

Critical Release Notice

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The content of this customer NTP supports the SN06 (DMS) and ISN06 (TDM) software releases.

Bookmarks used in this NTP highlight the changes between the baseline NTP and the current release. The bookmarks provided are color-coded to identify release-specific content changes. NTP volumes that do not contain bookmarks indicate that the baseline NTP remains unchanged and is valid for the current release.

Bookmark Color Legend

Black: Applies to new or modified content for the baseline NTP that is valid through the current release.

Red: Applies to new or modified content for NA017/ISN04 (TDM) that is valid through the current release.

Blue: Applies to new or modified content for NA018 (SN05 DMS)/ISN05 (TDM) that is valid through the current release.

Green: Applies to new or modified content for SN06 (DMS)/ISN06 (TDM) that is valid through the current release.

Attention!

Adobe® Acrobat® Reader™ 5.0 is required to view bookmarks in color.

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662-7001-200

Network Test Systems

Digital Test Head

Installation and Maintenance

Standard 02.04 January 2000

NORTEL
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Network Test Systems

Digital Test Head

Installation and Maintenance

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November 1991

First draft issue of Release 32 documentation.

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About this document

This document describes the installation and maintenance of a Digital Test Head (DTH).

Using this NTP

This NTP describes the installation and maintenance of the DTH. It is intended for DTH installers and administrators.

Associated NTPs

For a detailed discussion of DTH, refer to 662-7001-100. 662-7001-300, shows how to use the DTH to perform trunk testing.

General

A Digital Test Head (DTH) is a circuit testing and measurement device.

- It performs digital measurements on switched voice and data special services.
- It calculates performance and operational parameters directly from the digital bit stream.
- It derives analog parameters using digital signal processing (DSP) algorithms on the DS0 carried pulse code modulated (PCM) data.
- It supports multiple tests running concurrently. It can perform single-ended testing or double-ended testing with other testing devices, including another DTH.
- The customer can install it, bring it on-line, and maintain it to the card level.

DTH configurations

Three configurations of DTHs are available. They differ in the necessary hardware, and the their functionality. The three configurations are:

1. The DTH/ROTL (Remote Office Test Line) performs analog testing. It emulates an APC 1066A ROTL/52 Responder.
2. The DTH/DTT (Digital Trunk Testing) performs digital trunk testing over a digital interface.
3. The DTH/ROTL and DTT performs the functions of both of the DTH types.

Environmental requirements

The environmental conditions that most telecommunications equipment require also apply to the DTH in a central office. Investigate existing office conditions to assure that you can meet the following environmental conditions.

The operating range of the DTH is 5 to 40 degrees C (41 to 104 degrees F.) This is the ambient temperature at the lowest inlet to the unit, and it assumes a clear air flow above it.

The DTH withstands short-term temperatures ranging from 2 to 50 degrees C (35 to 122 degrees F), but may not operate correctly. The DTH returns to normal operation when the temperature returns to the nominal range. (Short term is not more than 72 hrs, and not more than 15 days in total.)

The DTH accepts temperature changes of up to 1 degree F per minute. Do not mount a unit directly in front a cycling air conditioner output duct.

The shipping temperature range of the unit is between -29 and +71 degrees C (-20 and +160 degrees F). The shipping humidity range of the unit is between 10 and 90% relative humidity (RH), non-condensing. The unit can tolerate atmospheric pressure as low as that found at 3657.6 m (12 000 ft.) above sea level.

Required tools

Table 1-1 shows the tools you need to install a DTH.

Table 1-1
Required tools

RTP Tool	Canadian Tool	Description
T7018	A7018	0.25 in. socket wrench set
Tool Kit	19	Installers ToolKit
Tool Kit	A8752	Bit and Sleeve, 22 gauge
Tool Kit	A8499	Bit and Sleeve, 22 gauge
Tool Kit	R2060	Trimmer, Butt cable
Tool Kit	A9613	Wrist strap, grounding

Required test sets

Table 1-2 shows the electronic equipment you need to install a DTH.

Table 1-2
Required test sets

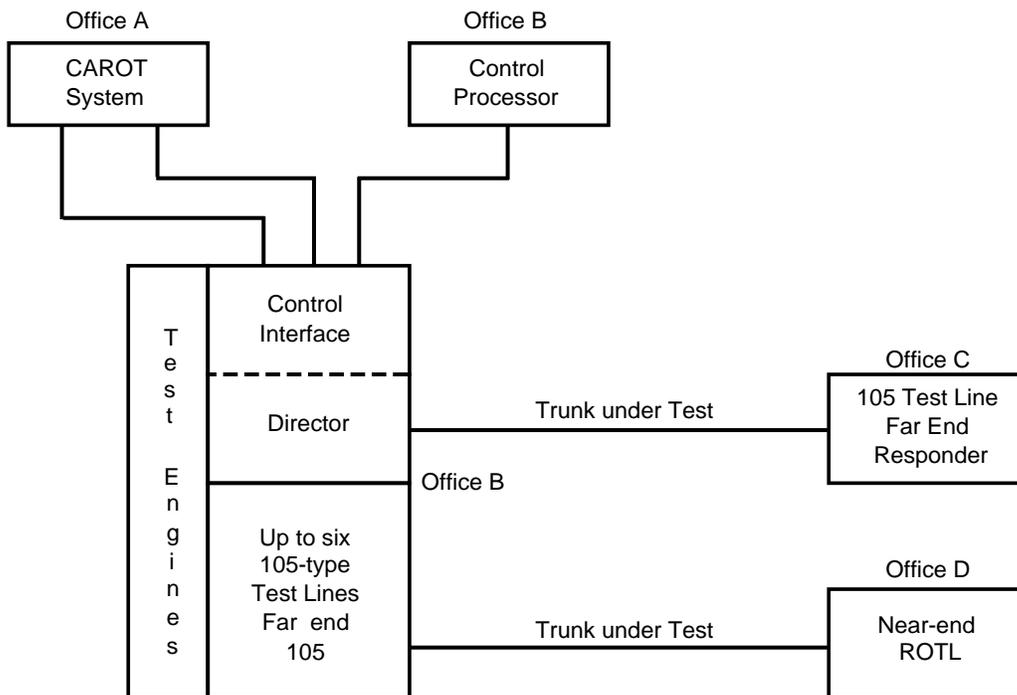
RPT test sets	Canadian test sets	Description
7283	E-4442-A	multimeter, digital
4089	E7230	TTS-44 Transmission Test Set
7100CL	N/A	VT220 terminal

DTH/ROTL information

This section contains general information about the DTH in the ROTL configuration which is used on 105 test lines.

A DTH/ROTL (Remote Office Test Line) is a testing device that enables remote applications such as Centralized Automatic Reporting on Trunks (CAROT) to test analog trunks.

Figure 1-1
Network model for ROTL



Typical operation

Section “Logical operation” shows a typical sequence of events during a ROTL test. The four basic functions are:

1. typical ROTL tests
2. sending priming digits
3. performing test
4. disconnect or recycle

Logical operation

The following steps describe the operational sequence that the ROTL performs in a typical trunk testing session. This description includes the

function(s) of the control system, the ROTL, and the DMS-100, in the operation of the ROTL.

1. The control system terminates on a ROTL unit access port.
2. The ROTL takes the following actions:
 - a. causes an off-hook condition on the called access port
 - b. waits 300 ms
 - c. sends test progress tone (TPT) to the control section
 - d. connects its multi-frequency (MF) receiver
 - e. seizes corresponding test port trunk circuit to the DMS-100
3. The DMS-100 connects its MF receiver, allocates a call process, and sends a start dial signal to the ROTL.
4. The ROTL removes TPT from the control system, signaling it to begin sending the priming digits.
5. The control system sends the priming digits in the following format: KP+zz+xxxx+yyyy+ooo+abcdefghij+ST, where:
 - zz = test line type indicator
 - xxxx = trunk group number
 - yyyy = trunk number
 - ooo = DMS switch
 - abcdefghij = test line DN for distant test line
6. The ROTL and the DMS-100 simultaneously collect the priming digits the control system sends.
7. The DMS-100 translates the priming digits, and determines the status of the trunk under test (TUT), and reserves it, if available.
8. The SD points receive an indication of TUT status.
9. The ROTL sends a 0.5 s TPT to the control system indicating that the TUT is available.
10. The ROTL returns start sending to the DMS-100 over the SD points.
11. The DTH seizes the outgoing TUT, and out-pulses digits to the far-end (FE) after receiving a start dial signal (wink).
12. There is a connection between the ROTL and the TUT (the FE test line is attached).
13. The ROTL monitors the far-end for the appropriate tone (TPT or 1 kHz), and sends TPT to the controller, if successful.
14. The ROTL performs test(s) on TUTs as commanded by the control system using MF tones (winks).

15. The ROTL sends Frequency Shift Keying (FSK) results back to the control system.
16. The control system instructs the ROTL to disconnect.
17. The ROTL sends a Disconnect to the DMS-100 through a sense point access line disconnect, and disconnects from the access port.
18. The DMS-100 releases the call.

Figure 1-2
Priming digits format

TEST TYPE	TEST LINE	DIGITS																						
		KP	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	ST
TRANSMISSION TESTS	100	KP	00												ROT DOES NOT SEND THESE DIGITS TO THE DMS	FAR-END-TEST LINE NUMBER								
	102	KP	02																					
	105	KP	05																					
	100	KP	10																					
	102	KP	12																					
	105	KP	15																					
OPERATIONAL TESTS	NON-SYNC	KP	20												TRUNK GROUP MEMBER NUMBER	FAR-END-TEST LINE NUMBER								
	SYNC	KP	21																					
	103	KP	23																					
	NON-SYNC	KP	30																					
	SYNC	KP	31																					
	103	KP	33																					
TERMINAL BALANCE TEST		KP	40												ST ST ST ST	FAR-END-TEST LINE NUMBER								
MAKE BUSY (OOS) REMOTELY		KP	50																					
RESTORE IDLE REMOTELY		KP	51																					
INDIVIDUAL TRUNK STATUS		KP	52																					
TRUNK GRP STATUS		KP	53																					
TRUNK GRP STATUS BY GRP		KP	54																					
CALL BACK REQUEST		KP	55	ID	ST																			
CONNECTION APPRAISAL	100	KP	60																		ST	FAR END TEST LINE NUMBER (.12 DIGITS)		
	102	KP	62																		ST			
	105	KP	65																		ST			
HOME OFFICE TEST LINES	100	KP	70																		ST	FAR-END-TEST LINE NUMBER		
	102	KP	72												TRUNK GROUP AND MEMBER	ST ST ST								
	103	KP	73																					
	NON-SYNC	KP	74																					
	105	KP	75																					

Note: Digits 11 - 13 above must always be 000 when going to a DTH/ROTL.

ROTL hardware

Here is a sample of the hardware required for a DTH/ROTL. Contact Nortel Networks customer engineering to verify specific central office, DTH setup, and releases.

Table 1-3
DTH equipment list/ROTL-only configuration

Equipment designation	Part number	Slot	Quantity
Shelf Assy	NT7F22_	-	1
RS-232 cable (W9)	NT7F27_	-	1
Power supply	NT5A23_	0	1
Filler faceplate	NT7F30_	As needed	As needed
Faceplate, double slot	NT7F30_	As needed	1
Faceplate, Wide	NT7F30_	As needed	1
Control processor (CP)	NT7F23_	1	1
VF I/F (ROTL) card	NT7F29_	9/10	1
ROM pack	NT7F26_	Piggy back on CP	1
DSO Handler card	NT7F25_		As needed
RS-232 cable, (local terminal)	NT7F27_	-	As needed
RS-232 cable, (PAD)	NT7F27_	-	As needed

Note 1: All cables will vary in length depending upon site requirements.

Note 2: Check with Nortel Networks to verify latest equipment part number version is the version number.

ROTL datafill instructions

Verify that the customer data tables listed in Table 1-4 are correctly datafilled for proper ROTL operation. For example:

Table 1-4
Customer data tables

Tables	Comments
CLLI	New CLLIs are ROTLTP (ROTL test port) and TERM1 05
TRKGRP	For ROTLTP: GRIPTYPE = ROTL TRAFCLS = value does not matter ENDOFC = NPDGRP Other fields as usual For TERM105: GRPTYPE = T105 TRAFCLS = value does not matter ENDOFC = NPDGRP Other fields as usual
TRKSGRP	For ROTLTP: SCGRP = 0 or 1 CARDCODE = 3X91AA DIR = IC IPULSTYP= MF ISTARTSG = WK IPSPDSEIZ = 30 PARTDIAL 30 Other fields NO, N, or NONE For TERM105: SCGRP=Oorl CARDCODE = 3X91AA DIR = OG OPULSTYP NP OSTARTSG IM TRKGRDTIM = 160 Other fields = 0, N, NO, or NONE
TRKMEM	Cannot delete all entries if any SC and SD points are still assigned in ALMSC or if trunk is not INB.
ROTLSCSD	Table containing location information for the SC and SD points associated with a particular test port (ROTLTP).
ALMSC	Add entry for the ROTL power fail alarm, usually #4.
ROTLCB	ROTL Call Back Callback key INDEX = 1 to 10 AUTHORIZATION = AUTO or MANUAL (directory number) DR = numeric
OFCENG	ROTL OUT OF SERVICE LEVEL ROTL-TIME-IN-20MIN

Table 1-4
Customer data tables

Tables	Comments
CLLIMTCE	9dB Tx, 12dB Rx
MWDATA	Table defining the default dB and Hz of the DMS-100
NNX	Network numbering exchange
NPA	Numbering plan area (area code)

ROTL switch configuration

Verify that the switch has this configuration. (NPA refers to the area code.)
 For example:

```

>table mwdata

IDXKEY  MWDATA

-----

0                0      1004

>Table trkgrp

JOURNAL FILE UNAVAILABLE - DMOS NOT ALLOWED

TABLE:TRKGRP

>heading:pos rot1

GRPKEY

GRPINFO

ROTLTP ROTL 0 NPDGP NCOT NIL NPRT NPA  NSCR

>heading;pos term105

GRPKEY

GRPINFO

-----

TERM 105

T105 0 NPDGP NCRT OG MI MIDL NPA NPRT NSCR NPA 000 N N
    
```

>table cllimtce

JOURNAL FILE UNAVAILABLE DMOS NOT ALLOWED

TABLE: CLLIMTCE

>heading;pos rotltp

CLL1 SCLL1 MINALM MAJALM CRITALM SYNCTYPE TSTNOIND MWIDX

SIGTST PRFXDIGS DIAGDATA

ROTLTP ROTLTP 5 10 15 NSS 0 0 N

N (3)

>sub

>lis all

TOP

EXTRKNM DBREC DBTRANS DIGDBRCV DIGDBTRN PRECBAL COMPRES LOOP
CABLEPR ZONE EML NML NIAL INSVCE

0 48 36 4 4 2X77AA LO SH XXXX 0

0 0 50 50 Y

1 48 36 4 4 2X77AA LO SH XXXX 0

0 0 50 50 Y

2 48 36 4 4 2X77AA LO SH XXXX 0

0 0 50 50 Y

BOTTOM

Note: The numbers 0, 1, and 2 may vary depending upon the number of ROTLs in the configuration and their use. In a ROTLTP configuration, the numbers may be 0 and 1. A TERM 105 configuration may use 0 through 5.

Examples of the fill for data tables

Here are sample fills for data tables:

>heading;pos term105

```
CLL1 SCLL1 MINALM MAJALM CRITALM SYNCTYPE TSTNOIND MWIDX  
SIGTST PRFXDIGS DIAGDATA
```

```
TERM105 TERM10 5 10 15 NSS 0 0 Y
```

```
N ( 5)
```

>sub

>lis all

>Top

```
EXTRKNM DBREC DBTRANS DIGDBRCV DIGDBTRN PRECBAL COMPRES LOOP
```

```
CABLE
```

```
CABLEPR
```

```
ZONE EML NML NIAL. INSVCE
```

```
-----  
1 48 36 44 2X77AA LO SH XXXX 0
```

```
0 0 50 50 Y
```

```
2 48 36 44 2X77AA LO SH XXXX 00 0 50 50 Y
```

```
3 48 36 44 2X77AA LO SH XXXX 0
```

```
0 0 50 50 Y
```

```
4 48 36 44 2X77AA LO SH XXXX 0
```

```
0 0 50 50 Y
```

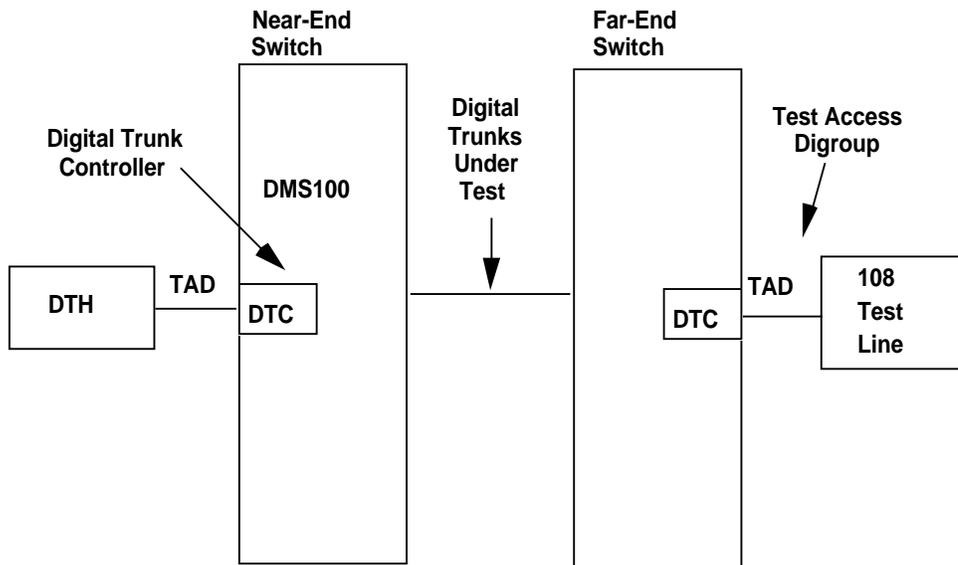
```
BOTTOM
```

DTH/DTT information

This section contains general information about the DTH in the DTT configuration, used when testing 108 test lines. Contact customer engineering to verify specific CO order, DTH setup, and hardware release information.

The DTHs connect to their respective switches to provide testing of a digital trunk. However, the far-end can be a third party 108 test line.

Figure 1-3
End-to-end test setup



DTT hardware

The DTH/DTT consists of the following hardware package:

Table 1-5
DTT equipment list/DTT only

Equipment designation	Part number	Quantity
Shelf assembly	NT7F22_	1
Cable, 22 gauge (TAD)	NT7F27_	1
Power supply	NT5A23_	1
Filler faceplate	NT7F30_	As req.
Faceplate, double wide	NT7F30_	As req.
Filler faceplate, wide	NT7F30_	As req.
Control processor	NT7F23_	1
DSO Handler card	NT7F25_	1-6
DS1 card	NT7F32_	1
ROM Pack	NT7F26_	1

**Table 1-5
DTH equipment list/DTT only**

Equipment designation	Part number	Quantity
RS-232 cable, (local terminal)	NT7F27DB	As req.
RS-232 cable, (PAD)	NT7F27DA	As req.

Sample DTT datafill instructions

Verify the datafill of the DMS-100 switch. A sample is shown below, but your data may vary by site, refer to appropriate terminal is located within 15.24 meters (50 ft.) of the DTH, take the appropriate NTP for table datafill:

1. Verify the data fill of trunk group DTHTP incoming to the switch.

For example:

```
>table clli;pos DTHTP
DTHTP 208 24 DTH_TEST_PORT

>table trkgrp;pos DTHTP 0
DTHP DTH 0 NPDGP NCRT

>table trksgrp;pos DTFITP 0
DTHTP DS I SIG STD IC MF WK N 7 7 NO NO N
N N M UNEQ

>table trkmem;pos dth4bdtc4 1
DTHTP 1 0 DTC 4_0 13
```

2. Verify the datafill of outgoing trunk group TERM 108T, starts at 1.

For example:

```
>table clli;pos TERM 108T
TERM 108T 209 24 TERM 108TestLine

>table trkgrp;pos term 108t
TERM 108T IT 0 TLD NCRT OG N NIL MIDL NPA
NPRT NSCR NPA 000 N N

>table trksgrp;pos term108t 0
```

```
TERM 108T 0 DS I SIG STD OG NP IM 7 0 NO NO N
```

```
N Y 70 UNEQ
```

```
>table trkmem;pos term108t 1
```

```
TERM 108T 10 DTC 2 11 1
```

3. Verify that the DTC span the DTH uses has its framing format and line code set to match the DTH TAD's configuration:
 - If you have 6X50AA cards, use SF ZCS framing.
 - For 6X50AA and 6X50AB cards, use SF ZCS.
 - With 6X50AB only cards, you may use either ESF B8ZS or SF ZCS, although the former is preferred.

This is a two step process:

- a. From the MAP, enter the LTCPSINV TABLE. Then, position on the DTC used by the DTH (for example, POS DTC 4). Locate the span that the DTH's TAD will use, and record the parameters associated with it (for example, for span 0, use 0 DS 1 DEFAL N).
- b. From the MAP, enter TABLE CARRMTC, and position on the DTC DEFAL (see above example). Make sure that the correct framing format and line code appear in the table. For example, POS DTC DEFAL:

```
CSPM TYPE TEMPLNM      RTSML RSTOL_ ATTR
DTC DEFAL      255      255 NT6X50ABMU_LAW ESFB8ZS BPV NILDL
                                N 250 100 50 50 150 100 3 6 864 100
                                17 511 4 255
```

If the tuple's Framing Format (ESF here) and Line Code (B8ZS here) do not match the TAD's configuration, BERTs will generate many error messages.

