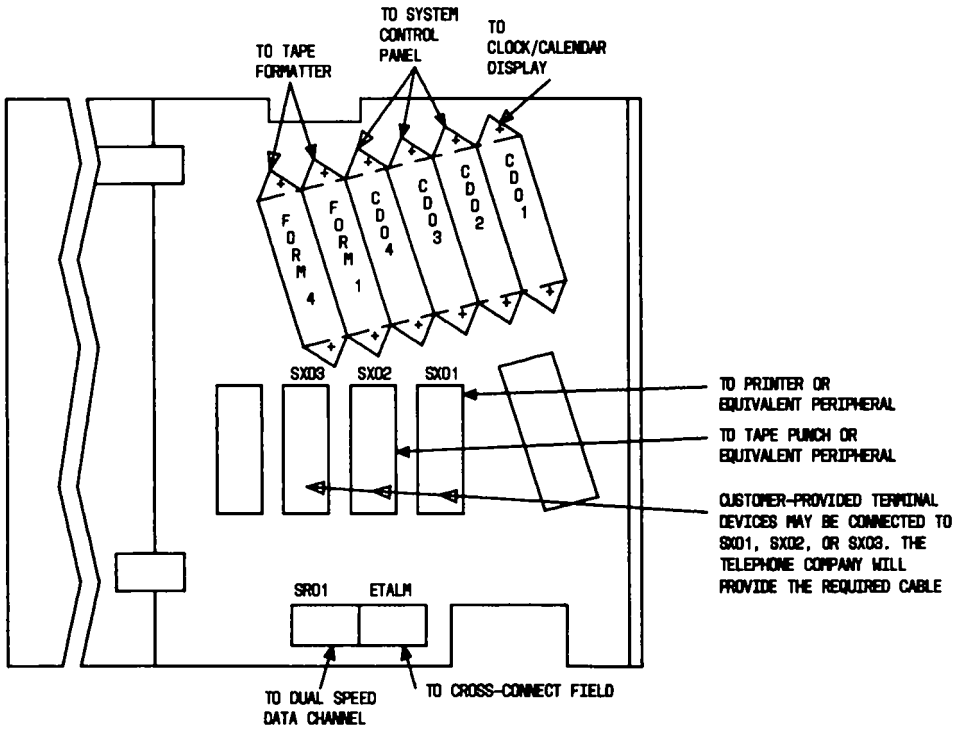


Fig. 25—SMDR Carrier Connector Locations

the desired operations of the selected tape transport. Motion control logic includes flip-flops that control forward, reverse, and rewind operations, and the associated delay circuits. A start/stop delay circuit is used to permit the tape transport to reach normal operating speed before it is required to accept or furnish data to the Format Control Unit. These delays are also designed for minimum stress on the magnetic tape when starting and stopping.

8.06 Status logic contains circuitry which indicates the current status of the tape transport, the formatter, and the condition of the data block being written or read.

8.07 The transport drivers and receivers include necessary logic and amplifier circuits to supply write data and motion control signals to the tape transport, and to receive read data and status signals from the transport.

8.08 The model 9217 performs the following functions for SMDR:

- Write one block
- Write end-of-file gap
- Backspace one block
- Rewind to load point.

8.09 The formatting circuitry includes separate clocks for high and low density formats, and establishes the load point gap, interrecord gap, and file mark gap.

B. Physical Description

8.10 The Kennedy formatter (Fig. 26) measures 483 mm (19 inches) wide, 390 mm (15.37 inches) deep, and 89 mm (3.5 inches) high and is mounted in the bottom of the SMDR cabinet (Fig. 17). The formatter is part of J59209AA-2, List 9, and can be ordered for replacement as follows:

Formatter KS-22078, L1 (402454904)

Cable KS-22078, L2 (402445845).

