

# 13

CROSSBAR SYSTEMS  
 NO. 3  
 LINE NUMBER TRANSLATOR AND CONNECTOR  
 CIRCUIT

CHANGES

A. Changed and Added Functions

A.1 This circuit is arranged to function with the crossbar No. 3 200- to 1200- line application. Number translation is increased from 1200 to 1800, line translation is increased from 800 to 1200.

B. Changes in Apparatus

B.1 Added - New App Fig. 9 consisting of relays B0-11, BLO-11, T0-9 and TNO-9, their associated networks and wiring per Y option is added for this feature. Existing relays B0-7, BLO-7, T0-9, TNO-9, and Z option are designated Fig. 8, rated A&M Only.

D. Description of Changes

EXPANDED NUMBER AND LINE TRANSLATION

D.1 The line number translator is changed to provide increased number and line capacity for the crossbar No. 3 200- to 1200- line application. Number capacity is increased from 1200 to 1800 numbers, and line translation capability is increased from 800 to 1200. Apparatus Fig. 9 and Y

option are added for this feature. Existing wiring and apparatus is designated App Fig. 8 and Z wiring rated A&M Only.

D.2 Due to equipment considerations, circuits equipped with App Fig. 9 are not compatible with those not equipped with Fig. 9. For additions to existing installations not equipped with App Fig. 9, equipment and wiring per App Fig. 8 and Z wiring, rated A&M Only must be specified.

F. Changes in CD Sections

F.1 In SECTION I, LINE ASSIGNMENTS, change 2.02 to read:

2.02 Since the translator is capable of making both line-to-number and number-to-line translations, each line will have two identifications. One is a 4-digit directory number, and the other is 3- or 4-digit line number. In the 200- to 800- line application, lines are numbered 000 through 799, and in the 200- to 1200- line application, lines are numbered 0000 through 1199. The correlation between line number and equipment location is shown in the following table.

F.2 Change table in SECTION I, 2.02 as follows:

<u>Line Number</u>	<u>Line Link</u>	<u>Line Block</u>	<u>Line Group</u>	<u>Line Switch Horizontal</u>	<u>Line Appearance</u>
500 - 599 through 1100 - 1199	1	2	0-4*	0-9*	A, B*
	1	5	0-4*	0-9*	A, B*

F.3 In SECTION II, under 2.02 first and last sentence change:  
 . . . the selection of a specific line number.  
 . . . the selection of a specific 3-digit line number.

F.4 In SECTION II, under 3.01 change second sentence to read:  
 . . . The output for field A is over C0-11 and B0-7 in the 200- to 800- line application and over C0-11 and B0-11 in the 200- to 1200- line application.

F.5 Under 3.02 change:  
 the directory number . . .  
 to read:  
 . . . The directory number to line-ringing combination translation requires a 1-out-of-8 indication over B0-7 in the 200- to 800- line application and a 1-out-of-12 indication over B0-11 leads in the 200- to 1200- line application, and a 1-out-of-12 indication over leads C0-11.

TABLE C

Directory Number to Line Number

LEAD DESIG	Output Information											
	B0	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11
C0	LH/RC0	LH1/RC0	LH2/RC0	LH3/RC0	LH4/RC0	LH5/RC0	LH6/RC0	LH7/RC0	LH8/RC0	LH9/RC0	LH10/RC0	LH11/RC0
C1	LH0/RC1	LH1/RC1	LH2/RC1	LH3/RC1	LH4/RC1	LH5/RC1	LH6/RC1	LH7/RC1	LH8/RC1	LH9/RC1	LH10/RC1	LH11/RC1
C2	LH0/RC2	LH1/RC2	LH2/RC2	LH3/RC2	LH4/RC2	LH5/RC2	LH6/RC2	LH7/RC2	LH8/RC2	LH9/RC2	LH10/RC2	LH11/RC2
C3	LH0/RC3	LH1/RC3	LH2/RC3	LH3/RC3	LH4/RC3	LH5/RC3	LH6/RC3	LH7/RC3	LH8/RC3	LH9/RC3	LH10/RC3	LH11/RC3
C4	LH0/RC4	LH1/RC4	LH2/RC4	LH3/RC4	LH4/RC4	LH5/RC4	LH6/RC4	LH7/RC4	LH8/RC4	LH9/RC4	LH10/RC4	LH11/RC4
C5	LH0/RC5	LH1/RC5	LH2/RC5	LH3/RC5	LH4/RC5	LH5/RC5	LH6/RC5	LH7/RC5	LH8/RC5	LH9/RC5	LH10/RC5	LH11/RC5
C6	LH0/RC6	LH1/RC6	LH2/RC6	LH3/RC6	LH4/RC6	LH5/RC6	LH6/RC6	LH7/RC6	LH8/RC6	LH9/RC6	LH10/RC6	LH11/RC6
C7	LH0/RC7	LH1/RC7	LH2/RC7	LH3/RC7	LH4/RC7	LH5/RC7	LH6/RC7	LH7/RC7	LH8/RC7	LH9/RC7	LH10/RC7	LH11/RC7
C8	LH0/HU	LH1/HU	LH2/HU	LH3/HU	LH4/HU	LH5/HU	LH6/HU	LH7/HU	LH8/HU	LH9/HU	LH10/HU	LH11/HU
C9	LH0/HD	LH1/HD	LH2/HD	LH3/HD	LH4/HD	LH5/HD	LH6/HD	LH7/HD	LH8/HD	LH9/HD	LH10/HD	LH11/HD
C10	PN0	PN1	PN2	PN3	PN4	PN5	PN6	PN7	PN8	PN9	PN10	PN11
C11	RI	TI										