4. Insure your incoming test trunks translate to your chosen TERM 108 DN (for example, 959-1080) from HNPACONT.

Example:

```
>traver tr (incoming clli name) (priming digits for the
calling office) b
```

```
TABLE TRKGRP D217D40702 T2 0 TLD NCRT NIL
```

```
MIDL 7 N N NPRT NSCR NPA NLCL N N
```

```
TABLE HNPACONT
```

```
NPA 549 8201 T OFRT 110
```

```
TABLE OFRTB

110 S D TERM108T

EXIT TABLE OFRT

+++ TRAVER: SUCCESSFUL CALL TACE +++

DIGIT TRANSLATION ROUTES

TERM108T 5498201 ST

2 T60

TREATMENT ROUTES. TREATMENT IS: GNCT

1 DRAM ATB

T120

+++ TRAVER: SUCCESSFUL CALL TRACE +++

>table dnroute;pos NPA 549 8201

TABLE: DNROUTE

NPA5498201 T OFRT 110

>table ofrt; pos 110

TABLE:OFRTB

110 (S D TERM108T) (S D T60)
```

Find the office route number associated with the term 108t. If there is not a T60 line after term 108t, add T60 as shown as route two above.

DTH switch configuration

Verify the following switch configuration:

```
>table trkgrp

JOURNAL FILE UNAVAILABLE  DMOS NOT ALLOWED

TABLE:TRKGRP
```

```
>heading;pos dthtp
```

```
GRPKEY
```

```
GRPINFO
```

```
DTHTP
```

```
DTH 0 NPDGP NCRT
```

```
>heading;pos term108t
```

```
GRPKEY
```

```
GRPINFO
```

```
TERM 108T
```

```
IT 0 TLD NCRT OG DD MIDL NPA NPRT NSCR NPA 000 N N $
```

Required patches

Verify the presence of the following patches in the DMS-100 switch:

Table 1-6
Required patches

Patch name	BCS required	Comments
RW061	31-34	
RW062	31-34	
RW067	31 only	put into RW061
RW070	31-33	put into RW062
RW078	31-34	
RWOXX	31-33	put into RW061
RWOYY	31-33	put into RW061
DVCOO	31-33	fixed in 34

Note: Contact your Nortel Networks Regional Support Office to determine if you need any additional patches to support the DTH. To verify if the patches are in the switch, enter:

```
PATCHER; INFORM LIST patch
```

These feature patches implement a new trunk type, DTH, which indicates an incoming test access circuit from a DTH. It is a winkstart MF trunk that expects to receive digits in the same format as analog ROTL priming digits. It connects to several types of outgoing or two-way trunks for completing to far-end test lines. It can also complete to home office test lines for verification. The PATCH may require allocation of software resources. Each incoming

DTH test access port requires a software extension block known as a ROTL_PRIMINGBLOCK. The number of ROTL_PRIMINGBLOCKS must be at least equal to the total number of incoming ROTL ports, plus all incoming DTH ports. The size of TABLE ROTLSCSD determines the allocation of ROTL_PRIMINGBLOCKS. The ROTLSCSD tuple in TABLE SYSDATA controls the size of ROTLSCSD. If you require more ROTL_PRIMINGBLOCKS, increase the size of ROTLSCSD in the TABLE SYSDATA and perform a cold restart.

Although this increases the available size of ROTLSCSD, you need not add DTH ports to the table since they have no association with SC or SD points.

Verify that the switch contains the NTX052AB feature package.

When performing BER testing from the DMS to the DTH, the XPMs must contain a the NT6X69AA or NT6X69AB Message card. Use of the NT6X99AA, requires the NT6X79AA Tone card for this procedure.

Datafill a new trunk in TABLE TRKGRP of the type DTH. This trunk indicates an incoming test access from the DTH. The trunk has the datafill of a WinkStart MF trunk that expects to receive digits in the same format as analog ROTL priming digits. Refer to *DTH switch configuration* (term108t).

DTH hardware

The DTH resides in a shelf measuring 58.42 cm (23 in.) wide by 35.84 cm (14 in.) high by 33.02 cm (13 in.) deep. (These dimensions do not include the mounting hardware, that comes with the unit.) You can mount it in either a standard 58.42 cm (23 in.) rack or 66.04 cm (26 in.) rack (using rack adapters). The DTH unit is available in brown only.

The DTH cabinet holds a maximum of ten cards. It includes one power supply unit, one control processor (CP) card, one DS1 interface card, one ROTL card and at least one DS0 handler card.

Viewing from the front, the DTH, see Figure 1-4, shows the following components from left to right:

- power supply unit
- CP card with ROMPACK
- DS0 handler cards (from 1 to 6)
- DS1 SF/ESF interface card
- card for appropriate application (for example ROTL)

Figure 1-4
Front view of DTH

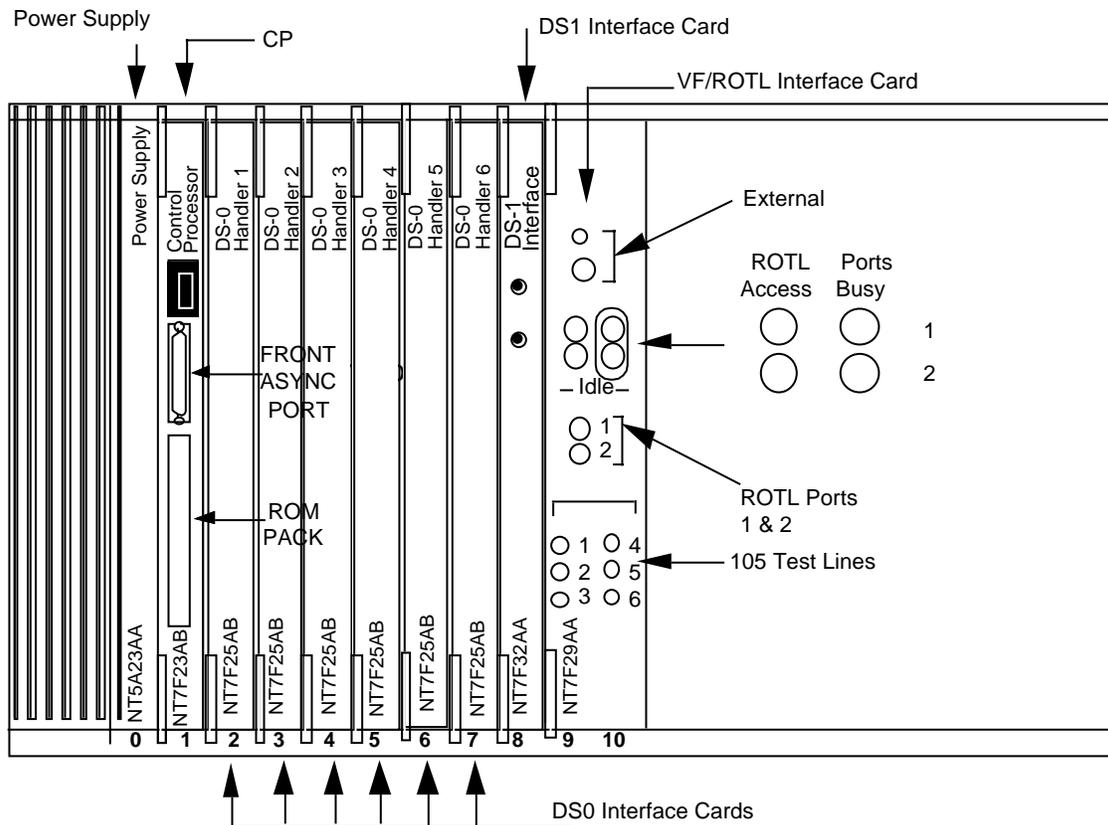


Figure 1-4, shows the DTH with a full complement of cards.

Power Supply - NT5A23_

The power supply provides the +5 and +/- 12 Vdc voltages for DTH operation. The power connector accepts 12-gauge strand wire terminated in a ring crimp terminal. The two terminals, shown in Figure 2-1, have these labels:

- -48 RET (C.O. ground)
- -48 (C.O. battery)

The switching center ground terminal serves as a battery return for the supply current. The internal logic and frame ground both have isolation from the battery return.

The switching center battery terminal is the power source for the DTH. The power supply provides an internal blocking diode to protect against reverse voltage application. The DTH requires 3 A at -48 Vdc.

The DTH operates from -43 to -56 Vdc nominal, with under one minute voltages of 60 Vdc and noise impulses of up to 100 Vdc (10 micro second rise, 100 micro second fall, with 110 to 50% of full voltage using exponential decay, linear rise).

Power should go through a designated breaker with a label of DTH. Install this breaker at convenient place on the fuse service panel (FSP).



CAUTION

ELECTROSTATIC DISCHARGE (ESD)

To ensure against damage to electronic components, use ESD protection when handling any modules.

Wear grounding wrist straps, and connect them to the frame ground when removing or replacing modules. At all other times (such as shipping and storage) keep the modules in their protective bags.

Control processor card - NT7F23_

The CP card controls the operation of the other DTH cards, and communication between the DTH and other components. The CP manages from one to six DS0 handler cards.

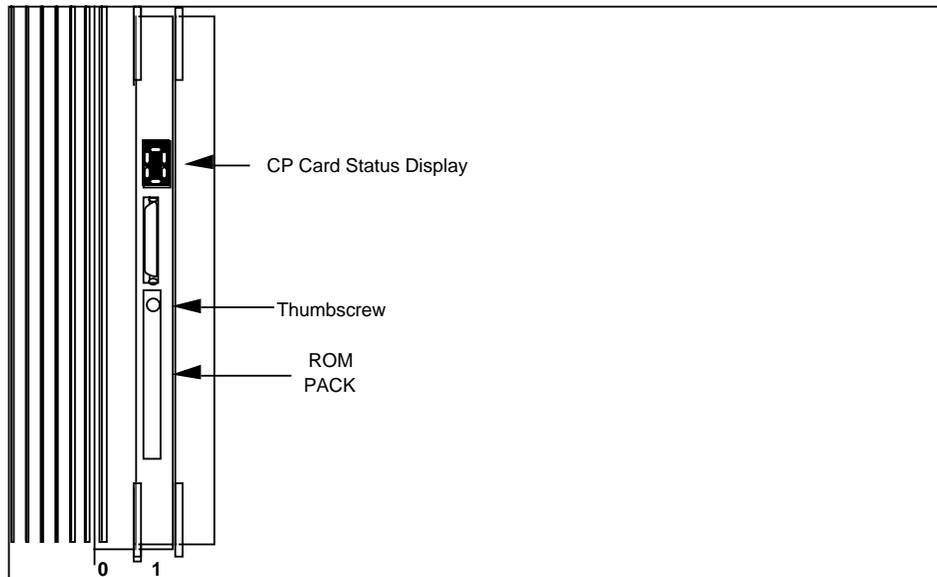
The CP card has four RS-232C serial ports.

The serial ports allow serial asynchronous communication at 9600 baud, each being independently set, using jumpers (see “Configuring and inserting the CP ROMPACK NT7F26_ card.”)

The ROMPACK resides on the CP card in slot 1 (see Figure 1-5). Its primary use is when the DTH receives new features. You will probably receive a new ROMPACK, simply remove the old and insert the new.

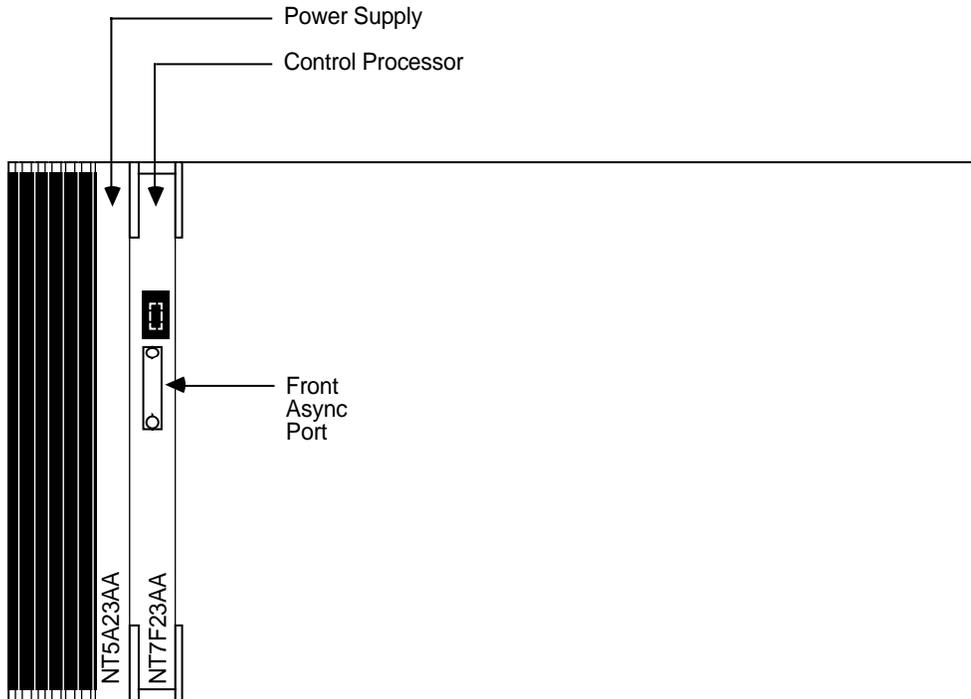
1. Go to the MAP and busy the trunks that have association with the ROTL, TERM 105, DTHTP, and TERM 108.
2. Remove power to the DTH by removing its fuse/circuit breaker on the FSP.
3. Loosen the thumbscrew that secures the top of the submodule in the CP card.
4. Pull down on the handle, which forces the submodule to slide out of the CP card.

Figure 1-5
CP card status display and ROMPACK Installation



5. Insert the kits ROMPACK submodule into the CP card, push up on the handle, and tighten the thumbscrew.
6. Re-install the DTHs fuse/circuit breaker at the FSP.
7. When power is again applied to the DTH, return the ROTL, TERM 105, DTHTP, and TERM 108 trunks to service

Figure 1-6
Location of the CP card



DS0 handler card NT7F25_

Each DS0 handler card has four test engines. (A test engine is a digital signal processor and the related circuitry to run special DSP software.) For some tasks, two test engines on the DS0 handler card must share the load; therefore, the engines are in pairs. Engines 1 and 2 are companions, as are engines 3 and 4. Whenever two engines must share the load, the CP assigns one of these pairs. The ROTL application requires an entire DS0 cards engines 1- 4.

DS1 interface card (DTT only) NT7F32_

The DS1 interface card links the DTH with the DS1 Test Access Digroups (TADs) of network elements. This card accepts two DS1 streams, TAD 1 and TAD 2. The card extracts incoming PCM data and signaling bits from each stream. Each decoded stream then passes onto the backplane. At the same time, the DS1 card receives parallel data from the backplane, converts it into a DS1 format, and transmits it onto the DS1 streams.

Each TAD in a DS1 card is configurable for the following:

- framing, as SF (super frame) or as ESF (extended super frame)
- zero logic, as AMI, ZCS, or B8ZS
- TAD cable length, the distance between the DTH and the DSX, is either:

- 30.48cm - 40.53 m (1 ft. - 133 ft.)
- 40.84 m - 81.07 m (134 ft. - 266 ft.)
- 81.38 m - 121.61 m (267 ft. - 399 ft.)
- 121.92 m - 162.45 m (400 ft.- 533 ft.)
- 162.76 m - 199.64 m (534 ft.- 655 ft.)

The card detects loss of signal, framing failure, and bipolar violations, and dynamically displays them at the local terminal.

VF interface card (ROTL only) NT71729_

This card is a testing device that enables remote applications such as CAROT, or a manual interrogator, to perform tests on analog and digital trunks. The addition of the ROTL card and firmware allow the baseline DTH to emulate a ROTL device. For information about how the DTH/ROTL performs, 662-7001-100.

This card provides analog test access to the DTH through digital test bus number 1; twelve test bus channels are used.

- Two channels are for the two 2-wire telephone lines for controller (can be CAROT, RAMPART, or manual interrogator) access to the ROTL.
- Two channels are for the two 4-wire E&M trunks in use as ROTL test trunks.
- Two channels are dedicated to the interface to the DMS as control and sense points, supplementing the signaling for each ROTL test trunk.
- Six channels are 4-wire E&M trunks used as type 105 test lines.

Cables - NT7F27_

There are three NT7F27_ cables in the DTH/ROTL configuration:

- One connects the DTH/ROTL access lines to the MDF.
- A second connects the DTH/ROTL test trunks and test lines to the MDF.
- A third cable connects the DTH/ROTL scan points and control points to the MDF.

Cables - NT71727_

There are two cables:

- A fourth cable connects TAD B to the switch for DTT use.
- The fifth cable connects TAD A to the DCC for special services testing in the DTT configuration.

Installing DTH/ROTL

This chapter explains how to install the DTH/ROTL, configuration. If you are installing a DTH/DTT, refer to section “Installing DTH/DTT” elsewhere in this document.

The major steps in installation are as follows:

1. unpacking
2. mounting
3. connecting the breaker trip on the FSP
4. connecting the power supply, breaker trip, and office alarm cables
5. inserting the power supply unit
6. configuring and inserting the control processor (CP) card, including the ROMPACK
7. connecting and configuring the local terminal
8. inserting the DS0 handler card(s)
9. inserting the appropriate interface card(s) and connecting the cables

Shipping

When you receive the DTH it is ready to assemble and install. It withstands normal truck and air freight transportation.

Note: If shipping had the DTH at an extreme temperature do not install it for at least an hour. The cards must acclimate to the proper operating temperature before DTH power-up. This helps to prevent thermal shock, particularly when shipping was in a very cold environment.

Unpacking the DTH



CAUTION ELECTROSTATIC DISCHARGE (ESD)

To ensure against damage to electronic components, use ESD protection when handling any modules.

Wear grounding wrist straps, and connect them to the frame ground when removing or replacing modules. At all other times (such as shipping and storage) keep the modules in their protective bags.

To unpack the DTH:

1. Open the top of the carton and remove the packing material. Each card has its own wrapping, open it carefully. Handle a card by its faceplate, and be conscious of static discharge.
2. Check the contents against the packing list and report any discrepancies.
3. Inspect the shipping material for evidence of any shipping damage.

Note: Keep all shipping material for repacking and shipping if necessary.

Mounting the DTH

The unit mounts on a rack. You can mount it in a standard 58.42 cm (23 in.) rack with EIA or WECO hole sizes and spacing. Alternatively, you can mount it in a standard 66.02 cm (26 in. rack) (using the provided rack adapters). When installing the DTH in the rack, mount it with the width of the unit in the horizontal plane as shown in Figure 2-1.

To mount the DTH, use a ratchet set and the mounting hardware. Perform the following steps:

1. Determine the position in the bay in which to mount the DTH shelf i.

Note 1: There must be at least 13.2 cm. (5 in.) of clear space above and below the unit.

Note 2: Do not mount a DTH above a heat source that would raise the temperature of the unit above the maximum ambient limit.

2. Carefully slide the shelf between the rack uprights, and position it over the mounting holes.
3. Use the tools in the ratchet set to secure the shelf in place, with the 12 screws. Use a star washer for the lower-left and upper-right mounting

bolts on both the shelf brackets and the frame, to ensure adequate grounding of the chassis to the bay.

Miscellaneous

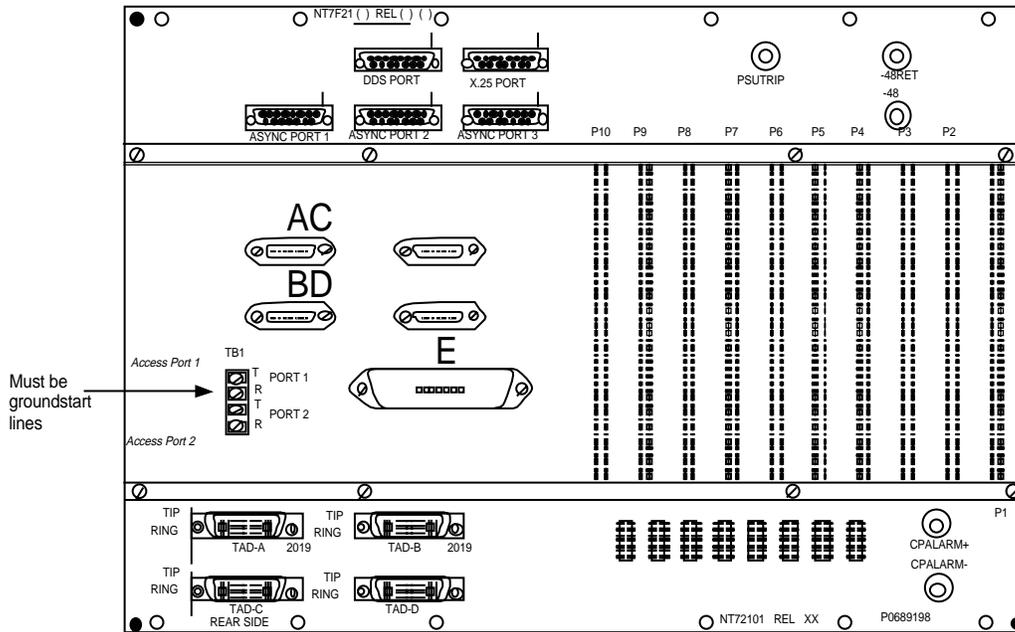
Install the NT3X25AA Common Equipment shelf in the MIS-004, shelf position.

Install AC for the Common Equipment Shelf per IM926, see Sections 2272, and 2276.

The DTH backplane and connections

The front asynchronous port is on the front panel of the CP card. It supports modem access to the local terminal. All other signal connectors, except for the jacks on the ROTL card for the manual interrogator and headphones, are on the backplane, see Figure 2-1. The backplane has a plastic shield that you must before performing any activities on it.

Figure 2-1
DTH backplane, w/o TAD connections



DTH connections

Table 2-1, explains the connections on the DTH's backplane.

