COMMON CHANNEL INTEROFFICE SIGNALING

DATA SET FRAME SD-94874-01

DESCRIPTION AND OPERATION

1. GENERAL

1.01 This section includes the description and operation of the Common Channel Interoffice Signaling (CCIS) data set frame (CCDS) (SD-94874-01), as used in CCIS switching offices (SO) and signal transfer point (STP) offices.

1.02 This section is reissued to generally revise the section. Since this is a general revision, arrows ordinarily used to denote changes have been omitted. This reissue does not affect the Equipment Test List (ETL).

1.03 CCIS STPs and SOs are interconnected into an integrated CCIS network. This interconnection is made through signaling links (refer to Fig. 1) that carry all signaling data, including supervisory and address signals necessary to control call setup and takedown, as well as network management signals. For more detailed information of the CCIS network, refer to Section 212-100-002.

1.04 Analog signaling links for 2400 bits per second (BPS) are shown in Fig. 2. References for signal message storing and processing, "800" Service, Auto Bill Calling, etc, are included in Table A.

2400 BPS Analog Signaling Link

1.05 The present CCIS link consists of a voice frequency link (VFL), two signaling terminals, and two data sets. Each data set (201D) forms a digital-analog interface between the terminals and the VFLs. The terminal is capable of 4800 BPS operation, but is limited to the 2400 BPS rate by the 201D data set. The 201D data set unit consists of plug-in circuit packs and is mounted in the 58B mounting apparatus of each terminal unit. The interface between the 201D data set and the CCIS terminal is shown in Fig. 3.

4800 BPS Analog Signaling Link

1.06 The basic hardware difference between the 4800 BPS and 2400 BPS operation is that the 2048A data set is used in place of the 201D data set. The 2048A data set is interfaced to the terminal by the terminal-modem interface (TMI) (SD-94872-01). The TMI unit consists of plug-in circuit packs mounted in a modified 58B apparatus mounting, which is located on the terminal unit in the CCIS terminal group frame (J67504A,B).

1.07 The function of the TMI unit is to provide an interface between the existing J99360C terminal unit and the 2048A data set and to provide encryption. The TMI unit is plug compatible in the location now occupied by the 201D data set.

2. CCIS DATA SET FRAME

2.01 The CCIS data set frame (CCDS) (Fig. 4) is seven feet high, one foot six inches deep, and two feet two inches wide. The CCDS frame is an electronic-type frame, consisting of a fuse panel, converter unit, control panel (Fig. 5), and two data set units (0 and 1). Each CCDS frame can accommodate up to 8 A, or 16 B or C CCIS signaling links. The CCDS frame has no power key control, but its power states (normal and fuse alarm) are reported to the system via scan points.

Data Set Unit

2.02 Each data set unit consists of up to eight 2048A data sets mounted in a 64C1 apparatus mounting (Fig. 6). There are three cooling fans mounted in the bottom portion of each data set unit. These fans are required to limit the temperature of the 2048A data set circuit components. All three fans in each data set unit are supplied from the same fused source. Loss of one of these fuses will cause all three fans in a unit to fail simultaneously. A fan fail-

ure detector is located in each 64C1 apparatus mounting. A fan failure results in a minor alarm and a lamp indication, and in two outputs. The first output lights the red FAIL lamp, which stays lighted until the fan is operating correctly and the alarm is reset. The second output is interruptible by the FAN ALARM 3-position switch. In the top (ON) position, the failure output is enabled, in the center (OFF) positions, the failure output is disabled, and in the spring-loaded bottom (RST) position, the alarm is reset. The fan filter must be cleaned every three months and each fan should be checked for proper operation.

Cabling

2.03 Cabling between the CCDS frame and the terminal units is fully connectorized at both ends. Each data set requires a minimum of one M25A cord and one M37A cord. These cords are available in lengths of 5, 9, 25, 50, 75, and 100 feet, and can be plugged together to reach the terminal group (TG) frame. Maximum cable length between the CCDS frame and the TG frame is 500 feet.

2.04 The cabling arrangement shown in Fig. 7 is used to connect 2048A data sets to their interface circuits. The cable is terminated on the front of the terminal frame and is routed down the front upright of the terminal frame. The cable plugs into connectors mounted on the modified 58B mounting.

2048A Data Set

2.05 The 2048A data set (Fig. 8) measures 11.4 inches high, 12.5 inches deep, and 2 inches wide, and is designed to mount in a 64C1 apparatus mounting. There are no ON/OFF switches on the 2048A data set. Refer to the Bell System Practices listed below for 2048A data set information:

  (1) Section 592-040-120, General Description

  (2) Section 592-040-220, Private Line Installation

2.06 To insure CCIS link availability in the event of a loss of a power bus, power for a CCIS terminal and its associated 2048A DS must be supplied from the same office power bus. To accomplish this, the 2048A DS must be assigned to the proper data set unit. Tables D and E provide the terminal-power bus association for 4A SO and STP offices, and data set power bus association.

2048A Data Set Options

2.07 Refer to Section 592-040-120 for information to set the network address, and for setting the following options into the 2048A data set.

  (a) Signal Transfer Point (STP): These options and network address are set by executing a clear options command, then setting the following options and network address:

    A1 - B1 - C5 - D7 - E5 - NA=30

  (b) Switching Office (SO): These options and network address are set by executing a clear options command, then setting the following options and network address:

    A2 - B1 - C5 - D7 - E5 - NA=01

2.08 The 2048A data set has a local mounting address that must be set in the data mounting five-position local address switch. Refer to Section 592-040-220 for data mounting description. Local address switch sections 1 through 4 are set to represent the data set frame number (00-15) in binary. In local address switch sections 1 through 4, switch section 1 (SW1) is the least significant bit. Local address switch section 5 (SW5) is set to the data mounting unit number (0 or 1), within a given data set frame. An open switch is a binary 0, and a closed switch is a binary 1.

2.09 Refer to Section 592-040-220 for the following:

  (a) Instructions for setting the fast rise time option

  (b) Instructions for changing the 2048A data set faceplate orientation to facilitate easy reading of the display

  (c) Instructions for enabling the battery contained in the 2048A data set.

Fuse Panel

2.10 A fuse panel (Fig. 9) is located near the bottom of the CCDS frame. This panel provides −48 volt fusing for the cooling fans and the DC-DC converters, and +24 volt fusing for the data sets.

Fuse Alarm

2.11 In the event of a fuse alarm, the CCDS frame report message DFR02 is printed out, an audi-

ble alarm is sounded, and the abnormal lamp on the A & D panel (Fig. 10) is lighted.