8.11 The formatter contains six circuit packs and a power supply that can be connected to a 120-Vac or 240-Vac source. A switch on the rear of the

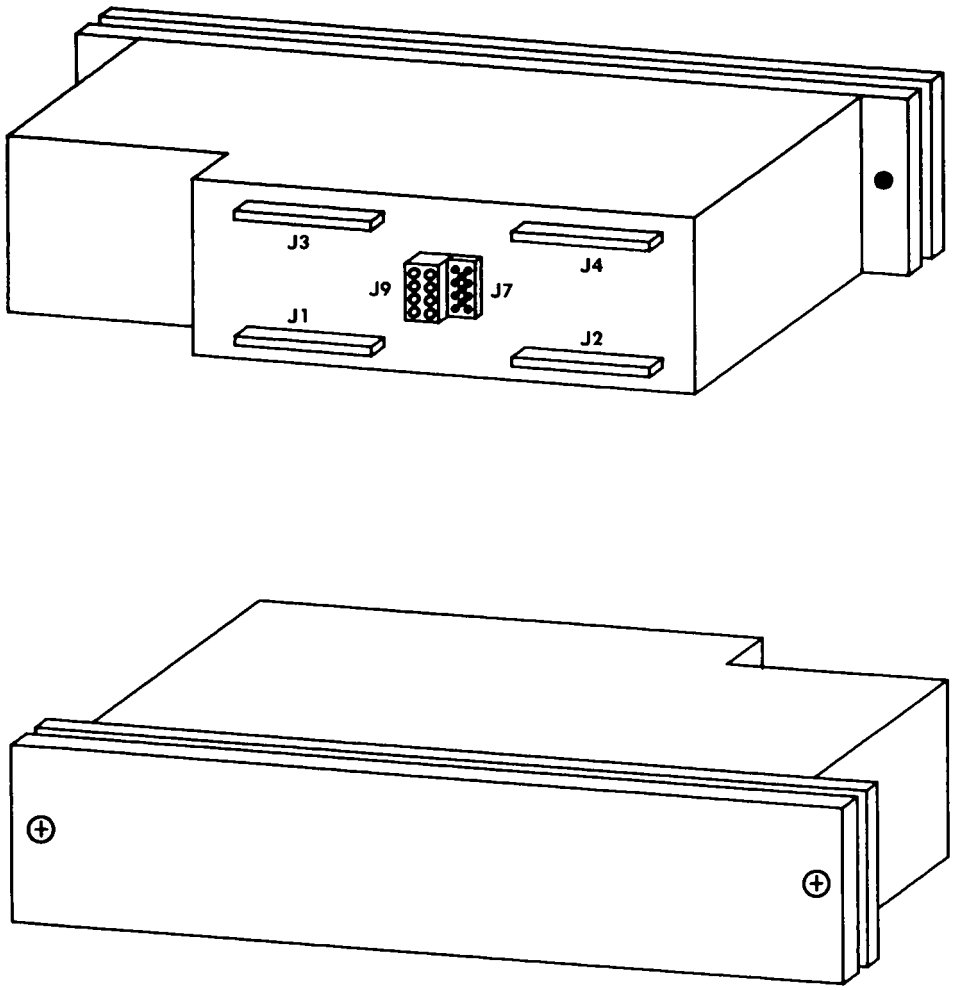


Fig. 26—Formatter

formatter is used to select the correct input voltage. The SMDR is always connected to a 120-Vac source.

8.12 The following is a numerical listing and a brief description of the formatter circuit packs:

- ***3930—Interface Receiver:*** The Interface Receiver is used in conjunction with the 3931 transport output to provide the interface between the SMDR carrier and the formatter control circuits.

- ***3931—Transport Output:*** The transport output is used in conjunction with the 3930 interface receiver to provide the interface between the tape transport and the formatter control circuits.

- ***4062—Write Control Board:*** The write control board contains the circuits used to generate the tape format for writing NRZ1 and phase encoded data. It contains the timing circuits, the program control counter, the delay counter, and their associated gating.

- ***4065—Output Driver:*** The 4065 output driver is used in conjunction with the 4240 output driver to provide the interface between the SMDR carrier and the formatter control circuits. It contains a set of driver/inverters to supply zero true lines to the SMDR carrier.

