

CIRCUIT DESCRIPTION

CD-5D091-01  
ISSUE 1  
APPENDIX 4B  
DWG ISSUE 5B  
DISTN CODE BT13

5ESS® SWITCHING EQUIPMENT  
INTEGRATED SERVICES LINE UNIT  
CIRCUIT

CHANGES

B. Changes In Apparatus

- B.01 Added option S to allow KCD3B to be used in place of KCD3 (option ZA) Line Group Control circuit pack for 5E6 or 5EE4.2 and later generic offices.
- B.02 Added option M to allow KCB1B to be used in place of KCB1 (option N) analog circuit pack for Netherland offices.
- B.03 Added option J to allow KCB3B to be used in place of KCB3 (option K) analog circuit pack for Taiwan offices.
- B.04 Added option F to allow KCB4B to be used in place of KCB4 (option G) analog circuit pack for Korea offices.
- B.05 Added option B to allow KCB5B to be used in place of KCB5 (option E) analog circuit pack for China offices.
- B.06 Added option Q to allow KCB6B to be used in place of KCB6 (option R) analog circuit pack for domestic offices.
- B.07 Added KCB15 analog circuit pack for Spain offices.
- B.08 Added KCB17 ANSI Std. U-DSL circuit pack to be used in 5E6 or 5EE4.2 and later generic offices.
- B.09 Added option A to allow 553B to be used in place of 553 (option Y) Line Group Power circuit pack for 5E6 or 5EE4.2 and later generic offices.

D. Description of Changes

- D.01 Updated App. Figure information.
- D.02 Updated Equipment notes 208 and 209.

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CD-5D091-01 - ISSUE 1

- D.03 Updated Information notes 302, 303 305, 306, 307, and 308.
- D.04 Added Information notes 315, 316, and 317 explaining 553B, KCB17, and KCD3B implementation.

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DEPT 55421-CHS-TMM

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CIRCUIT DESCRIPTION

CD-5D091-01  
ISSUE 1  
APPENDIX 3A  
DWG ISSUE 4A  
DISTN CODE BT13

5ESS® SWITCHING EQUIPMENT  
INTEGRATED SERVICES LINE UNIT  
CIRCUIT

CHANGES

B. Changes In Apparatus

B.01 Added option T to allow MC5X264A1 (TN1346) to be ordered for PRC. This was done to accommodate new EPROMs and adapters on circuit packs previously identified as MC5D101A1.

D. Description of Changes

D.01 Updated Information note 303.

D.02 Updated CAD 49.

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5ESS™ SWITCHING EQUIPMENT  
INTEGRATED SERVICES LINE UNIT  
CIRCUIT

CHANGES

B. Changes in Apparatus

B.1 Add option Y to allow usage of the 553A line group power supplies in offices of a 5E4(2) or 5EE3 generic or beyond. The 553A is a replacement for the KCD2 line group power pack. When a 553A is used within a line group, a KCB16 auxiliary power pack is not required.

B.2 Add option W to allow usage of the KCB10 U-Card in offices of a 5E4(2) or 5EE3 generic or beyond. The KCB10, which is one line card circuit pack in width, is a replacement for the 6A U-Card, which is two line card circuit packs in width.

D. Description of Changes

D.1 Add option V to allow fan alarm circuitry wiring which is required when two ISLUs are mounted in a single cabinet.

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SESS™ SWITCHING EQUIPMENT  
INTEGRATED SERVICES LINE UNIT  
CIRCUIT

CHANGES

D. Description of Changes

- D.1 The following changes are documentation changes only and do not affect the hardware in any way.
- D.2 Modify apparatus Figures 3-25 to show the correct list numbers to be associated with the appropriate "J" code.
- D.3 Correct Note 101 to state that fusing is "5 per Service Group in the Common Shelf" instead of "5 per Service Group."
- D.4 Remove the duplicate note about the 982ET apparatus in Notes 206 and 207.
- D.5 All references of ED-5D630 have been changed to 6A.
- D.6 Add Note 208 identifying line card sparing.
- D.7 Add CAD numbers 45, 46, and 47 to sheets A1 and GB1A.
- D.8 Change power lead designations in order to make them more identifiable with the portion of the ISLU for which they are providing power.
- D.9 Add Note 209 identifying which circuit packs can be pulled "HOT".

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SESS™ SWITCHING EQUIPMENT  
 INTEGRATED SERVICES LINE UNIT  
 CIRCUIT

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2. GENERAL DESCRIPTION OF OPERATION

A. Outside Plant Interface

2.01 Each customer line terminates on its own line card (LC). Depending on LC type, the unit can support up to 512 customers.

