

SUBSCRIBER LOOP CARRIER 1 (SLC*-1) SYSTEM CENTRAL OFFICE INSTALLATION AND TESTING

	CONTENTS	PAGE
1.	GENERAL	1
2.	CENTRAL OFFICE UNIT INSTALLATION	1
	J98729B SHELF	1
	A. Installation	1
	B. Power Wiring	3
	C. Cabling	4
	NS1 CIRCUIT PACK	4
	A. Installation	4
3.	SERVICE ORDER INSTALLATION AND REMOVAL	4
	CENTRAL OFFICE TERMINAL	4
	A. Frame Connections	4
	B. Cluster Application	5
	C. Testing Connections and Units	5
	D. Denial of Service (Physical or Derived)	5
	E. Service Removal	9
	F. Service Orders	9
4.	CENTRAL OFFICE TESTING	9

1. GENERAL

1.01 The central office unit (COU), consisting of the J98729B shelf, NS1 circuit packs, and associated cabling to the horizontal main distributing

frame (HMDF), normally will be installed by Western Electric Company installation forces in accordance with an Engineer, Furnish, and Install Order. Since some operating companies provide their own personnel for central office (CO) equipment installation, a general guide to the installation requirements is presented in Part 2.

1.02 When this section is reissued, the reasons for reissue will be included in this paragraph.

1.03 Part 3 presents service order installation and removal procedures. Information presented in Part 3 assumes the SLC-1 units are mounted in CO shelves and cabled to the main frame. On a conventional main distributing frame (MDF), the SLC-1 terminations are made to 8-point terminal blocks mounted on the horizontal side of the main frame. In COs using the Common Systems Main Interconnecting (COSMIC) frame or on ESS modular frames, the SLC-1 units are terminated on a special distributing frame and tie cables are used to connect with the COSMIC or ESS frames.

1.04 Part 4 presents the testing arrangements used to find SLC-1 troubles within the CO.

2. CENTRAL OFFICE UNIT INSTALLATION

2.01 All cabling and wiring should be in accordance with standard practices and safety procedures provided in applicable sections of Western Electric Company installation handbooks or local procedures.

J98729B SHELF

A. Installation

2.02 The J98729B shelf may be located anywhere in the CO. All CO shelf units may be located side by side to provide a centralized installation. The length of the shelf cabling to

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the HMDF is not critical, but the cable must be shielded. There are no mounting restrictions on proximity to other carrier, switching, or power-regulating equipment. However, locations within 2 feet of a D channel bank power supply (J86498A) should be avoided. Electromagnetic radiation from the power supply exceeds present standards and may cause interference on the derived lines.

2.03 Each shelf requires a 6-1/2 inch vertical mounting space in a standard 23-inch equipment rack and accepts 12 plug-in NS1 circuit packs. A protective cover and all mounting hardware are furnished with each shelf assembly.

2.04 The shelf is designed for a 12-inch guard rail lineup, but can be mounted in a 10-inch lineup by using spacers to minimize the overhang into the wiring aisle. The maximum number of shelves that can be mounted in various equipment frames is as follows:

FRAME TYPE	HEIGHT (FT)	MAXIMUM NUMBER OF SHELVES
ESS, Sheet Metal	7.0	5 below control panel 6 above control panel
Unequal Flange	7.0	12
Unequal Flange	9.0	16
Unequal Flange	11.5	21
Bulb Angle	9.0	15
Bulb Angle	11.5	20

2.05 Wire-wrap terminal connections are made to the wiring field on the shelf according to shelf pin assignments given in Table A and illustrated in Fig. 1.

TABLE A

SHELF PIN ASSIGNMENT	FUNCTION
7	R(2) Derived Line Eqpt
5	
13	-48V Frame Ground
15	
19	
17	G Disconnect
11	
9	R(1) Physical Line Eqpt
3	
1	R(0) Cable Pair

2.06 Cable pairs are connected to an 8-point terminal block installed on the HMDF as shown in Fig. 2. This terminal block is to be stenciled according to CAD 2 of SD-97740-01 prior to installation. Selection of blocks providing wire-wrap connections, quick-connect, or solder terminals is based on the type of terminal blocks in use on the local HMDF. The block is referred to as the SLC-1 terminal block.

2.07 On a conventional MDF, the CO shelf terminations would be made to the SLC-1 terminal blocks mounted on the horizontal side of the MDF. In COs using the COSMIC frame, the CO channel unit appearance would be terminated on a special distribution frame and tie cables would be used to connect to the COSMIC frame or the ESS modular frame.