- ***4240—Output Driver:*** The 4240 output driver is used in conjunction with the 4065 output driver to provide the interface between the tape transport and the formatter control circuits. It contains a set of driver/inverters to supply zero true lines to the tape transport.

- ***4257—Phase Encoded Read Board:*** The 4257 phase encoded read board detects input data transitions from the tape transport, decodes and deskews data, generates the read clock, detects formatting and parity errors, corrects single track errors, and performs file mark detection.

TAPE TRANSPORT

A. General

8.13 The Kennedy digital tape transport is a synchronous digital magnetic tape unit capable of reading and writing ASCII and IBM compatible tapes.

8.14 The tape transport is equipped with the circuitry necessary for reading and writing tapes and for controlling the tape motion. The head specifications and the mechanical and electrical tolerances of the tape transport meet the requirements for ASCII and IBM compatibility. However, the formatting circuitry parity generator, cyclic redundancy check character (CRCC) generator, gap control, etc, are not included and must be provided by the tape control and formatter in order to generate properly formatted IBM compatible tapes.

8.15 For SMDR, the tape transport is configured for phase encoded recording, a density of 63 characters per millimeter (1600 characters per inch), and a speed of 635 mm (25 inches) per second.

8.16 Read-after-write electronics, using a dual gap, write-and-read head assembly with a side-mounted full width erase head, are available in both 7- and 9-track configurations, allowing for read-after-write operation.

B. Physical Description

8.17 The Kennedy tape transport (Fig. 27) measures 483 mm (19 inches) wide, 424 mm (16.68 inches) deep, and 311 mm (12.23 inches) high. It is mounted in the top of the SMDR cabinet (Fig. 17). The tape transport is part of J59209AA-2, List 9, and can be ordered for replacement as follows:

Transport KS-22077, L1 (402443220).

8.18 The tape transport contains 15 circuit packs and a power supply that can be connected to a 120-Vac or 240-Vac source. A switch on the rear of the tape transport is used to select the correct input voltage. The SMDR is always connected to a 120-Vac source.

8.19 An indicator and control unit (Fig. 28) is mounted on the tape transport dust cover. The following is a description of the function of these indicators and buttons:

- WRITE STATUS—Lighted when tape transport is on-line, selected, and write status is selected.

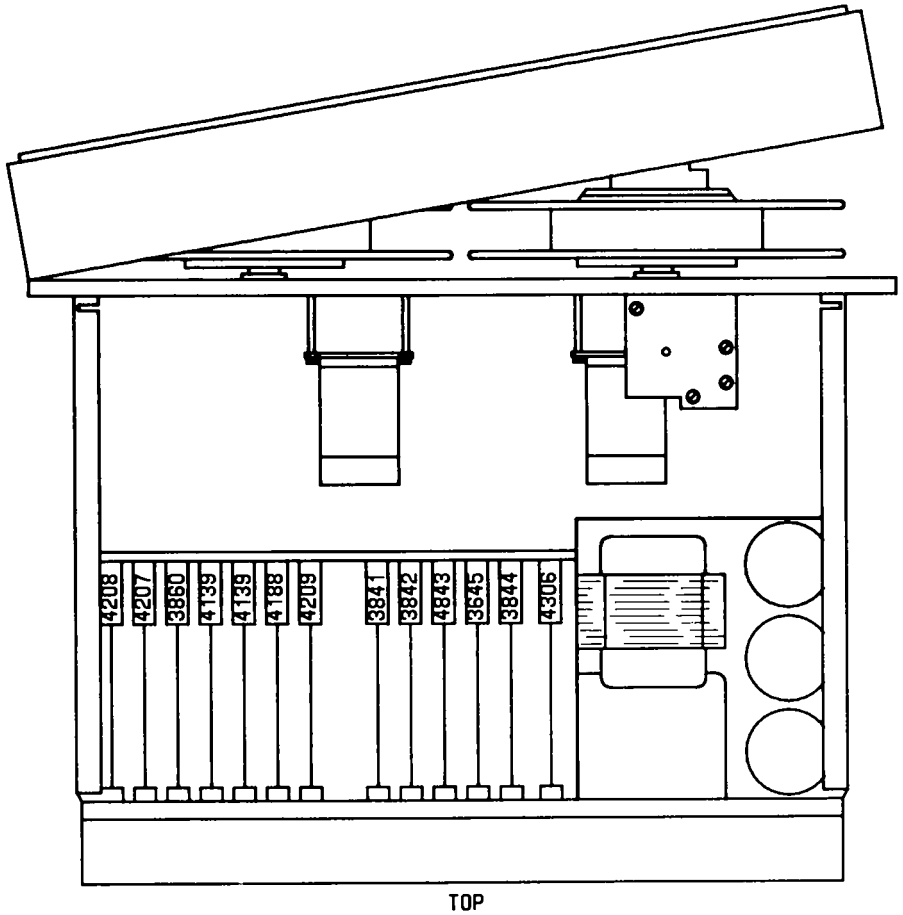
- READ STATUS—Lighted when tape transport is on-line, selected, and read status is selected.