2.12 The condition of each power converter, fuse, or power feeder is monitored by the host processor. Failure of any one of these units will cause an alarm to be sounded in the office. The audible alarm can be silenced at the CCDS frame by operating the AUD-ALM-OFF key. After the fuse alarm condition is corrected, the CCDS frame report message DFR00 is printed out, signifying that the CCDS frame has been returned to a normal state. At this time, if the AUD-ALM-OFF key has been operated, release the key by operating the AUD-ALM-NORMAL key.

CCDS Frame Power Requirements

2048 Data Set Options

2.13 The CCDS frame requires two 30 ampere +24 volt power feeders and two 5 ampere −48 volt power feeders from the power distributing (PD) frames. The −48 volt feeders provide power to the DC-DC converter which, in turn, converts the −48 volts to −24 volts for the 2048A DS. CCDS frame power distribution is shown in Fig 11.

2.14 Even and odd numbered data sets in a unit receive +24 volts dc from separately fused sources. Therefore, four data sets in a unit will be inoperative if one of the fuses is blown.

2.15 The −24 volt dc source is supplied through two power converters that are located at the bottom of each CCDS frame. Again, even and odd numbered data sets in a unit are supplied through different power converters, and the failure of a power converter will cause loss of four data sets in a frame.

2.16 Data set assignments within a CCDS frame are important to reduce the possibility that data sets for a full "A" link pair could be powered through the same fuse and power converter. In such a case, loss of a single fuse or power converter could cause simultaneous failure of the "A" link pair. In an STP, one-half of a signal quad could also be subject to simultaneous failure. For this reason, (1) mate pair data sets should be assigned to different data set units and (2) data sets and terminals should be assigned to the same office power bus (Tables D and E). If there is a conflict between (1) and (2), (1) must always be observed.

Link Encryption Unit

2.17 CCIS signal links carry a variety of signaling and call setup information. With Calling Card service, links carry sensitive customer billing information. Portions of many signal links are carried on radio facilities. Adding encryption to the CCIS terminal at each end of the signaling link and encrypting the data stream, secures the links from unauthorized use. Encryption is provided as an integral part of the J99360CB unit, which automatically encrypts all 4800 BPS links. (See Fig. 12 for CP arrangement.)

Terminal-Modem Interface

2.18 Replacing a 201D data set with a 2048A DS requires a circuit to provide the proper terminal-modem interface. This circuit, the terminal-data set interface (TMI) (J99360CB), configured in a 58B apparatus mounting, replaces the 201D data set. The function of the TMI is outlined in paragraph 1.07. The TMI is plug compatible with the existing terminal and no wiring modification is required in the terminal unit (Fig. 13). Table C contains office terminal configuration.

Software Requirements

2.19 The software is designed to allow an office to operate with any combination of 2400 and 4800 BPS signal links. Links can be converted to 4800 BPS on an "as required" basis. However, an "A" link pair or a full "B" or "D" link quad must be converted at the same time.

2.20 The conversion of signal links to 4800 BPS requires some software changes in the SPC1A processor, and associated Peripheral Bus Computers (PBCs). The Electronic Translator System (ETS) and signal transfer point (STP) changes are required in the terminal diagnostic and link security program area, and in the direct signaling load balancing data inputs. Changes are also necessary to handle the encryption function.

2.21 PBC software requires an entry in a "look-up" table to identify link speed for determination of load expectations. Originally, Link Group and Pool Reports are keyed to 2400 BPS loads and must be changed for 4800 BPS.

TABLE A

FEATURE REFERENCES

FEATURE	SECTION NO.	SECTION TITLE
800-SERVICE	212-100-003	DESCRIPTION AND METHOD OF OPERATION
	212-816-502	TRANSLATION AND VERIFICATION
AUTO BILL CALLING	212-344-101	DESCRIPTION
DIRECT SIGNALING	212-401-102	DIRECT SIGNALING DESCRIPTION AND OPERATION

TABLE B

CIRCUIT PACK REQUIREMENTS

DESCRIPTION	CP CODE
4800 BPS Interface	AR924
Loop-Back Relay	AR925
Encryption—MAC-8	AR927
Encryption—Memory	AR928
Encryption—SIO/IO	AR929
Encryption—DES	AR930
Power Supply	208J1

Note: The J99360CB unit consists of a modified 58B apparatus mounting equipped with AR924, AR925, AR927-30, and 208J1 circuit packs.

TABLE C

OFFICE TERMINAL CONFIGURATION

TYPE OFFICE	MAXIMUM NUMBER OF TERMINALS					MAXIMUM NUMBER OF DATA SETS		
	UNITS			FRAMES				
		RESTRICTIONS		DOUBLE BAY	SINGLE BAY	2048A DS PER FRAME	DS UNITS PER FRAME ‡	CCDS FRAMES
	PHYSICAL	PROGRAM	HARDWARE					
SO	16	14		1	2	16	2	1
ETS/STP	256		252*	16	32	256	2	16
SPC/STP†	256		252*	16	32	256	2	16

* The peripheral scanner applique units presently in an office do not contain sufficient connections for the remaining four CCIS terminal units, and at this time it is not feasible to add another applique unit for four more CCIS terminal units.