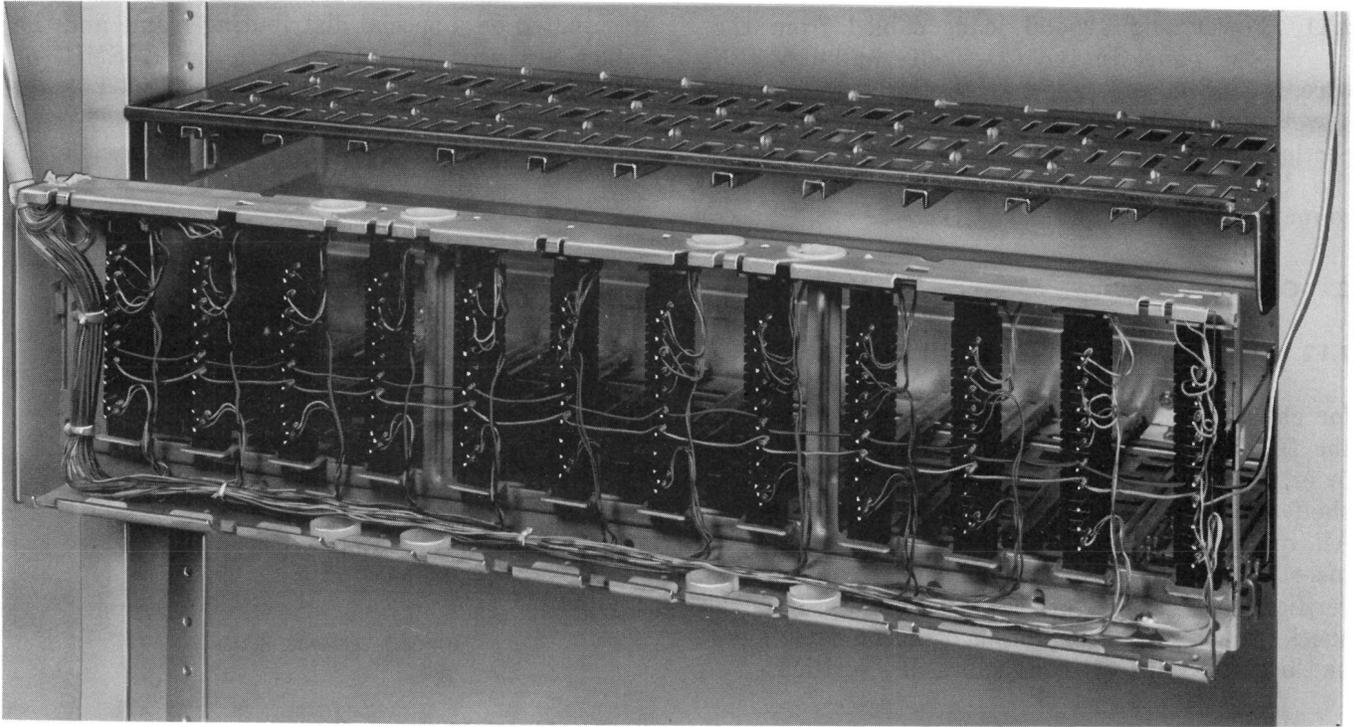


Fig. 1—J98729B Shelf Wiring Field

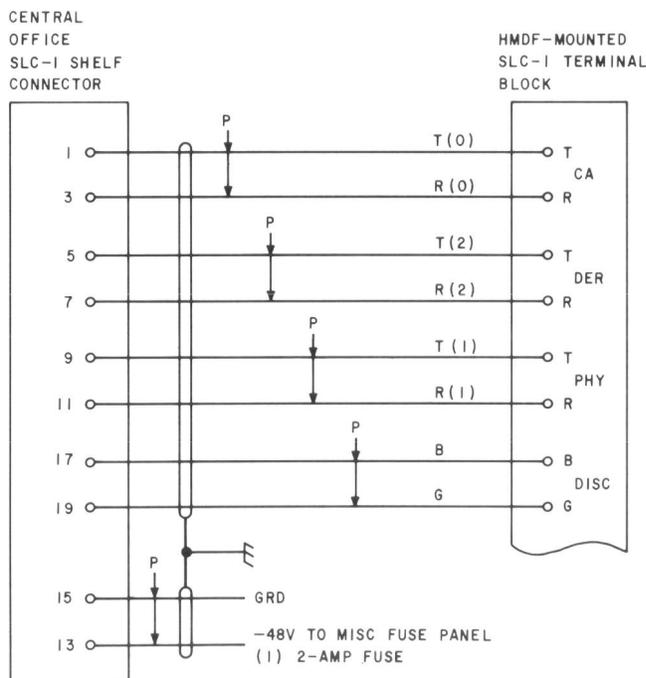


Fig. 2—J98729B Shelf Wiring

2.08 Depending on local engineering requirements, cable pairs from a shelf to the SLC-1 terminal block on the HMDF may be included in one shielded cable. The cable shall be shielded per X-17198, L1 and terminated per Section 880-612-164. Each shelf requires 48 pairs for distribution to the SLC-1 terminal block. A typical cable for this application is the 270AS (24BU).

2.09 In an office where the frame is zoned to avoid long cross-connection runs, it may be desirable to distribute SLC-1 terminal blocks among the zones. Terminal block locations should be selected according to the expected distribution of SLC-1 applications in the outside plant.

B. Power Wiring

2.10 Negative 48V dc is required to power each shelf. Power is supplied through a fuse panel located near the shelf installation. Each shelf is to be fused for 2 amps.

WARNING: The fuse should not be installed until after the continuity tests have been completed.

2.11 Power and ground leads cabled from the fuse panel to the CO shelf shall be 24BF wire, wrapped and soldered to the first pair of power pins. The shield shall be terminated per Section 800-612-164. Factory-installed wiring extends the battery and ground leads to all channel connectors on the shelf.