- WRITE ENABLE—Lighted when a tape reel equipped with a write-enable ring is mounted on the supply hub.

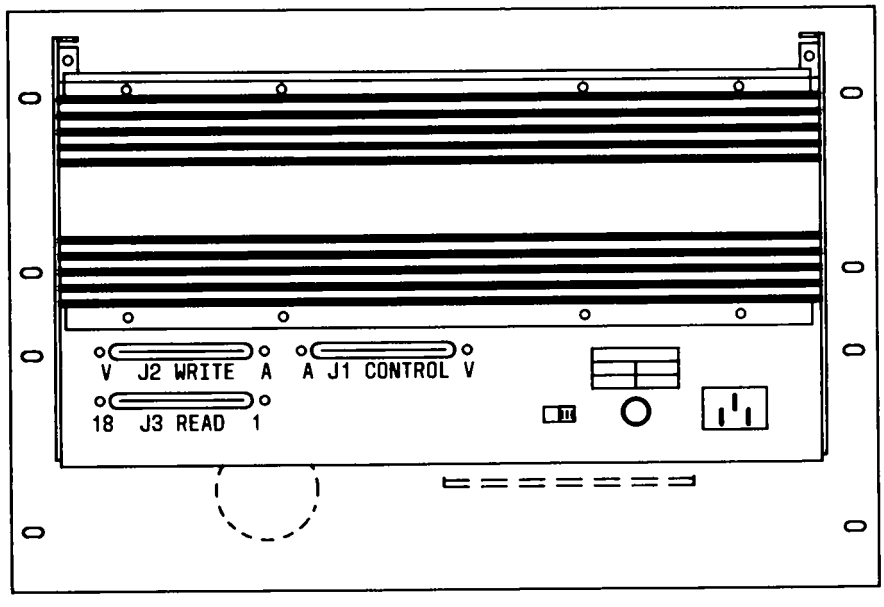
- ON LINE—A nonlocking pushbutton, which functions to place the unit on-line or off-line. When first pressed, the tape unit is placed in an on-line condition; when the tape unit is on-line, it can be remotely selected and will be ready if tape is loaded to or past the load point. When pressed again, it takes the unit off-line. The lamp is lighted in the on-line condition. A short time lag is built in between closure and action to prevent accidental operation.

- LOAD—A nonlocking pushbutton activates the reel servos (tensions tape) and starts the load sequence. The lamp is lighted when the reel servos are activated and tape is tensioned. When the ON-LINE lamp is lighted, the button is disabled.

- REWIND—The nonlocking pushbutton activates a rewind operation. This control is enabled only when tape is tensioned and unit is off-line. The lamp is lighted during either a local or remote rewind operation.



