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**Meridian 1**  
**Succession 1000**  
**Succession 1000M**  
Succession 3.0 Software

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# Spares Planning

Document Number: 553-3001-153  
Document Release: Standard 16.00  
Date: October 2003

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## Revision history

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### September 2003

Standard 16.00. This document is up-issued to support Succession 3.0 Software. This document is up-issued to include information for Succession 1000M Small Systems and Meridian 1 Small Systems.

### January 2002

Standard 15.00. This document is up-issued to support Meridian 1 Release 25.40 systems. This document is up-issued to include Call Processor Pentium (CP PII) and Fibre Network Fabric (FNF) for Option 81C.

### April 2000

Standard 14.00. This is a global document and is up-issued for X11 Release 25.0x. Document changes include removal of: redundant content; references to equipment types except Options 11C, 51C, 61C, and 81C; and references to previous software releases.

### June 1999

Standard 13.00. This document is reissued to include the NT5D03 Call Processor Card and minor edits. Changes to technical content are noted by revision bars in the margins.

### October 1997

Standard 12.00. Changes are noted by revision bars in the margins.

### August 1996

Standard 11.00. Changes to technical content are noted by revision bars in the margins.

**August 1996**

Standard 10.00. This document is reissued to include the Fiber Remote Multi-IPE units. Changes to technical content are noted by revision bars in the margins.

**December 1995**

Standard 9.00. This document is reissued to include the NT9D19 Call Processor Card and minor edits. Changes to technical content are noted by revision bars in the margins.

**July 1995**

Standard 8.00. This document is reissued to include international information to create a global NTP and Meridian 1 option 81C. Changes to technical content are noted by revision bars in the margins.

**December 1994**

Standard, 7.0. This document is reissued to include Small Systems Multi Disk Unit (SMDU), option 51C, and failure rate information updates. Changes to technical content are noted by revision bars in the margins.

**April 1994**

Standard 6.0. This document is reissued to include information on Meridian 1 system option 61C. New information and changes to technical content are noted by revision bars in the margins.

**April 1993**

Standard 5.0.

**December 1992**

Standard 4.0. This document is reissued to include information on system option 81 and equipment required for compatibility with X11 release 18. New information and changes to technical content are noted by revision bars in the margins.

**December 1991**

Standard 3.0. This document is reissued to include technical content updates. Due to the extent of changes revision bars are omitted.

**December 1990**

Standard 2.0. Reissued to include MTBF information for station equipment.

January 1990

Standard 1.0.



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## About this document

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This document is a global document. Contact your system supplier or your Nortel Networks representative to verify that the hardware and software described is supported in your area.

### Subject

This document provides the information needed to calculate and plan for spare (replaceable) equipment. This guide also provides hardware failure rates.

#### **Note on legacy products and releases**

This NTP contains information about systems, components, and features that are compatible with Succession 3.0 Software. For more information on legacy products and releases, click the **Technical Documentation** link under **Support** on the Nortel Networks home page:

<http://www.nortelnetworks.com/>

### Applicable systems

This document applies to the following systems:

- Meridian 1 Option 11C Chassis
- Meridian 1 Option 11C Cabinet
- Meridian 1 Option 51C
- Meridian 1 Option 61
- Meridian 1 Option 61C

- Meridian 1 Option 61C CP PII
- Meridian 1 Option 81
- Meridian 1 Option 81C
- Meridian 1 Option 81C CP PII
- Succession 1000
- Succession 1000M Cabinet
- Succession 1000M Chassis
- Succession 1000M Half Group
- Succession 1000M Single Group
- Succession 1000M Multi Group

Note that memory upgrades may be required to run Succession 3.0 Software on CP3 or CP4 systems (Options 51C, 61, 61C, 81, 81C).

### System migration

When particular Meridian 1 systems are upgraded to run Succession 3.0 Software and configured to include a Succession Signaling Server, they become Succession 1000M systems. Table 1 lists each Meridian 1 system that supports an upgrade path to a Succession 1000M system.

