

**L MULTIPLEX TERMINALS
COMMON EQUIPMENT
CARRIER TRANSMISSION MAINTENANCE SYSTEM (CTMS)
L3 PEARL TONE MEASUREMENTS**

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1. GENERAL

1.01 The L3 PEARL tone measurement program (L3PT) is run in three modes to:

- create an L3 PEARL tone data base
- measure L3 PEARL tones
- measure modulation products involving PEARL tones.

In its routine mode of operation, L3PT measures the level of PEARL (Performance Evaluation of Amplifiers at Remote Locations) tones at the receiving end of an L3 line to check the condition of individual amplifiers of the line equipment. Manual tests of PEARL tones and modulation products measurements are described in Section 359-060-501.

1.02 When this section is reissued, the reason for reissue will be given in this paragraph.

2. ACCESS CIRCUIT

2.01 L3 PEARL tones and modulation products are measured by accessing the received L3 signal via the circuit shown in Fig. 1.

3. SCHEDULING PROGRAM

3.01 L3PT in a magnetic tape storage system is controlled by BOS commands IT (to establish an execution time), ON to initialize the program for routine running), and ON,L3PT,NOW... (for demand execution). In a disc storage system, one of two methods of control may be used: (1) RTE system commands IT and ON as above for routine execution and RU for demand execution, or (2) control by the auxiliary terminal monitor (ATM) program in which L3PT is initialized by an IP command, scheduled by an IS command, and run as a demand program by an ON,L3PT,NOW... command. The BOS and RTE system commands and the ATM program commands are described in Section 103-260-300.

3.02 L3PT must be run as a demand program to generate the L3 PEARL tone data base, measure modulation products, or measure the PEARL tones of a single line. The format to run L3PT as a demand program is:

`*ON,L3PT[,p1 [,p2,p3 [,p4]]]`

Where:

p1 = 0 (or absent) sequence through all L3 lines.

p1 = *n* where *n* is the short code assigned to a specific line to be tested or for which to enter data base information.

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SECTION 356-010-558

p2 is always 0 (enter by default using two commas).

p3 = 0 (or absent) print only out-of-limits measurements.

p3 = 1 print all measurements.

p4 = 0 (or absent) measure PEARL tones routine.

p4 = 1 measure modulation products.

p4 = 2 form data base.

4. DATA BASE GENERATION

4.01 L3PT must be run in its data base mode the first time it is run in an office. The starting command is then:

```
*ON,L3PT,,,2
```

The program searches the line file in the data base and prints the identification of each L3 line as it is located. Each entry is followed by the command:

DATA BASE INPUT:

Unless the L3 line is not equipped with the PEARL feature (a zero should be entered for unequipped lines), the operator must type four bits of information in the form:

n1,n2,n3,n4

Where:

n1 is the number of auxiliary stations on the line which are powered from the local office.

n2 is the total number of auxiliary stations in the switching section of the line.

n3 is the direction the line runs from the office.

Use one of the following numerical indicators:

1—south

2—north

3—east

4—west

n4 is the spacing arrangement. Enter 1 for standard L3 spacing of 4 miles, or 2 for L1 spacing of 8 miles converted to L3 spacing of 4 miles.

4.02 Figure 2 is an example of L3PT data base generation. The entry for unequipped lines is a zero. After the data base entry for any pending L3 line is typed, the program presents the next L3 line in the data base. When all L3 lines have been listed and the data base information entered, the program prints a stop message.

5. ROUTINE PEARL TONE MEASUREMENT

5.01 The threshold level for PEARL tones is -20 dBm0 as shown in the heading of Fig. 3. Information on any measurement which equals or exceeds this level is printed to identify the faulty amplifier. The data consists of the auxiliary station location, the frequency of the oscillator signal fed to the amplifier, the last recorded measurement level (stored by the program during the previous measurement), the new measurement level, the amount of change between measurements, and the amount by which the threshold has been exceeded. If the DEV/LIM number is negative, it indicates that the level is within limits but a change of ± 5 dB or more has occurred.

6. MODULATION PRODUCTS MEASUREMENT

6.01 L3PT must be run as a demand program to measure modulation products. This is necessary because the line to be measured must be switched out of service and assistance is required to apply a 4-MHz test tone at the far end. The command to start L3PT for modulation product measurements and print all measurements is:

```
*ON,L3PT,n,,1,1
```

If it is desired that only out-of-limits measurements be printed, the command should be:

```
*ON,L3PT,n,,1
```

Where:

n is the short code of the line to be tested.

6.02 Figure 4 illustrates the printout that results from running L3PT in the modulation products mode when all measurements are printed. A heading

is printed that identifies the program and the line under test. The heading ends with the command:

CONNECT 4MHZ INPUT AT FAR END

The 4-MHz tone should be applied to the far end of the line, then typing any character plus RETURN (or RETURN and LINE FEED in a tape system) signals the program to start the measurements. Each amplifier is tested by measuring the level of second order sum product formed when the amplifier is fed the high-level 4-MHz signal; thus, the measurement is made at 4 MHz plus PEARL oscillator frequency of the amplifier. The result of each amplifier test is printed as (1) the auxiliary station location, (2) the frequency at which the measurement was made, (3) the actual level in dBm0 of the modulation product formed, and (4) the amount in dB by which the measurement deviated from the allowable limit which is set at -40 dBm0. When the measurement deviation is a

negative number, it is within the allowable limit; if it is positive, the deviation exceeds the limit.