Change Table C to read:

CD-26388-01 - ISSUE 1 - APPENDIX 1D

F.6 Change 3.06 to read:

3.06 For ANI translation, additional flexibility is provided by the use of arbitrary fields for the thousand-hundred digit. Assignment of an arbitrary field to a specific TH-H digit is covered in Section D of the SD.

F.7 Add to 3.08:

. . . This flexibility is provided in the 200- to 800- line application only. There

is no provision to alter the output fields in the 200- to 1200- line application.

F.8 Under SECTION III, 2.01 Relays

change: B0-7 and BLO-7

to read: B0-11 and BLO-11

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DEPT 5245-GFC

WE DEPT 582-VHL-GWC-DS

10

CROSSBAR SYSTEMS  
NO. 3  
LINE NUMBER TRANSLATOR  
AND CONNECTOR CIRCUIT

TABLE OF CONTENTS	PAGE	TABLE OF CONTENTS (Cont)	PAGE
<u>SECTION I - GENERAL DESCRIPTION</u> . . .	1	<u>7. RELEASE OF LINE NUMBER TRANSLATOR</u>	9
<u>1. PURPOSE OF CIRCUIT</u> . . . . .	1	<u>SECTION III - REFERENCE DATA</u> . . . . .	9
<u>2. GENERAL DESCRIPTION OF OPERATION</u>	1	<u>1. WORKING LIMITS</u> . . . . .	9
SELECTION OF LNT . . . . .	1	<u>2. FUNCTIONAL DESIGNATIONS</u> . . . . .	9
LINE ASSIGNMENTS . . . . .	1	<u>3. FUNCTIONS</u> . . . . .	10
CLASS-OF-SERVICE ASSIGNMENT . . .	2	<u>4. CONNECTING CIRCUITS</u> . . . . .	10
TRANSLATIONS . . . . .	2	<u>5. MANUFACTURING TESTING REQUIRE-</u>	
HUNTING GROUP . . . . .	3	<u>MENTS</u> . . . . .	10
TWO-LINE HUNT . . . . .	3	<u>SECTION I - GENERAL DESCRIPTION</u>	
CALL-WAITING . . . . .	3	<u>1. PURPOSE OF CIRCUIT</u>	
INTERCEPT . . . . .	3	1.01 The major function of the line number	
BLANK NUMBER . . . . .	3	translator (LNT) is to serve as an	
NUISANCE CALL TRACING . . . . .	3	information center for the marker. The LNT	
<u>SECTION II - DETAILED DESCRIPTION</u> . .	3	furnishes the marker with the originating	
<u>1. SELECTION OF LINE NUMBER TRANS-</u>		lines class of service, the line number	
<u>LATOR</u> . . . . .	3	(which is equitable to the equipment loca-	
<u>2. TRANSLATIONS</u> . . . . .	4	tion) and ringing combination on termina-	
ANI TRANSLATIONS . . . . .	4	ting calls, and the customer (directory or	
<u>3. OUTPUT FIELDS</u> . . . . .	5	charge) number on originating calls requir-	
<u>4. TEST LEADS</u> . . . . .	8	ing automatic number identification (ANI).	
<u>5. TRANSLATOR HUNTING</u> . . . . .	8	<u>2. GENERAL DESCRIPTION OF OPERATION</u>	
<u>6. SPECIAL FEATURES</u> . . . . .	8	SELECTION OF LNT	
BLANK NUMBER . . . . .	8	2.01 The marker selects the translator on	
INTERCEPT . . . . .	8	the basis of the thousands-hundreds	
NUISANCE CALL . . . . .	9	block for number to line translations and	
TWO-LINE HUNT . . . . .	9	by line hundreds block for line to number	
CALL-WAITING . . . . .	9	translations and class-of-service assignment.	
		Each marker has access to all translators,	
		but only one marker at a time may be con-	
		nected to a particular LNT.	
		LINE ASSIGNMENTS	
		2.02 The lines in crossbar No. 3 have two	
		identifications. One is a 4-digit	
		directory number and the second is a 3-	
		digit line number which has a direct corre-	
		lation to the equipment location. The 3-	
		digit line numbers are 000 through 799.	
		The correlation to equipment location is	
		shown in the following table:	