**Table 1**  
**Meridian 1 systems to Succession 1000M systems (Part 1 of 2)**

<b>This Meridian 1 system...</b>	<b>Maps to this Succession 1000M system</b>
Meridian 1 Option 11C Chassis	Succession 1000M Chassis
Meridian 1 Option 11C Cabinet	Succession 1000M Cabinet
Meridian 1 Option 51C	Succession 1000M Half Group
Meridian 1 Option 61	Succession 1000M Single Group
Meridian 1 Option 61C	Succession 1000M Single Group
Meridian 1 Option 61C CP PII	Succession 1000M Single Group

**Table 1**  
**Meridian 1 systems to Succession 1000M systems (Part 2 of 2)**

<b>This Meridian 1 system...</b>	<b>Maps to this Succession 1000M system</b>
Meridian 1 Option 81	Succession 1000M Multi Group
Meridian 1 Option 81C	Succession 1000M Multi Group
Meridian 1 Option 81C CP PII	Succession 1000M Multi Group

Note the following:

- When an Option 11C system is upgraded to run Succession 3.0 Software, that system becomes a Meridian 1 Option 11C Cabinet.
- When an Option 11C Mini system is upgraded to run Succession 3.0 Software, that system becomes a Meridian 1 Option 11C Chassis.

For more information, see one or more of the following NTPs:

- *Small System: Upgrade Procedures (553-3011-258)*
- *Large System: Upgrade Procedures (553-3021-258)*
- *Succession 1000 System: Upgrade Procedures (553-3031-258)*

## Intended audience

This document is intended for individuals responsible for system administration.

## Conventions

### Terminology

In this document, the following systems are referred to generically as “system”:

- Meridian 1
- Succession 1000
- Succession 1000M

The following systems are referred to generically as “Small System”:

- Succession 1000M Chassis
- Succession 1000M Cabinet
- Meridian 1 Option 11C Chassis
- Meridian 1 Option 11C Cabinet

The following systems are referred to generically as “Large System”:

- Meridian 1 Option 51C
- Meridian 1 Option 61
- Meridian 1 Option 61C
- Meridian 1 Option 61C CP PII
- Meridian 1 Option 81
- Meridian 1 Option 81C
- Meridian 1 Option 81C CP PII
- Succession 1000M Half Group
- Succession 1000M Single Group
- Succession 1000M Multi Group

The call processor in Succession 1000 and Succession 1000M systems is referred to as the “Succession Call Server”.

## Related information

This section lists information sources that relate to this document.

### NTPs

The following NTPs are referenced in this document:

- *Equipment Identification* (553-3001-154)
- *Small System: Maintenance* (553-3011-500)

### Online

To access Nortel Networks documentation online, click the **Technical Documentation** link under **Support** on the Nortel Networks home page:

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# Spares planning

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## Contents

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## Introduction

Spares planning is used to determine desired inventory levels of spare (replaceable) items. Spares planning is used by repair houses and centralized depots in order to ensure that there is an adequate stock of replaceable items on hand.

## Definitions and assumptions

- Failure rate**—Failure rate equals the estimated number of failures for that item during one million ( $10^6$ ) hours of operation. The only exception is to measurements for cabling or other items with low failure rates. Rates are also measured in Failures in Time (FIT) measurements. One FIT equals one billion ( $10^9$ ) hours of operation.
- Sparing interval**—The sparing interval is the period of time that stocks of replaceable items should last without being replenished. This period is assumed to be one year following the installation of the system.

**Stock confidence level**—The stock confidence level is the allowed probability of not being out of stock when the sparing interval of one year is greater than 99.9 percent.

**Card ambient temperature**—The card ambient temperature is the average temperature of the air immediately surrounding the circuit card (usually higher than the ambient room temperature). Card failure rates in this document are based on a card ambient temperature of 40° C (104° F).

**Turnaround time for repair**—Equipment may be serviced at a repair house or at a centralized depot that serves sub-depots. The turnaround time for the return-to-stock of a failed item is about ten working days (240 hours) from a repair house. The turnaround time for the return-to-stock of a failed item is about two working days from a centralized depot.

Actual turnaround periods vary in the field. As the number of systems served increases, the percentage of replaceable items required in stock is reduced.

**Population range**—Population range is the quantity of each type of system in the area served by the depot.

**Spare stock size**—The quantity of spares for a given stock item depends on the sparing interval, stock confidence level, failure rate, turnaround time for repair, and population range.