Table 2-1
DTH backplane connections

Connector name	Use
DDS Port	Not used
X.25 Port	Not used
Asynchronous Port 1	PAD
Asynchronous Port 2	PAD/Local Terminal

RS-232C ports

The DTH has with three operational asynchronous ports. They use the RS-232C interface standard, and have 25-pin D female connectors. The ports configuration is:

- Port 1 - on the backplane, and supports all modem control signals. This is currently the Network Operations Protocol (NOP) port.
- Port 2 - on the backplane, and supports only the receive and transmit signals. (local terminal port.)
- Port 3 - on the backplane, and is currently not in use.
- Front asynchronous port - on the front panel of the CP card, and supports all modem control signals.

You can configure all the RS-232C ports independently as data terminal equipment (DTE) or data communication equipment (DCE) using the configuration jumpers on the CP card. To configure the local terminal (a VT220), and NOP parameters, use the dual in-line package (DIP) switches on the CP card. Configure the baud rate, parity, and stop bits by toggling the DIP switches.

All RS-232C connectors have lead assignments as shown in Table 2-2.

Table 2-2
RS-232C pin assignments

Pin	Signal
1	no-connect
2	receive (Rx)

Table 2-2
RS-232C pin assignments

Pin	Signal
3	transmit (Tx)
7	signal ground

Configuring and installing the DTH's circuit packs

Configuring and inserting the CP card

To configure and insert the CP card, follow these steps:

1. Using the configuration jumpers, set the RS-232C ports of DTH to the proper configuration, either DCE or DTE.

The location of the configuration jumpers is shown in Figure 2-2. Table 2-3, shows suggested settings.

To configure a port as DCE, place a jumper over the left pair of pins. To configure a port as DTE, place a jumper over the right pair of pins.

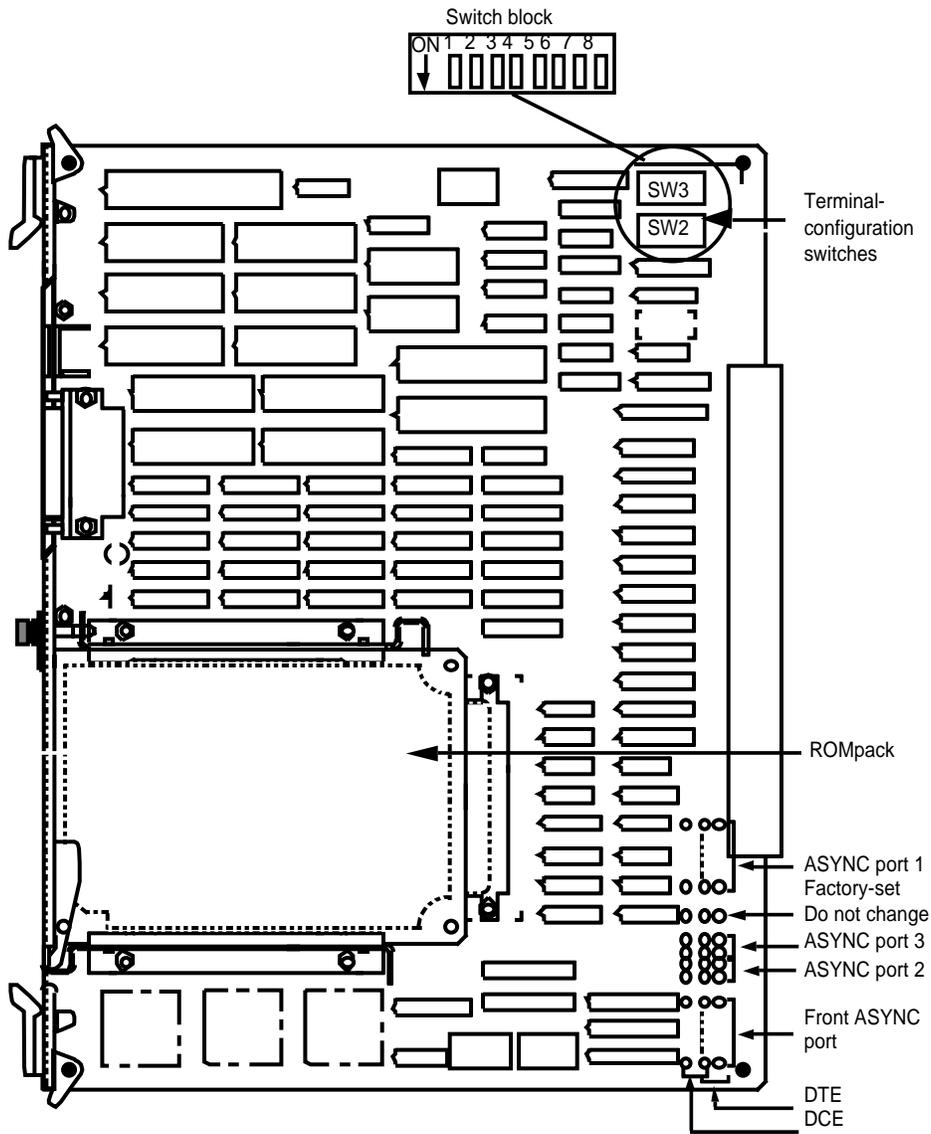
Note: To determine whether to configure a port as DTE or DCE, remember that the jumpers are set to what the DTH is acting as, and not to what is connected to the DTH.

2. Set the terminal configuration DIP switches. There are two DIP switches, whose location is shown in Figure 2-2.

Table 2-3
Configuration jumper settings

Port	Connected to	Jumper setting
Port 1	PAD device	DTE
Port 2	terminal	DCE
Port 3	not used	not used
Front port	modem	DTE
Front port	terminal	DCE

Figure 2-2
CP card



3. Set the terminal configuration DIP switches. To control Asynchronous Port 2 on the backside of the DTH, there are two DIP switches. The location of DIP switches is shown in Figure 2-2. On the NT7F23 CP, place SW2-7, SW3-2, and SW3-8 to 'On', place all the other switches 'Off'.

Set SW 2-6 to On and SW2-7 to Off when connecting the local terminal to the front asynchronous port (the SW3 settings remain the same).

4. Insert the ROMPACK into the slot on the CP card and fasten the thumbscrew.

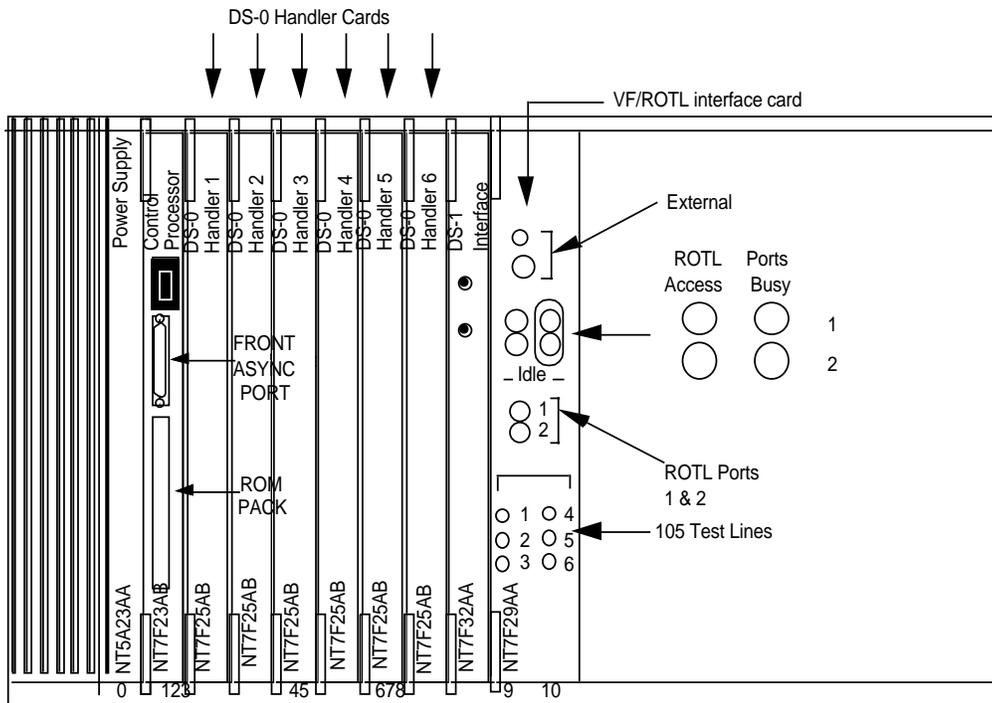
5. Insert the CP card into its slot in the DTH unit (see Figure 1-6).

Inserting the DS0 handler card

You need not configure the DS0 handler card before installing it. Insert it into any of the DS0 handler slots, see Figure 2-3. When installing cards, fill the empty DS0 slots from the left (closest to the CP card) to the right, leaving no empty slots.

Note: A DTH/DTT/ROTL configuration requires at least two DS0 cards.

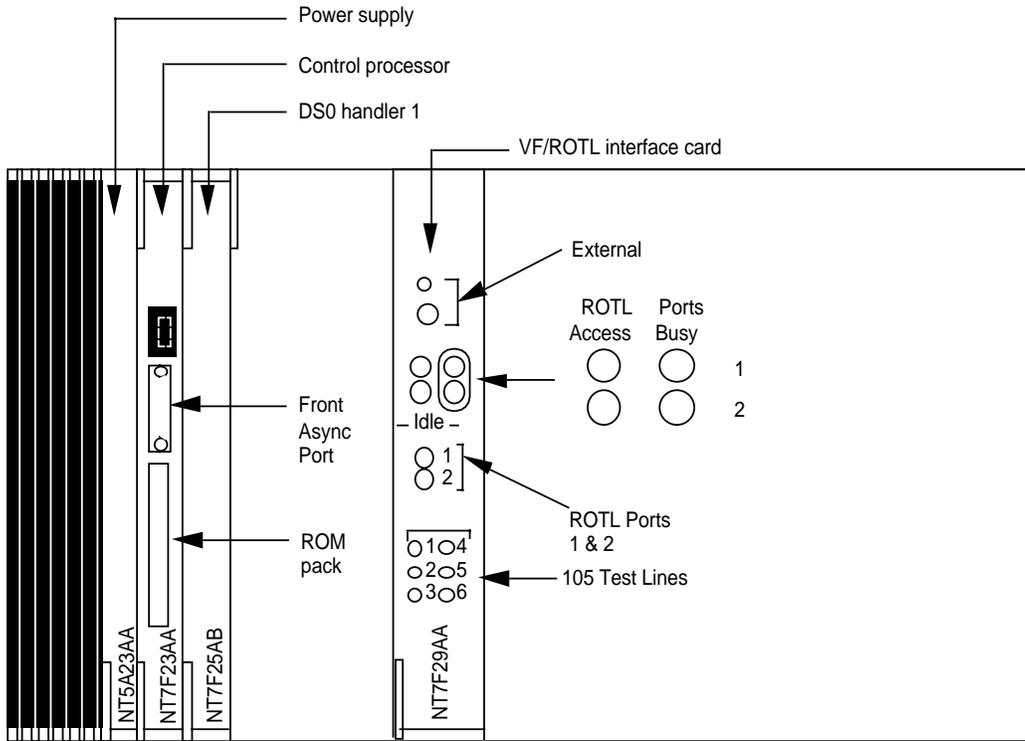
Figure 2-3
Location of DS0 handler cards



Inserting the ROTL card

Insert the ROTL card as shown in Figure 2-4. You can only seat in its proper slot.

Figure 2-4
Location of the ROTL card



DTH alarm(s)

The DTH has two distinct independent alarm systems on the backplane. Either of the two alarm systems work with DTT, ROTL, or DTT/ROTL setups separately. The two alarms are:

1. CPALARM+/CPALARM-
2. PSUTRIP

DTH/ROTL alarm(s)

The DTH/ROTL has two distinct independent alarm systems on the backplane. Either of the two alarm systems work with DTT, ROTL, DTH/ROTL setups separately. The two alarms are:

1. CPALARM+/CPALARM-
2. PSUTRIP.CPALARM+/CPALARM-

CPALARM+/CPALARM-

The CPALARM+/CPALARM- is a two wire alarm that connects the CPALARM+ to the scan point 1.00 and the CPALARM- to the 0X10 scan

point 2.00. Table ALMSC range item #4 has to be set up as a STATE closure (1).

The E connector has an A & AM pair tied down at the ROTL block. This pair is on pins 19 (A, CPALARM+) and 44 (AM, CPALARM-) at the E connector that is internally connected to CPALARM+ and CPALARM- respectively. The alarm fault given at the DMS MAP screen is ROTL/MAJ. This alarm occurs either upon CPU card removal, or during a CPU card failure or malfunction.

PSUTRIP

PSUTRIP is a one wire alarm. Run it from the PSUTRIP stud on the DTH/ROTL backplane to the MTM block. At the MTM block, tie wire down on the scan point 2.10. Table ALMSC range item #4 has to be set up as a NORMAL STATE closure (1). The PSUTRIP alarm shows power failure to the DTH/ROTL shelf at the DMS MAP.

You must connect both of these alarms for the ROTL to have its full alarm system working. Either of these alarms will work independent from each other. The CPALARM+/CPALARM- is failure of the CPU card. The PSUTRIP is for power to the DTH/ROTL shelf.

Note: You will usually have to build a new tuple for the PSUTRIP alarm.

Connect the CPALARM+/CPALARM- alarm to points on one circuit of the 0X10. Connect the PSUTRIP alarm to another 0X10 circuit.

Fuses

Connect the DTH to a 10 A fuse/breaker that may have an alarm. The alarm signal is available on the CPALARM + and CPALARM- terminals.

You must label this fuse/breaker during installation.

Firmware

The DTH firmware is on a ROMPACK on the CP card. The CP itself contains power up firmware so that the DTH can begin boot-up before inserting a ROMPACK.

Attaching power cables and inserting the power supply



WARNING - Fuse/breaker Installation

Remove the CO -48 Vdc main and alarm fuses/breakers, and do not replace them until the installation is complete.

This procedure shows how to connect the power cables and breaker wires. The DTH ensures ISG compliance by means of an isolated power supply. Figure 2-5 shows the backplane and the location of the terminals.

1. Using AWG 12 wire or thicker, connect a power cable from the -48 RET terminal to the CO battery return (ground).
2. Using AWG12 wire or thicker, connect a power cable from the power terminal to the CO battery.
3. Insert the power supply unit in the first slot. Firmly seat the power supply prior to latching it.

The contacts of the alarm relay are brought out to terminals on the backplane where you can wire it to the switching center alarm system. The contacts of the relay have a 2 A at 24 V dc rating. The terminals (shown in Figure 2-5) have the following labels:

- CP ALARM +
- CP ALARM -

To provide a convenient connection to the switch sense points, the contacts of the relay are also brought out, in parallel, to connector E on the backplane. The CP ALARM+ connects to pin 19 and the CP ALARM- to pin 44 on connector E. Use only one set of contacts.



CAUTION - Card installation

Do not install any cards into the DTH while power is applied.

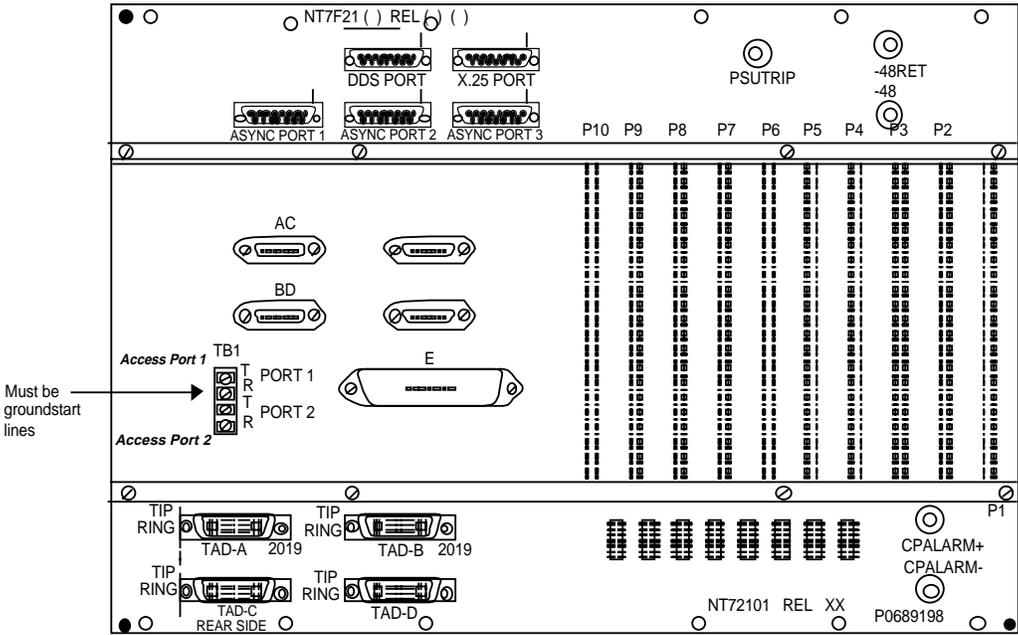
ROTL cabling

Connect the ROTL cables to connectors A through E and TB 1 on the DTH as detailed in Table 2-4.

Table 2-4
ROTL connectors

Connector name	Use
ROTL A	T and R for test trunks and 105 test lines
ROTL B	T1 and R1 for test Trunks and 105 test lines
ROTL C	E and SIG leads for test trunks and 105 test lines
ROTL D	M and SIB for test trunks and 105 test lines
ROTL E	Sense and control points for test trunks
TB!	Access ports 1 and 2

Figure 2-5
DTH backplane for ROTL connectors



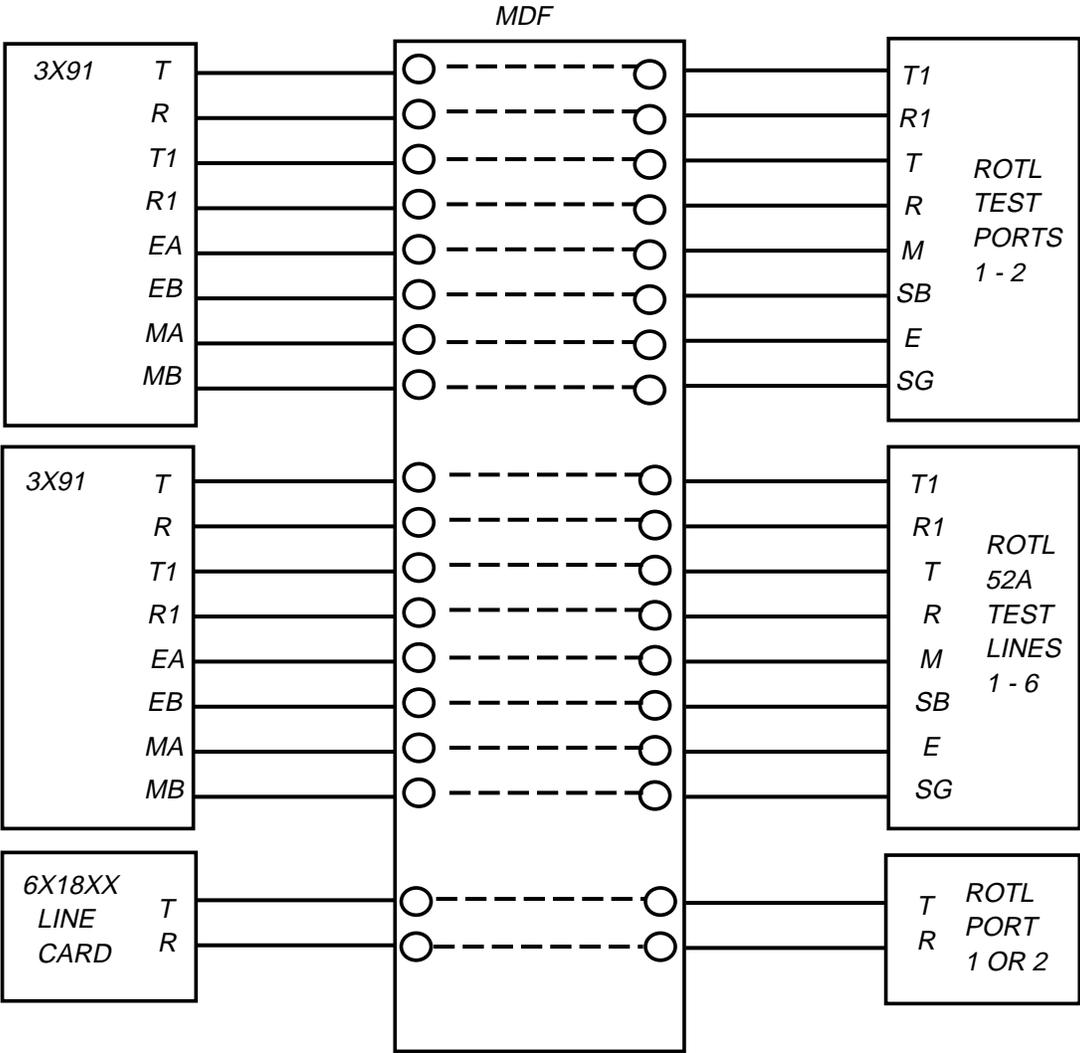
2-12 Installing DTH/ROTL

Figure 2-6
MDF terminations for connectors A-E and TB1

		1	2	3	4	5	6	7	8	9	10	11	12
TO CONN	SB BL2W	O2W	G2W	BR2W	S2W	BL2R	O2R	SB G2R	C3M BR2W	S3M BR2BK	C3M G2R	S3M G2Y	
	M BL1W	O1W	G1W	BR1W	S1W	BL1R	O1R	M G1R	C3 BR1W	S3 BR1BK	C3 G1R	S3 G1Y	
TO CONN	SG BL2W	O2W	G2W	BR2W	S2W	BL2R	O2R	SG G2R	C2M G2W	S2M G2BK	C2M O2R	S2M O2Y	
	E BL1W	O1W	G1W	BR1W	S1W	BL1R	O1R	E G1R	C2 G1W	S2 G1BK	C2 O1R	S2 O1Y	
TO CONN	R1 BL2W	O2W	G2W	BR2W	S2W	BL2R	O2R	R1 G2R	C1M O2W	S1M O2BK	C1M BL2R	S1M BL2Y	
	T1 BL1W	O1W	G1W	BR1W	S1W	BL1R	O1R	T1 G1R	C1 O1W	S1 O1BK	C1 BL1R	S1 BL1Y	
TO CONN	R BL2W	O2W	G2W	BR2W	S2W	BL2R	O2R	R G2R	COM BL2W	SOM BL2BK	COM S2W	SOM S2BK	
	T BL1W	O1W	G1W	BR1W	S1W	BL1R	O1R	T G1R	CO BL1W	SO BL1BK	CO S1W	SO S1BK	
DMS MAP	ROTL TP 0	ROTL TP 1	TERM 105 0	TERM 105 1	TERM 105 2	TERM 105 3	TERM 105 4	TERM 105 5	ROTL TP 0	ROTL TP 0	ROTL TP 1	TP 1	
DTH TERMINAL	TST PORT 1	TST PORT 2	TST LINE 1	TST LINE 2	TST LINE 3	TST LINE 4	TST LINE 5	TST LINE 6	TO CONN. "E"				
	ROTLTP INFORMATION		TERM105 INFORMATION						NTOX26BX				
2	AM BR2Y	R1 BLUE	R2 WHITE										
	A BR1Y	T1 BLK	T2 RED										
1	ALM CONN E	1 2 ACCESS											