<u>LINE NUMBER</u>	<u>LINE LINK</u>	<u>LINE BLOCK</u>	<u>LINE GROUP</u>	<u>LINE SWITCH HORIZONTAL</u>	<u>LINE APPEARANCE</u>
000-009	0	0	0	0-9	A
010-019	0	0	0	0-9	B
020-029	0	0	1	0-9	A
030-039	0	0	1	0-9	B
040-049	0	0	2	0-9	A
050-059	0	0	2	0-9	B
060-069	0	0	3	0-9	A
070-079	0	0	3	0-9	B
080-089	0	0	4	0-9	A
090-099	0	0	4	0-9	B
100-199	1	0	0-4*	0-9*	A,B*
200-299	0	1	0-4*	0-9*	A,B*
300-399	1	1	0-4*	0-9*	A,B*
400-499	0	2	0-4*	0-9*	A,B*
500-599	1	2	0-4*	0-9*	A,B*
600-699	0	3	0-4*	0-9*	A,B*
0-799	1	3	0-4*	0-9*	A,B*

\* Line group, horizontal, and appearance same as for LLO, LBO. For example, line number 437 would have an equipment location of LLO, LB2, LG1, L7B.

**CLASS-OF-SERVICE ASSIGNMENT**

2.03 Customer class-of-service assignment is derived from the line appearance. Assignment is limited to one class per 5 lines. Each line has the same corresponding appearance in each line group of a line block. That is, line LOA in line group LGO-4 form one group of 5 lines that must be assigned to the same class. Lines LOB, L1A, L1B, etc, are similarly treated.

2.05 Each line number translator is capable of making up to 600 directory number to line equipment number translations and up to 600 line number to directory or charge number ANI translations. Each App Fig. 2 (LNT unit) will serve to make 300 directory number translations and 300 ANI translations. Each App Fig. 2 will provide ANI translations for 100 individual lines and 100 individual or 2-party lines or two line blocks, 50 individual and 50 2-party lines per line block.

**TRANSLATIONS**

2.04 Each directory number and each ANI translation requires two cross connections. Each class-of-service translation requires one cross connection. Separate cross connection fields are provided for each type of translation, however, the translation output to the marker uses translation relays and leads common to all three types of translations. Where two cross connections are required the translation fields are separated into two groups A and B.

2.06 After the marker connects to the LNT, it operates relays which connect -48 volt potential to the desired translation fields. For the originating class-of-service translation, the potential is applied to terminals each representing groups of 5 lines which is extended through cross connections to select one of eight classes of service, identify the service as dial pulse or TOUCH-TONE®, and the assignment to office A or B. Under special conditions, these indications may be modified by the marker.

2.07 The customers directory number to line number translation directs the potential from directory number terminals through cross connections to a line number and ringing combination, output field. Ringing combinations RCO-7 indicate parties 1 to 8, respectively. The output field also contains terminals to provide a hunting group PN-, a 2-line hunt HU- or HD-, or a regular RI or temporary (trouble) intercept TI indication to the marker.

2.08 To make the line number to directory or charge number ANI translation, the -48 volt potential is extended through cross connections from terminals in the line number field to terminals in the directory number output field.

2.09 The output from the three fields is passed to the marker on a common set of leads and the marker interprets the information received on the basis of the type of translation requested CS, ANI, etc.

HUNTING GROUP

2.10 One number is assigned as a pilot number for a hunting group and would normally be the only one listed in the directory. When the pilot number is dialed, the LNT provides the marker with the information PN- that the number is in a hunting group. The marker then checks the lines in the hunting group to select an idle line or, if all are busy, it initiates a busy indication to the calling party.