## Calculating spares requirements

Use the following procedure to calculate the number of spares required to stock a depot for a one-year sparing interval:

- 1 Determine the number (N) of in-service specified circuit cards serviced by the depot.
- 2 Look up the card failure rate (F) for the specified circuit card in “Failure rates – Large Systems” on [page 27](#), or “Failure rates – Small Systems” on [page 37](#).
- 3 Card failure rates are expressed in terms of the number of failures per million hours ( $10^6$ ).
- 4 Determine turnaround time (T) in hours.



- 5 For repair house service, turnaround time is typically ten working days (240 hours). For centralized depot service, turnaround time is typically two working days (48 hours).
- 6 Calculate the NFT value by multiplying  $N \times F \times T$ .
- 7 Look up the number of spares required in "NFT values" on [page 19](#).

**Example:** A centralized depot services 10,000 NT8D02 Digital Line Cards. The failure rate given for this card is 1.8 failures per 1 million hours. With a turnaround time of 48 hours:

$$\text{NFT} = 10,000 \times \frac{1.8}{1,000,000} \times 48 = 0.864$$

The number of spares required for an NFT value of 0.864 = 6.



# NFT values

Table 2 translates NFT values to the number of spares required in stock. The following abbreviations are used:

- N—Number in use
- F—Failure rate
- T—Turnaround time (in hours)

Table 2  
Number of spares required (Part 1 of 7)

NFT values		Spares required	NFT values		Spares required
From	To		From	To	
0	0.001	1	2.94	3.46	11
0.001	0.0452	2	3.46	4.01	12
0.0452	0.189	3	4.01	4.58	13
0.189	0.425	4	4.58	5.16	14
0.425	0.734	5	5.16	5.76	15
0.734	1.09	6	5.76	6.37	16
1.09	1.5	7	6.37	6.99	17
1.5	1.95	8	6.99	7.62	18
1.95	2.43	9	7.62	8.26	19
2.43	2.94	10	8.26	8.91	20

**Table 2**  
**Number of spares required (Part 2 of 7)**

NFT values		Spares required	NFT values		Spares required
From	To		From	To	
8.91	9.57	21	23.9	24.6	42
9.57	10.2	22	24.6	25.4	43
10.2	10.9	23	25.4	26.2	44
10.9	11.5	24	26.2	26.9	45
11.5	12.2	25	26.9	27.7	46
12.2	12.9	26	27.7	28.5	47
12.9	13.6	27	28.5	29.2	48
13.6	14.3	28	29.2	30	49
14.3	15	29	30	30.8	50
15	15.8	30	30.8	31.6	51
15.8	16.5	31	31.6	32.4	52
16.5	17.2	32	32.4	33.2	53
17.2	17.9	33	33.2	33.9	54
17.9	18.7	34	33.9	34.7	55
18.7	19.4	35	34.7	35.5	56
19.4	20.1	36	35.5	36.3	57
20.1	20.9	37	36.3	37.1	58
20.9	21.6	38	37.1	37.9	59
21.6	22.4	39	37.9	38.7	60
22.4	23.1	40	38.7	39.5	61
23.1	23.9	41	39.5	40.3	62

**Table 2**  
**Number of spares required (Part 3 of 7)**

NFT values		Spares required	NFT values		Spares required
From	To		From	To	
40.3	41.1	63	57.5	58.3	84
41.1	41.9	64	58.3	59.1	85
41.9	42.7	65	59.1	60	86
42.7	43.5	66	60	60.8	87
43.5	44.3	67	60.8	61.6	88
44.3	45.2	68	61.6	62.5	89
45.2	46	69	62.5	63.3	90
46	46.8	70	63.3	64.1	91
46.8	47.6	71	64.1	65	92
47.6	48.4	72	65	65.8	93
48.4	49.2	73	65.8	66.6	94
49.2	50	74	66.6	67.5	95
50	50.9	75	67.5	68.3	96
50.9	51.7	76	68.3	69.2	97
51.7	52.5	77	69.2	70	98
52.5	53.3	78	70	70.9	99
53.3	54.2	79	70.9	71.7	100
54.2	55	80	71.7	72.5	101
55	55.8	81	72.5	73.4	102
55.8	56.6	82	73.4	74.2	103
56.6	57.5	83	74.2	75.1	104