† Area STP or Regional STP

‡ A CCDS frame contains a maximum of 2 data set units, each containing a maximum of 8 2048A data sets.
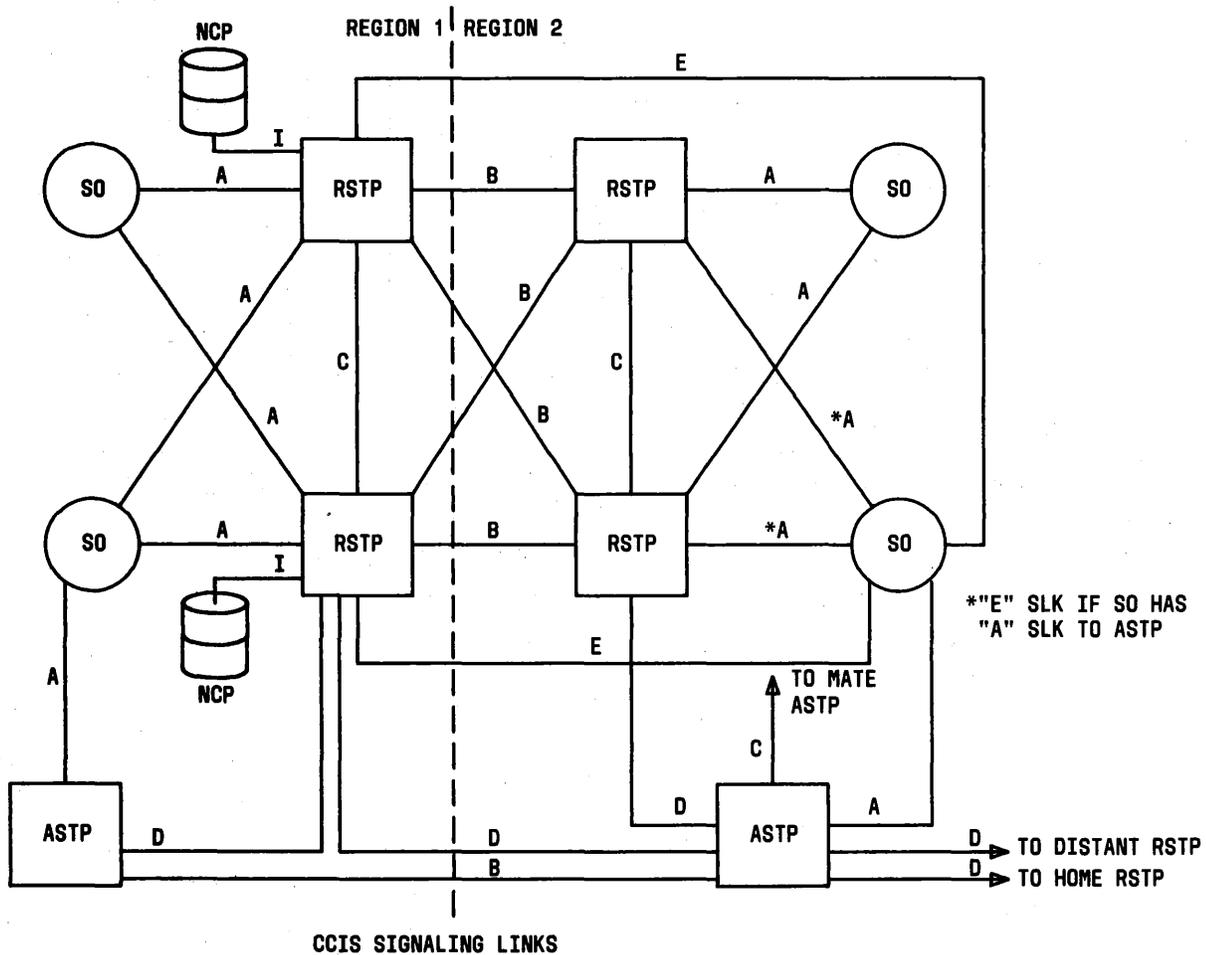
TABLE D

CCIS TERMINAL-POWER BUS ASSOCIATION 4A SO & STP

CCIS TERMINAL	OFFICE POWER BUS
00	A
01	B
02	A
03	B
04	A
05	B
06	A
07	A
08	A
09	A
10	A
11	B
12	B
13	B
14	B
15	B

TABLE E

2048A DATA SET –48V POWER BUS ASSOCIATION FOR EACH DATA SET FRAME

DATA SET UNIT	DATA SET	OFFICE POWER BUS
0	1 – 8	A
1	1 – 8	B

CCIS SIGNALING LINKS

LINK TYPE	DESCRIPTION
A	AN "A" LINK EXTENDS FROM EACH CCIS SWITCHING OFFICE OR TRAFFIC SERVICE POSITION SYSTEM (TSPS) LOCATION TO AREA SIGNAL TRANSFER POINTS (ASTPs) AND TO REGIONAL SIGNAL TRANSFER POINTS (RSTPs) LOCATED IN THE HOME REGION.
B	A "B" LINK CONNECTS A REGIONAL STP TO ANOTHER REGIONAL STP LOCATED IN A DIFFERENT REGION. THE "B" LINK IS ALSO USED TO CONNECT AN AREA STP TO ANOTHER AREA STP EITHER IN OR OUT OF THE HOME REGION.
C	A "C" LINK CONNECTS THE PAIR OF REGIONAL STPs, OR A PAIR OF AREA STPs, LOCATED IN THE SAME REGION. AREA STPs (ASTPs) WILL NORMALLY BE PUT IN PAIRS WITHIN A REGION.
D	A "D" LINK CONNECTS A REGIONAL STP TO AN AREA STP LOCATED EITHER IN OR OUT OF THE HOME REGION.
E	AN "E" LINK CONNECTS A CCIS SWITCHING OFFICE TO AN STP LOCATED IN A DISTANT REGION.
I	AN "I" LINK CONNECTS A REGIONAL STP TO THE 3B PROCESSOR CONTAINING A DATA BASE (NETWORK CONTROL POINT) WHICH IS REFERENCED TO AS NCP, AND THE LINK HANDLES ONLY DIRECT SIGNALING TRAFFIC.

Fig. 1—CCIS Signaling Links

CONTROL

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┌──────────┐  DATA   ┌─ DATA SET HOUSING ─────────┐        ┌──────────┐
│  CCIS    │─────────│         ┌──────────┐        │────────│  VFLA    │──────────┐   TO ANALOG
│ TERMINAL │         │         │  201D    │        │        └──────────┘          ├── TRANSMISSION
│          │─────────│         │ DATA SET │  DATA  │────────┌──────────┐          │
└──────────┘ CONTROL │         └──────────┘        │        │  VFLA    │──────────┘
                     └────────────────────────────┘        └──────────┘
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TO MAINTENANCE
TERMINAL

