

BESS™ SWITCHING EQUIPMENT
LIMITING CONDUCTOR SPECIFICATION

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(SHEET 1 OF 15)

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1. Purpose

This SD specifies cable limitations that may restrict the engineering of a SESS office. This SD provides guidelines for cable length and gauge requirements throughout the SESS Switch and, when appropriate, references other drawings that control specific cabling requirements.

1.1 General

1.1.1 Cabling Philosophy In general, the switch is connectorized to greatly reduce the installation intervals. Factory assembled cables are fully tested for connectivity, shorts, crosses, and voltage breakdown. This reduces problems at the office and introduces pluggable mass terminations in the field. During installation of insulation displacement connectors the use of proper tools is imperative for reliable connections.

All connectors used in the system are approved for use by BTL. At the backplanes, BELLPAC™ Hardware is used for most connections. The 982 type connectors terminate discrete and ribbon cables and, 963N displacement type connectors will be introduced at the backplane for 26 gauge PVC or Teflon™ insulated wires. Both the 982 type and 963N type connectors are secured to the backplane using the 127C mounting apparatus. At the distributing frame, 711 connectors are used to terminate 32 pairs of tip and ring using insulation displacement. To insure a proper connection the 851A Tool (R-4774) must be used when joining 711 connectors.

The preferred type of cable is AT&T Technologies manufactured 26 gauge switchboard, formed switchboard, or formed cables. The use of 26 gauge allows the introduction of insulation displacement, 963N type, connectors. In certain instances the circuit requirements demand the use of ribbon, tight twisted, shielded, Teflon insulated, or coaxial cables, but these types of cables are avoided because of higher cost. Sometimes, larger gauges of wire are necessary to meet loop loss requirements.

1.1.2 ED Drawing Organization The cables for the SESS Switch in 6 foot cabinets can be ordered using several ED drawings. ED-5D500-10 orders the cables found in an Interface Module (IM). These cables are referred to as intracabinet cables. This excludes cables that are always found in the IM at the same equipment locations. Cables that are always equipped within a particular cabinet or unit at fixed positions are ordered from the J-drawing of that particular piece of equipment. All other cables that run through the cable racks and are referred to as inter-cabinet cables. ED5D073-11 is used to order DC power cables; ED5D021-12 is used to order AC power cables; ED5D022-11 is used to order and grounding cables; and ED5D500-11 orders all the other inter-cabinet cables. ED-5D500-12 shows the method of cabling for the intracabinet cables, and ED-5D500-13 shows the method of cabling for the inter-cabinet cables. Cross connections at the distributing frame are shown in ED-5D500-15. All other ED drawings show the cable layout and contain the stock list for each cable. For a list of all cabinet drawings see figure B.

1.1.3 Conductor Lengths and Resistance Values Lead lengths greater than specified herein would result in excessive delay times or excessive signal loss that could critically affect system operation. For restrictions on leads that are delay limited, conductor length is specified. For restrictions on leads that are resistance limited, conductor resistance is specified, and for some restrictions, both the length and resistance of a cable are specified. An equivalent lead length can be based on the table of resistances below. These values consider the effect of insulation and twisting of a conductor when it is part of a twisted pair in a switchboard cable.

Gauge of Copper Wire	Feet of Paired Wire Per Ohm	Loop Resistance Ohms Per 100 Ft. of Paired Wire
22	28.1	3.56
24	17.5	5.72
26	10.5	9.48

1.1.4 Cable Rack Compartments For the SESS Switch the traditional compartments have been combined. In the SESS Cable Rack there are only two compartments in the cable rack. One compartment is used for the T1 lines, power, and tip and ring cables, the other compartment is used for fiber optics.

1.2 Future Planning

Because of possible future growth, the final cable lengths should be taken into consideration at the time the initial floor plan is made. For example, suppose that an initial installation of 5000 lines is planned. At the same time it is expected that the final office size will be 50,000 lines. It is necessary and important that the maximum conductor lengths for the final office size of 50,000 lines be considered in the initial installation.

2. The SESS Switch

The SESS Switch is a digital time division switching system for local, local/toll and toll application. The switch uses time division techniques under microprocessor control. The system is characterized by distributed architecture, high level software design, powerful data link facilities, and an digital time division network.

3. Limitations on System Connections

3.1 System Architecture-Multimodular Office

A multimodular office (SE1(?) and subsequent software generic) can consist of five architectural blocks consisting of the Interface Module (IM), the Remote Switching Module (RSM), the Host Interface Module (HIM), the Administrative Module (AM), and the Communications Module (CM).