2.11 Each LNT may have a maximum of 60 lines assigned to hunting groups. However, these are limited to a maximum of six groups of ten or fewer lines (6 tens blocks) and no more than two groups can be combined (max 20 lines) to serve one customer.

TWO-LINE HUNT

2.12 When a customer has two lines, a feature to permit hunting between the two lines is available. The two lines must be the same line appearance in two adjacent lines groups within a single line block. The LNT provides a Hunt-Up (HU-) or Hunt-Down (HD-) indication to the marker and the marker will hunt to the second line if the first one is busy.

CALL-WAITING

2.13 To provide a customer with the call-waiting feature, two lines are used with one directory number. The directory number and one line are cross connected in the same manner as for the 2-line hunting feature. The hunting would only be to the second line assigned when the first line is

busy (this can be either a Hunt-Up or a Hunt-Down condition). The second line will have no cross connections made in the LNT.

INTERCEPT

2.14 When it is desired to provide an intercept indication on particular terminating calls, the number is cross connected to either the RI terminal for regular intercept or the TI terminal for temporary or trouble intercept. This indication is then passed to the marker.

BLANK NUMBER

2.15 If no cross connections are made for a directory number, the marker will not receive a translation and will interpret this as a blank number.

NUISANCE CALL TRACING

2.16 To trap a number on nuisance calls, the A field cross connection from the directory number terminal to the line hundreds number-ringing combination terminal is removed and replaced by two cross connections, one from the directory number to the NCI or 2 terminal and the other from the NAI or 2 terminal to the line hundreds number-ringing combination terminal. This provides the marker with a nuisance call record indication over the NCR lead and the marker can initiate a trouble record of the call to identify the point of origination.

SECTION II - DETAILED DESCRIPTION

1. SELECTION OF LINE NUMBER TRANSLATOR

1.01 When the marker requires the originating class of service for a line or the directory number for a line, it selects the LNT on the basis of the line hundreds block (hundreds digit of line number).

1.02 If the marker requires a line number (equipment location) for a given directory number on a terminating call, it selects the proper LNT using the hundreds and thousands digits of the directory number.

1.03 The markers must bid for a particular LNT. The bid is made over STA or STB leads. Marker 0 operates relay MPO and marker 1 operates relay MP1 in the LNT preference and connector circuit. If relay MP1 is operated, relay MPO can operate, but the operate path of relay MO is opened by contacts of relay MP1. If relay MPO is operated, relay MP1 cannot operate because relay MPO opens the ground path to relay MP1.

1.04 When relay MP1 is operated, it closes its own operate path to ground preventing premature release if relay MPO should operate. Relays MPO and MP1 operate relays MO and M1, respectively. Contacts on relays MO or M1 close resistance battery on leads BS1 and BS2 from the marker to operate LNT connector relays MA(-) through MD(-). A contact on the M- relay closes ground to lead TCK and indicates to the marker that it has successfully connected to the LNT.

1.05 The marker connector relays close the communication leads between the marker and the desired LNT.

## 2. TRANSLATIONS

2.01 For the class of service or for individual or 2-party ANI translations, the marker applies resistance battery BS8 to an LBA-D or TLBA-D lead and operates the desired ring block (RBA-D) or tip block (TBA-D) relay in the LNT. The RB- relays are used for class of service, or for the ring party on individual or 2-party ANI translations. For the tip party on 2-party ANI translations, relays TB- are used.

### ANI TRANSLATIONS

2.02 For ANI translations of an individual or 2-party line, the selection of a specific 3-digit line number is made as follows: The marker selects the line hundreds block by operating an RB- or TB- relay which in turn operates a specific LG- relay. Each RB-, TB-, and LG- relay is dedicated to a single line hundreds digit. The marker applies resistance battery BS9 over the TN- leads, through one of ten contacts of the operated LG- relay to select an L- relay. Each L- relay is wired to represent a single tens digit. Therefore, the operation of an L- relay narrows the selection of the line number down to a group of ten lines. To determine one line out of the group of ten, the marker applies resistance battery BS10 over the UNO-9 leads to indicate the units digit of the desired line number by operating a U- relay in the LNT. Contacts of the U- relays steer resistance battery AF1 and BF1 from the marker through splitting relays to contacts of the L- relays. This enables the selection of a specific 3-digit line number.