**Table 2**  
**Number of spares required (Part 4 of 7)**

NFT values		Spares required	NFT values		Spares required
From	To		From	To	
75.1	75.9	105	93	93.9	126
75.9	76.8	106	93.9	94.7	127
76.8	77.6	107	94.7	95.6	128
77.6	78.5	108	95.6	96.5	129
78.5	79.3	109	96.5	97.3	130
79.3	80.2	110	97.3	98.2	131
80.2	81	111	98.2	99.1	132
81	81.9	112	99.1	99.9	133
81.9	82.7	113	99.9	100.8	134
82.7	83.6	114	100.8	101.7	135
83.6	84.4	115	101.7	102.5	136
84.4	85.3	116	102.5	103.4	137
85.3	86.2	117	103.4	104.3	138
86.2	87	118	104.3	105.1	139
87	87.9	119	105.1	106	140
87.9	88.7	120	106	106.9	141
88.7	89.6	121	106.9	107.7	142
89.6	90.4	122	107.7	108.6	143
90.4	91.3	123	108.6	109.5	144
91.3	92.2	124	109.5	110.3	145
92.2	93	125	110.3	111.2	146

**Table 2**  
**Number of spares required (Part 5 of 7)**

NFT values		Spares required	NFT values		Spares required
From	To		From	To	
111.2	112.1	147	129.6	130.5	168
112.1	113	148	130.5	131.4	169
113	113.8	149	131.4	132.2	170
113.8	114.7	150	132.2	133.1	171
114.7	115.6	151	133.1	134	172
115.6	116.4	152	134	134.9	173
116.4	117.3	153	134.9	135.8	174
117.3	118.2	154	135.8	136.6	175
118.2	119.1	155	136.6	137.5	176
119.1	119.9	156	137.5	138.4	177
119.9	120.8	157	138.4	139.3	178
120.8	121.7	158	139.3	140.2	179
121.7	122.6	159	140.2	141.1	180
122.6	123.5	160	141.1	141.9	181
123.5	124.3	161	141.9	142.8	182
124.3	125.2	162	142.8	143.7	183
125.2	126.1	163	143.7	144.6	184
126.1	127	164	144.6	145.5	185
127	127.8	165	145.5	146.4	186
127.8	128.7	166	146.4	147.3	187
128.7	129.6	167	147.3	148.1	188

**Table 2**  
**Number of spares required (Part 6 of 7)**

NFT values		Spares required	NFT values		Spares required
From	To		From	To	
148.1	149	189	166.8	167.7	210
149	149.9	190	167.7	168.6	211
149.9	150.8	191	168.6	169.5	212
150.8	151.7	192	169.5	170.4	213
151.7	152.6	193	170.4	171.3	214
152.6	153.5	194	171.3	172.2	215
153.5	154.4	195	172.2	173.1	216
154.4	155.2	196	173.1	174	217
155.2	156.1	197	174	174.9	218
156.1	157	198	174.9	175.8	219
157	157.9	199	175.8	176.7	220
157.9	158.8	200	176.7	177.5	221
158.8	159.7	201	177.5	178.4	222
159.7	160.6	202	178.4	179.3	223
160.6	161.5	203	179.3	180.2	224
161.5	162.4	204	180.2	181.1	225
162.4	163.3	205	181.1	182	226
163.3	164.1	206	182	182.9	227
164.1	165	207	182.9	183.8	228
165	165.9	208	183.8	184.7	229
165.9	166.8	209	184.7	185.6	230



**Table 2**  
**Number of spares required (Part 7 of 7)**

NFT values		Spares required	NFT values		Spares required
From	To		From	To	
185.6	186.5	231	197.3	198.2	244
186.5	187.4	232	198.2	199.1	245
187.4	188.3	233	199.1	200	246
188.3	189.2	234	200	200.9	247
189.2	190.1	235	200.9	201.8	248
190.1	191	236	201.8	202.7	249
191	191.9	237	202.7	203.6	250
191.9	192.8	238	203.6	204.5	251
192.8	193.7	239	204.5	205.4	252
193.7	194.6	240	205.4	206.3	253
194.6	195.5	241	206.3	207.2	254
195.5	196.4	242	207.2	208.1	255
196.4	197.3	243	208.1	209	256



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# Failure rates – Large Systems

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## Overview

Failure rates are based on a circuit card ambient temperature of 40° C (104° F). This temperature is usually higher than the surrounding room temperature. Running the system at a lower temperature will increase the life expectancy of components and improve overall system reliability.