The IM terminates lines and trunks on the SESS Switch. It converts the signals into a digital format, performs many of the call processing functions, and switches calls and trunks that terminate on the IM. The RSM is a SESS IM remote on digital transmission facilities. The HIM is an IM at the central office that terminates the transmission facilities connected to a RSM. The AM provides many of the memory intensive functions and the interface for maintenance and operation support systems. Its services are provided by a 3B²⁰ Computer. The CM is the focal point for voice, data, message switching. It provides communication between the AM and the IM's. This module includes the Time Multiplexed Switch (TMS) and the Message Switch (MSG). For a view of the system architecture and the associated hardware see Figure 1.

3.1.1 IM to CM Cable Limitations The IM is connected to the TMS with fiber optic cable, LB2L-L. The maximum length for the fiber optic cable is 1000 ft.

3.1.2 CM to AM (3B20) Cable Limitations The MSG found in the CM and the 3B20 found in the AM are connected by a dual serial channel. The maximum length for the cable is 50 feet.

3.1.3 CM Cable Limitations The maximum cable length between the TMS and the MSG is 50 feet.

3.2 System Architecture-Singlomod Office

The singlomod office (SE1(1A) software generic) consists of the IM, the AM, and the CM.

Lines and trunks terminate on an IM of the SESS Switch. The IM converts the signals into a digital format, performs many of the call processing functions, and switches calls and trunks that terminate on the IM. The AM provides many of the memory intensive functions and the interface for maintenance and operation support systems. Its services are provided by a 3B20 Computer. The CM is the focal point for voice, data, message switching. It provides communication between the AM and the IM's. For a view of the system architecture and the associated hardware see Fig. 2.

3.2.1 IM to CM Cable Limitations The IM is connected to the MSG in the CM by a fiber optic cable, LB2L-L. This cable is limited to 1000 ft. in length.

4. AM (3B20 Computer) Cable Limitations

The AM functions are provided by a 3B20 Computer. Within the 3B20 Computer is the Input/Output Processor (IOP) which provides video, printer, and data-link terminal interfaces to the 3B processor. The IOP also provides scanner and signal distributor functions using a UN33 circuit pack. See Fig. 3.

4.1 Scan and Distribute Cable Limitations

The maximum length for the cables that terminate on the UN33 providing scanner and signal distributor functions is 1000 feet. This includes the cables that run between the Office Alarm Unit (OAU) and the 3B20 Computer.

4.2 Video and Data-Link Terminal Interface Cable Limitations

Data Sets may terminate on the following circuit packs in the 3B20 Computer IOP: TN75C, TN74, TN83B, and TN82. The maximum cable length for the cables between these circuit packs and the data sets is 50 ft. In addition, a video terminal or a printer may be cabled directly to the TN74 in which case the cable limitation is 50 feet. The video terminal and printer supplied with the 3B20 terminates on a TF2 Port Switch and these cables are also limited to 50 feet in length.

5. IM Cabling Limitations

All lines and trunks interface the SESS switch via peripheral units found in the IM. These units convert the received signals into the digital format found in the office. There are also peripheral units that perform testing, metallic access function, and some special functions such as tone generation and conference calls. The IM also contains a module processor that performs many of the call processing functions as well as controlling time division switching. The time division switch can connect lines or trunks within the same IM, or can connect the lines and trunks to the communications module CM via the MSG. The IM consists of two types of cabinets The Interface Module Control (IMC) cabinet and the Line Trunk Peripheral (LTP) cabinet. In the IMC cabinet is the Time Slot Interchange Unit (TSIU), Interface Module Processor (IMP), and the Local Digital Services Unit (DSU). Adjacent to the IMC are LTP cabinets that house the peripheral units. See Figure 4. The units that may be found in the LTP include the following:

1. Line Unit (LU) J5D004AB
2. Line Unit Model 2 (LU Model 2) J5D004AC
3. Line Unit Model 2-Export (LU Model 2-Export) J5D004AE
4. Trunk Unit (TU) J5D003AC
5. Analog Trunk Unit-Export (ATU-Export) J5D003AG
6. Digital Line Trunk Unit (DLTU) J5D003AD
7. Digital Line Trunk Unit-Export (DLTU-Export) J5D003BA
8. Directly Connected Line Unit (DCLU) J5D003AR
9. Directly Connected Line Unit-Supplemental (DCLU-Supp) J5D003AS
10. Facilities Interface Unit (FIU) J5D003AP
11. Metallic Services Unit (MSU) J5D003AL
12. Modular Metallic Services Unit (MMSU) J5D003BD
13. Directly Connected Test Unit (DCTU) J1P023AM
14. Digital Services Unit (DSU) J5D003AE
15. Local Digital Services Unit-Export (Local DSU-Export) J5D003BB
16. Global Digital Services Unit-Export (Global DSU-Export) J5D003BC
17. Periodic Pulse Metering Unit (PPMU) J5D003AW

5.1 Cabling Limitations Within the IM

The signals from the module processor are sent to a peripheral unit over the Peripheral Interface Control Bus (PICB) cables. The data and voice information is sent to the time division switch from the peripheral unit over the Peripheral Interface Data Bus (PIDB) cables. There are important timing aspects in the consideration of the lengths of the PICB and PIDB cables. A signal is sent from the IMC to the peripheral units which triggers pulses and sends information back to the IMC's data or control interfaces. This process must be completed within one cycle of the 4MHz Clock. Since there are delays associated with the IMC and peripheral unit interface circuits, the PICB and PIDB cables should be less than 20 cable feet to assure the proper operation of the units. If the PICB's or PIDB's are made too long pulses will not reach the IMC in time and service will fail. See Fig. 5.