C. Cabling

2.12 All CO wiring associated with the installation of the COU should follow standard practices for channel numbering, lead dress, and lashing of the finished wiring. Special care should be used to ensure that tip and ring integrity between the shelf and the SLC-1 terminal block is maintained. All installation wiring shall be verified prior to insertion of the NS1 circuit packs. Continuity verification must be performed as a terminal-to-terminal check. Each lead designation of every cable shall be "buzzed" until all conductors are verified.

2.13 Wiring of the shelf assembly with supporting information on CO cabling to the SLC-1 terminal block is covered in T-97740-30. The schematic and circuit description are provided in SD-97740-01 and CD-97740-01, respectively.

NS1 CIRCUIT PACK

A. Installation

2.14 The NS1 circuit packs may be seated in the shelf upon completion of the cabling operation and inspection of the circuit packs.

3. SERVICE ORDER INSTALLATION AND REMOVAL

3.01 Service order installation is the process of connecting the SLC-1 COU to the cable pair and installing the SLC-1 subscriber unit and telephone set(s) at the subscriber location.

3.02 Service order removal covers the operations of denial or termination of service.

3.03 In what follows, we assume the SLC-1 COUs are mounted in CO shelves and cabled to the main frame. On a conventional MDF, the SLC-1 terminations are made to 8-point terminal blocks mounted on the horizontal side of the main frame (Fig. 3). In COs using the COSMIC frame or on ESS modular frames, the SLC-1 units are

terminated on a special distributing frame and the cables are used to connect with the COSMIC or ESS frames.

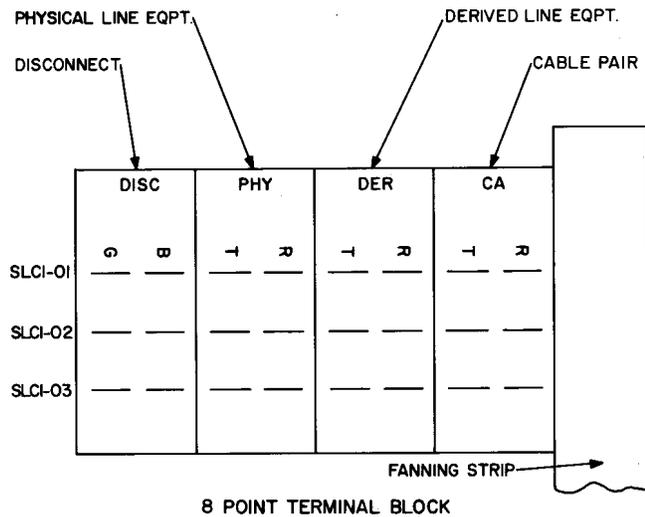


Fig. 3—HMDF Terminal Block for SLC-1 System

3.04 The steps to be taken to provide the customer service when a service order is received containing all assignment information are covered in 3.05 through 3.17.

CENTRAL OFFICE TERMINAL

A. Frame Connections

3.05 When equipped but unassigned channels are required for service, connections of the CO jumpers between the vertical main distributing frame (VMDF), the HMDF, and the SLC-1 terminal block are needed before installation of the subscriber unit.

CAUTION: Care must be taken to prevent service interruption if a working physical circuit is used.

3.06 All distributing frame wiring is to be made with 2-conductor cross-connection wire and installed following standard practices in the following sequence:

- (a) Frame person begins installation per service order by running cross-connection from the cable pair on the VMDF to the SLC-1 terminal block, terminals labeled CA. Figure 3 shows

the block and terminal markings. Tip and ring integrity must be maintained for all MDF connections.

(b) A horizontal cross-connection then is placed from the physical circuit line equipment to the SLC-1 terminal block lugs, labeled PHY.

(c) After connecting the new cross-connections, test the physical line to ensure physical service has not been interrupted. The old cross-connection from cable pair to physical line equipment should then be removed.

(d) The remaining horizontal cross-connection from the derived line equipment is then run to the SLC-1 terminal block lugs, labeled DER.

(e) Test the derived circuit installation with the CO test arrangement, if available (see 3.08 through 3.10).

B. Cluster Application

3.07 A cluster application involves installing two or more SLC-1 systems together, eg, for service at an apartment complex. In a cluster application, some or all of the physical and derived lines may not be placed in service initially. Thus, cross-connections from the cable pair to the CA lugs [3.06 (a)] are made at once, but connections to line equipment are made only as required by service orders. If physical service is not provided initially, then DISC and PHY terminals should be connected as for a physical disconnect (see 3.13). This is required initially to allow cable and installation tests at the cluster location and subsequently to keep the subscriber unit battery charged.

C. Testing Connections and Units

3.08 Figures 4 and 5 show two locally assembled test facilities for verifying CO wiring and SLC-1 COU operation. Either arrangement may be assembled, depending on local requirements, as a fixed or portable test unit. The test arrangement consists of an SLC-1 subscriber unit, 1119A filter, and two station sets mounted on a base. These items are wired to simulate the physical and derived sets of a typical subscriber installation. When not in use, the cable pair input to the test arrangement is connected to -48V battery and ground to keep the SLC-1 unit charged.

3.09 When in use, the test facility is connected to the VMDF with the cable pair opened (looking in with a test shoe). Tests can be performed on both lines by checking for dial tone and ringback. If trouble is indicated, refer to Table B.

3.10 A failure on cable pair tests made by the station installer may indicate missed cross-connections or a defective or unplugged COU. The test facility is effective in proving the source of failure either toward the CO or toward the outside plant.