There are many cables available from Nortel Networks. The approximate failure rate for most cables, based on failures in time per billion hours (10<sup>9</sup>), is 0.5. For a detailed listing of cables, see *Equipment Identification* (553-3001-154).

## Failure rate tables

**Note:** In these tables, “N/A” indicates the failure rate is not available at this time.

### Modules and packaging

Table 3 gives the failure rates for system modules and associated packages.

**Table 3**  
**Failure rates of modules, and packaging**

Order code	Description	Failure rate per 10 <sup>6</sup> hrs
A773056	Fiber Remote Multi-IPE Single-mode (1-4 Superloops)	1.86
A773059	(1-2 Superloops)	
A773054	Fiber Remote Multi-IPE Multi-mode (1-4 Superloops)	1.86
A773055	(1-2 Superloops)	
A0634492	Fiber Remote Multi-IPE Redundant Option Single-mode	1.86
A0634493	Multi-mode	
NT4N41AA	Core/Network Module AC	N/A
NT4N41AD	Core/Network Module AC	
NT5D21AA	Core/Network Module AC	0.25
NT5D21DA	Core/Network Module DC	
NT7D00AA	Top Cap (AC)	0.14
NT7D00BA	Top Cap (DC)	
NT8D35AA	Network Module AC	0.90
NT8D35DC	Network Module DC	
NT8D37AA	Intelligent Peripheral Equipment IPE Module AC	0.80
NT8D37DC	IPE Module DC	

## Power and cooling equipment

Table 4 gives the failure rates for power and cooling equipment.

**Table 4**  
**Failure rates of power and cooling equipment**

Order code	Description	Failure rate per 10 <sup>6</sup> hrs
A0355200	Power Failure Transfer Unit	5.70
NT6D40	PE Power Supply DC	1.60
NT6D41	CE Power Supply DC	0.61
NT6D42	Ringling Generator DC	N/A
NT8D06	PE Power Supply AC	2.10
NT8D21	Ringling Generator AC	2.02
NT8D22	System Monitor	1.00
NT8D29	CE Power Supply AC	1.27
NT8D52AB	Pedestal Blower Unit AC	2.00
NT8D52DD	Pedestal Blower Unit DC	N/A
NT8D53AD	Power Distribution Unit (Option 21A)	N/A
NT8D53CA	Power Distribution Unit AC	N/A
NT8D56AA	CE Module Power Distribution Unit	N/A
NT8D56AC	CE or PE Module Power Distribution Unit	N/A
NT8D57AA	PE Module Power Distribution Unit	N/A
QBL12	Battery Distribution Box	1.33
QBL15	Power Distribution Box	2.81

## Circuit cards

Table 5 gives the failure rates for circuit cards.

**Table 5**  
**Failure rates of circuit cards (Part 1 of 6)**

Order code	Description	Failure rate per 10 <sup>6</sup> hrs
	Call Processor Pentium II® for Succession 3.0	N/A
A0810496	Call Processor Pentium II® (128 MB)	N/A
A0786611	Call Processor Pentium II® (128 MB)	N/A
NT1P61	Fiber Superloop Network Card	1.05
NT1P62	Fiber Controller Card	1.03
NT1P63	Electro-optical Interface	1.14
NT1R20	Off-Premises Station Analog Line Card	5.00
NT4N43AA	cPCI Multi-Media Disk Unit	N/A
NT4N64	Call Processor Pentium II® (256 MB)	N/A
NT4N65AB	cPCI® Core to Network Interface	N/A
NT4N66AB	cPCI® Core to Network Interface Transition	N/A
NT4N67AA	System Utility	N/A
NT4N68AA	System Utility Transition	N/A
NT5D03AA	Call Processor Card (48 MB)	N/A
NT5D03BA	Call Processor Card (64 MB)	N/A
NT5D03CA	Call Processor Card (80 MB)	N/A
NT5D03EA	Call Processor Card (112 MB)	N/A
NT5D03FA	Call Processor Card (128 MB)	N/A

