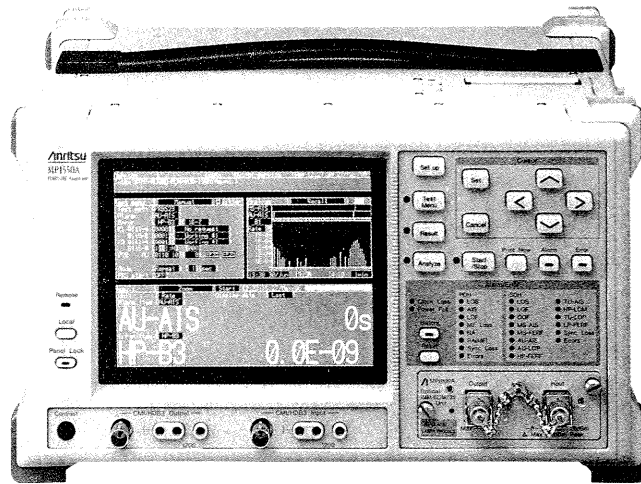


**PDH/SDH ANALYZER  
MP1550A/B**

PDH: 2/8/34/139 Mb/s, SDH: 156/622 Mb/s



**GPIB  
OPTION**

The MP1550A/B is the world's smallest\* PDH/SDH analyzer. Despite its size, it has all the functions necessary for evaluating PDH/SDH system like bit errors, alarms, pointers, performance, jitter and wander measurement functions. It can be carried easily by hand, and is ideal for pre-shipment inspection on production lines, connecting tests at construction sites, acceptance tests, periodic maintenance, and other tasks.

\*: As of April 1995

**Features**

- All PDH/SDH system tests
- Large, easy-to-read color LCD (MP1550A)
- Built-in printer and floppy disk drive (standard)
- In-service and out-of-service measurement
- Simultaneous error and alarm measurements at multi layer
- Trouble-search functions

**Specifications**

**• MP1550A/B PDH/SDH Analyzer**

PDH	Bit rate	2.048, 8.448, 34.368, 139.264 Mb/s
	Level/waveform	Conforms to ITU-T G.703 (with 20 dB monitoring points)
	Connector	BNC, 75 Ω unbalanced, 3-pin Siemens 120 Ω balanced 2.048 Mb/s: HDB3 balanced/unbalanced 8.448, 34.368 Mb/s: HDB3 unbalanced 139.264 Mb/s: CMI unbalanced
	Clock	Internal (accuracy: ±7 ppm), external (ECL [AC] 50 Ω), receive
	Auxiliary interface	Clock sync output, frame sync output
	Frame format	Unframed: 2, 8, 34, 139 Mb/s Framed: 2 Mb/s (30, 31 ch with or without CRC4) [G.704], 8 Mb/s [G.742], 34 Mb/s [G.751], 139 Mb/s [G.751], MUX/DEMUX function (option)
	Test pattern	PRBS: 2 <sup>11</sup> -1, 2 <sup>15</sup> -1, 2 <sup>20</sup> -1, 2 <sup>23</sup> -1 (O.151) Word: 16 bit program, all 0, all 1
	Error addition	Bit all, bit info, code, Ebit, FAS Timing: Single, 10 <sup>-3</sup> , 10 <sup>-4</sup> , 10 <sup>-5</sup> , 10 <sup>-6</sup> , 10 <sup>-7</sup> , 10 <sup>-8</sup> , 10 <sup>-9</sup> , all FAS: n in 16 (n: 1 to 4), all
	Alarm addition	LOS, AIS, RA, RA (MF), Timing: all
	Measurement	Mode: Single, repeat, manual In-service Error: Frame, code, CRC-4, Ebit Alarm: Power fail, LOS, AIS, LOF, MF loss, RA, RA (MF) Performance: G.821 (including ANNEX. D), M.2100, G.826 Out-of-service Error: Frame, code, CRC-4, Ebit, bit Alarm: Power fail, LOS, AIS, LOF, MF loss, RA, RA (MF), sync loss Performance: G.821 (including ANNEX. D), M.2100, G.826
LED	LOS, AIS, LOF, MF loss, RA, RA (MF), sync loss, errors	
Monitor	Frame word (FAS)	