CURRENT 2400 BPS DESIGN

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┌──────────┐  D   ┌─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─┐   ┌───────────┐ C+D  ┌─────────────────┐
│  CCIS    │──────│      ┌───────────┐    │   │ INTERFACE │──────│  2048A DATA SET │
│ TERMINAL │      │      │ ENCRYPTION│    │   │           │      └─────────────────┘
│          │  C   │      └───────────┘    │   │  ┌─────┐  │      ┌──────────┐      TO ANALOG
└──────────┘──────│                       │   │  │  |  │  │──────│  VFLA    │──────┐ TRANSMISSION
                  └─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─┘   │  │  X  │  │      └──────────┘      │
                  │  DATA SET HOUSING         │  └─────┘  │      ┌──────────┐      │
                  └───────────────────────────┴───────────┴──────│  VFLA    │──────┘
                                                                  └──────────┘
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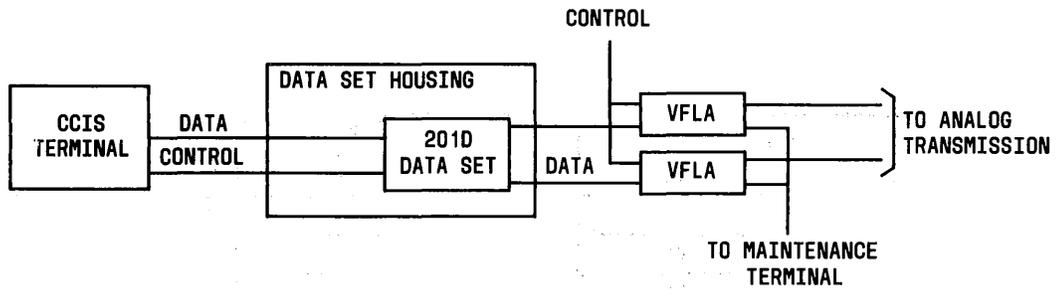
CONTROL   TO
           MAINTENANCE
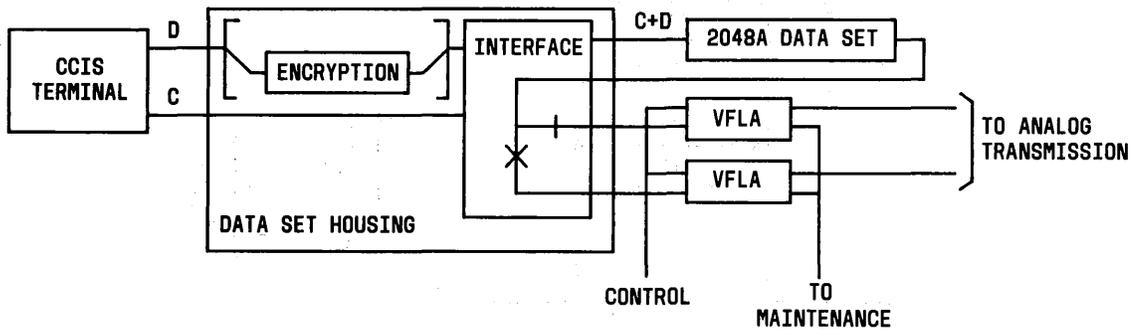
4800 BPS ANALOG

Fig. 2—CCIS Analog Signaling Links
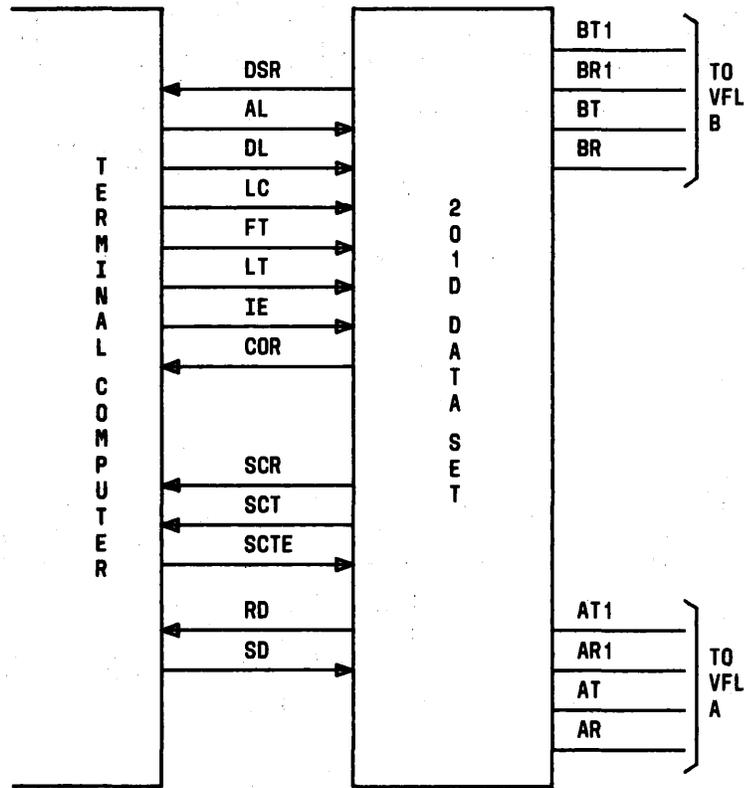
Fig. 3—CCIS Terminal—201D Data Set Interface

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┌──────────────────────────┐
│  ┌────────────────────┐   │
│  │     AIR SPACE      │   │
│  ├────────────────────┤   │
│  │                    │   │
│  │  DATA SET          │◄──── 64C1 DATA SET
│  │  UNIT 1            │       MOUNTING
│  │  (SEE FIG. 6)      │       (REFER TO FIG. 13)
│  │                    │   │
│  ├────────────────────┤   │
│  │     │     │        │◄──── 3 COOLING FANS
│  ├────────────────────┤   │
│  │     AIR SPACE      │   │
│  ├────────────────────┤   │
│  │   CONTROL PANEL    │◄──── J67479AD
│  │                    │       (REFER TO FIG. 12)
│  ├────────────────────┤   │
│  │     AIR SPACE      │   │
│  ├────────────────────┤   │
│  │                    │   │
│  │  DATA SET          │◄──── 64C1 DATA SET
│  │  UNIT 0            │       MOUNTING
│  │  (SEE FIG. 6)      │   │
│  │                    │   │
│  ├────────────────────┤   │
│  │     │     │        │◄──── 3 COOLING FANS
│  ├────────────────────┤   │
│  │     AIR SPACE      │   │
│  ├────────────────────┤   │
│  │  CONVERTER UNIT    │◄──── J99399AB
│  ├────────────────────┤   │
│  │    FUSE PANEL      │◄──── J99399AA
│  ├────────────────────┤   │
│  │   FILTER UNIT      │   │
│  │   J1A053AA         │   │
│  └────────────────────┘   │
└──────────────────────────┘
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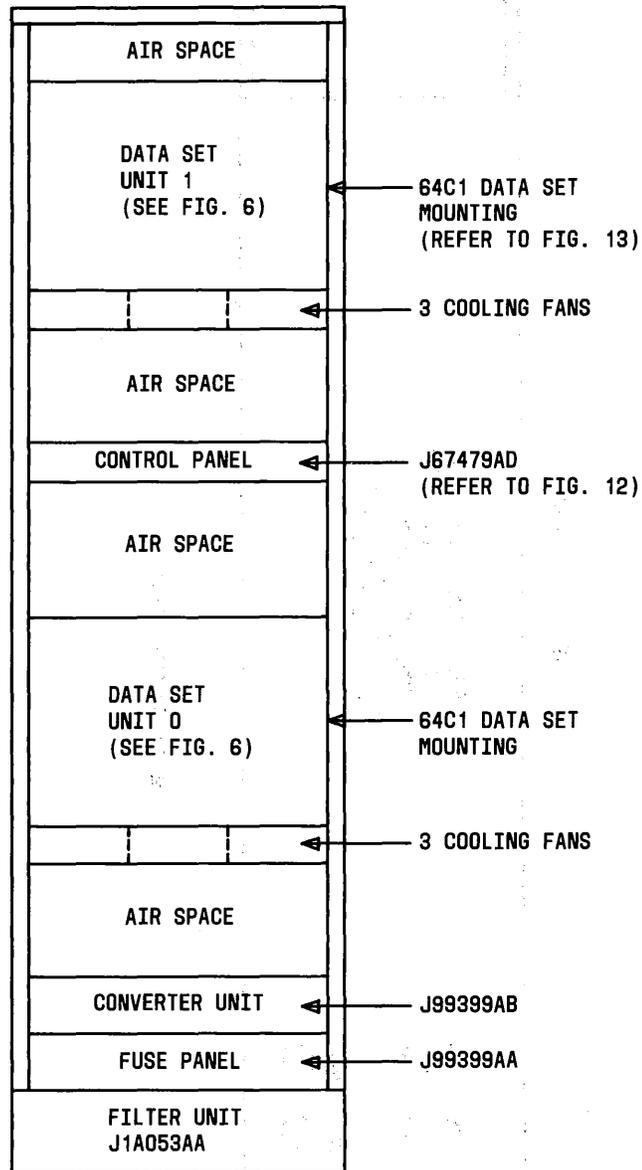
Fig. 4—Data Set Frame (J99399A)

