ANT-20, ANT-20E
Advanced Network Tester

3

STS-1 Mappings

BN 3035/90.10
BN 3035/90.11
BN 3035/90.12
BN 3035/90.13

Drop & Insert

BN 3035/90.20
in combination with
STS-1 Mappings

Software Version 7.20

Operating Manual

BN 3035/98.30

WAVETEK
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Communications Test Solutions

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Contents

Specifications

Specifications

These specifications apply to the options:

SONET mappings

STS-1 mapping for ANSI tributaries

STS-1 mapping for ETSI tributaries

1 STS-1 mapping

1.1 General information

STS-1 and STS-3 signals

STS-1 and STS-3 signals are generated and evaluated to conform with Bellcore GR-253 and ANSI T1.105.

The STS-3 signal consists of one STS-1 tributary equipped with a selected payload and two unequipped STS-1 tributaries.

Mapping/Demapping

One selected STS-1 mapping is included in the mainframe instrument. Other mappings can be added as required.

Container contents:

- Framed or unframed asynchronous payload in a selected container.
- Filling of a selected container with a test pattern,
  without justification bits (bulk signal).

Drop & Insert

An additional Drop & Insert Option (BN 3035/90.20) for dropping or inserting tributary signals (via sockets) is available in conjunction with the mapping options.

1.2 Tributary channel numbering

VT1.5 locations

VT1.5#	Group #/VT #	Column[1] #s	VT1.5#	Group #/VT #	Column[1] #s
1	1, 1	2, 31, 60	15	1, 3	16, 45, 74
2	2, 1	3, 32, 61	16	2, 3	17, 46, 75
3	3, 1	4, 33, 62	17	3, 3	18, 47, 76
4	4, 1	5, 34, 63	18	4, 3	19, 48, 77
5	5, 1	6, 35, 64	19	5, 3	20, 49, 78
6	6, 1	7, 36, 65	20	6, 3	21, 50, 79
7	7, 1	8, 37, 66	21	7, 3	22, 51, 80
8	1, 2	9, 38, 67	22	1, 4	23, 52, 81
9	2, 2	10, 39, 68	23	2, 4	24, 53, 82
10	3, 2	11, 40, 69	24	3, 4	25, 54, 83
11	4, 2	12, 41, 70	25	4, 4	26, 55, 84
12	5, 2	13, 42, 71	26	5, 4	27, 56, 85
13	6, 2	14, 43, 72	27	6, 4	28, 57, 86
14	7, 2	15, 44, 73	28	7, 4	29, 58, 87

1 Column 1 = STS POH
Column 30, 59 = Fixed stuff

Table S-1 VT1.5 locations

VT2 locations

VT2#	Group #/VT #	Column[1] #s	VT2#	Group #/VT #	Column[1] #s
1	1, 1	2, 23, 45, 67	12	5, 2	13, 35, 56, 78
2	2, 1	3, 24, 46, 68	13	6, 2	14, 36, 57, 79
3	3, 1	4, 25, 47, 69	14	7, 2	15, 37, 58, 80
4	4, 1	5, 26, 48, 70	15	1, 3	16, 38, 60, 81
5	5, 1	6, 27, 49, 71	16	2, 3	17, 39, 61, 82
6	6, 1	7, 28, 50, 72	17	3, 3	18, 40, 62, 83
7	7, 1	8, 29, 51, 73	18	4, 3	19, 41, 63, 84
8	1, 2	9, 31, 52, 74	19	5, 3	20, 42, 64, 85
9	2, 2	10, 32, 53, 75	20	6, 3	21, 43, 65, 86
10	3, 2	11, 33, 54, 76	21	7, 3	22, 44, 66, 87
11	4, 2	12, 34, 55, 77	-	-	-

1 Column 1 = STS POH
Column 30, 59 = Fixed stuff

Table S-2 VT2 locations

VT6 locations

VT6#	Group #/VT #	Column[1] #s
1	1, 1	2, 9, 16, 23, 31, 38, 45, 52, 60, 67, 74, 81
2	2, 1	3, 10, 17, 24, 32, 39, 46, 53, 61, 68, 75, 82
3	3, 1	4, 11, 18, 25, 33, 40, 47, 54, 62, 69, 76, 83
4	4, 1	5, 12, 19, 26, 34, 41, 48, 55, 63, 70, 77, 84
5	5, 1	6, 13, 20, 27, 35, 42, 49, 56, 64, 71, 78, 85
6	6, 1	7, 14, 21, 28, 36, 43, 50, 57, 65, 72, 79, 86
7	7, 1	8, 15, 22, 29, 37, 44, 51, 58, 66, 73, 80, 87

1 Column 1 = STS-1 POH
Colunm 30, 59 = Fixed stuff

Table S-3 VT6 locations

1.3 Scrambling/Descrambling

The STS-N signal is scrambled/descrambled as described in Bellcore GR-253 and ANSI T1.105.

1.4 Overhead generation

1.4.1 Transport Overhead (TOH)

Standard overhead, STS-1 (hex)

TOH			
	1	**2**	**3**
1	A1 F6	A2 28	J0 01
2	B1 XX	E1 00	F1 00
3	D1 00	D2 00	D3 00
4	H1 60	H2 00	H3 00
5	B2 XX	K1 00	K2 00
6	D4 00	D5 00	D6 00
7	D7 00	D8 00	D9 00
8	D10 00	D11 00	D12 00
9	S1 00	M0 00	E2 00

Table S-4 TOH contents, STS-1

Standard overhead, STS-3 (hex), STS-3c

TOH										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	
1	A1 F6	A1 F6	A1 F6	A2 28	A2 28	A2 28	J0 01	— 02	— 03	
2	B1 XX	— 00	— 00	E1 00	— 00	— 00	F1 00	— 00	— 00	
3	D1 00	— 00	— 00	D2 00	— 00	— 00	D3 00	— 00	— 00	
4a	H1 60	H1 60	H1 60	H2 00	H2 00	H2 00	H3 00	H3 00	H3 00	at STS-3
4b	H1 60	Y 93	Y 93	H2 00	— FF	— FF	H3 00	H3 00	H3 00	at STS-3c
5	B2 XX	B2 XX	B2 XX	K1 00	— 00	— 00	K2 00	— 00	— 00	
6	D4 00	— 00	— 00	D5 00	— 00	— 00	D6 00	— 00	— 00	
7	D7 00	— 00	— 00	D8 00	— 00	— 00	D9 00	— 00	— 00	
8	D10 00	— 00	— 00	D11 00	— 00	— 00	D12 00	— 00	— 00	
9	S1 00	Z1 00	Z1 00	Z2 00	Z2 00	M1 00	E2 00	— 00	— 00	

Table S-5 TOH contents, STS-3

XX: Inserted by parity formation (B1, B2)

H1 and H2 depend on the pointer address setting (pointer address = 0 is shown), H3 depends on whether or not a pointer action takes place.

TOH byte contents

- Static bytes: all except B1, B2, H1, H2, H3
- Overhead sequence m, n, p: all except B1, B2, H1, H2, H3
- Dynamic bytes filled using PRBS 11: E1, F1, E2
- Dynamic byte groups filled using PRBS 11: D1 to D3, D4 to D12
- Dynamic bytes filled via DCC/ECC interface (V.11): E1, F1, E2
- Dynamic byte groups filled via DCC/ECC interface (V.11): D1 to D3, D4 to D12, K1 to K2

1.4.2 STS-N error insertion (anomalies)

Error insertion (anomalies) . . . . . B1, B2, B3 parity errors, FAS word errors, REI-L, REI-P, bit errors in test pattern (TSE), code errors (single errors only)

Trigger types . . . . . Single or Rate

When Rate triggering is selected a bit error rate is inserted.