5.2 Tip, Ring, Scan, and Distribute Cable Limitations

5.2.1 Line Unit and Trunk Unit Cables Limitations: The maximum cable length between any of the various line units and the distributing frame or the TU and the distributing frame is 500 ft. of 26 gauge wire or cabling whose maximum total loop impedance is less than 47.4 ohms. This is because series impedance requirements for test access paths through the MMSU. Allocation of signal loss is not the limiting factor in determining the cable length on cabling between the units and the distributing frame. See Fig. 6. For length limitations when a PPMU is used with a Line Unit see section 5.2.2.

5.2.2 Cable Limitations Involving the PPMU: For systems using the PPMU, the maximum total loop impedance from the first appearance of a line on the horizontal side of the distributing frame through the PPMU to the Line Unit is 47.4 ohms. See Fig. 7. The cables that run from the LU to the distributing frame are 26 gauge and the cables between the PPMU and the distributing frame are 22 gauge. Since the Line Unit and corresponding PPMU are found in the same IM, the cable lengths will be the same. Therefore, the maximum cable distance between the Line Unit and the distributing frame or the PPMU and the distributing frame is 275 feet. If a longer run is needed, then a larger gauge cable must be spliced into the cables. This also holds true when the Line Interface Cabinet (LNI) supplying gas tube protection is used; the total loop length from the first appearance of the line at the distributing frame to the line unit is 47.4 ohms. In this case the PPMU, the LNI, and the LU tip and ring cables terminate at the distributing frame where the units are cross connected. The path from the first appearance of a line at the distributing frame goes from the distributing frame, to the LNI, back to the distributing frame, then to the PPMU, back to the distributing frame, and finally to the LU. The PPMU cables are 22 gauge and the Line Unit and LNI cables are 26 gauge.

5.3 Digital Line and Trunk Cable Limitations

The maximum length for the cable between the DSX and the DCLU, DCLU-SUPP, or the DLTU is 655 feet. The circuit pack used to interface the line or trunk depends on the cable length. See Fig. 6. See the unit SD's for the proper circuit packs.

1. DCLU SDS0202-01
2. DCLU-SUPP SD5D203-01
3. DLTU SD5D201-01
4. DLTU-Export SD5X204-01

5.4 Scan Cable Limitations

The MSU and MMSU provide scanner functions for many of the BESS office needs. These scan points are cabled to the distributing frame where they are cross connected to the desired circuit. The MMSU and MSU scan points have no practical restriction to the maximum length. If the loop resistance of the scan point is under 6800 ohms, the logical state will be zero. If the loop resistance of the scan point is over 30,000 ohms the logical state will be one.

5.5 Metallic Test Bus Limitations

The metallic paths in the office are used to access each subscriber line for testing. As specified in the LSSS, "on at least 95% of all test accesses, the magnitude of the total series impedance of the access path (tip plus ring) from 0 to 3200 Hz shall not exceed 500 ohms." A typical test path through the office would run from the distributing frame to the LU via tip and ring cables, through one or more MMSU's to the test trunk via metallic test bus cables, and back out to the distributing frame via a test trunk line. If the cable limitations, as outlined in this SD are followed, then this requirement should not be a problem except in large offices where the metallic path may have to run through several MMSU's. The section 1.1.3 Conductor Lengths and Resistance Values may be used to calculate the impedance of the metallic path.

6. DC Power Cabling Restrictions

The length and gauge requirements for DC power leads in the SESS Switch is controlled by the DC Power Distribution Schematic Diagram, SD50005-01. Some of the general information is covered here, and special items are included. The maximum loop lengths for feeder pairs found in SD50005-01 must be followed.

6.1 Limitations on Power Feeders to Equipment Frames

The power feeders between the power plant distribution fuse board and each equipment frame shall be sized to insure a voltage range of -42.75 to -52.5 volts at each equipment frame. The maximum loop voltage drop between the power distribution fuse board and the power distribution frame or panel is 1/4 V. The maximum loop voltage drop between the power distribution frame or panel and the equipment frame is 1 volt. See Figure 8.