KEYS   LAMPS

TEL-( )

SP

A

B

-48   +24

GRD   HRG

AUD   ALM   OFF   PWR
OFF   NOR   NOR   OFF
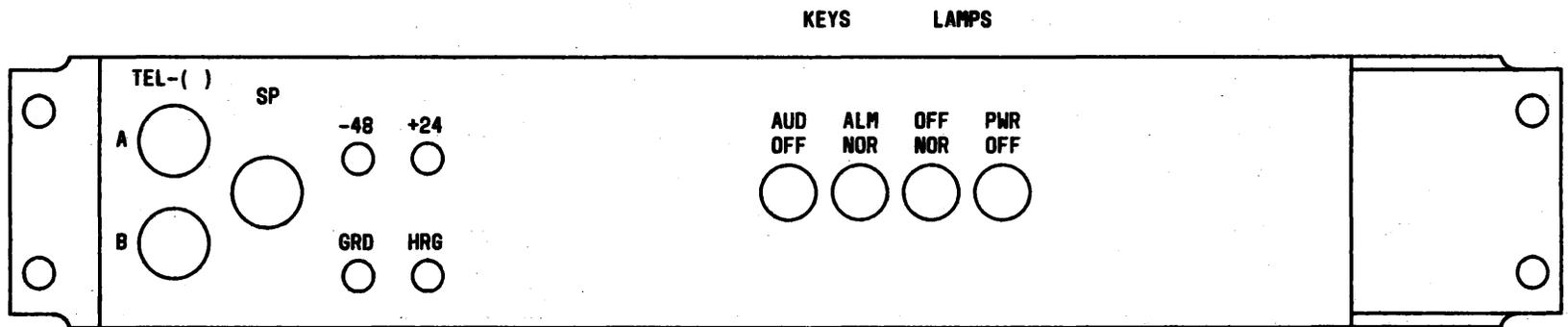
Fig. 5—Control Panel
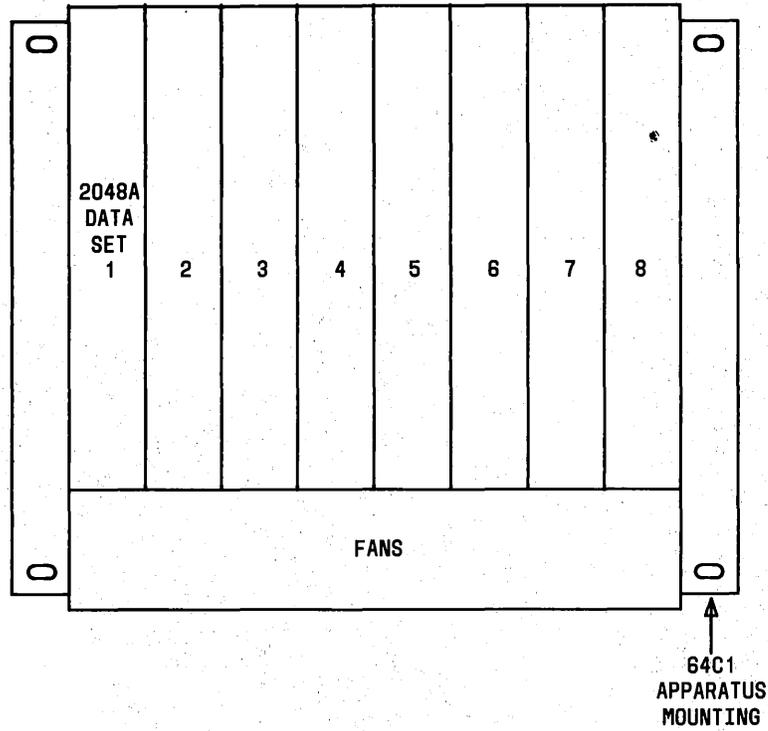
Fig. 6—2048A Data Set Mounting