**Table 5**  
**Failure rates of circuit cards (Part 2 of 6)**

Order code	Description	Failure rate per 10 <sup>6</sup> hrs
NT5D10AA	Call Processor Card (48 MB)	N/A
NT5D10CA	Call Processor Card (64 MB)	N/A
NT5D10EA	Call Processor Card (80 MB)	N/A
NT5D10JA	Call Processor Card (112 MB)	N/A
NT5D11	Line side T1 Line Card	N/A
NT5D14		
NT5D12AA	Dual DTI/PRI Card (DDP)	1.76
NT5K02	Flexible Analog Line Card	6.00
NT5K07	Universal Trunk Card for Hong Kong	4.30
NT5K09	Quad Density Receiver	1.50
NT5K10	Enhanced Dual Loop Buffer Card	1.00
NT5K17	Enhanced Dual Loop Buffer Card	1.90
NT5K18	Extended PPM CO Trunk Card	3.50
NT5K19	E&M/2280 Hz Trunk Card	2.20
NT5K20	Extended Tone Detector	2.20
NT5K21	XMFC/MFE Sender Receiver card	2.70
NT5K36	Direct Inward Dial/Direct Outward Dial Trunk Card for Germany	19.00
NT5K70	Central Office Trunk Card for Germany (8 units)	4.60
NT5K71	Central Office Trunk Card for Germany (4 units)	4.60
NT5K72	E&M Trunk Card for Germany	19.00

**Table 5**  
**Failure rates of circuit cards (Part 3 of 6)**

Order code	Description	Failure rate per 10 <sup>6</sup> hrs
NT5K82	Central Office Trunk Card	4.60
NT5K83	E&M Trunk Card for Switzerland	19.00
NT5K83AA	E&M Trunk Card for Denmark	2.50
NT5K83BA	E&M Trunk Card for Denmark	N/A
NT5K83CA	E&M Trunk Card for Norway	2.50
NT5K83DA	E&M Trunk Card for Holland	19.0
NT5K83EA	E&M Trunk Card for Australia	2.50
NT5K83FA	E&M Trunk Card for Sweden	N/A
NT5K83GA	E&M Trunk Card for Italy	N/A
NT5K83HA	E&M Trunk Card for Belgium	N/A
NT5K84AA	Direct Inward Dial Trunk Card for Switzerland	2.50
NT5K84BA	Direct Inward Dial Trunk Card for Australia	4.60
NT5K84HA	Direct Inward Dial Trunk Card for Belgium	N/A
NT5K93	Central Office Trunk Card for Norway	4.60
NT5K99	Central Office Trunk Card for Spain	4.60
NT5K96	Flexible Analog Line Card without Message Waiting	6.00
NT6D6003	Core Bus Terminator Card	0.23
NT6D65	Core to Network Interface Card	3.00
NT6D80AA	Multi-purpose Serial Data Link Card	4.47



**Table 5**  
**Failure rates of circuit cards (Part 4 of 6)**

<b>Order code</b>	<b>Description</b>	<b>Failure rate per 10<sup>6</sup> hrs</b>
NT7D16	Data Access Card	4.07
NT7R51	Local Carrier Interface Card	2.40
NT7R52	Remote Carrier Interface Card	1.80
NT8D01BC	Controller-4 Card SMT	1.86
NT8D01BD	Controller-2 Card	1.86
NT8D02	Digital Line Card	1.80
NT8D03	Analog Line Card	5.10
NT8D04BA	Superloop Network Card	2.32
NT8D09	Analog Message Waiting Line Card	5.80
NT8D14	Universal Trunk Card	3.40
NT8D15	E&M Trunk Card	3.70
NT8D16	Digitone Receiver Card	2.70
NT8D17	Conference/TDS Card	5.10
NT8D41BA	Quad Serial Data Interface Paddle Board	164.00
NT8D72AB	2048 kbps Primary Rate Interface	5.62
NT9D34	Enhanced Mass Storage Interface Card	2.26
NTAG03	Central Office Trunk Card for Holland	19.00
NTAG04	Central Office/Direct Inward Dial Trunk Card for Holland	19.00
NTAG26	Extended Multi-frequency Receiver	N/A
NTBK51	Downloadable D-Channel Daughterboard	1.24
NTCK16	Generic Central Office Trunk Card	4.6