2.02 At the present time three LC types are available, as follows:

(a) Analog (2-wire) line feed with ground based resistive feed, called the Z-Card.

(b) CCITT standard integrated services digital network (ISDN) interface to a digital subscriber line (DSL) (4-wire), called the T-DSL.

(c) ISDN DSL (2-wire), called the U-DSL.

B. Switch Module Interface

2.03 The ISLU interfaces to the switch module (SM) via the following connections:

(a) Peripheral interface control bus (PICB), used to control the unit and pass status back to the active and standby sides of the SM.

(b) Peripheral interface data bus (PIDB), used to pass data

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 The integrated services line unit (ISLU) is designed to interface a variety of customer lines to the SESS™ Switch.

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(such as digitized voice) between the ISLU and the active and standby sides of the SM.

- (c) Directly connected PIDB (DPIDB), used to pass data between the ISLU and the packet switched interface unit (PSIU).
- (d) Metallic test bus (MTB), which connects the modular metallic service unit (MMSU) to the ISLU and is used for customer line testing.
- (e) Fan alarm cables, which tie the ISLU fan system into the control and alarm functions of the fan unit at the base of the cabinet.

### C. RISLU Application

2.04 The remote ISLU (RISLU) does not directly interface to the SM. Instead, the PIDBs and PICBs connect to the DLTU-R (digital line trunk unit-RISLU). The DLTU-R is located with the remote ISLU at some distance from the central office.

## SECTION II - DETAILED DESCRIPTION

### 1. BLOCK DIAGRAM

1.01 Figure 1 is a block diagram of the ISLU. At the top of the figure are the duplex controllers. The common control (CC) of each service group (SG) has access to all peripherals in both SGs. The PICBs connect to the common control interface (CCI) boards. Data is handled by the common data (CD) boards of the two SGs.

1.02 At the bottom of the figure are the 16 line groups (LGs). Each LG can contain up to 32 LCs of various

types. Each LC terminates one customer.

1.03 The other boxes in the figure relate to metallic functions, such as ringing, high voltage signaling, and line test. The two ringing generators (RGs) drive the two ringing buses for POTS ringing. They gain access to the LCs via the metallic access network (MAN) boards. Six high level service circuits (HLSCs) also use the MAN.

1.04 If only certain types of LCs are used, some of the metallic-function-related circuit packs can be omitted from the unit.

## 2. INTERFACES

### A. Outside Plant Interface

2.01 Two types of customers can connect to an ISLU:

- (a) Analog customers
- (b) DSLs

2.02 Analog customers use only one tip and ring pair of conductors. Signals pass in analog form. Power for the customer's telephone is usually supplied by the ISLU.

2.03 DSLs, on the other hand, use one or two tip/ring pairs. Signal pass in a digital format. At the present time, power is not supplied to the customer.

2.04 Details of the analog and DSL interface can be found in the CDs for the Z-card (KCB6), U-DSL (KCB10), and T-DSL (KCB7).

2.05 In all cases, the tip/ring pairs from the ISLU connect to the main distribution frame (MDF). Options

exist on the MDF blocks to support either 2-wire or 4-wire customers.

## B. SM Interface

### PICBs

2.06 Two PICBs are used by the ISLU. One connects to the CC in service group SGO and the other to the CC in SG1.

2.07 The number of PIDBs used by an ISLU is a function of expected traffic. A minimum of two PIDBs is required, with one going to each SG. A maximum of 24 PIDBs is available, with six PIDBs terminating at each of the four CD packs.

2.08 Each PIDB can be in one of the following states:

- (a) Unequipped
- (b) Connected to the time slot interface unit (TSIU)
- (c) Connected to the packet switched interface unit (PSIU).

2.09 The TSIU handles circuit switch data, such as digitized voice or the block transfer of data. The PSIU handles the signaling protocol of DSLs as well as packet switched data. Up to eight PIDBs can go to the PSIU; the other 16 PIDBs can connect to the TSIU.

### MTB

2.10 The ISLU connects to two MTBs. Each SG has access to both MTB0 and MTB1. All MMSU testing passes through these MTBs.

## FAN ALARM

2.11 The ISLU contains 12 fans. They are monitored by fan alarm boards mounted at the rear of the drawer unit. Control of these alarm boards and any subsequent alarms pass through the fan alarm cables. Each of the four fan alarm boards behaves the same as the alarm interface of a fan unit.

## C. Power and Ground

2.12 The ISLU is connected to 26 fuses fed by the office battery. Ten connect to the common shelf (CS), while the remaining 16 feed the LGs.