CONNECTORIZED CABLE
FROM 2048A DATA SET

M37A
CABLE

M25A
CABLE

208J-1
POWER UNIT

+12V

- 5V

RTN

+5.1V

D-82360-01
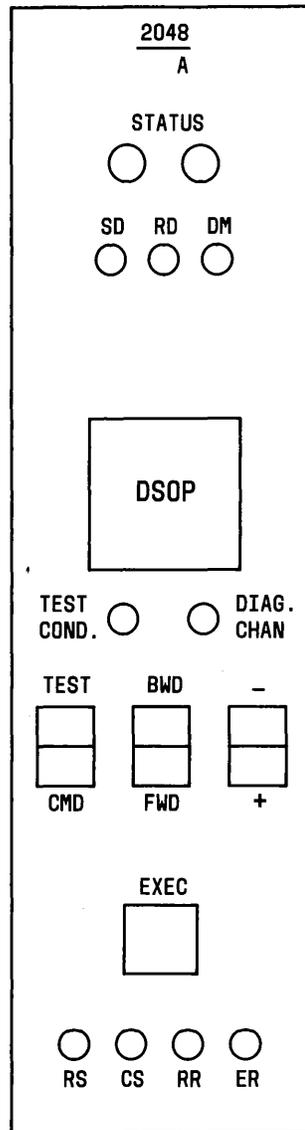
58B
APPARATUS
MOUNTING

CONNECTORIZED CABLE
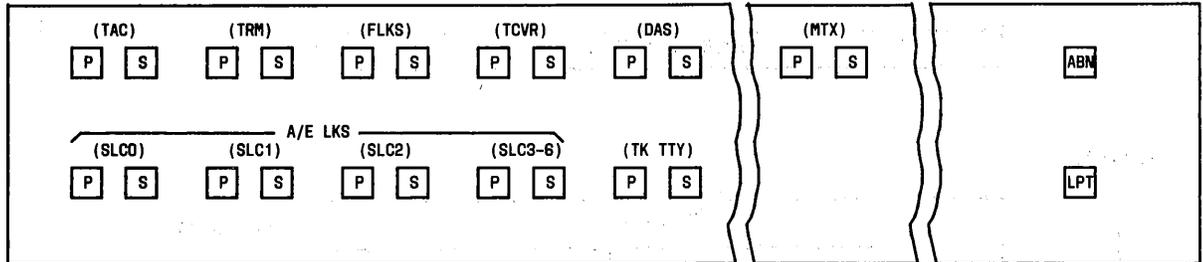FROM 2048A DATA SET
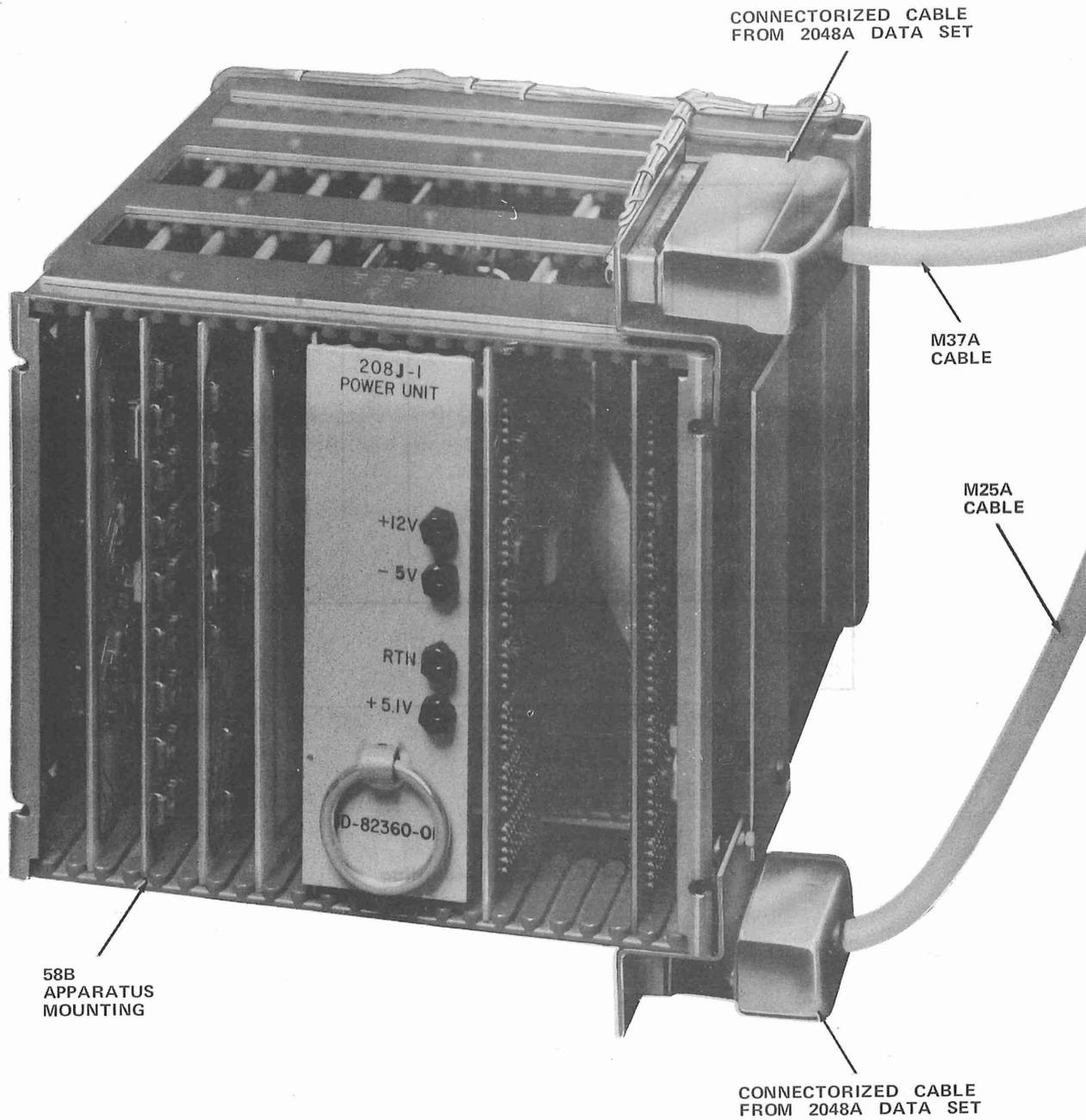
Fig. 7—Cabling Arrangement