Continued on next page

SDH	Bit rate	155.520, 622.080 Mb/s
	Clock	Internal (accuracy: $\pm 3.5$ ppm), lock (2 M), external (ECL [AC] 50 $\Omega$ ), receive
	Auxiliary interface	Clock sync output, frame sync output, DCC interface (V.11)
	Multiplexing structure	See figure 1
	Through	Loop-through with bit-error insertion
	Test pattern	PRBS: $2^{11}-1$ , $2^{15}-1$ , $2^{20}-1$ , $2^{23}-1$ (O.151) Word: 16 bit program, all 0, all 1
	Error addition	Bit all, bit info, B1, B2, B3, BIP-2, MS-FEBE, HP-FEBE, LP-FEBE Timing: Single, $10^{-3}$ , $10^{-4}$ , $10^{-5}$ , $10^{-6}$ , $10^{-7}$ , $10^{-8}$ , $10^{-9}$ , all
	Alarm addition	LOS, LOF, MS-AIS, MS-FERF, AU-AIS, AU-LOP, HP-FERF, TU-AIS, TU-LOP, HP-LOM, LP-FERF Timing: All
	OH preset data	SOH, VC3/VC4 POH, VC1 POH, K1/K2, pointer, path trace
	Measurement	Mode: Single, repeat, manual In-service Error: B1, B2, B3, BIP-2, MS-FEBE, HP-FEBE, LP-FEBE Alarm: Power fail, LOS, LOF, OOF, MS-AIS, MS-FERF, AU-AIS, AU-LOP, HP-FERF, TU-AIS, HP-LOM, TU-LOP, LP-FERF Performance: G.826 Out-of-service Error: B1, B2, B3, BIP-2, MS-FEBE, HP-FEBE, LP-FEBE, bit Alarm: Power fail, LOS, LOF, OOF, MS-AIS, MS-FERF, AU-AIS, AU-LOP, HP-FERF, TU-AIS, HP-LOM, TU-LOP, LP-FERF, sync loss Performance: G.826
	LED	LOS, LOF, OOF, MS-AIS, MS-FERF, AU-AIS, AU-LOP, HP-FERF, TU-AIS, HP-LOM, LP-FERF, sync loss, errors
	Justification	AU-PTR, TU-PTR, C, C1/C2 Measurement: NDF, +PJC, -PJC, 3 times consecutively
	Monitor	SOH, VC3/VC4 POH, VC1 POH, K1/K2, pointer, path trace
Pointer sequence	Single of opposite polarity, double of opposite polarity, regular with double, regular with missing (G.783)	
PDH, SDH	Trouble search	Search the all channels errors/alarms automatically, and results are displayed every channel.
	Delay measurement	0 to 10.00 s
	Graphics	Error/alarm, Bar resolution: 1, 15, 60 min
	Printer	Internal (built-in)/external
	Internal memory	10 setup memories: 15 graphic memories
	Others	FDD (standard), RS-232C (Option 03), GPIB (Option 04), buzzer, real time clock
General	Dimensions	320 (W) x 177 (H) x 215 (D) mm
	Mass	approx. 8.5 kg (without options)
Power supply		85 to 132 Vac or 170 to 250 Vac, 47.5 to 63 Hz, $\leq 300$ VA
Temperature		$0^{\circ}$ to $50^{\circ}$ (operating, except FDD operating), $-20^{\circ}$ to $60^{\circ}$ C (storage)
EMC*1		EN55011 (1991, Group 1, Class A), EN50082-1 (1992)
Safety		EN61010-1; 1993 (Installation Category II, Pollution Degree II)

\*1: Electromagnetic compatibility

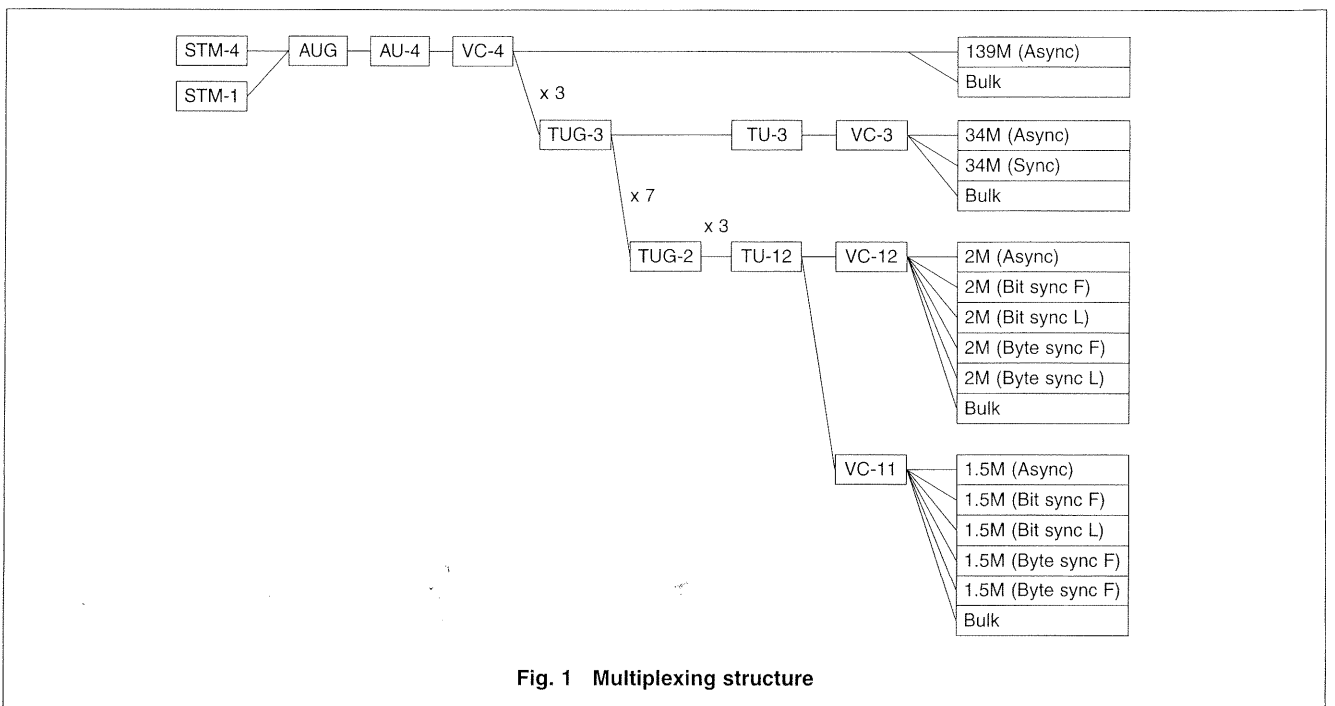


Fig. 1 Multiplexing structure

## • Jitter (Tx)/frequency offset (Option 06)

Bit rate	2.048, 8.448, 34.368, 139.264, 155.520, 622.080 Mb/s																																																	
Jitter generation	<p>Conforms to ITU-T O.171                      Frequency: 2 Hz to 6 MHz                      Amplitude: 0 to 20.00 Ulp-p                      Resolution: 0.001 Ulp-p (2 UI range), 0.01 Ulp-p (20 UI range)</p> <table border="1"> <thead> <tr> <th>Bit rate (Mb/s)</th> <th>A1 (Ulp-p)</th> <th>F1 (Hz)</th> <th>F2*(kHz)</th> <th>F3*(kHz)</th> <th>F4*(kHz)</th> <th>F5*(MHz)</th> </tr> </thead> <tbody> <tr> <td>2.048</td> <td>0.5</td> <td>2</td> <td>1</td> <td>20</td> <td>27.5</td> <td>0.11</td> </tr> <tr> <td>8.448</td> <td>0.5</td> <td>2</td> <td>2</td> <td>20</td> <td>105</td> <td>0.42</td> </tr> <tr> <td>34.368</td> <td>0.5</td> <td>2</td> <td>5</td> <td>100</td> <td>250</td> <td>1</td> </tr> <tr> <td>139.264</td> <td>0.5</td> <td>2</td> <td>5</td> <td>100</td> <td>1000</td> <td>4</td> </tr> <tr> <td>155.520</td> <td>0.5</td> <td>2</td> <td>6.5</td> <td>500</td> <td>150</td> <td>1.5</td> </tr> <tr> <td>622.080</td> <td>0.5</td> <td>2</td> <td>25</td> <td>500</td> <td>600</td> <td>6</td> </tr> </tbody> </table> <p>Accuracy: <math>\pm 5\% \pm 0.05</math> Ulp-p at 1 kHz (2 UI range), <math>\pm 5\% \pm 0.3</math> Ulp-p at 1 kHz (20 UI range)                      Frequency response error referring to error at 1 kHz:  <math>\pm 5\%</math> (2 to 20 Hz), <math>\pm 2\%</math> (20 Hz to 300 kHz), <math>\pm 3\%</math> (300 kHz to 1 MHz), <math>\pm 5\%</math> (1 to 3 MHz), <math>\pm 10\%</math> (3 to 6 MHz)</p>	Bit rate (Mb/s)	A1 (Ulp-p)	F1 (Hz)	F2*(kHz)	F3*(kHz)	F4*(kHz)	F5*(MHz)	2.048	0.5	2	1	20	27.5	0.11	8.448	0.5	2	2	20	105	0.42	34.368	0.5	2	5	100	250	1	139.264	0.5	2	5	100	1000	4	155.520	0.5	2	6.5	500	150	1.5	622.080	0.5	2	25	500	600	6
Bit rate (Mb/s)	A1 (Ulp-p)	F1 (Hz)	F2*(kHz)	F3*(kHz)	F4*(kHz)	F5*(MHz)																																												
2.048	0.5	2	1	20	27.5	0.11																																												
8.448	0.5	2	2	20	105	0.42																																												
34.368	0.5	2	5	100	250	1																																												
139.264	0.5	2	5	100	1000	4																																												
155.520	0.5	2	6.5	500	150	1.5																																												
622.080	0.5	2	25	500	600	6																																												
Auxiliary interface	Ext modulation/10M input, jitter reference clock output (ECL [AC] 50 $\Omega$ )																																																	
Jitter tolerance	Conforms to ITU-T G.823, G.825, G.958 Display: Numerical or graphical																																																	
Frequency offset	Range: $\pm 999$ ppm (1 ppm steps), Accuracy: $\pm 1$ ppm																																																	

\*1: Typical value (typical values are given for reference only to assist in the use of this instrument, and are not guaranteed specifications.)

## • Jitter (Rx) (Option 07)

Bit rate	2.048, 8.448, 34.368, 139.264, 155.520, 622.080 Mb/s																																																								
Jitter measurement	<p>Conforms to ITU-T O.171                      Frequency: 2 Hz to 5 MHz                      Amplitude: 0 to 20.00 Ulp-p, 0 to 7.07 Ulrms                      Resolution: 0.001 Ulp-p/0.001 Ulrms (2 UI range), 0.01 Ulp-p/0.01 Ulrms (20 UI range)</p> <table border="1"> <thead> <tr> <th>Bit rate (Mb/s)</th> <th>A1 (Ulp-p)</th> <th>F1 (Hz)</th> <th>F1' (Hz)</th> <th>F2*(kHz)</th> <th>F3*(kHz)</th> <th>F4*(MHz)</th> <th>F5*(MHz)</th> </tr> </thead> <tbody> <tr> <td>2.048</td> <td>0.5</td> <td>2</td> <td>20</td> <td>0.45</td> <td>—</td> <td>25</td> <td>0.1</td> </tr> <tr> <td>8.448</td> <td>0.5</td> <td>2</td> <td>20</td> <td>0.2</td> <td>—</td> <td>100</td> <td>0.4</td> </tr> <tr> <td>34.368</td> <td>0.5</td> <td>2</td> <td>20</td> <td>0.5</td> <td>—</td> <td>500</td> <td>0.8</td> </tr> <tr> <td>139.264</td> <td>0.5</td> <td>2</td> <td>20</td> <td>0.25</td> <td>—</td> <td>1000</td> <td>3.5</td> </tr> <tr> <td>155.520</td> <td>0.5</td> <td>2</td> <td>20</td> <td>0.7</td> <td>500</td> <td>500</td> <td>1.3</td> </tr> <tr> <td>622.080</td> <td>0.5</td> <td>2</td> <td>20</td> <td>20</td> <td>500</td> <td>2000</td> <td>5</td> </tr> </tbody> </table> <p>Accuracy: <math>\pm 5\% \pm 0.01</math> Ulp-p <math>\pm X</math> Ulp-p at 1 kHz (2 UI range), <math>\pm 5\% \pm 0.1</math> Ulp-p <math>\pm X</math> Ulp-p at 1 kHz (20 UI range)                      X: 0.025 Ulp-p/2 and 8 Mb/s, 0.055 Ulp-p/34 Mb/s, 0.085 Ulp-p/139 and 156 Mb/s, 0.13 Ulp-p/156 and 622 Mb/sO (<math>+10^\circ</math> to <math>+40^\circ</math>C), 0.25 Ulp-p/156 MHz clock, 0.04 Ulp-p/622 MHz clock (2 UI range); 0.12 Ulp-p/2, 8 and 34 Mb/s, 0.2 Ulp-p/139 and 156 Mb/sE, 0.2 Ulp-p/156 and 622 Mb/sO (<math>+10^\circ</math> to <math>+40^\circ</math>C), 0.1 Ulp-p/156 and 622 MHz clock (20 UI range)                      Additional 0.01 Ulp-p/dB at 156 Mb/sO with input levels <math>&lt; -25</math> dBm                      Additional 0.01 Ulp-p/dB at 622 Mb/sO with input levels <math>&lt; -20</math> dBm</p> <p>[Ulrms]                      Accuracy: <math>\pm 5\% \pm 0.002</math> Ulrms <math>\pm Y</math> Ulrms at 1 kHz (2 UI range), <math>\pm 5\% \pm 0.02</math> Ulrms <math>\pm Y</math> Ulrms at 1 kHz (20 UI range)                      Y: 0.004 Ulrms/2 and 8 Mb/s, 0.015 Ulrms/34 Mb/s, 0.02 Ulrms/139 and 156 Mb/sE, 0.03 Ulrms/156 and 622 Mb/sO (<math>+10^\circ</math> to <math>+40^\circ</math>C), 0.015 Ulrms/156 MHz clock, 0.025 Ulrms/622 MHz clock (2 UI range); 0.02 Ulrms/2, 8 and 34 Mb/s, 0.04 Ulrms/139 and 156 Mb/sE, 0.06 Ulrms/156 and 622 Mb/sO (<math>+10^\circ</math> to <math>+40^\circ</math>C), 0.03 Ulrms/156 MHz clock, 0.05 Ulrms/622 MHz clock (20 UI range)                      Additional 0.002 Ulrms/dB at 156 Mb/sO with input levels <math>&lt; -25</math> dBm                      Additional 0.002 Ulrms/dB at 622 Mb/sO with input levels <math>&lt; -20</math> dBm</p> <p>Frequency response error referring to error at 1 kHz:  <math>\pm 5\%</math> (2 to 20 Hz), <math>\pm 2\%</math> (20 Hz to 300 kHz), <math>\pm 3\%</math> (300 kHz to 1 MHz), <math>\pm 5\%</math> (1 to 3 MHz), 10% (3 to 5 MHz)</p>	Bit rate (Mb/s)	A1 (Ulp-p)	F1 (Hz)	F1' (Hz)	F2*(kHz)	F3*(kHz)	F4*(MHz)	F5*(MHz)	2.048	0.5	2	20	0.45	—	25	0.1	8.448	0.5	2	20	0.2	—	100	0.4	34.368	0.5	2	20	0.5	—	500	0.8	139.264	0.5	2	20	0.25	—	1000	3.5	155.520	0.5	2	20	0.7	500	500	1.3	622.080	0.5	2	20	20	500	2000	5
Bit rate (Mb/s)	A1 (Ulp-p)	F1 (Hz)	F1' (Hz)	F2*(kHz)	F3*(kHz)	F4*(MHz)	F5*(MHz)																																																		
2.048	0.5	2	20	0.45	—	25	0.1																																																		
8.448	0.5	2	20	0.2	—	100	0.4																																																		
34.368	0.5	2	20	0.5	—	500	0.8																																																		
139.264	0.5	2	20	0.25	—	1000	3.5																																																		
155.520	0.5	2	20	0.7	500	500	1.3																																																		
622.080	0.5	2	20	20	500	2000	5																																																		

Continued on next page

	Filters					
	Bit rate (Mb/s)	HP1 (Hz)	HP2 (kHz)	HP2' (kHz)	HP (kHz)	LP (MHz)
Jitter measurement	2.048	20	18	0.7	12	0.1
	8.448	20	3	80	12	0.4
	34.368	100	10	—	12	0.8
	139.264	200	10	—	12	3.5
	155.520	500	65	—	12	1.3
	622.080	1000	250	—	12	5
Auxiliary interface	Jitter demodulation output, jitter reference clock input (ECL [AC] 50 Ω)					
Hit measurement	Display: Hit count, hit second, %hit-free second					
Jitter transfer	Conforms to ITU-T G.823, G.825 Display: Numerical or graphical					

\*1: Typical value (typical values are given for reference only to assist in the use of this instrument, and are not guaranteed specifications.)

### • Jitter (Rx)/2M Wander (Option 08)

Wander measurement	2.048 Mb/s Reference input: Clock or HDB3 (unbalanced) Measurement range: p-p; 0.0 to 2E8 ns, +p/-p; 0.0 to 1E8 ns, TIE; 0.0 to ±1E8 ns
Jitter (Rx)	Same as Option 07

### • Built-in CMI (156M) (Option 10)

The specifications are the same as the MP0105A CMI Unit.

### • MP0104A Optical 156M (1.31) Unit

Transmit	155.520 Mb/s (NRZ) Wavelength: 1310 nm Power: -15 to -8 dBm IEC825-1: CLASS 1 LASER PRODUCT Connector: FC-PC (SM-F)
Receive	155.520 Mb/s (NRZ) Sensitivity: -34 to -8 dBm (with test pattern: PRBS 2 <sup>23</sup> -1 at BER of 10 <sup>-10</sup> ) Connector: FC-PC (GI-F)

### • MP0109A Optical 156M/622M (1.31) Unit

Transmit	155.520, 622.080 Mb/s (NRZ) Wavelength: 1310 nm Power: -15 to -8 dBm IEC825-1: CLASS 1 LASER PRODUCT, 21 CFR 1040.10: CLASS 1 LASER PRODUCT Connector: FC-PC (SM-F)
Receive	155.520, 622.080 Mb/s (NRZ) Sensitivity 156M: -33 to -8 dBm (with test pattern: PRBS 2 <sup>23</sup> -1 at BER of 10 <sup>-10</sup> , +10° to +40°C) 622M: -28 to -8 dBm (with test pattern: PRBS 2 <sup>23</sup> -1 at BER of 10 <sup>-10</sup> , +10° to +40°C) Connector: FC-PC (SM-F)

### • MP0105A CMI Unit

Transmit	155.520 Mb/s Level: 1±0.1 V Connector: BNC, 75 Ω
Receive	155.520 Mb/s Level: 1±0.1 V (with 0 to 12 dB automatic √f equalization and 20 dB additional gain) Connector: BNC, 75 Ω

### • MP0110A Optical 156M/622M (1.55) Unit

Transmit	155.520, 622.080 Mb/s (NRZ) Wavelength: 1550 nm Power: -5 to -1 dBm IEC825-1: CLASS 1 LASER PRODUCT, 21 CFR 1040.10: CLASS 1 LASER PRODUCT Connector: FC-PC (SM-F)
Receive	155.520, 622.080 Mb/s (NRZ) Sensitivity 156M: -33 to -8 dBm (with test pattern: PRBS 2 <sup>23</sup> -1 at BER of 10 <sup>-10</sup> , +10° to +40°C) 622M: -28 to -8 dBm (with test pattern: PRBS 2 <sup>23</sup> -1 at BER of 10 <sup>-10</sup> , +10° to +40°C) Connector: FC-PC (SM-F)

### • MP0108A NRZ Unit

Transmit	155.520, 622.080 Mb/s Level: ECL Connector Clock: SMA (50 Ω), Data: SMA (50 Ω)
Receive	155.520, 622.080 Mb/s Level: ECL (-2 V) Connector Clock: SMA (50 Ω), Data: SMA (50 Ω)

### Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
	<b>Main Frame</b>
MP1550A	PDH/SDH Analyzer (color display)
MP1550B	PDH/SDH Analyzer (monochrome display)
	<b>Standard accessories</b>
J0670A	AC power cord (for 200 Vac mains): 1 pc
J0017	AC power cord, 2.5 m (for 100 Vac mains): 1 pc
Z0169	Thermal paper for printer (5 rolls/pack): 1 pack
F0012	Fuse, 3.15A (for 200 Vac mains): 2 pcs
F0014	Fuse, 6.3A (for 100 Vac mains): 2 pcs
B0329G	Protective cover: 1 pc
W0933AE	MP1550A/B operation manual: 1 copy
W0934AE	MP1550A/B remote control operation manual: 1 copy
W1000AE	MP1550A/B option 06/07/08 operation manual: 1 copy
	<b>Units</b>
MP0104A	Optical 156M (1.31) Unit (cannot be done jitter measurement with this unit even when Option 07 or 08 is installed)
MP0105A	CMI Unit
MP0108A	NRZ Unit
MP0109A	Optical 156M/622M (1.31) Unit
MP0110A	Optical 156M/622M (1.55) Unit
	<b>Options</b>
Option 01	MUX/DEMUX (add PDH MUX/DEMUX functions)
Option 03	RS-232C
Option 04	GPIB
Option 06	Jitter (Tx)/frequency offset
Option 07	Jitter (Rx), Option 07 cannot be upgraded to Option 08)
Option 08	Jitter (Rx)/2M wander
Option 10	Built-in CMI (156M)
MP0109A/0110A-3B	ST connector (replaceable)
MP0109A/0110A-39	DIN connector (replaceable)
MP0109A/0110A-40	SC connector (replaceable)
MP0109A/0110A-43	HMS-10/A connector (replaceable)
	<b>Application equipment</b>
MP1656A	Portable STM-16 Analyzer
	<b>Optional accessories</b>
MZ8012A	Connector Cleaning Set (for MP0109A/0110A)
J0162A	Balanced cord, M-3192•—•M-3192, 1 m
J0162B	Balanced cord, M-3192•—•M-3192, 2 m
J0775D	Coaxial cord, BNC-P620•3C-2WS•BNC-P620, 2 m (75 Ω)
J0776D	Coaxial cord, BNC-P-3W•3D-2W•BNC-P-3W, 2 m (50 Ω)
J0635B	Optical fiber cord, 2 m (for SM, both ends with FC-SPC connector)
J0322B	Coaxial cord, 11SMA•SUCOFLEX104•11SMA, 1 m
J0008	GPIB cable, 2 m
B0368A	Shoulder bag
B0369A	Carrying case
B0370A	Soft case
W0933BE	MP1550A/B service manual