TOP



REAR

Fig. 27—Tape Transport

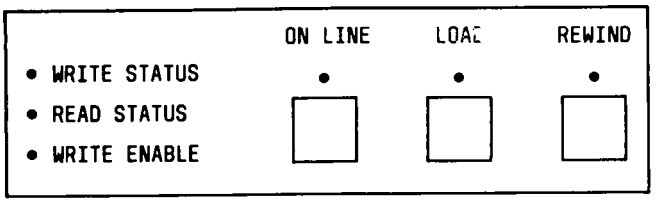


Fig. 28—Tape Transport Indicators and Controls

8.20 The following is a numerical listing and brief description of the tape transport circuit packs:

- ***3631—Read Preamplifier:*** The 3631 read preamplifier contains nine identical amplifier stages which receive the analog signals from the read head windings and supply the amplified signals to the read amplifiers.
- ***3645—Ramp Generator:*** The 3645 ramp generator generates the proper analog signal inputs to the capstan servo system to control the direction and velocity of tape motion. The outputs are voltages that rise and fall linearly to minimize stress on the tape and maintain accurate speeds.
- ***3841—Control Terminator:*** The 3841 control terminator is used to terminate control input leads for minimum reflection.
- ***3842—Interface Control:*** The 3842 interface control contains receivers for the control commands and drivers that provide the tape transport status information to the formatter. It also contains controls and delays to ensure proper tape motion and transport operation.
- ***3844—Sensor Amplifier/Driver:*** The 3844 sensor amplifier/driver responds to signals from photorestive cells which sense the load point and end of tape reflective strips and broken tape condition. It also contains the file protect circuitry and the write and erase head driver.
- ***3860—Data Termination:*** The 3860 data termination is used to terminate the write data leads from the formatter for minimum reflection.
- ***4013—Connector Board:*** The 4013 connector board provides connections for the file protect solenoid and switch, and the broken tape, load point, and end of tape sensors.
- ***4139—Quad Phase Encoded Read Detector:*** The 4139 quad phase encoded read detector contains four read detector circuits. The quad phase encoded read detector receives the amplified signals from the read preamplifier. It detects the beginning and end of data, differentials, limits, and filters the analog signal and supplies the digitized data outputs to the formatter. Two of these circuit packs are required to process channels 0 through 8 of the 9-track tape.
- ***4188—Read Amplifier/Clipping Control:*** The 4188 read amplifier/clipping control contains the channel P read amplifier stage and the read amplifier clipping level control. The read amplifier/clipping control provides four clipping levels to the read amplifier: normal, low, high, and very high. When an error is detected during a read-only operation and the transport is commanded by the tape control unit to backspace over the erroneous block and reread it, the clipping level is kept at a normal level during the first reread. If an error is still detected and a second reread is commanded, the clipping level is switched from normal to lower clipping level to compensate for a possible partial dropout. If a third reread is initiated, the clipping level is switched to a higher than normal level to eliminate possible baseline noise spikes. During a read-after-write operation, the normal and high clipping levels are combined to supply a still higher clipping level which is not used during a read-only operation.
- ***4207—Four-Channel Phase Encoded Write Amplifier:*** The four-channel phase encoded writer amplifier amplifies the phase encoded data for channels P, 0, 1, and 2 from the formatter to energize the respective write heads. It also generates the all-1 or all-0 test pattern for these channels when the test mode is selected.
- ***4208—Five-Channel Phase Encoded Write Amplifier:*** The 4208 five-channel phase encoded write amplifier amplifies the phase encoded data for channels 2 through 7

from the formatter to energize the respective write heads. It also generates the all-1 or all-0 test pattern for these channels when the test mode is selected.

- ***4209—Read Control Logic:*** The 4209 read control logic performs the following control functions:

  (a) Drives the test panel SKEW indicator, monitoring excessive skew during a read test mode when using 31.5 characters per millimeter (800 characters per inch) skewmaster tape.

  (b) Drives the test panel DATA indicator, disabling it when one or more channels are disabled.

  (c) Generates a 80 kHz reference frequency used to write the test pattern during the write test mode.

  (d) Generates the SELECT 2 signal used to enable the read amplifier.