Fig. 8—2048A Data Set Front Panel
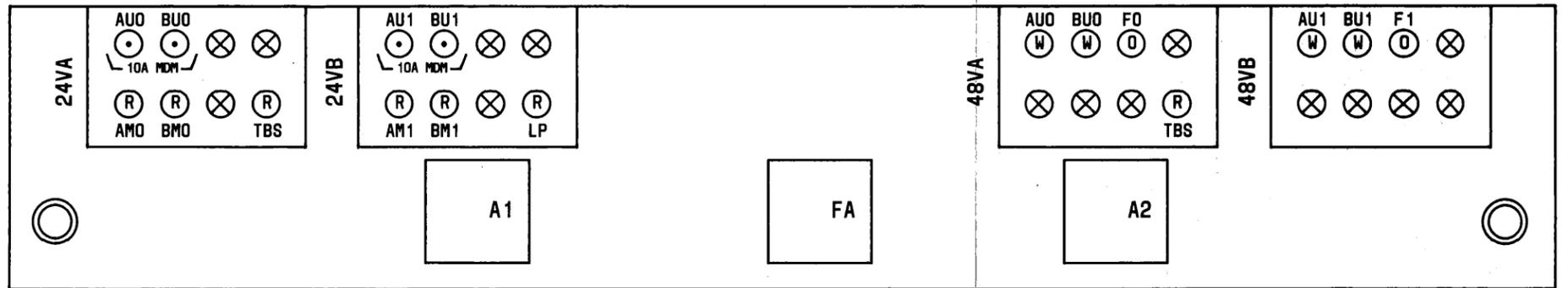
Fig. 9—Fuse Panel
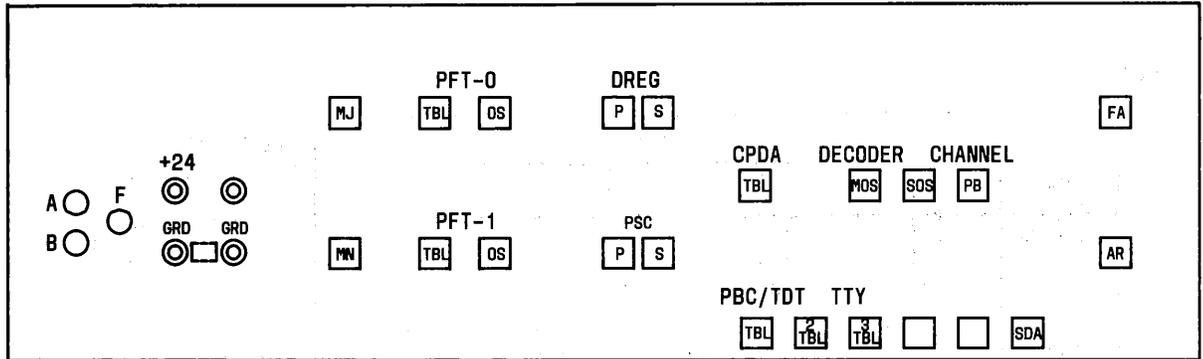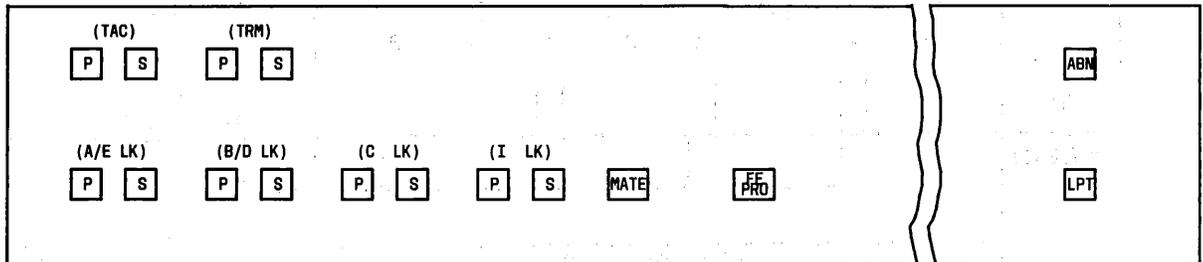
Fig. 10—Alarm and Display Panel
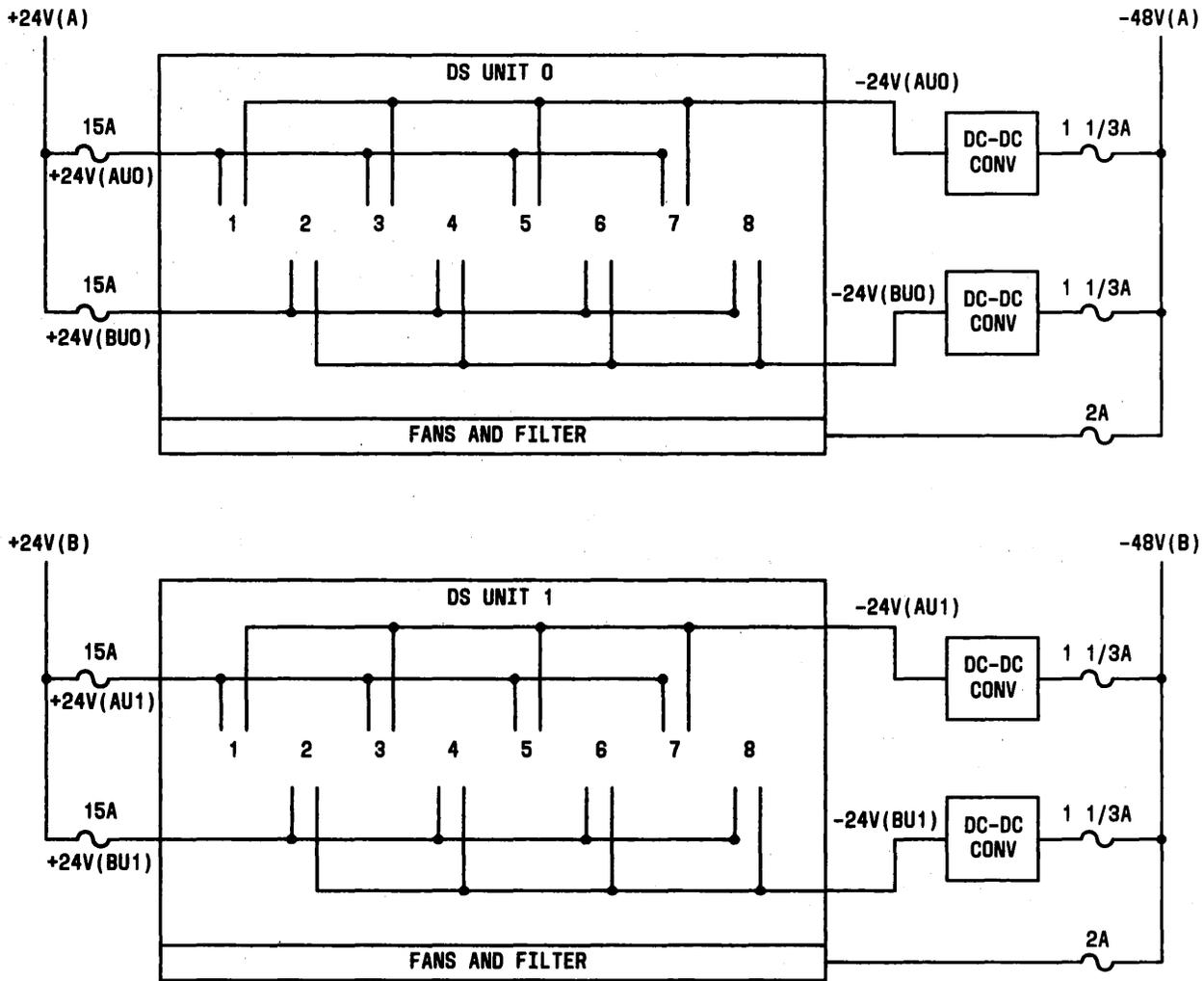