2.03 In order to utilize the full complement of 30 contacts on the line (L-) relays or the number (N-) relays, a

method of splitting was developed. The splitting relays NSP1,-2, LSP, and HSP are controlled by relays RB-, TB-, or HB- dependent upon the type of translation required. For any given L- relay, 15 contacts are used for field A and 15 are used for field B. Twenty of the contacts on each L- relay (10 for field A and 10 for field B) are used to select a tens block of ring party line terminals. The remaining 5 contacts for each field are used to select the tip party for the five lines (same tens block) which may also be assigned as 2-party lines. The 2-party lines must be assigned to line numbers with a units digit of 5 through 9.

2.04 The path to a specific L- relay contact is determined by steering resistance battery BS11 and BS13 from the marker through contacts of the U- relays and then through the no split (NSP1,-2) or high split (HSP) relay contacts. For ANI translations, relay LSP is not used. The ring (or individual) party will always use the NSP- (units digit 0-9) relays while the tip party will always use the HSP (units digit 5-9) relay.

2.05 For the directory number to line number-ringing combination translation, the marker applies resistance battery BS8 to one of the HBA-F leads and operates the corresponding relay in the LNT. Each hundreds block (HB-) relay represents a specific office code and 2-digit thousands-hundreds block of 100 directory numbers. The block assignments are made by cross connections in the marker.

2.06 The directory number to line number translation is made in the following manner. After a marker selects an LNT and the desired HB- relay is operated, the HB- relay operates an NG- relay. Relays HBA, HBC, HBD, and HBF apply direct ground to the winding of relays NGO-3, respectively. Contacts of relays UO-9 are connected in series with contacts of relays HBB and HBE. Ground applied through contacts of relays UO-4 when in series with contacts of relay HBB will operate the NGO and LSP relays and when in series with relay HBE will operate relays NG2 and LSP. Ground through contacts of relays U5-9 in series with contacts of relay HBB or HBE operate either the HSP and NG1 or HSP and NG3 relays. The NG- relay contacts determine the N- relay operation in the same manner as the LG- relays select the L- relays.

2.07 The contacts of the N- relays are wired directly to the directory number terminals. As with the line relays, 15 contacts of each N- relay are associated with field A and 15 contacts with field B. Ten of the contacts for field A and 10 contacts for field B are associated with a single tens block of directory numbers. The remaining 5 contacts associated with each field represent 5 of the numbers (units digits 0-4 or 5-9) in a second tens block. The other 5 numbers (0-4 or 5-9) in the second tens block are associated with another N- relay. This sharing of contacts from two N- relays to translate a single tens block is accomplished through the use of the splitting relays. The tens blocks which are not split are in the thousands-hundreds blocks HBA, C, D, and F. The split tens blocks are in either block HBB or HBE. The NSP- relays are used for the tens blocks which are not split. Relay LSP is used for units digits 0-4 of the split tens block and relay HSP is used for units digits 5-9 of the split tens block.

2.08 To check for proper operation of relays in the LNT, the units UO-9 relays and the splitting NSP-, SP-, HSP, LSP relays have contacts in a check path which passes ground over lead UK to the marker when the relays have operated correctly in the LNT.

2.09 To determine the class of service (CS) for the originating line, after selecting the correct LNT and operating proper RBA-D, UO-9, and NSP1, 2 relays the marker diverts resistance battery BS9 from the TN-leads to either lead CSA or CSB and operates relay CSA or CSB dependent upon an A or B line appearance.

2.10 For class of service, the L- relays are not operated. Instead, the resistance battery AFL from the marker is steered through contacts of relays NSP1, NSP2, UO-9, CSA or B, and RBA-D to class-of-service line terminals (CSL). Each CSL-terminal represents five specific lines within the same line hundreds block. The five lines have the same line switch level and appearance in each of the five line groups in a line block. For example, lines 000,020, 040,060, and 080 must have the same class of service.

### 3. OUTPUT FIELDS

3.01 There are basically two translation output fields for information being sent to the marker, fields A and B. The output for field A is over leads CO-11 and BO-7. Field B output is over leads UO-9 and TO-9.

3.02 Field A output varies with the different translations. For the class-of-service translation, the output is on a 1-out-of-4 indication over leads BO-3 and on a 1-out-of-8 indication over leads CO-7. The ANI translation is on a 1-out-of-4 indication over leads BO-3 and a 1-out-of-10 indication over leads CO-9. The directory number to line number-ringing combination translation requires a 1-out-of-8 indication over leads BO-7 and a 1-out-of-12 indication over leads CO-11. See Tables A-C for output information.

3.03 Field B output is the same for both ANI and directory number to line number translations, 1-out-of-10 on both the UO-9 and TO-0 leads. There is no B field output on class of service.

