ME7760A

43.5Gbit/s BERT System

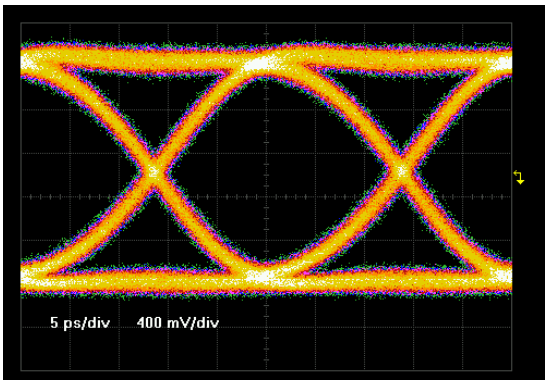
25Gbit/s to 43.5Gbit/s

Measurement solution for 40Gbit/s SONET/SDH system and modules.

Main Features

■High Quality Waveform

The re-timing circuit using D-type Flip-Flop realizes high quality waveform (low jitter and low wave distortion) and high output amplitude (2Vp-p).



MP1801A Output Waveform Sample
(Data Output for OC-768/STM-256)

■ Measurement with Pure PRBS

The MP1775A Pulse Pattern Generator can generate PRBS on 43.5 Gbit/s (selectable pattern length = 2^n-1: n= 7, 9, 11, 15, 20, 23, 31). The phase of each channel is shifted 1/4 cycle and multiplexed signal can be treated as pure PRBS.

■ Wide operation frequency

It has capability to treat FEC signals on the 40Gbit/s. 4 channels pulse pattern generator (MP1775A) and the 4 channels error detector (MP1776A) can support 100Mbit/s to 12.5Gbit/s signals. The multiplexer (MP1801A) and the de-multiplexer (MP1802A) can support 25Gbit/s to 43.5Gbit/s signals.

■ 32Mbits pattern memory for OC-768/STM-256

The MP1775A and the MP1776A have 32Mbits pattern memory and it is suitable for 40Gbit/s SDH/SONET frames (OC-768 / STM -256). Its pattern can be edited using the MX177601A SDH/ SONET pattern editor via GPIB interface.

■ High flexibility

The MP1775A Pulse Pattern Generator and the MP1776A Error Detector can be used as the single measurement equipment. It will bring you the high flexibility on the various combinations and scenes.

43.5Gbit/s BERT System

MP1801A 43.5G MUX

The MP1801A 43.5G MUX can multiplex maximum 4 data signal inputs (each transmission speed is maximum 10.875Gbit/s) and generate 43.5Gbit/s multiplexed signal. It can also generate 1/4 clock signal.

MP1802A 43.5G DEMUX

The MP1802A 43.5G DEMUX can de-multiplex the 43.5Gbit/s data input into 4 signals. Its 4 output signal lines are brought to the 4 channels error detector (MP1776A) and it enables to evaluate 43.5Gbit/s high-speed data signal.

43.5Gbit/s BERT System

MP1775A
Pulse Pattern Generator

The MP1775A Pulse Pattern Generator has 4 channels data output lines and each channel has capability to generate maximum 12.5Gbit/s signal. It is available to create PRBS (maximum pattern length is 2^n-1, n=7, 9, 11, 15, 20, 23, 31) and 32Mbits programmable pattern (user defined pattern). Combining with the MP1801A 43.5G MUX makes it possible to generate 43.5Gbit/s pure PRBS or programmable pattern suitable for OC-768/STM-256.

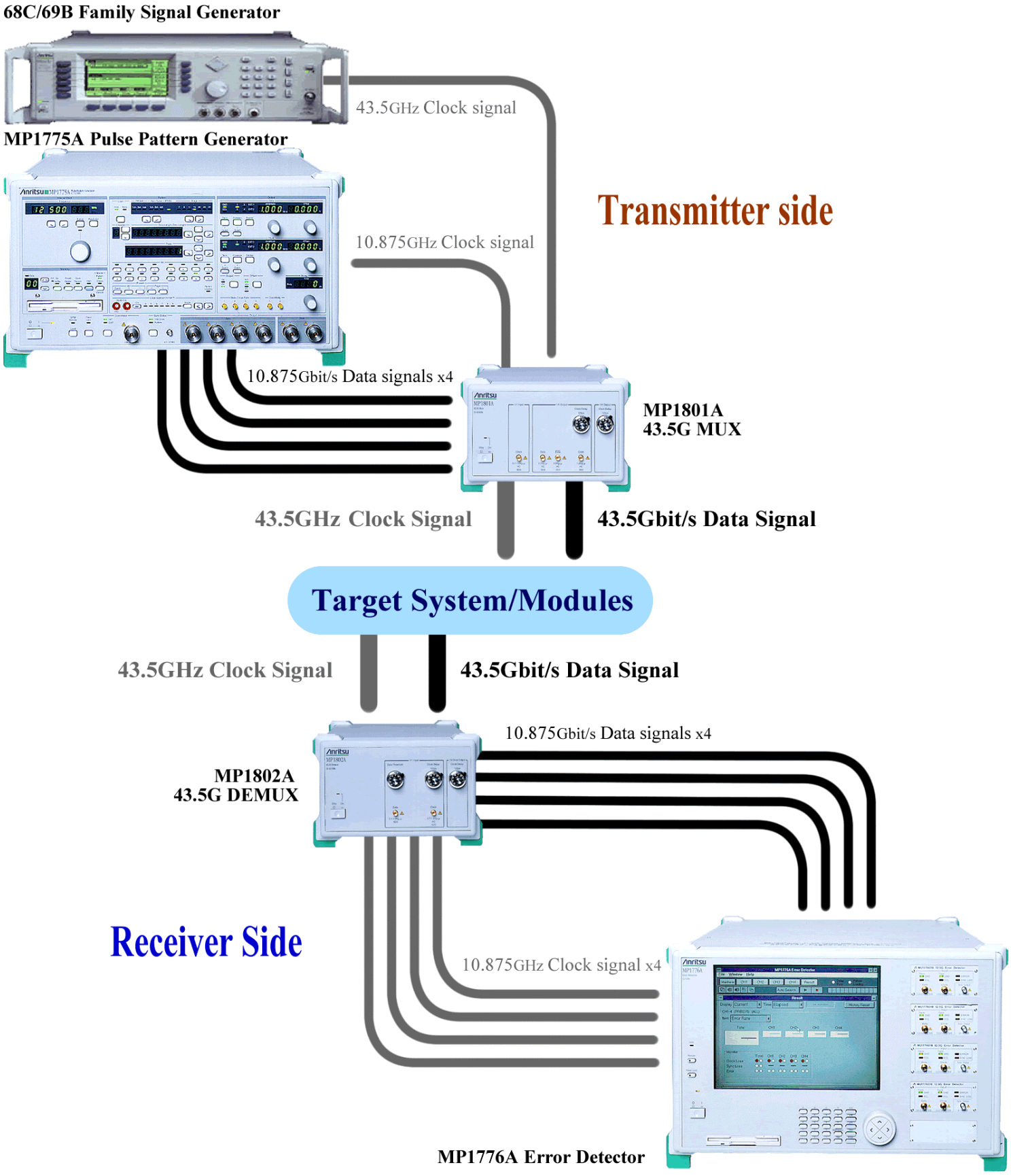
MP1776A Error Detector

The MP1776A Error Detector has 4 channels error detector units and each channel has capability to measure bit error rate on maximum 12.5Gbit/s signal. Each channel can be configured and operates independently, but it will operate most effectively under the 4Ch Combined Mode. This mode makes relationship between each channel, and considers 4 channels as the single 43.5Gbit/s data input.

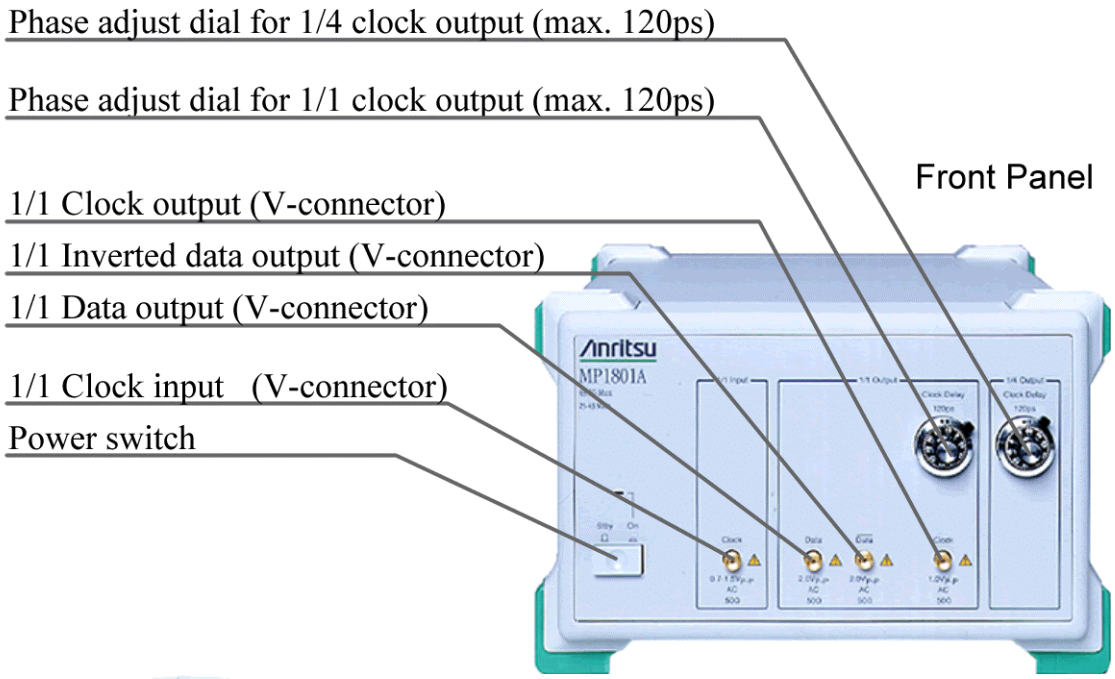
68C/69B Family Synthesized Signal Generator

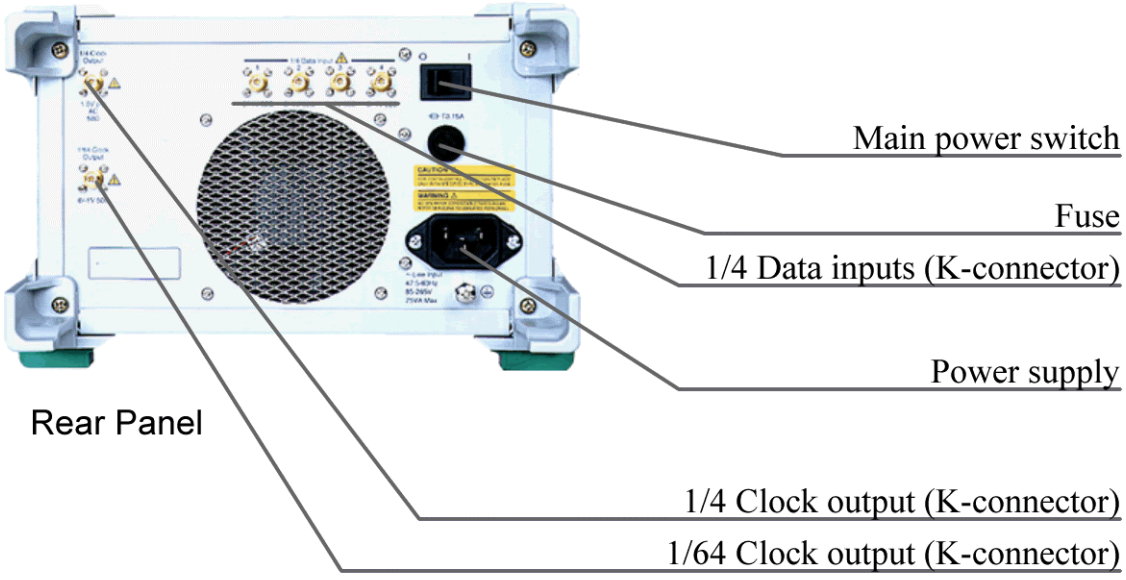
Anritsu 68C or 69B family signal generator is necessary for the 43.5G BERT System. Its waveform contains less jitter and wave distortion on the very high frequency. This equipment acts as the clock source in the 43.5G BERT System and its waveform quality influences every signal through the system. 68C/69B series will satisfy the needs for evaluation with high quality and accuracy.

System Configurations

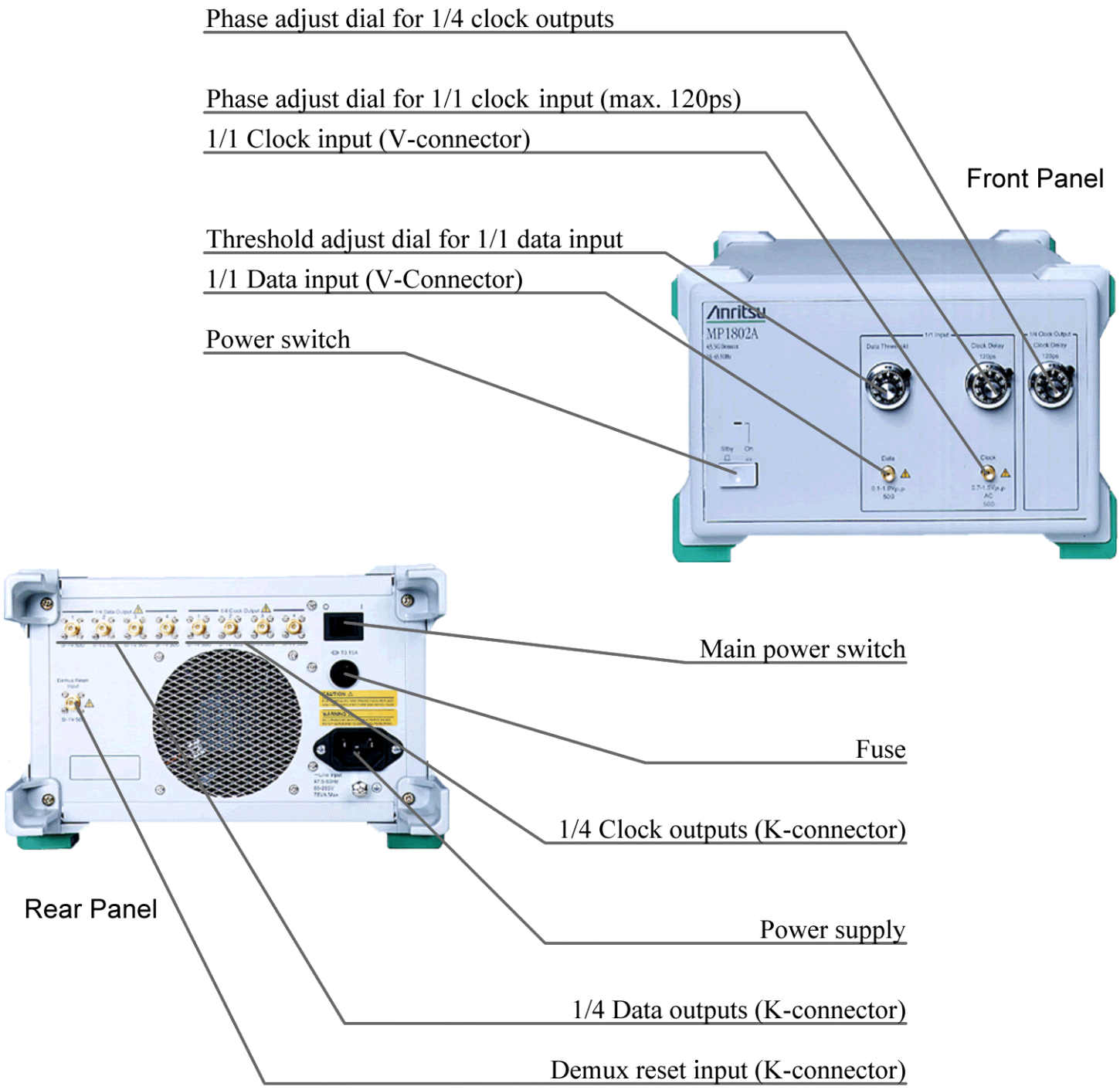


MP1801A 43.5G MUX - Front/Rear Panels

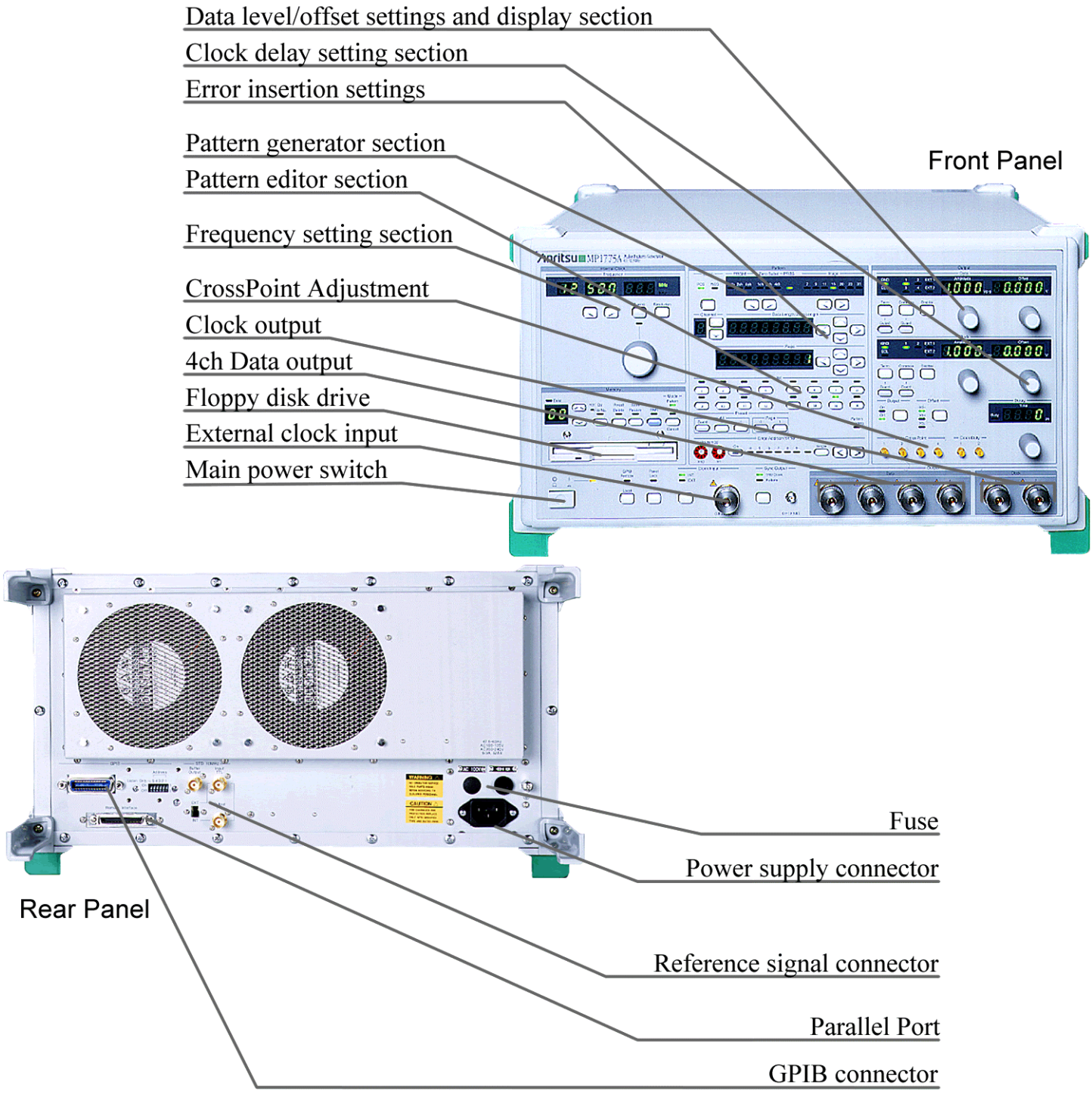




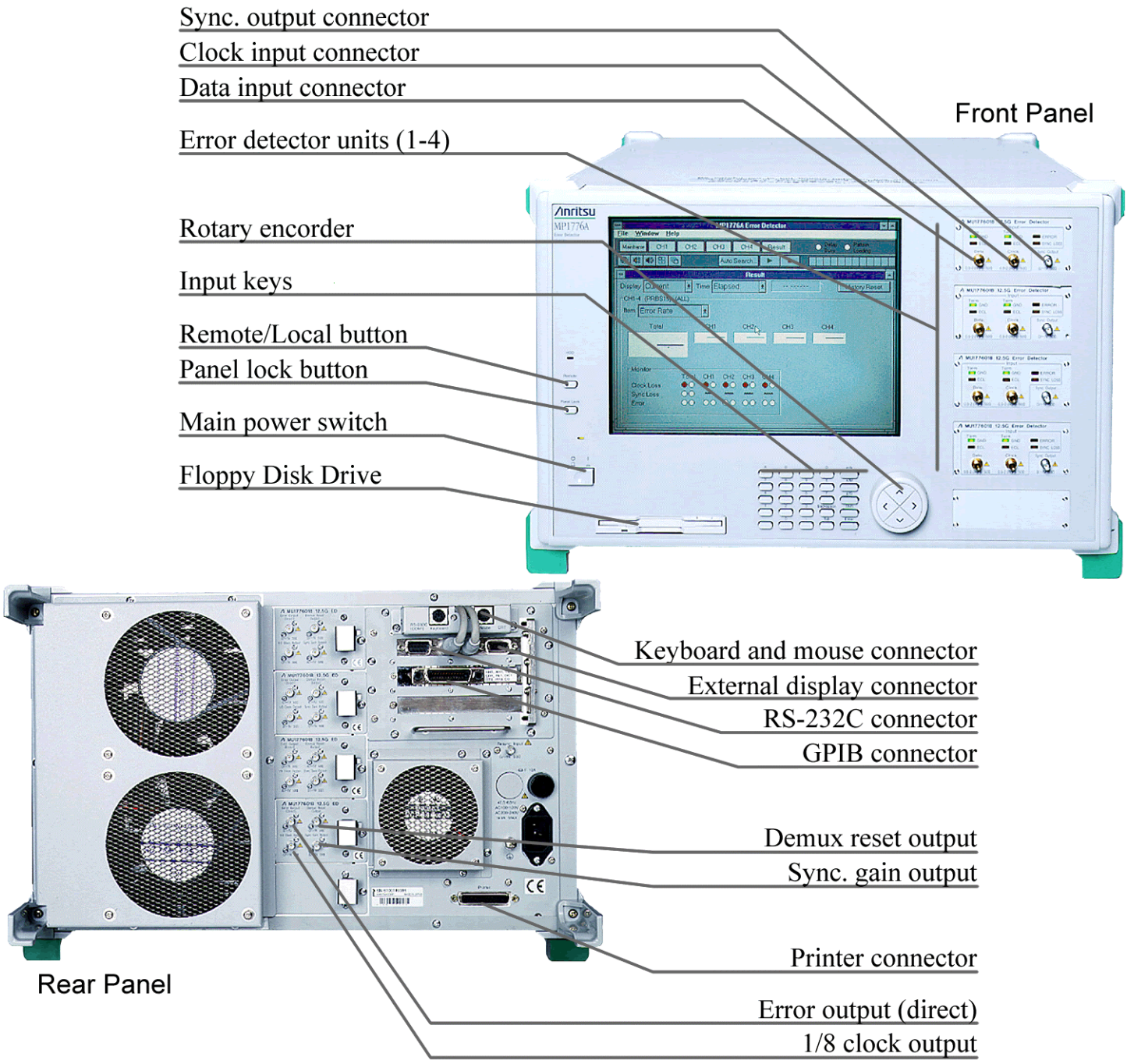
MP1802A 43.5G DEMUX - Front/Rear Panels -



MP1775A Pulse Pattern Generator - Front/Rear Panels -



MP1776A Error Detector - Front/Rear Panels -



MP1801A 43.5G MUX Specifications

■ MP1801A 43.5G MUX

Operation frequency	25GHz to 43.5GHz
Data output	Number of outputs: 2 (Data and inverted Data) Output waveform: NRZ Output amplitude: 2.0 Vp-p (AC coupling) fixed Tr/Tf (10-90%): ≤18 ps Pattern jitter: ≤10 ps Waveform distortion: ≤10% Termination: 50 ohm (with back termination) Connector: V-connector
Clock output	Output amplitude: 1.0 Vp-p (AC coupling) fixed Tr/Tf (10-90%): ≤18 ps Waveform distortion: ≤10% Termination: 50 ohm (with back termination) Connector: V-Connector Phase adjust range: 120ps
Clock input	Input waveform: Sine or rectangular wave (duty 50%) Input amplitude: 0.7 Vp-p to 1.5 Vp-p Connector: V-connector
1/4 Data input	Number of inputs: 4 Input level: V_{OH}: 0V±0.3V, V_{OL}: -1.0±0.3V Input impedance: 50 ohm
1/4 Clock output	Output amplitude: V_{OH}: 0V±0.3V, V_{OL}: -1.0±0.3V Tr/Tf (10-90%): ≤35 ps Waveform distortion: ≤10% Connector: K-connector Phase adjust range: 120ps
Operation temperature	20℃ to 30℃
Power	85V to 265V, 47Hz to 63Hz, ≤75VA
Dimensions and mass	213(W) x132.5 (H) x350 (D), ≤8kg

MP1802A 43.5G DEMUX Specifications

■ MP1802A 43.5G DEMUX

Operation frequency	25GHz to 43.5GHz
Data input	Input waveform: NRZ Input amplitude: 0.1 Vp-p to 1.0 Vp-p Threshold voltage: +0.25V to –0.75V (variable) Termination: 50 ohm/GND Connector: V-connector
Clock input	Input waveform: Sine or rectangular wave (duty 50%) Input amplitude: 0.7 Vp-p to 1.5 Vp-p Termination: 50 ohm/GND Connector: V-connector Phase adjust range: 120ps
1/4 Data output	Number of outputs: 4 Output amplitude: V_{OH}: 0V±0.3V, V_{OL}: -1.0V±0.3V Tr/Tf (10-90%): ≤35 ps Pattern jitter: ≤20 ps (peak to peak) Waveform distortion: ≤10% Impedance: 50 ohm Connector: K-connector
1/4 Clock output	Number of outputs: 4 Output amplitude: V_{OH}: 0V±0.3V, V_{OL}: -1.0V±0.3V Tr/Tf (10-90%): ≤35 ps Waveform distortion: ≤10% Impedance: 50 ohm Connector: K-connector Phase adjust range: 120ps
DEMUX reset input	Input level: V_{OH}: 0V±0.1V, V_{OL}: -1.0V±0.1V Termination: 50 ohm/GND Connector: K-connector
Operation temperature	20℃ to 30℃
Power	85V to 265V, 47Hz to 63Hz, ≤75VA
Dimensions and mass	213(W) x132.5 (H) x350 (D), ≤8kg

MP1775A Pulse Pattern Generator Specifications

■ MP1775A Pulse Pattern Generator

Operation frequency	100MHz to 12.5GHz (Internal/External clock)
External clock input	Input level: 0.8 Vp-p to 2.0 Vp-p Input waveform: Sine (≥500MHz) or rectangular wave Connector: APC-3.5
Internal clock input	Frequency setting resolution: 1kHz, 1MHz Reference signal: 10MHz (internal/external, selectable)
Measurement pattern	Pseudo-random pattern: 2^n-1 (n=7,9,11,15,20,23,31) Programmable pattern: max. 8Mbits x4 channels Logic inversion: provided Error addition (error rate): 10^{-n} (n=4,5,6,7,8,9), single
Data output	Number of outputs: 4 Output waveform: NRZ Output amplitude: 0.5 Vp-p to 2.0 Vp-p Offset voltage: -2.0 V_{OH} to +2.0 V_{OH} ECL termination: provided Load impedance: 50 ohm Connector: APC-3.5
Clock output	Number of outputs: 2 Output amplitude: 0.5 Vp-p to 2.0 Vp-p Offset voltage: -2.0 V_{OH} to +2.0 V_{OH} Delay: -500 ps to +500 ps ECL termination: provided Load impedance: 50 ohm Connector: APC-3.5
Sync. Output	Number of outputs: 1 (1/32 clock output / pattern sync output selectable) Output amplitude: 1 Vp-p Load impedance: 50 ohm Connector: SMA
Control	Control interface: GPIB, Parallel port Parameter memory: 3.5-inch FDD (MS-DOS® compatible)
Operation temperature	15℃ to 35℃
Dimensions and mass	426(W) x221 (H) x450 (D) mm, ≤35kg

MP1776A Error Detector Specifications

■ MP1776A Error Detector

Operation frequency	100MHz to 12.5GHz
Measurement pattern	Pseudo-random pattern: 2^n-1 (n=7,9,11,15,20,23,31) Zero-substitution pattern: 2^n (n=7,9,11,15) Programmable data: max. 8Mbits (Independent mode), 16Mbits (2ch combined mode), 32Mbits (4ch combined mode) Logic inversion: provided
Measurement mode	Independent, 2-channels combined, 4-channels combined
Synchronization method	Normal, Frame
Error detection mode	Insertion, Omission, Total
Measurement items	Error ratio: 0.0000×10^{-16} to 1.0000×10^{0} Error count: 0 to 9,999,999, 1.0000×10^{7} to 9.9999×10^{16} Clock frequency: 100MHz to 12.5GHz (independent), 200MHz to 25GHz (2-channels combined), 400MHz to 50 GHz (4-channels combined) / Resolution: 1kHz, accuracy: 10ppm ±1kHz
Sync threshold voltage	Internal, 10^{-n} (n=2,3,4,5,6,7,8)
Auto search function	Supported
Data input	Number of inputs: 1 (for each error detector unit) Input waveform: NRZ Input amplitude: 0.5 to 2.0 Vp-p Threshold voltage: -3.000V to +1.750V (1mV step) Termination condition: -2.0V/GND Input impedance: 50 ohm Connector: APC-3.5
Clock input	Number of inputs: 1 (for each error detector unit) Input level: 0.5 Vp-p to 2.0 Vp-p Input waveform: Sine (≥500MHz) or rectangular wave Clock delay: ±500 ps Polarity inversion: provided Input impedance: 50 ohm Connector: APC-3.5
Resync input	Input level: 0/-1 V±0.1V Connector: SMA
System environment	Display: 10.4-inch color LCD, Touch screen, 640x480 resolution, 256 colors. Printer/Keyboard/Mouse connectable (via PS/2 and parallel port) Parameter memory: 3.5-inch FD
Remote control	RS-232C, GPIB
Power	90Vac to 120Vac / 180Vac to 250Vac, 47.5Hz to 63Hz, ≤ 1000VA
Operating temperature	+15℃ to +35℃
Dimensions and mass	426(W) x266(H) x584(D) mm, ≤ 50kg (with 4 units of MU177601B)

MX177601A SDH/SONET Pattern Editor Specifications

■ MX177601A SDH/SONET Pattern Editor

Required System	Computer: IBM-PC/AT or full compatible CPU: Pentium 200MHz or higher OS: Windows 95/98/2000/NT4.0 Memory: 128MB or more Display Resolution and Color: 800x600 or more and 256 colors or more FDD: 3.5-inch (1.44MB), Hard drive: require 100MB or more GPIB: National Instruments-made GPIB Interface (PCMCIA-GPIB or AT-GPIB/TNT series boards are recommended)
Functions	SDH/SONET pattern editor Mapping for SDH: [MP1758A] STM-n (n=1, 4c, 16c) [MP1775A/ 1776A] STM-n (n=1, 4c, 12c, 16c, 32c, 64c, 256c) Mapping for SONET: [MP1758A] STS-n (n=3c, 12c, 48c) [MP1775A/ 1776A] STS-n (n=3c, 12c, 48c, 192c, 768c) Pattern edit: Arbitrary editing of program patterns (PRBS pattern can be inserted in the payload.), time indication, table indication/edit Payload: Free format, ALL 0, ALL 1, PRBS 2^n-1 (n=7, 9, 11, 15, 20, 20z, 23, 31) [Pattern repetition up to the length of all frames] Measurement condition: ALL, payload, SOH ALL, POH ALL, OH (D1-D3), OH (D4-D12), OH (1 byte) [Pattern repetition up to the length of all frames] CID pattern: Available (Conforming to ITU-TG.958) Frame repetition: Maximum 6 frames Alarm addition: Alarm addition conforming to SDH/SONET standard SDH: [items: OOF/LOF, MS-AIS, MS-RDI, MS-REI, MS-AIS, HP-RDI, HP-REI] SONET: [items: OOF/LOF, AIS-L, RDI-L, REI-L, AIS-P, RDI-P, REI-P] BIP error addition: Generates parity errors of B1, B2 and B3 B1, B2 and B3 calculation: Automatic calculation Scramble: ON/OFF OH editor: All bytes edit are possible except B1, B2, B3, H1, H2, H3. Pointer (H1, H2, H3) is fixed value.

Ordering Information

MP1801A 43.5G MUX

Model/Order No.	Name		Notes
	-Main Frame-		
MP1801A	43.5G MUX		
	-Standard Accessories-		
J1090	Cable	3	V120MM-30CM
J0696B	SMA Cable	6	AA-165-800
J0017	Power Cord 2.5m	1	
F0012	Fuse	1	T3.15A 250V
Z0306A	Wrist strap	1	
B0329M	Front Cover	1	
W1961AE	MP1801A Operation manual	1	

MP1802A 43.5G DEMUX

Model/Order No.	Name		Notes
	-Main Frame-		
MP1802A	43.5G DEMUX		
	- Standard Accessories -		
J0696D	Semi-Flexible Cable, 2m	1	AA-165-2000
J1090	Cable	2	V120MM-30CM
J0696B	SMA Cable	8	AA-165-800
J0017	Power Cord 2.5m	1	
J1115	6dB ATT	1	41V-6
F0012	Fuse	1	T3.15A 250V
Z0306A	Wrist strap	1	
B0329M	Front Cover	1	
W1960AE	MP1802A Operation manual	1	

For MP1775A Pulse Pattern Generator, MP1776A Error Detector and 69B Family Signal Generator, please refer to each brochure of these products.

- Windows and MS-DOS are Registered trademarks of Microsoft Corporation.
- IBM and AT are Registered trademarks of International Business Machines.
- Pentium is a Registered trademark of Intel Corporation.
- PCMCIA-GPIB and AT-GPIB/TNT are Registered trademarks of National Instruments.
- All other trademarks are the property of their respective owners.
- No part of this paper may be copied, modified for any means without permission of Anritsu Corporation.

Anritsu

Specifications are subject to change without notice.

ANRITSU CORPORATION
MEASUREMENT SOLUTIONS
5-10-27, Minamiazabu, Minato-ku, Tokyo 106-8570, Japan
Phone: +81-3-3446-1111
Telex: J34372
Fax: +81-3-3442-0235

- **U.S.A.**
ANRITSU COMPANY
North American Region Headquarters
1155 East Collins Blvd., Richardson, Tx 75081, U.S.A.
Toll Free: 1-800-ANRITSU (267-4878)
Phone: +1- 972-644-1777
Fax: +1-972-671-1877

- **Canada**
ANRITSU ELECTRONICS LTD.
Unit 102, 215 Stafford Road West
Nepean, Ontario K2H 9C1, Canada
Phone: +1-613-828-4090
Fax: +1-613-828-5400

- **Brasil**
ANRITSU ELETRÔNICA LTDA.
Praia de Botafogo 440, Sala 2401 CEP 22250-040,
Rio de Janeiro, RJ, Brazil
Phone: +55-21-5276922
Fax: +55-21-537-1456

- **U.K.**
ANRITSU LTD.
200 Capability Green, Luton, Bedfordshire LU1 3LU, U.K.
Phone: +44-1582-433200
Fax: +44-1582-731303

- **Germany**
ANRITSU GmbH
Grafenberger Allee 54-56, 40237 Düsseldorf, Germany
Phone: +49-211-96855-0
Fax: +49-211-96855-55

- **France**
ANRITSU S.A.
9, Avenue du Québec Z.A. de Courtaboeuf 91951 Les
Ulis Cedex, France
Phone: +33-1-60-92-15-50
Fax: +33-1-64-46-10-65

- **Italy**
ANRITSU S.p.A.
Via Elio Vittorini, 129, 00144 Roma EUR, Italy
Phone: +39-06-509-9711
Fax: +39-06-502-24-25

- **Sweden**
ANRITSU AB
Botvid Center, Fittja Backe 1-3 145 84 Stockholm, Sweden
Phone: +46-853470700
Fax: +46-853470730

- **Spain**
ANRITSU ELECTRÓNICA, S.A.
Europa Empresarial Edificio Londres, Planta 1, Oficina
6 C/ Playa de Liencres, 2 28230 Las Rozas. Madrid, Spain
Phone: +34-91-6404460
Fax: +34-91-6404461

- **Singapore**
ANRITSU PTE LTD.
6, New Industrial Rd., #06-01/02, Hoe Huat Industrial
Building, Singapore 536199
Phone: +65-6282-2400
Fax: +65-6282-2533

- **Hong Kong**
ANRITSU COMPANY LTD.
Suite 719, 7/F., Chinachem Golden Plaza, 77 Mody
Road, Tsimshatsui East, Kowloon, Hong Kong, China
Phone: +852-2301-4980
Fax: +852-2301-3545

- **Korea**
ANRITSU CORPORATION
14F Hyun Juk Bldg. 832-41, Yeoksam-dong,
Kangnam-ku, Seoul, Korea
Phone: +82-2-553-6603
Fax: +82-2-553-6604 ~ 5

- **Australia**
ANRITSU PTY LTD.
Unit 3/170 Forster Road Mt. Waverley, Victoria, 3149,
Australia
Phone: +61-3-9558-8177
Fax: +61-3-9558-8255

- **Taiwan**
ANRITSU COMPANY INC.
6F, 96, Sec. 3, Chien Kou North Rd. Taipei, Taiwan
Phone: +886-2-2515-6050
Fax: +886-2-2509-5519

Catalog No. ME7760A-E-A-3-(1.00) Printed in Japan 2002-4 30M