Anomaly	**Single**	**Rate**[1]	**Burst m, n (frames)**
FAS	yes	2E-3 to 1E-10	m = 1 to 196000
B1	yes	2E-4 to 1E-10	m = 1 to 196000
B2	yes	2E-3 to 1E-10	m = 1 to 196000
REI-L	yes	2E-3 to 1E-10	m = 1 to 196000
B3[2]	yes	2E-4 to 1E-10	m = 1 to 196000
REI-P	yes	2E-4 to 1E-10	m = 1 to 196000
TSE	yes	1E-2 to 1E-8	-
BPV (code error)	yes	-	-

1 Mantissa: 1 to 9 (only 1 for TSE), exponent: -1 to -10 (whole numbers)
2 Static error insertion, can be edited using a 8-bit mask (x = don't care, 1 = insert error)

Table S-6 Available anomalies and trigger modes (STS-N)

The insertion of **errors** (anomalies) **and alarms** (defects) are mutually exclusive. The first action selected is active. The second action is rejected.

1.4.3 STS-N alarm generation (defects)

Defect	Test sensor function	Test sensor thresholds	
	On/Off	M in N	|----t1----| |------t2------|
LOS[1]	ja	M = 800 bis 7200 N = 1600 bis 8000	t1 = 0.1 bis 60.0 s t2 = 0.2 bis 600 s
LOF	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
TIM-L	yes	-	-
AIS-L	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
RDI-L	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
LOP-P	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
AIS-P	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
UNEQ-P	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
PLM-P	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
RDI-P	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
TIM-P	yes	-	-
PDI-P	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s or t1 = 0.5 to 250 ms t2=1 to 8000 ms
1 Only in conjunction with an optical interface			

Table S-7 Available defects (STS-N)

The insertion of **alarms** (defects) **and errors** (anomalies) are mutually exclusive. The first action selected is active. The second action is rejected.

1.4.4 Pointer action generation

Stimulation

Pointer sequences

On all pointer levels to ANSI T1.105.03

T1, T4: 0.25 ms to 600 s . . . . . (2 to 4800000 frames)

T2, T3: 0.25 ms to 10 s . . . . . (2 to 80000 frames)

T5: 0 ms to 600 s. . . . . (0 to 4800000 frames)

n: 1 to 2000

Fig. S-1 Perodic (single/multiple) pointers with identical polarity

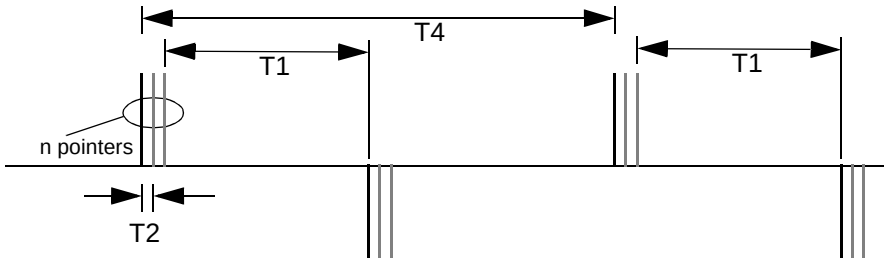

Fig. S-2 Perodic (single/multiple) pointers with different polarity

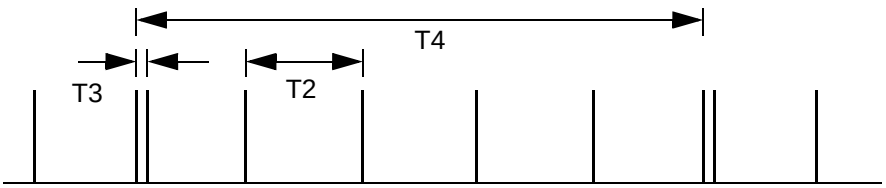

Fig. S-3 Periodic pointers with one double pointer

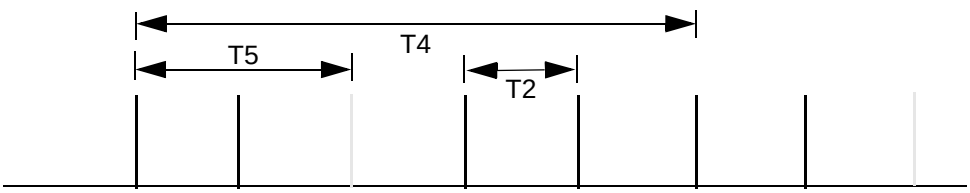

Fig. S-4 Periodic pointers with one missing pointer

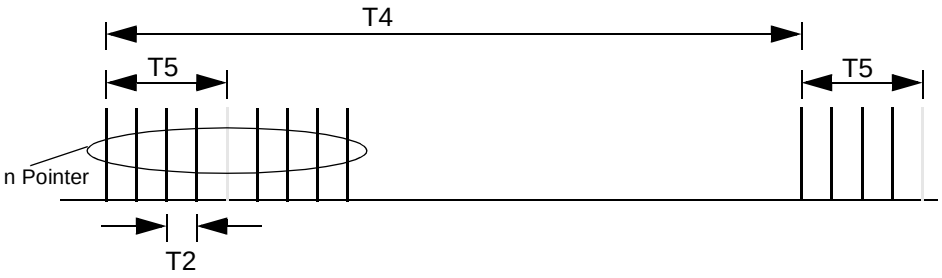

Fig. S-5 Pointer burst with missing pointers

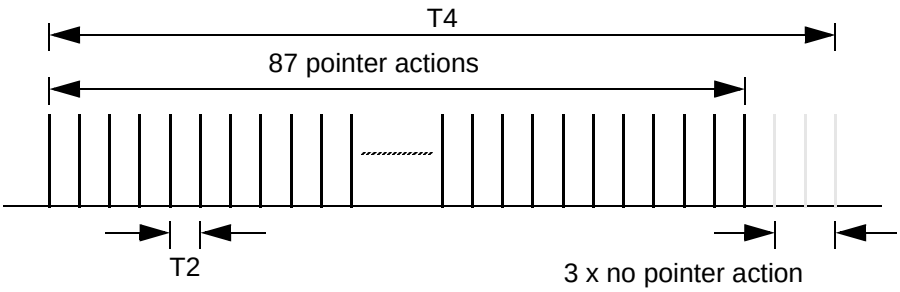

Fig. S-6 ”87-3” sequence

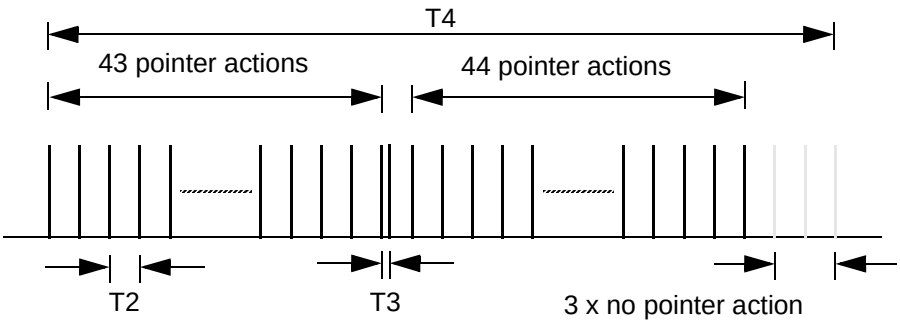

Fig. S-7 ”43-44” sequence with double pointer

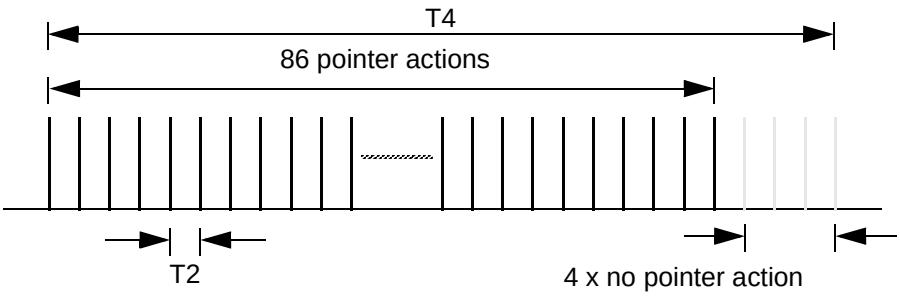

Fig. S-8 ”86-4” sequence with missing pointer

Pointer jumps

Pointer jump from pointer value A to pointer value B (also setting a new pointer).
Pointer jumps are executed with or without NDF.