6.2 Protected AC Inverter Cable Limitations

The -48V and return leads of the inverter KS-20816.L1A have specific gauge and length requirements. For cables up to a length of 50 feet the minimum wire size is 6 gauge. For cables between 50 and 100 feet the minimum wire size is 2 gauge.

6.3 DC Power Feeder Limitations to the Moving Head Disk Cabinet

The power feeders for the Disk Power Control Cabinet (6 ft) J1C175A-1 has the following gauge and length requirements:

Cable Length	Cable Gauge
0-35	4
35-60	2
60-100	0
100-125	00
125-200	0000

7. Miscellaneous Equipment

7.1 13A Recorded Announcement Cable Limitations

The SESS Switch uses the 13A Recorded Announcement System to provide recorded announcements of various lengths. The 13A is a multichannel system allowing one to eight channels. Each channel is capable of recording and playing one recorded message. The 13A is completely electronic and is based on digitized speech stored in a 29A magnetic bubble memory.

The loop resistance of the twisted pairs that connect the audio amplifier output terminals to the point where distribution is made to multiple trunk circuits should be as low as possible. This will assure minimum loss of announcement level with increasing numbers of trunk circuits. It will also provide maximum talk-through suppression between multiple trunks. In engineering an office, therefore, the tables below should be used as a guide in selecting the gauge of wire to used in connecting the T1, R1 terminals of the 13A to the DF. These tables assure that the maximum loss in announcement level from one trunk circuit connection to the maximum number shown will not exceed 3.5dB minimum. For example, to connect 100 900-ohm

trunks to the 13A with 100 feet of twisted pair 24 gage wire or heavier must be used. If 100 600-ohm trunks are to be connected with 100 feet of twisted pair, 22 gage wire or heavier must be used.

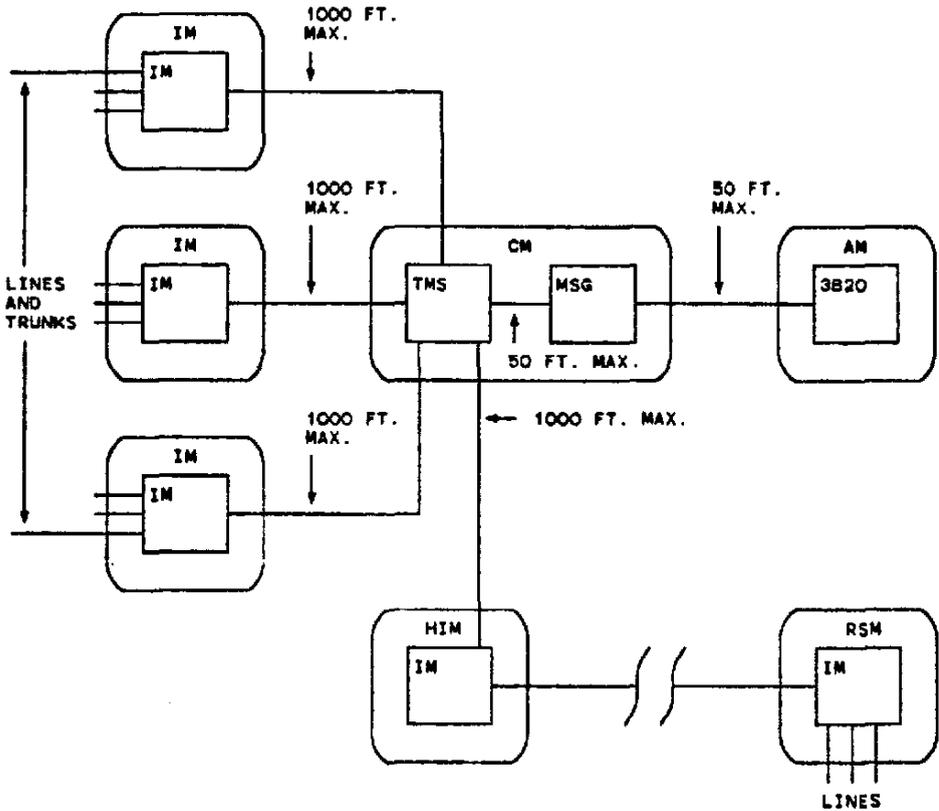
Wire Gage for 900 Ohm Distribution							
Dist.(ft)	Number of Trunk Circuits						
	1	50	100	200	300	400	500
25	26	26	26	26	24	22	20
50	26	26	26	24	22	20	16
75	26	26	26	22	20	18	14
100	26	26	24	20	20	16	
200	24	24	22	18	16	14	
400	22	22	18	14	14		
800	18	18	16				
1000	18	18	14				

Wire Gage for 600 Ohm Distribution							
Dist.(ft)	Number of Trunk Circuits						
	1	50	100	200	300	400	
25	26	26	26	24	22	20	
50	26	26	26	22	20	16	
75	26	26	24	20	18	14	
100	26	26	22	20	16		
200	24	24	20	16	14		
400	22	22	18	14	14		
800	18	18	16				
1000	18	18	14				