**Table 5**  
**Failure rates of circuit cards (Part 5 of 6)**

Order code	Description	Failure rate per 10 <sup>6</sup> hrs
QPC43	Peripheral Signaling Card	1.73
QPC71	E&M/DX/Paging Trunk Card	3.10
QPC250	Release Link Trunk Card	7.73
QPC311	Data Line Card (SL-1)	13.91
	— vintage F and later	8.26
QPC327	MFC Sender/Receiver Card	20.07
QPC343	Ground Button Recall Line Card (A-Law)	12.50
QPC353	Modem Pool Line Card ( $\mu$ -Law)	8.23
QPC354	Modem Pool Line Card (A-Law)	6.26
QPC397	MCDS Asynchronous Card	12.68
QPC414	Network Card	3.00
QPC422	Tone Detector Card	17.40
QPC430	Asynchronous Interface Line Card	22.82
QPC432	4-Port Data Line Card	8.15
QPC441	Three-Port Extender Card	2.00
QPC449	Loop Signaling Trunk Card	2.27
QPC450	CO/FX/WATS Trunk Card	3.34
QPC451	SL-1 Line Card	5.15
QPC471	Clock Controller Card	2.44
	— vintage H and later	1.00
QPC494	500/2500 Message Waiting Card	8.00
QPC526	PPM CO Trunk Card (A-law)	16.82

**Table 5**  
**Failure rates of circuit cards (Part 6 of 6)**

<b>Order code</b>	<b>Description</b>	<b>Failure rate per 10<sup>6</sup> hrs</b>
QPC527	CO/FX/WATS Trunk Card (A-law)	12.37
QPC532	Ground Button Line Card	13.93
QPC540	Tone Detector Card	6.49
QPC574	Digitone Receiver Card	0.83
QPC578	Integrated Services Digital Line Card	2.72
QPC594	500/2500 Line Card	3.70
QPC595	Dual DT Receiver Card (A-law)	6.28
QPC659	Dual Loop Peripheral Buffer Card	2.75
QPC720	Primary Rate Interface Card	6.00
QPC841	Four-Port Serial Data Interface Card	2.30

## Mass storage equipment

Table 6 gives the failure rates for mass storage equipment.

**Table 6**  
**Failure rates of mass storage equipment**

<b>Order code</b>	<b>Description</b>	<b>Failure rate per 10<sup>6</sup> hrs</b>
QPC584	Mass Storage Interface Card	2.26
QPC742	Floppy Disk Interface Card	3.23
QUW1	Magnetic Tape Unit	48.00
QUW9	Magnetic Tape Unit	20.58

## Terminal equipment

Table 7 gives the failure rates for terminal equipment.

**Table 7**  
**Failure rates of station equipment**

Order code	Description	Failure rate per 10 <sup>6</sup> hrs
NE-500/2500	500/2500-type Analog Telephone	N/A
NE-DGQC-35	Line Cord	3.50
NE-G3AR-35	Handset	0.50
NE-G3DRN-3	Console Handset	0.50
NTZK06	M2006 Telephone	3.08
NTZK08	M2008 Telephone	3.10
NTZK16	M2616 Telephone	3.88
NTZK20	M2016S Telephone	5.87
NTZK22	M2216ACD-1 Telephone	4.68
NT6G00	M2250 TCM Console	N/A
	M2317 Telephone	N/A
QMT11	Asynchronous/Synchronous Interface Module	6.34
QMT12	Add-On Data Module	9.92

## Miscellaneous components - replacement

This section provides information and replacement information for additional components not listed in the tables in the previous section.

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# Failure rates – Small Systems

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## Overview

Failure rates are based on a circuit card ambient temperature of 40° C (104° F). This temperature is usually higher than the surrounding room temperature. Running the system at a lower temperature will increase the life expectancy of components and improve overall system reliability.