Pointer range A + B:
STS pointer . . . . . 0 to 782
VT6 pointer . . . . . 0 to 427
VT2 pointer . . . . . 0 to 139
VT1.5 pointer . . . . . 0 to 103

1.4.5 STS-N error measurements (anomalies)

Evaluation

All errors (anomalies) are counted simultaneously and stored.

Gate times . . . . . 1 to 99 seconds
or 1 to 99 minutes
or 1 to 99 hours
or 1 to 99 days

Intermediate results . . . . . 1 to 99 seconds
or 1 to 99 minutes

Display

of anomalies via LEDs:

CURRENT LED (red) is on when the anomaly is present

HISTORY LED (yellow) is on if the anomaly has occurred at least once during the current measurement interval.

Display of errors as count or ratio values (equivalent bit error ratio): When calculating the ratio value, correction formulae are used for the anomalies B1, B2, B3 and BIP-2 as well as REI-L and REI-P. These take into account that a multiple error in the same bit can lead to clearance of the error.

Anomaly	LED
OOF	LOF/OOF
FAS	-
B1	B1/B2
B2	B1/B2
REI-L	-
B3	B3
REI-P	-

Table S-8 LED display of available anomalies (STS-N)

Evaluation and display refer to the selected measurement channel.

1.4.6 STS-N alarm detection (defects)

Evaluation

All alarms (defects) which occur are evaluated simultaneously where possible and stored. Storage takes place only within a started measurement interval.

Time resolution of defects . . . . . 100 ms

Display

of defects via LEDs:

CURRENT LED (red) is on when the defect is present

HISTORY LED (yellow) is on if the defect has occurred at least once during the current measurement interval.

Defect	**LED**
LOS	LOS
LOF	LOF/OOF
TIM-L	-
AIS-L	MS-AIS/AIS-L
RDI-L	MS-RDI/RDI-L
LOP-P	AU-LOP/LOP-P
AIS-P	AU-AIS/AIS-P
UNEQ-P	HP-UNEQ/UNEQ-P
PLM-P	HP-PLM/PLM-P
RDI-P	HP-RDI/RDI-P
TIM-P	-
PDI-P	-

Table S-9 LED display of available defects (STS-N)

Evaluation and display refer to the selected measurement channel.

1.4.7 Evaluation of STS and VT pointer actions

Evaluation

All pointers in the selected path are shown as absolute values and the direction and number of pointer movements is detected and counted.

NDF (New Data Flag) is detected and counted.

Display

of:

- Number of pointer operations separate for STS and VT pointers:
  Increments, decrements, sum of increments + decrements,
  difference of increments - decrements
- Pointer address
- Number of NDF events
- Corresponding clock deviation
- NDF-P and NDF-V can be indicated by the LED display on the front panel
  (Application Manager - “Configuration” menu - LED Display ...):
  – the “AU-LOP/LOP-P” LED indicates “NDF-P” in addition to “LOP-P”
  – the “TU-LOP/LOP-V”LED indicates “NDF-V” in addition to “LOP-V”

Absolute pointer values, increments, decrements, sum of increments + decrements and NDF are displayed as a histogram with selectable time resolution in seconds, minutes, hours or days.

Printout

Absolute pointer values, increments, decrements, sum of increments + decrements and NDF are printed out as a table with 1 second time resolution.

1.4.8 Evaluation of Transport Overhead (TOH) and Path Overhead (POH)

Evaluation

Bit error measurement

using PRBS 11 (bytes) E1, F1, E2, F2
using PRBS 11 (byte groups) . . . . . D1 to D3, D4 to D12

Output

as bytes via DCC/ECC interface (V.11) E1, F1, E2, F2, K3
as byte groups via DCC/ECC interface (V.11) . . . . . .D1 to D3, D4 to D12, K1 to K2

Display

of complete TOH and POH . . . . . hexadecimal
of Trace Identifier J0, J1. . . . . .ASCII, plain text

1.4.9 STS Path Overhead (POH)

Standard overhead

POH Byte	Option 3035/90.10 Option 3035/90.11 Option 3035/90.13	Option 3035/90.12	Option 3035/90.03	Option 3035/90.70 Option 3035/90.71
J1 (ASCII)	"WG STS-TRACE"			
B3 (hex)	Inserted by parity formation			
C2 (hex)	"02"	"04"	"12" at mapping "01" at bulk	"13"
G1 (hex)	"00"			
F2 (hex)	"00"			
H4 (hex)	"FC", "FD", "FE", "FF" sequence across 4 frames	"FF"	"FF"	"FF"
	48-frames-sequence as GR253			
F3 (hex)	"00"			
Z4 (hex)	"00"			

Table S-10 POH contents

STS POH byte contents

- Static bytes: all except B3, H4
- Overhead sequence m, n, p: J1, C2, G1, F2, F3, Z4
- Trace Identifier (Length = 64 frames): J1
- Dynamic byte filled using PRBS 11: F2
- Dynamic bytes filled via DCC/ECC interface (V.11): F2, Z4, N1
- H4 sequence, switchable, 4/48 Bytes

1.5 STS-3c mapping (E4 in STS-3c, ATM in STS-3c)

Option BN 3035/90.03 or BN 3035/90.70 required

STS-3c SPE mapping structure

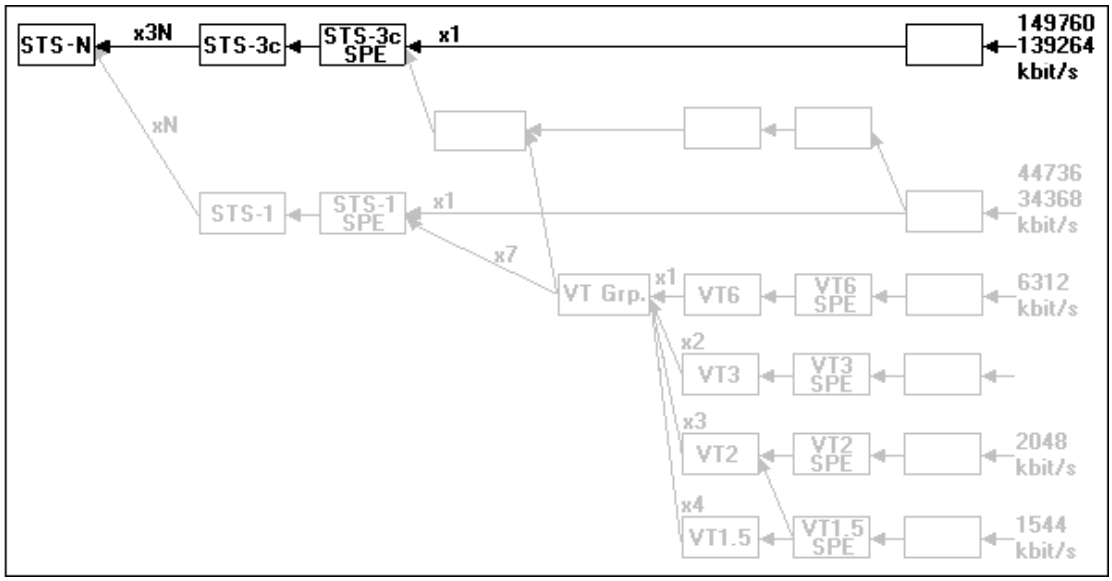

Fig. S-9 Mapping structure: 139 MBits/s "→" STS-3c SPE "→" STS-3c

Path overhead contents Sec. 1.4, Page S-4.