TABLE A

Class-Of-Service Output Information

<u>LEAD DESIG</u>	<u>B0</u>	<u>B1</u>	<u>B2</u>	<u>B3</u>	<u>B4</u>	<u>B5</u>	<u>B6</u>	<u>B7</u>
C0	ADP CS0	AMF CS0	BDP CS0	BMF CS0				
C1	ADP CS1	AMF CS1	BDP CS1	BMF CS1				
C2	ADP CS2	AMF CS2	BDP CS2	BMF CS2				
C3	ADP CS3	AMF CS3	BDP CS3	BMF CS3				
C4	ADP CS4	AMF CS4	BDP CS4	BMF CS4				
C5	ADP CS5	AMF CS5	BDP CS5	BMF CS5				
C6	ADP CS6	AMF CS6	BDP CS6	BMF CS6				
C7	ADP CS7	AMF CS7	BDP CS7	BMF CS7				
C8								
C9								
C10								
11								

TABLE B

Automatic Number Identification Output Information

<u>LEAD DESIG</u>	<u>B0</u>	<u>B1</u>	<u>B2</u>	<u>B3</u>	<u>B4</u>	<u>B5</u>	<u>B6</u>	<u>B7</u>
C0	THA/H0	THB/H0	THC/H0	THD/H0				
C1	THA/H1	THB/H1	THC/H1	THD/H1				
C2	THA/H2	THB/H2	THC/H2	THD/H2				
C3	THA/H3	THB/H3	THC/H3	THD/H3				
C4	THA/H4	THB/H4	THC/H4	THD/H4				
C5	THA/H5	THB/H5	THC/H5	THD/H5				
C6	THA/H6	THB/H6	THC/H6	THD/H6				
C7	THA/H7	THB/H7	THC/H7	THD/H7				
C8	THA/H8	THB/H8	THC/H8	THD/H8				
C9	THA/H9	THB/H9	THC/H9	THD/H9				
C10								
C11								

TABLE C

## Directory Number To Line Number

## Output Information

<u>LEAD DESIG</u>	<u>B0</u>	<u>B1</u>	<u>B2</u>	<u>B3</u>	<u>B4</u>	<u>B5</u>	<u>B6</u>	<u>B7</u>
C0	LH/RC0	LH1/RC0	LH2/RC0	LH3/RC0	LH4/RC0	LH5/RC0	LH6/RC0	LH7/RC0
C1	LHO/RC1	LH1/RC1	LH2/RC1	LH3/RC1	LH4/RC1	LH5/RC1	LH6/RC1	LH7/RC1
C2	LHO/RC2	LH1/RC2	LH2/RC2	LH3/RC2	LH4/RC2	LH5/RC2	LH6/RC2	LH7/RC2
C3	LHO/RC3	LH1/RC3	LH2/RC3	LH3/RC3	LH4/RC3	LH5/RC3	LH6/RC3	LH7/RC3
C4	LHO/RC4	LH1/RC4	LH2/RC4	LH3/RC4	LH4/RC4	LH5/RC4	LH6/RC4	LH7/RC4
C5	LHO/RC5	LH1/RC5	LH2/RC5	LH3/RC5	LH4/RC5	LH5/RC5	LH6/RC5	LH7/RC5
C6	LHO/RC6	LH1/RC6	LH2/RC6	LH3/RC6	LH4/RC6	LH5/RC6	LH6/RC6	LH7/RC6
C7	LHO/RC7	LH1/RC7	LH2/RC7	LH3/RC7	LH4/RC7	LH5/RC7	LH6/RC7	LH7/RC7
C8	LHO/HU	LH1/HU	LH2/HU	LH3/HU	LH4/HU	LH5/HU	LH6/HU	LH7/HU
C9	LHO/HD	LH1/HD	LH2/HD	LH3/HD	LH4/HD	LH5/HD	LH6/HD	LH7/HD
C10	PNO	PN1	PN2	PN3	PN4	PN5	PN6	PN7
C11	RI	TI						

3.04 The translation field output information requires conversion before being sent to the marker. The potential applied by the marker to the translation field passes through a jumper to a terminal in the common output field. This terminal basically represents two bits of information. For example, on a directory number to line number translation, one terminal represents LHO and RCO. The lead from this terminal is designated B0-C0 and is connected through a back contact of unoperated relay BLO to the winding of relay B0. When the marker applies battery through the translation field, relay B0 operates and completes a path to output lead B0. Contacts of relay B0 also complete the operate path of relay BLO and close resistance battery AF2 to lock relays B0 and BLO operated. Battery AF2 is returned to the marker over lead B0. Operation of relay BLO transfers the potential of lead B0-C0 to the output lead C0 to the marker.