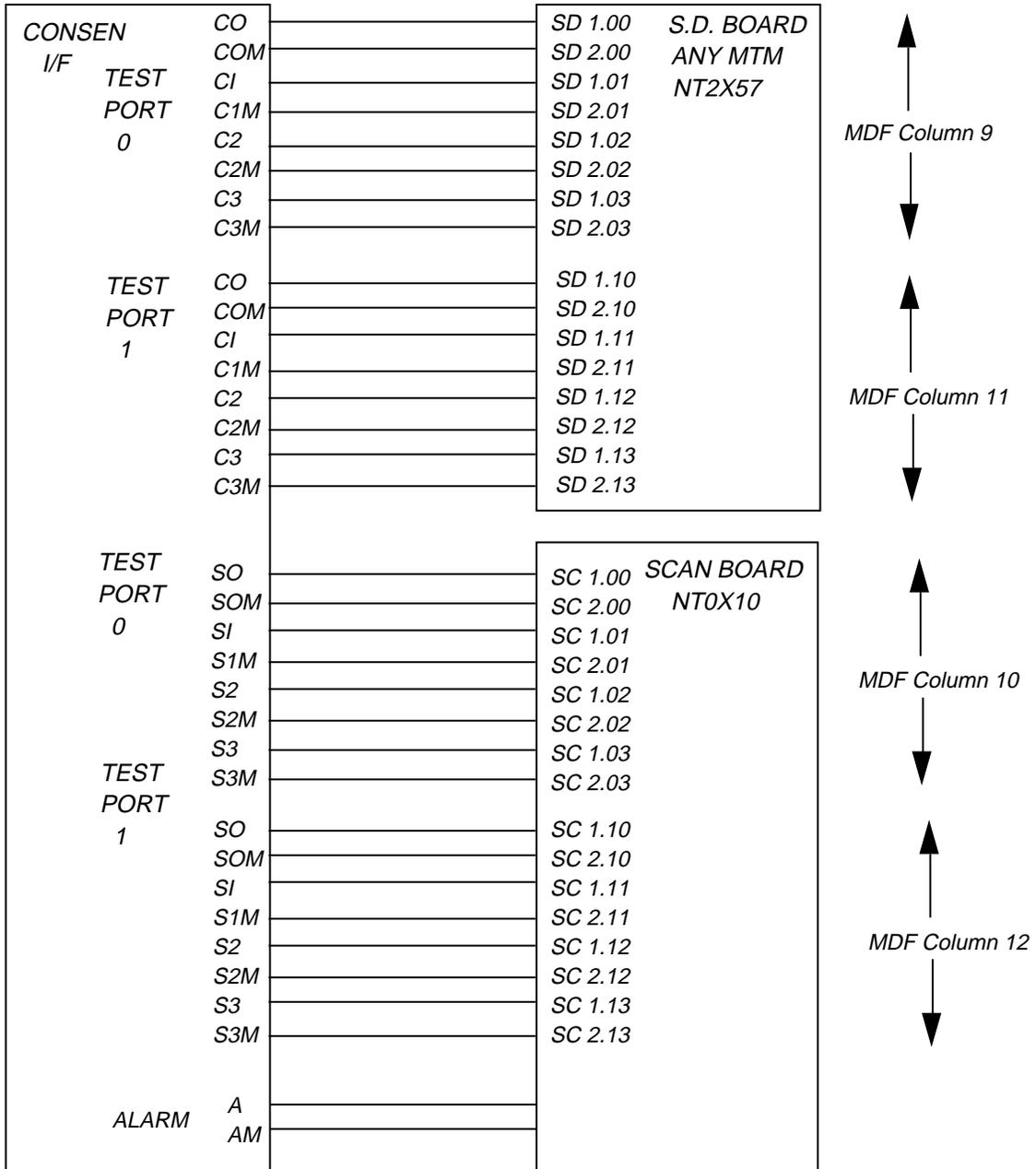
Note: Figure 2-6 is for reference only. Refer to the Central Office 050 drawings for actual wiring information.

Figure 2-7
Additional cross connection information (Connector E)



Note: Dial up lines must be ground start.

Figure 2-8
Additional cross connection Information (Connector E)



Note 1: Dial up lines must be ground start.

Note 2: References to *MDF Columns* above are related to Figure 12.

Connecting and configuring the local terminal

You can have the local terminal near the DTH, or in a remote location.

Using an RS-232C cable not longer than 15.24 m (50 ft.), connect the DTH to the video terminal (or to a modem if the terminal is located remotely).

Connecting to a VT220 (or equivalent) video terminal

If the local terminal is located within 15.24 m (50 ft.) of the DTH, take the following steps to connect it:

1. Connect an RS-232C cable (NT7F27DB) to the EIA host port connector on the back of the VT220 terminal.
2. Connect the other end of the cable to port 2 on the DTH backplane. See Figure 2-5.
3. The VT220 set up is as shown in Table 2-5.

Table 2-5
VT220 local terminal set up

Communication set-up	General set-up
7 bits/character	VT200 mode, 7 bits
Odd Parity	TX=Rx
1 Stop Bit	
9600 Baud Rate	
Xoff 64	

DTH power up

After installing and configuring the circuit packs, and connecting the appropriate cabling, power up the DTH by inserting its fuse/circuit breaker at the power source. After doing this, check the indication of the LED display on the control processor board, you should see a 0, indicating a power up and then, after about three minutes, a 1 indicating normal operation. If you see either of the other possible indications listed in Table 2-6, there is a problem, that requires troubleshooting. You must label this fuse/breaker, usually located in the FSP of the MIS Bay housing the DTH, during installation.

Note: Also compare DTH and DMS Framing Format and Line Code as shown in the DTT Datafill instructions step 3.

LED display

LED display on the CP card faceplate shows the status of DTH. The meanings of the numbers on the display are shown in Table 2-6.

Table 2-6
LED definitions

Indication	Meaning
0	Powerup
1	Normal operation
2	CID hardware corrupt, cannot start
3	No test-access interface, cannot start
4	No fully functional DSO handlers, cannot
5	ROTL application malfunctioned

DTH power down

Every time you reset or remove power from the DTH, go to the MAP terminal and busy the trunks associated with the ROTL, TERM 105, DTHTP, and TERM 108. After again applying power to the DTH, return these trunks to service. If you do not busy the trunks before power down, the SCC receives a number of log messages.

Installing DTH/DTT

This chapter explains how to install the DTH/DTT configuration. If you are installing a DTH/ROTL, refer to that section elsewhere in this document.

The major steps in installation are as follows:

- unpacking
- mounting
- connecting the breaker trip on the FSP
- connecting the power supply, breaker trip, and office alarm cables
- inserting the power supply unit
- configuring and inserting the control processor (CP) card, including the ROMPACK
- connecting and configuring the local terminal
- inserting the DS0 handler card(s)
- inserting the appropriate interface card(s) and connecting the cables

Shipping

The DTH is shipped as a unit ready to assemble and install. It can withstand normal truck and air freight transportation.

Note: If shipping had the DTH at an extreme temperature, do not install it for at least an hour. The DTH cards must acclimate to their operating temperature before DTH power up. This helps to prevent thermal shock, particularly when the DTH when shipping was in a very cold environment.

Unpacking the DTH



CAUTION

ELECTROSTATIC DISCHARGE (ESD)

When handling any modules, use ESD protection to ensure against damage to electronic components.

Wear grounding wrist straps, and connect them to the frame ground when removing or replacing modules. At all other times (such as shipping or storage), keep the modules in their protective bags.

To unpack the DTH:

1. Open the top of the carton and remove the packing material. Each card has its own wrapping, open it carefully. Handle a card by its faceplate, and be conscious of static discharge.
2. Check the contents against the packing list and report any discrepancies.
3. Inspect the shipping material for evidence of any shipping damage.

Note: Keep all shipping material for repacking and shipping if necessary.

Mounting DTH

The unit mounts on a rack. You can mount it in a standard 58.42 cm (23 in.) rack with EIA or WECO hole sizes and spacing. Alternatively, you can mount it in a standard 66.02 cm (26 in.) rack (using the provided rack adapters). When installing the DTH in the rack, mount it with the width of the unit in the horizontal plane as shown in Figure 3-1.

To mount the DTH, use a ratchet set, and the mounting hardware provided. Perform the following steps:

1. Determine where in the bay to mount the DTH.

Note: There must be at least 12.7 cm (5 in.) of clear space above and the unit.

Note: Do not mount a DTH above a heat source that would raise its temperature above the maximum ambient limit.

2. Carefully slide the shelf between the rack uprights, and position it over the assigned mounting holes.
3. Use the ratchet set to secure the shelf in place using the 12 screws provided. Use a star washer for the lower-left and upper-right mounting

bolts on both the shelf brackets and frame to ensure adequate chassis-to-bay grounding.

Miscellaneous

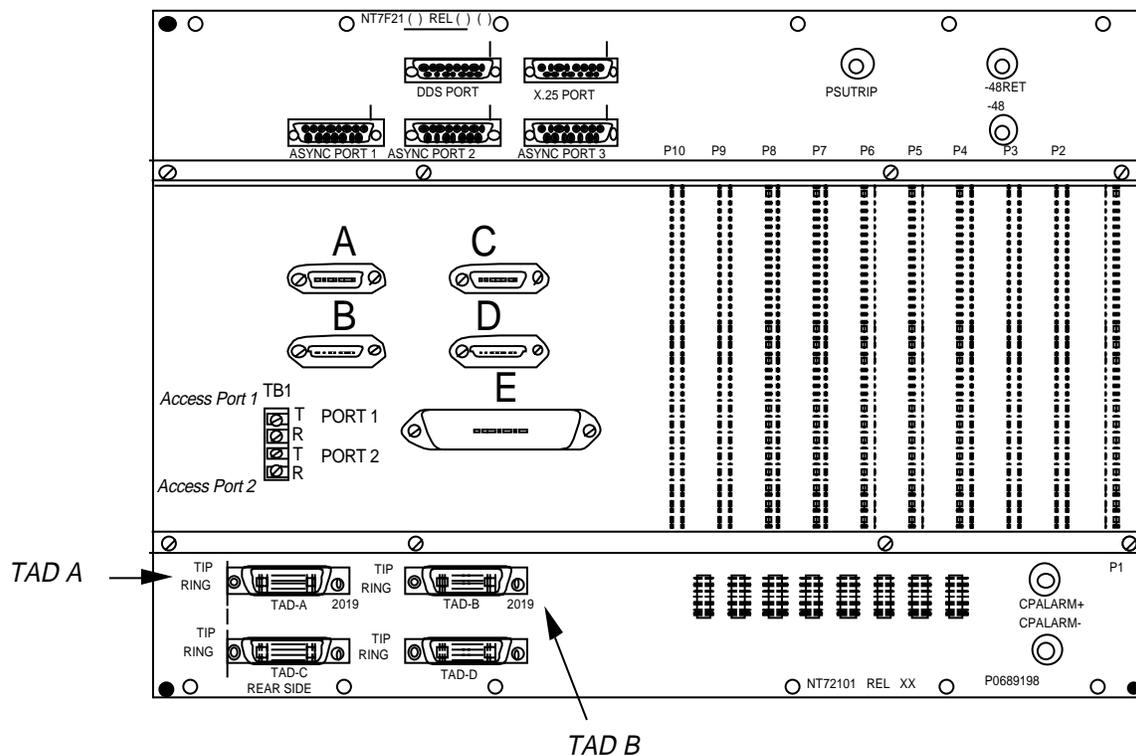
Install the NT3X25AA Common Equipment Shelf in MIS004, shelf position.

Install AC for the Common Equipment Shelf per IM926, see Section 2272, 2276.

The DTH backplane and connections

The front asynchronous port is on the front panel of the CP card. It supports modem access to the local terminal. All other signal connectors, except for the jacks on the ROTL card for the manual interrogator and headphones, are on the backplane, see Figure 3-1. The backplane has a plastic shield that you must remove before performing any activities on it.

Figure 3-1
DTH backplane w/o TAD connections



DTH connections

Table 3-1 explains the connections on the DTHs backplane.

Table 3-1
DTH backplane connections

Connector name	Use
DDS port	not used
X.25 port	not used
Asynchronous port 1	PAD
Asynchronous port 2	PAD/local terminal

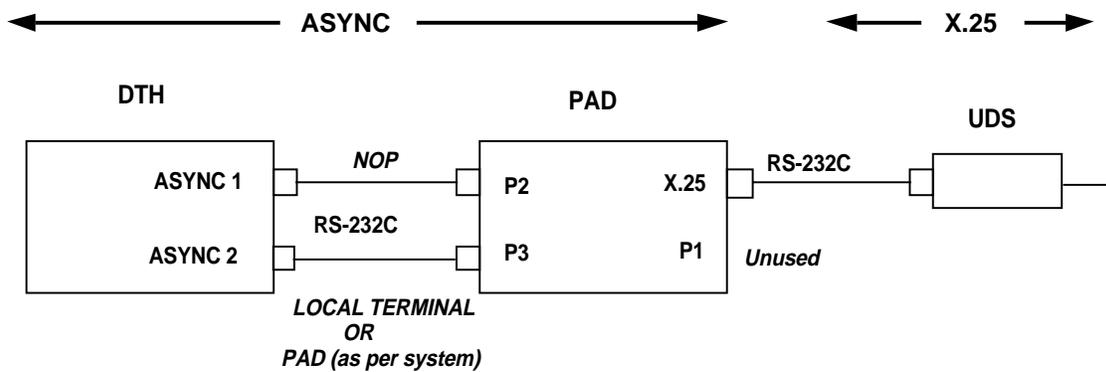
DTH PAD UDS interconnection

Figure 3-2 shows how to interconnect the DTH, the PAD, and the UDS MR-1 data service unit. The DTH shipping package includes the cables between the DTH and the PAD. The package does not include cable between the PAD and the UDS. Install the RS-232C cables between the units at this time, but do not apply power to the units.

- Run a NT7F27DA cable between the ASYNC I Port of the DTH and P2 of the PAD.
- Run a NT7F27DA cable between either the
 - DTHs ASYNC 2 port and P3 of the PAD, or
 - ASYNC 2 Port and the local terminal

depending upon your system requirements.

Figure 3-2
DTH-PAD-UDS interconnection



RS-232C ports

The DTH has with three operational asynchronous ports. They use the RS-232C interface standard, and have 25-pin D female connectors. The ports configuration is:

- Port 1 - on the backplane; supports all modem control signals. This is currently the network operations protocol (NOP) port.
- Port 2 - on the backplane; supports only the receive and transmit signals (local terminal port)
- Port 3 - on the backplane; currently not in use
- Front asynchronous port - on the front panel of the CP card; supports all modem control signals

You can configure all the RS-232C ports independently as data terminal equipment (DTE) or data communication equipment (DCE) using the configuration jumpers on the CP card. To configure the local terminal, and NOP parameters, use the dual in-line package (DIP) switches on the CP card. Configure the baud rate, parity, and stop bits by toggling the DIP switches.

All RS-232C connectors have pin assignments as shown in Table 3-2.

Table 3-2
RS-232C pin assignments

Pin	Signal
1	no-connect
2	receive (Rx)
3	transmit (Tx)
4	signal ground

DTH alarm(s)

The DTH has two distinct independent alarm systems on the backplane. Either of the two systems work with DTT, ROTL, or DTT/ROTL setups separately. The two alarms are:

1. CPALARM+/CPALARM-
2. PSUTRIP

CPALARM+/CPALARM-

The CPALARM+/CPALARM- is a two wire alarm that connects the CPALARM+ to the 0X10 scan point 1.00, and the CPALARM- to the 0X10 scan point 2.00. Set up Table ALMSC range item #4 as a NORMAL STATE closure (1).

If the DTH is set up for a DTT, run two wires from the backplane CPALARM+/CPALARM- studs to the MTM block with the 0X10 scan points.

PSUTRIP

PSUTRIP is a one wire alarm. Run it from the PSUTRIP stud on the DTH/ROTL backplane to the MTM block. At the MTM block, tie wire down on the scan point 2.10. Table ALMSC range item #4 has to be set up as a NORMAL STATE closure (1). The PSUTRIP alarm shows power failure to the DTH/ROTL shelf at the DMS MAP.

Note: You will usually have to build a new tuple for the PSUTRIP alarm.

Connect the CPALARM+/CPALARM- alarm to points on one circuit of the 0X10. Connect the PSUTRIP alarm to another 0X10 circuit.

Fuses

Connect the DTH to a 10 A fuse/breaker that has an alarm. The alarm signal is available on the CPALARM + and CPALARM- terminals.

Label this fuse/breaker during installation.

Firmware

The DTH firmware is on a ROMPACK on the CP card. The CP itself contains power up firmware so that the DTH can begin boot-up before inserting a ROMPACK.

Attaching power cables and inserting the power supply



Danger of electric shock

Fuse/breaker installation

When running power cables, remove the CO -48 Vdc main and alarm fuses/breakers, and do not install them until installation is complete.

This procedure shows how to connect the power cables, breaker wires, and frame ground wire. The DTH ensures ISG compliance by means of an isolated power supply. Figure 3-4 shows the backplane and the location of the terminals.

1. Using AWG 12 wire or thicker, connect a power cable from the -48 RET terminal to the CO battery return (ground).
2. Using AWG 12 wire or thicker, connect a power cable from the -48 power terminal to the CO battery.

3. Insert the power supply unit in the first slot. Firmly seat the power supply prior to latching it.

The contacts of the alarm relay are brought out to terminals on the backplane where it can be wired into the switching center alarm system. The contacts of the relay are rated at 2 A at 24 Vdc. The terminals are labeled as follows:

- CP ALARM +
- CP ALARM -

To provide a convenient connection to the switch sense points, the contacts of the relay are also brought out, in parallel, to connector E on the backplane. The CP ALARM + is assigned to pin 19; the CP ALARM- is assigned to pin 44. Use only one set of contacts.

DTT cabling

The DTT cabling between the DTH TAD B, the DSX bay and DTC bay is explained here. Connect the TAD B cable to connector TAD B on the back of the DTH as shown in Figure 3-3. Do not connect the TAD A on either end.

3-8 Installing DTH/DTT

Figure 3-3
DTH backplane w/ TAD connections

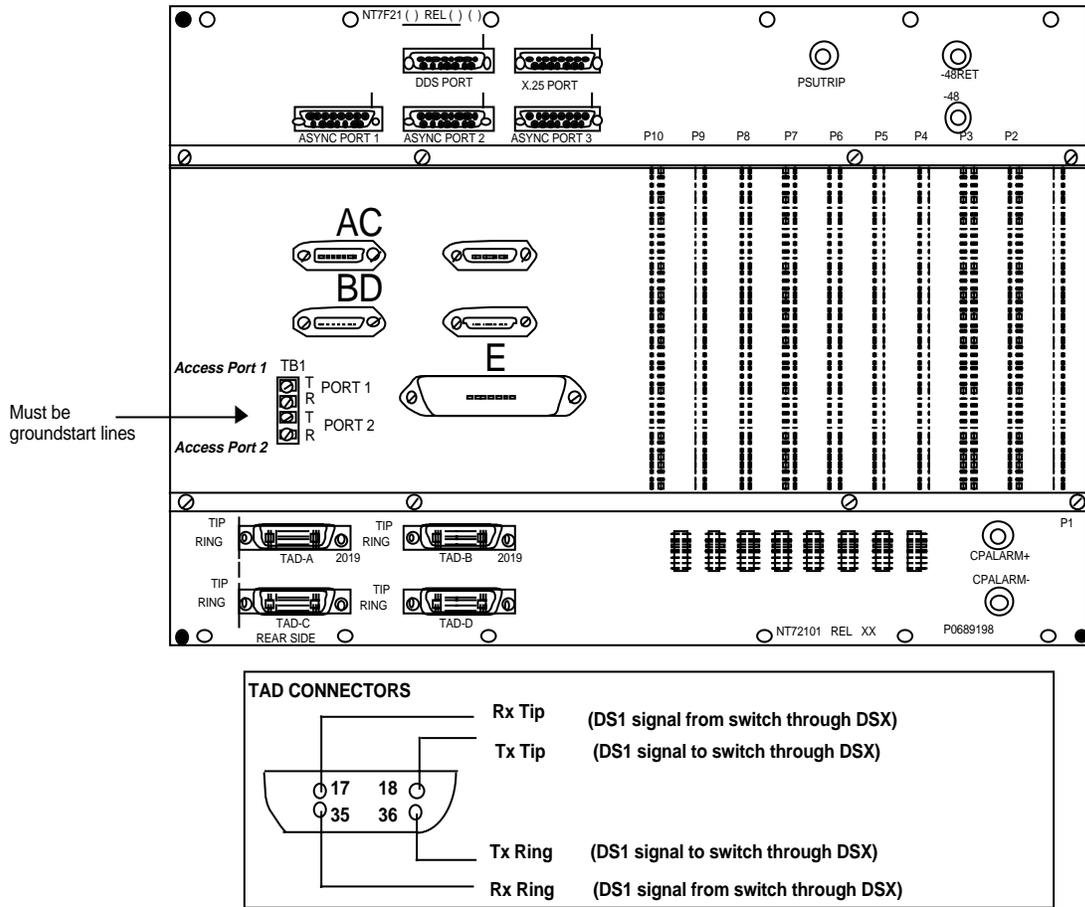
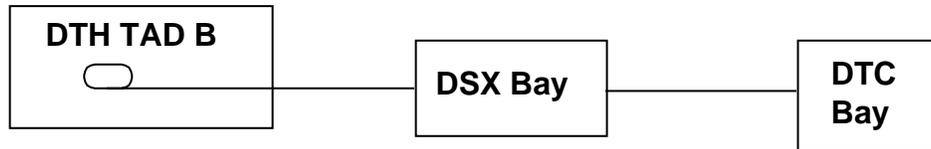


Table 3-3
DTT connector

Connector Name	Use
TAD A	Test access digroup, DS1 interface 1
TAD B	Test access digroup, DS1 interface 2
TAD C	not used
TAD D	not used

Figure 3-4
TAD B - DTC interconnection diagram



Note: Setting up the TAD B cables is setting up the term108 test lines.