D. Denial of Service (Physical or Derived)

3.11 Service order removal or temporary denial cannot be made in the normal manner on either the SLC-1 physical or derived line.

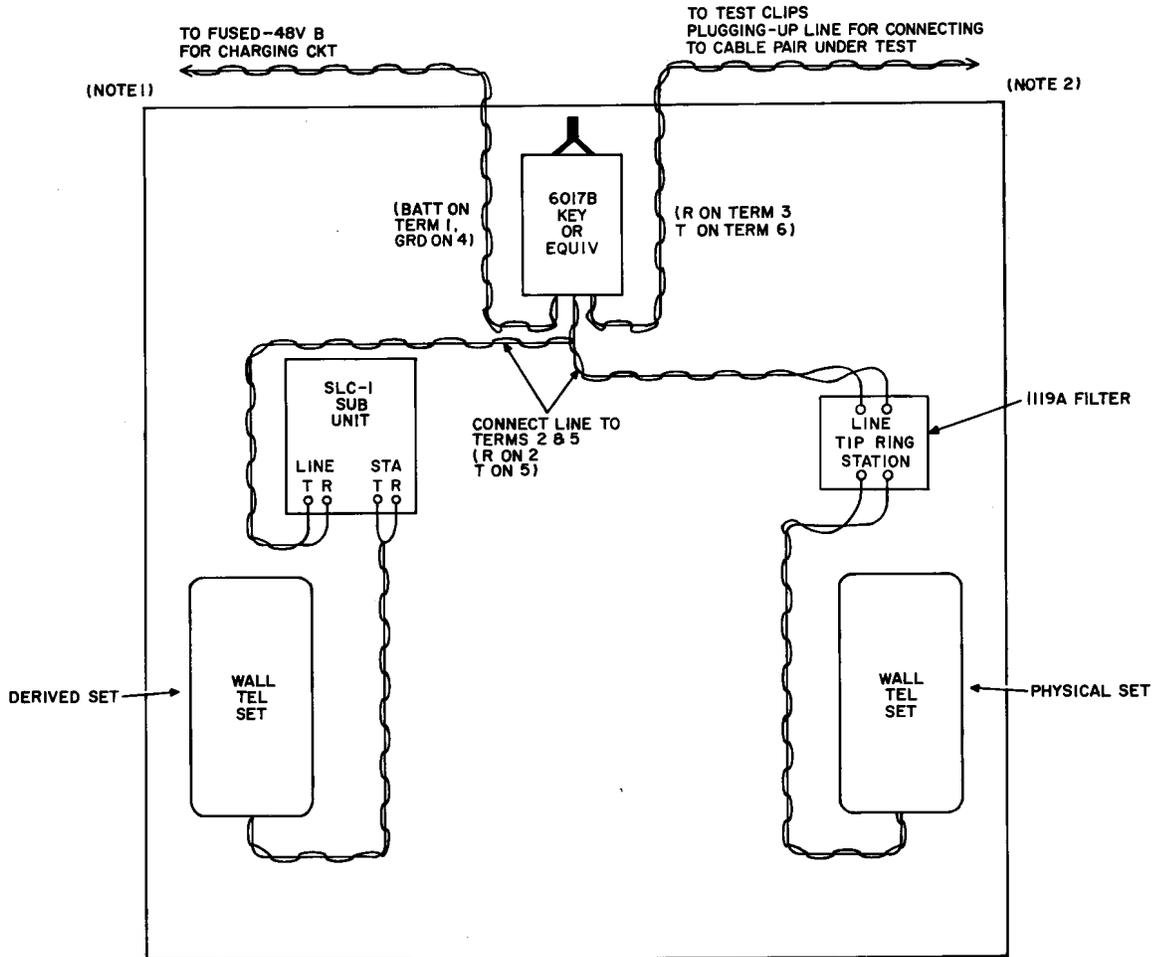


The following procedures must be followed to avoid interfering with the service of the other subscriber.

3.12 For temporary service denial of the derived line, the horizontal cross-connection to the derived line equipment should be laid back at the SLC-1 terminal block. The telephone number should also be placed on intercept according to local practices.

3.13 Temporary denial of the physical subscriber is made by laying back the cross-connection from the physical line equipment at the SLC-1 block. When this is done, a connection between the DISC terminals and the PHY terminals is required to maintain charging current to the battery in the SLC-1 subscriber unit. This may be done either by connecting a 4-pin **physical disconnect strap** or by strap wiring between the DISC and the PHY terminals, B to R and G to T (Fig. 6). The number shall be placed on intercept in the normal manner.