8. Supporting Information

Document	Number
Multimodule Office Equipment and Functional Description SESS Switch	BSP 235-100-105
3B200 Model 2 Processor System Circuit	SD4C122-01
Directly Connected Line Unit (DCLU)	SD5D202-01
DCLU - Supplementary	SD5D203-01
Digital Line Trunk Unit (DLTU)	SD5D201-01
Common Systems 13A Announcement System	SD97753-01
DC Power Distribution	SD5D005-01
Message Switch (MSG) Cabinet 7' Design	SD5D116-01
Message Switch (MSG) Cabinet 6' Design	SD5D146-01
Time Multiplex Switch (TMS) 7' Design	SD5D117-01
Time Multiplex Switch (TMS) 6' Design	SD5D147-01
SESS System Application	SD5D014-02
Schematic 6' Cabinets	
Interface Module Application	SD5D012-02
Schematic 6' Cabinets	

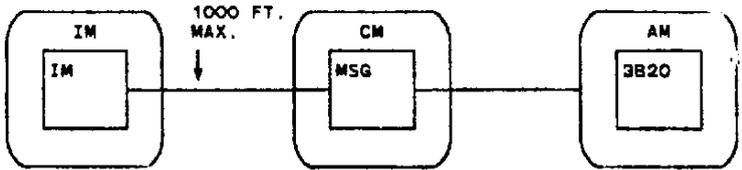
FIGURE 1
SESS MULTIMODULAR ARCHITECTURE



3B20 - 3B20 PROCESSOR
 AM - ADMINISTRATIVE MODULE
 CM - COMMUNICATION MODULE
 HIM - HOST INTERFACE MODULE

IM - INTERFACE MODULE
 MSG - MESSAGE SWITCH
 RSM - REMOTE SWITCHING MODULE
 TMS - TIME MULTIPLEXED SWITCH

FIGURE 2
SESS SINGLEMOD ARCHITECTURE



- 3B20 - 3B20 PROCESSOR
- AM - ADMINISTRATIVE MODULE
- CM - COMMUNICATION MODULE
- IM - INTERFACE MODULE
- MSG - MESSAGE SWITCH