2.13 Two grounds are employed in the unit. Frame ground is referenced by part of the CCI and CD packs in order to communicate with the SM. The rest of the unit ties to -48RTN.

## D. Operation

2.14 Analog lines have five states, as follows:

- (a) Disconnect state - tip/ring conductors are isolated from LC.
- (b) Scanning state - unit is looking for change in hookswitch status of line.
- (c) Address signaling/talking state - dialing and subsequent stable talking state.
- (d) Alerting state - applying ringing voltage to line.

- (e) Line testing state - MMSU is connected to LC for customer line testing.

2.15 Digital lines have similar states except that they are performed by messages passed between the DSL and the PSIU. Note. Line testing for the U-DSL is performed in the same way as the analog line. (The T-DSL has no line testing feature.)

### SECTION III - REFERENCE DATA

#### 1. WORKING LIMITS

##### A. Line Types

###### Analog Lines

1.01 The Z-Card interface permits the following types of lines to terminate at an ISLU:

- (a) Noncoin, loop start lines, up to 1600 ohms dc resistance, including party lines.
- (b) Coin lines, up to 1500 ohms dc resistance, including both ground start and loop start.
- (c) PBX-CO trunks, up to 1600 ohms dc resistance, including both ground start and loop start.

###### DSLs

1.02 The T-DSL connects via four wires to a standard ISDN T interface. The U-DSL connects via two wires to a standard ISDN U interface.

##### B. Line Conditions

1.03 The following conditions are assumed to exist on conductor loops used by the Z-Card and the U-DSL:

###### Leakage

1.04 In a conductor loop, the leakage resistance can be defined as the direct resistance from tip to ring, ring to ground, and tip to ground. Under normal operating conditions, each of these resistances should equal or exceed 30 kohms.

###### Foreign Potentials

1.05 Lightning surges, normal 60 Hz power induction, power faults, and crosses constitute foreign potential sources other than dc leakage sources. The ISLU is protected such that it can withstand repeated occurrences of foreign potential described below:

1.06 Lightning Surges. Protection circuits on the Z-Card divert surge currents to ground. Only carbon blocks are needed on the MDF, in contrast to other line units that require gas tubes. The Z-Card can survive 50 repeated surges, as described below, of either positive or negative polarity, with peak current limited to 100A per line conductor.

1.07 The protection circuits in the and U-DSL cards can survive either of the following surges:

- (a) 600 volts, 10 x 1000 us
- (b) 1000 volts, 10 x 360 us

1.08 The T-DSL and U-DSL line cards are transformer coupled to the line and present a high impedance to ground from tip and ring. These cards therefore do not pass destructive currents. Tip to ring surges do meet the above surge requirements.

1.09 Power Faults and Crosses. Both the Z and U Cards are able to survive transient foreign potentials as large as 265 volts rms from a source resistance of 600 ohms, lasting up to 1 second.

Earth Potentials

1.10 Limits. Earth potential limits are  $\pm 3$  volts dc. There can be small isolated areas where the earth potential can exceed this limit. Office designs will be to the  $\pm 3$  volts dc limit.

1.11 Electrolysis corrosion/polarity. The Z and U cards maintain all loop conductors at negative potentials with respect to the earth under steady-state conditions.

Battery Feeds

1.12 Only the Z card feeds battery to the customer.

2. CONNECTING CIRCUITS/UNIT LAYOUT

2.01 Fig. 2 shows the physical layout of the unit. The common shelf (CS) holds all circuits except those associated directly with an LG. The drawers located below the CS house the 16 LGs.