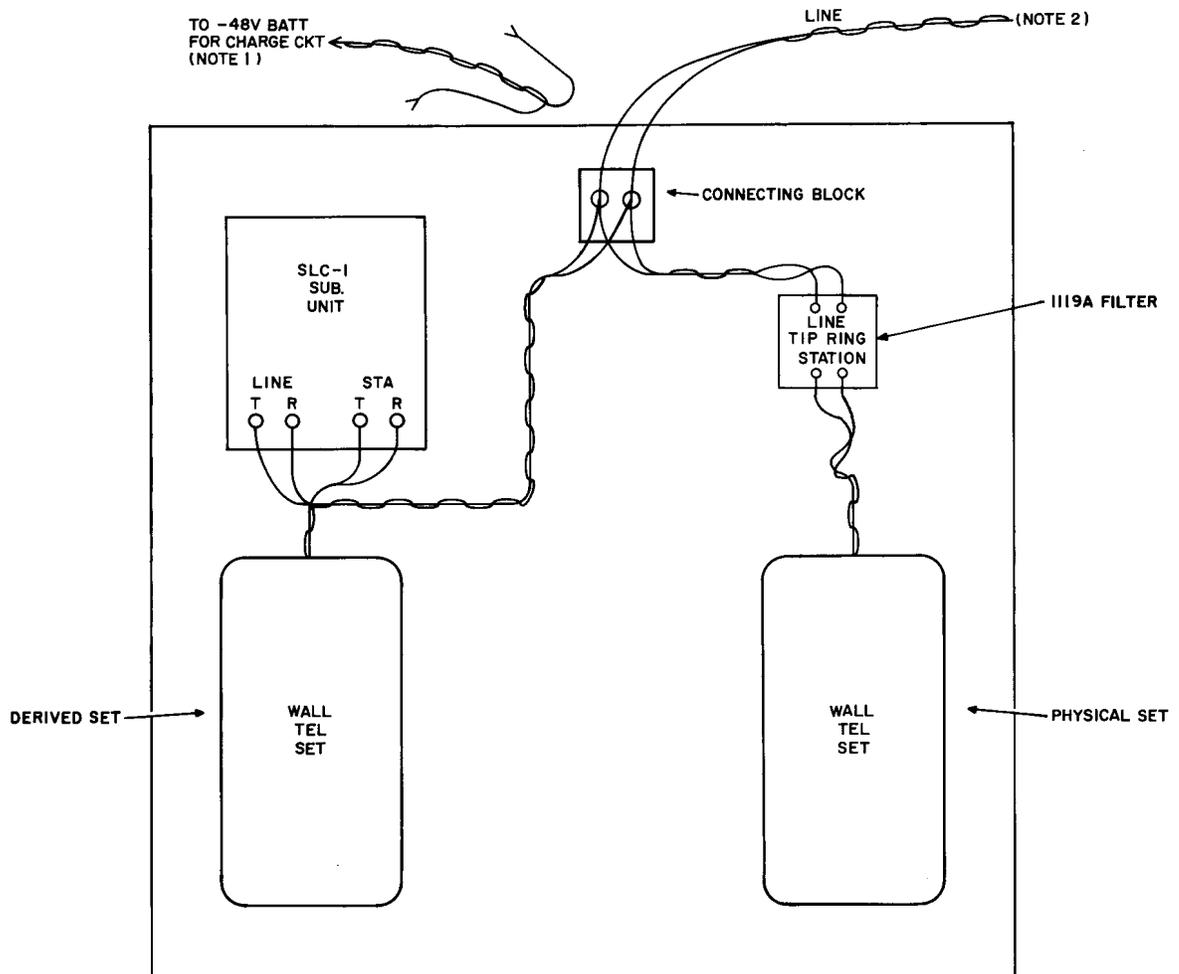
3.14 The physical disconnect strap (Fig. 7) is a modified Crown intercept connector No. 96 (from Crown Design and Manufacturing Corporation) or the equivalent. The tool is modified by removing the two unused connector positions.



NOTES:

1. WHEN TEST FACILITY IS NOT BEING USED, THROW 6017 KEY TO CONNECT 48V BATTERY AND GRD TO TEST CIRCUIT. THIS WILL RETAIN CHARGE ON SLC-1 BATTERY.
2. IN LARGE OFFICES THESE LEADS MAY BE WIRED TO A DEDICATED, SPARE SET OF "PLUGGING UP" LINE JACKS AND PICKED UP VIA MULTIPLE JACK BOXES LOCATED ON VMDF FOR CONNECTION TO CABLE PAIRS.

Fig. 4—Arrangement for Testing CO Units and Connections—Example 1



NOTES:

1. WHEN TEST FACILITY IS NOT BEING USED, DISCONNECT LINE AND CONNECT 48V FUSED BATTERY AND GRD FOR RETAINING CHARGE ON SLC-1 BATTERY. (BATTERY TO "R" SIDE AND GRD TO "T" SIDE).
2. FOR PORTABLE TYPE INSTALLATION, THIS COULD CONSIST OF A CORD WITH CLIPS FOR CONNECTING TO CABLE PAIR OF CIRCUIT BEING TESTED. IN LARGER OFFICES, LINE MAY BE WIRED TO SPARE "PLUGGING UP" LINE JACKS AND PICKED UP VIA MULTIPLE JACK BOXES LOCATED ON VMDF FOR CONNECTION TO CABLE PAIRS.