3.05 The same circuit operation is used for all B(-)-C(-) and T(-)-U(-) lead output from the translation field.

3.06 On ANI calls part of the translation field output is taken through a second cross connection field. This second field

provides a flexibility of assignment for the thousands-hundreds digits of the directory number. In the translation field there are 30 sets of grouping terminals with 10 terminals in each set. These 30 sets have 30 individual terminals representing them in the frame cross connect field. One or more sets are cross connected to a TH(-)-H(-) terminal which has B(-)-C(-) leads to the conversion field.

3.07 The tens and units digits of the directory number are handled in the same manner as for the line number.

3.08 Special cross connections are provided to reassign line hundreds 4 through 7 in the LH(-)-RC(-) field to appear as line hundreds 0, 1, 2, and/or 3. This arrangement permits additional ringing combination terminations within a line hundreds block for a smaller office. Terminals BA0-3 are permanently associated with LHO-3, respectively, and terminals BCO-3 are permanently associated with LH4-7, respectively. Leads B4-7 from the translation conversion field are tied to terminals BBO-3. These BB-terminals may be cross connected to either the BA- or BC- terminals to arrange the circuit to fit the job conditions.

TEST LEADS

01 An indication to the test circuit is provided over the LNTCO and 1 leads to identify which LNT is functional on a test call. The test circuit applies ground over the CNGO and 1 leads to the connector relays in the translator and the ground is returned on leads LNTCO or 1 for circuits 0 or 1, respectively. Ground is returned on both leads LNTCO and 1 for circuit 2.

5. TRANSLATOR HUNTING

5.01 The line hunting group feature provides for up to ten lines in the first group with one advance to a second group of ten lines if required.

5.02 There is one pilot number per hunting group and when it is dialed, the LNT sends a PN- indication to the marker to initiate hunting. The lines assigned to the hunting groups are cross connected at the CDM from the line link LT- terminals to the line number translator LT- terminals. The LT- leads from the CDM terminate on contacts of the LTO-5 relays.

5.03 When the marker applies battery for translation of the pilot number, the A field potential is passed through a cross connection to one of the LTO-5 terminals. These terminals connect to the windings of relays LTO-5 and also through a make-contact the LT- relays to terminals PO-5. The P- terminal is cross connected to the corresponding PN- terminal. When an LTA- relay operates, the potential is passed to the translation conversion field via the PN- (B-C) lead. Contacts of the LTA- relays complete the operate path of relay LT-. This cuts through the LT- leads from the CDM to the LO-9 marker leads and enables the marker to test for an available line.

5.04 If one of the lines is idle, the marker will release the operated translation relays, the U- and LT- relays and operates the U- relay for the idle line. The marker then reapplies battery for translation of the selected line.

5.05 If all of the lines in the first group are busy, the marker returns battery to the LNT over lead A. The LNT multiples the A lead through a make-contact of each LT- relay to the corresponding HAO-5 terminal.

5.06 If there is a single group of 10 (or less) lines, the HA- terminal is cross connected to the group busy (GB) terminal

and battery is returned to the marker over lead GB to indicate the entire hunting group is busy.

5.07 If an advance to a second group is required, the HA- terminal for the first group is cross connected to terminal AO or 1 and battery is applied to advance relay AO or 1. A make-contact of the A- relay closes its own lock path over lead AK to battery in the marker. Marker advance check relay AK operates to indicate that the advance relay in the LNT has separated. The marker then releases the translation relays, the U- and N- relays and requests that the LNT advance to the second group by applying battery over lead AV. Make contacts of relay A- apply this potential to advance terminal AVO or 1 and advance tens terminal ATO or 1.

5.08 The AV- terminal is cross connected to an LT- terminal to operate the LT- relay for the second group of ten lines and the AT- terminal is cross connected to the TNO-9 terminal to operate the N- relays for the new tens block of directory numbers. The marker then tests the second group for an idle line.

5.09 If a line is available, the marker will operate the U- relay for that line and apply battery to complete the translation.

5.10 If no idle lines are available, the marker will again apply battery to lead A. The HA- terminal for the second group is cross connected to terminal GB and, as described previously, the marker receives a group busy indication. The marker will then release the translator.