Table 3-4 shows the pin number and wire color for the TAD B connector.

Table 3-4
TAD B pin and wire assignments

Pin	Color
18	red (Tx) (to switch) (tip)
36	yellow (Tx) (to switch) (ring)
17	green (Rx) (from switch) (tip)
35	white/green (Rx) (from switch) (ring)

Configuring and installing the DTH's circuit packs

Configuring and inserting the CP card

To configure and insert the CP card, follow these steps:

1. Using the configuration jumpers, set the RS-232C ports of DTH to the configuration, either DCE or DTE.

The location of the configuration jumpers is shown in Figure 3-5, which shows the suggested settings.

To configure a port as DCE, place a jumper over the left pair of pins. To configure a port as DTE, place a jumper over the right pair of pins.

Note: To determine whether to configure a port as DTE or DCE, remember that the jumpers are set to what the DTH is acting as, and not to what is connected to the DTH.

2. Set the terminal configuration DIP switches. There are two DIP switches. The location of DIP switches is shown in Figure 3-5. On the NT71723

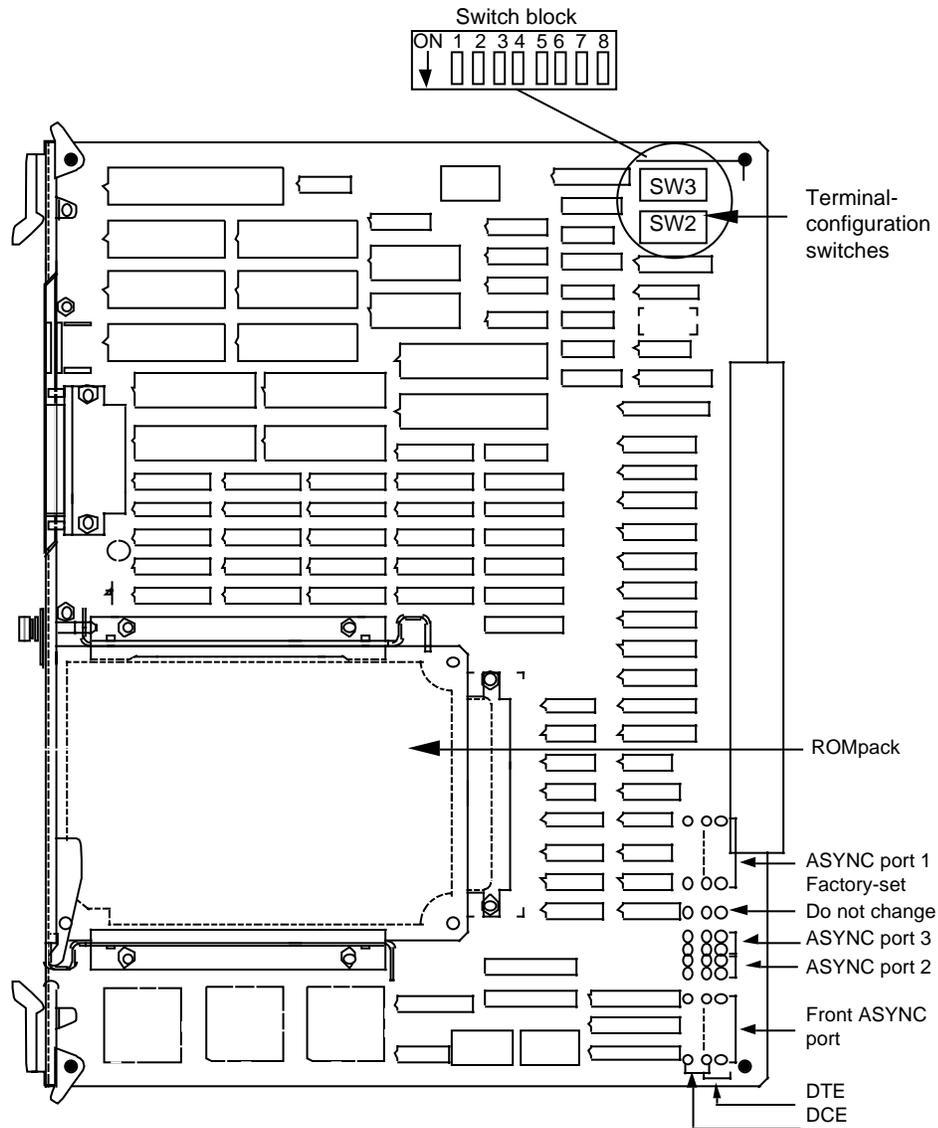
3-10 Installing DTH/DTT

CP, place SW2-7, and SW3-2, and SW3-8 ON, place all the other switches OFF.

Table 3-5
Configuration jumper settings

Port	Connected to	Jumper setting
Port 1	PAD device	DTE
Port 2	terminal	DCE
Port 3	not used	not used
Front port	modem	DTE
Front port	terminal	DCE

Figure 3-5
CP card



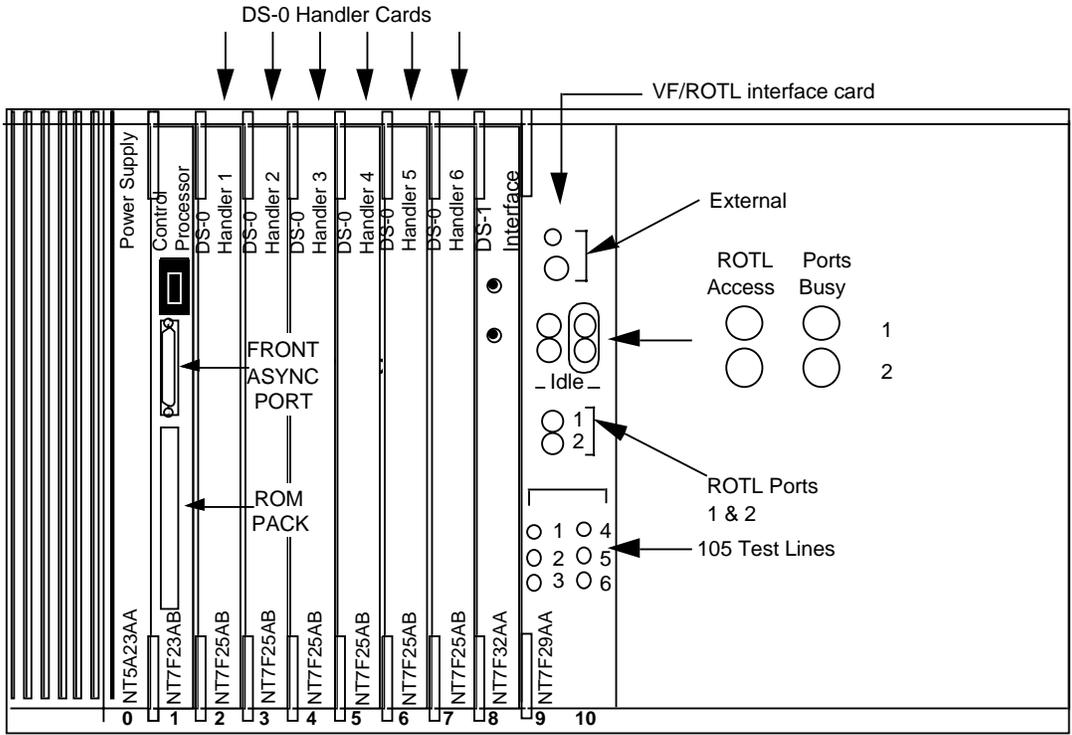
Set SW 2-6 to ON when connecting the local terminal to the front asynchronous port.

1. Insert the ROMPACK into the slot on the CP card and fasten the thumb screw.
2. Insert the CP card into its slot in the DTH unit (see Figure 1-6).

Inserting the DS0 handler card

You need not configure the DS0 handler card before installing it. Insert it into any of the DS0 handler slots, see Figure 3-6. When installing cards, fill the empty DS0 slots from the left (closest to the CP card) to the right, leaving no empty slots.

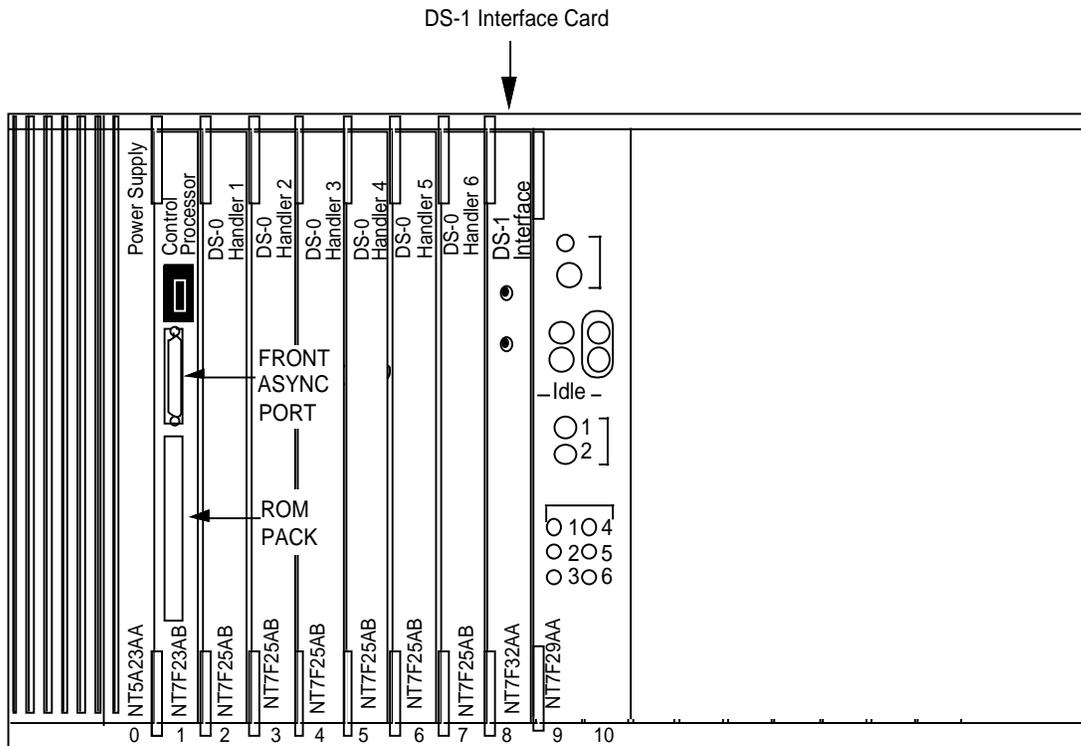
Figure 3-6
Location of DS0 Handler cards



Inserting the DS1 interface card

Insert the DS1 interface card as shown in Figure 3-7. You can only seat in its proper slot.

Figure 3-7
Location of the DS1 interface



DTH power-up

After installing and configuring the circuit packs, and connecting the appropriate cabling, power up the DTH by inserting its fuse/circuit breaker at the power source. After doing this, check the indication of the LED display on the control processor board, you should see a 0, indicating a power up and then, after about three minutes, a 1 indicating normal operation. If you see either of the other possible indications listed in Table 3-6 there is a problem that requires troubleshooting. You must label this fuse/breaker, usually located in the FSP of the MIS Bay housing the DTH, during installation.

Note: Also compare DTH and DMS framing format and line code as shown in the DTT datafill instructions step 3.

LED display

The LED display on the CP card faceplate shows the status of DTH. The meanings of the numbers on the display are shown in Table 3-6.

Table 3-6
LED definitions

Indication	Meaning
0	power-up
1	normal operation
2	CP hardware corrupt, cannot start
3	no test access interface, cannot start
4	no fully functional DSO handlers, cannot start
5	ROTL application malfunctioned

DTH power down

Every time you reset or remove power from the DTH, go to the MAP and busy the trunks associated with the ROTL, TERM 105, DTHTP, and TERM 108. After again applying power to the DTH, return these trunks to service. If you do not busy the trunks before power down, the SCC will receive a number of log messages.

DTH/ROTL set-up

After a successful power-up, set-up and configure the DTH with the appropriate equipment to be used for testing. This means calibrating the ROTL and provisioning the accompanying 105 test lines.

DTH/ROTL set-up

DTH/ROTL calibration

The calibration of the ROTL requires knowledge of the DMS-100 operations. When you replace either the NT7F29 on the DTH, or the 3X91 or 2X59 on the switch, you must re-calibrate the DTH/ROTL. If you replace either the NT7F23 and/or the NT7F26 on the DTH, re-calibrate the DTH.

To prepare for ROTL calibration, you must:

1. Set up the local terminal.
2. Log in to the local terminal and MAP.
3. Stop the ROTL.
4. Busy all trunks.
5. Set the 3X91 switches (for BCS 34 and earlier; BSC 35 and later do not require that you remove 7 dB).

After performing these steps, calibration may begin. Upon completion of calibration, return the busied trunks to service.

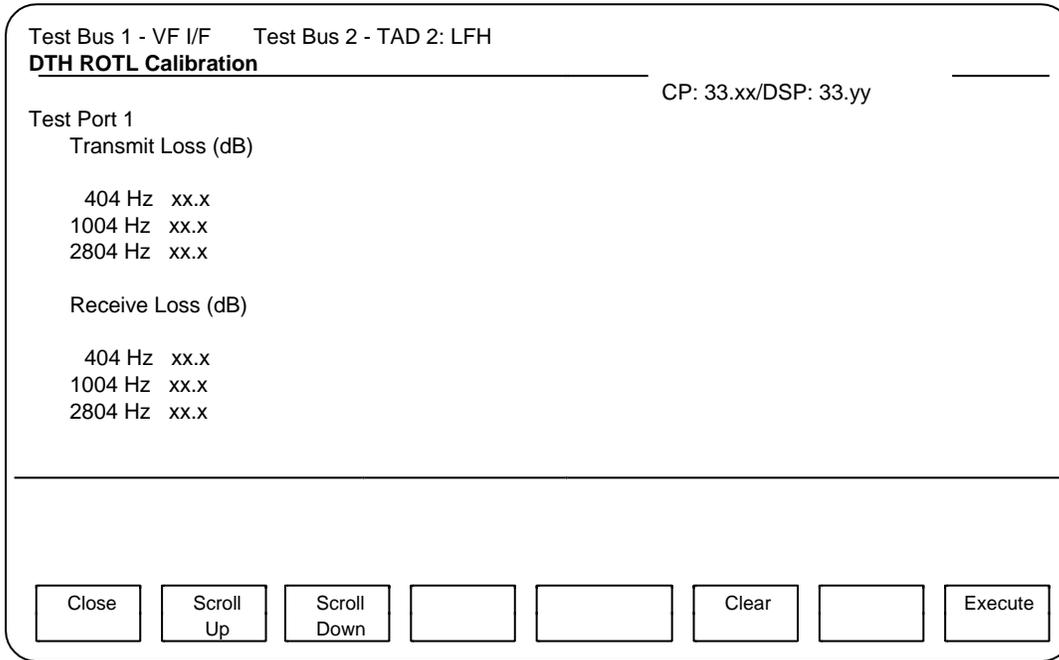
Setting up the local terminal

Set-up the VT220 according to the instructions in Table 2-5.

Logging in

Log on to the local terminal with a login of **admin** and a password of **system**. Then log on to your MAP, whose login and password you should already know.

Figure 4-1
ROTL commands screen

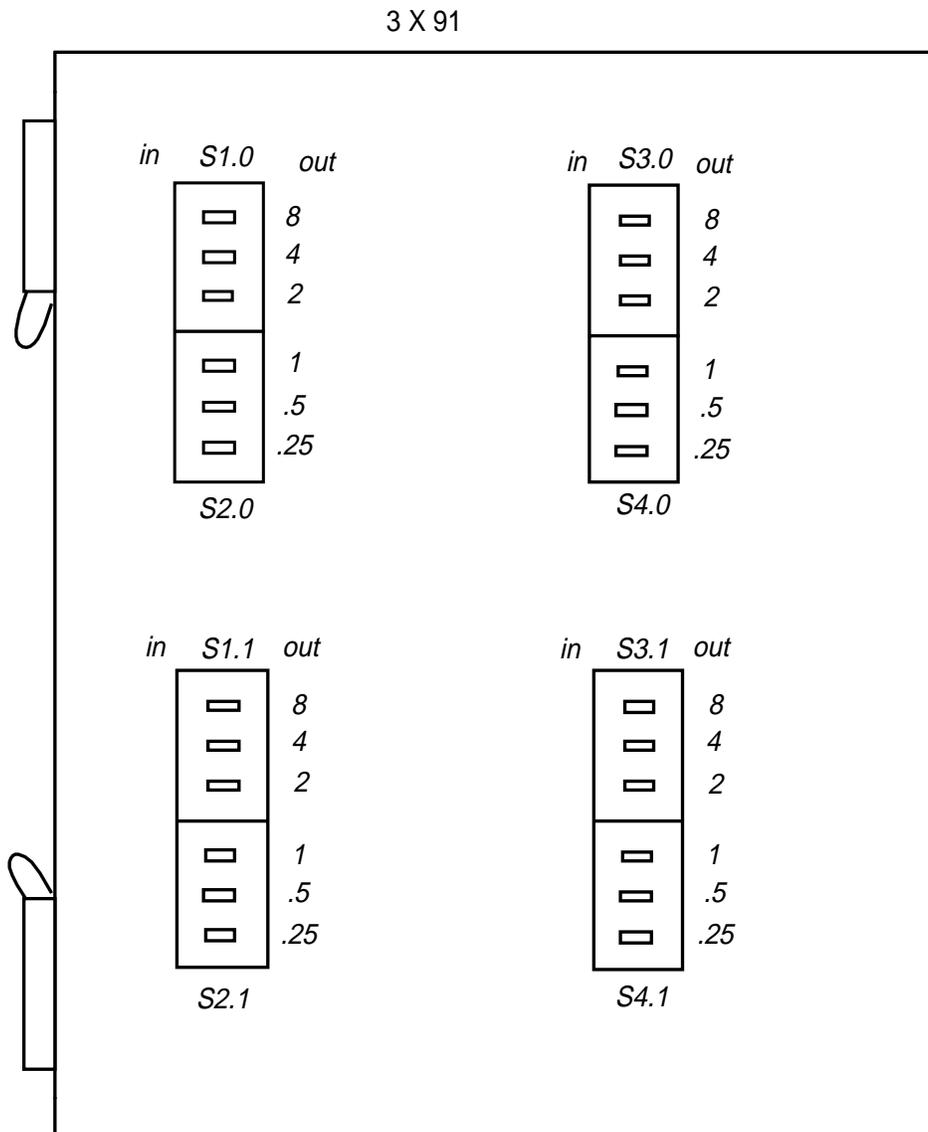


Stopping the ROTL

To begin the procedure (see Figure 4-1):

1. Use the arrow keys on the local terminal, to move the cursor to the Stop ROTL option.
2. Choose the **select** softkey, and see the ROTL Commands screen.
3. To stop the ROTL, move the cursor to the Stop ROTL option, and choose the **select** softkey.
4. Look for a 'Working...' message and then a 'ROTL functionality stopped' message.

Figure 4-2
3X91 card, DIP switch reference



Busying the trunks

To busy all the trunks, enter the following at the MAP (press **Return** after each entry):

```
>MAPCI; MTC; TRKS; TTP; MANUAL; POST G (either
ROTLTP or TERM 105)
```

```
>BSY INB ALL
```

Setting the 3X91 switches

To begin the process of setting the 3X91 switches, at the MAP, (mapci;mtc;trks;ttp), post the first ROTL port and perform a diagnostic on that circuit. Do this for each ROTL port and TERM105 test line.