FIGURE 3
ADMINISTRATIVE MODULE

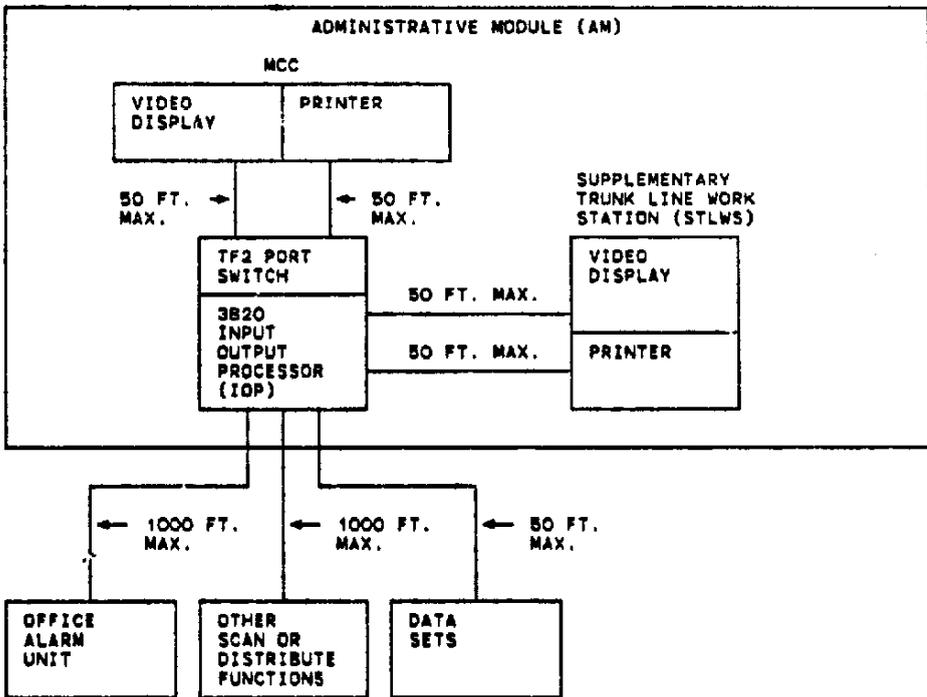
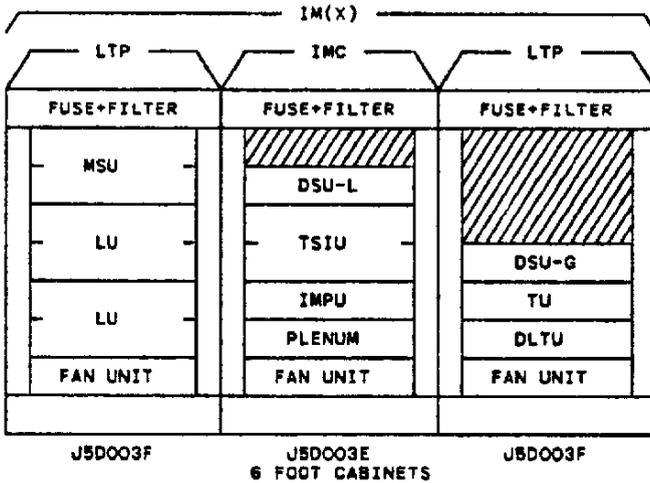
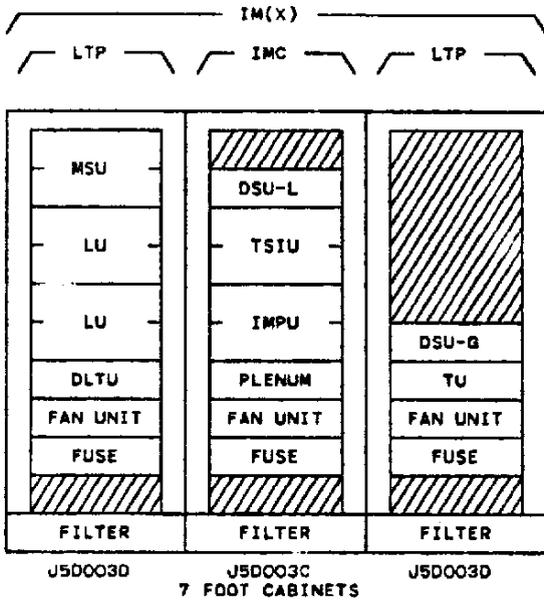
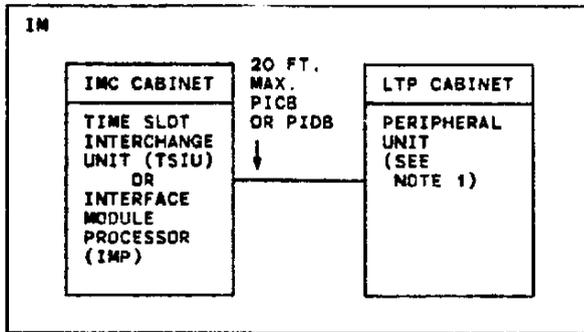


FIGURE 4
TYPICAL BESS INTERFACE MODULE



- | | |
|----------------------------------------|----------------------------------------|
| DLTU - DIGITAL LINE TRUNK UNIT | IMPU - INTERFACE MODULE PROCESSOR UNIT |
| DSU-G - DIGITAL SERVICE UNIT - GLOBAL | LU - LINE UNIT |
| DSU-L - DIGITAL SERVICE UNIT - LOCAL | LTP - LINE TRUNK PERIPHERAL CABINET |
| IM - INTERFACE MODULE | MSU - METALLIC SERVICE UNIT |
| IMC - INTERFACE MODULE CONTROL CABINET | TSIU - TIME SLOT INTERCHANGE UNIT |
| | TU - TRUNK UNIT |

FIGURE 5
CABLING LIMITATIONS WITHIN THE IM



IM - INTERFACE MODULE
 IMC - INTERFACE MODULE CONTROL
 LTP - LINE TRUNK PERIPHERAL
 PICB - PERIPHERAL INTERFACE CONTROL BUS
 PIDB - PERIPHERAL INTERFACE DATA BUS

NOTES:
 1. FOR A LIST OF PERIPHERAL UNITS. SEE PAGES 4 AND 5.