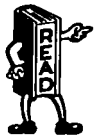
- ***4210—Magpot Tension Arm Position Sensor:*** The 4210 magpot tension arm position sensor generates an analog signal representing the position of the tension arm.

- ***4306—Servo Preamplifier:*** The 4306 servo preamplifier contains the capstan servo and reel servo amplifier stages.

- ***4843—APR Pushbutton Control:*** The APR pushbutton control contains the drive and write control logic circuitry. The drive control logic circuitry encodes tape motion commands received from the formatter and generates signals in response to control panel button pushes. The write control logic circuitry generates the write ready signal to the read data circuitry. It also provides a connector for the test panel, responds to signals from the test panel, and drives indicators on the test panel.

INSTALLATION AND MAINTENANCE

8.21 Installation and maintenance of the Kennedy Company model 9217 formatter and model 9800 digital tape transport is covered in Section 554-010-410 (TOP) and Section 554-000-100, Peripheral Equipment Maintenance Manual Index, Kennedy tape drive and formatter.



In order to prevent or reduce electrostatic noise in the system, the frame shall be well grounded as discussed in Part 6 (POWER AND GROUNDING). ◗Always attach an authorized wrist grounding strap before working on the system or handling circuit packs.◖

8.22 When installing the 9-track SMDR, adjustment of the load point and end-of-tape sensor voltage is required. The following is the procedure to be followed for this adjustment.

(a) Verify that the tape is properly loaded onto the tape transport and the tape is not at load point or at end-of-tape position. Write lamp should be lighted.

(b) Disconnect ac power cord to fans.

(c) Connect digital multimeter to test points E and F on the sensor amplifier/driver circuit pack 3844 (Fig. 29). Adjust R16 on the 3844 for 0 volts on the multimeter.

8.23 The following maintenance equipment is available from Kennedy Company:

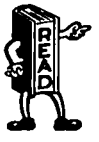
(a) Test Panel, part number 192-9900-001

(b) Master Alignment Tape, 800 density, part number 154-0036-001

(c) Extender Card, part number 190-2224-001

(d) Maintenance Kit, part number 190-2324-001.

9. MAINTENANCE PLAN



◗Always attach an authorized wrist grounding strap before working on the system or handling circuit packs.◖

9.01 The maintenance philosophy for the SMDR is basically an extension of that for the PBX. The primary objective is to minimize repair time of the SMDR equipment. A combination of fault detection