Setting a zero point of reference

To set a zero point of reference:

1. Disconnect connectors A, B, C, D, and E from the DTH backplane.
2. Find the location of each ROTLTP and TERM 105 (3X91 location and its circuit number). >POS G (ROTLTP or TERM 105), press **Return** at the MAP.
3. Write each location down (TM8 number and circuit number). To go to the next circuit, type NEXT or 12 at the MAP.
4. If the circuit is EVEN, the transmit pins on the TM8 backplane are T-2A and R-3A. The receive pins are TI-34A and RI-33A.
5. If the circuit is ODD, the transmit pins on the TM8 backplane are T-4A and R-5A. The receive pins are TI-32A and RI-31A.

Zeroing the backplane -- the zero point of reference

6. At the terminal, move the cursor down to the DTH/ROTL Calibration option, and choose **select**. The cursor moves to Test Port 1. (You can change the port number by pressing either **F7** or **F8** to scroll up or down respectively. After Test Port is Test Line.)
 - a. test port maximum of two per DTH/ROTL
 - b. test line maximum of six per DTH/ROTL
7. Busy the circuit at the MAP that corresponds with the test port or test line posted on the terminal screen. Pull that 3X91 out and verify that the transmit and receive pads are set initially to RX=12 and TX=9.
8. Verify that the dip switches are set as shown in Table 4-1.

Table 4-1
3X91 DIP switch settings

	Receive In	On	Transmit In	On
Even	S1.0	4, 8	3.0	8
Circuit	S2.0	0	S4.0	1
Odd	S3.1	4, 8	S3.1	8
Circuit	S2.1	0	S4.1	1

9. Re-install the 3X91 card.

Transmit zeroing procedure

Connect the TTS, HP 4935A, for example, to the TRANSMIT Tip and Ring pins. These are the pins on the backplane of the TM8 that support the 3X91 the DTH terminal has posted (even circuit T-2, R-3; odd circuit T-4, R-5).

Configure the TTS as shown in Table 4-2.

Table 4-2
TTS configuration

Display	Receive (RCV)
310 plug	set in the Normal position
Set up	terminate into 600 ohms
Measurement	level frequency
Termination	made to the TTS

To begin the procedure:

1. Verify that TABLE TRKGRP contains the NO PAD Group Option (NPDGP) for ROTLTP AND TERM 105 (POST G ROTLTP or POST G TERM 105)
2. Verify that TABLE MWDATA contains the following: 0 0 1004.

Note: If your switch software is BCS 35 or later, do not take 7 dB out of the 3X91 Pads. (The 3X91 will only need [BSY (busy), TST (test), RTS (return to service)] and continue the calibration procedure.) Prior to BCS 35 the calibration of each ROTLTP and TERM 105 was made easier by subtracting 7dB from the TRANSMIT pad on each 3x91 (EVEN S3.0/S4.0, ODD S3.1/4.1) There should be 2.00 dB padding in the TRANSMIT PAD of each circuit when the 7 dB is taken out.

Note: Each time you change the 3X91 pad switches, BSY, TST, and RTS the 3X91 card(s). Perform a test on these cards; the test fails because the hardware setting and the software in the switch does not match. Once these steps are complete, begin calibration.

3. At the MAP, (RTS) the 3X91 that connects TTS to its backplane pins. Enter TGEN 404 0 at the MAP, and press **Return**. The TTS reads 404 0 in the RECEIVE mode. Do the same for each tone 1004 0 and 2804 0 (see Table 4-3). The TTS should read the same frequency that you TGEN. If the readings are +/- .2 OUT, busy the 3X91, and change the TRANSMIT pad by 0.25 dB.

Table 4-3
TGen frequencies

MAP TGen frequency	TTS reading
404 0	.2 404
1004 0	.2 1004
2804 0	.3 2804

Note: If you take out or put in more than 0.25dB of padding in the physical pad(s) of the 3X91, replace it (8.75 - 9.25 -TX is the range).

4. BSY the 3X91 circuit and remove that 3X91. Take 0.25 dB out of the transmit padding. The transmit value becomes 8.75 dB. Return the 3X91 to its TM8 slot, and RTS the circuit.

Note: Each time you change the 3X91 pad switches, you must BSY, TST, and RTS the 3X91 card(s). Performing a test sets the new pad setting in the switch.

5. Repeat Step 3. Your TIP and RING pins are still connected. The readings should be similar to those shown in Table 4-4.

Table 4-4
3X91 adjusted termination to the TTS

MAP TGen frequency	TTS reading
404 0	.0 404
1004 0	.0 1004
2804 0	.1 2804

Receive zeroing procedure

6. BSY the circuit at the MAP that corresponds with the test port or test line shown on the terminal screen.

Note: Each time you change the 3X91 pad switches, BSY, TST, and RTS the 3x9l card(s). Performing a test sets the new pad setting in the switch.

7. Connect the TTS, to the Receive Tip and Ring pins. These are the pins on the backplane of the TM8 that supports the 3X91 the terminal has posted (even circuit T-34, R-33; odd circuit T-32, R-3 1).

8. Configure the TTS as shown in Table 4-5..

Table 4-5
TTS configuration

Display	Transmit (TRMT)
310 plug	Set in the Normal position
Set up	Terminate into 600 ohms
Measurement	Level frequency
Termination	Made to the Transmission Test Set

9. At the MAP, RTS the 3X91 that has the TTS connection to its backplane pins. Enter LOSS at the MAP, and press **Return**. The TTS transmits 404 0 to the MAP. (Do the same for each tone 1004 0 and 2804 0. See Table 4-6. The switch reads a zero (0) LOSS. If the readings are +/- .2 OUT, busy the 3X9 1, and change receive pad by 0. 25 dB.

Note: If you insert or remove more than 0.25 dB of padding in the physical pad(s) of the 3X91, replace it (11.75 - 12.25 -RX is the range.)

Table 4-6
3X91 RECEIVING from TTS

MAP TGen frequency	MAP reads loss
404 0	.2
1004 0	.2
2804 0	.3

10. BSY the 3X91 circuit and remove that 3X91. Remove 0.25 dB from the receive padding. The receive value becomes 11.75 dB. Put the 3X91 back into its TM8 slot and RTS the circuit.

Note: Each time you change the 3X91 pad switches, BSY, TST, and RTS the 3x91 card(s). Performing a test sets the new pad setting in the switch.

11. Repeat step 9. Your Tip and Ring pins are still connected. The readings should read something similar to the examples given in Table 4-7.

Table 4-7
3X91 ADJUSTED RECEIVING from TTS

MAP TGen frequency	MAP reads loss
404 0	.0
1004 0	.0
2804 0	.1

Note: If you had to take out or put in more than .5 dB of padding in the 3X91 pads, replace them. The Rx range is 11.5 to 12.5.

You should have the Transmit and Receive sides of the 3X91, even or odd circuit calibrated to +/- 0.1 dB of zero.

Calibrate each of the ROTLTPs and TERM 105s as the one above was done.

After calibrating to the respectful pins on all the TM8 backplane(s) with 3X91(s), connect connectors A, B, C, D, and E to the DTH/ROTL backplane.

ROTL calibration adjustment at 404,1004, and 2804 Hz levels

To perform this procedure:

1. Enter the following commands at the MAP:

```
>MAPCI; MTC;TRKS;TTP; POST G xxx;MANUAL
```

(where xxx is the type of circuit (ROTLTP or TERM 105))

To measure the transmitting signal from the ROTL to the DMS, enter the following command at the MAP:

```
>LOSS
```

2. At the DTH Terminal Test Port (1 or 2) calibration screen:

Position on 404.0 and select **Execute** on the DTH. The dB level should be as close to .0 level as possible on the MAP. If the dB level is -.3 at the MAP, then the dB level on the terminal must increase. To increase the dB level, use **scroll Up**. If the dB level is .1, decrease it using **Scroll Down**, the DTH dB level will decrease.

EXAMPLE: DMS MAP LOSS = -.3; DTH TERMINAL SCROLL UP= +3

THIS EXAMPLE IS FOR TRANSMIT ONLY

3. Repeat step 2 for 1004 Hz, and 2804 Hz. Repeat step 2 for 404 Hz., 1004 Hz, and 2804 Hz for each ROTLTP and TERM 105 in that DTH/ROTL.

Figure 4-3
DTH ROTL calibration

Test Bus 1 - VF I/F	Test Bus 2 - TAD 2: LFH
DTH ROTL Calibration	
CP: 33.xx/DSP: 33.yy	
Test Port 1	
Transmit Loss (dB)	
404 Hz	xx.x
1004 Hz	xx.x
2804 Hz	xx.x
Receive Loss (dB)	
404 Hz	xx.x
1004 Hz	xx.x
2804 Hz	xx.x
<input type="button" value="Close"/> <input type="button" value="Scroll Up"/> <input type="button" value="Scroll Down"/> <input type="button" value=""/> <input type="button" value="Clear"/> <input type="button" value="Execute"/>	

Calibrating ROTL transmit

(Perform this procedure after calibrating the 3X91s.) Calibrating the transmit functionality requires a fine adjustment, given below.

Calibration adjustment

To make the calibration adjustment:

1. Enter the following commands at the MAP:

```
>>MAPCI; MTC;TRKS;TTP; POST G xxx;MANUAL
```

(where xxx is the type of circuit (ROTLTP or TERM 105))

To measure the transmitting signal from the ROTL to the DMS, enter:

```
>>LOSS
```

2. On the local terminal, (see Figure 4-3) move the cursor down to the DTH ROTL Calibration, and choose the **se1ect** softkey. The cursor is on Test

Port 1. To change the port, use the **Scroll Up** or **Scroll Down** softkeys.

Note: Each time you change the 3X91 pad switches, you must, at the MAP, (mapci;mtc;trks;ttp), BSY, RTS, and TST the 3X91 card(s). Perform a test on these cards; the test fails because the hardware setting and the software in the switch do not match. Once these steps are complete, begin calibration.

ROTL calibration adjustment at 404,1004, and 2804 Hz levels

To perform the ROTL calibration adjustment:

1. At the TTP level on the MAP, enter:

```
>>MAPCI;MTC;TRKS;TTP;POST G xxx;MANUAL
```

(where xxx is the type of circuit (ROTLTP or TERM 105))

To measure the transmitting signal from the ROTL to the DMS, enter the following command at the MAP:

```
>>LOSS
```

2. At the DTH Terminal Test Port (1 or 2) calibration screen, position on 404 0 and choose **Execute**. The dB level should be as close to .0 level as possible on the MAP. If the dB level is -.3 at the MAP, the dB level on the DTH terminal must increase. To increase the dB level, use **scroll Up**. If the dB level is .1, then decrease it using **scroll Down**, the DTH dB level decreases.

EXAMPLE: DMS MAP LOSS = -.3; DTH TERMINAL SCROLL UP = +.3

THIS EXAMPLE IS FOR TRANSMIT ONLY

3. Repeat step 2 for 1004Hz, and 2804 Hz. Repeat step 2 for 404 Hz., 1004 Hz, and 2804 Hz for each ROTLTP and TERM 105 in that DTH/ROTL.

Calibrating ROTL receive

To calibrate the ROTL receive:

1. Set the MAP to transmit (TGEN).
2. Enter the following command to generate a 0 dB level:

```
>MAPCI;MTC;TRKS;TTP;POST G xxx;MANUAL (where xxx is the type of circuit (ROTLTP or TERM 105))
```

where TGEN is transmitting a tone from the DMS to the DTH/ROTL receive side. To transmit enter the following command:

```
>TGEN xxx 0 (where xxx is the frequency, and 0 is the dB level)
```

3. >TGEN 404 0 and press **Return**. At the DTH/ROTL calibration screen position on the Receive 404 and select **Execute**. The ROTL reads the tone and calculates the LOSS. You can not increase or decrease the Receive values because the ROTL calculates it.

4. Repeat step 3 for 1004 Hz and 2804 Hz. You can not change these values.
5. Repeat steps 3 and 4 for all ROTLTP test ports and TERM 105 test lines provisioned in that DTH/ROTL.

Calibration of other test ports and test lines

Repeat the Transmit and Receive steps for each test port (ROTLTP) and each test line (TERM 105) associated with that DTH/ROTL

Calibration completion

Once calibration is complete, restart the ROTL. Press **F6** to close the present screen. Move the cursor to Start ROTL (see Figure 4-1) and choose **Execute**.

Final alignment of 3X91 pad switch settings

To comply with the DMS-100 test software application, perform the following steps after the calibration is complete.

1. At the MAP, BSY the 3X91 card(s) associated with the ROTL.
2. If the BCS load is 35 or later skip this step.

Go to the 3X91 card(s) and remove it to change the switch settings. (If you have BCS 34 or earlier take 7dB out of transmit). Change the switch settings, for both sets of S3.0/S4.0 and S3.1/S4.1 to an additional 7 dB, these switches were used to complete the calibration, and leave the settings for S 1.0/S2.0 and S 1.1/S2.1 at their final settings. Re-install the 3X91 card. Repeat for each ROTLTP and TERM 105.

For example: S3.0/S4.0 was 1.75 + 7 = 8.75 --The amount, 1.75, after zeroing the TM8.

Note: Leave the receive side at the same value after zeroing the TM8. The receive side does not change after zeroing.

3. Return the 3X91 card(s) back to service.
4. Perform a diagnostics test on the 3X91 card(s) (BSY;TST;RTS).

Returning busied trunks to service

To return the previously-busied trunks to service upon completion of calibration, at the TTP Manual level, enter the following:

```
>>POST G (where G is either ROTLTP or TERM 105)
```

```
>>BSY ALL
```

```
>>RTS ALL
```

Provisioning the 105 test lines

This function allows you to select 105 test lines from the six available ports.

Use this screen to customize the number of 105 test lines available when ROTL starts. You can provision from 1 to 6 lines. Provision the number of test lines to match the switch hardware. Figure 4-4 shows the 105 test line provisioning screen.

Up to three 105 test lines can execute on a single test engine.

Figure 4-4
105 test line provisioning

Test Bus 1 - VF I/F Test Bus 2 - TAD 2: LFH
DTH ROTL 105 Test Lines Provisioning CP: 33.xx/DSP: 33.yy

105 Test Line	Provisioned
1	yes
2	yes
3	no
4	no
5	no
6	no

Close Toggle Execute

To provision a 105 test line:

1. Select ROTL on the Menu of DTH Options.
The ROTL Commands screen (refer to Figure 4-1) appears.
2. Select DTH ROTL 105 Test Line Provisioning on the ROTL Commands screen.
The DTH ROTL 105 Test Line Provisioning screen appears.
3. Move the cursor to the test line you want to provision.
4. Select the **Toggle** softkey to provision or de-provision the line.
5. Select the **Execute** softkey to record the changes in NVRAM.

6. To exit, select the **C**lose softkey.
The ROTL Commands screen appears.

Optional verification of DIAS tone procedure

Addendum A provides information on how to verify the tones generated by the DTH/ROTL and the Test Signal Generator Card (1X90) of the DMS-100. The procedure uses an external test device to read the frequency and dB level of the tones used in this calibration procedure.

Regional testing

(This testing can be done by TAC or the installer.) The installer should call their regional support group and have them to run a Home Office Test on this switch. There need not be a connection to external trunks to perform this test. Each region requires a manual interrogator to perform this test.

Home office test setup

Here is the home office test setup.

1. Get the TERM 105 admin number from table CLLI.
2. Connect a POT line connect to the back of the ROTL. (Does not have to be ground start. The ROTL must be up and running.)
3. Know the POT dial up number.
4. Know how many ROTL ports and TERM 105(s) test lines.
 - a. 75 - tells the switch that this is a Home Office Test request.
 - b. xxxx - always has four digits; zero(s) inserted where there are no digits; 80 admin = 0080
 - c. yyyy - always has four digits; zero(s) inserted where there are no digits; two total 105(s) written as 0000 or 0001 (a number the software assigns) depending on which 105 in the switch.

Manual interrogator operator

1. Turn the manual interrogator on, and set the test mode for ROTLS TWO (2) WIRE.
2. Press Access and enter the POT dial-up number.
3. Press Prime, and enter the following:
 - a. 75 - tells switch that this is a Home Office Test request
 - b. xxxx - the operator puts in the term 105 admin number
 - c. yyyy - the operator puts in the term 105 that they want to test
4. - The priming string looks like the following in the display:
>75xxxxyyyy

For example:

```
75 Home Office Test Request
38 Admin Number of the Term 105
00 The First Term 105 in the DMS
```

Access Number (919)-555-1988 Port 1
Access Number (919)-555-1989 Port 2
Test Mode ROTL(s) two (2) wire
Press Access port 1 enter: (919)-555-1988
Press Prime Enter: 7500380000

Test each TERM 105 on each ROTL port.

When the ROTL is functioning, contact the CAROT CENTER. The CAROT CENTER can run a home office test given the information.

CAROT testing

Contact the CAROT personnel to perform the '05, 15 and 75' analog tests. These tests need to be done for the acceptance of the ROTL.

- 05 Regular TERM 105 test
- 15 Regular TERM 105 test with busy override
- ** 75 Home Office Test does not require any external trunks to be connected to switch.

Note: * * 75 Test is not required if the switch has external trunks in operation.

DTH/DTT set-up

After a successful power-up, and set-up, configure the DTH/DDT with the appropriate equipment it uses for testing. This means configuring the TAD(s) and provision the accompanying 108 test lines.

Setting up the local terminal

Set up the VT220 according to the instructions in Table 2-5.

Logging in

Log on to the local terminal with a login of 'admin', and a password of 'system'. Then log on to your MAP, whose login and password you should already know.

TAD configuration

You use the TAD Configuration screen (Figure 5-1) to control the assignment of configuration parameters for the TADs. The settings are stored in non-volatile RAM.

Prior to changing a TAD's configuration in an existing office, you must de-provision its term 108 lines. Refer to the explanation of "108 test line provisioning".

Set the TAD's configuration according to the information found in the switch reference DTT CARRMTC Data Fill table, shown under "D77 Datafill Instructions", step 3.

Figure 5-1
TAD configuration screen

Test Bus 1 - TAD 1: LFH Test Bus 2 - TAD 2: LFH
DTH Test Access Digroup (TAD) Configuration CP: 33.xx/DSP: 33.yy

Framing Format : SF
Line Code : B8ZS
Cable Length : 0 - 133 feet

Selected Test Bus : 2

Parameter entry

The possible TAD parameters are:

- framing format
 - SF (Superframe)
 - ESF (Extended Superframe)
- line code
 - AMI (Alternate Mark Inversion)
 - B8ZS (Binary Eight Zero Substitution)
 - ZCS (Zero Code Suppression)
- cable length
 - 0 - 3.96 m (0 - 13 ft.)
 - 40.84 - 81.07 m (134 - 266 ft.)
 - 81.38 - 121.61 m (267 - 399 ft.)
 - 121.91 - 162.45 m (400 - 533 ft.)
 - 162.7 - 199.64 m (534 - 655 ft.)

In general, for DTT, configure the TAD as follows:

- DS1 signal framing: ESF
- DS1 zero logic coding: B8ZS
- TAD cable length: as required (1 - 655 ft.)

However, the DS1 framing and coding must match the 6X50 card setting in the DTC in the switch (refer to the CARRMTC table).

Measure the cable's length as from the DTH to the DSX jack field, the maximum length is 199.64 m (655 ft.)

To configure the TADs:

1. Select TAD Configuration on the 'Configuration, Diagnostics, & Control' screen, the TAD Configuration screen appears.
2. Use the cursor arrows to move through the parameters, using the **Scroll Up** and **Scroll Down** to select the parameter you require. To configure the chosen TAD with the TAD type shown, choose the **Execute** softkey.
3. To configure the other TAD, choose the **Switch TAD** softkey. (Usually only TAD2 used.)

108 test line provisioning

A 108 test line is a specific trunk used to loop back information to the transmitting DTH. The trunk's primary function is to assist in measuring the integrity of the digital data transmitted between digital exchanges.

This function allows you to select (provision) 108 test lines. Perform this procedure upon installation, or whenever there is a need to change the number of lines that are provisioned. Channels provisioned for 108 test lines are not available for other functions; they must first be de-provisioned.

Figure 5-2
DTH 108 test line provisioning screen

Test Bus 1 - TAD 1: LFH Test Bus 2 - TAD 2: LFH

108 Test Line Provisioning CP: 33.xx/DSP: 33.yy

TAD	Channel	Provisioned	TAD	Channel	Provisioned
2	01	yes	2	13	no
2	02	yes	2	14	no
2	03	no	2	15	no
2	04	no	2	16	no
2	05	no	2	17	no
2	06	no	2	18	no
2	07	no	2	19	no
2	08	no	2	20	no
2	09	no	2	21	no
2	10	no	2	22	no
2	11	no	2	23	no
2	12	no	2	24	no

Disconnect Timer Value
0 00:20:00

To provision a line for use in 108 testing, you must select the TAD, then the Channel, toggle the Provisioned entry for that line to *yes*, and specify the Disconnect Timer Value. (The default timer value is 20 min.) Configure all of the 108 test lines you will require at this time.

1. Select 'Configuration, Diagnostics & Control' from the Menu of DTH Options.
2. Highlight 108 Test Line Provisioning on the 'Configuration, Diagnostics & Control Menu', and choose the **select** softkey.
The screen shown in Figure 5-2 appears.
3. Use **Up Arrow** and/or **Down Arrow** to highlight the appropriate field.
4. If applicable, use the **Toggle** softkey to select the TAD.
5. Press **Right Arrow** to move the cursor to the Channel column, and enter a channel number between 01 and 24, then press **Enter**.
6. Use **Right Arrow** to move the cursor to the 'Provisioned' column and use the **Toggle** softkey so that 'yes' appears in the Provisioned column. Use the arrow keys as required to provision the appropriate lines.

7. Then, enter the Disconnect Timer Value. You can enter a maximum value of 9 days, 23 hrs., 59 min., and 59 sec. The minimum value is 1 second.
8. After selecting a line for provisioning, there is a test to verify its integrity. The test's successful initiation is shown by a 'Test in progress' message. If the provisioning was not successful, either 'Idle' or 'Not Present' in the appears in the Provisioned column.
9. When you de-select a line so that it is no longer provisioned for 108 testing, an 'Activity aborted' message appears.
10. Upon completion, choose the **C1ose** softkey to return to the Configuration, Diagnostics & Control Menu.