FIGURE 6
TIP AND RING CABLE LIMITATIONS

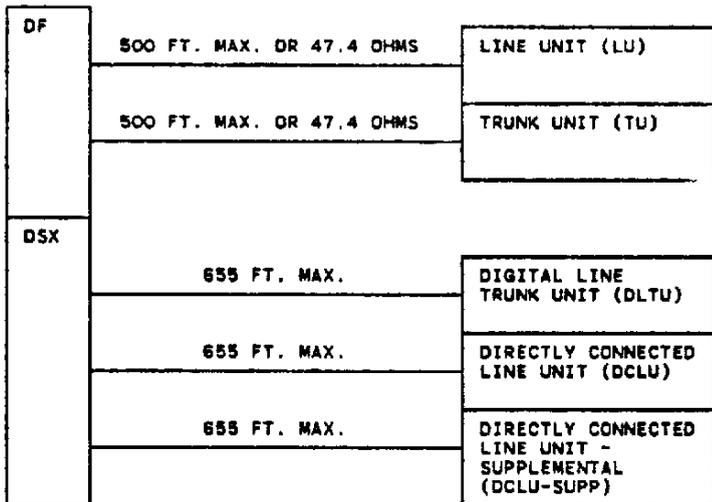
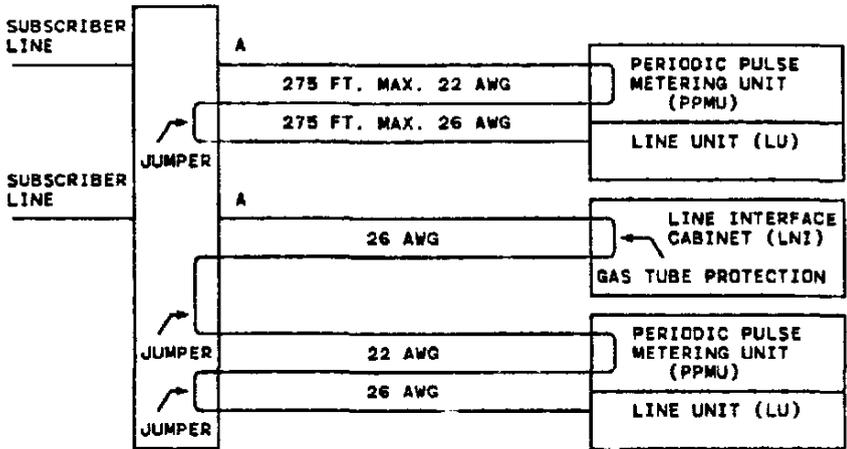
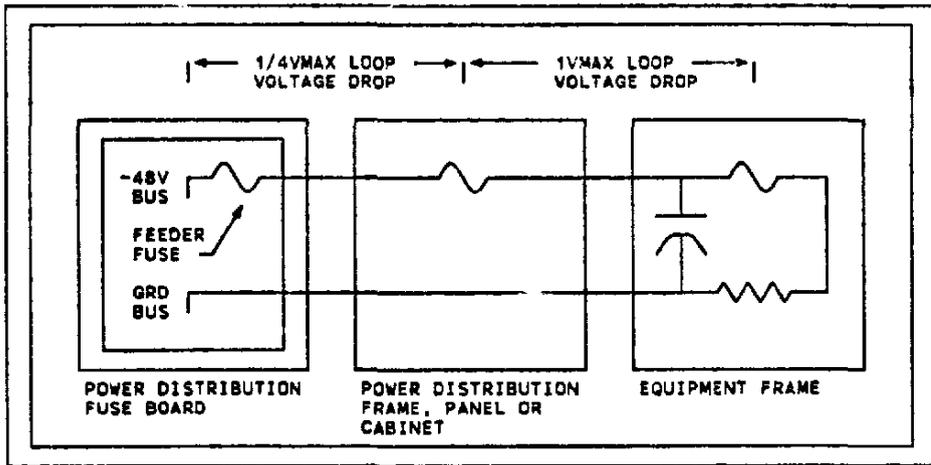


FIGURE 7
CABLE LIMITATIONS INVOLVING PERIODIC PULSE METERING



- NOTES:**
1. FROM POINT A TO THE LINE UNIT (LU) THE MAXIMUM EQUIVALENT IMPEDANCE IS 47.4 OHMS.

FIGURE 8
LENGTH LIMITATIONS ON POWER FEEDERS



**INTER (SWBD) CABLING LIST
FOR
SESS DRAWING COMPARISON OF FRAMES OR CABINETS**

DRAWING TITLE	FRAME DRAWINGS	7' CABINET DRAWINGS	6' CABINET DRAWINGS
INTERFRAME CABLING REQUIREMENTS	ED-5D030-11	ED-5D100-11	ED-5D500-11
METHOD OF CABLING FOR "INTER" FRAME CABLES			ED-5D500-13
CROSS CONNECTIONS FOR THE SESS SWITCH			ED-5D500-15
CONNECTORIZED CABLES FOR MCC-TLWS	ED-5D039-30	ED-5D039-30	ED-5D502-30
CONNECTORIZED CABLES FOR INTERFACE MODULE	ED-5D040-30	ED-5D112-30 (NON-CONN) (ED-5D112-40)	ED-5D503-30 (NON-CONN) (ED-5D503-35)
CONNECTORIZED CABLES FOR MSG	ED-5D042-30	ED-5D113-30	ED-5D506-30
CONNECTORIZED CABLES FOR TMS	ED-5D043-30	ED-5D114-30	ED-5D501-30
CONNECTORIZED CABLES FOR MISC	ED-5D047-30	ED-5D115-30 (NON-CONN) (ED-5D115-40)	ED-5D505-30 (NON-CONN) (ED-5D505-35)
CONNECTORIZED CABLES FIBER-OPTIC LIGHTGUIDE	ED-5D066-30	ED-5D066-30	ED-5D066-30
METHOD OF CABLING FOR CONNECTORIZED D.F.	ED-5D090-10	ED-5D090-10	ED-5D090-10
CONNECTORIZED CABLES FOR D.F. EQUIPPED WITH 89 & 711 TYPE CONN	ED-5D090-30		
STAMPING INFO FOR 89 TYPE CONN AT D.F.	ED-5D025-11	ED-5D025-11	ED-5D025-11
QUIET GROUND (MSU)	ED-5D129-30	ED-5D129-30	ED-5D129-30
LNI CABLING		ED-5D531-30	
DATA SET CABLING			ED-5D517-30