Fig. 11—CCIS 4800 Data Set Frame Power Bus Arrangement
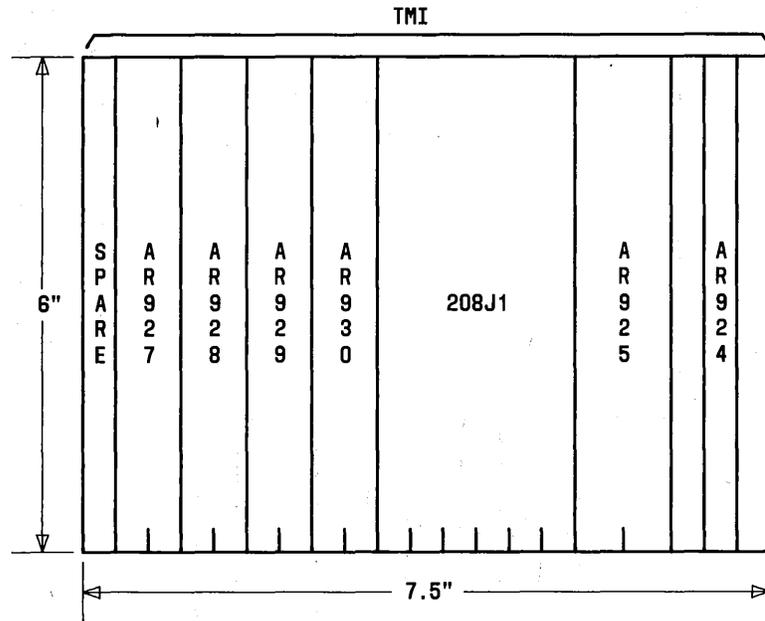
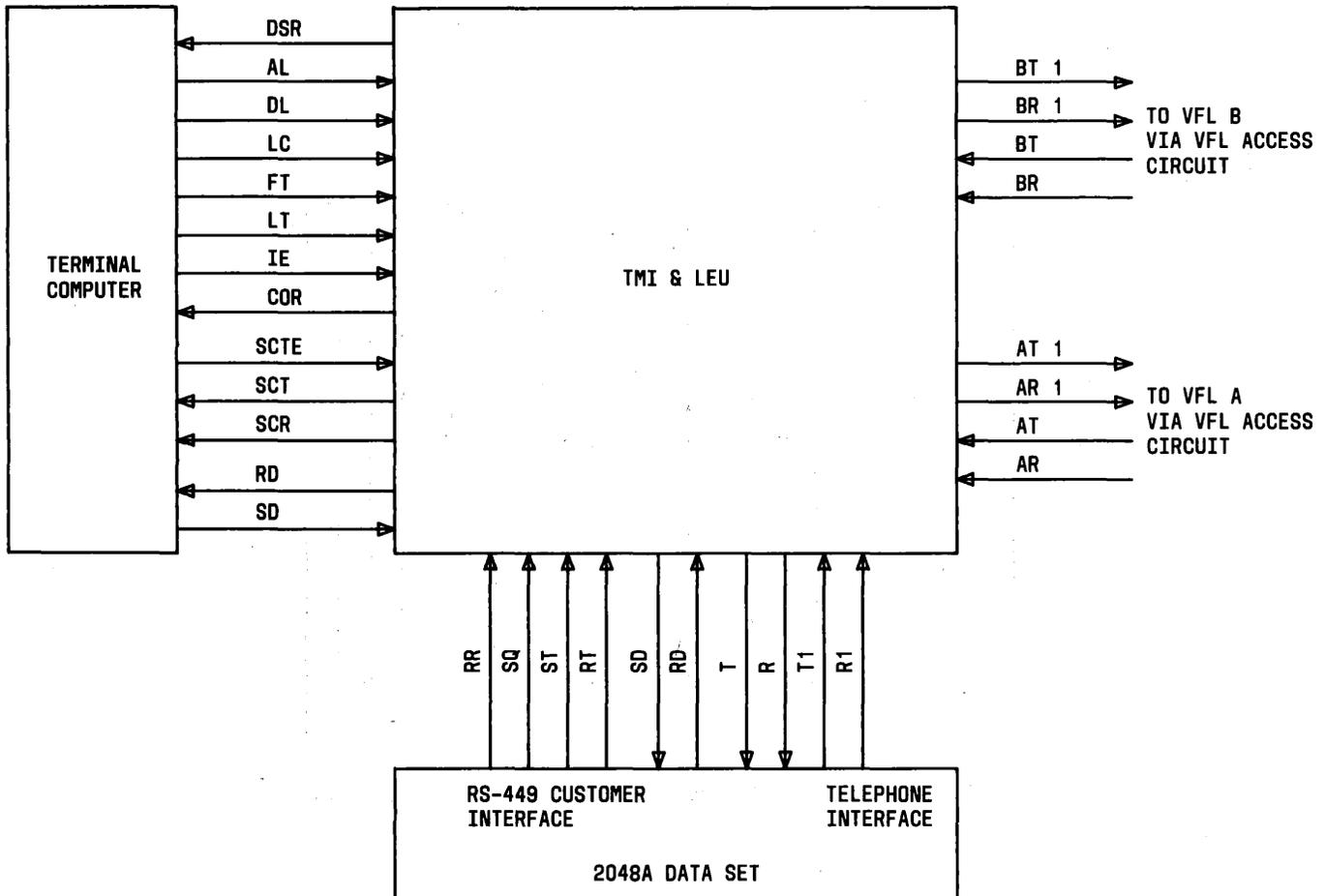Fig. 12—Enhanced CCIS Links 4800 BPS Data Set Arrangement

Fig. 13—Terminal-Modem Interface (TMI) Interface to the CCIS Terminal and 2048A Data Set