6. SPECIAL FEATURESBLANK NUMBER

6.01 When the marker requests a number to line translation for an unassigned number (has no cross connections made in the LNT), the absence of translation indicates to the marker that this is a blank number.

INTERCEPT

6.02 For regular intercept, cross connect the NA- to RI terminals and omit the NB- to T-/U- cross connection. The regular intercept RI indication is sent to the marker over leads BO and Cl1.

6.03 For temporary (or trouble) intercept, cross connect the NA- to TI terminals and retain the normal NB- to T-/U- cross connection. The temporary (or trouble) intercept TI indication to the marker is sent over the B1 and C11 leads.

6.04 To place a hunting group on intercept, the pilot number is cross connected as for a regular number.

NUISANCE CALL

6.05 To take a trouble record on nuisance calls, the NA- terminal for the customer number is cross connected to terminal NCl or 2 to operate relay NCl or 2, respectively, when the marker applies the translation potential to terminal NA-. A make contact of relay NC- returns the potential through terminal NAO or 1 and a cross connection to the LH(-)-RC(-) terminal. When relay NC- operates it also closes ground to the marker over lead NCR.

TWO-LINE HUNT

6.06 For lines requiring 2-line hunting, the line assignment for the two lines must be within the same line hundreds block. The lines must be on the same level and the identical appearance in two adjacent line groups. A line within line group 0 may be given a HU- ringing combination in which case the hunting would be to the identical line appearance in line group 1 (same switch level and line appearance). If the line were instead given a HD- ringing combination, the hunting would be to the identical line location in line group 4 of the same line hundreds block.

6.07 When the marker requests a number to line translation, the LNT returns the line location and either a hunt-up or a hunt-down ringing combination to the marker. If the marker finds the line-busy, it advances to the adjacent line group according to the ringing combination indication and tests the second line and either connects to it or returns a busy tone.

CALL-WAITING

6.08 The call-waiting feature arranges one directory number to have access to two lines. In essence, there is a primary and a secondary line. The primary line would always be used when available. The secondary would be used to permit a second call to be completed while the first call is in progress.

6.09 The number to line cross connection for the call-waiting feature is the same as for one-half of the 2-line hunt feature. It may be either a hunt-up or a hunt-down ringing combination. There are no cross connections made for the second line.

7. RELEASE OF LINE NUMBER TRANSLATOR

7.01 The release of the LNT on nonhunting calls is made as soon as the class of service, the line number and ringing combination or the customer number is received by the marker.

7.02 On calls to hunting groups, the LNT is held until an idle line is found or a group busy (all lines busy) indication is received by the marker.

7.03 The marker releases the LNT by opening the start leads and the battery supplies BS1 and BS2 for the connector relays. These leads are opened at the same time to insure that the connector relays M(A-D)- for one marker are released before the connector relays for the second marker can operate. The battery supply for leads HB-, LB-, TLB-, TN-, CS-, BSA, and U- are also opened at the same time as for the start leads.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 None.

2. FUNCTIONAL DESIGNATIONS

2.01 Relays

<u>Designation</u>	<u>Meaning</u>
AO,1	Advance
BO-7	A Field - B Output
BLO-7	A Field - C Output and Lock
CSA,B	Class of Service
HBA-F	Directory Number Thousands-Hundreds Block
HSP	High Split
LOO-19	Line Connector
LGO-3	Line Grouping

<u>Designation</u>	<u>Meaning</u>
LTO-5	Line Test
LTAO-5	Line Test
MO,1	Marker
M(A-D)0,1	Marker Connector
MPO,1	Marker Preference
NOO-19	Number Connector
NC1,2	Nuisance Call
NGO-3	Number Grouping
NSP1,2	No Split
RBA-D	Ring Block
SP1,2	Multiparty ANI Split
TO-9	B Field - Tens Output
TBA-D	Tip Block

<u>Designation</u>	<u>Meaning</u>
TNO-9	B Field - Units Output and Lock
UO-9	Units Digit (Input)

3. FUNCTIONS

3.01 See SECTIONS I and II.

4. CONNECTING CIRCUITS

4.01 When this circuit is shown on a key-sheet, the connecting information thereon should be followed:

(a) Marker Circuit - SD-26384-01.

(b) Test Circuit - SD-26411-01.

5. MANUFACTURING TESTING REQUIREMENTS

5.01 This circuit shall be capable of performing all of the functions listed in this Circuit Description and meeting the requirements listed in the Circuit Requirements Tables.

BELL TELEPHONE LABORATORIES, INCORPORATED

PT 5245-LCB

DEPT 355-KTG-KLF-MH