1.6 STS-1 SPE mapping (DS3 in STS-1, 34/45 Mbit in STM-0)

Option BN 3035/90.12 required

34/45 Mbit/s in STM-0 see also: “STM-1 mapping” Operating Manual.

STS-1 SPE mapping structure

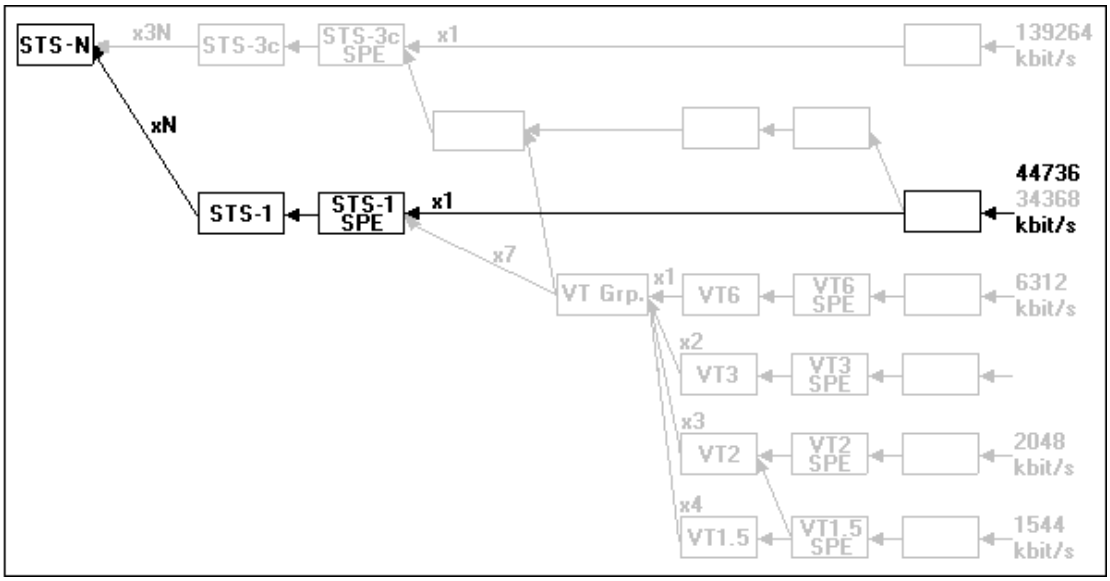

Fig. S-10 Mapping structure: DS3 “→” STS-1 SPE “→” STS-1/3

Path overhead contents Sec. 1.4, Page S-4.