DTH call origination

This functionality directs a DTH to carry out an inverted BERT on a specific trunk group member which terminates on a type 108 test line at a distant switch. The test line provides a digital loopback so there are tests on that both directions of the digital trunk. The DTH at the near-end (NE) switch originates the call, sets up the connection, and generates the bit pattern which is transmitted to the far-end (FE) switch. The same DTH also measures the errors in the pattern looped-back from the FE.

Use DTH call origination to place a call on a TAD's channel to access the ADTT (Advanced Digital Trunk Testing) feature patch available on the DMS family of digital switches.

Note: The FE 108 test line has a default time-out value of 20 min. A call automatically disconnects if the duration reaches the time-out value.

The screen has four fields where you can specify:

- the type of test to be run, either Home Office (78), Operational (18), or Transmission (08)
- the TUT's four-digit Trunk Group Number
- the trunk under test's four-digit Trunk Member Number
- the phone number to reach the FE test line (for Home Office tests, this field is left blank)

Figure 5-3
DTH call origination screen

Test Bus 1: VF I/F Test Bus 2- TAD 2: LFH
DTH Call Origination

Test Type	78	CP: 33.xx/DSP: 33.yy
Trunk Group Number	xxxx	
Trunk Group Member Number	xxxx	
Test Line Telephone Number	xxxxxxxx	

Selected Test Bus :
Selected Channel(s) :

Close Scroll Up Scroll Down Channel Select Dis-connect Execute

To originate a call on one of the DTH TAPs, use the Digital Call Origination screen shown in Figure 5-3. To initiate call origination:

1. Select Test Line Call Origination from the Menu of DTH Operations.
The DTH Call Origination screen appears.
2. Select the type of test to be run by placing its corresponding number in the field. Use either the **scroll Up** or **Scroll Down** softkey to move through the three choices.
3. Press **Down Arrow** to move the cursor to the Trunk Group Number field, and enter a valid four-digit number (0001 to 9990). The cursor is automatically moves to the first digit in the field. (Pressing **Tab** moves the cursor one position to the right; **Backspace** moves the cursor one position to the left.)
4. Move the cursor to the Trunk Member Number field, and enter the appropriate four-digit number.
5. Now place the cursor in the Test Line Telephone Number field. Enter the number is assigned to the test line.
6. Use the **Channel select** softkey to reach the Selected Test Bus field. Enter either 1 or 2 to represent the TAD number.

7. After entering the TAD number, the cursor automatically moves to the Selected Channels field. Enter the two-digit channel number between 01 and 24, corresponding to the TAP you want to use, (note that calls cannot be originated on channels provisioned as test lines (TL)), and select the Execute softkey.
8. Wait for a call connection or other disposition from the switch.
9. If the call is successful,
A 'Call connected' message appears.
10. After receiving a 'Call connected', verify the channel's status by choosing the **status** softkey on the Menu of DTH Options, and pressing the **Channel status** softkey.
11. Refer to "Digital tests and monitoring" for the parameters to use on the BERT.
12. When testing on that trunk is complete, go back to the DTH Call Origination screen and select the **Disconnect** softkey to release the channel.

UDS modem set-up

As part of the UDS modem set-up procedure, perform the following:

- Connect the unit's power cable.
- If it is not already done, connect the RS-232 cable from the DTE port on the UDS to port 0 on the PAD
- Connect the dial-up line from the UDS's dial port to the phone jack.

Configure the UDS using the parameters given in Table 5-1. You can perform this configuration locally using the display switches on the unit's front panel.

Table 5-1
UDS configuration settings

Menu option	Setting
Timing	DDS
Auto Baud	Disabled
Rate	9600
Sync/Async	Sync
Buffer	Off
Loopback	BIL- enabled
DSR opt	Off
SS opt	Off

Table 5-1
UDS configuration settings

Menu option	Setting
Circuit Assurance	On
RSCS Delay	Normal
DTE tests	RL - Off, TP - Off LL- Off RT - Off
Save	Yes

PAD set-up

You can configure the PAD locally using a VT220-type terminal, or remotely through the packet network from the NTSC. Refer to the PADs user manual for specific procedures.

If you have not already done so, interconnect the PAD's cabling as follows:

- Link the ASYNC 2 port of the DTH to port 3 of the PAD.
- Link the PADs port 0 to the UDSs DTE port.
- Connect the ASYNC port 1 of the DTH to port 2 of the PAD.
- Note that the PSDs port 1 is not in use.

PAD jumper configuration

Configure the PAD's jumpers as shown in Table 5-2.

Table 5-2
PAD jumper connections

LK1	LIK2
A2 to B2	B5 to B6
A3 to B3	C5 to C6
	B8 to C8
	B10 to C10

Setting the PADs options

For a Teleglobe (Memotec) 830/04 PAD, perform the following:

1. Initiate communications with the PAD, type three periods and press **Return**. This allows the PAD to sync to the baud rate of the computer.
A Service prompt appears.

2. Determine the PAD's firmware version, either 732, or 750A, by sending the 'DS' command.

Look for a CMD ACCEPTED operating command message to confirm that the PAD took the command.

3. Set the system for an optional password:

No command password required, command PA(ssword) ('S S OP:N PA:XYXYXY').

4. Set Network Configuration; CH(annel):O, Selected Network SP(eed): timing provided by an External communication device, Packet Window X.25 level 3 limit: 2 is default, Normal traffic data packet Size: 128 bytes, DTE:Yes (S N C CH: 0; SP:E; PW:2; NS:128; TE: Y).
5. Set Address Associations, POrt:2, ADdressing from incoming calls. Appended to parameter AD, include the calling DTE address in the call request packet (S A A PO:2; AD:<DPN ADDRESS>).
6. Set Address Associations, POrt:3, ADdressing from incoming calls. Appended to parameter AD, include the calling DTE address in the call request packet (S A A PO:3; AD:<DPN ADDRESS>).
7. Set Line Parameters, POrt:2, Length of user port character: 8 bits/ character, Port paRity:None, port SPeed:9600 baud, STop bits: 1(S L P PO:2; LE:8; PR:N; SP:9600 ST:1).
8. as above, except for POrt 3, 7 bits /character, and Odd parity (S L P PO:3; LE:7; PR:NO; SP:9600; ST: 1).
9. Set the Asynchronous Parameters Profile to load into the port profile after a logical disconnection: 'DO (10)', Profile Configuration mode: Yes, an X.28 command causes a change in the default profile (pointed to by the PF: parameter) instead of the port's work profile (S A P PF:DO; PC:Y).

Note: The following two commands will not have the 'CMD ACCEPTED'.

10. Load PROFile A 1 (default form Transparent) (PROFA 1).
11. Set 4 (Idle Timer Delay) to (1/20th of a second) (0.1 second). Set 7 (Operation of PAD on break signal to 0 (No action on break) (SET 4:2, 7:0).
12. Local global profile DO (Defined as A I above) to POrt:2, 3 (S A P PF:DO; PC:Y; PO:2,3).
13. Set parameters of local port to default (A2) (S A P PF:A2; PC:N).

Note: Execute the next command only if the PAD has 732 firmware.

14. Set Memory Location 1FAE to DAta:08. This sets the 'MORE' bit, which allows the PAD to recognize packets greater than 128 bytes. This condition occurs occasionally, depending on the information the network is handling (S M LO: IFAE DA:08).

Note: Execute the next commands only if the PAD has 750A firmware.

15. Set System X29 Reselect No. (S S XR:N).

16. Set Memory Location 215E to DA:08. This sets the 'MORE' bit, which allows the PAD to recognize packets greater than 128 bytes. This condition occurs occasionally, depending on the information the network is handling (S M LO:215E DA:08).

17. Set Asynchronous parameter, POrts 2 and 3, InterFace (dialout) application uses the user-defined profile named 'DO'. The IF parameter should be set identical to the PF parameter (S A P PO:2,3 MDO).

Note: The next command applies to all PADs, regardless of its firmware revision.

18. Warm-start the PAD (W S).

Packet network parameters

Configure the X.25 circuit access to the operating company's packet network as indicated below. Supply these parameters to the packet network service provider so that the currently-configured circuit is available before installation.

There are two X.25 addresses for the PAD. The first is between the local terminal and the PAD. The second is between the NOP port and the PAD. The X.25 address must be 14 digits long and have three sections:

- The first four digits is the data network identification code (DNIC)
- The next 12 digits is the network terminal number (NTN).
- The last two digits are for accessing Ports 2 and 3 or the PAD.

```
PROC=07 LINE=44 VERSION=0 ACTIVE 76-00-00
X.25
DNA=14 7 04400; DSE=23
PACKET SIZES ALLOWED: 128 256
DEFAULT PACKET SIZES: SEND= 128; RECEIVE=128
```

```
DEFAULT THROUGHPUT CLASSES: SEND=8; RECEIVE=8
DEFAULT WINDOW SIZES: SEND=2; RECEIVE=2
CHARGING INFORMATION NOT ALLOWED
CHARGING INFORMATION NOT SUBSCRIBED
BLOCK NUI ACCEPT NOT SET
EXTENDED CUG FORMAT NOT SETDEFAULT PRIORITY PACKET
SIZES: SEND=128; RECEIVE= 128
LOCAL CHARGING PREVENTION NOT SET
REVERSE CHARGE FORCED NOT SET
CALL OPTIONS ALLOWED:
IN REVERSE CHARGED PRIORITY; IN REVERSE CHARGED
NORMAL
OUT NORMAL CHARGED
```

```
OUT NORMAL (DEFAULT); OUT PRIORITY
INCOMING ACCESS; OUTGOING ACCESS
```

NO PRESELECT RPOA
NO SELECT RPOA
DO NOT SIGNAL PREFERENTIAL CUG
CUG INDEX ZERO ALLOWED
PROTOCOLCONVERSION SCREENING: OFF
ACCOUNTING RECORD COLLECTION REASONS:
AUDIT = N; STUDY = N; TEST =N; BILLING = Y
FORCED =N
NEW ACCOUNT CLASS: 11

Interface information for dna.

PROC=07 LINE=44 VERSION=0 ACTIVE 76-00-00
X.25
INTERFACE TYPE: X25 1980
STC=Y; MAX LPE STC= 15
TIMERS: RESTART= 180; CALL= 180; RESET= 180 CLEAR= 180;
IDLE=180; RESPONSE=180
CHECK OCTET=Y
WINDOW: NEGOTIATION=STATIC (2)
DIAGNOSTIC PACKET: SEND=N; RECEIVE=N
TRAFFIC CLASS INDICATION: REVERSE CHARGING
DIRECT CALL ONLY=N; CALL TARIFF=N
CALL STATS=N; D-BIT MODIFICATION=N
CALL COLLISION: CLEAR DCE
X25 1976 DIAGNOSTIC CODE=N
MULTI DNA=N
NEGOTIATION: PACKET=N; WINDOW=N; THROUGHPUT=N
IGNORE LOCAL ADDRESS NOT SET
PACKET DELAY: NORMAL= 0; PRIORITY= 0

Stats for dna.

PROC=07 LINE=44 VERSION=0 ACTIVE 76-00-00
X.25 SERVICE:
DEDICATED LINK
CM=DCE; ALARM SET=NORMAL; SINGLE LINK; NOT OCTET ONLY
MODEM=201; PORT=NORMAL; ADAPTOR=HDLC; SPEED=9600
OOS ALARM=MINOR; MODEM ALARM=DEGRADE
MODEM TIMEOUT= 5:INPUT Q SIZE= 30;MAX FRAMESIZE=2104
RNR
LIMIT= 25; RR LIMIT= 10

PROTOCOL PROCEDURE=LAPB; TIMEOUT= 3
RETRANSMIT=10; WINDOW=7
COMMAND ADDRESS=3; RESPONSE ADDRESS= I

5-12 DTH/DTT set-up

Number of Icn's on dna.

PROC=07 LINE=44 VERSION=0 ACTIVE 76-00-00

X.25 CHANNELS:

LCN BASE TOTAL LCN TOTAL PVC #OVCS #IVCS ORDER

15000ASCENDING

Digital tests and monitoring

The DTH Digital Tests and Monitoring Menu (Figure 6-1) is available from the Menu of DTH Options. The procedures in this chapter assume that you are starting from it. If not, return to the Menu of DTH Options by selecting the **close** softkey until it is displayed, and then selecting 'Digital Tests and Monitoring'.

To exit a test, and return to the Digital Tests and Monitoring menu, use the **close** softkey from any parameter entry or results screen.

Figure 6-1
DTH digital test and monitoring menu

Test Bus 1 - TAD 1: LFH Test Bus 2 - TAD 2: LFH

DTH Digital Tests and Monitoring CP: 33.xx/DSP: 33.yy

Bit Error Ratio
 MJU Control
 Digital Loopback
 Digital Monitoring

Selected Test Bus :
 Selected Channel(s) :

Main Menu			Status	Channel Select	Abort Activity	Activity Results	Select
-----------	--	--	--------	----------------	----------------	------------------	--------

You must specify input parameters for the BER, and MJU Control tests. The values shown in the following screens are the defaults. For a BER test, you must request the results. If the DTH can not perform a test, a message appears on line 20 describing the problem.

Note: Upon completion of a BERT, you must request the results before the channel on which the test is running can be free for other tests.

Bit error ratio test

This procedure explains how to do a BERT. You can test sub-DS0 DS0A format data rates supported by DDS (digital data services), of 2400, 4800, 9600, and 56 000 baud, as well as sub-DS0 DS0B format data rates supported by DDS of 2400, 4800, and 9600 baud. In addition, you can perform this test from DS0 to DS1 rates at any DS0 multiple rate. Figure 6-2 shows the relevant screen.

Figure 6-2
Bit error ratio test parameters

Test Bus 1 - VF I/F: LFH Test Bus 2 - TAD 2: LFH

Bit Error Ratio Parameters Entry

CP: 33 xx/DSP: 33.yy

Rate	: DS0A 56 kbps
DS0B Customer	:
Loopback Device	: None
Device Number	:
Pattern Type	: 2047
User Pattern	:
Error Correction	:
Inject Error Rate	: Manual
Duration	: 0 00:05:00

Selected Test Bus : 2
Selected Channel(s) : 01

Close	Scroll Up	Scroll Down		Channel Select			Execute
-------	-----------	-------------	--	----------------	--	--	---------

Entering parameters for the BER test

When you select the Bit Error Ratio option from Digital Tests and Monitoring Menu, the Bit Error Ratio Test Parameters Entry screen appears. Select values for the following parameters:

- Rate - the rate at which to perform the test. Either:
 - DS0A at 2.4 kb/s (1 channel only)
 - DS0A at 4.8 kb/s (1 channel only)
 - DS0A at 9.6 kb/s (1 channel only)
 - DS0A at 56 kb/s (1 channel only) (default)
 - DS0B at 2.4 kb/s (1 channel only)
 - DS0B at 4.8 kb/s (1 channel only)
 - DS0B at 9.6 kb/s (1 channel only)
 - DS0 at 64 kb/s to 24 x 64 kb/s in multiples of 64 kb/s on the chosen channel
- The DS0B customer of interest - the range of this field depends on the DS0B rate. Allowable values for this field are:
 - 1 - (default)
 - 1- 20 for 2.4 kb/s rate
 - 1 - 10 for 4.8 kb/s rate
 - 1 - 5 for 9.6 kb/s rate
- Loopback device - Loopback device required for sub-DS0 testing rates. Use 'None' when a digital loopback is provided at the FE. Allowable values for this field are:
 - none - no loopback device (default)
 - invoke latching OCU (office channel unit) loopback
 - invoke latching HL96NY loopback
 - invoke latching CSU loopback (customer premises channel loopback)
 - invoke latching MJU (multi-junction units) loopback
 - invoke latching DS0 dataport (DS0DP) loopback
 - invoke non-latching OCU (office channel unit) loopback
 - invoke non-latching HL 96NY loopback
 - invoke non-latching CSU loopback (customer premises channel loopback)
 - invoke non-latching DSU (data service unit) loopback
 - invoke latching DSU loopback

- invoke 56 kb/s repeater loopback invoke non-latching DS0 dataport (DS0DP) loopback
- Device number - device number of interest. Applies only if you placed 'Latching DS0P' or '56 kb/s repeaters' in the Loopback device field.
- Pseudo-random pattern type - the pseudo-random or stress pattern desired. Allowable values for this field are:
 - 511 = 511 bit pseudo-random pattern ($2^9 - 1$)
 - 2047 = 2047 bit pseudo-random pattern ($2^{11} - 1$)
 - PRBS_15 pseudo-random pattern
 - PRBS_23 pseudo-random pattern
 - low ones density stress pattern
 - medium ones density stress pattern
 - all ones stress pattern
 - alternating medium and low ones density stress pattern
 - alternating high and low ones density stress pattern
 - alternating ones and zeroes stress pattern
 - user defined pattern
 - ASCII Fox pattern
 - EBCDIC Fox pattern
 - BCDIC Fox pattern
 - Baudot Fox pattern
- User sequence - you must specify the input bit pattern if 'user defined pattern' is in the 'Pseudo-random pattern type' field. (A bit pattern is a sequence of 0s and 1s.)
 - DS0(s) 64 kb/s requires an 8 bit pattern
 - DS0A 56 kb/s requires an 7 bit pattern
 - all other rates use a 6 bit pattern
- Error correction - you can apply this to the received data when conducting a test on DS0A subrates 2.4, 4.8, and 9.6 kb/s. Error correction is not available on DS0A at 56 kb/s and DS0B formats. The entry may be either:
 - Yes-there is error correction
 - No-there is error no correction
- Inject error rate - while performing a BERT, you may wish to inject errors in its output sequence. Allowable values for this field are:
 - Manual - inject one error each time you choose the **Inject Error** function key in the Activity Results screen(s)

- 10^{-3} - inject one error every 10^3 bits transmitted
- 10^{-6} -inject one error every 10^6 bits transmitted
- Duration - the test's duration. Enter only digits in this field. The separating “ ” and “.” are not input. The format is d hh.mm.ss, where:
 - d (days) may be 0 to 9
 - h (hours) may be 00 to 23
 - m (minutes) and s (seconds) may be 00 to 59 (you may not have a duration of 0:00:00:00)

This field ignores the scroll keys, **Tab** advances through the fields, **Backspace** moves backwards through the fields.

Running the BER test

To run the BERT:

1. On the Menu of DTH Options, choose the **Channel select** softkey.
The cursor moves to the ‘Selected Test Bus’ prompt.
2. Enter 2, for TAD 2.
The cursor moves to the ‘Selected Channel(s)’ prompt.
3. Enter the appropriate channel number(s) (01 through 24 are the valid entries), then press **Return**; use **Backspace** to erase a channel. (For most tests select only one channel.)
4. Select Digital Tests and Monitoring.
The DTH digital test and monitoring menu screen appears.
5. Select the Bit Error Ratio option.
The Bit Error Ratio Test Parameters Entry screen appears.
6. Select the parameters as described in “Entering parameters for the BER test.”
7. Choose the **Execute** softkey to begin the test. While the system attempts to perform a BER measurement on the chosen TAD and channels, for the specified duration, the following messages may appear, depending on the circumstances:
 - a. ‘Test in progress; Waiting for synchronization’
 - b. ‘Test in progress; Synchronization achieved’
 - c. ‘Unable to synchronize. Invalid DS0 format specified’
 - d. ‘Test aborted; Failed to start loopback’
8. You can check the status of the test at any time. For instructions, see “Displaying channel status”. To display the results of the test, see “Displaying bit error ratio results”.

Displaying bit error ratio results

This procedure explains how to display BER results. Figure 6-3 and Figure 6-4 show the relevant screens.

Figure 6-3
Bit error ratio test results (page 1)

Test Bus 1 - VF I/F Test Bus 2 - TAD 2: LFH

Bit Error Ratio Results CP: 33.xx/DSP: 33.yy

Rate	: 56kBps	Elapsed Time	: 00 00:04:23
Customer Number	:	Available Time	: 00 00:04:23
Loopback Device	: None	Unavailable Time	: 00 00:00:00
Device Number	:		
Pattern Type	: 2047	Bits Received	: 1.472800 E+07
User Pattern	:	Bits in Error	: 0.000000 E+00
Error Correction	: Yes	Bit Error Ratio	: 0.000000 E+00
Inject Error Rate	: Manual	Blocks Received	: 1.472800 E+04
Duration	: 1 11:23:45	Blocks in Error	: 0.000000 E+00
		Block Error Ratio	: 0.000000 E+00
		Framing Errors	: 0.000000 E+00

Selected Test Bus :2 Page 1 of 2
Selected Channels :01

Test in Progress

CloseInject ErrorSwitch PageAbort ActivityActivity Results

Figure 6-4
Bit error ratio test results (page 2)

Test Bus 1 - TAD		Test Bus 2 - TAD 2: LFH	
Bit Error Ratio Results			
		CP: 33.xx/DSP: 33.yy	
Elapsed Time	: 00 00:04:23	Errored Secs	: 0
Error-Free Secs	: 263	Sev. Errored Secs	: 0
% Error- Free Secs	: 1.000000 E+02	Degraded Minutes	: 0
Selected Test Bus :2		Page 2 of 2	
Selected Channels :01			
Test in Progress			
Close		Inject Error	Switch Page
		Abort Activity	Activity Results

If there is a loopback device, when a test starts, the DTH sends the control sequence to activate the loopback device. These control sequences vary in length depending on the loopback device. During this process, the message 'Working...' appears. After transmission of the optional loopback sequence, the DTH tries to synchronize on the incoming bit sequence to compute the BER. If there is synchronization within the first second, the message 'Test in progress; Synchronization achieved' appears. The channel status becomes 'BERT' and there is an appropriate message upon selecting the channel activity results display. The time remaining for the test starts to decrease.