Fig. 5—Arrangement for Testing CO Units and Connections—Example 2

TABLE B

CO TROUBLE ANALYSIS FOR DERIVED LINE

TEST RESULT	POSSIBLE CAUSE	REMEDIAL ACTION
No dial tone	Defective or incorrect MDF wiring COU Central office equipment	Check MDF wiring and connections Replace unit Use standard procedures
No ringback	COU Central office equipment	Replace unit Use standard procedures
Poor transmission quality	COU	Replace unit

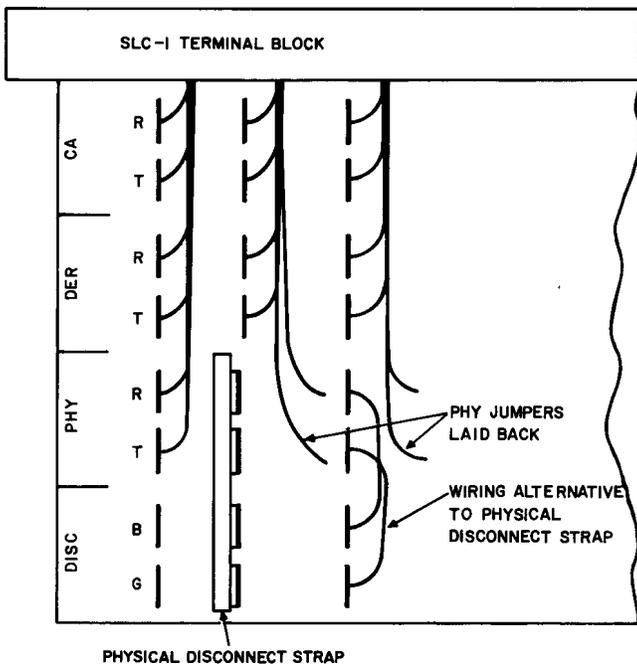


Fig. 6—SLC-1 Physical Disconnect

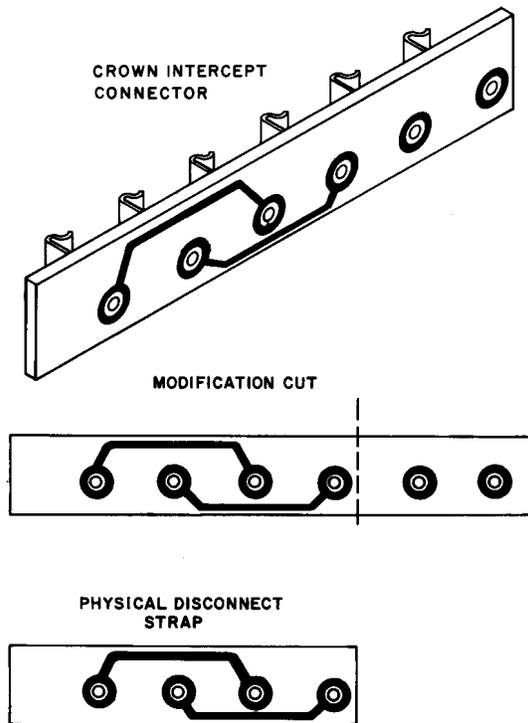


Fig. 7—SLC-1 Physical Disconnect Strap

3.15 If PN1 and PN2 circuit packs are used, temporary denial of the physical subscriber is similar to that given for the NS1 in 3.13 except instead of applying a physical disconnect strap, the PHY terminals must be cross-connected to the CO battery and ground disconnect terminals at the MDF, as shown in Fig. 8. Battery and ground is supplied to the disconnect terminals by a PN2 unit in the twelfth shelf position. Note that three sources of CO battery and ground (disconnect lugs) are provided on the 6-point terminal block by one PN2 circuit pack. One pair of disconnect lugs per physical disconnect is recommended; but, where necessary, each can be used for as many as four disconnects.

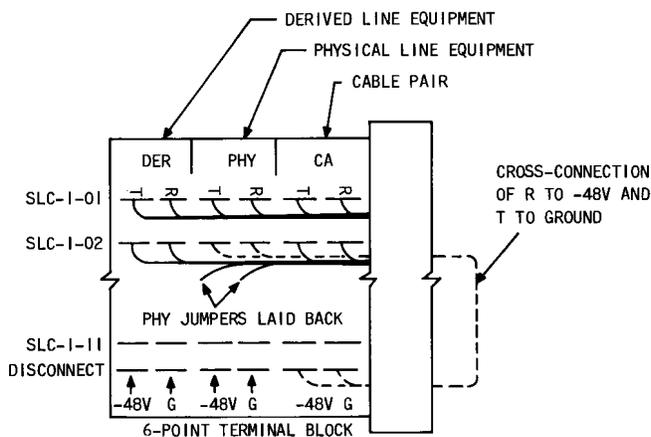


Fig. 8—SLC-1 Physical Disconnect With PN1 and PN2 Circuit Packs

3.16 If PN1 circuit packs are used without a PN2 unit in the shelf, charging current to the subscriber unit battery is supplied by placing the physical disconnect switch (located on the faceplate of the PN1 unit) to the PHYSICAL DISABLE position (this position is labeled DERIVED in older PN1s) if the physical subscriber is being temporarily denied service. To deny service to the derived subscriber, the disconnect switch need not be used when the derived line equipment is disconnected at SLC-1 terminal block. If the disconnect switch is used for temporary denial of service to either subscriber, the cross-connection to the line equipment need not be disconnected.

E. Service Removal

3.17 For service removals that are connect-through (CT), the same procedure previously described in 3.11 through 3.16 for denials is followed, except

that the cross-connection between the line equipment and the SLC-1 block is removed instead of laid back. Non-CT service removal of the derived line requires that all cross-connections to the SLC-1 terminal block be removed and the physical line cross-connection be restored between the cable pair (VMDF) and the line equipment (HMDF). The cross-connection between the cable pair and HMDF is restored first to prevent service interruption to the physical subscriber.