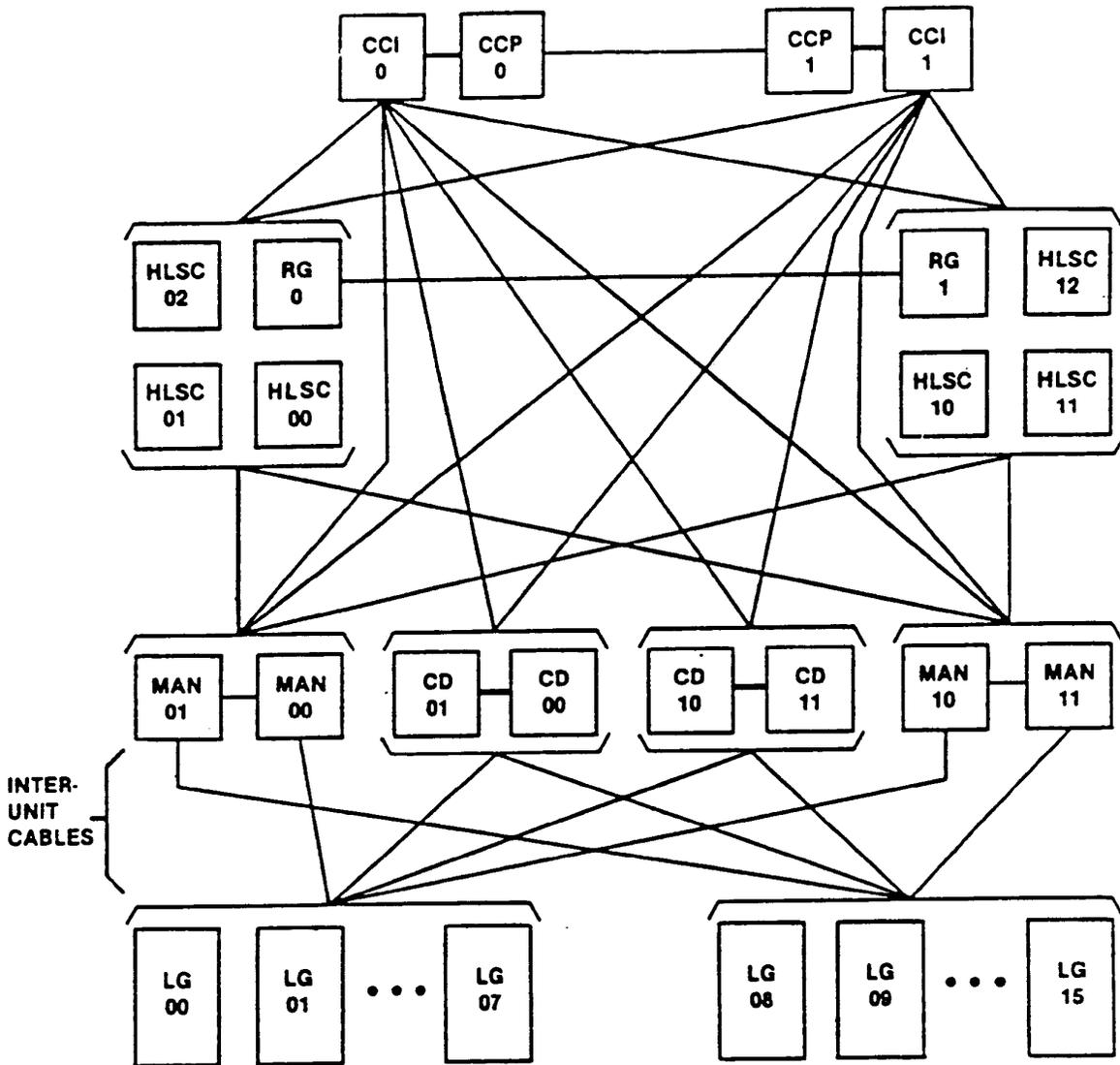
2.02 Within the CS are the two SGs placed in a mirror image fashion. Starting at the left side of the CS is RGO. It is flanked by the three HLSCs, which feed into its neighboring two MAN packs. The SGO bulk power converter is next, followed by the two CD packs. Last is the CC complex, which includes a CCI and common control processor (CCP) board.

3. GLOSSARY

CC	Common control
CCI	Common control interface
CCP	Common control processor
CD	Common data
CS	Common shelf
DLTU-R	Digital line trunk unit-RISLU
DPIDB	Directly connected peripheral interface data bus
DSL	Digital subscriber line
HLSC	High level service circuit
ISDN	Integrated services digital network
ISLU	Integrated services line unit
LC	Line card
LG	Line group
MAN	Metallic access network
MDF	Main distribution frame
MMSU	Modular metallic service unit
MTB	Metallic test bus
PICB	Peripheral interface control bus
PIDB	Peripheral interface data bus
POTS	Plain old telephone service
PSIU	Packet switched interface unit
RISLU	Remote integrated services line unit
RG	Ringin generator
SG	Service group
SM	Switching module
TSIU	Time slot interface unit