1.7 VT1.5 SPE mapping (DS1 in STS-1/3, 1.5 Mbit in STM-0)

Option BN 3035/90.10

1.5 Mbit/s in STM-0 see also: “STM-1 mapping” Operating Manual, section “C-11 mapping”.

VT1.5 mapping structure

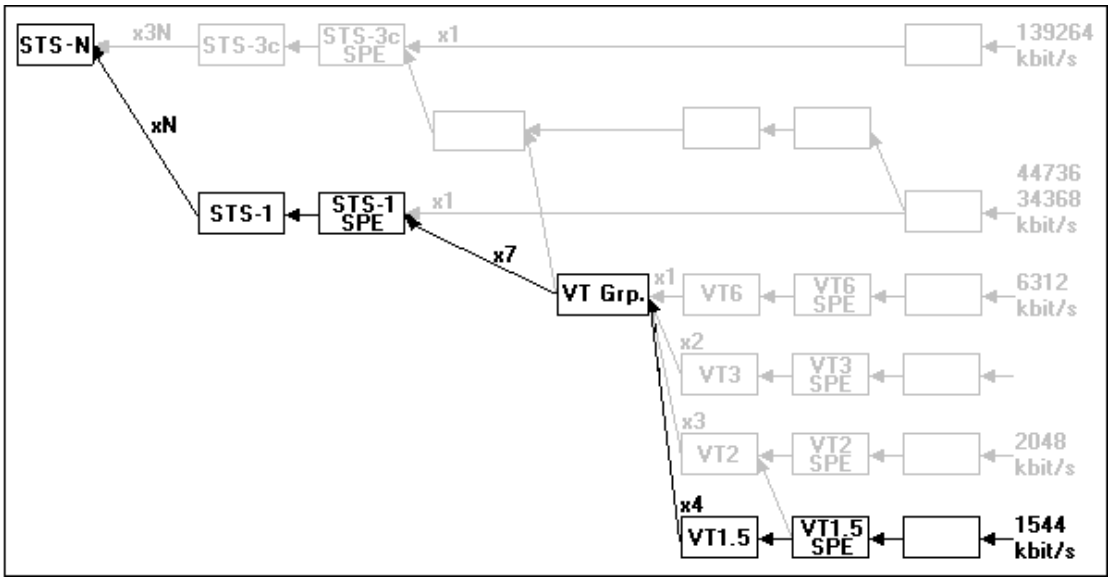

Fig. S-11 Mapping structure: DS1“→” VT1.5 “→” STS-1 SPE “→” STS-1/3

1.5 Mbit/s in STM-0 mapping structure (AU-3, TU-11)

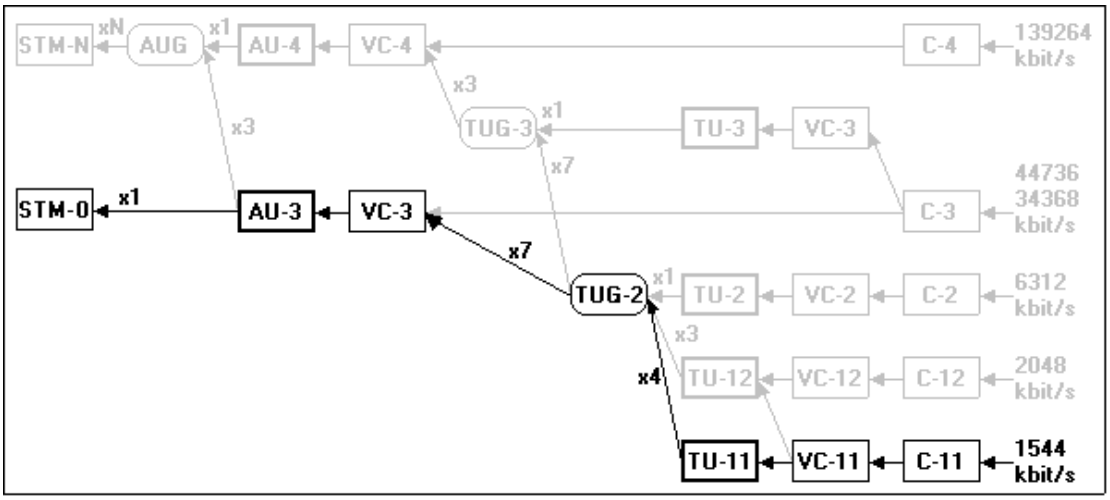

Fig. S-12 Mapping structure: 1.5 Mbit/s “→” C-11 “→” TU-11 “→” AU-3 “→” STM-0

1.5 Mbit/s in STM-0 mapping structure (AU-3, TU-12)

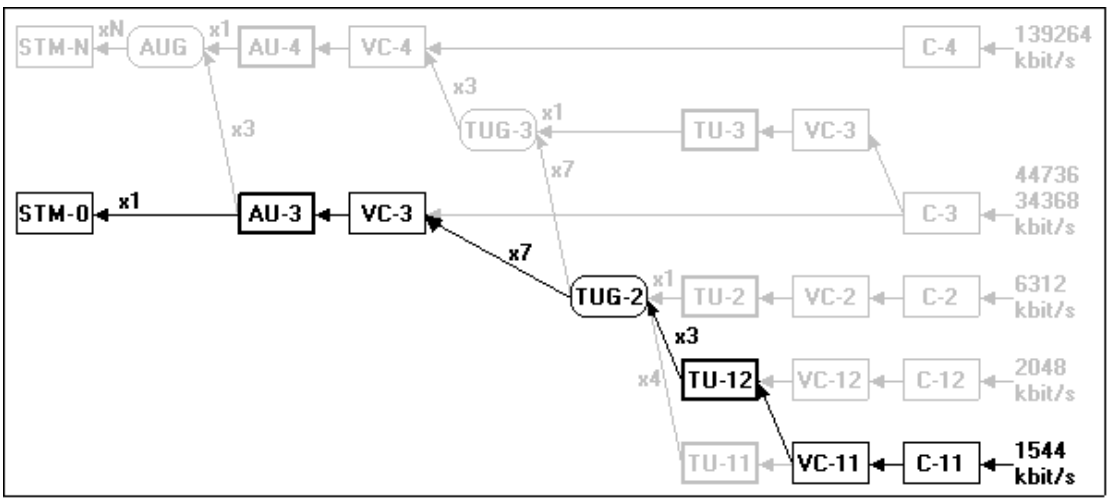

Fig. S-13 Mapping structure: 1.5 Mbit/s “→” C-11 “→” TU-12 “→” AU-3 “→” STM-0

Mapping method

The following modes are available:

- Asynchronous mode
- Byte-synchronous mode (floating); TU-11

1.7.1 VT1.5 Path Overhead contents

POH byte	Measurement channel	Filler channels
V5 (binary)		
BIP-V (bits 1-2)	Inserted by parity formation	Inserted by parity formation
REI-V (bit 3)	“0”	“0”
RFI-V (bit 4)	“0”	“0”
Path Label (bit 5-7)	“010” for asynchronous mode “100” for byte-synchronous mode “001” for bulk signal	“010” for asynchronous mode “100” for byte-synchronous mode
RDI-V (bit 8)	“0”	“0”
J2	“WG VT-TRACE” (ASCII)	“00” (hex)
Z6 (hex)	“00”	“00”
Z7 (hex)	“00”	“00”

Table S-11 VT1.5 POH (Standard Overhead) contents

Measurement channel byte contents (VT1.5)

- Static bytes: all except bits 1-2 of V5
- Overhead sequence m, n, p: J2, N2, K4
- Trace Identifier (Length = 64 frames): J2
- Dynamic bytes filled via DCC/ECC interface (V.11): Z6

Filler channel byte contents (VT1.5)

Fixed (non-editable) as in (see Tab. S-11)

1.7.2 VT1.5 error insertion (anomalies)

The following anomalies can be inserted in addition to the error types specified in Sec. 1.4.2, Page S-6:

Anomaly	Single	Rate
BIP-V[1]	yes	2E-4 to 1E-10
REI-V	yes	2E-4 to 1E-10

1 Static error insertion, can be edited using a 2-bit mask (x = don’t care, 1 = insert error)

Table S-12 Additional anomalies (VT1.5)

Error insertion refers to the selected measurement channel.

1.7.3 VT1.5 alarm generation (defects)

The following defects can be generated in addition to the alarm types specified in Sec. 1.4.3, Page S-7:

Defect	**Test sensor function**	**Sensor thresholds**	
	On/Off	M in N	I----t1----I I------t2------I
LOM-V	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
LOP-V	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
AIS-V	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
UNEQ-V	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
PLM-V	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
RDI-V	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
TIM-V	yes	-	-
RFI-V	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
PDI-V	yes	M = 1 toN - 1 N = 1 to 8000	t1 = 0,1 to 60,0 s t2 = 0.2 to 600 s or t1 = 0.5 to 250 ms t2=1 to 8000 ms

Table S-13 Additional defects (VT1.5)

Alarm generation refers to the selected measurement channel.

1.7.4 VT1.5 Path Overhead evaluation

Display

- of the complete POH (hexadecimal)
- of the Trace Identifier (ASCII, plain text): J2

Output

- via DCC/ECC interface (V.11): Z6

1.7.5 VT1.5 error measurements (anomalies)

The following anomalies can be evaluated and displayed in addition to the error measurements specified in Sec. 1.4.5, Page S-10:

Anomaly	**LED**
BIP-V	LP-BIP/BIP-V
REI-V	-

Table S-14 LED display of additional anomalies (VT1.5)

Evaluation and display refer to the selected measurement channel.

1.7.6 VT1.5 alarm detection (defects)

The following defects can be evaluated and displayed in addition to the alarm detection specified in Sec. 1.4.6, Page S-12:

Defect	**LED**
LOM	TU-LOM
LOP-V	TU-LOP/LOP-V
AIS-V	TU-AIS/AIS-V
UNEQ-V	LP-UNEQ/UNEQ-V
PLM-V	LP-PLM/PLM-V
RDI-V	LP-RDI/RDI-V
TIM-V	-
RFI-V	-
PDI-V	-

Table S-15 LED display of additional defects (VT1.5)

Evaluation and display refer to the selected measurement channel.