F. Service Orders

3.18 Illustrative examples of service orders are given for the following SLC-1 applications:

New Derived Line, Scattered Application (Fig. 9)

New Derived Line, Cluster Application (Fig. 10)

CT Disconnect of Derived Line (Fig. 11)

CT Disconnect of Physical Line (Fig. 12)

Disconnect of Derived Additional Line (Fig. 13)

Reinstallation of CT'd Physical Line (Fig. 14).

4. CENTRAL OFFICE TESTING

4.01 The test arrangement shown in Fig. 4 or 5 may be used to find SLC-1 troubles within the CO. This arrangement consists of an SLC-1 subscriber unit, a 1119A filter, and two station sets mounted on a base. These items are wired to simulate the physical and derived stations of a typical subscriber installation.

4.02 Connection is usually made at the VMDF with the cable pair opened, but may be made at the CA terminals of the SLC-1 terminal block if the situation warrants.

4.03 This arrangement is used to verify that the MDF cross-connections are placed correctly and the CO unit is working properly. Tests may be performed on both the physical and the derived lines by checking for dial tone and ringback. Refer to Table B for possible trouble cause and remedial action. If there are voice transmission troubles on the derived line, test the CO unit by placing a call and talking both ways.

4.04 When not in use, the cable pair input to the test arrangement should be connected to -48V battery and ground to keep the battery in the subscriber unit charged.

UNIVERSAL SERVICE ORDER					
T N	CUS	CD	EX	APP	
236-4384	423	8-29-75	UNIV	8-22	
O R D	C S	1FR	S	D	
N 7599		1FR		8-29-W	

3		
4	ILN	BOND, JOHN H
5	ILA	121 PINE
6		
7	---BILL	
8		
9	IPO	12345
10	ICC	B
11	ICI	SALESMAN
12		
13	---S&E	
14		
15	I1	1FRBC
16		
17	---ASGM	
18		
19	RT	18/PRQ Y/OAB WP
20	IOE	11-05-21/SSC SLC-1, 15, D
21	IF1	/CA 6/PR 605/BP 7
22		/TEA P12 PINE/PPR 236-3209
23		
24	LST	
25	AU	1FR/TN 236-3209
26	OOE	10-03-51
27	IOE	10-03-51/SSC SLC-1, 15, P
28	OF1	/CA 6/PR 605/BP 7/TEA P6 PINE
29	IF1	/CA 6/PR 605/BP 7
30		/TEA P6 PINE/FLT/DPR 236-4384
31		
32		<i>Explanation:</i>
33		
34		Single-channel subscriber carrier, SLC-1,
35		position 15, is to be connected to cable 6,
36		pair 605 which is a working physical pair.
37		Physical pair of PPR 236-3209, will be con-
38		nected to the carrier via the LST. The
39		derived circuit will work at P12 PINE,
40		binding post 7 on line equipment 11-05-21.
41		The physical subscriber works on cable 6,
42		pair 605 at P6 PINE on binding post 7. The
43		isolation filter will be placed at the physical
44		subscriber terminal location.
45		

Fig. 9—New Install, Derived Line, Single-Channel Subscriber Carrier—Scattered Application

UNIVERSAL SERVICE ORDER					
	T N	CUS	CD	EX	APP
	236-5431	491	8-4-75	UNIV	8-24
	O R D N 7479	C S 1FR	S L C 1142	D B 8-4-W	
3					
4	ILN	WHITE, JOHN H			
5	ILA	325 ELM			
6	ILOC	APT 19			
7					
8	--BILL				
9					
10	IPO	12345			
11	ICC	B			
12	ICI	SALESMAN			
13					
14	--S&E				
15					
16	I1	1FRBC			
17					
18	--ASGM				
19					
20	RT	18/PRQ Y/OAB WP			
21					
22					
23	IOE	10-01-06/SSC SLC-1, 26, D			
24	DOP				
25	IF1	/CA 6/PR 602/BP 2			
26		/TEA B325 ELM/PPR 236-3521			
27		/RMK CLUSTER LOCATION			
28					
29		<i>Explanation:</i>			
30					
31		Single-channel subscriber carrier SLC-1,			
32		position 26, is connected to cable 6, pair 602.			
33		Cluster location indicates that the isolation			
34		filter and the subscriber terminal unit have			
35		been preinstalled at this terminal address and			
36		the associated physical circuit has been pre-			
37		viously rearranged on the main frame. This			
38		work would have been authorized via an			
39		engineering work order and a line or station			
40		transfer sheet (Form E-2574 or equivalent).			
41					
42					
43					
44					
45					

Fig. 10—New Install, Derived Line, Single-Channel Subscriber Carrier—Cluster Application