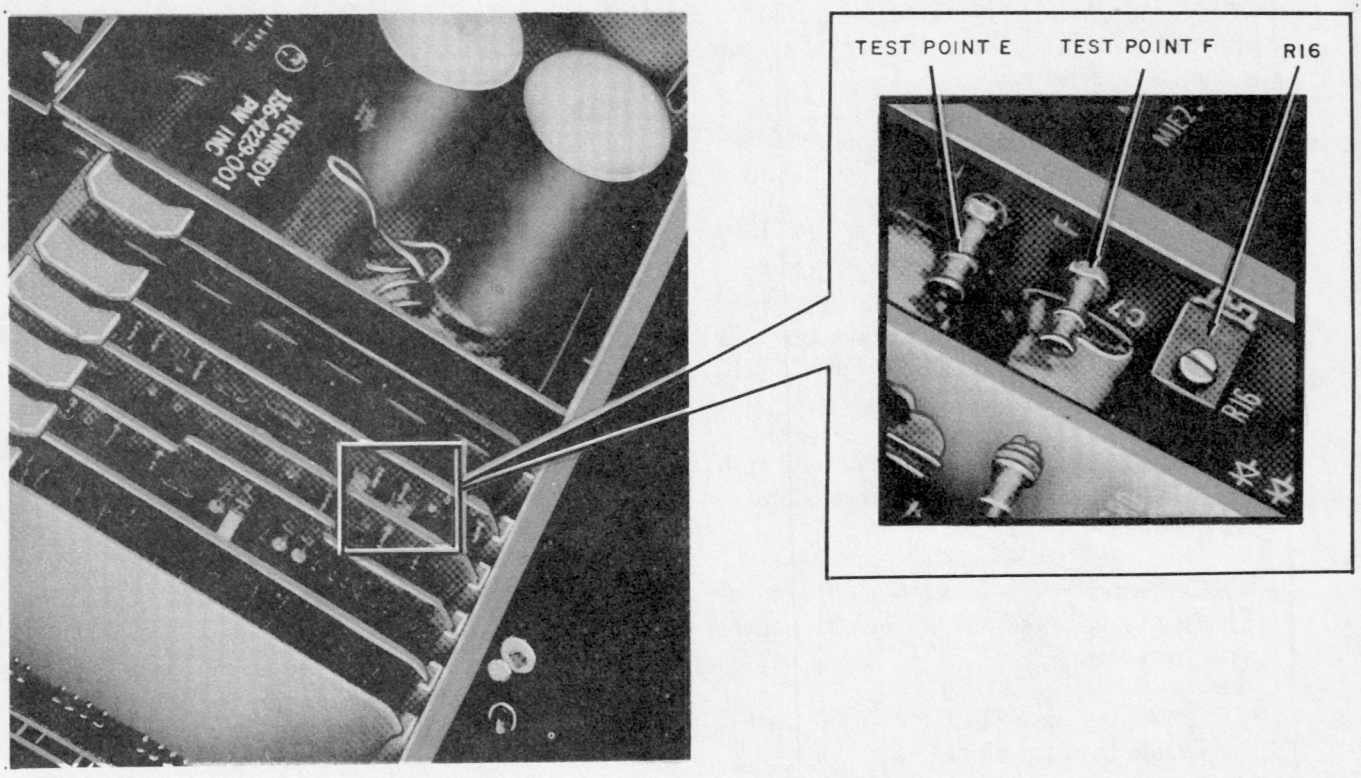


Fig. 29—Location of Tape Drive Photosensor Adjustment

hardware and software diagnostic program is used to provide trouble-locating information at the circuit pack replacement level. The use of these aids should enable isolation of a fault to either the DIMENSION PBX, SMDR, or output equipment. Specific hardware-caused trouble should be corrected with an accuracy of 70 percent on the first indicated circuit pack replacement. Troubles caused by software failure or complex multiple faults may require more highly-trained personnel.

9.02 Maintenance testing of the SMDR is performed using the PBX Maintenance and Administration Panel (MAAP). Refer to the appropriate Section 554-010-410 (TOP) for administrative and maintenance procedures.

9.03 The information available on the printout of the SMDR may be the first indication that maintenance is required. The customer and the craft personnel should be aware of the type of information in the printout. The printout from the direct output printer should be consistent with the format as shown in Fig. 9, 10, or 11. The processed data from the paper-tape punch should be consistent with user requirements. The customer and craft personnel should also be aware of partial printouts caused by heavy traffic situations. This situation may occur when the direct output version SMDR hardware receives more calls than its memory capacity (16). If this occurs and the customer is unaware, a trouble condition would normally be reported.

10. REFERENCES

BELL SYSTEM PRACTICES

10.01 The following sections are associated with the PBX and SMDR and, when available, may be used for additional information.

SECTION	TITLE
554-000-000	Numerical Index—Division 554—DIMENSION PBX (Refer to this Index for TOP Documents.)

SECTION	TITLE
554-000-010	Labor Time Reporting for DIMENSION PBX (100, 400, 2000, and Custom) to Track Costs
554-000-100	DIMENSION PBX—Documents not listed in 554 Division Index (Refer to this Index for Administration and Maintenance Manuals.)
554-010-123	DIMENSION PBX—Station Message Detail Recording (SMDR)—Maintenance Support
554-101-100	DIMENSION 400 PBX System Description
554-101-102	DIMENSION 100 PBX System Description
554-105-100	DIMENSION 600 PBX—System Description
554-111-100	DIMENSION 2000 and Custom PBX—System Description
554-191-100	DIMENSION PBX Feature Document Reference Guide