1.8 VT2 mapping (E1 in STS-1/3, 2 Mbit/s in STM-0)

Option: BN 3035/90.13

2 Mbit/s in STM-0: see also “STM-1 mappings” Operating Manual, section “C-12 mapping”.

VT2 mapping structure

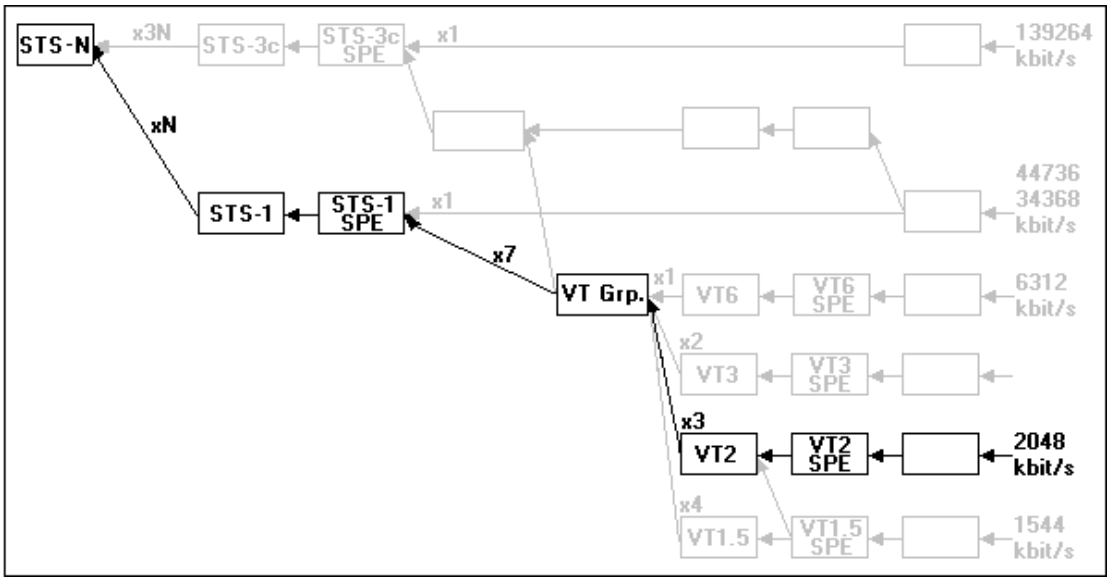

Fig. S-14 Mapping structure: 2 Mbit/s “→” VT2 SPE “→” STS-1 SPE “→” STS-1/3

2 Mbit/s in STM-0 mapping structure

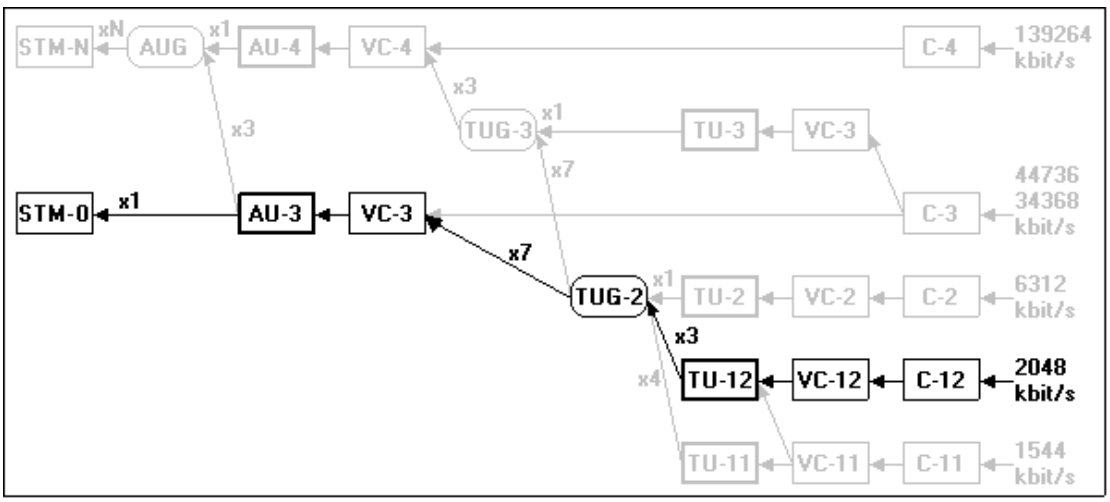

Fig. S-15 Mapping structure: 2 Mbit/s “→” AU-3“→” STM-0

Mapping method

The following modes are available:

- Asynchronous mode
- Byte-synchronous mode (floating)

1.8.1 VT2 Path Overhead contents

POH byte	Measurement channel	Filler channels
V5 (binary)		
BIP-V (bits 1-2)	Inserted by parity formation	Inserted by parity formation
REI-V (bit 3)	“0”	“0”
RFI-V (bit 4)	“0”	“0”
Path Label (bit 5-7)	“010” for asynchronous mode “100” for byte-synchronous mode “001” for bulk signal	“010” for asynchronous mode “100” for byte-synchronous mode
RDI-V (bit 8)	“0”	“0”
J2	“WG VT-TRACE” (ASCII)	“00” (hex)
Z6 (hex)	“00”	“00”
Z7 (hex)	“00”	“00”

Table S-16 VT2 POH (Standard Overhead) contents

Measurement channel byte contents (VT2)

- Static bytes: all except bits 1-2 of V5
- Overhead sequence m, n, p: J2, N2, K4
- Trace Identifier: J2 (Length = 64 frames)
- Dynamic bytes filled via DCC/ECC interface (V.11): Z6

Filler channel byte contents (VT2)

Fixed (non-editable) as in Tab. S-16, Page S-23

1.8.2 VT2 error insertion (anomalies)

The following anomalies can be inserted in addition to the error types specified in Sec. 1.4.2, Page S-6:

Anomaly	Single	Rate
BIP-V[1]	yes	2E-4 to 1E-10
REI-V	yes	2E-4 to 1E-10

1 Static error insertion, can be edited using a 2-bit mask (x = don’t care, 1 = insert error)

Table S-17 Additional anomalies (VT2)

Error insertion refers to the selected measurement channel.

1.8.3 VT2 alarm generation (defects)

2 Mbit/s in STM-0: see “STM-1 mapping” Operating Manual, section “C-12 mapping”.

The following defects can be generated in addition to the alarm types specified in Sec. 1.4.3, Page S-7:

Defect	**Test sensor function**	**Sensor thresholds**	
	On/Off	M in N	I----t1----I I------t2------I
LOM	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
LOP-V	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
AIS-V	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
UNEQ-V	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
PLM-V	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
RDI-V	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
TIM-V	yes	-	-
RFI-V	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s or t1 = 0.5 to 250 ms t2 = 1 to 8000 ms
PDI-V	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s

Table S-18 Additional defects (VT2)

Alarm generation refers to the selected measurement channel.

1.8.4 VT2 Path Overhead evaluation

Display

- of the complete POH (hexadecimal)
- of the Trace Identifier (ASCII, plain text): J2

Output

- via DCC/ECC interface (V.11): Z6

1.8.5 VT2 error measurements (anomalies)

The following anomalies can be evaluated and displayed in addition to the error measurements specified in Sec. 1.4.5, Page S-10:

Anomaly	**LED**
BIP-V	LP-BIP/BIP-V
REI-V	-

Table S-19 LED display of additional anomalies (VT2)

Evaluation and display refer to the selected measurement channel.

1.8.6 VT2 alarm detection (defects)

The following defects can be evaluated and displayed in addition to the alarm detection specified in Sec. 1.4.6, Page S-12:

Defect	**LED**
LOM	LOM
LOP-V	TU-LOP/LOP-V
AIS-V	TU-AIS/AIS-V
UNEQ-V	LP-UNEQ/UNEQ-V
PLM-V	LP-PLM/PLM-V
RDI-V	LP-RDI/RDI-V
TIM-V	-
RFI-V	-
PDI-V	-

Table S-20 LED display of additional defects (VT2)

Evaluation and display refer to the selected measurement channel.

1.9 VT6 mapping (6 Mbit/s in STS-1/3)

Option BN 3035/90.11

Mapping structure: VT6

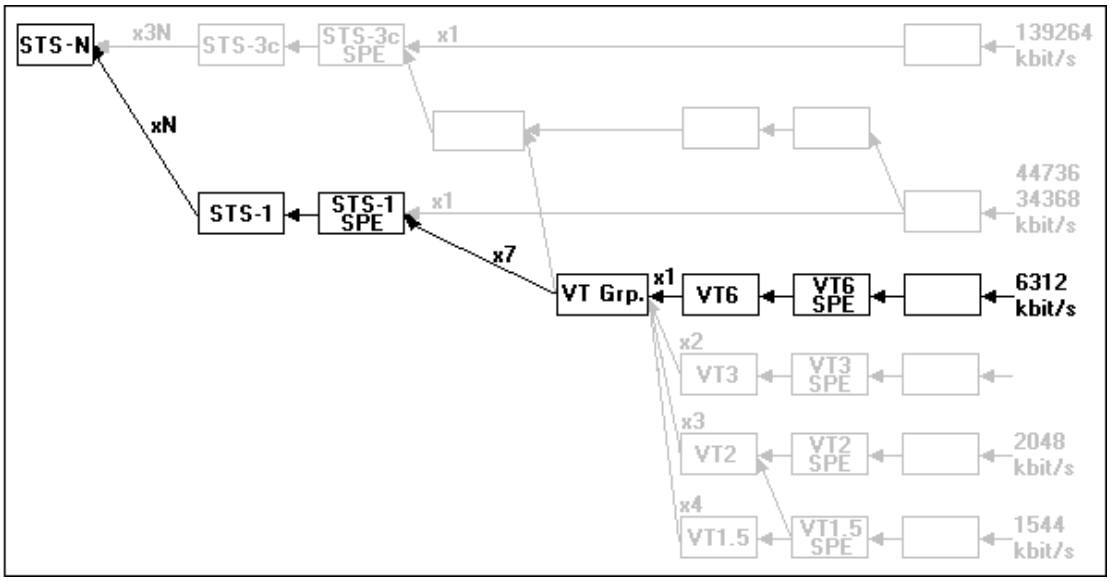

Fig. S-16 Mapping structure: 6 Mbit/s “→” VT6 SPE “→” STS-1 SPE “→” STS-1/3

Mapping method

The following mode is available:

- Asynchronous mode

1.9.1 VC-6 Path Overhead contents

POH byte	Measurement channel	Filler channels
V5 (binary)		
BIP-V (bits 1-2)	Inserted by parity formation	Inserted by parity formation
REI-V (bit 3)	“0”	“0”
RFI-V (bit 4)	“0”	“0”
Path Label (bit 5-7)	“010” for asynchronous mode “001” for bulk signal	“010” for asynchronous mode
RDI-V (bit 8)	“0”	“0”
J2	“WG VT-TRACE” (ASCII)	“00” (hex)
Z6 (hex)	“00”	“00”
Z7 (hex)	“00”	“00”

Table S-21 VT6 POH (Standard Overhead) contents

Measurement channel byte contents (VT6)

- Static bytes: all except bits 1-2 of V5
- Overhead sequence m, n, p: J2, N2, K4
- Trace Identifier: J2 (Length = 64 frames)
- Dynamic bytes filled via DCC/ECC interface (V.11): Z6

Filler channel byte contents (VT6)

Fixed (non-editable) as in (see Tab. S-21)

1.9.2 VT6 error insertion (anomalies)

The following anomalies can be inserted in addition to the error types specified in section 1.4.2 “STS-N error insertion (anomalies)”:

Anomaly	Single	Rate
BIP-V[1]	yes	2E-4 to 1E-10
REI-V	yes	2E-4 to 1E-10
1 Static error insertion, can be edited using a 2-bit mask (x = don’t care, 1 = insert error)		

Table S-22 Additional anomalies (VT6)

Error insertion refers to the selected measurement channel.

1.9.3 VT6 alarm generation (defects)

The following defects can be generated in addition to the alarm types specified in Sec. 1.4.3, Page S-7:

Defect	**Test sensor function**	**Sensor thresholds**	
	On/Off	M in N	I----t1----I I------t2------I
LOM	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
LOP-V	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
AIS-V	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
UNEQ-V	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
PLM-V	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
RDI-V	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s
TIM-V	yes	-	-
RFI-V	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s or t1 = 0.5 to 250 ms t2 = 1 to 8000 ms
PDI-V	yes	M = 1 to N - 1 N = 1 to 8000	t1 = 0.1 to 60.0 s t2 = 0.2 to 600 s

Table S-23 Additional defects (VT6)

Alarm generation refers to the selected measurement channel.

1.9.4 VT6 Path Overhead evaluation

Display

- of the complete POH (hexadecimal)
- of the Trace Identifier (ASCII, plain text): J2

Output

- via DCC/ECC interface (V.11): Z6

1.9.5 VT6 error measurements (anomalies)

The following anomalies can be evaluated and displayed in addition to the error measurements specified in Sec. 1.4.5, Page S-10:

Anomaly	**LED**
BIP-V	LP-BIP/BIP-V
REI-V	-

Table S-24 LED display of additional anomalies (VT6)

Evaluation and display refer to the selected measurement channel.

1.9.6 VT6 alarm detection (defects)

The following defects can be evaluated and displayed in addition to the alarm detection specified in section 1.4.6 “STS-N alarm detection (defects)”:

Defect	**LED**
LOM	LOM
LOP-V	TU-LOP/LOP-V
AIS-V	TU-AIS/AIS-V
UNEQ-V	LP-UNEQ/UNEQ-V
PLM-V	LP-PLM/PLM-V
RDI-V	LP-RDI/RDI-V
TIM-V	-
RFI-V	-
PDI-V	-

Table S-25 LED display of additional defects (VT6)

Evaluation and display refer to the selected measurement channel.

1.10 Filler channel contents

Mapping structure like measurement channel, test pattern PRBS11.

2 Drop & Insert / Through Mode

Option BN 3035/90.20

2.1 Function

This option provides the following functions for all the mapping options included in the ANT-20.

Drop & Insert

Generator and receiver operate independently as mapper and demapper. The signal from a selected channel is dropped from the receive signal and output to a connector. An external signal is inserted into the transmit signal.

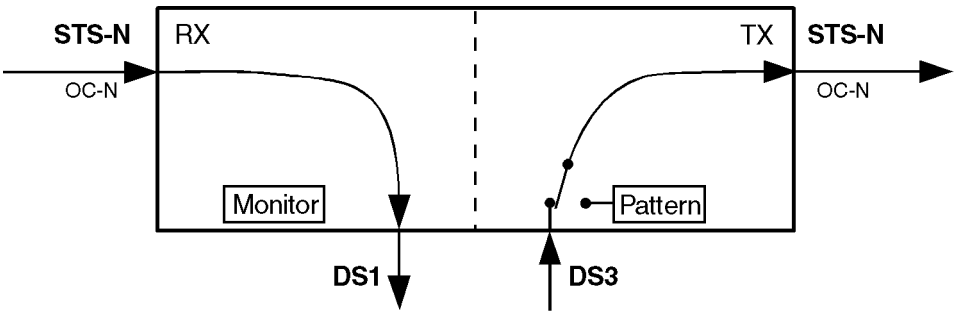

Fig. S-17 Drop & Insert: Generator and receiver operate independently

An unbalanced digital input and output are provided on the mainframe instrument for dropping and for inserting tributary signals (see Sec. 2.2.1, Page S-33 and Sec. 2.3.1, Page S-34).

The mainframe instrument is also equipped with a balanced output [13] and input [12] for dropping and for inserting tributary signals via balanced interfaces.

Through Mode

The received signal is looped through the ANT-20 and re-transmitted by the generator. One tributary signal can be output (dropped).

The ANT-20 can also operate in Through Mode as a signal monitor without affecting the signal content.

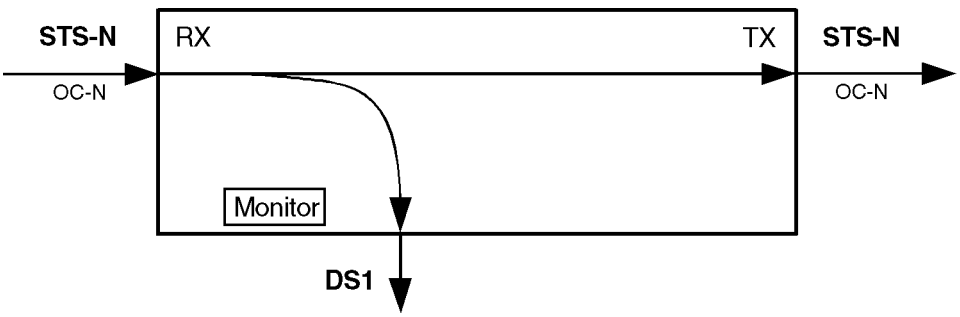

Fig. S-18 Through Mode: Generator and receiver coupled

In conjunction with the Options “PDH MUX/DEMUX” and “M13 MUX/DEMUX”, BN 3035/90.30 to BN 3035/90.32, the ANT-20 provides access to the tributary channels within the MUX/ DEMUX chain (except DS2). This also applies if the PDH signal is transmitted in a container.

The looped-through signal can also be jittered using the Jitter Generator options (Jitter Generator up to 155 or 622 Mbit/s, BN 3035/90.60 to 61). This function is available for all bit rates fitted to the instrument.