UNIVERSAL SERVICE ORDER					
	CUS	CD	EX	APP	
T N	236-8011	801	8-1-75	UNIV	7-25
O R D	D 7411	C S 1FR	1201	D D 8-1-W	
3					
4	OLN BOND, JOHN H				
5	OLA 113 PINE				
6					
7					
8					
9					
10					
11					
12	---S&E				
13					
14	O1 1FRBC				
15					
16	---ASGM				
17					
18	RT 18/PRQ Y/OAB WP				
19	OOE 11-04-01/SSC SLC-1, 2, D				
20	CT				
21	OF1 /CA 6/PR 616/BP 11				
22	/TEA P12 PINE/PPR 236-4211				
23	/RMK PPR 236-4211 WILL REMAIN				
24	WORKING				
25					
26	<i>Explanation:</i>				
27					
28	"CT" indicates that single-channel subscriber				
29	carrier, SLC-1, position 2, will remain con-				
30	nected to cable 6, pair 616 on the MDF. The				
31	isolation filter will remain connected at the				
32	physical subscriber terminal location. The				
33	subscriber unit will also remain connected.				
34	The derived circuit will be disconnected by				
35	removing the cross connection at the MDF				
36	between the line equipment 11-04-01 and the				
37	derived circuit terminals on the SLC-1, posi-				
38	tion 2, block.				
39					
40					
41					
42					
43					
44					
45					

Fig. 11—Disconnect, Derived Line, Single-Channel Subscriber Carrier—Primary Service

UNIVERSAL SERVICE ORDER					
T N	234-8012	CUS	CD	EX	APP
		501	8-8-75	UNIV	8-4
O R D	D 7571	C S	1FR	S I C K E T	1051
					D 8-8-W

3		
4	OLN	SMITH, JOHN W
5	OLA	95 PINE
6		
7		
8		
9		
10		
11		
12	--S&E	
13		
14	O1	1FRBC
15		
16		
17	--ASGM	
18	RT	18/PRQ Y/OAB WP
19	OOE	04-11-32/SCC SLC-1, 40, P
20	CT	
21	OF1	/CA 6/PR 608/BP 9
22		/TEA P6 PINE/FLT/DPR 234-9821
23		/RMK DPR 234-9821 WILL REMAIN
24		WORKING
25		
26		<i>Explanation:</i>
27		
28		The physical circuit user 234-8012 will be
29		disconnected by removing the cross connec-
30		tion at the MDF between the line equipment
31		04-11-32 and the physical pair terminals on
32		the SLC-1, position 40, block. The idle
33		physical terminals will be connected to the
34		"B" and "G" terminals. This will maintain
35		charging current to the battery in the work-
36		ing subscriber unit of the derived circuit DPR
37		234-9821. "CT" indicates that cable 6, pair
38		608, will remain intact connected, as indi-
39		cated above, to SLC-1, 40 and the isolation
40		filter will remain in place.
41		
42		
43		
44		
45		

Fig. 12—Disconnect, Physical Line Associated With Single-Channel Subscriber Carrier

UNIVERSAL SERVICE ORDER					
T N	CUS	CD	EX	APP	
236-9011	601	8-1-75	UNIV	7-24	
O R D	C S	S	D	D	
D 7451	1FR		1022	8-1-W	

3		
4	OLN	RING, JAMES H
5	OLA	111 PINE
6		
7		
8		
9		
10		
11		
12	--S&E	
13		
14	O1	1FRBC/ADL
15		
16		
17	--ASGM	
18	RT	18/PRQ Y/OAB WP
19	OOE	12-01-11/SSC SLC-1, 24, D
20	OF1	/CA 6/PR 612/BP 9
21		/TEA P12 PINE/PPR 236-9205
22		/RMK PPR 236-9205 WILL REMAIN
23		WORKING
24		
25	LST	
26	AU	1FR/TN 236-9205
27	OOE	08-41-32/SSC SLC-1, 24, P
28	IOE	08-41-32
29	OF1	/CA 6/PR 612/BP 9
30		/TEA P12 PINE/FLT
31	IF1	/CA 6/PR 612/BP 9
32		/TEA P12 PINE
33		
34		<i>Explanation:</i>
35		
36		Single-channel subscriber carrier, SLC-1,
37		position 24, will be disconnected from cable
38		6, pair 612 at the MDF. The LST will
39		reestablish the physical circuit between cable
40		6, pair 612, and line equipment 08-41-32.
41		The isolation filter and subscriber unit will
42		be removed.
43		
44		
45		

Fig. 13—Disconnect, Derived Line, Single-Channel Subscriber Carrier—Additional Main Line

UNIVERSAL SERVICE ORDER					
T N	234-9201	CUS	CD	EX	APP
3		320	8-22-85	UNIV	8-12
O R D	N 7582	S 1FR	1254	D 8-22-W	
4	ILN	SMITH, JOHN W			
5	ILA	109 PINE			
6					
7	---BILL				
8					
9	IPO	1234			
10	ICC	B			
11	ICI	SALESMAN			
12					
13	---S&E				
14					
15	I1	1FRBC			
16					
17	--ASGM				
18					
19	RT	18/PRQ Y/OAB WP			
20	IOE	11-02-14/S SC SLC-1, 45, P			
21	CT				
22	IF1	/CA 6/PR 620/BP 13			
23		/TEA P6 PINE/FLT/DPR 234-2113			
24					
25		<i>Explanation:</i>			
26					
27		"CT" indicates that cable 6, pair 620 is			
28		already cross connected at the MDF to the			
29		single-channel subscriber carrier, SLC-1,			
30		position 45. The idle physical terminals were			
31		connected to the "B" and "G" terminals.			
32		This maintained charging current to the			
33		battery in the working subscriber unit on the			
34		derived circuit, DPR 234-2113. The isolation			
35		filter (FLT) is already connected at the			
36		physical subscriber terminal location.			
37					
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Fig. 14—Reinstall, Physical Line Associated With Single-Channel Subscriber Carrier