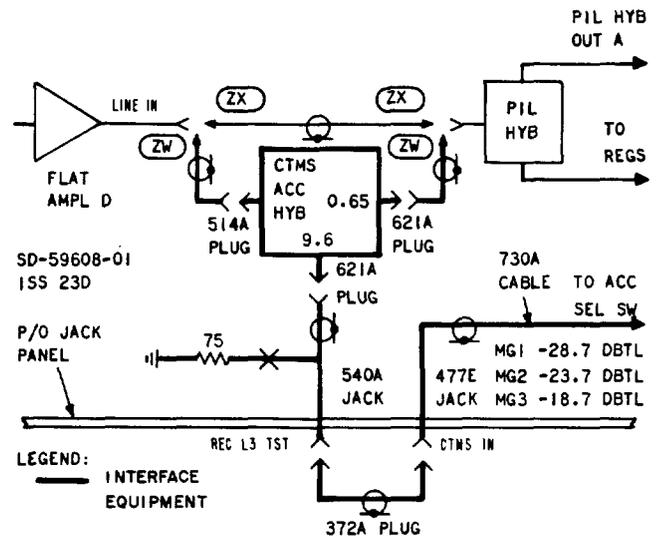


Fig. 1—L3 Receiving Access Circuit

L3PT: L3 PEARL TONES - RCVG AT LINE ISSUE 1
LIMIT: 20 DR BELOW TL

```

*****
L3PT:      DATE 132   8:52
LINE= 4200;  L3   ELP  NEWYRK4 NY NEWYRK7 NY
DATA BASE INPUT: 0
*****
L3PT:      DATE 132   8:58
LINE= 4300;  L3   FAB  NEWYRK4 NY NEWYRK7 NY
DATA BASE INPUT: 0
*****
L3PT:      DATE 132   8:58
LINE= 4400;  L3   FRB  NEWYRK4 NY NEWYRK7 NY
DATA BASE INPUT: 0
*****
L3PT:      DATE 132   8:59
LINE= 4500;  L3   FDR  NEWYRK4 NY NEWYRK7 NY
DATA BASE INPUT: 0
*****
L3PT:      DATE 132   8:59
LINE= 4600;  L3   FER  NEWYRK4 NY NEWYRK7 NY
DATA BASE INPUT: 0
*****
L3PT:      DATE 132   8:59
LINE= 4700;  L3   ECA  NEWYRK4 NY NEWYRK7 NY
DATA BASE INPUT: 0
*****
L3PT:      DATE 132   9: 0
LINE= 4800;  L3   FLL  NEWYRK7 NY WHITEP2 NY
DATA BASE INPUT: 7,7,2,1
*****
L3PT:      DATE 132   9: 6
LINE= 4900;  L3   FAA  NEWYRK7 NY WHITEP2 NY
DATA BASE INPUT: 7,7,2,1
*****
L3PT:      DATE 132   9: 7
LINE= 5000;  L3   FRL  NEWYRK7 NY WHITEP2 NY
DATA BASE INPUT: 7,7,2,1
*****
L3PT:      DATE 132   9: 7
LINE= 5100;  L3   ACF  NEWYRKRXNY NEWYRK7 NY
DATA BASE INPUT: 3,3,2,1
L3PT : STOP   0000

```

Fig. 2—L3PT Data Base Generation

L3PT: L3 PEARL TONES - RCVG AT LINE ISSUE 1
 LIMIT: 20 DB BELOW TL

L3PT: DATE 132 9:42
 LINE= 4200; L3 ELR NEWYRK4 NY NEWYRK7 NY

L3PT: DATE 132 9:42
 LINE= 4300; L3 EAR NEWYRK4 NY NEWYRK7 NY

L3PT: DATE 132 9:43
 LINE= 4900; L3 FAA NEWYRK7 NY WHITEP2 NY

..AUX-STA..	FREQ-KHZ..	OLD..	NEW..	CHANGE..	DEV/LIM
L 1.0 N	253.	-17	-17	0	3
L 2.0 N	254.	-19	-19	0	1
L 5.0 N	257.	-15	-15	0	5
# TONES MEAS=	7	# TONES > LIMIT=	3		

L3PT: DATE 132 9:44
 LINE= 5000; L3 FPL NEWYRK7 NY WHITEP2 NY

..AUX-STA..	FREQ-KHZ..	OLD..	NEW..	CHANGE..	DEV/LIM
L 6.0 N	258.	-20	-20	0	0
# TONES MEAS=	7	# TONES > LIMIT=	1		

L3PT: DATE 132 9:44
 LINE= 5100; L3 ACF NEWYRKRXNY NEWYRK7 NY

..AUX-STA..	FREQ-KHZ..	OLD..	NEW..	CHANGE..	DEV/LIM
L 1.0 N	257.	-20	-20	0	0
L 1.0 N	258.		\$		
# TONES MEAS=	3	# TONES > LIMIT=	1		

L3PT SUMMARY
 TONES= 24
 #>LIMIT= 5
 Z>LIMIT= 20
 L3PT : STOP 0000

Fig. 3—Measure PEARL Tones Routine

L3PT: L3 PEARL TONES - RCVG AT LINE ISSUE 1

L3PT: DATE 84 9:54
LINE= 4800; L3 FLL NEWYRK7 NY WHITEP2 NY

MODULATION PRODUCT TEST

CONNECT 4MHZ INPUT AT FAR END

...	AUX-STA...	FREQ-KHZ...	LEVEL...	MOD/LIM..
L	1.0 N	4253.	-56	-16
L	2.0 N	4254.	-65	-25
L	3.0 N	4255.	-51	-11
L	4.0 N	4256.	-52	-10
L	5.0 N	4257.	-53	-10
L	6.0 N	4258.	-55	-15
L	7.0 N	4259.	-57	-17

TONES MEAS= 7 # TONES > LIMIT= 0

Fig. 4—Measure Modulation Products Routine