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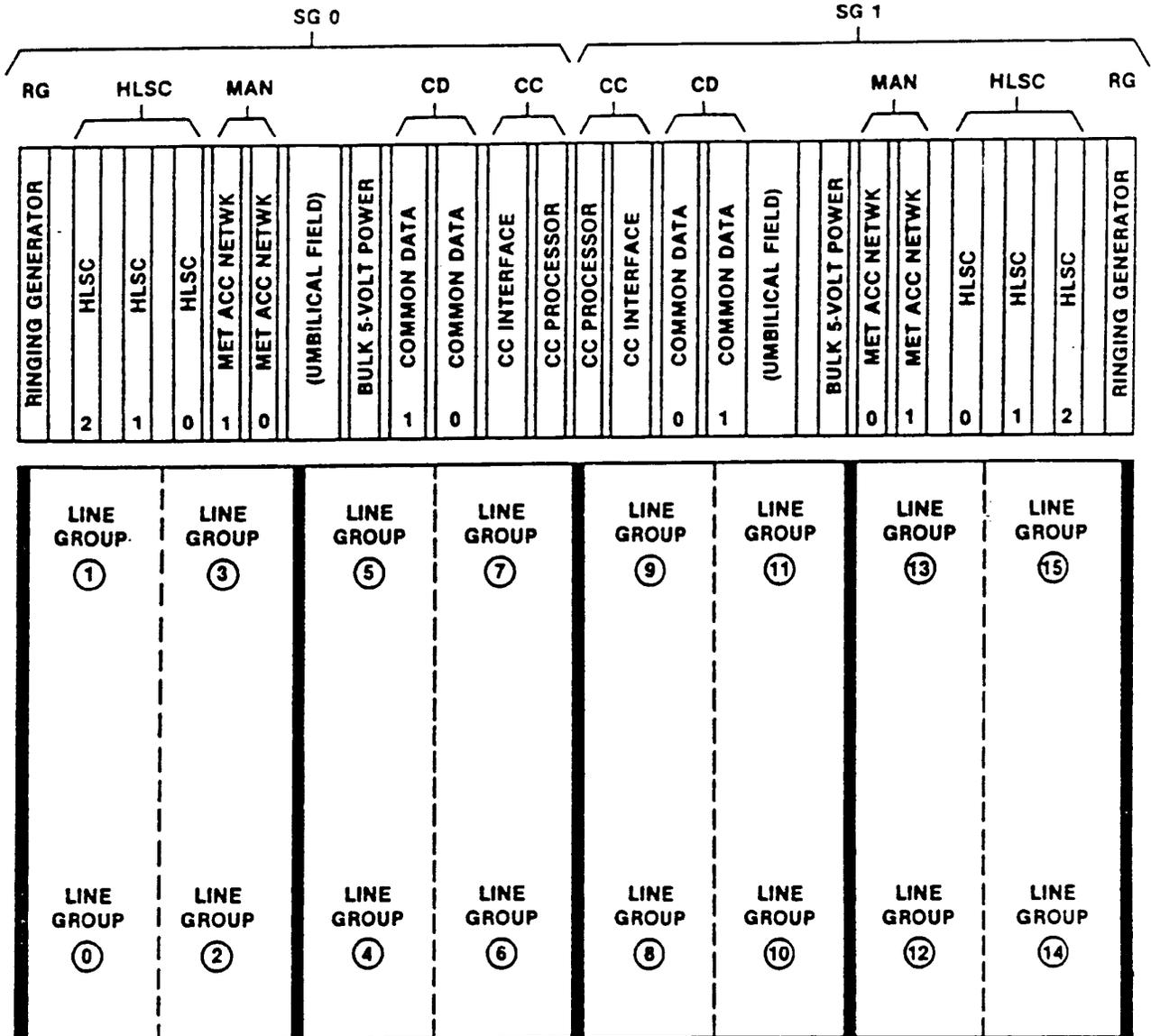


**KEY**

- CCI** COMMON CONTROL INTERFACE [PERIPHERAL INTERFACE CONTROL BUSES (PICB<sub>s</sub>) TIE HERE]
- CCP** COMMON CONTROL PROCESSOR
- RG** BULK RINGING GENERATOR
- HLSC** HIGH LEVEL SERVICE CIRCUIT
- CD** COMMON DATA [PERIPHERAL INTERFACE DATA BUSES (PIDB<sub>s</sub>) TIE HERE]
- MAN** METALLIC ACCESS NETWORK [METALLIC TEST BUSES (MTB<sub>s</sub>) TIE HERE]
- LG** LINE GROUP (CUSTOMERS' LINES TIE HERE)

IHM60455A02

Fig. 1. Integrated Services Line Unit (ISLU) Block Diagram



**KEY**  
 CC        COMMON CONTROL  
 HLSC     HIGH LEVEL SERVICE CIRCUIT  
 MET ACC  METALLIC ACCESS

Fig.2. Integrated Services Line Unit - Physical View