If the DTH can not synchronize within the first second, the channel status becomes 'BERT' and the message 'Test in progress; Waiting for synchronization' appears. This message also appears if you request results and there was no synchronization. The message continues until you aborts the activity. While the DTH tries to synchronize on the bit pattern, the time does not decrease.

For DS0B, you must specify the rate. This rate may be lower than the rate of the DS0B. For example, there may be multiplexing of a 2.4 kb/s customer on a 9.6 kb/s DS0B. For DS0B subrates, the test engine detects the attempt of a

DSOB test on a DSOB for which an invalid customer was specified (for example, customer 8 for a 4.8 kb/s signal multiplexed with four 9.6 kb/s signals). The error message is: 'Unable to synchronize. Invalid DS0 format specified'. Results are available if there was synchronization.

Displaying BERT results

You can request results from a number of screens, such as the Menu of DTH Options, the Channel Status screen, or the Digital Test and Monitoring screen.

To display the results of a BERT:

1. On the Menu of DTH Options, choose the **Channel Select** softkey.
The cursor moves to the 'Selected Test Bus' prompt.
2. Enter 2 for TAD 2.
The cursor moves to the 'Selected Channel(s)' prompt.
3. Enter the channel number(s) (01 through 24 are the valid entries), then press **Return**; use **Backspace** to erase a channel. (For most tests select only one channel.)
4. Choose the **Activity Results** softkey.
The Bit Error Ratio Test Results screen' appears.
5. Use the **Switch Page** softkey to display the other results page.
6. Select the **Abort Activity** softkey to terminate the BERT.

Note: If the test is not complete, selecting 'Activity Results' updates the display of the results. The DTH updates the results every second, but does not display them until you press the **Activity Results** softkey.

Interpreting results

Use the **Activity Results** softkey to ask for results. The test returns the following results:

- Input parameters - for the BERT, as shown on the Bit Error Ratio Parameters Entry screen: the rate, subrate channel, the loopback device, the pattern, and the duration
- Elapsed time - time since the test began
- Bits received
- Bits in error
- Framing errors - framing errors in the last second (For DSOB only)
- Bit error ratio - the number of bits in error divided by the number of bits sent during the time deemed available
- Blocks received (1 block = 1000 bits)
- Blocks in error

- Block error ratio - number of blocks in error divided by the number of blocks sent during the time deemed available. A block is 1000 bits.
- Error-free seconds - the number of seconds when no error was detected during the time deemed available
- Percentage error-free seconds
- Errored seconds - available seconds in which the bit error ratio is greater than zero but less than 10^{-3} bit errors per available second
- Severely errored seconds - available seconds in which the bit error ratio is greater than or equal to 10^{-3} bit errors per available second
- Degraded minutes - a count of available minutes in which the bit error ratio is greater than or equal to 1^{-4} bit errors per available minute
- Available time - the time the unit was available for testing, beginning with the receipt of a sync signal and ending with the completion of the test. This is exclusive of any time intervals deemed unavailable.
- Unavailable time - the time, in seconds, of which there are consecutive severely errored seconds, which then indicates that number of seconds recorded as part of the unavailable time

After encountering ten consecutive severely errored seconds, the BERT is considered to be unavailable. The count of unavailable time is from the beginning of the ten consecutive severely errored seconds. During unavailable time, the DTH accumulates no BERT results, except for elapsed time, since there was probably a catastrophic failure. The bit errors recorded during this unavailable time would swamp the BERT results during available time.

The BERT switches back to available time and results gathering upon the detection of ten consecutive error-free or errored (but not severely errored) seconds. These relatively clean seconds count as available time, and the DTH records the results. This scenario may occur more than once during a long BERT on a particularly bad channel test-path. The unavailable and available times indicate their relative total values.

Maintaining the DTH

This section explains routine maintenance and trouble-clearing procedures for the DTH.

You can maintain the DTH to the card level. This means that personnel, in the field, can replace cards. Each card is labeled for easy identification. When replacing a card, you need not remove the DTH from the rack.

Service for the DTH is also available at a central repair depot.



CAUTION Replacing the ROMPACK

When you receive a new DTH firmware upgrade, it comes in the form of a new insertable ROMPACK.

You must remove the ROMPACK, while DTH has no power, and then recalibrate the DTH/ROTL. (The DTH/DTT requires no calibration.) Also compare DTH and DMS Framing Format and Line Code as shown in the DTT Datafill Instructions step 3.

For major firmware revisions, you may need to replace the CP bootROM socketed chips.

Routine maintenance

Routine maintenance for the DTH includes the following tasks:

- displaying DTH operational measurements
- performing hardware diagnostics

You should display DTH operational measurements once a week to check the number of testing requests that have been denied.

Trouble detection

You can request a hardware check at any time. The DTH performs hardware diagnostic checks for the DS1 interface card, the ROTL card, the ROMPACK, the CP card, and the test engines on the DS0 handler cards. See "Running hardware diagnostics" in 662-7001-300 for interpretation of the test results.

One of the events of a hardware diagnostic check is that it stops the ROTL. As a result of this, you must manually re-start it.



CAUTION Danger of electric shock

DTH power down procedure

Should you have to remove one of the cards from the DTH, remove the fuse/circuit breaker at the DTHs power source first.

Tone verification procedure

Use the information below to verify tones generated by DMS-100 Test signal generator card (1X90) and the DTH/ROTL. This procedure uses external test equipment to verify the analog signals generated. It requires calibration of the DMS-100 four-wire test trunk jack according to IM925-0414. The procedure is only for verification. Complete it if your company requires using external equipment to verify the DMS-100 tones.

>QUIT ALL;TABLE CLLINITCE;POS JACK;SUB;LIST ALL

1. Type these commands to verify fields dbrec = 48 and dbtran 32. Check the EML value and set it to zero, if it is not zero. (Check the settings of each jack you use, and check and change them if necessary).

>QUIT ALL;TABLE TRRGRP;POS JACK

These commands close table climtce and open table trkgrp. In table trkgrp, switch personnel should verify the PADGRP field is set to NPDGR instead of ELO and TLD.

2. Check the calibration of the external tone box. Bring it as close to zero (0) as possible using its own transmit and receive looped together.

>QUIT ALL

This closes all open tables.

>MAPCI;MTC;TRRS; POST G JACR;MANUAL

This positions you into the jack environment (1X54) of the switch.

3. From this DMS map position, switch personnel can TGEN the tones, (404 0, 1004 0, and 2804 0) through the TSG (1X90) card to the external tone box. This measurement reading shows the loss of signaling.

**>RLS;POST G ROTLTP;JACK# or >RLS;POST G
TERM105;JACK#**

The switch connects the ROTLTP port to the chosen jack. The # designates which jack to use. If necessary, examine table termdev to determine which jack(s) are available to the MAP. The switch person should go to the DTH/ROTL MAP, choose ROTL in the Main Menu, and press **Execute**. Stop the ROTL, and select ROTL Calibration. Position on the Test Port # (1 or 2) or Test

8-2 Tone verification procedure

Line # (1 through 6). Work in the Transmit portion of the screen sending the tones (404 0, 1004 0, and 2804 0) to the external tone box. This measurement reading shows the loss of signaling coming from the DTH/ROTL.

Note: If there are changes to any tables, change them back to their original value. The MAP jack should not have a reading of more than -0.1 or +0.1 dB from the frequency level at 0dB level. If the measurement of one or more readings is considerably out of tolerance, calibrate the (jack) 1X54 per Installation Manual 925 section 0410.

4. Use the arrow keys on the local terminal, to move the cursor to the ROTL option.
5. Choose the **select** softkey
The ROTL Commands screen appears.
6. To stop the ROTL, move the cursor to the Stop ROTL option, and choose the **select** softkey.
7. Highlight ROTL Calibration and choose the **select** softkey.
The DTH ROTL Calibration appears.
8. Position on the Test Port # (1 or 2) or Test Line # (1 through 6). You should work in the TRANSMIT portion of the screen sending the tones (404.0, 1004.0, and 2804.0) to the external tone box. This measurement reading will show the loss of signaling coming from the DTH/ROTL.

Note: If you made changes to any tables, change them back to their original value. If the measurement of one or more readings is considerably out of tolerance, calibrate the (jack) 1X54 per Installation Manual 925 section 0410. The MAP JACK should not have a reading of more than +/-0.1 dB from the frequency at 0 dB level.

DTH equipment information

This appendix contains an interconnection diagram for the DTH and its associated equipment. There is also a parts lists for the appropriate equipment.

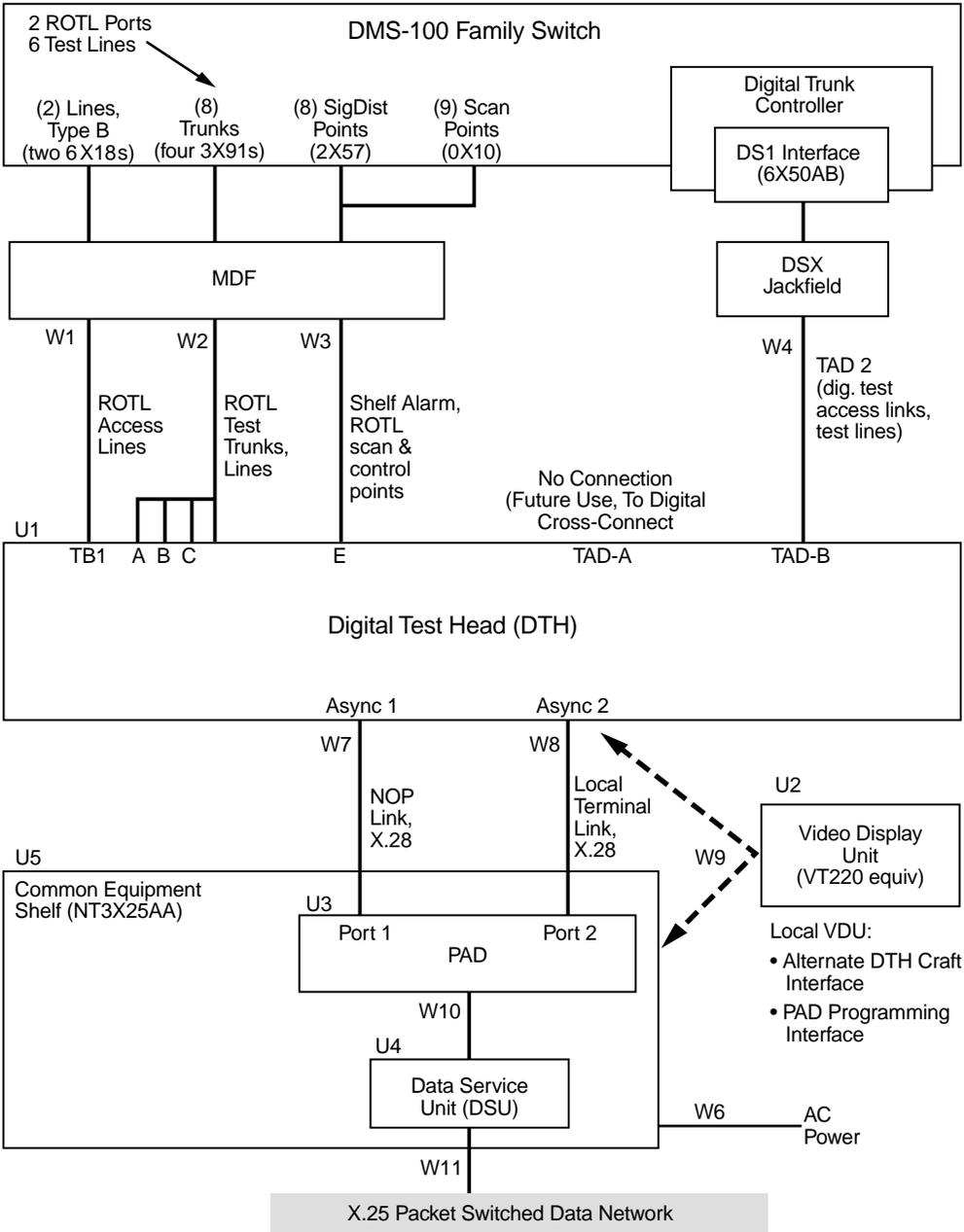
DTH equipment group

Figure 9-1 shows a typical DTH equipment configuration. The DTH is shown with the digital switch which controls the trunks to be tested. Refer to the next section for a detail list of DTH equipment:

1. For a ROTL installation, cables shown as W1, W2, and W3 connect the DTH shelf to the MDF (main distribution frame). These cables are part of the ROTL cable kit NT7F27BA. In turn, DMS-100 cabling provides connection from the MDF to the following switch hardware:
 - a. Line cards, usually type 6X18, in the DMS-100 line card module (LCM). The CAROT center uses the two telephone lines to access and control the ROTL. Hence, there is a need for two 6X18 cards, each supporting one type B line.
 - b. Trunk cards, usually type 3X91AA, with a Type 11 E&M signaling configuration. Two trunks are test trunks and six as type 105 test lines. Hence, it requires four 3X91AA cards, each supporting two trunk circuits
 - c. Scan Cards, usually type 0X10AA. For each ROTL test trunk, four sense points connect to the scan card. There is an additional sense point for the DTH shelf alarm. Hence, there are nine sense points.
 - d. Signal distribution (SD) cards, usually type 2X57AA. For each ROTL test trunk, the signal distribution card has four control points. Hence, it uses eight control points.
2. The DTH and the switch interconnect through TAD 2. A TAD is a DS1 link consisting of a transmit pair and a receive pair. At the DTH, this link terminates on connector TAD-B. The link goes through a jack-field (DSX) to the switch. At the switch, the link terminates on a DS1 interface card. The recommended card is the 6X50AB, which handles two DS1 links. The 6X50AB card is in a DMS-100 peripheral, usually the DTC.

- a. The TAD cable (W4) is in cable kit NT71727AA. The maximum length from the DTH to the DSX is 199.64 m (655 ft.).
3. The DTH links to the packet network through a PAD. The PAD must support at least two 9600 baud RS-232 ports allowing packet network access to two DTH ports:
 - a. Asynchronous communications port 1, for TSC/DTH communications. The messaging protocol is NOP.
 - b. Asynchronous communications port 2, for accessing the DTH through its local terminal interface.
4. The PAD must comply with the following CCITT recommendations:
 - a. X-3, which defines the PAD operating characteristics, operating speed, character echo, and flow control. These are collectively referred to as 'PAD Parameters' defined in the PADs profile.
 - b. X.28, which defines the procedure for character exchange between a terminal and the PAD. X.28 encompasses both PAD command signals (terminal user's instructions to the PAD) and PAD services signals (responses to the terminal). X.28 is used to set up the PAD upon installation.
5. There must be a DSU for the interface between the operating company's packet network and the PAD.
6. You may connect a VT220-equivalent VDU directly to the DTH for use as a local terminal interface. This is an optional arrangement which uses asynchronous communications port 2. During installation, you may connect the VDU to the PAD to program the PAD settings.

Figure 9-1
DTH interconnection diagram



DTH equipment list

Table 9-1 and Table 9-2 identify every major unit and cable necessary for DTH operation. The list is correct from a functional perspective. It describes the units and cables shown in Figure 9-1. However, use the actual drawings

9-4 DTH equipment information

for the listed top assemblies to develop customer information, installation procedures, and related material.

Note: All part numbers given are accurate when this document was written, but are subject to change. The latest version of the parts has been replaced by '-', check with Nortel Networks Customer Service for the number of the part you should have.

Table 9-1
Major assemblies

Item	Description	Part/Model Number	Quantity (or provisioning rule)
U1	DTH assembly		
U2	VDU (optional, for installation and local maintenance) <ul style="list-style-type: none">• VT-220 equivalent• HP700/40 or other units used in DMS-100 MAP applications are suitable	VT-220 equiv	
U3	Packet Assembler Disassembler (PAD) <ul style="list-style-type: none">• one X.25 port• four asynchronous RS-232 ports, supporting at least 9600 baud• includes AC power cord, to be plugged into power strip of Common Equipment Shelf• must comply with CCITT recommendations X.3, X.25, X.28, and X.29 for start/stop asynchronous command, response and control	A0382277 (Memotec SPP-830/4)	1

Table 9-1
Major assemblies

Item	Description	Part/Model Number	Quantity (or provisioning rule)
U4	Data Service Unit (DSU) <ul style="list-style-type: none"> • EIA-232 interface • must support half-duplex, full-duplex, 4-wire • must support both synchronous and synchronous transmission • must support data rates 64, 56, 19.2, 9.6, 4.8, 2.4, and 1.2 kb/s • Bell 500A and 500B compatible • includes modular cord • includes AC power cord, to be plugged into power strip of Common Equipment Shelf (U5) 	64565074 UDS-Motorola 64565074)	1
U5	Common equipment shelf <ul style="list-style-type: none"> • supports items 3 and 4 • includes AC power outlet with isolated ground • installed in same MIS frame as DTH (U1) 	NT3X25AA	1

Table 9-2
Cable descriptions

Item	Description	Part/Model Number	Quantity (or Provisioning rule)
W1	ROTL access lines <ul style="list-style-type: none"> • connects DTH ROTL access lines to MDF • kit incorporates W1, W2 and W3 	p/o NT7F27xx	
W2	ROTL test trunks and test lines <ul style="list-style-type: none"> • connects DTH ROTL test trunks and test lines to MDF • kit incorporates W1, W2, and W3 	p/o NT7F27xx	
W3	ROTL scan and control points <ul style="list-style-type: none"> • connects DTH ROTL scan points and control points to MDF • kit incorporates W1, W2, and W3 	p/o NT7F27xx	

9-6 DTH equipment information

**Table 9-2
Cable descriptions**

Item	Description	Part/Model Number	Quantity (or Provisioning rule)
W4	DTH/ DTT TAD B <ul style="list-style-type: none"> • connects Test Access Digroup B (TAD-B) to switch • maximum length 199.64 m (655 ft.); shorter lengths available; install to exact length • kit incorporates W4 and W5 	p/o NT7F27xx	
W5	DTH/ DTT TAD A <ul style="list-style-type: none"> • connects TAD-A to DCC for special services testing (reserved for future use) • not used when DTH is equipped with ROTL 	p/o NT7F27xx	Not used
W6	AC power cable <ul style="list-style-type: none"> • armored power cable assembly, with isolated ground • run between common equipment shelf (item 5) and power inverter • length approximately 1.52 m (5 ft.) 	NTOX27xx - B0207823	1
W7	RS-232 cable, NOP link, DTH-to-PAD <ul style="list-style-type: none"> • wired for full modem support (12 conductors). Uses signals TX, RX, RTS, CTS, DSR, SG, CD, DTR, and RI • length 1.31m (43 in.) when DTH and PAD are in same bay; 15.24 m (50 ft.) for interbay connection 	Refer to next section	
W8	RS-232 cable, local terminal link, DTH-to-PAD <ul style="list-style-type: none"> • wired for full modem support (12 conductors); uses signals TX, RX, and SG • length 1.31m (43 in.) when DTH and PAD are in same bay; 15.24 m (50 ft.) for interbay connection 	Refer to next section	
W9	RS-232 cable, local terminal cable-to-optional VDU 15.24 m (50 ft.). <ul style="list-style-type: none"> • wired for full modem support (12 conductors). Uses signals TX, RX, RTS, CTS, DSR, SG, and DTR 	NT7F27xx	Provided with basic platform

Table 9-2
Cable descriptions

Item	Description	Part/Model Number	Quantity (or Provisioning rule)
W10	X.25 Link, PAD to Modem <ul style="list-style-type: none"> • wired for full modem support (12 conductors). sees signals TX, RX, RTS, CTS, DSR, SG, CD, DCE TX Clock, RX Clock, and RI. • length 1.31 m (43 in.) 	NT7F27xx	
W11	4-Wire Circuit, DSU to Packet Switch Port <ul style="list-style-type: none"> • plugs into RJ 11 /RJ45 jack on DSU • provided with DSU equipment 	Modular Cord	included with DSU

DTH assembly provisionable items

Table 9-3 contains PEC codes, and quantities, for the DTH shelf assembly and other provisionable items.

Table 9-3
DTH assembly provisionable items

Description	Part/Model number	Quantity in basic platform	Required for ROTL only	Required for DTT only	Required for DTT/ROTL
DTH Basic Platform, includes:	NT7F18_	-	1	1	1
DTH Shelf Assembly, with hardware kit	NT7F22_	1	-	-	-
Power Supply	NT5A23_	1	-	-	-
RS232 Cable, 15.24 m (50 ft.) (W9)	NT7F27_	1	-	-	-
Filler Faceplate, Double-Slot	NT7F30_	1	-	-	-
Filler Faceplate, Wide	NT7F30_	1	-	-	-
Additional modules, application dependent					
Control Processor	NT7F23_	-	1	0	0
ROM Pack	NT7F26_	-	1	0	0
Control Processor	NT7F23_	-	0	1	1
ROM Pack	NT7F26_	-	0	1	1

9-8 DTH equipment information

Table 9-3
DTH assembly provisionable items

Description	Part/ Model number	Quantity in basic platform	Required for ROTL only	Required for DTT only	Required for DTT/ ROTL
DS1 Card	NT7F32_	-	0	1	1
VF I/F Card	NT7F29_	-	1	0	1
DSO Handler Card	NT7F25_	-	1	As req.	As req.
Filler Faceplate, Single-Slot	NT7F30_	-	As req.	As req.	As req.
ROTL Cable Kit (W1,W2, W4)	NT7F27_	-	1	0	1
DTT Cable Kit	NT7F27_	-	0	1	1
RS-232 Cable, 1.31m (43 in.)	NT7F27_	-	0	As req.	As req.
RS-232 Cable, 15.24 m (50 ft.)	NT7F27_	-	0	As req.	As req.

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Digital Test Head
Installation and Maintenance

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