There are many cables available from Nortel Networks. The approximate failure rate for most cables, based on failures in time per billion hours ( $10^9$ ), is 0.5. For a detailed listing of cables, see *Equipment Identification* (553-3001-154).

## Failure rate tables

**Note:** In these tables, “N/A” indicates the failure rate is not available at this time.

### Modules and packaging

Table 8 gives the failure rates for system modules and associated packages.

**Table 8**  
**Failure rates of modules, and packaging**

Order code	Description	Failure rate per 10 <sup>6</sup> hrs
NTAK11	Cabinet	N/A
NTDK91	Chassis	1.70
NTDK92	Chassis Expander	1.70

### Power and cooling equipment

Table 9 gives the failure rates for power and cooling equipment.

**Table 9**  
**Failure rates of power and cooling equipment**

Order code	Description	Failure rate per 10 <sup>6</sup> hrs
NTAK04	AC/DC Power Supply	3.60
NTDK72	DC Power Supply	3.60
NTDK78	AC/DC Power Supply	3.60

## Circuit cards

Table 10 gives the failure rates for circuit cards.

**Table 10**  
**Failure rates of circuit cards (Part 1 of 2)**

Order code	Description	Failure rate per 10 <sup>6</sup> hrs
NT8D02	Digital Line Card	1.80
NT8D09	Analog Message Waiting Line Card	5.80
NT8D14	Universal Trunk Card	3.40
NT8D15	E&M Trunk Card	3.70
NTAK02	SDI/DCH Circuit Card	2.90
NTAK10	2.0 Mb DTI	2.40
NTAK20	Clock Controller	0.54
NTBK22	MISP Circuit Card	7.66
NTBK50	2.0 Mb PRI	3.40
NTBK51	Downloadable D-Channel Daughterboard	1.22
NTDK16	48-port Digital Line Card	1.80
NTDK22	10m Fiber Daughterboard	2.19
NTDK23	10m Fiber Receiver Card	2.15
NTDK24	3km Fiber Daughterboard	2.19
NTDK25	3km Fiber Receiver Card	2.15
NTDK26	Upgrade Daughterboard	0.46
NTDK79	3km Fiber Daughterboard	2.19
NTDK80	3km Fiber Receiver Card	2.15
NTDK81	Software Daughterboard	0.83

**Table 10**  
**Failure rates of circuit cards (Part 2 of 2)**

Order code	Description	Failure rate per 10 <sup>6</sup> hrs
NTDK85	Dual Fiber Expansion Daughterboard	2.28
NTDK97	Mini System Controller	3.39

## Station equipment

Table 11 gives the failure rates for station equipment.

**Table 11**  
**Failure rates of station equipment**

Order code	Description	Failure rate per 10 <sup>6</sup> hrs
NTZK06	M2006 Telephone	3.08
NTZK08	M2008 Telephone	3.10
NTZK16	M2616 Telephone	3.88
NTZK22	M2216ACD-1 Telephone	4.68
NTZK23	M2216ACD-2 Telephone	5.37
NT1F05	M2009 Telephone	12.22
NT6G00	M2250 TCM Console	N/A

## Miscellaneous components - replacement

This section provides information and replacement information for additional components not listed in the tables in the previous section.



**NTAK75 extended battery back-up unit**

The batteries supplied with the NTAK75 have an average useful life of four years, meaning that the batteries are depleted to 80% of capacity and back-up time is diminished. After this period of time, the batteries should be replaced.

The mean time between failures (MTBF) of the NTAK75 without batteries is 100 years at 25° C.

For more information, refer to *Small System: Maintenance* (553-3011-500).

**NTAK76 battery back-up unit**

The batteries supplied with the NTAK76 have an average useful life of four years, meaning that the batteries are depleted to 80% of capacity and back-up time is diminished. After this period of time, the batteries should be replaced.

The mean time between failures (MTBF) of the NTAK76 without batteries is 370 years at 25° C.

For more information, refer to *Small System: Maintenance* (553-3011-500).



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## **Spares Planning**

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Publication number: 553-3001-153

Document release: Standard 16.00

Date: October 2003

Produced in Canada