**INTRA CABLING LIST
FOR
BESS DRAWING COMPARISON BETWEEN FRAMES & CABINETS**

DRAWING TITLE	FRAME DRAWINGS	7' CABINET DRAWINGS	6' CABINET DRAWINGS
CONNECTORIZED CABLING REQUIREMENTS	ED-50030-10	ED-5D100-10	ED-5D500-10
METHOD OF CABLING FOR "INTRA" FRAME CABLING			ED-50500-12
PERIPHERAL INTERFACE CONTROL BUS CABLE	ED-50031-30	ED-5D031-30	ED-5D503-26 (LTP) ED-5D503-21 (IMC)
PERIPHERAL INTERFACE DATA BUS CABLE	ED-50032-30	ED-5D032-30	ED-5D503-25 (LTP) ED-5D503-22 (IMC)
TIME SLOT INTERCHANGE AND MODULE (IOP CABLE)	ED-50034-30	ED-5D120-30	ED-50507-20
INTERFACE MODULE CONTROL (IMC AND LINE TRUNK PERIPHERAL) (LTP) CABINETS (POWER CABLE ASSEMBLY)	ED-50048-30	ED-5D097-30	ED-5D503-15 (LTP) ED-5D507-15 (IMC)
DLT UNIT CABLES	ED-50089-30	ED-5D089-30	ED-5D089-30
MESSAGE SWITCH METHOD OF CABLING			ED-50506-10
MESSAGE SWITCH (POWER CABLES)	ED-50036-30	ED-5D098-30	ED-50506-15
MESSAGE SWITCH AND CLOCK UNIT CROSS COUPLING CABLING ASSEMBLY	ED-50046-30	ED-5D101-30	ED-50506-20
MESSAGE SWITCH (IOMI CABLE ASSEMBLY)	ED-50044-30	ED-5D103-30	ED-50506-22
MESSAGE SWITCH (LINK INTERFACE CROSS COUPLE)		ED-5D118-30	ED-50506-24
MESSAGE SWITCH POWER CONTROL ASSEMBLY	ED-50045-30	ED-5D104-30	ED-50506-23
METHOD OF CABLING FOR TMS INTRACABLES			ED-5D501-10
DFI CLOCK-STATUS CABLES (FIU)		ED-5D126-30	ED-5D503-20
TIME MULTIPLEX SWITCH (ALARM AND CONTROL CABLE)	ED-50068-30	ED-5D105-30	ED-5D501-20
TIME MULTIPLEX SWITCH (POWER AND ALARM CABLE)	ED-50069-30	ED-5D099-30	ED-5D501-15
TIME MULTIPLEX SWITCH (SHELF CONTROL CABLE)	ED-50070-30	ED-5D106-30	ED-5D501-21
TIME MULTIPLEX SWITCH (TEST BOARD ACCESS CABLE)	ED-50071-30	ED-5D119-30	ED-5D501-22

INTRA CABLING LIST (CONT)

DRAWING TITLE	FRAME DRAWINGS	7' CABINET DRAWINGS	6' CABINET DRAWINGS
EXPANDED MEMORY MODULE CONTROL UNIT (FLEX TAPE) IMPU		ED-5D127-30	ED-5D127-30
RESET (FIU)		ED-5D128-30	ED-5D503-21
MULTI MSU MULT		ED-5D130-30	ED-5D130-30
MMSU MTB MULTS TO 4AB LINE UNIT			ED-5D503-22
MMSU MTB MULTS TO 3AC TRUNK UNIT			ED-5D503-23
MMSU CONTROL MULTS			ED-5D503-27
MMSU SERVICE GROUP MULTS			ED-5D503-28
JK PNL CABLE ASSY		ED-5D146-30	ED-5D146-30
MESSAGE SWITCH (INTERFACE BUS CABLE)	ED-5D037-30	ED-5D102-30	ED-5D506-21
TEST ACCESS UNIT	ED-5D035-30	ED-5D035-30	ED-5D035-30
FUSE-FILTER UNIT POWER DISTRIBUTION CABLE			ED-5D507-16
TEST TRUNK CIRCUITS (SN107) MTB MULTS			ED-5D503-24