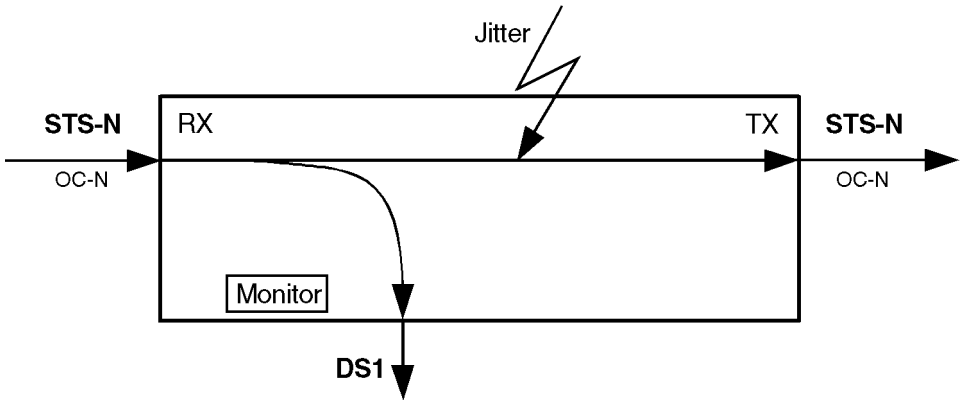

Fig. S-19 Through Mode: Adding jitter to the looped-through signal

In Through Mode, anomalies can be inserted in the SOH or the SOH bytes can be manipulated.

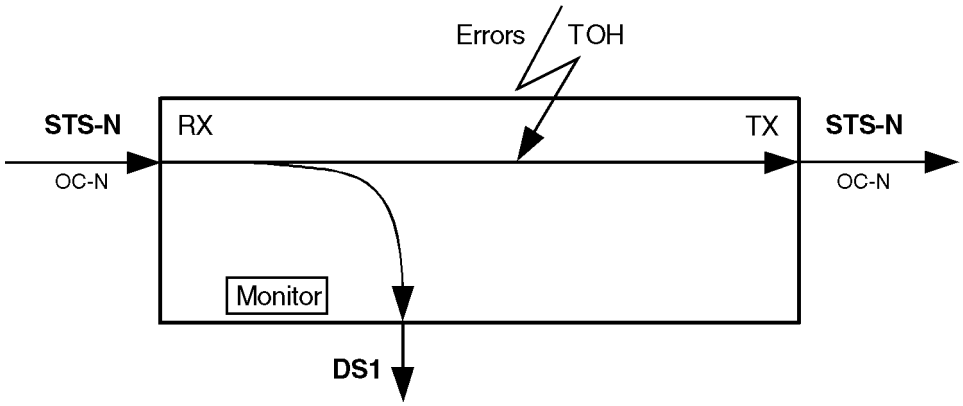

Fig. S-20 Through Mode: Inserting errors in the TOH

2.1.1 Clock generator

Drop & Insert

As specified in the “Specifications” of the mainframe instrument, section 1.2.

Through Mode

In Through Mode, clock generation is always derived from the receive signal clock.
No offset is possible in this operating mode (see also the “Specifications” of the mainframe instrument).

2.1.2 Overhead generator

Drop & Insert

As specified in Sec. 1.4.1, Page S-4.

Through Mode

The “From Rx” function can be set in addition to the functions described in Sec. 1.4.1, Page S-4 for all bytes except bytes B1, B2 and M1.

Dynamic filling of the byte group D4 to D12 via DCC/ECC interface is not possible for STS-1.

2.1.3 Anomaly insertion

Drop & Insert

As specified in Sec. 1.4.2, Page S-6.

Through Mode

Anomaly insertion in bytes B1, B2 and REI-L.
Insertion limits are specified in Sec. 1.4.2, Page S-6.

2.1.4 Defect generation

Drop & Insert

As specified in Sec. 1.4.3, Page S-7.

Through Mode

No direct defect generation is possible.

Alarms (defects) in the TOH can be generated by manipulating the TOH bytes.

2.1.5 Pointer generation

Drop & Insert

As specified in Sec. 1.4.4, Page S-8.

Through Mode

The receive-side pointer is re-transmitted unchanged.

2.1.6 Measurements

There are no restrictions on measurements.
See Sec. 1.4.5, Page S-10 through Sec. 1.4.9, Page S-14.

2.2 Signal outputs

2.2.1 AUXILIARY signal output [11], electrical

Connector . . . . . unbalanced, (coaxial)

Socket type . . . . . BNC

Output impedance . . . . . 75 Ω

Max. permitted peak spurious input voltage . . . . . ± 5 V

Interface	Bit rate (Mbit/s)	Line code	Output voltage
E4	139.264	CMI	± 0.5 V
DS3	44.736	B3ZS	± 1.0 V
E3	34.368	HDB3	
E2	8.448	HDB3	± 2.37 V
DS2	6.312	B8ZS	± 2.0 V
E1	2.048	HDB3	± 2.37 V
DS1	1.544	B8ZS	
The bit rates depend on the mapping options fitted.			

Table S-26 Specifications of the AUXILIARY signal output [11], electrical

2.2.2 LINE/AUXILIARY signal output [13], electrical

Connector . . . . . balanced

Socket type . . . . . Lemo SA (Bantam)

Output impedance
2.048 Mbit/s . . . . . 120 Ω
1.544 Mbit/s . . . . . 100 Ω

Max. permitted peak spurious input voltage . . . . . ± 5 V

Interface	Bit rate (Mbit/s)	Line code	Output voltage
E1	2.048	HDB3	± 3.0 V
DS1	1.544	B8ZS	DSX-1 compatible
The bit rates depend on the mapping options fitted.			

Table S-27 Specifications of the LINE/AUXILIARY signal output [13], electrical

The balanced output is used both as “LINE” and as “AUXILIARY” output.

2.3 Signal inputs

2.3.1 AUXILIARY signal input [10], electrical

Connector . . . . . unbalanced, (coaxial)

Socket type . . . . . BNC

Input impedance . . . . . 75 Ω

Max. permitted frequency offset . . . . . ± 500 ppm

Input voltage range . . . . . 0 dB attenuation referred to nominal level

Max. permitted peak input voltage . . . . . ± 5 V

Interface	Bit rate (Mbit/s)	Code	Input voltage
E4	139.264	CMI	1.0 V ±10 %
DS3	44.736	B3ZS	1.0 V ±10 %
E3	34.368	HDB3	
E2	8.448	HDB3	2.37 V ±10 %
DS2	6.312	B8ZS	2.0 V ±10 %
E1	2.048	HDB3	2.37 V ±10 %
DS1	1.544	B8ZS	
Available bitrates depending on mapping options			

Table S-28 Specifications of the AUXILIARY signal input [10], electrical

LOS (Loss of Signal) status display

LED is on if the signal input is active but no signal is present.

2.3.2 LINE/AUXILIARY signal output [12], electrical

Connector . . . . . balanced
Socket type . . . . . Lemo SA (Bantam)

Input impedance
2.048 Mbit/s . . . . . 120 Ω
1.544 Mbit/s . . . . . 100 Ω

Max. permitted frequency offset . . . . . ± 500 ppm

Max. number of consecutive zeros for line code = AMI 15

Max. permitted peak input voltage . . . . . ± 5 V

Interface	Bit rate (Mbit/s)	Line code	Input voltage
E1	2.048	HDB3	3.0 V ±10 %
DS1	1.544	B8ZS	
The bit rates depend on the mapping options fitted.			

Table S-29 Specifications of the LINE/AUXILIARY signal input [12], electrical

LOS (Loss of Signal) status display

LED is on if the signal input is active but no signal is present.

The balanced input is used both as “LINE” and as “AUXILIARY” input.

Notes: