DATA TRANSMISSION ANALYZER
MD6420A

For Evaluating Quality of Digital Data Networks

GPIB OPTION

Bit error rate measurement is the most critical parameter in evaluating the quality of digital transmission modes. However, conventional methods, which measure only average bit error rates, are inadequate. In the MD6420A, various types of extension and remote control units are provided as options, as well as units which allow the use of various types of interfaces.
The measuring conditions can be stored in memory and recalled prior to measurement with the touch of a single key. An error analysis function allows histograms of either error or alarm data to be quickly and easily displayed. In addition, the analyzer is portable so that it can be used on site for maintenance operations.

Features

• Can measure a variety of devices from low-speed modems to high-speed digital lines
Can be configured to a variety of communications protocols via ITU-T V, X, G, and I series by using plug-in units. Can perform high-quality evaluations of data communications systems that have bit rates from 50 b/s to 10 Mb/s.

• Simultaneous error measurement of various error parameters
The error count (bit error, parity error, and CRC error, etc.) error rate, block error count, block error rate, US, %US, SES, %SES, DM, %DM, ES, %ES, EFS, %EFS, AT, %AT, BBER, clock slip, and synchronization loss can be measured, Alarm states such as AIS can be continuously monitored*.
*: Conforms to ITU-T G.821

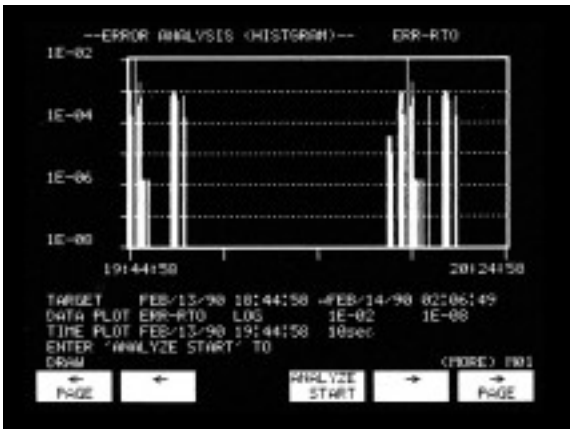
• Data will not be lost if a power failure occurs during measurement
If an AC power failure occurs during error rate measurements, all data obtained prior to the failure is recalled from memory and the measurement is automatically continued when the power is resupplied. When the power returns, the time at which power failure occurred is displayed on the EL display.

• Storage and statistical analysis of error measurement data
When a error analysis unit is used, the error measurement data can be stored in the unit. The results of stored data analyses can be displayed as a histogram.

Example of display screen

• Overall display of error measurements
Up to 22 measurement items can be monitored simultaneously. If a power failure occurs during measurements then measurements will be continued from the time at which the power is resupplied. The failure time (PWL) will be displayed when power is resupplied.

• Histogram screen
The number of errors and the rates of which errors occurred can be displayed relative to the time of measurement. The parameters which are to be displayed on the horizontal and vertical axes can be selected by the user.



 For product ordering information, see pages 4 – 10

Combinations of interface and extension units

The MD6420A can be combined with many plug-in units to perform a variety of measurement.

		Extension units							
		MD0627A Analog	MD0630A Distortion Measurement	MD0630B CODEC	MD0632A 64 kb/s Jitter	MD0632B 1.544 Mb/s Jitter	MD0632C 2.048 Mb/s Jitter	MD0633A Error Analyzer	MD0610D/D1 Word Memory
Interface units	MD0621A V.24/V.28 (RS232C)	√	√					√	√
	MD0621B V.35	√	√					√	√
	MD0621C V.36 (RS-449)	√	√					√	√
	MD0621D X.20 (RS-423)/X.21 (RS-422)	√	√					√	√
	MD0622B G.703/G.704 1.544 Mb/s Bipolar	√*		√		√		√	√
	MD0622D G.703/G.704 6.312 Mb/s Bipolar	√*						√	√
	MD0622E G.703 64 kb/s	√*		√	√			√	√
	MD0623A/A1 G.703/G.704 2.048 Mb/s Bipolar	√*		√			√	√	√
	MD0623B G.703/G.741 8.448 Mb/s Bipolar	√*						√	√
	MD0625B I.431 1.544 Mb/s	√*		√		√		√	√
	MD0625C/C1 I.431 2.048 Mb/s	√*		√			√	√	√
	MD0626A TTL	√*	√					√	√
	MD0628B DS1	√*		√		√		√	√
	MD0628C DS1C	√*						√	√

*: Except DC voltage measurement

Interface units

• V/X series

MD0621A	V.24/V.28 (RS-232C)
MD0621B	V.35
MD0621C	V.36 (RS-449)
MD0621D	X.20 (RS-423)/X.21 (RS-422)

• G.703

MD0622B	G.703/G.704 1.544 Mb/s Bipolar
MD0622D	G.703/G.704 6.312 Mb/s Bipolar
MD0622E	G.703 64 kb/s
MD0623A/A1	G.703/G.704 2.048 Mb/s Bipolar
MD0623B	G.703/G.741 8.448 Mb/s Bipolar

• I.431

MD0625B	I.431 1.544Mb/s
MD0625C/C1	I.431 2.048Mb/s

• TTL

MD0626A	TTL

• For North America

MD0628B	DS1
MD0628C	DS1C

Extension units

• Analog

MD0627A	Analog

• Measurement extension

MD0630A	Distortion Measurement
MD0630B	CODEC
MD0610D/D1	Word Memory
MD0632A	64 kb/s Jitter
MD0632B	1.544 Mb/s Jitter
MD0632C	2.048 Mb/s Jitter

• Error analysis

MD0633A	Error Analyzer

Remote control units

MD0620A	GPIB
MD0620B	RS-232C

Specifications

Sending clock signal	Internal clock signal (ST1, ASYNC, ST/SP)*1	Clock: 50 to 20 kb/s in 5 b/s steps, 20 k to 400kb/s in 100 b/s steps 512 k, 576 k, 672 k, 768 k, 1024 k, 1152 k, 1344 k, 1536 k, 1920 k, 2048 k, 4096 k, 8192 kb/s Accuracy Self oscillation: ±5 ppm Slave oscillation: Subject to 8 kb/s or 8 kb/s of (64 k + 8 k) external input or receiving data Slave oscillation range: ≥ ±100 ppm
	External input	Operated by the external input clock signal (TTL level or sine waves)
	External clock signal (ST2, RT)	Clock (inversion can be used.) by each 50 b/s to 10 Mb/s interface
Receiving clock signal	External clock signal (RT)	Clock (inversion can be used.) by each 50 b/s to 10 Mb/s interface
	Internal clock signal (ASYNC, ST/SP)	50, 70, 100, 150, 200, 256, 300, 400, 500, 512, 600, 768, 800, 1 k, 1.2 k, 1.6 k, 1.8 k, 2 k, 2.4 k, 2.56 k, 3 k, 3.6 k, 4.8 k, 7.2 k, 9.6 k, 14.4 k, 19.2 kb/s
Pattern	Code	A, Z, 1:1, 3:1, 1:3, 7:1, 1:7
	Programmable pattern	8 bit repetition (5 to 8 bits for ST/SP, 5 bits for 2.0 M G.704 spare bit)
	Pseudorandom pattern	$2^n - 1$ bits repetition (n: 6, 7, 9, 11, 15, 19, 20, 23), positive/negative logic
	Word pattern	8 bits x 8 k words (manual input, setting, user's pattern)
	FOX pattern	Conforms to ITU-T (EBCDIC, ASCII, EBCD, BAUDOT)
Error insertion	Manual error	Single-bit error whenever the key is pressed or single-bit error every second
	Cyclic error	2.5×10^{-1} to 1.7×10^{-7}($N \times 10^{-n}$, N: 1.0, 1.1, 1.3, 1.5, 1.7, 2.0, 2.5, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0)
Start-stop synchro-nization	Start-stop bit length	Start bit: 1 bit, Stop bit: 1, 1.5, and 2 bits
	Data length	5, 6, 7 and 8 bits
	Parity	None, odd, even
Error measure-ment	Detection error	Bit error, code error, parity error, CRC error and frame mismatch are selected.
	Measurement items	Error count, error rate, block error count, block error rate, ES, %ES, DM, %DM, SES, %SES, US, %US, EFS, %EFS, AT, %AT, BBER clock slip, sync count/time, frame sync loss time, signal loss, AC power failure time
	Block length	2^5 to 2^{16} bits or 10^1 to 10^{16} bits
	Measurement time	10^2 to 10^9 bits measurement and repetition of 1 s to 999 hr 59 min. 59 s
	Display of measurement results	Among the measurement results, five or all optional items can be displayed simultaneously. The buzzer sounds if an error is detected (the volume can be adjusted). The lapse time after the measurement starts is displayed in units of seconds.
Pattern trace	No. of trace bytes	32 KB max.
	Traces stop trigger	Manual code detection, not code detection, signal lines ON/OFF, No. of trace bytes, external input signal ON/OFF
	Delay trace after trigger detection	10 to 8000 bytes
	Trace data display	Displays together with trace stop time in HEX, JIS8, ASCII, EBCDIC, EBCDIK, EBCD, Baudot bit (shift: +4 to –3 bits)
Voltage measurement		Measuring range: –30 to +30 V Accuracy: ±5% ±1 digit
Frequency measurement and count		Measuring range: DC to 10 MHz Accuracy:±5 ppm ±1 digit Display: Decimal 7 digits
Time measurement*3		Measuring range: 0 to 10 sec.(10 µs steps) except for ASYNC and ST/SP Accuracy: ±5 ppm ±1 digit Display: Decimal 7 digits
Signal monitor lamp		Displays the status of each signal line ("1"/"ON" : green or red*2, "0"/"OFF": lamp off)
External output		Error: Negative logic, TTL level (half clock with of receiving clock) Pattern sync loss: Negative logic, TTL level Clock: Receiving gate clock, TTL level Receiving clock: TTL level (64 k + 8 k) b/s clock: 64 kb/s clock with 8 kb/s violation, AMI, RZ, 1.0 V±10%, Impedance: 120 Ω Video output: Composite video signal (vertical: 16.666 ms ±100 ppm, horizontal: 63.61 µs±100 ppm, 1 Vp-p±10%
External input		Clock: 50 b/s to 10 Mb/s, TTL (64 k +8 k) b/s clock: 64 kb/s clock with 8 kb/s violation, AMI/RZ, Input level: 0.6 to 1.1 Vp-p, Impedance: 110 Ω Trigger: TTL level
Print output	Printing in error measurement	At measurement start: Prints measurement conditions and time During measurement Print time, error count and alarm generation/recovery information at specified intervals Prints time and measurement result after start of measurement Prints time and error count at termination of each measurement cycle At measurement end: Prints time and measurement result
	Other printing	Prints measurement conditions, measurement results, and time in manual measurement
Internal timer		Year, month, day, hour, minute, second
Power		85 to 132 Vac/170 to 250 Vac (changeable), 47 to 64 Hz, ≤180 VA (with full units)
Operating temperature range		0° to 40°C
Connectable unit		5 units max.
Dimensions and mass		319 (W) x 177 (H) x 450 (D) mm, ≤10.5 kg

*1: Up to 20 kb/s for ASYNC and STSP
*2: Denotes red LED alarm
*3: Can not measure delay time for async system and start-stop system

For product ordering information, see pages 4 – 10

Ordering information

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

MD6420A (main frame)

Model/Order No.	Name	
	Main frame	
MD6420A	Data Transmission Analyzer	
	Standard accessories	
	Power cord, 2.6 m:	1 pc
F0013*	Fuse, 5 A:	2 pcs
F0012*	Fuse, 3.15 A:	2 pcs
B0301	Protection cover:	1 pc
Z0031A	Printer paper:	2 rolls
B0254C	Blank panel (for interface units):	5 pcs
B0254D	Blank panel (for remote control units):	1 pc
W0618AE	MD6420A operation manual:	1 copy
	Options	
MD6420A-01	Sending pattern synchronized signal output (video output cannot be used with this option.)	
MD6420A-02	Sending pattern for word memory, 32 KB	
	Optional accessories	
B0291B	Carrying case (with casters)	
B0251F	Shoulder bag (for MD6420A)	
B0302	Rack mount kit	
B0251E	Unit housing case (accommodates 10 units)	
A0006	Headset	
J0386	Probe for external input (BNC-P · IC clip), 2 m	
J0315	Balanced cord (I-214APS · – · M-1PS), 2 m	
J0612B	Balanced cord (M-3912 · – · M-3912), 2 m	
J0050B	Balanced cord [M-214S · – · M-214S (shielded)], 2 m	
J0127B	Coaxial cable (BNC-P · RG-58A/U · BNC-P)	
J0106	Coaxial cable (3CV-P2 · M-1P), 2 m	
Z0174	Service kit for MD6420A	
J0673A	Double-ended 25 pin cross cable, 3 m	

*: Supplied one kind of fuse depending on the power supply voltage specified when ordering.

Interface units

Model/Order No.	Name	
MD0621A	V.24/V.28 (RS-232C) Interface Unit	
	Standard accessory	
W0595AE	MD0621A operation manual:	1 copy
	Optional accessories	
J0387	Double-ended 25-pin connector cable, 2 m	
J0388	25-pin DCE-DTE conversion adapter (used for DTE mode)	
MD0621B	V.35 Interface Unit	
	Standard accessory	
W0596AE	MD0621B operation manual:	1 copy
	Optional accessories	
J0864B	Double-ended 34-pin connector cable, 2 m	
J0390	34-pin DCE-DTE conversion adapter (used for DTE mode)	
MD0621C	V.36 (RS-449) Interface Unit	
	Standard accessory	
W0597AE	MD0621C operation manual:	1 copy
	Optional accessory	
J0391	Double-ended 37-pin connector cable, 2 m	
J0392	37-pin DCE-DTE conversion adapter (used for DTE mode)	
MD0621D	X.20 (RS-423)/X.21 (RS-422) Interface Unit	
	Standard accessory	
W0598AE	MD0621D operation manual:	1 copy
	Optional accessory	
J0393	Double-ended 15-pin connector cable, 2 m	
MD0622B	G.703/G.704 1.544 Mb/s Bipolar Interface Unit	
	Standard accessory	
W0599AE	MD0622B operation manual:	1 copy
	Optional accessories	
J0393	Double-ended 15-pin connector cable, 2 m	
J0440	Balanced cord (CS1-MM2), 2 m	
J0990	Measurement cable (D-SUB15/SBMD06FBS), 2 m	
J0991	Measurement cable (D-SUB15/CLIP), 2 m	

Model/Order No.	Name	
MD0622D	G.703/G.704 6.312 Mb/s Bipolar Interface Unit	
	Standard accessory	
W0600AE	MD0622D operation manual:	1 copy
	Optional accessories	
J0393	Double-ended 15-pin connector cable, 2 m	
J0127B	Coaxial cord (BNC-P · RG58A/U · BNC-P), 1 m	
MD0622E	G.703 64 kb/s Interface Unit	
	Standard accessory	
W0601AE	MD0622E operation manual:	1 copy
	Optional accessories	
J0162A	Balanced cord (M-3912 · – · M-3912), 1 m	
J0162B	Balanced cord (M-3912 · – · M-3912), 2 m	
J0162C	Balanced cord (M-3912 · – · M-3912), 2.5 m	
J0162D	Balanced cord (M-3912 · – · M-3912), 5 m	
J0537	Balanced cord (M-3912 · – · M-1PS), 2 m	
J0164	Balanced cord (M-3912 · – · M-214-SP), 2 m	
J0440	Balanced cord (CS1-MM2), 2 m	
MD0623A	G.703/G.704 2.048 Mb/s Bipolar Interface Unit (120 Ω balanced)	
MD0623A1	G.703/G.704 2.048 Mb/s Bipolar Interface Unit (75 Ω balanced)	
	Standard accessory	
W0602AE	MD0623A/A1 operation manual:	1 copy
	Optional accessories	
J0393	Double-ended 15-pin connector cable, 2 m	
J0440	Balanced cord (CS1-MM2), 2 m	
J0442	120 Ω/75 Ω adapter (balanced/unbalanced converter)	
J0127B	Coaxial cable (BNC-P · RG-58A/U · BNC-P), 2 m	
MD0623B	G.703/G.741 8.448 Mb/s Bipolar Interface Unit	
	Standard accessory	
W0603AE	MD0623B operation manual:	1 copy
	Optional accessory	
J0127B	Coaxial cord (BNC-P · RG-58A/U · BNC-P), 2 m	
MD0625B	I.431 1.544 Mb/s Interface Unit	
	Standard accessory	
W0606AE	MD0625B operation manual:	1 copy
	Optional accessories	
J0393	Double-ended 15-pin connector cable (GMP-AS12-001), 2 m	
J0440	Balanced cord, CS1-MM2, 2 m	
J0539	Cable with 15-pin and modular connectors, (ISO4903 · 15P-IS8877 · 8P), 3 m	
J0540	Cable with 15-pin connector and screw terminals, [ISO4903 · 15P-4 screw terminals (3 mm)], 3 m	
J0594	Cable with 8-pin modular connector, and alligator clip, ISO8877-8P alligator, 2 m	
MD0625C	I.431 2.048 Mb/s Interface Unit (120 Ω balanced)	
MD0625C1	I.431 2.048 Mb/s Interface Unit (75 Ω balanced)	
	Standard accessory	
W0607AE	MD0625C/C1/C2 operation manual:	1 copy
	Optional accessories	
J0393	Double-ended 15-pin connector cable (GMP-AS12-001), 2 m	
J0440	Balanced cord (CS1-MM2), 2 m	
J0442	120 Ω/75 Ω adapter (balanced/unbalanced converter)	
J0539	Cable with 15-pin and modular connectors, (ISO4903 · 15P-IS8877 · 8P), 3 m	
J0127B	Coaxial cable (BNC-P · RG58A/U · BNC-P), 2 m	
J0540	Cable with 15-pin connector and screw terminals, [ISO4903 · 15P-4 screw terminals (3 mm)], 3 m	
MD0626A	TTL Interface Unit	
	Standard accessory	
W0608AE	MD0626A operation manual:	1 copy
	Optional accessory	
J0127B	Coaxial cable (BNC-P · RG-58A/U · BNC-P), 2 m	
J0386	Probe for external input (BNC-P · IC clip)	

Continued on next page

Model/Order No.	Name
MD0628B	DS1 Interface Unit
	Standard accessory
W0610AE	MD0628B operation manual: 1 copy
	Optional accessory
J0167B	Balanced cord (WECO310 · – · WECO310), 2 m
MD0628C	DS1C Interface Unit
	Standard accessory
W0611AE	MD0628C operation manual: 1 copy
	Optional accessory
J0167B	Balanced cord (WECO310 · – · WECO310), 2 m

Extension units

Model/Order No.	Name
MD0627A	Analog Unit
	Standard accessory
W0609AE	MD0627A operation manual: 1 copy
	Optional accessory
J0135	Balanced cord (I-214APS · – · M-1PS), 2 m
MD0630A	Distortion Measurement Unit
	Standard accessory
W0614AE	MD0630A operation manual: 1 copy
MD0630B	CODEC Unit
	Standard accessory
W0614AE	MD0630B operation manual: 1 copy
	Optional accessories
J0127B	Coaxial cable (BNC-P · RG58A/U · BNC-P), 2 m
J0050B	Balanced cord [M-214S · – · M-214S (shielded)], 2 m
MA29A	75 Ω/600 Ω Conversion Transformer (for self-returning of voice output)
MD0632A	64 kb/s Jitter Unit
	Standard accessory
W0616AE	MD0632A/B/C operation manual: 1 copy
	Optional accessory
J0127B	Coaxial cable (BNC-P · RG58A/U · BNC-P), 2 m
MD0632B	1.544 Mb/s Jitter Unit
	Standard accessory
W0616AE	MD0632A/B/C operation manual: 1 copy
	Optional accessory
J0127B	Coaxial cable (BNC-P · RG58A/U · BNC-P), 2 m
MD0632C	2.048 Mb/s Jitter Unit
	Standard accessory
W0616AE	MD0632A/B/C operation manual: 1 copy
	Optional accessory
J0127B	Coaxial cable (BNC-P · RG58A/U · BNC-P), 2 m
MD0633A	Error Analyzer Unit (1 MB, RAM: 512 KB, memory card: 512 KB)
	Standard accessory
W0617AE	MD0633A operation manual: 1 copy
	Optional accessories
P0008	Plug-in memory card (256 KB)
P0009	Plug-in memory card (512 KB)
MD0610D	Word Memory Unit (8 KB)
MD0610D1	Word Memory Unit (32 KB)
	Standard accessory
W0143AE	MD0610D/D1 operation manual: 1 copy

Remote control units

Model/Order No.	Name
MD0620A	GPIB Remote Control Unit (The operation is described in the MD6420A operation manual.)
	Optional accessory
J0008	GPIB cable, 2 m
MD0620B	RS-232C Remote Control Unit (The operation is described in the MD6420A operation manual.)
	Optional accessories
J0387	Double-ended 25-pin connector cable, 2 m
J0673A	Double-ended 25-pin cross cable, 3 m

For product ordering information, see pages 4 – 10